



Presentation of the Chapter on “Oil & Gas industry”

From CAETS Energy report

“Towards Low-GHG Emissions from Energy Use in Selected Sectors”

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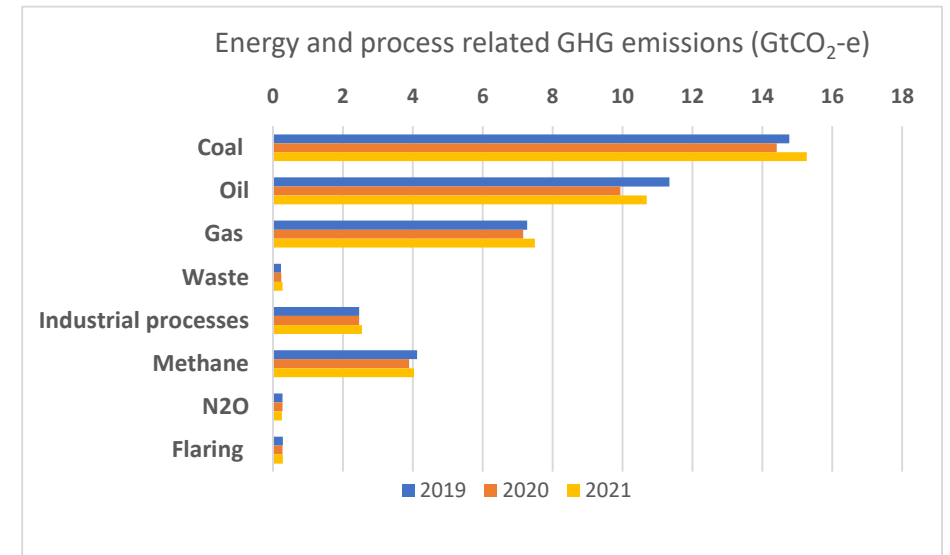


Introduction/Global GHG emissions

Global energy related GHG emissions have been the highest ever in 2021:

Main issues

- ✓ Oil and gas industry is the largest contributor to global GHG emissions
- ✓ Methane emissions are second largest contributor to global warming
- ✓ Oil combustion GHG emissions seem to be decreasing
- ✓ Gas combustion GHG emissions are continue increasing



Source: Data from IEA Energy and Carbon Tracker

Introduction/Oil and Gas industry

Main issues

- ✓ Oil & Gas industry currently provides more than 55 % of global primary Energy consumption (PEC), down from 64 % in 1970
- ✓ Global oil consumption has slowed down in the developed world, but it is still increasing in developing countries, resulting in a net increase of 0,6% annually from 2011 to 2021
- ✓ Natural Gas consumption increases faster than oil, at 2,2% annually from 2011 to 2021
- ✓ The aspiration of population in developing countries to achieve higher standards of living is the drive for growth of oil and gas consumption
- ✓ The IEA base case scenario shows a continued global increase in oil and gas through this decade, in spite of a much faster growth of low-carbon energy sources

