

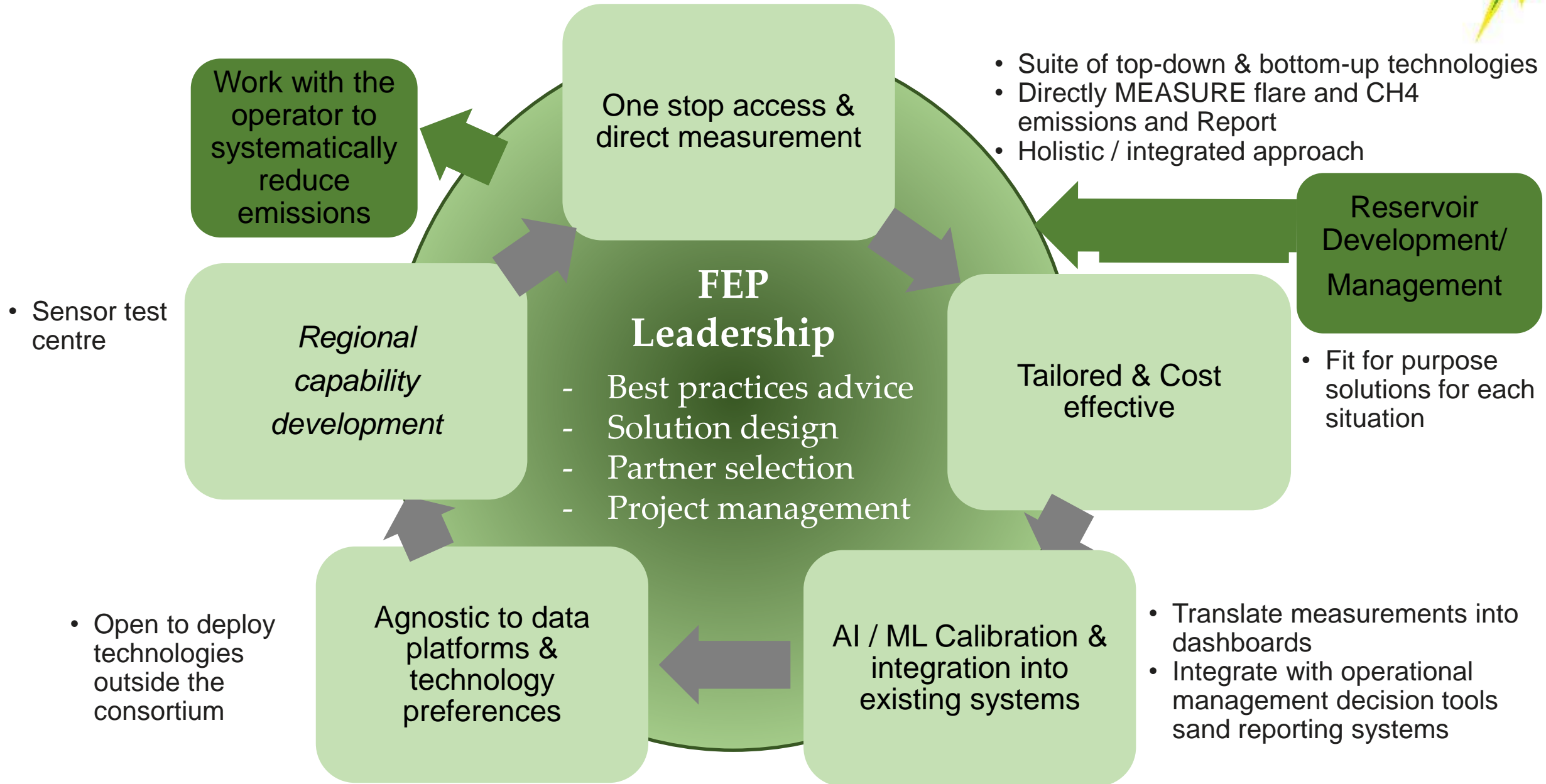


Energy solutions for a changing world

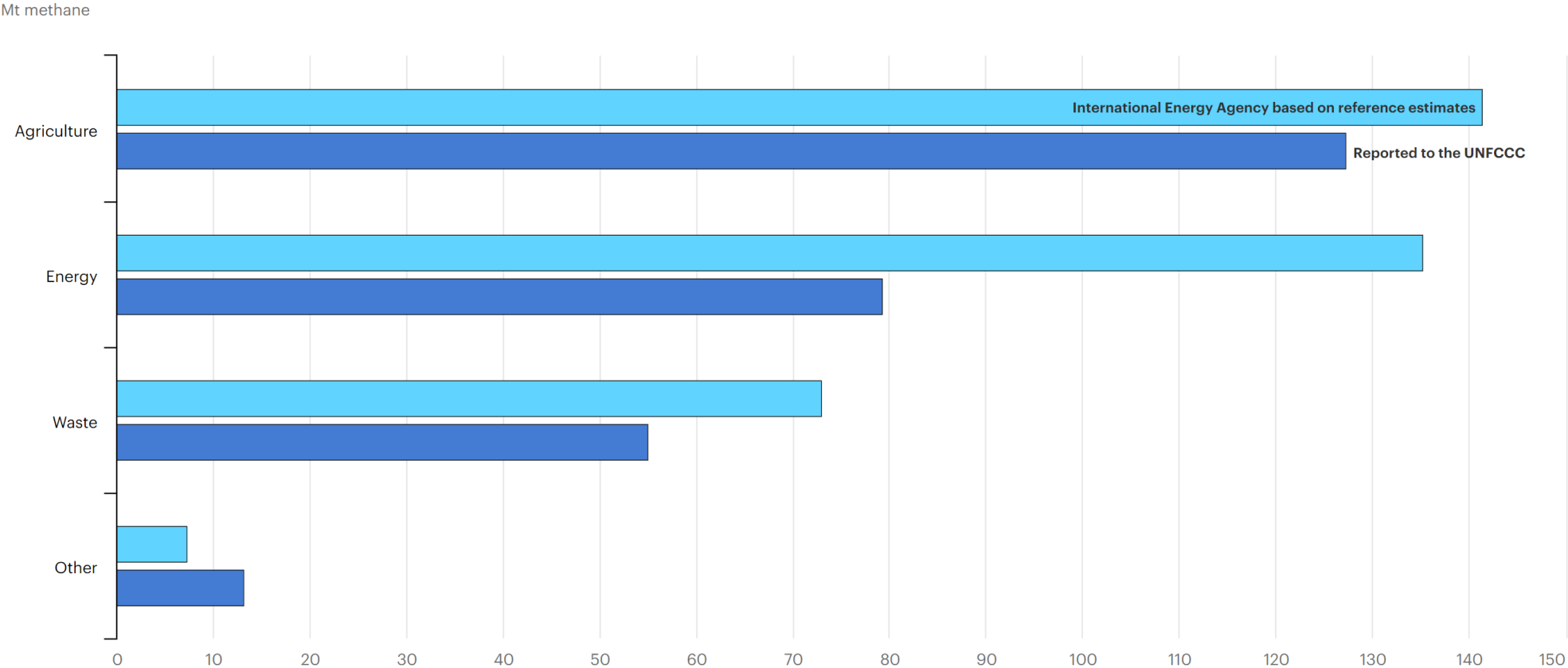
*Measuring and Eliminating Flaring & CH<sub>4</sub> emissions*

