

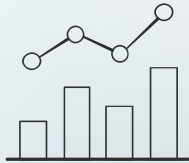


Statoil

Methane emissions in Norwegian gas production

The 4th session of the UNECE Group of Experts on Gas
27 MARCH 2017 | GENEVA

KEY FIGURES



EQUITY PRODUCTION

1.978 million

BARRELS OF OIL EQUIVALENT
PER DAY IN 2015



RESOURCES

20 billion

BARRELS OF OIL EQUIVALENT
IN RESOURCES



ADJUSTED EARNINGS*

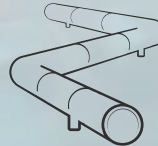
4.1 bn USD

*AS AT
Q4 2016



38%

OF OIL AND GAS EQUITY
PRODUCTION TOOK PLACE
OUTSIDE NORWAY IN 2015



2

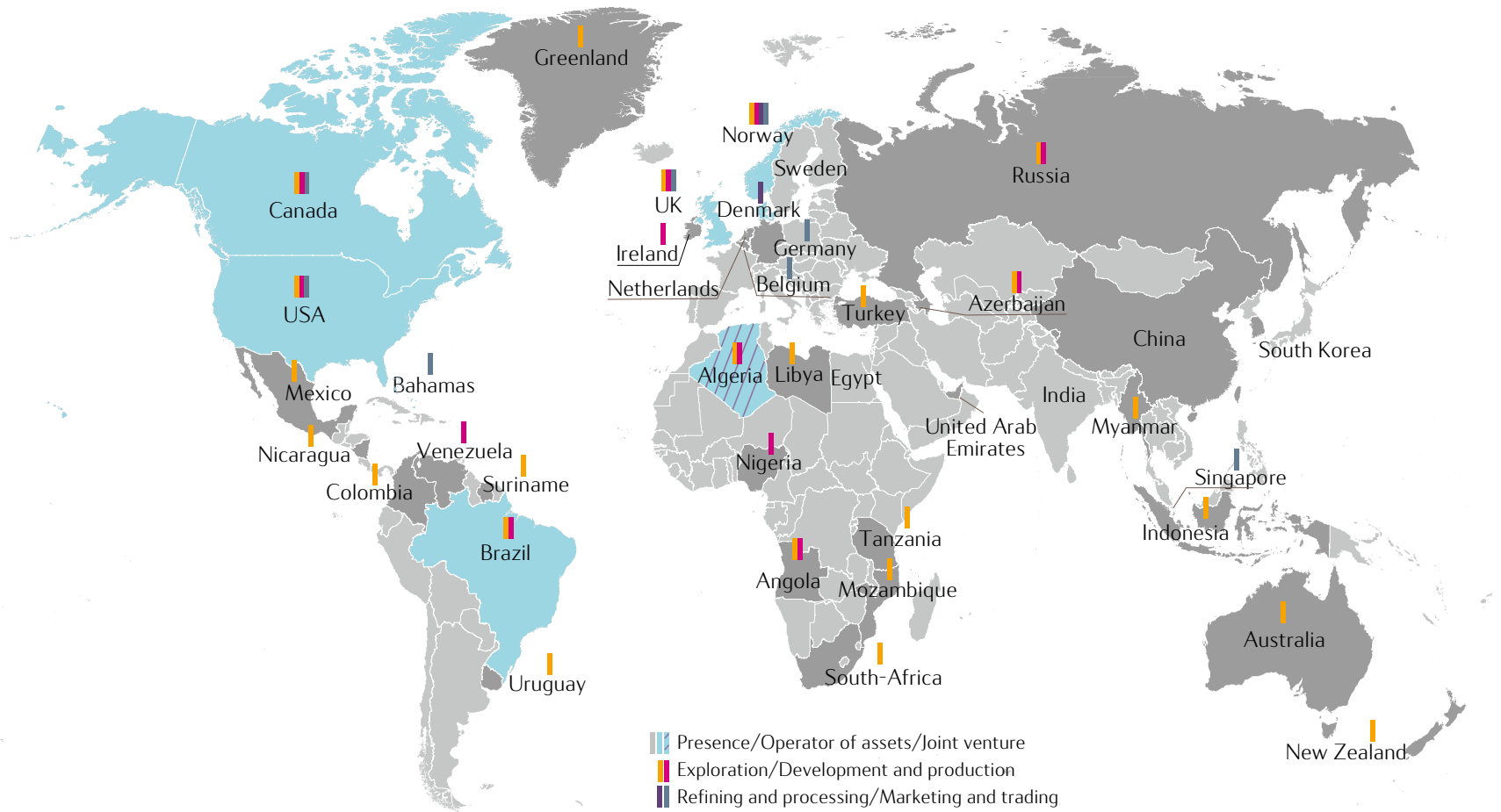
SECOND BIGGEST
GAS SUPPLIER TO
EUROPE



>600,000

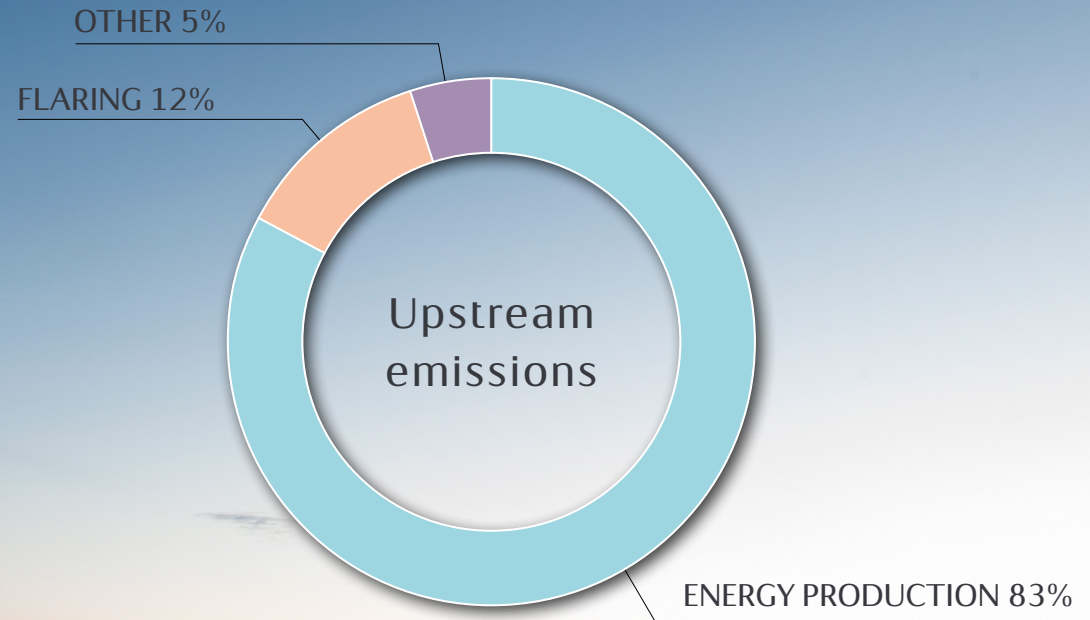
GROWING OFFSHORE WIND
BUSINESS SUPPLYING
>600,000 UK HOMES

WHERE WE ARE



REDUCING OWN CO₂ EMISSIONS IN A COST-EFFICIENT WAY

- Efficiency, digitalisation and sensing
- Design, electrification and concepts
- Hybridisation and storage
- Operational philosophy, monitoring and attention
- Portfolio





DELIVERING CLIMATE IMPROVEMENTS

on Norwegian continental shelf

800 000

tonnes CO₂
reduction/year

- Target established in 2008
- Reached in 2016

1 200 000

tonnes CO₂
reduction/year

- Increased target by 50% to 2020
- On track to deliver target already in 2018 - two years ahead of plan

2 000 000

tonnes CO₂
reduction/year

- New step up: another 2 million tonnes yearly CO₂ reductions by 2030
- Ambitious target - new ideas and solutions needed

200 ENERGY EFFICIENCY ACTIONS SINCE 2008



FLARE, PROCESS, GAS COMPRESSORS AND GAS TURBINES

Selected examples:

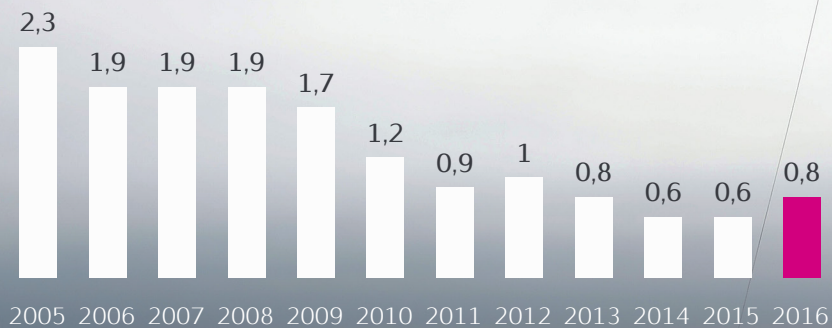
- Updating turbine control system on Oseberg Sør:
10 000 tonnes CO₂ reduction/year
- Modified two gas compressors on Åsgard A:
8 200 tonnes CO₂ reduction/year
- Changed freshwater production on Statfjord A:
4 800 tonnes CO₂ reduction/year

SAFETY, SECURITY & SUSTAINABILITY



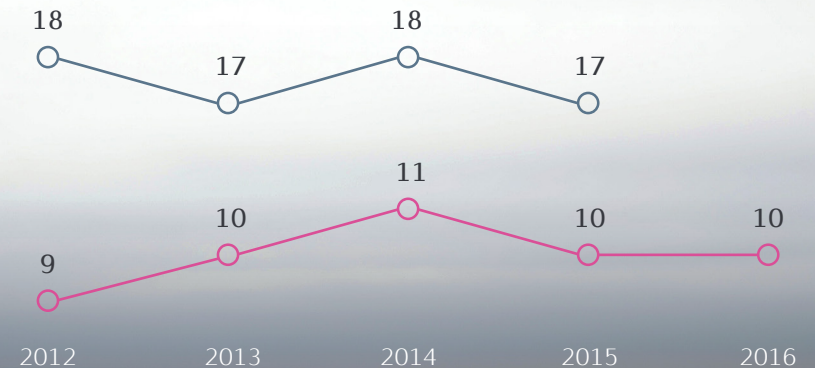
Serious incident frequency (SIF)

NUMBER OF SERIOUS INCIDENTS IN STATOIL PER MILLION HOURS WORKED



Carbon-efficient oil and gas producer

CO₂ INTENSITY (KG CO₂/BOE)*



Source: IOGP Environmental Performance Data 2015

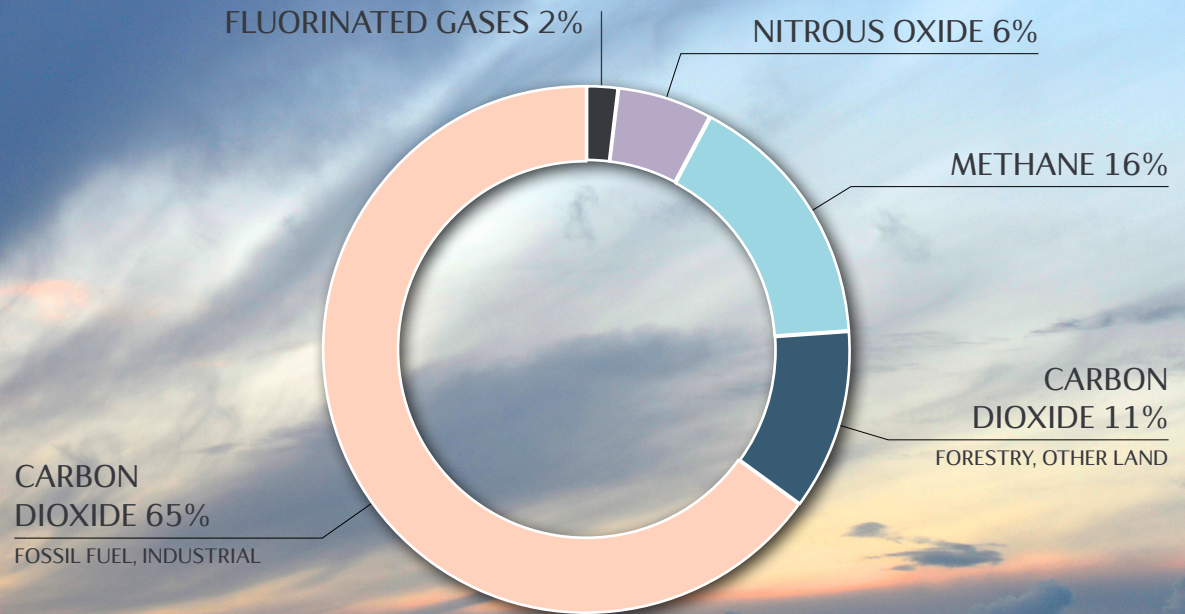
*Upstream (exploration and production) portfolio, based on operatorship