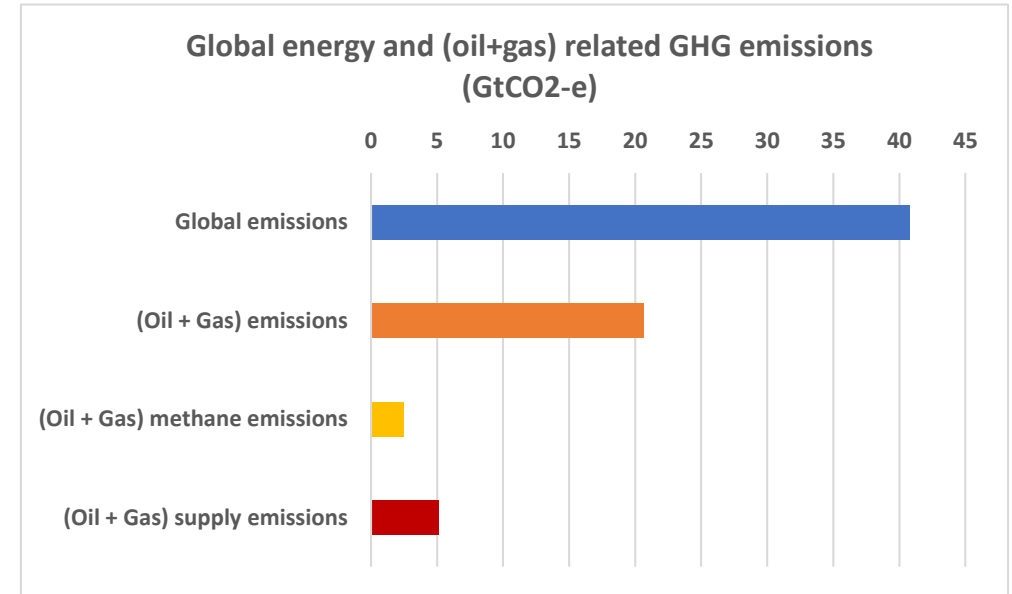
Introduction/Oil and Gas GHG emissions

Oil and Gas supply and end use GHG emissions:

- ✓ Energy and process related GHG amounted to 40,8 GtCO₂-e in 2021; 20,5 GtCO₂-e correspond to Oil & Gas

Oil and Gas supply emissions:

- ✓ GHG emissions from global supply of Oil and Gas (Well to Tank emissions) are about 24% of the overall emissions attributed to Oil and Gas
- ✓ Methane emissions represent near to 12% of the overall GHG emissions from Oil and Gas and about 50% of those due to supply operations



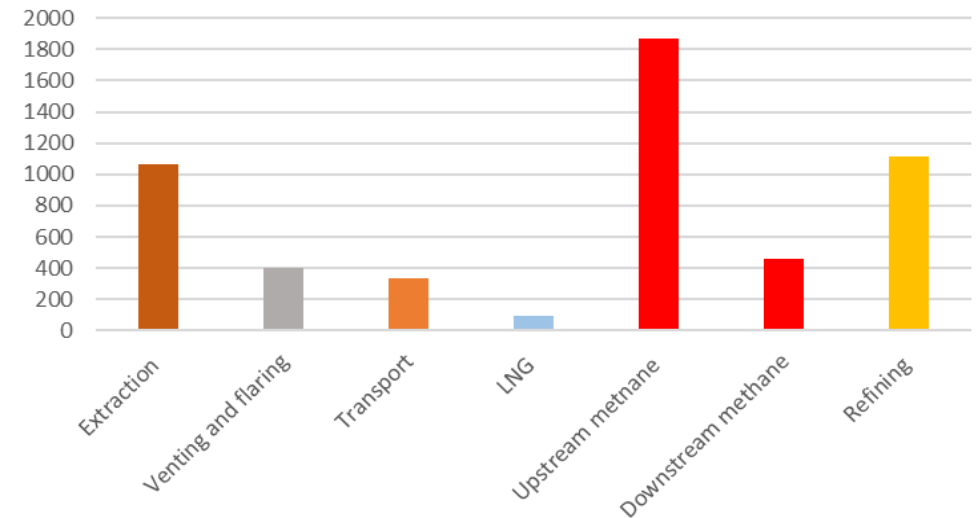
Source: Data from IEA, own elaboration

Technologies for decarbonisation/General

Main issues

- ✓ Improve energy efficiency by implementation of Energy Management Systems and Digitalization
- ✓ Replacing steam heating by electrical where possible using low carbon electricity
- ✓ Apply carbon capture, storage and use (CCUS)
- ✓ Gas reinjection for enhanced oil recovery (EOR)
- ✓ Improve refining catalytic process and heat integration inter-process units

Fig.4.- Oil and gas industry: WtT emissions (2019) (MtCO₂-e)



