



Estimating Emissions Intensities from Equivalent Barrels of Oil

*Using the Oil Climate Index plus Gas
(OCI+) and Satellite Data*

*Deborah Gordon
Sr. Principal, RMI*

*London Climate Action Week
June 2025*



**ENERGY
IS RMI'S
NORTH STAR.**

**We know that
energy is 70%
of the climate
problem and,
therefore,
must be
at least 70% of
our solution.**

**OUR GOAL
IS CLEAR.**

**“We must transform
how we produce
and use energy to
cut emissions in
half by 2030.”**

IPCC, Sixth Assessment Report, 2023

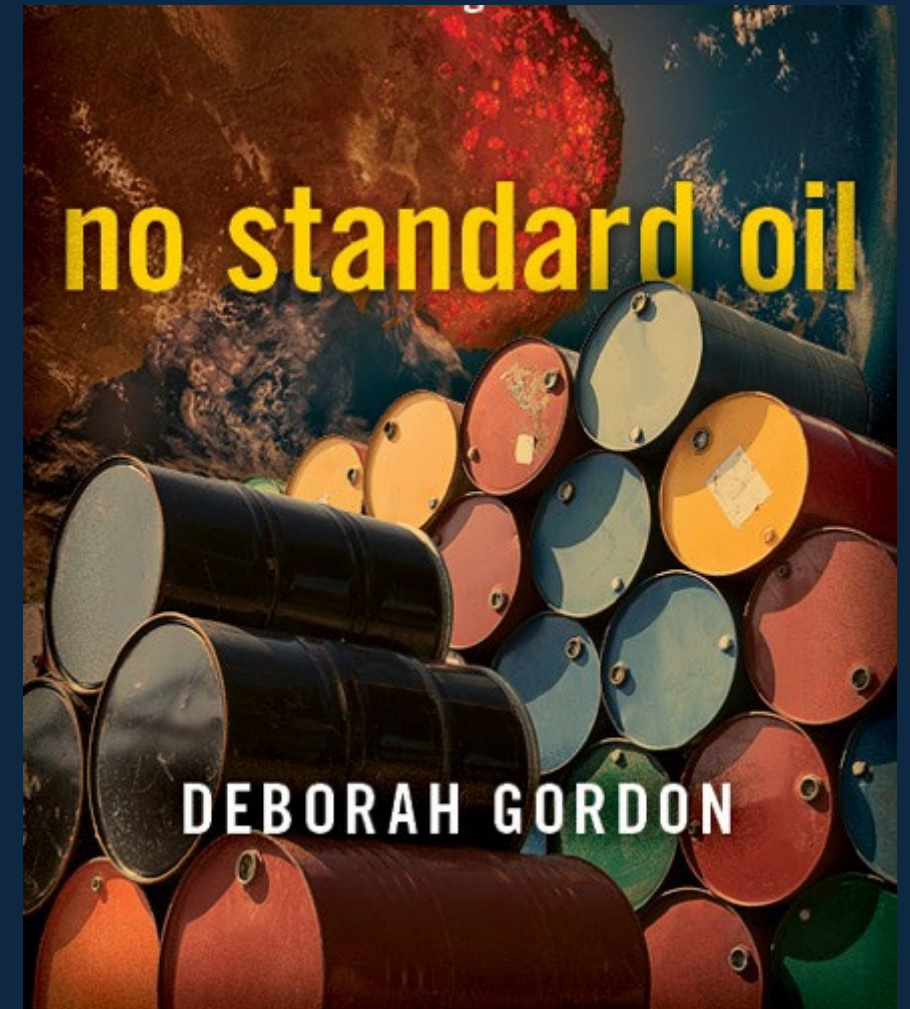
Creating the Oil Climate Index plus Gas (OCI+)

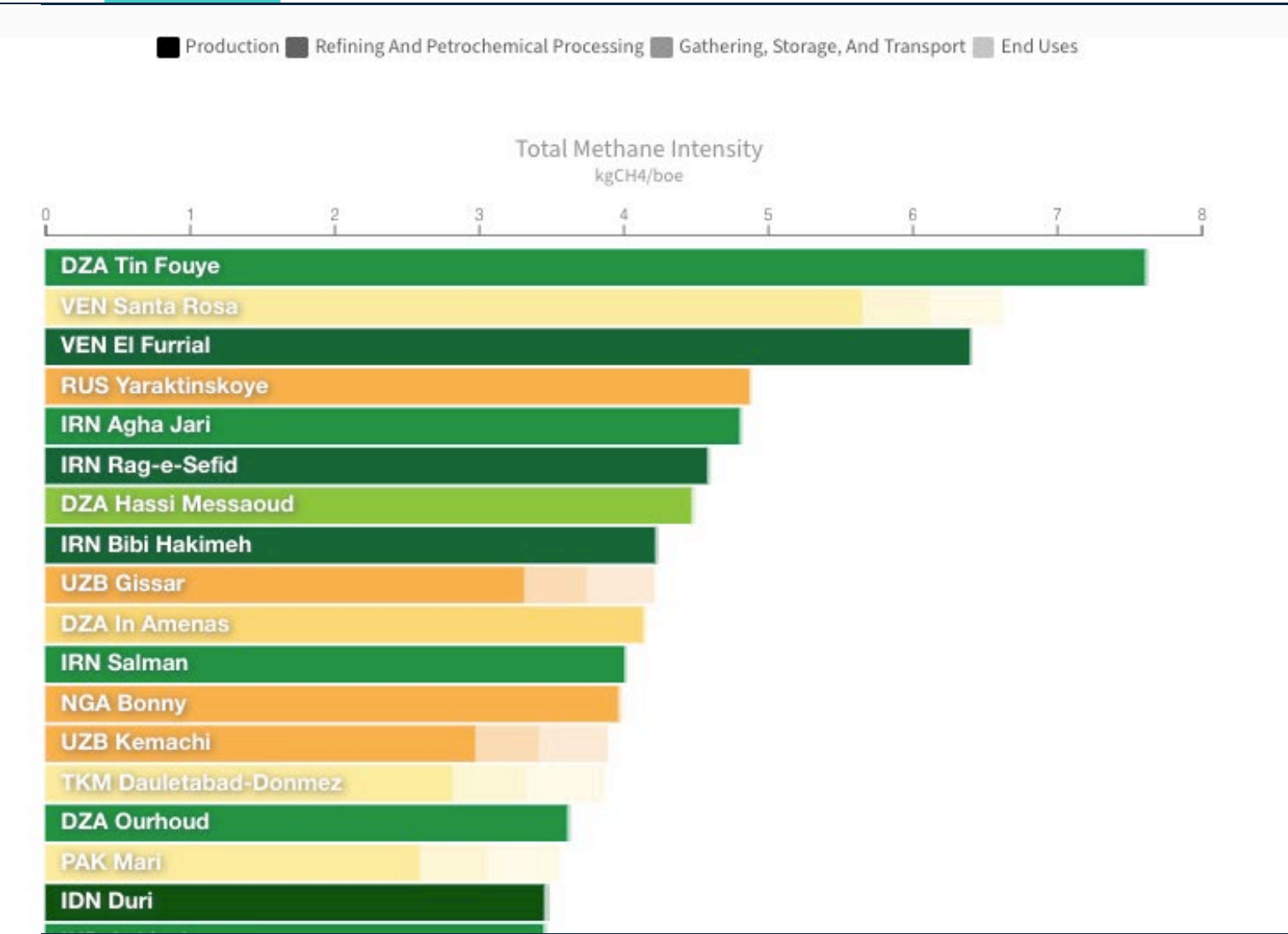
My Hypothesis:

- If the chemical and physical characteristics of oil and gas resources and the operational practices to extract and process them vary widely, so too will their emissions.
- This assertion gave rise to the OCI+.

Findings:

- There is no standard oil or gas.
- Analyzing where in the supply chain the greatest emissions occur identifies mitigation.
- Reducing equivalent barrels to the lowest intensity in practice can cut methane emissions by an estimated 90% (IEA).





Data Model

Global Warming Potential

20	100
----	-----

Emission Metric

Total Emissions Intensity
Methane Intensity
Carbon Dioxide Intensity

Units

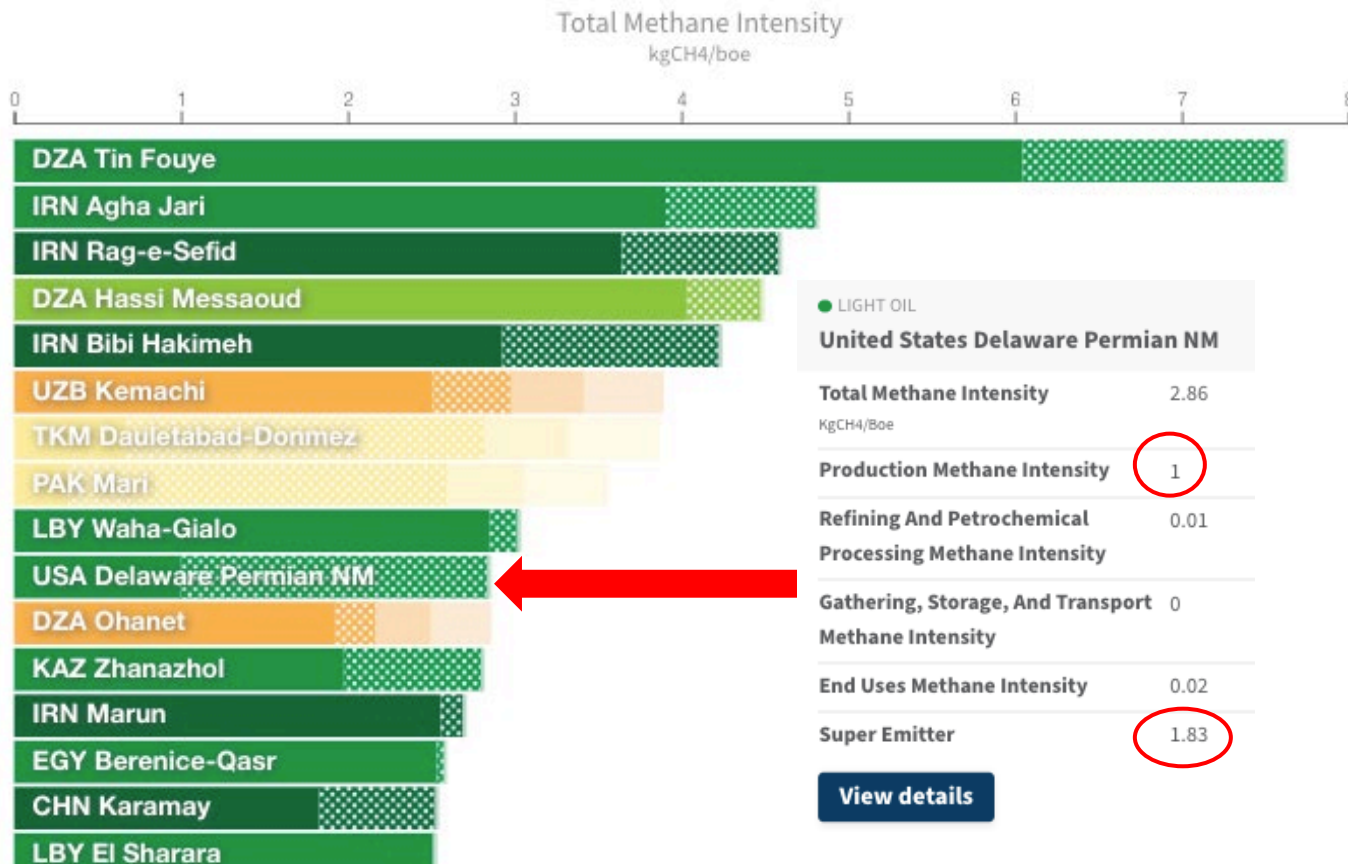
kgCH₄/boe
 gCH₄/MJ O&G Produced

Resource Type

<input type="checkbox"/> Ultra-Light Oil	<input type="checkbox"/> Dry Gas
<input type="checkbox"/> Light Oil	<input type="checkbox"/> Acid Gas
<input type="checkbox"/> Medium Oil	<input type="checkbox"/> Wet gas
<input type="checkbox"/> Heavy Oil	<input type="checkbox"/> Condensate
<input type="checkbox"/> Extra-Heavy Oil	

