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Methane Monitoring Technology Update

A turning point for climate action

December 1st, 2020

EUROPEAN BUREAU FOR CONSERVATION & DEVELOPMENT

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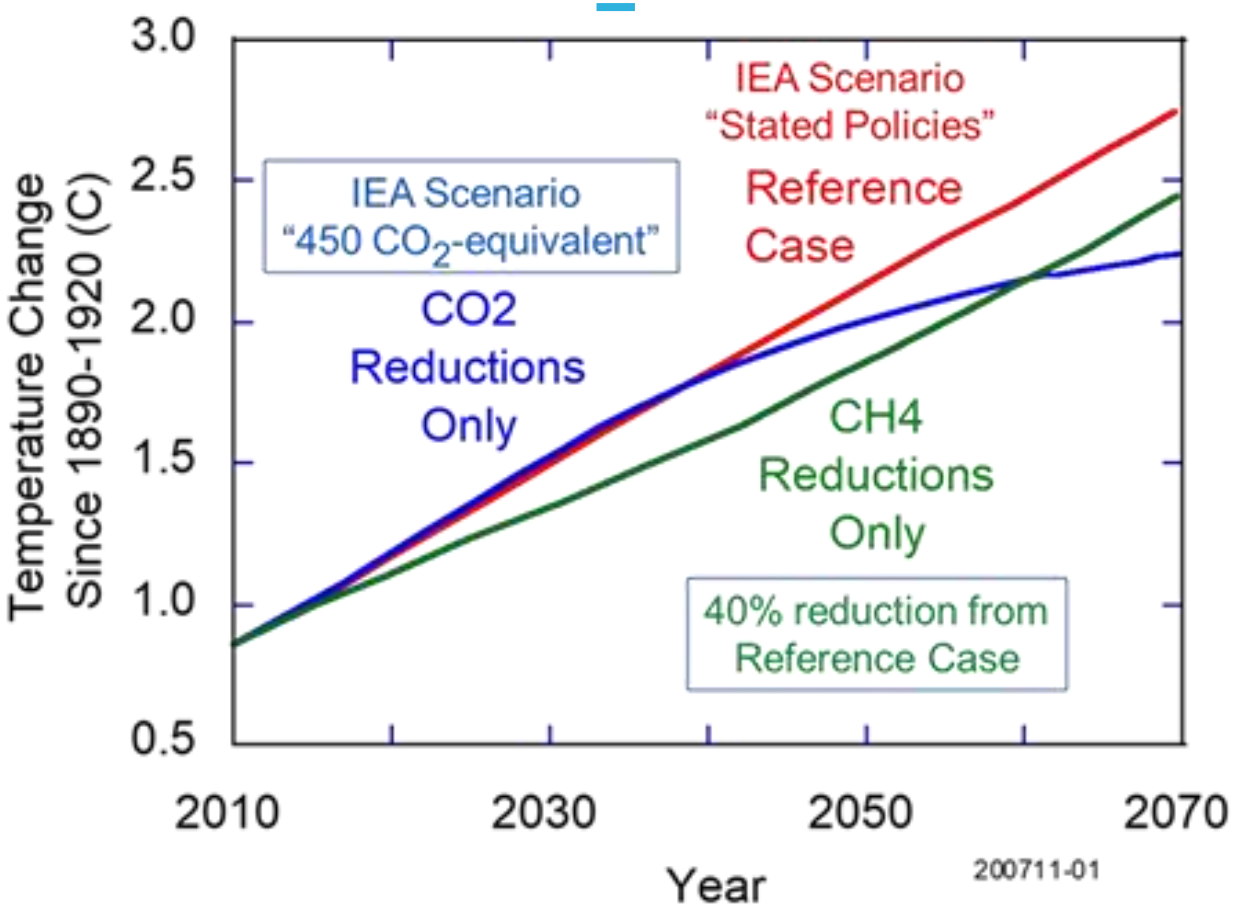
Methane Fugitive Emission detected by Kayrros

Global temperature change with time depending on emission reduction scenarios



Why should we

address methane emissions now?

The fastet way to slow down temperature rise is to reduce Methane emissions

NOW

Source: Shindell, Drew, et al. "Simultaneously mitigating near-term climate change and improving human health and food security." ***science*** 335.6065 (**2012**): 183-189.

