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Estimating Emissions Intensities from Equivalent Barrels of Oil

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

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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

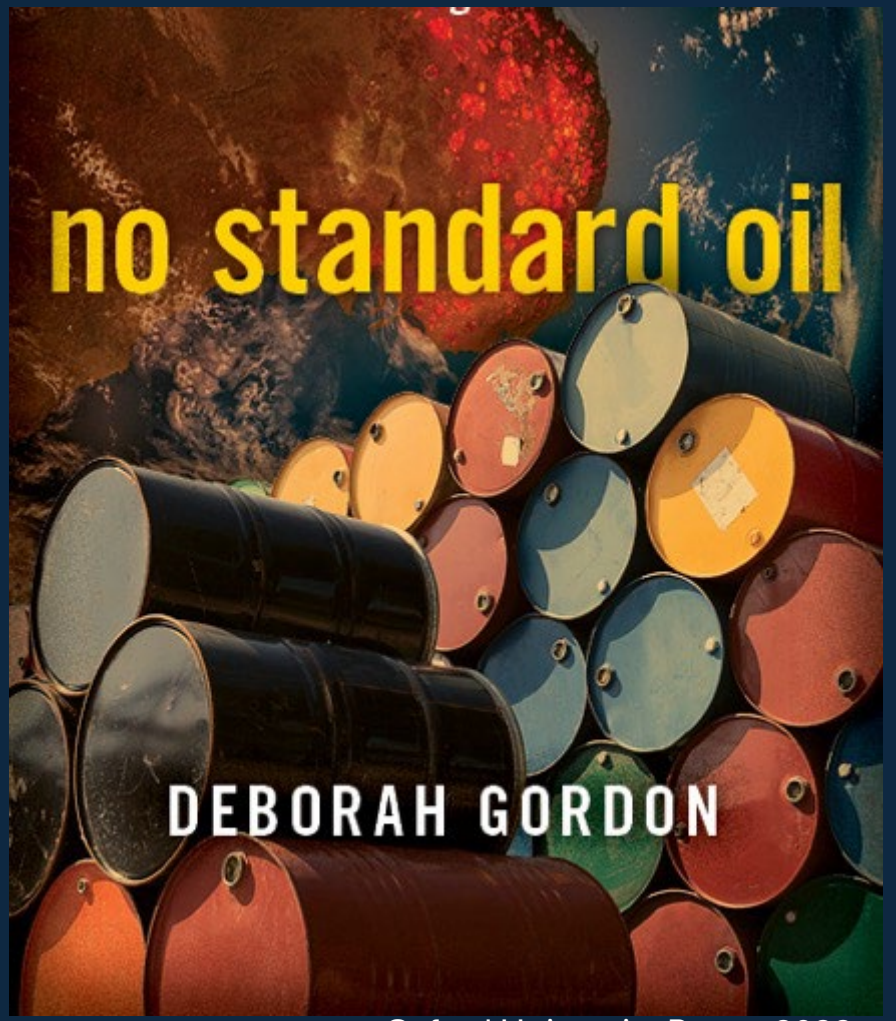
Creating the Oil Climate Index plus Gas (OCI+)

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).



Oxford University Press, 2022,
Paperback due out summer 2025

Sorting by Methane Intensities

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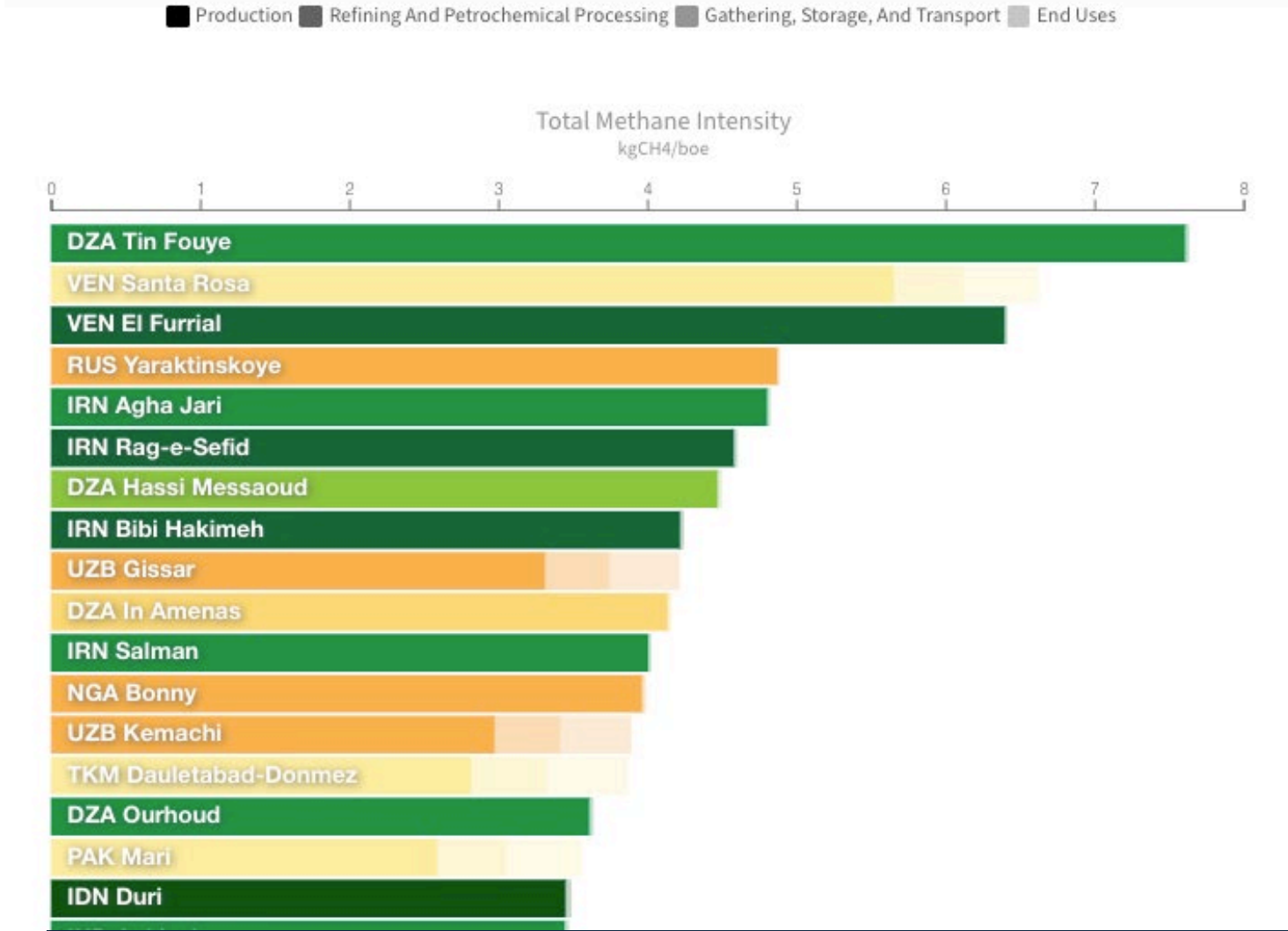
Search resources by field name