Map Supply Chain Benchmark Crude Analysis Flaring Risk Map

Production
 Super Emitter
 Refining And Petrochemical Processing
 Gathering, Storage, And Transport
 End Uses



United States Delaware Permian NM

Total Methane Intensity 2.86
KgCH₄/Boe

Production Methane Intensity 1

Refining And Petrochemical Processing Methane Intensity 0.01

Gathering, Storage, And Transport Methane Intensity 0

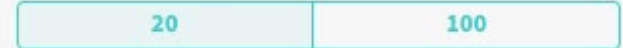
End Uses Methane Intensity 0.02

Super Emitter 1.83

[View details](#)

Data Model

Global Warming Potential



Emission Metric

- Total Emissions Intensity
- Methane Intensity
- Carbon Dioxide Intensity

Units

- kgCH₄/boe
- gCH₄/MJ O&G Produced

Resource Type

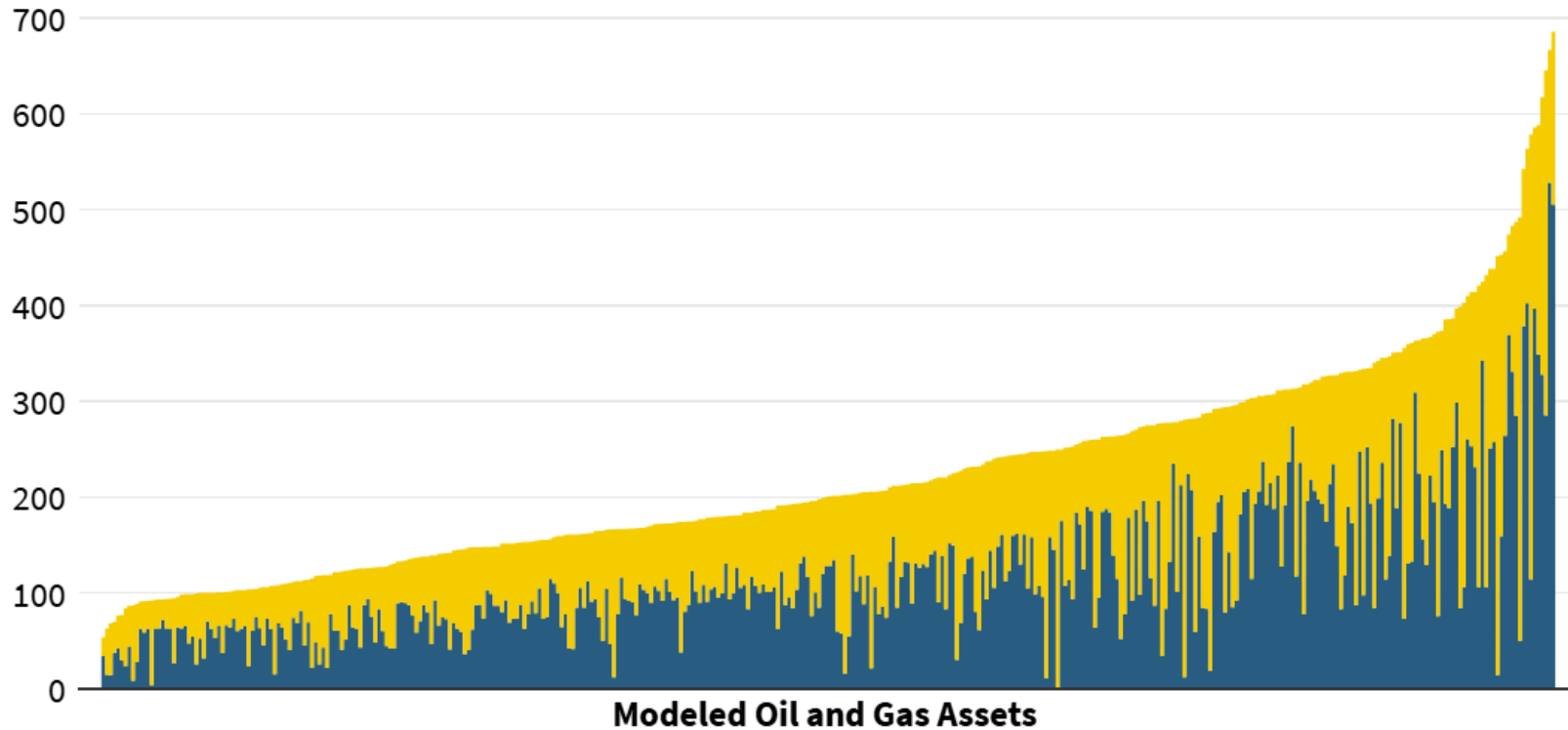
- Ultra-Light Oil
- Dry Gas
- Light Oil
- Acid Gas
- Medium Oil
- Wet gas
- Heavy Oil
- Condensate
- Extra-Heavy Oil

Adding Satellite Data

Methane is Responsible for an Estimated 1/2 of Industry GHG Emissions

Industry Emissions Intensity (kg CO₂e/boe)

■ Industry Methane ■ Industry Non-Methane



Note: Emissions intensity values assume a 20-year global warming potential (GWP) for methane of 82.5 times CO₂.