Methane emissions are uncontrolled

and CH_4 concentration is increasing twice as fast as CO2

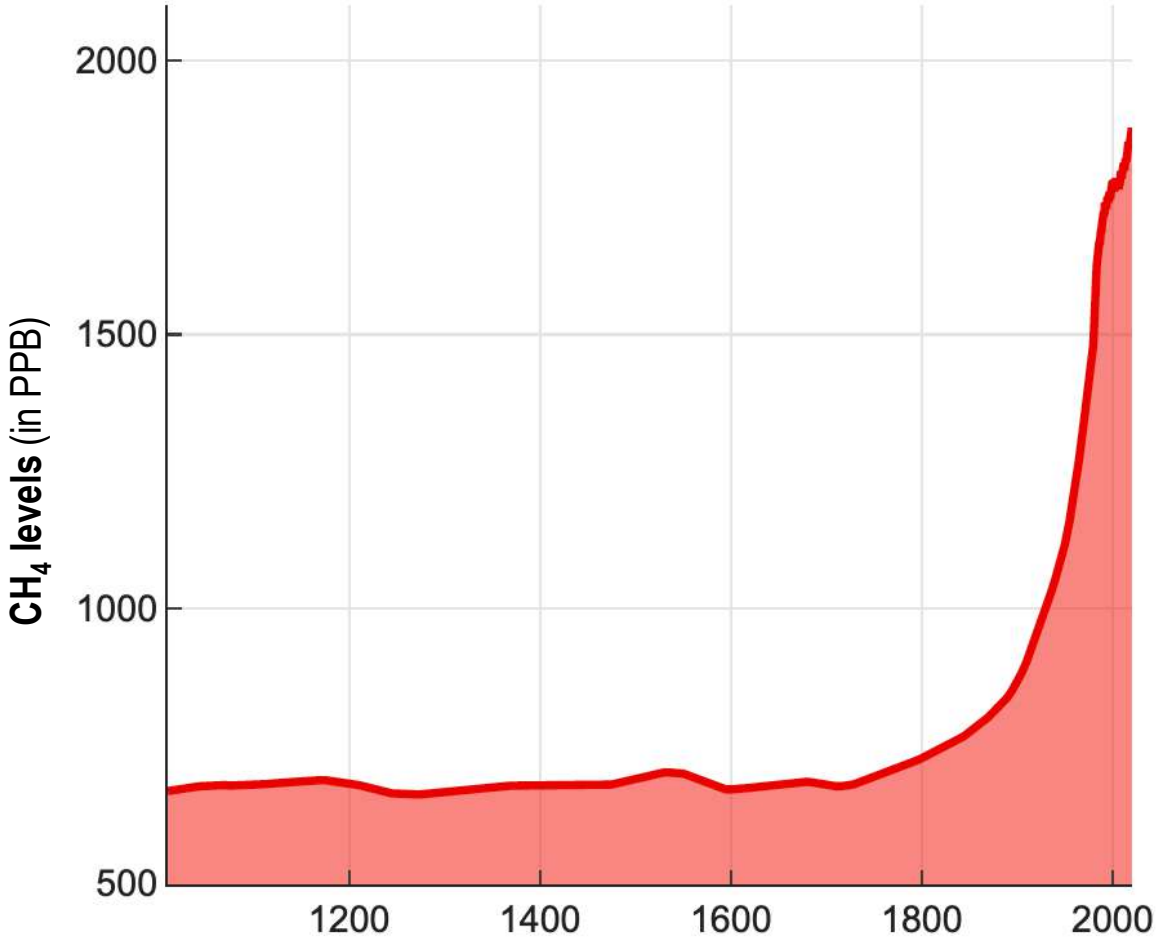
Increase since pre-industrial era:

+254%
in CH_4

+143%
in CO_2

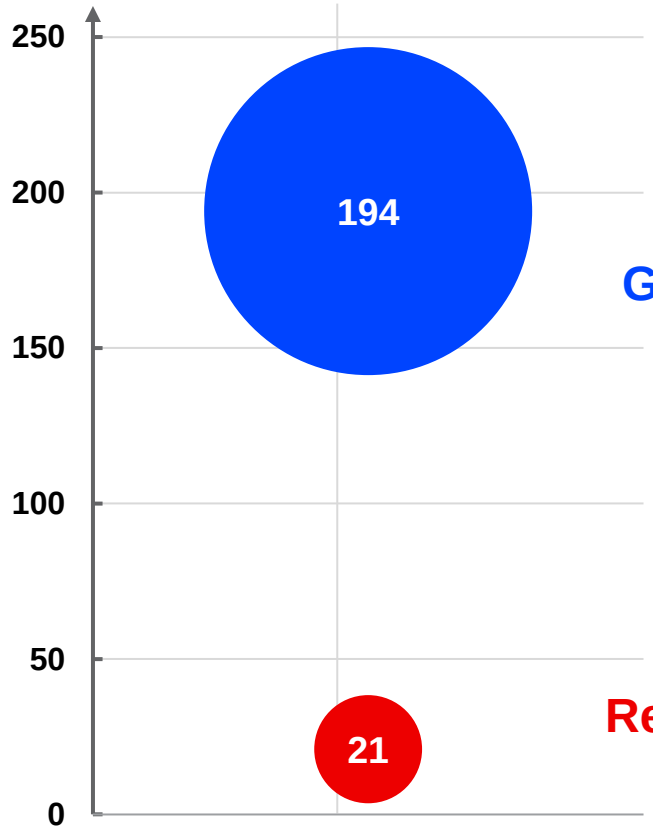
+121%
in N_2O

Global CH_4 levels



Source: 2 Degrees Institute

Kg of methane emitted per TJ of energy produced (equity basis)



International Energy Agency

Global Average*

Reported by O&G companies**

No global Methane Monitoring Technology

=

No methane reporting available

• • •

Until Now

*Based on global oil & gas production and IEA figures for upstream emissions
**ESG reports of a sample of 20 Oil & Gas producers (Majors, NOCs, independents)
Source: Kayrros analysis, IEA