Industry average —○—
Statoil —○—

GLOBAL ANTHROPOGENIC GREENHOUSE GAS EMISSIONS

After carbon dioxide, methane is the second most important greenhouse gas contributing to human-induced climate change

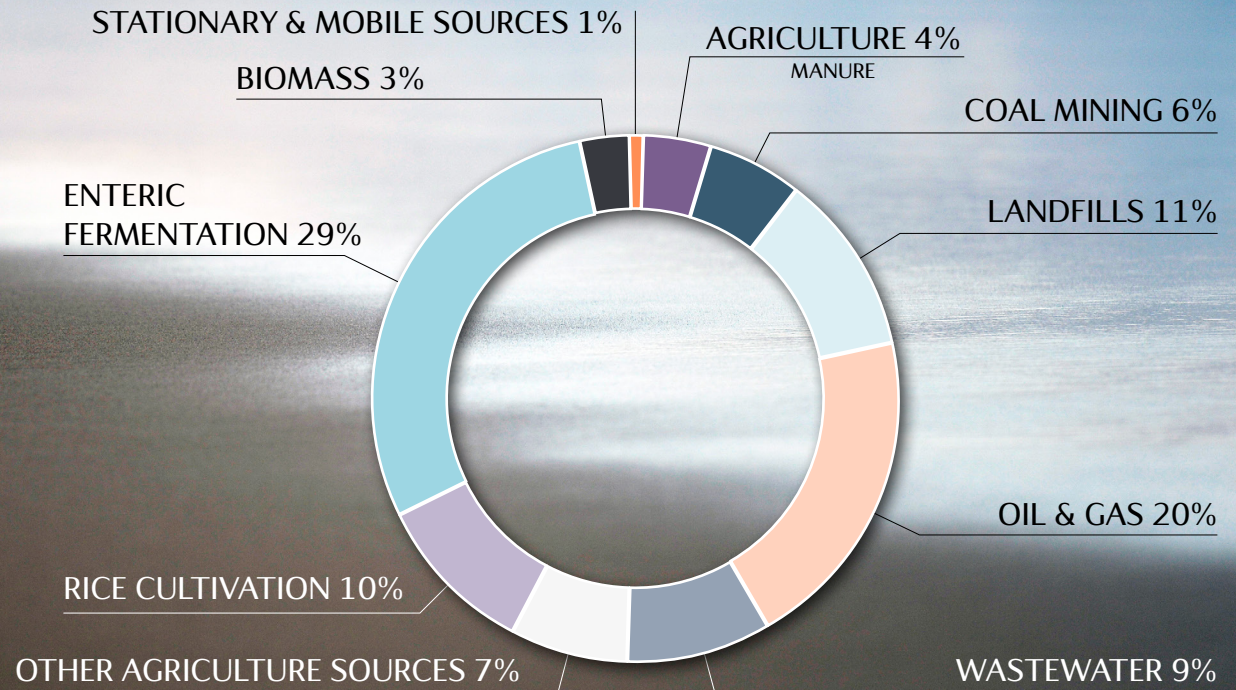
Source: IGU / U.S ENVIRONMENTAL PROTECTION AGENCY



GLOBAL ANTHROPOGENIC METHANE EMISSIONS

20% of antropogenic methane emissions from oil and gas production and distribution