Source: RMI OCI+, June 2025

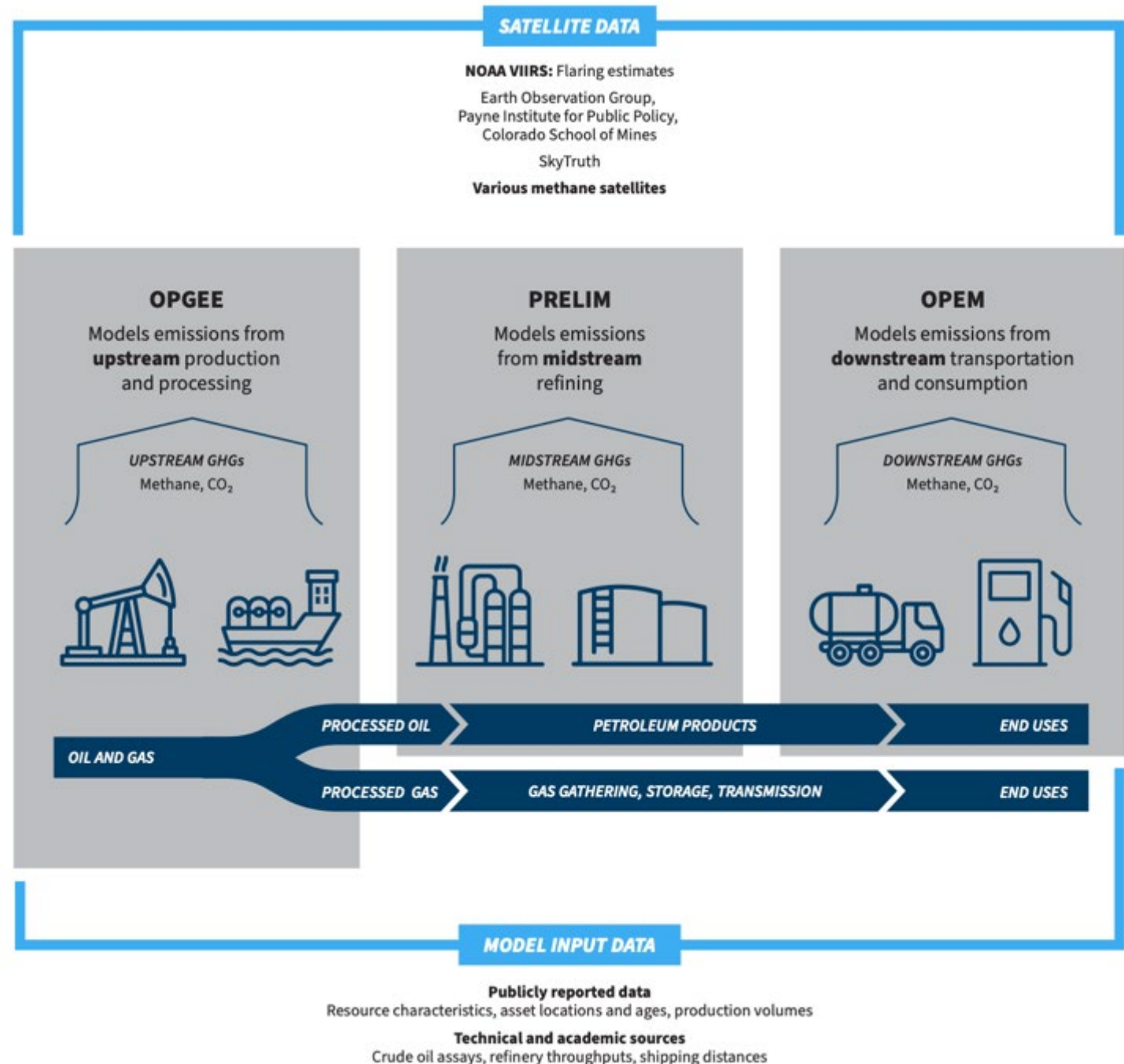
OCI+ Model

Peer-reviewed, open-source lifecycle GHG-estimation models

- Three underlying engineering models developed in collaboration with academic partners
- Updated as practices change
- Used by corporates, governments, NGOs

Data sources

- Oil and gas asset characteristics (public and private data)
- Activity and operational inputs (private data providers)
- Satellites (Carbon Mapper, other satellites for methane/CO₂ super emitters; VIIRS Nightfire for gas flaring volumes; ongoing remote sensing)