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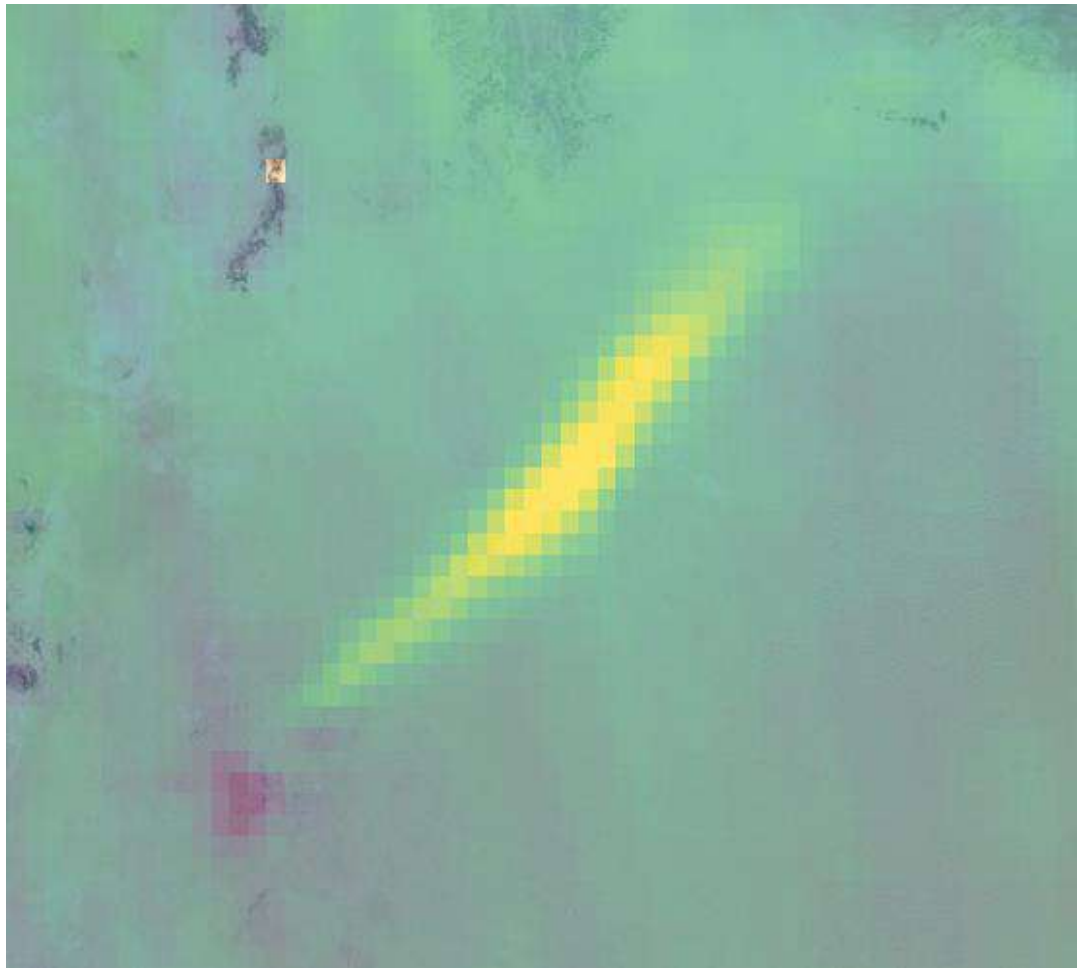
Methane concentration



Sources: Kayrros, Copernicus, Google Earth, NASA, ECMWF – ERA5
Notes : Yellow color indicates higher methane concentration,
Pixel size: 5 x 7 km
* Detection threshold is at ~5 tons of CH4 per hour

Copernicus Sentinel 5P
+ Kayrros A.I.

A breakthrough in methane detection*

Owner: European Commission
Operator: ESA
Coverage: Global
Revisit: Daily
Use for CH_4: Detect, quantify, and report

Methane plume overlaid on optical image

Sources: Kayrros, Copernicus, Google Earth, NASA, ECMWF – ERA5
Notes : Red color indicates higher methane concentration,
Pixel size: 20m x 20m
* Detection threshold is at ~5 tons of CH4 per hour