Source: Data from IEA, own elaboration

Case Studies

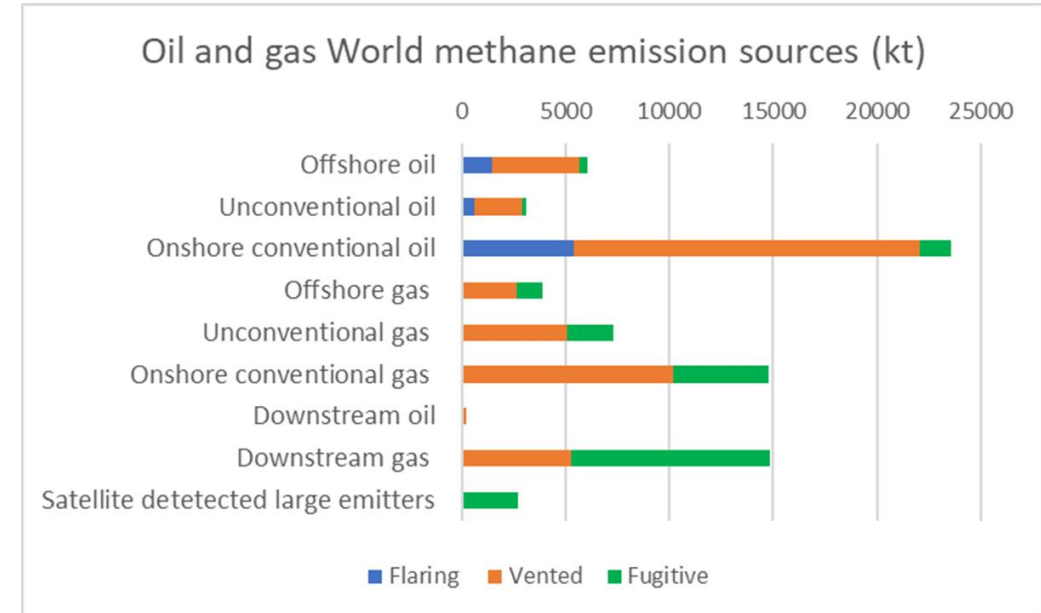
Experience and studies: CO₂ abatement:

- ✓ The move from “no-EMS” to implementing a “full-EMS” might achieve about 10% of energy savings
- ✓ Crude distillation offers the largest opportunity for reduction of energy consumption; it has been suggested that there is a 10 to 15% reduction by implementing existing BATs
- ✓ Energy integration of process units and petrochemical plants offers the possibility to benefit from better overall optimization
- ✓ Increase in refining conversion allows natural gas connected refineries replace liquid by natural gas with 20 to 25% reduction in CO₂ emissions
- ✓ Electricity from cogeneration facilities can replace network electricity and drive reduction of CO₂ emissions when the network carbon intensity is above 350 kgCO₂/MWh

Technologies for decarbonisation/Methane

Main issues

- ✓ Reduce continuous and unplanned venting by predictive maintenance, supervisory control, sensors, and advanced data analysis
- ✓ Reduce fugitive emissions by LDAR
- ✓ Replace pneumatic pumps and controllers and apply BATs for pumps, compressors and valve seals
- ✓ Install vapor recovery units (VRU)



Source: Data from IEA, own elaboration

Case Studies

Experience and studies: Methane abatement

- ✓ The abatement of methane emissions is not necessarily a cost as the recovered gas can be monetized
- ✓ Leak detection and repair (LDAR) pilot campaigns allowed the Chinese company CNPC to cut emissions by a 12.3% in 2019 in the Dagang oilfields
- ✓ Vent gas recovered is used to provide drilling power to rigs and auxiliary generators: in the Tarim oil field, 48 gas recovery stations have been set up, with a capacity of 4.2 million cubic meters per day
- ✓ Converting methane powered instrumentation to compressed air powered instrumentation; at the Barnett site Qnergy's technology enabled the elimination of up to 98% of the methane venting