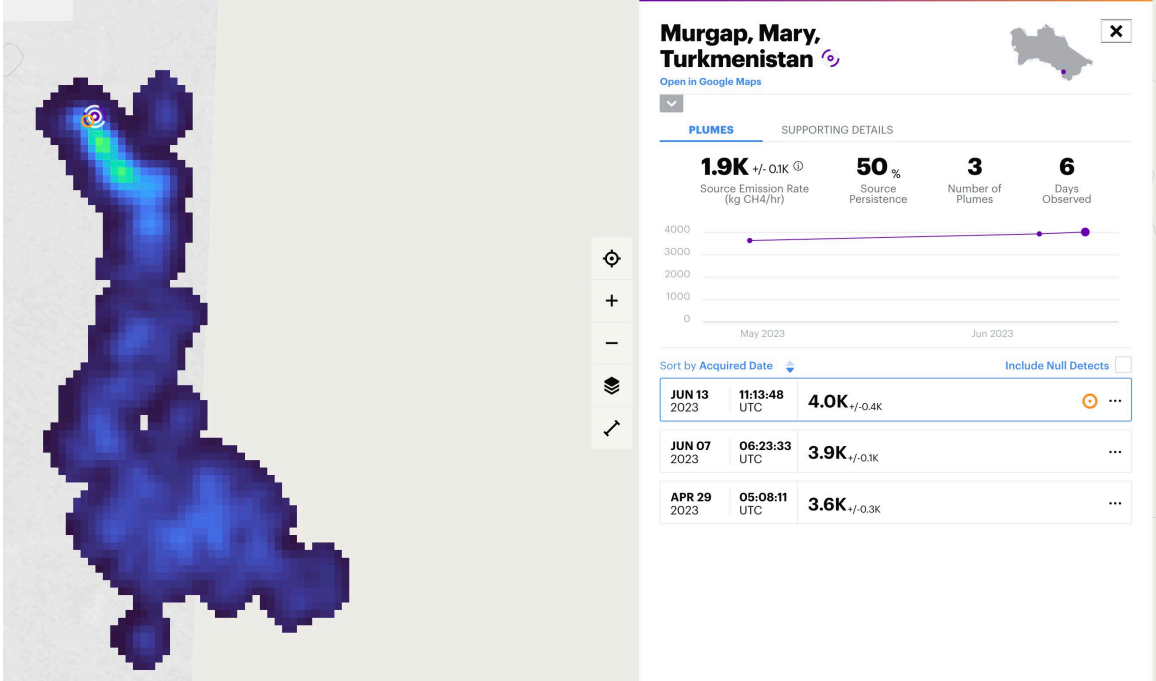


Incorporating Methane Satellites Data into OCI+?

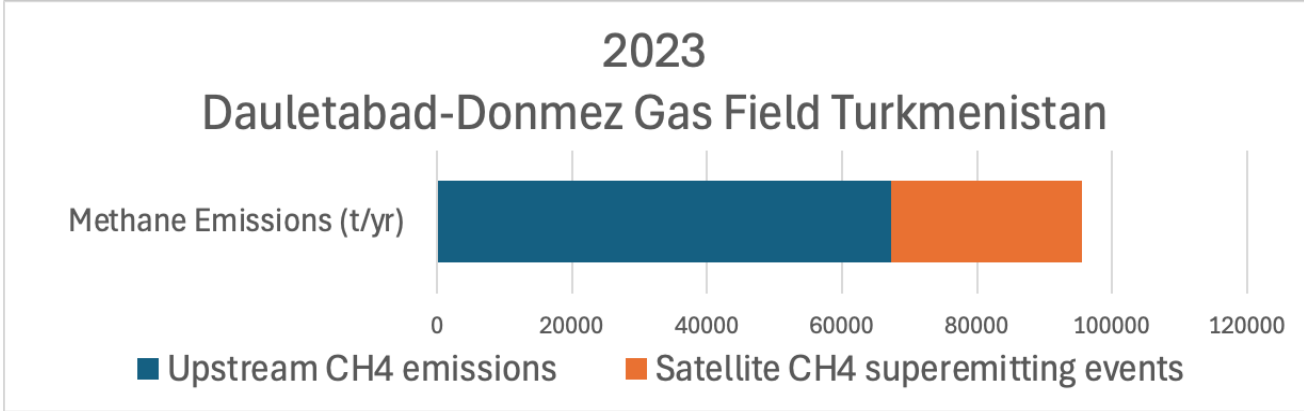
EXAMPLE

Integrating Carbon Mapper/EMIT and OCI+ data

- Assume emissions events of 100kg/hr+ are non-routine, abnormal operating conditions
- Use plume persistence to convert instantaneous observations into annual estimate of emissions rate
- Add to OCI+ emissions, which only model normal conditions