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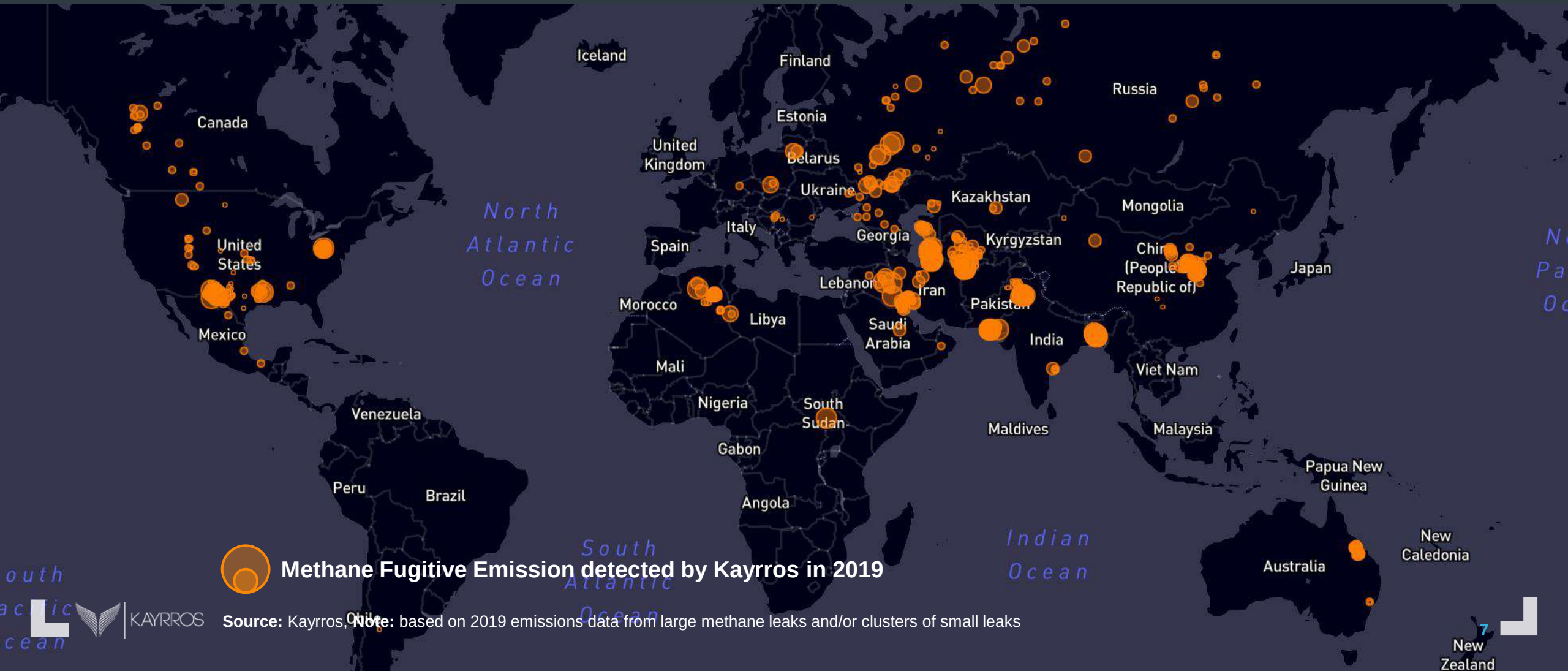
Copernicus Sentinel 2
+ Kayrros A.I.

A breakthrough in methane attribution*

Owner: European Commission
Operator: ESA
Coverage: Global
Revisit: ~3 days
Use for CH_4: Detect, quantify, attribute and report

We can NOW SEE AND ELIMINATE ~1Gt of CO_2e of visible methane per annum



Methane Fugitive Emission detected by Kayrros in 2019

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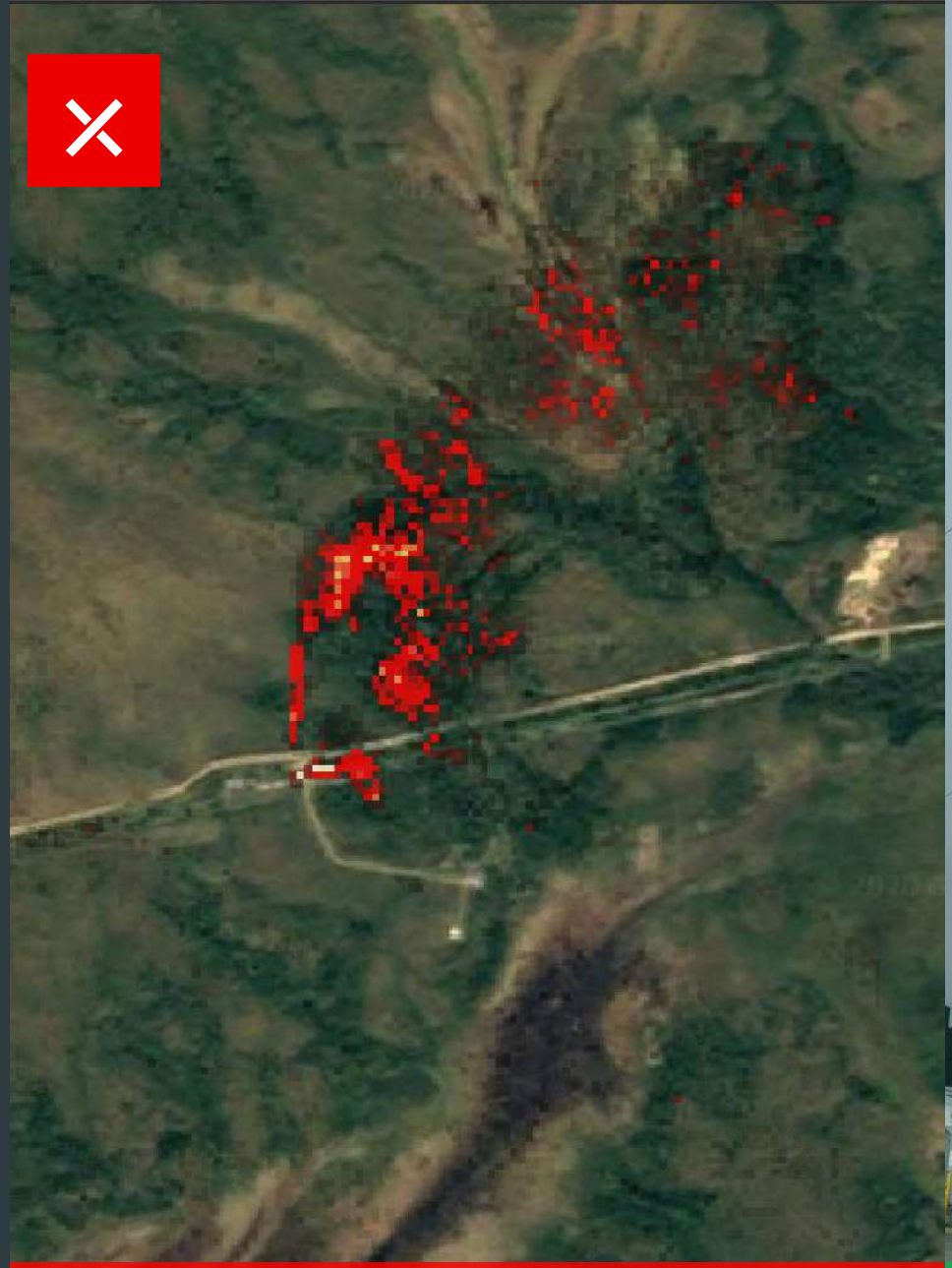
Source: Kayrros, **Note:** based on 2019 emissions data from large methane leaks and/or clusters of small leaks