Map | Supply Chain | Benchmark Crude | Analysis | Flaring Risk Map



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

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

Adding Satellite Data

RMI ENERGY. TRANSFORMED. OCI+ Oil Climate Index plus Gas

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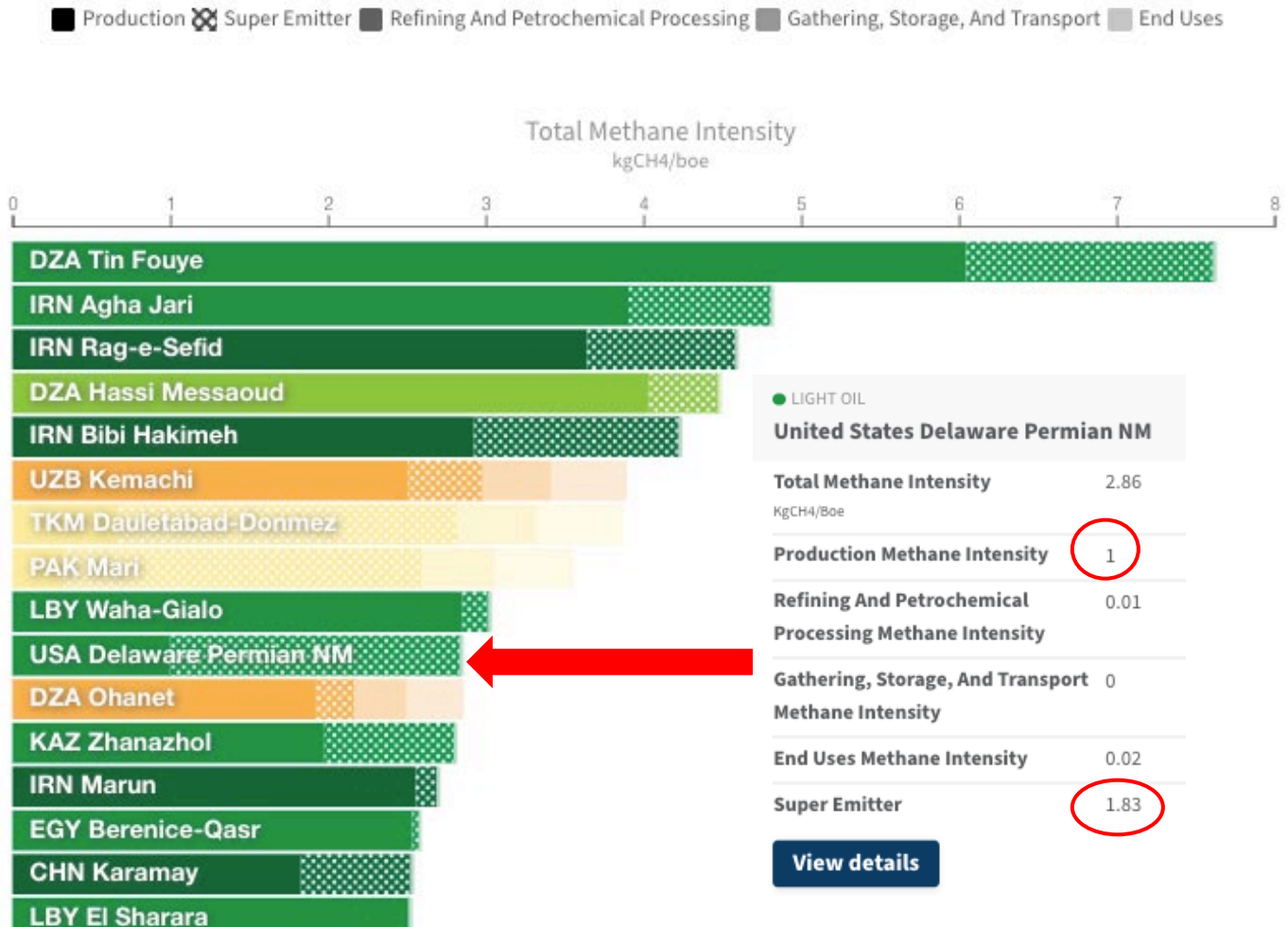