Source : EPA



EMISSIONS IN STATOIL'S GAS VALUE CHAIN

for gas from Norway to Germany and UK



UPSTREAM

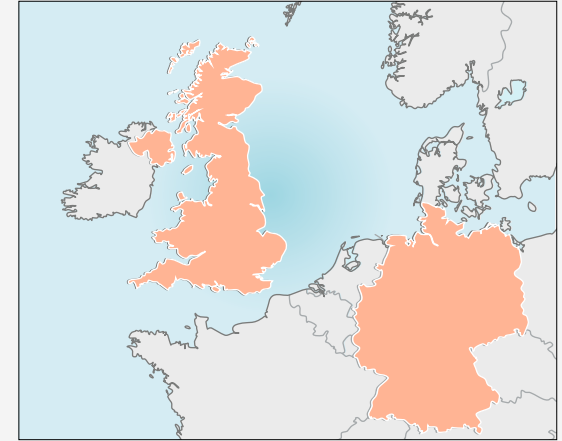
- Exploration/ production
- Pipeline transport to gas processing plants

- Data reported to Norwegian authorities



MIDSTREAM

- Onshore gas processing
- Pipeline transport to receiving terminals



DOWNSTREAM

- Receiving terminals in UK and Germany
- Local storage, transmission and distribution

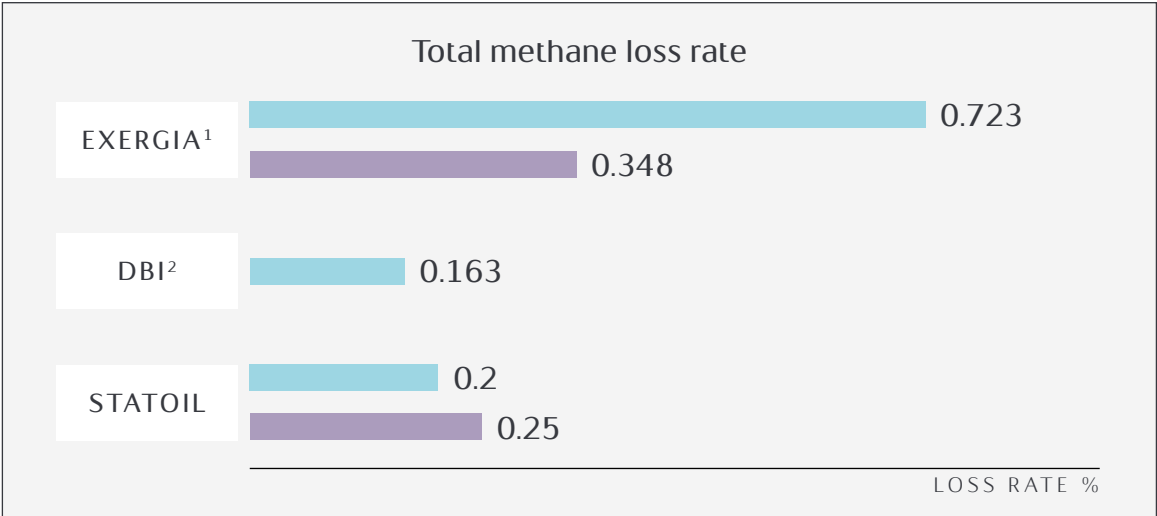
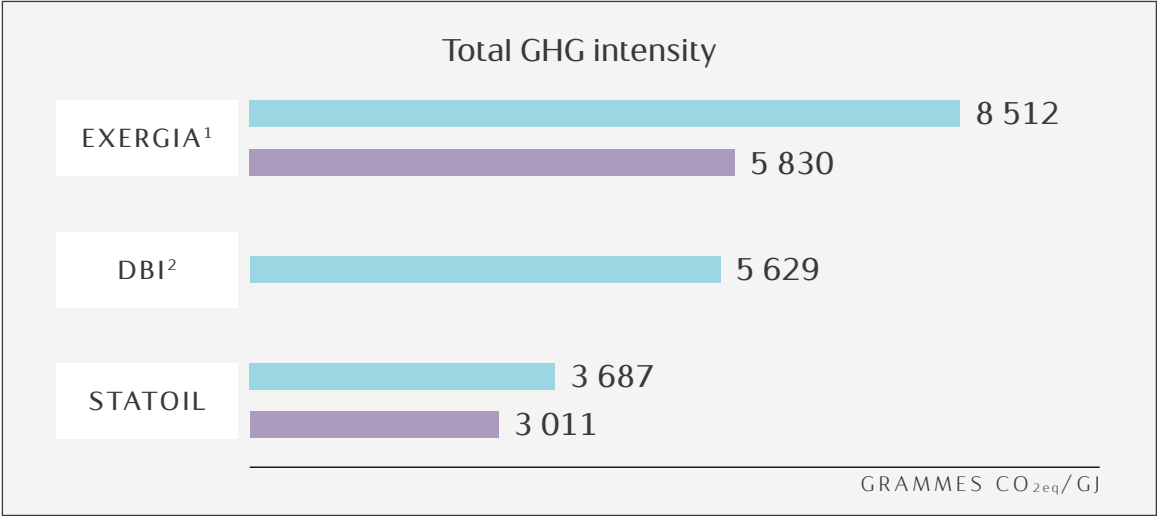
- Data from external studies (Exergias, Marcogaz, DBI)