Most of these emissions can be eliminated easily



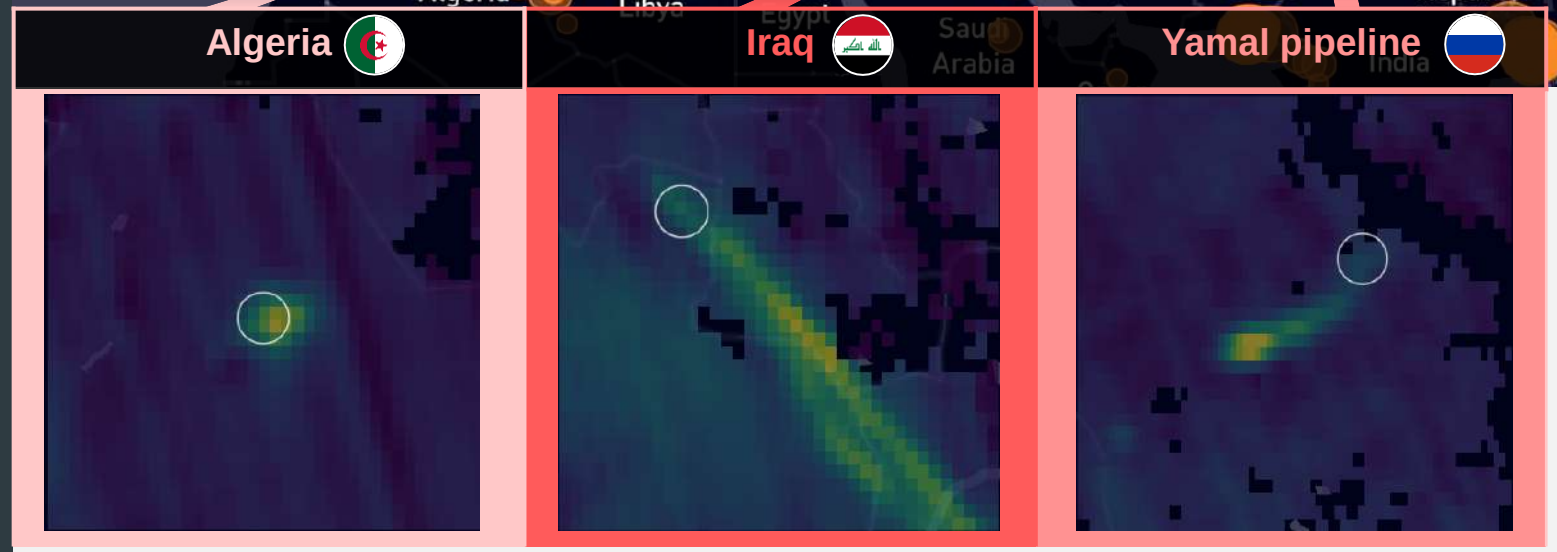
Venting instead of flaring during a pipeline maintenance