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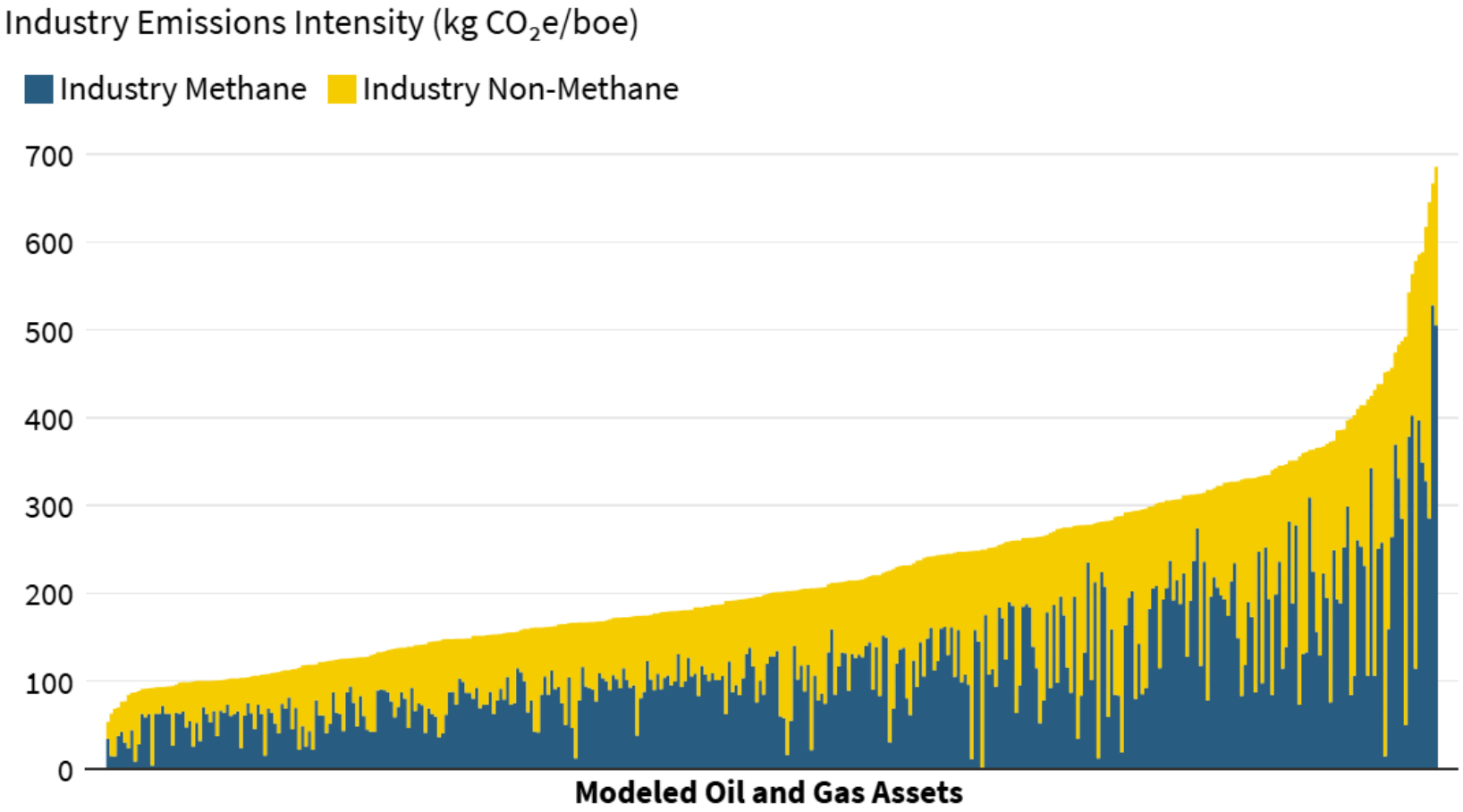
OCI+ Key Insights

Methane is Responsible for an Estimated ½ of Industry GHG Emissions



Note: Emissions intensity values assume a 20-year global warming potential (GWP) for methane of 82.5 times CO_2.