Emissions in Statoil's gas value chain for gas from Norway to Germany and UK





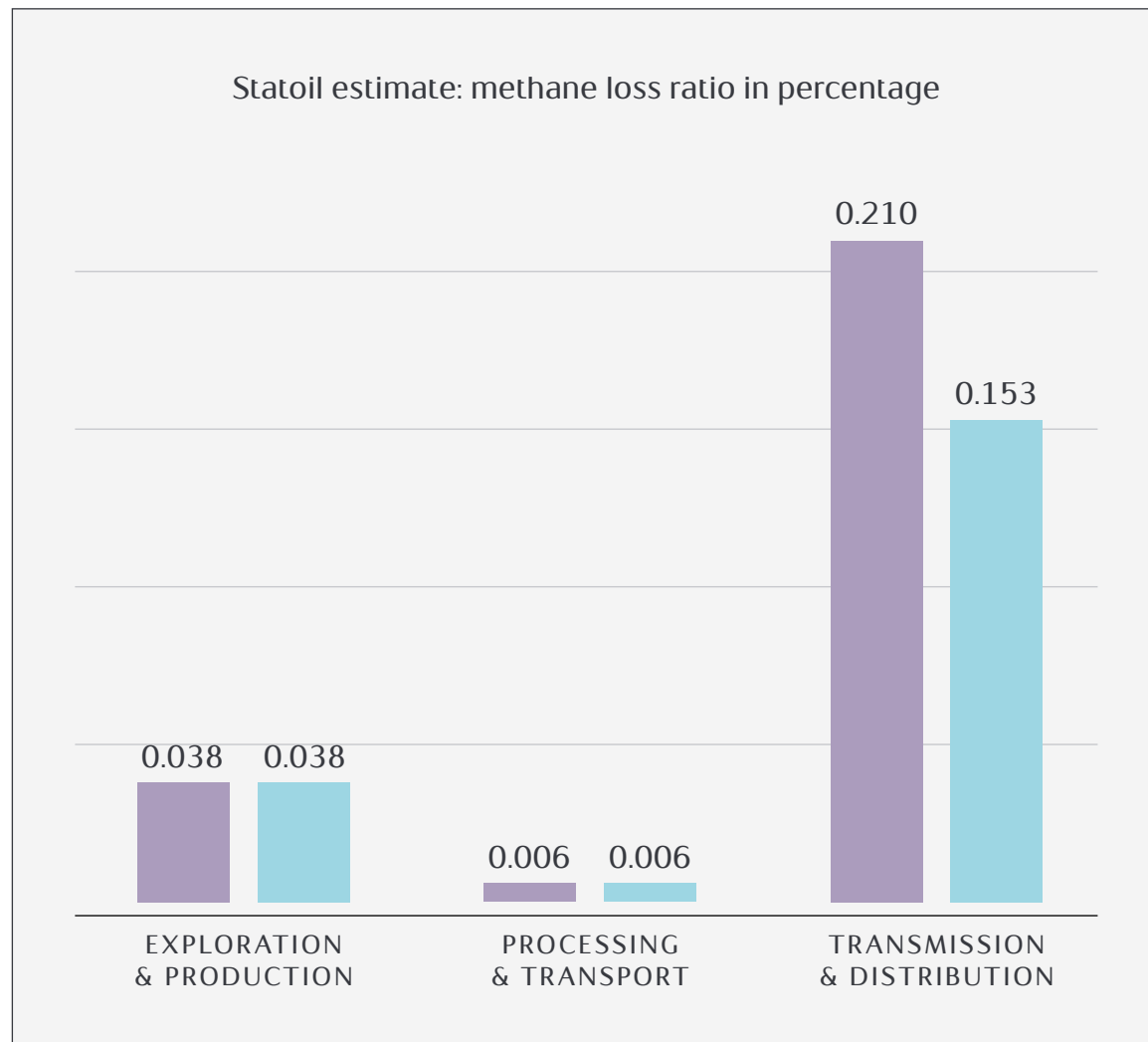
¹ EXERGIA: Study on actual GHG data for diesel, Petrol, Kerosene and natural gas. July 2015