Portable flaring equipment

Examples
of visible methane events detected by Kayrros technology

Methane Fugitive Emission detected by Kayrros in 2019

Source: Kayrros



Flow rate = 75t/hr
Equivalent to 10 coal plants

Flow rate = **447t/hr**
*Equivalent to **63 coal plants***

Flow rate = 132t/hr
Equivalent to 19 coal plants

Examples
of visible methane events detected by Kayrros technology

Methane Fugitive Emission detected by Kayrros in 2019

Source: Kayrros

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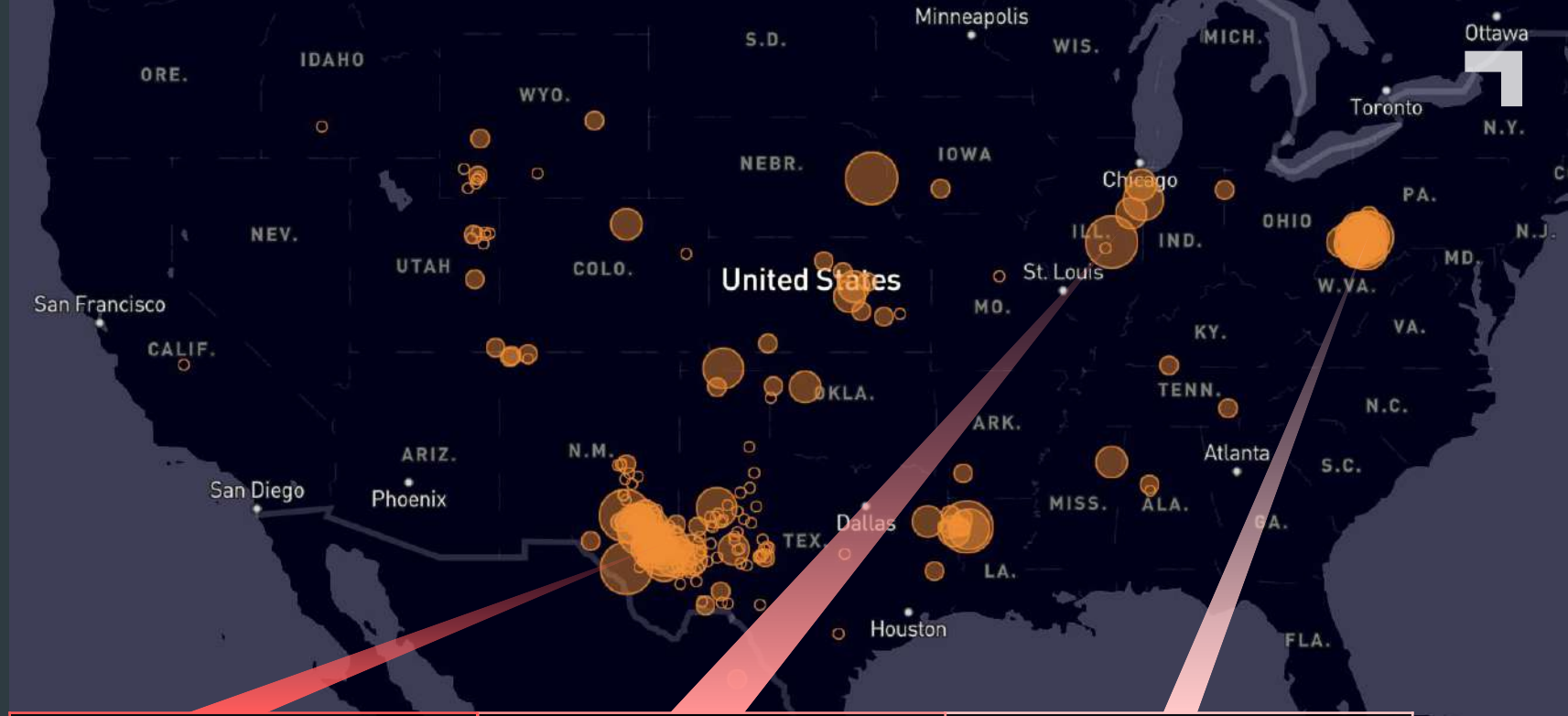
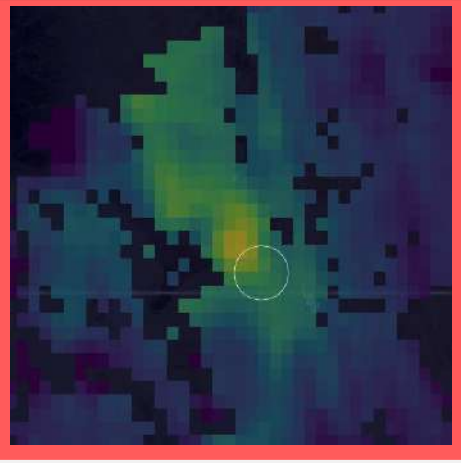
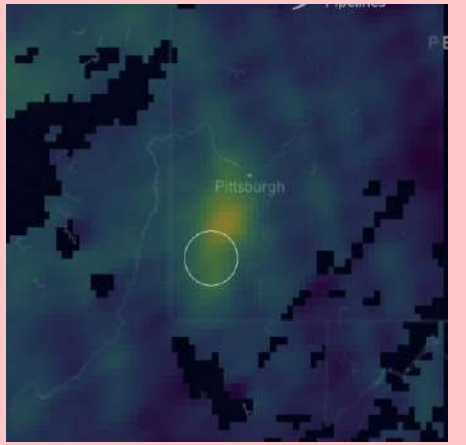


Permian basin	Midstream	Marcellus basin
		
Flow rate = **181t/hr** *Equivalent to **26 coal plants***	Flow rate = **155t/hr** *Equivalent to **22 coal plants***	Flow rate = **115t/hr** *Equivalent to **16 coal plants***