Source: RMI OCI+, June 2025

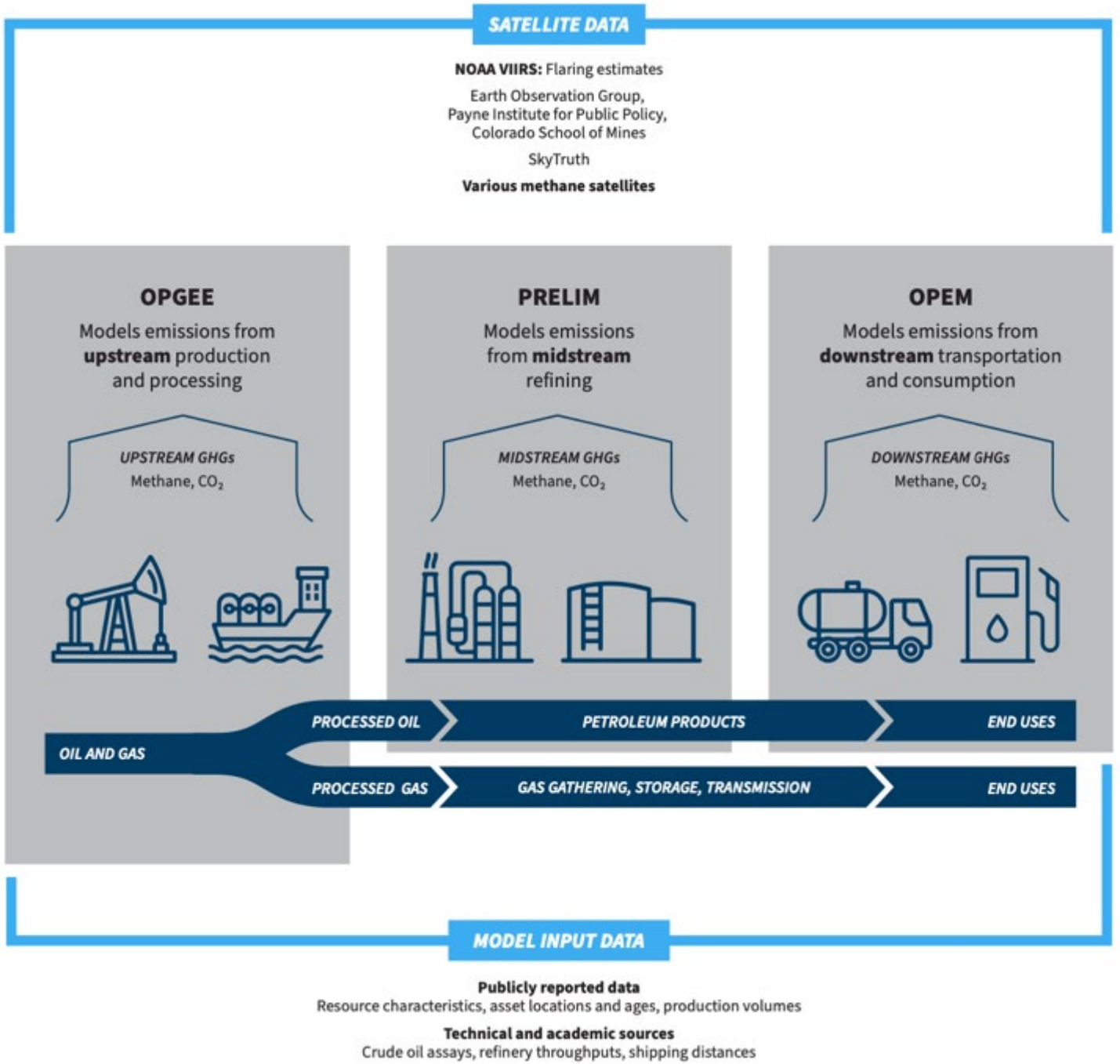
OCI+ Model

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/CO_2 super emitters; VIIRS Nightfire for gas flaring volumes; ongoing remote sensing)

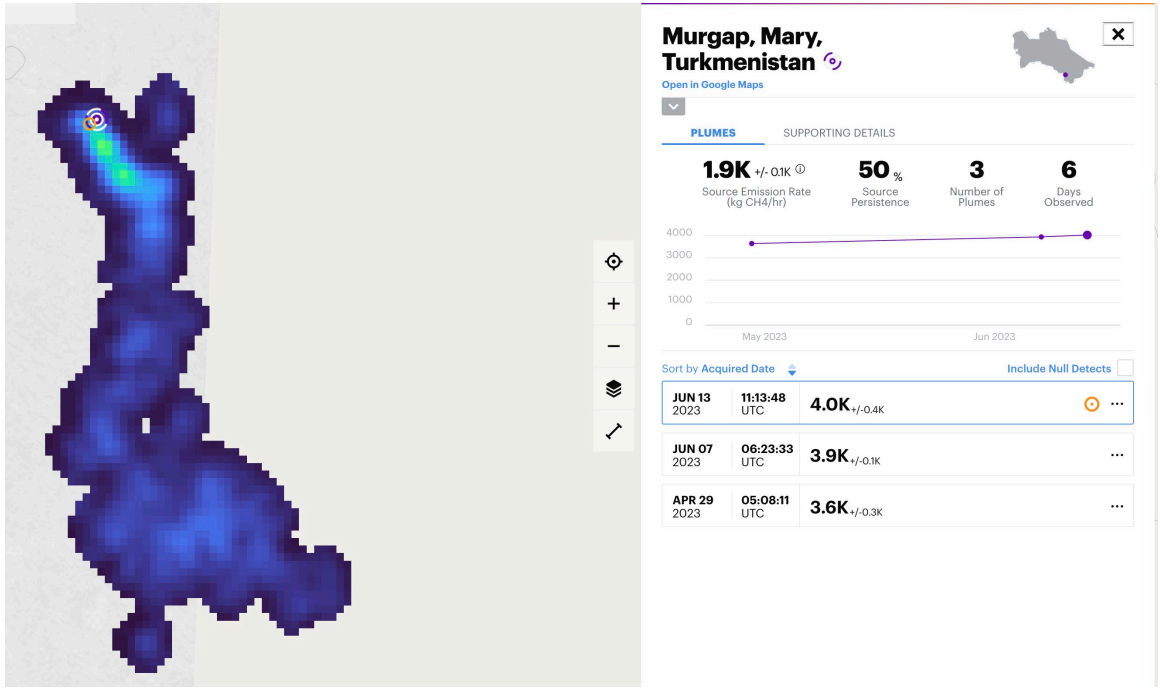


Incorporating Methane Satellites Data into OCI+?