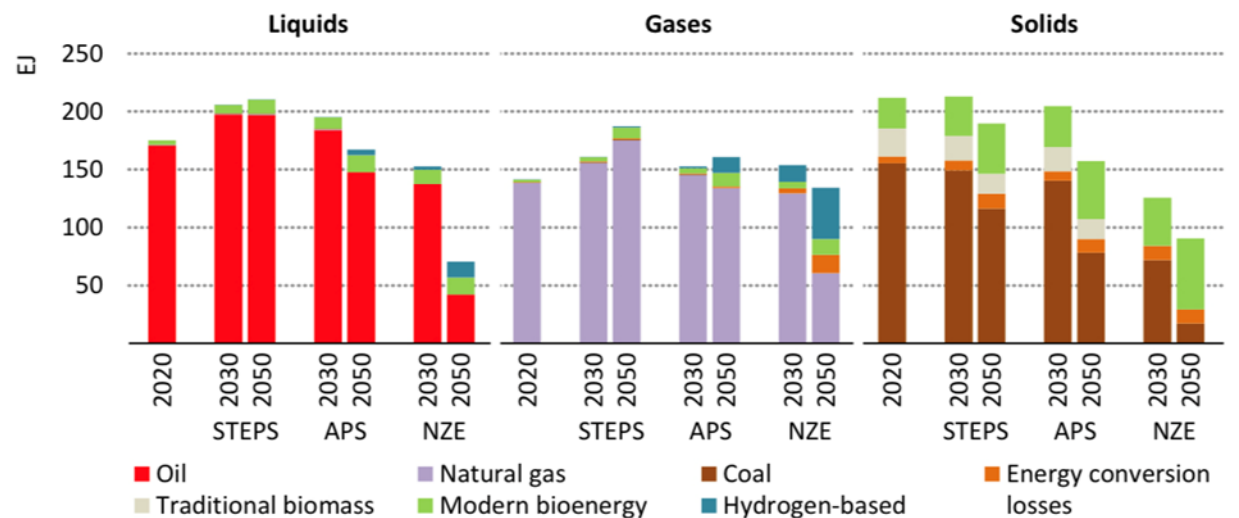
Sustainability, public policies and regulation

Main issues

- ✓ Country's climate Change policies and goals that support NDCs, following Paris Agreement, force Oil and Gas companies in the near term to reduce emissions and in the long term to decarbonize their operations
- ✓ Political measures like emission trading systems (ETS) aimed at reducing CO₂ emissions by limiting free allowances to emit, or setting a price for the CO₂ emitted are being passed
- ✓ More than 50 countries have already submitted Net-zero pledges
- ✓ The EU has made CO₂ emission reduction targets and Net-Zero emission to 2050 legally binding,
- ✓ The EU has prepared a set of proposals to revise and update EU legislation to ensuring a just, competitive and green transition to 2030 and beyond

Pathways to net-zero CO₂ emission/Different narratives

The IEA projections for global energy consumption use three scenarios:



Source: IEA

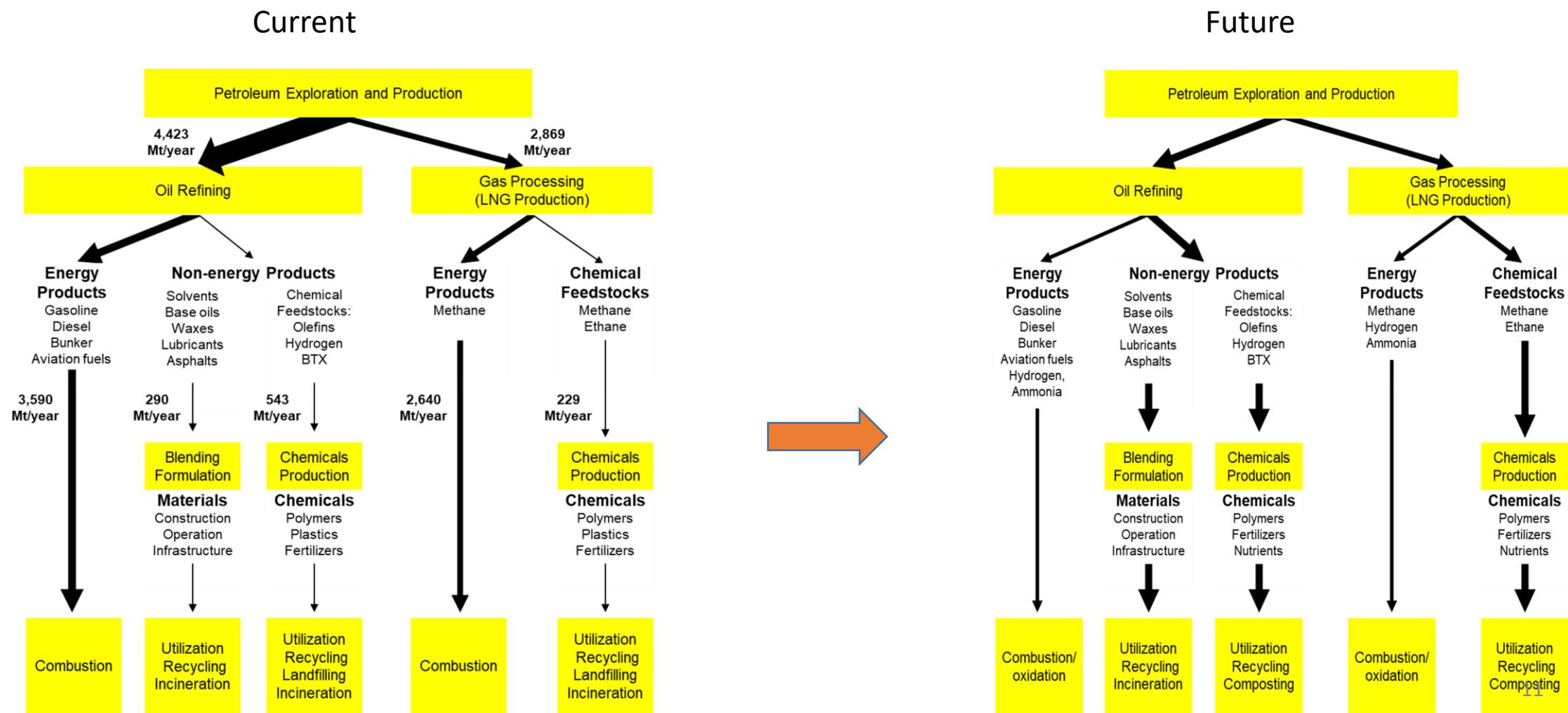
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STEPS: Stated Policies Scenario, projects global increase of fossil fuels in spite of increase of low carbon energy sources