EU Commissioner leverages Kayrros map to explain EU Methane Strategy

Tweet

Kadri Simson
@KadriSimson

#Methane hotspots can be seen from space🌍! At least by satellites like Sentinel-5P. This map shows what we want to fix with #MethaneStrategy! Technology to facilitate the strategy already exists thanks to #EU🇪🇺 long-term investments in satellite programs. #Copernicus #Horizon2020

Traduire le Tweet

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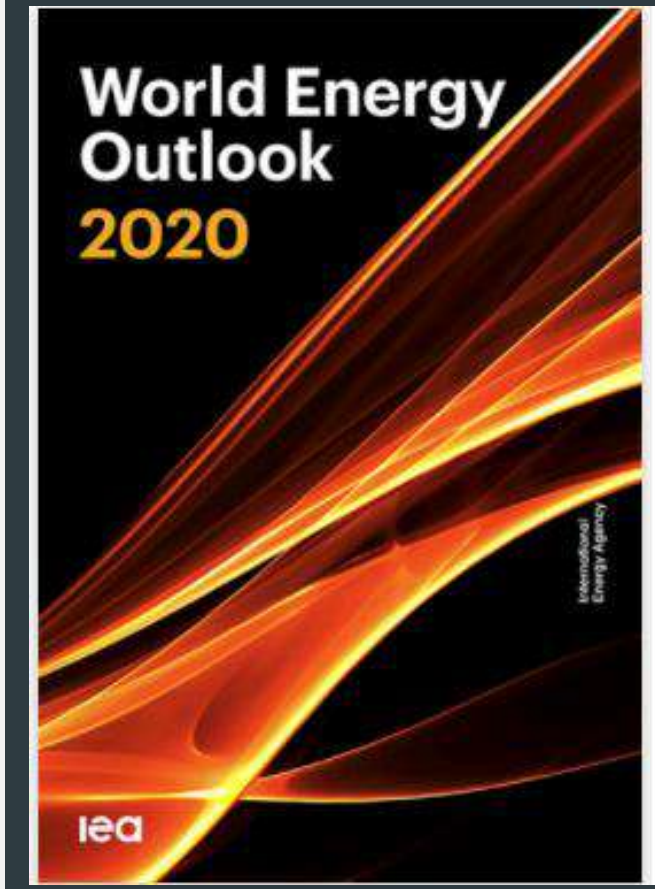
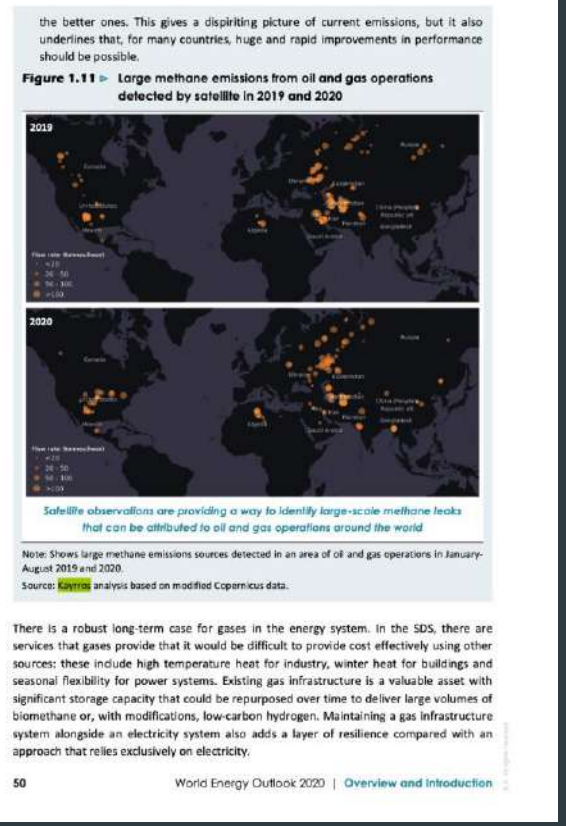
Kayrros data are quoted in OECD reports

OECD
BETTER POLICIES FOR BETTER LIVES

> ***Kayrros*** *is just a* ***huge step forward in transparency****. We assumed that these leaks were there, but we've never been able to pinpoint where exactly*

Tim Gould
Head of Division for Energy Supply Outlooks and Investment at the OECD IEA





the better ones. This gives a dispiriting picture of current emissions, but it also underlines that, for many countries, huge and rapid improvements in performance should be possible.

Figure 1.11 ▸ **Large methane emissions from oil and gas operations detected by satellite in 2019 and 2020**

2019

2020

Satellite observations are providing a way to identify large-scale methane leaks that can be attributed to oil and gas operations around the world

Note: Shows large methane emissions sources detected in an area of oil and gas operations in January-August 2019 and 2020.

Source: Kayrros analysis based on modified Copernicus data.

There is a robust long-term case for gases in the energy system. In the SDS, there are services that gases provide that it would be difficult to provide cost effectively using other sources: these include high temperature heat for industry, winter heat for buildings and seasonal flexibility for power systems. Existing gas infrastructure is a valuable asset with significant storage capacity that could be repurposed over time to deliver large volumes of biomethane or, with modifications, low-carbon hydrogen. Maintaining a gas infrastructure system alongside an electricity system also adds a layer of resilience compared with an approach that relies exclusively on electricity.