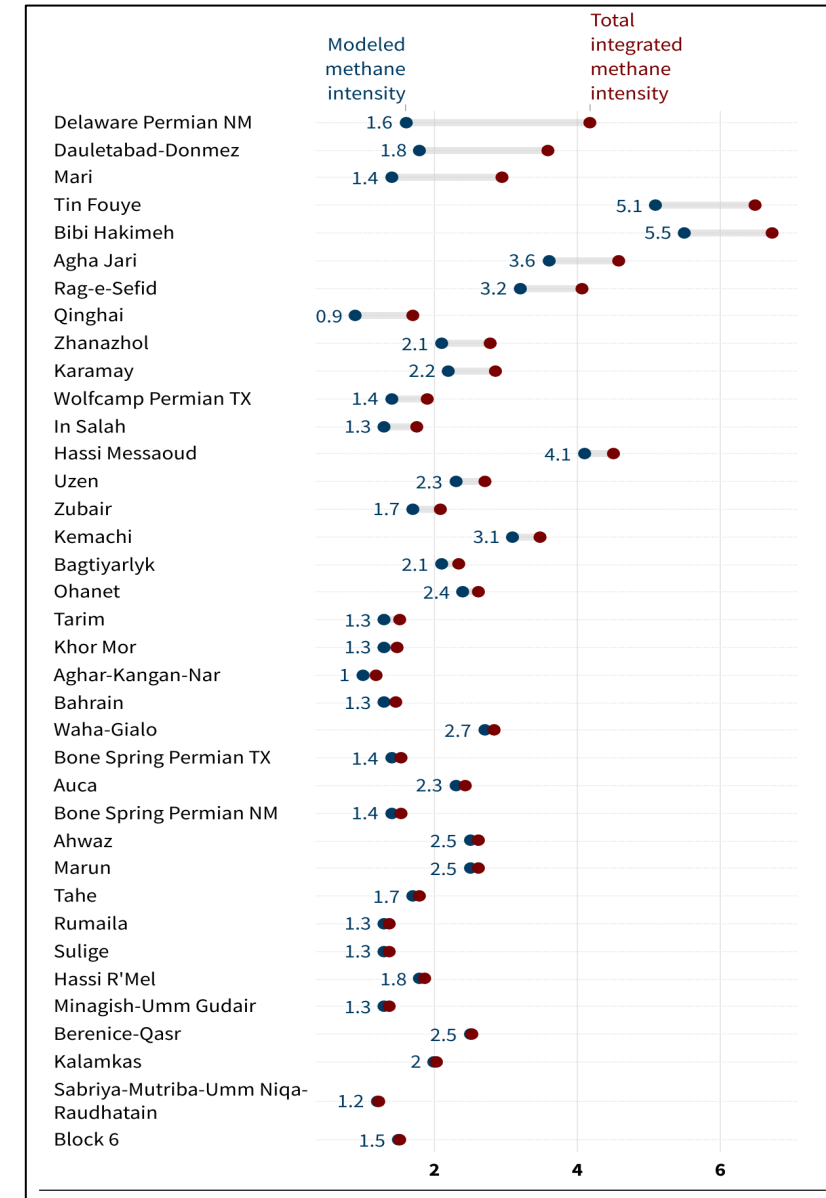
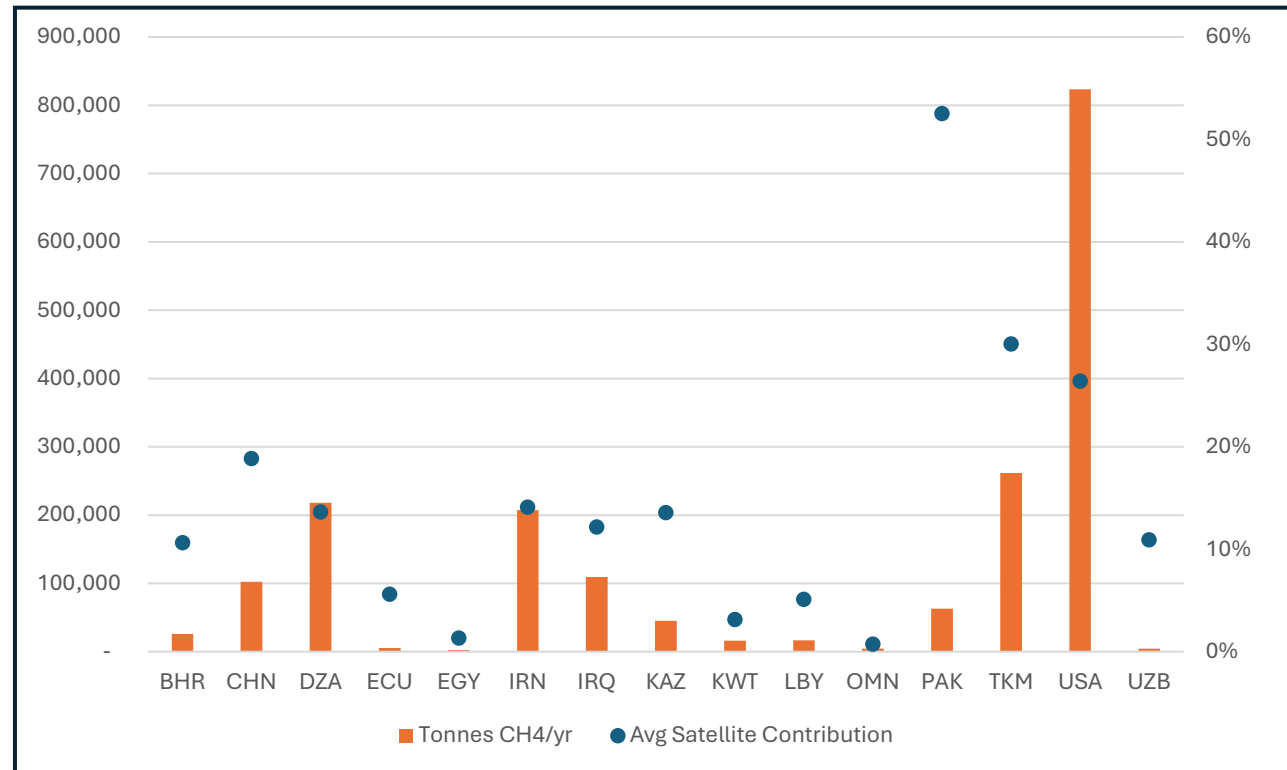
Carbon Mapper Data Portal, <https://data.carbonmapper.org/>



Methane satellite integration and superemitter analysis

Satellite contribution to OCI+ total methane intensity (2023 data)