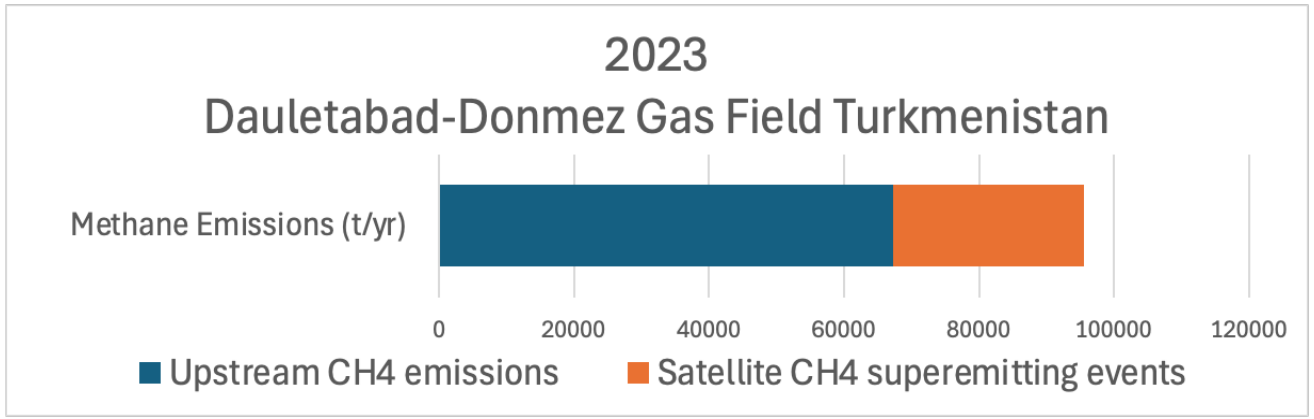
EXAMPLE

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



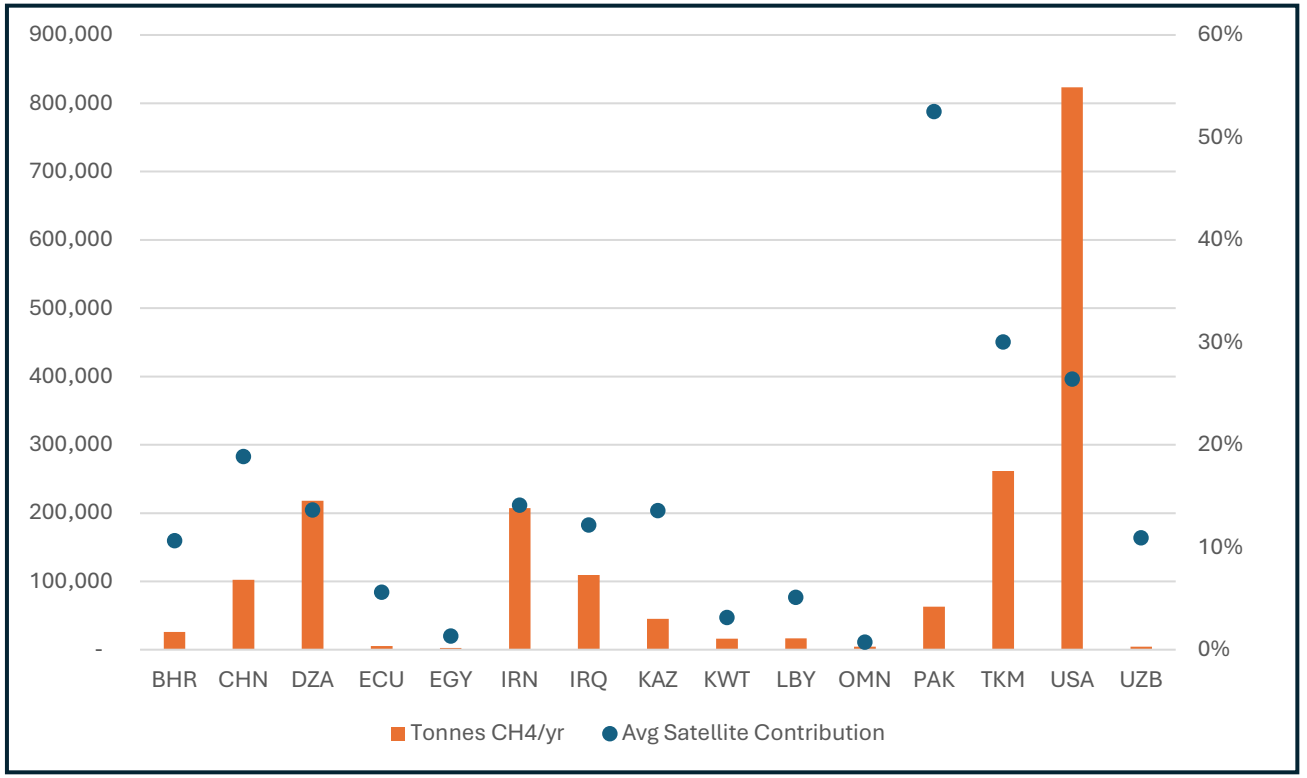
Carbon Mapper Data Portal, https://data.carbonmapper.org/