APS: Announced Policies and NZE scenarios, show decrease of fossil fuels consumption, strong increase on energy efficiency and low carbon energy sources

Pathways to net-zero CO₂ emission/Different narratives

Forecasted evolution of the Oil and Gas industry to Net Zero Emissions:



Education and training

Main issues

- ✓ The energy transition will bring reduction in oil demand and oil production jobs and the increase of those in low carbon technologies and energy products
- ✓ Reskilling and redeploying the workforce should be a key focus of oil and gas companies and of governments
- ✓ There are synergies to be found in switching from oil and gas to offshore wind, carbon capture and storage (CCS) and hydrogen and e-fuels production and distribution
- ✓ Transition to low carbon technologies will require increase of workforce educated in technologies such as electrochemistry, carbon and compound materials, AI and other digital technologies, for example; education and training in them will be basic pillars supporting this transition

Key Messages and Recommendations

Key Messages

- ✓ The World relies heavily on fossil fuels today, with Oil and Natural gas being the largest providers, accounting for more than 55% of the world's total
- ✓ Cumulative Investments in the oil and gas industry amount to trillions of dollars, facilities have life spans of decades. This makes it economically and operationally challenging to affect major changes at a rapid pace and on a global scale.
- ✓ Increasing use of fossil fuels is responsible for the main share of growing global greenhouse gas (GHG) emissions. There are rising political, social and financial pressure on oil and gas companies to contribute to the ambitious goal of Net Zero GHG emissions by 2050.

Key Messages and Recommendations

Key Messages

- ✓ Methane flaring and fugitive methane emissions are major contributors to greenhouse gas emissions from Oil and Gas supply
- ✓ Energy transition and decarbonization will remain dominant issues throughout the world's environmental and economic concerns, changes in public perceptions and investors attitudes
- ✓ The Oil and Gas Industry will need to adapt to the demand for low greenhouse gas production operations on energy and non-energy products

Key Messages and Recommendations

The group recommends:

- ✓ Put strong emphasis on reducing flaring of methane and fugitive methane emissions in all stages of oil and gas supply
- ✓ Explore increased electrification of the oil and gas industry
- ✓ Put greater emphasis on using and improving LCAs (Life Cycle Assessment models).
- ✓ Continued evaluation and development of potential of CCUS opportunities for oil and gas operations
- ✓ Increase investments in R&D and Training



THANK YOU!

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