- Min: 1%
- Avg: 16%
- Max: 62%
- Avg percent change between modelled MI and integrated MI: 25%



Know your oil and gas

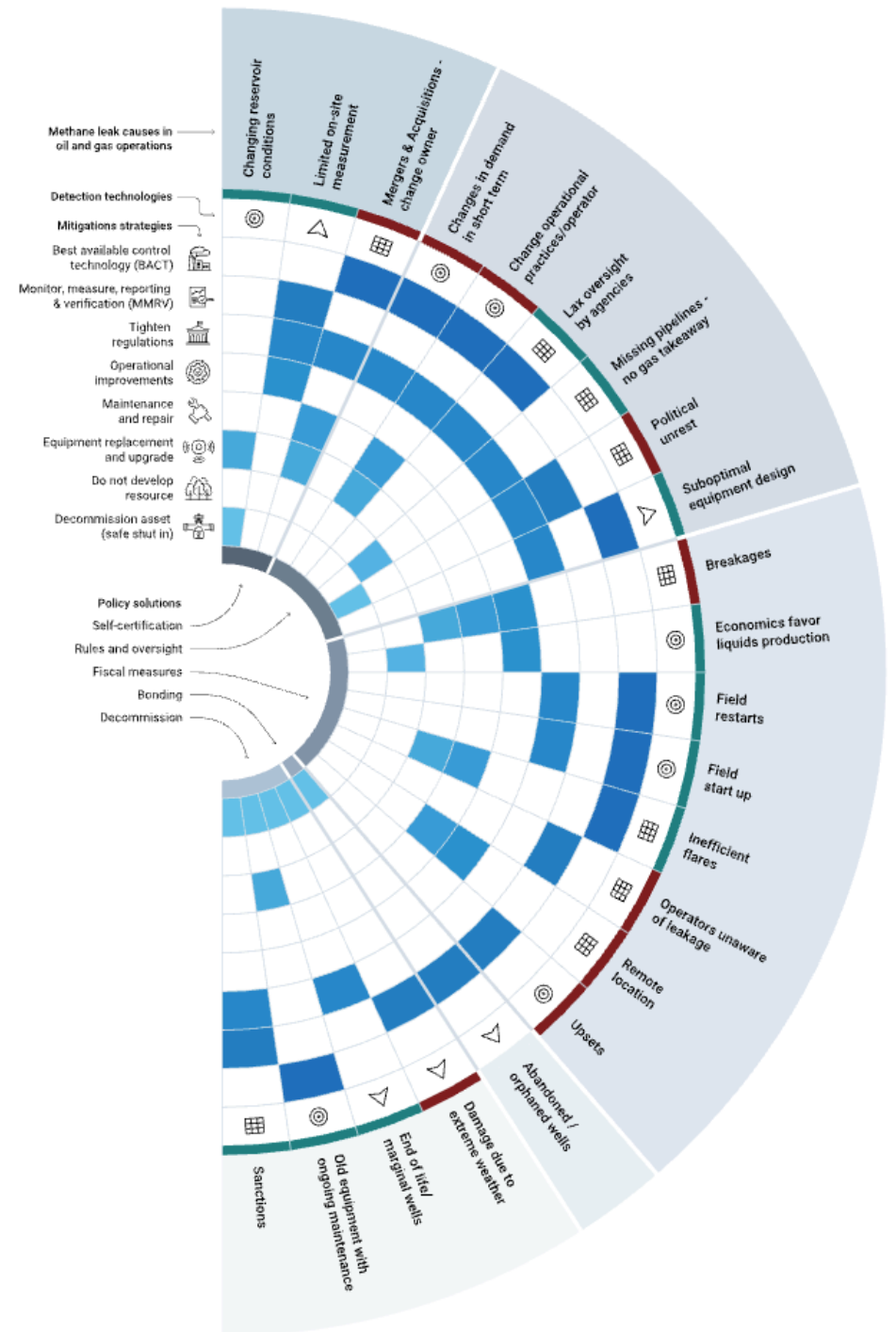
- Routine emissions
- Non routine emissions
- Exogenous events