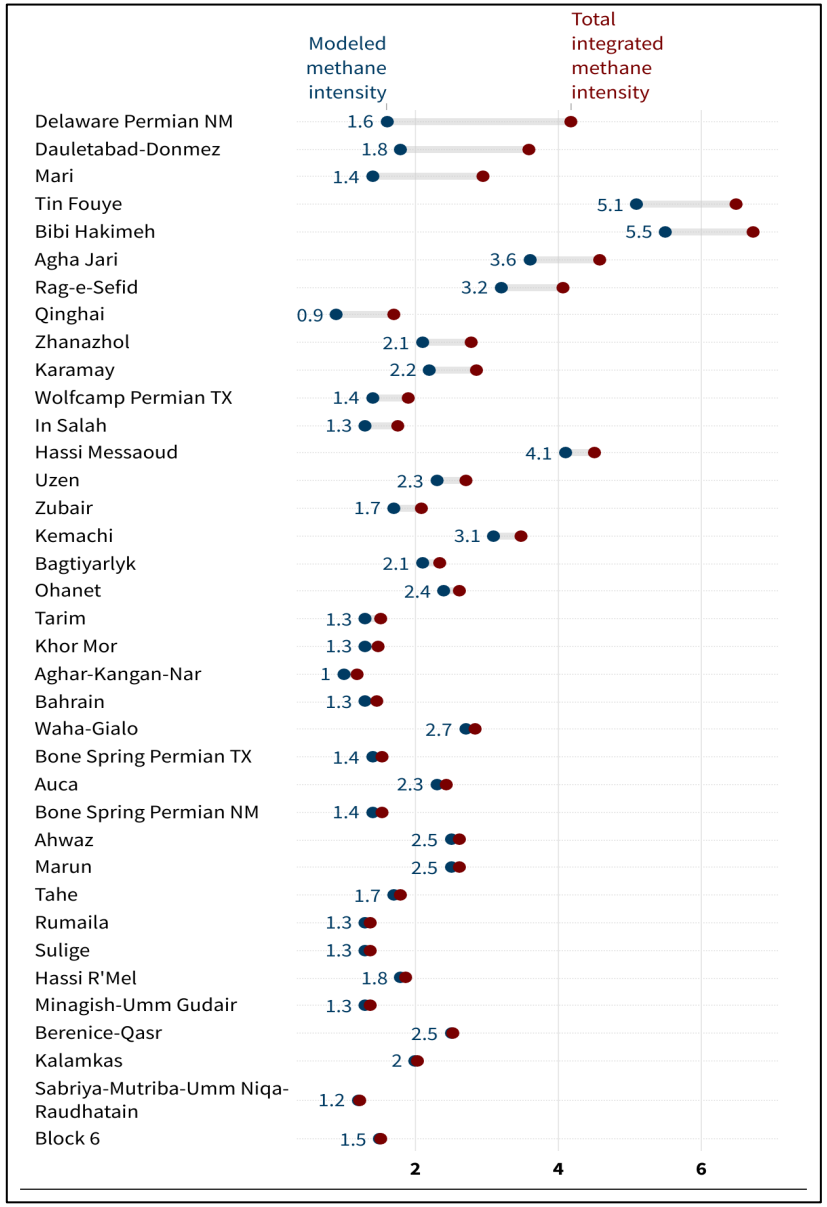


Methane satellite integration and superemitter analysis

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%





O&G Methane Abatement

Know your oil and gas

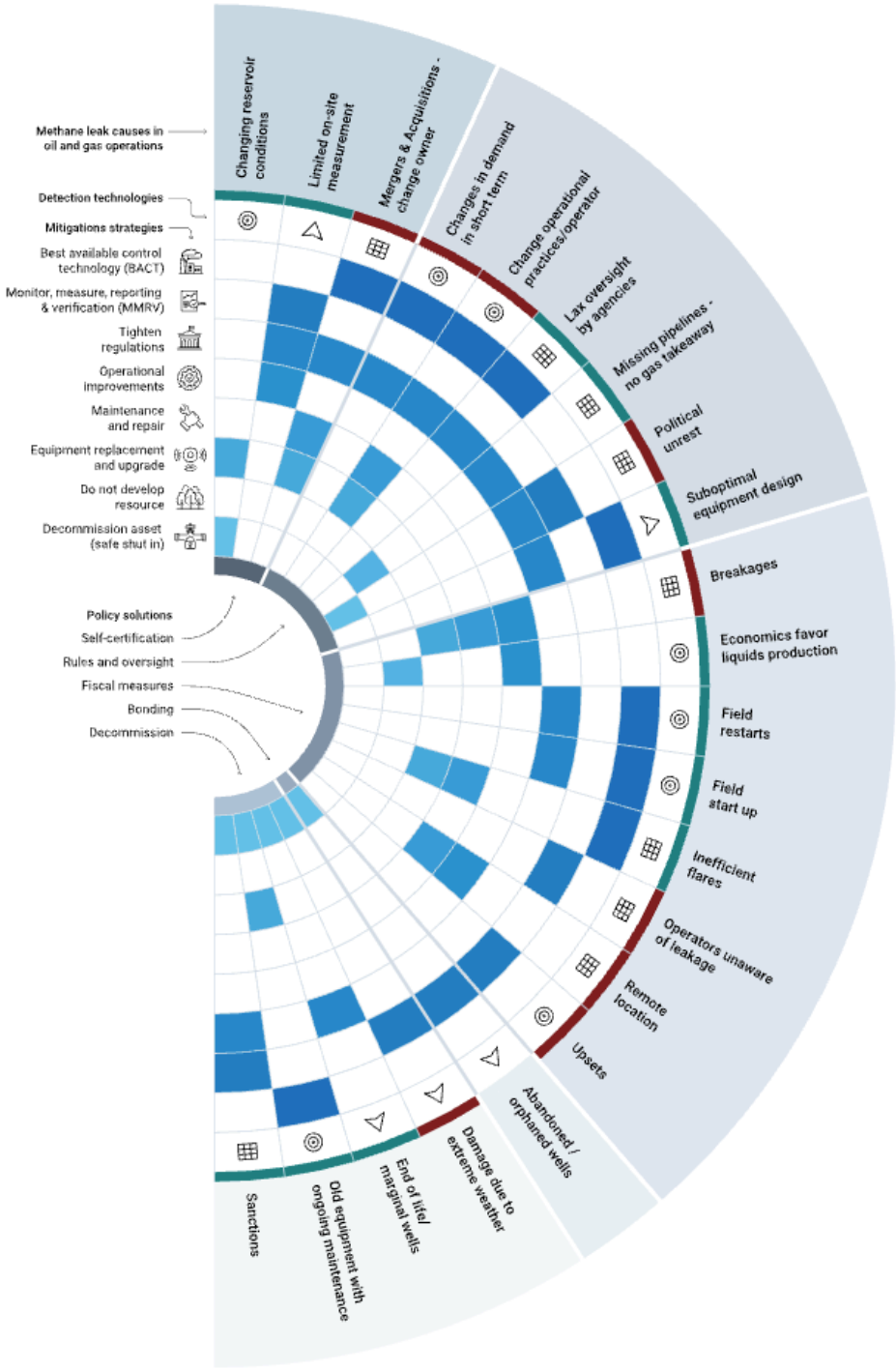
- Routine emissions
- Non routine emissions
- Exogenous events