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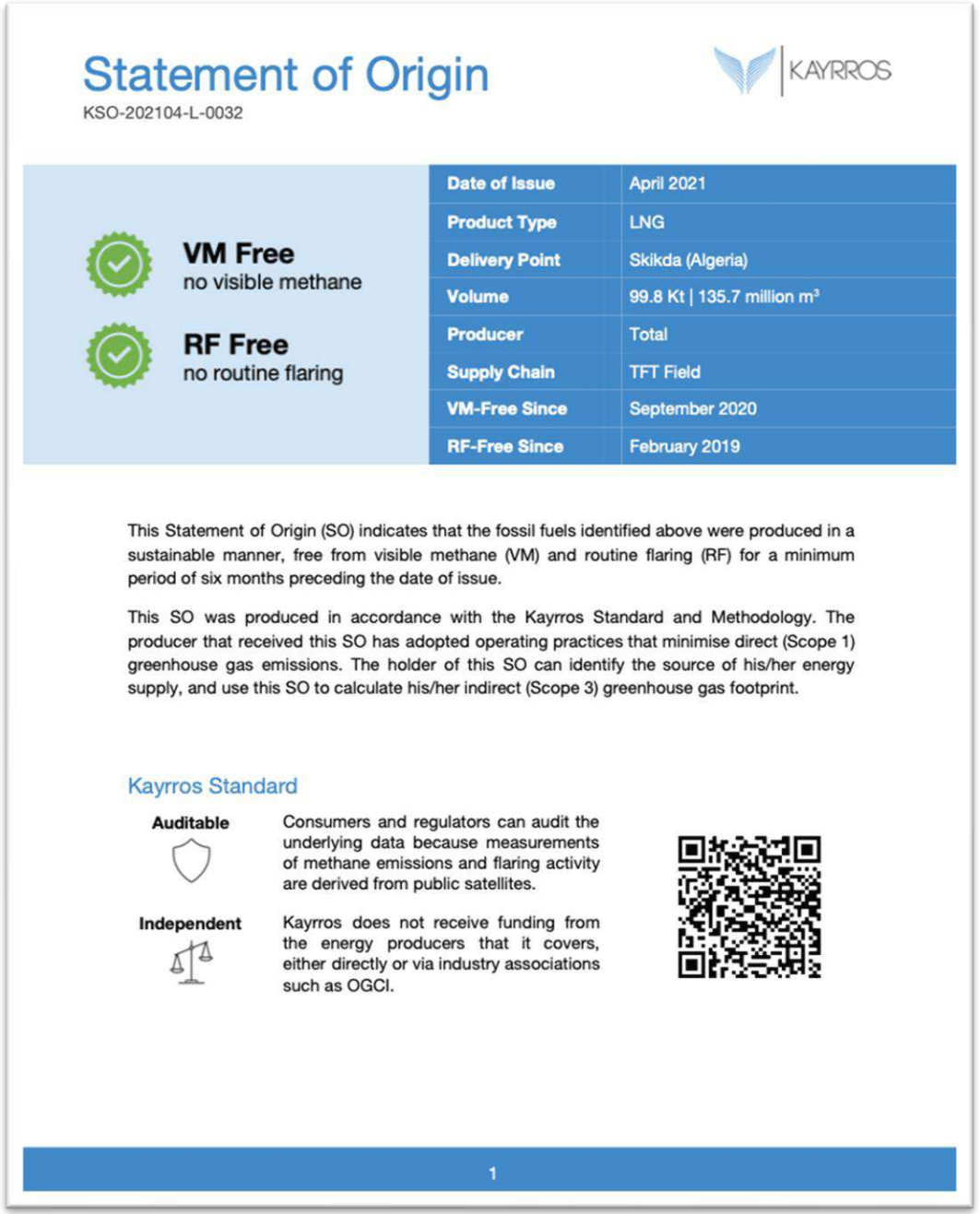
Importing responsible Natural Gas is FOR NOW

thanks to
EU Satellites and
EU AI
(Kayrros-H2020)



Statement of Origin

KSO-202104-L-0032

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VM Free
no visible methane

RF Free
no routine flaring

Date of Issue	April 2021
Product Type	LNG
Delivery Point	Skikda (Algeria)
Volume	99.8 Kt | 135.7 million m^3
Producer	Total
Supply Chain	TFT Field
VM-Free Since	September 2020
RF-Free Since	February 2019

This Statement of Origin (SO) indicates that the fossil fuels identified above were produced in a sustainable manner, free from visible methane (VM) and routine flaring (RF) for a minimum period of six months preceding the date of issue.

This SO was produced in accordance with the Kayrros Standard and Methodology. The producer that received this SO has adopted operating practices that minimise direct (Scope 1) greenhouse gas emissions. The holder of this SO can identify the source of his/her energy supply, and use this SO to calculate his/her indirect (Scope 3) greenhouse gas footprint.

Kayrros Standard

Auditable
Consumers and regulators can audit the underlying data because measurements of methane emissions and flaring activity are derived from public satellites.

Independent
Kayrros does not receive funding from the energy producers that it covers, either directly or via industry associations such as OGCI.

1


“Whatever it takes”
Europe saved the €uro
ECB President, July 2012
Will Europe save the Planet?
EP, December 2020

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