² DBI: Critical Evaluation of Default Values for the GHG emissions of the Natural Gas Supply Chain. October 2016





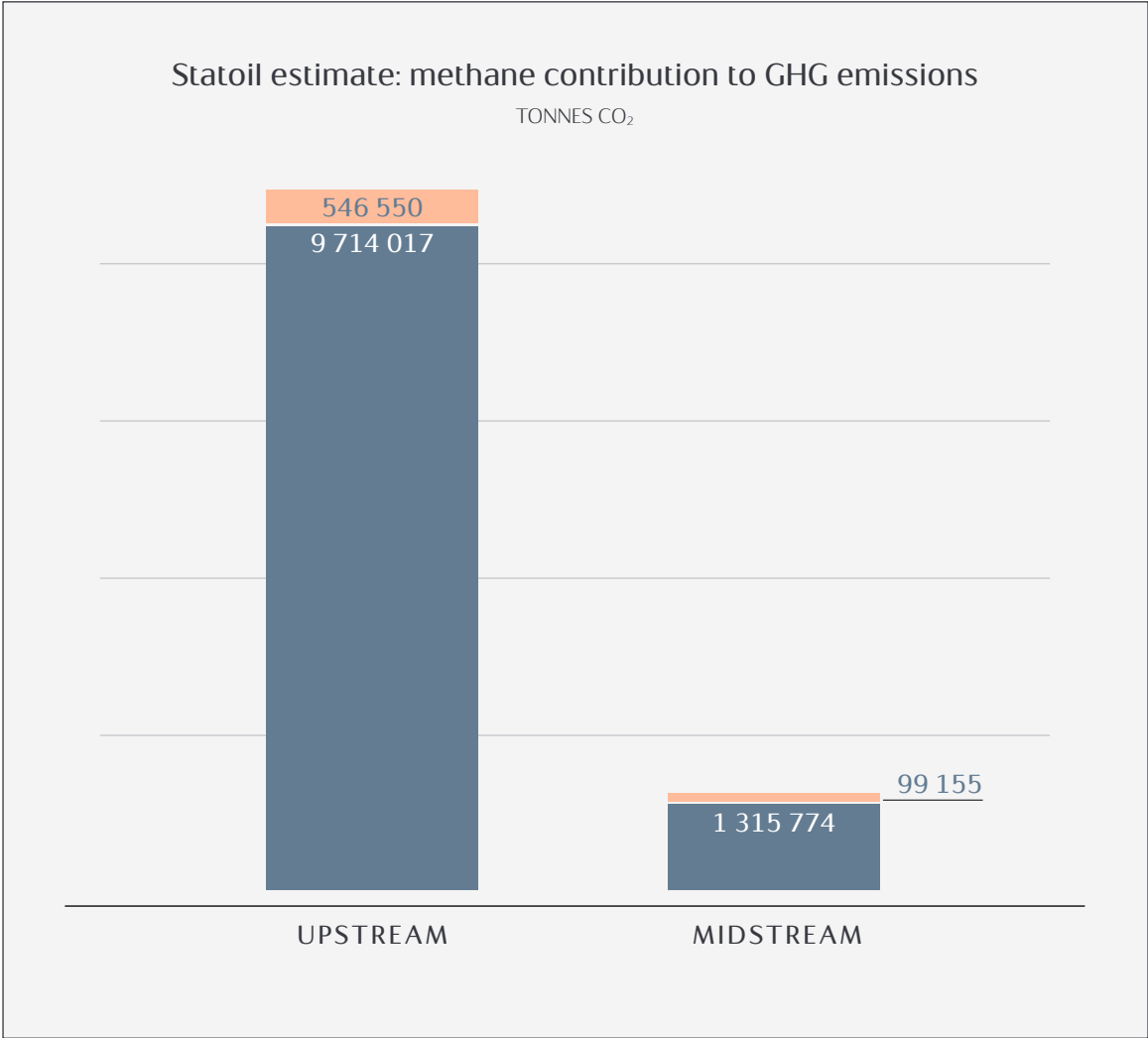
The downstream sector is accountable for about 80% of the total methane emissions in the gas value chain for Norwegian gas to UK and Germany