ID Emissions Type

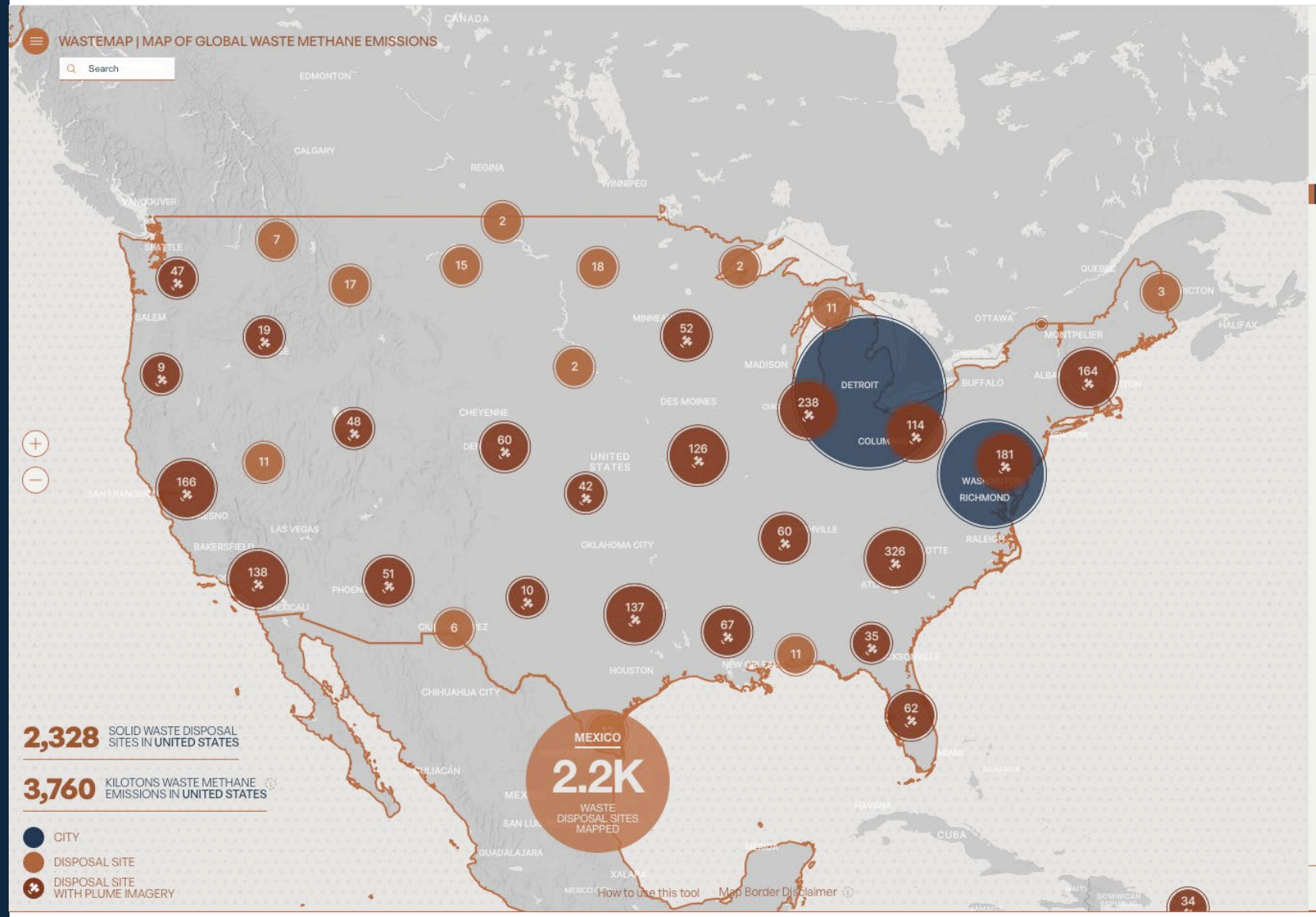
- Fugitives
- Venting
- Flaring

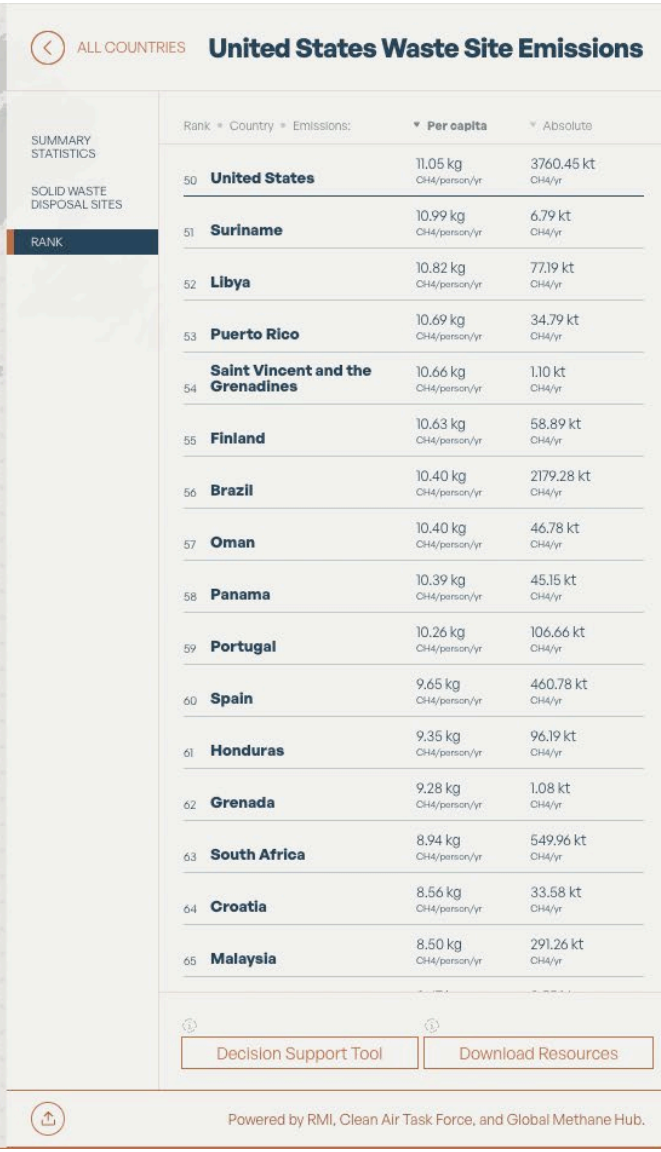
Targeted Actions

- Policy
- Certification