ID Emissions Type

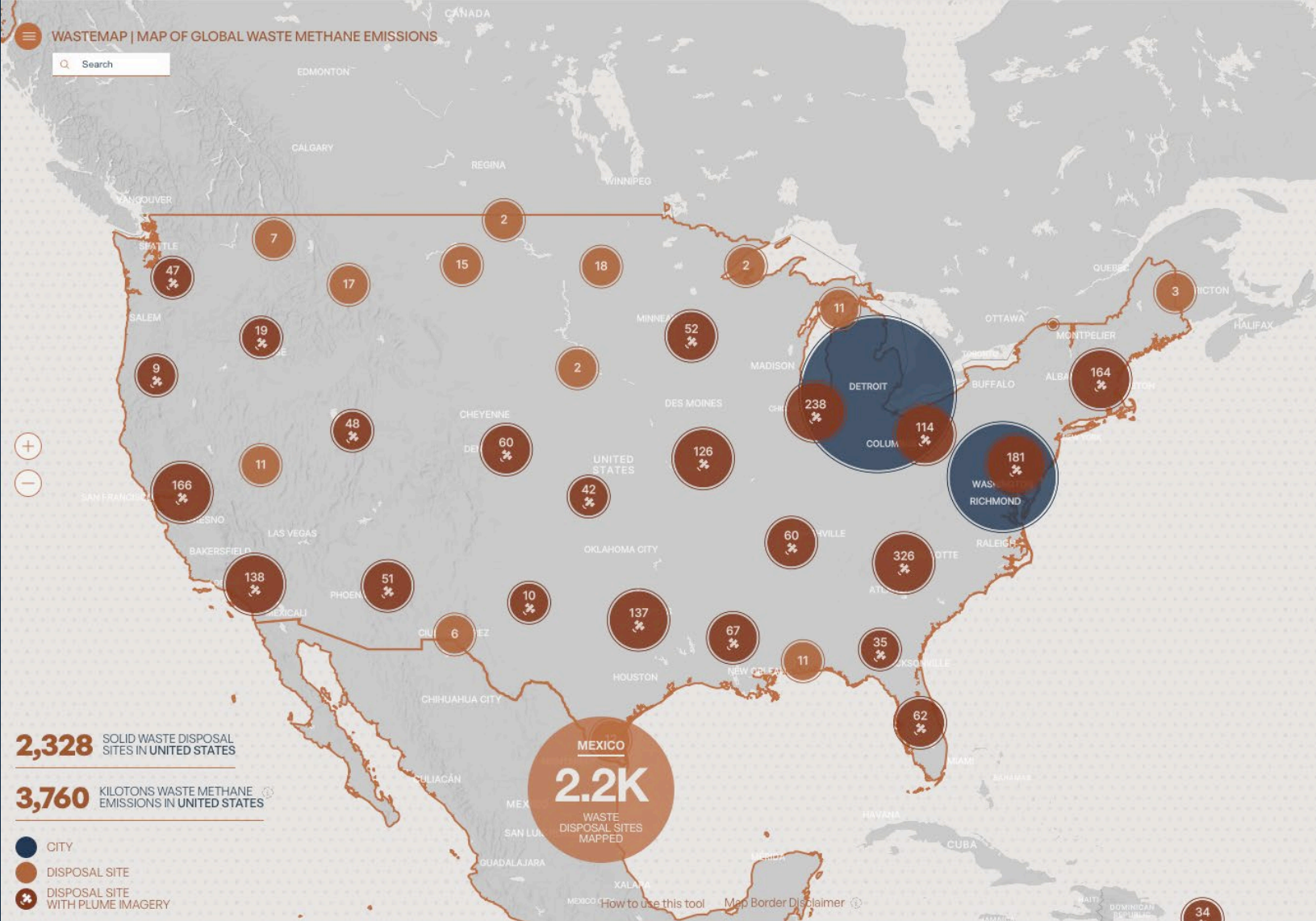
- Fugitives
- Venting
- Flaring

Targeted Actions

- Policy
- Certification
- Regulation
- Fiscal measures
- Decommissioning



WasteMap Decision Tool



United States Waste Site Emissions

ALL COUNTRIES

SUMMARY STATISTICS

SOLID WASTE DISPOSAL SITES

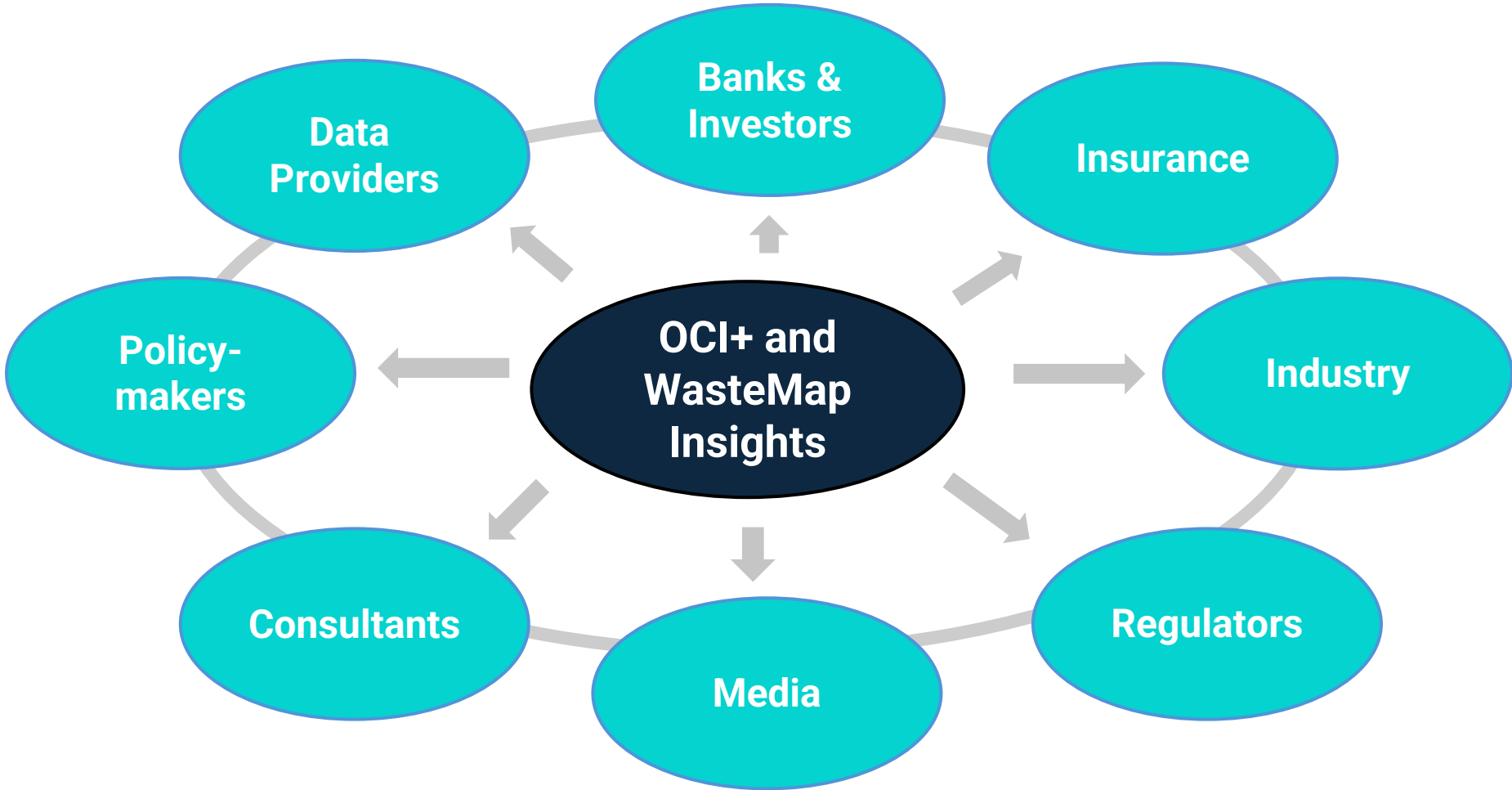
RANK

Rank	Country	Emissions:	Per capita	Absolute
50	United States		11.05 kg CH ₄ /person/yr	3760.45 kt CH ₄ /yr
51	Suriname		10.99 kg CH ₄ /person/yr	6.79 kt CH ₄ /yr
52	Libya		10.82 kg CH ₄ /person/yr	77.19 kt CH ₄ /yr
53	Puerto Rico		10.69 kg CH ₄ /person/yr	34.79 kt CH ₄ /yr
54	Saint Vincent and the Grenadines		10.66 kg CH ₄ /person/yr	1.10 kt CH ₄ /yr
55	Finland		10.63 kg CH ₄ /person/yr	58.89 kt CH ₄ /yr
56	Brazil		10.40 kg CH ₄ /person/yr	2179.28 kt CH ₄ /yr
57	Oman		10.40 kg CH ₄ /person/yr	46.78 kt CH ₄ /yr
58	Panama		10.39 kg CH ₄ /person/yr	45.15 kt CH ₄ /yr
59	Portugal		10.26 kg CH ₄ /person/yr	106.66 kt CH ₄ /yr
60	Spain		9.65 kg CH ₄ /person/yr	460.78 kt CH ₄ /yr
61	Honduras		9.35 kg CH ₄ /person/yr	96.19 kt CH ₄ /yr
62	Grenada		9.28 kg CH ₄ /person/yr	1.08 kt CH ₄ /yr
63	South Africa		8.94 kg CH ₄ /person/yr	549.96 kt CH ₄ /yr
64	Croatia		8.56 kg CH ₄ /person/yr	33.58 kt CH ₄ /yr
65	Malaysia		8.50 kg CH ₄ /person/yr	291.26 kt CH ₄ /yr

Decision Support Tool | Download Resources

Powered by RMI, Clean Air Task Force, and Global Methane Hub.

Different actors are involved in methane abatement.



Thank You!