Methane UK 
Methane Germany 



Methane contributes to about 5% of the total GHG emissions in the up- and midstream sectors in Norwegian gas production

Total CO₂ 
CH₄ as CO₂ equivalent 



HOW DO WE ESTIMATE METHANE EMISSIONS?

From upstream oil and gas production in Norway

For each methane leakage source the preferred methane quantification method has been defined:

METHANE LEAKAGE SOURCES	METHANE QUANTIFICATION METHOD
PRODUCED WATER TREATMENT	Upstream pressure and produced water volume
GLYCOL REGENERATION	Calculation from a computer programme (GRI-GLYCalc)
COMPRESSOR SEALS	Vendor data and throughput
FLARE GAS NOT BURNT	Logging time with unignited flaring
LEAKAGES IN THE PROCESS	Large gas leaks: Duration, volume
	Small gas leaks: Detection by IR camera

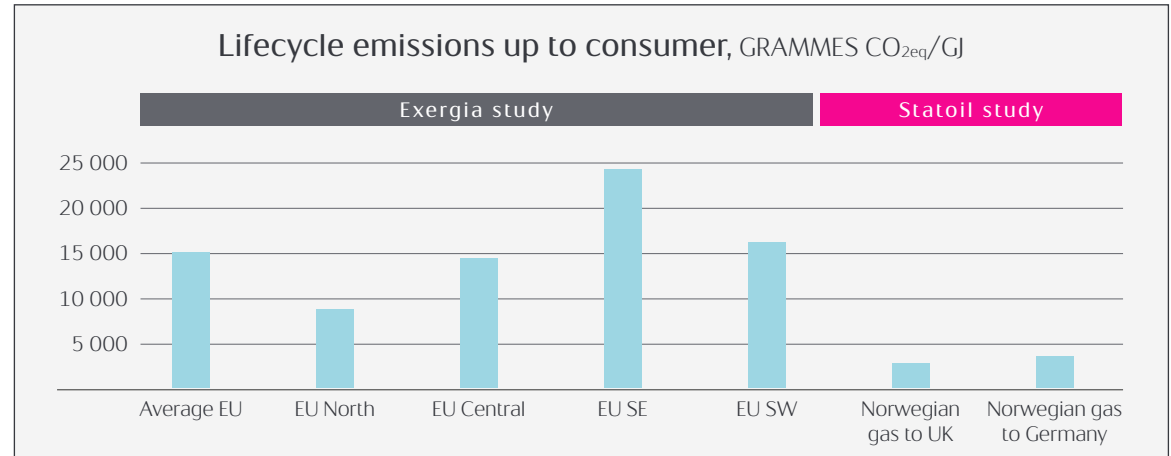


Methane detection with IR
camera



CONCLUSION

GHG intensities of Norwegian gas to UK and Germany are considerably lower than estimated in the Exergias study



Methane emission in Statoil's gas value chain for UK and Germany is well below the gas vs. coal natural gas threshold and levels in other gas markets