- Regulation
- Fiscal measures
- Decommissioning

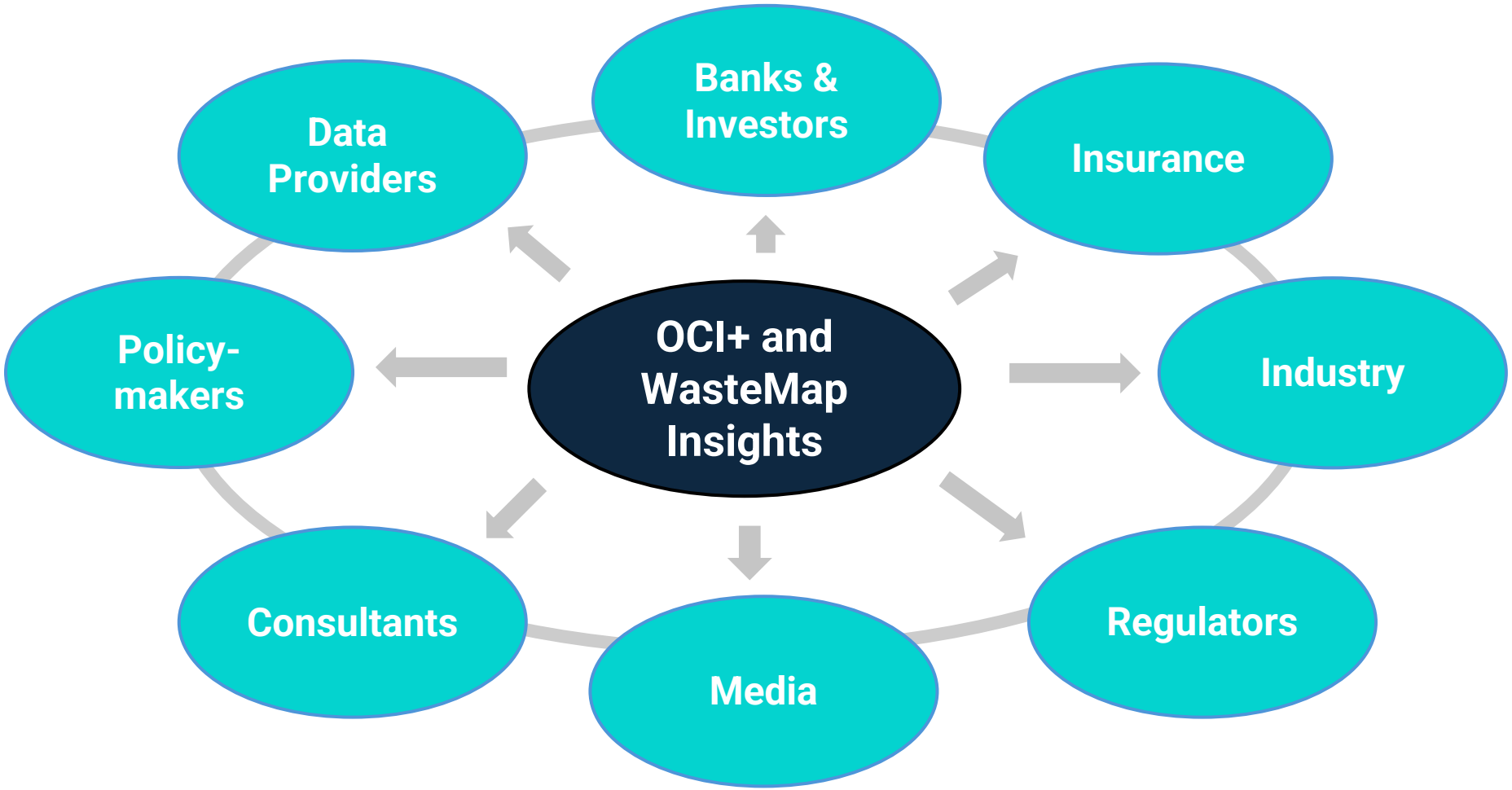


WasteMap Decision Tool





Different actors are involved in methane abatement.



Thank You!