*IMM Rotterdam  
June 8<sup>th</sup>, 2022*

# Overview Proposal & Value Proposition

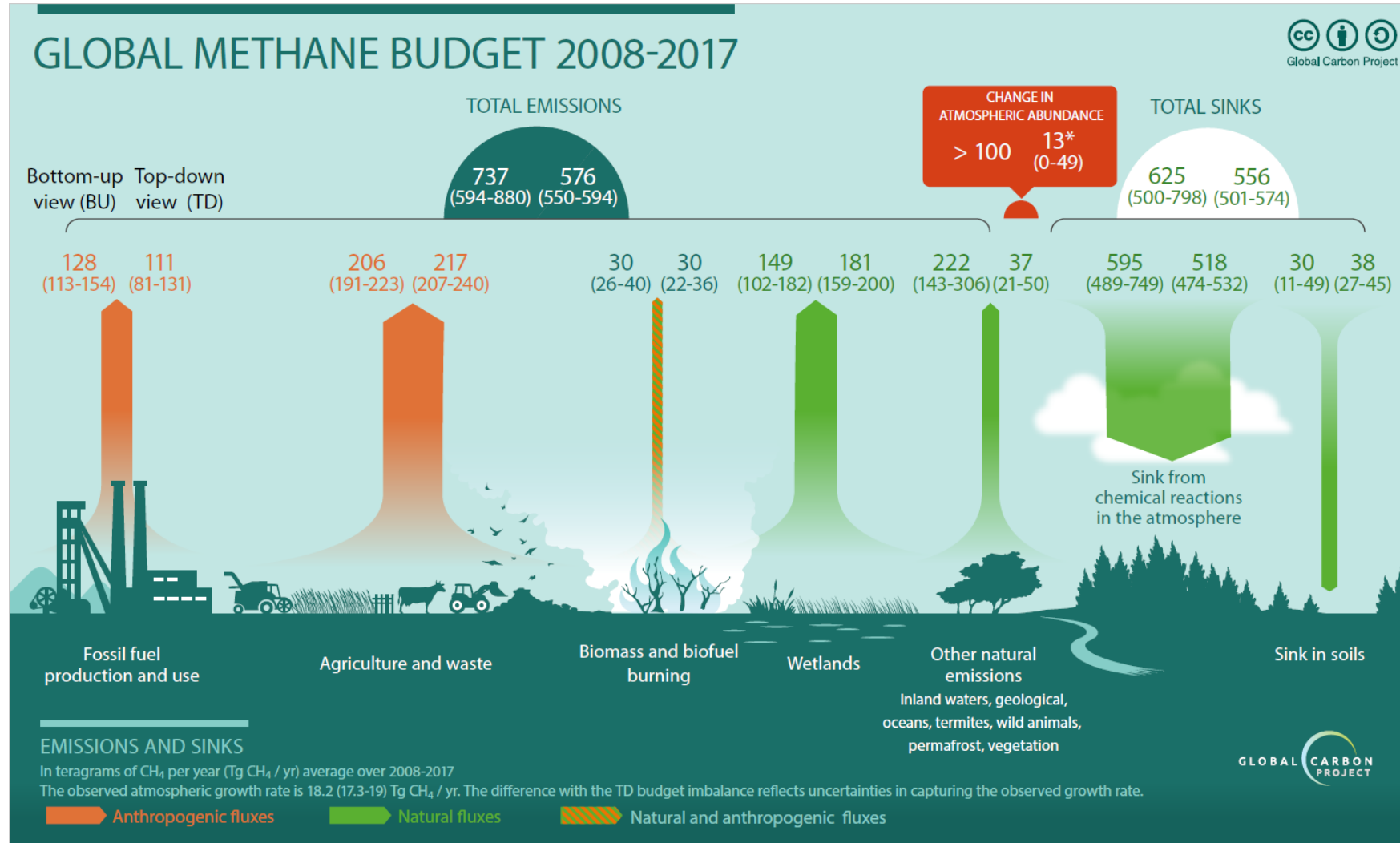


# Reporting of Methane- IEA 2022



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# The Methane Budget

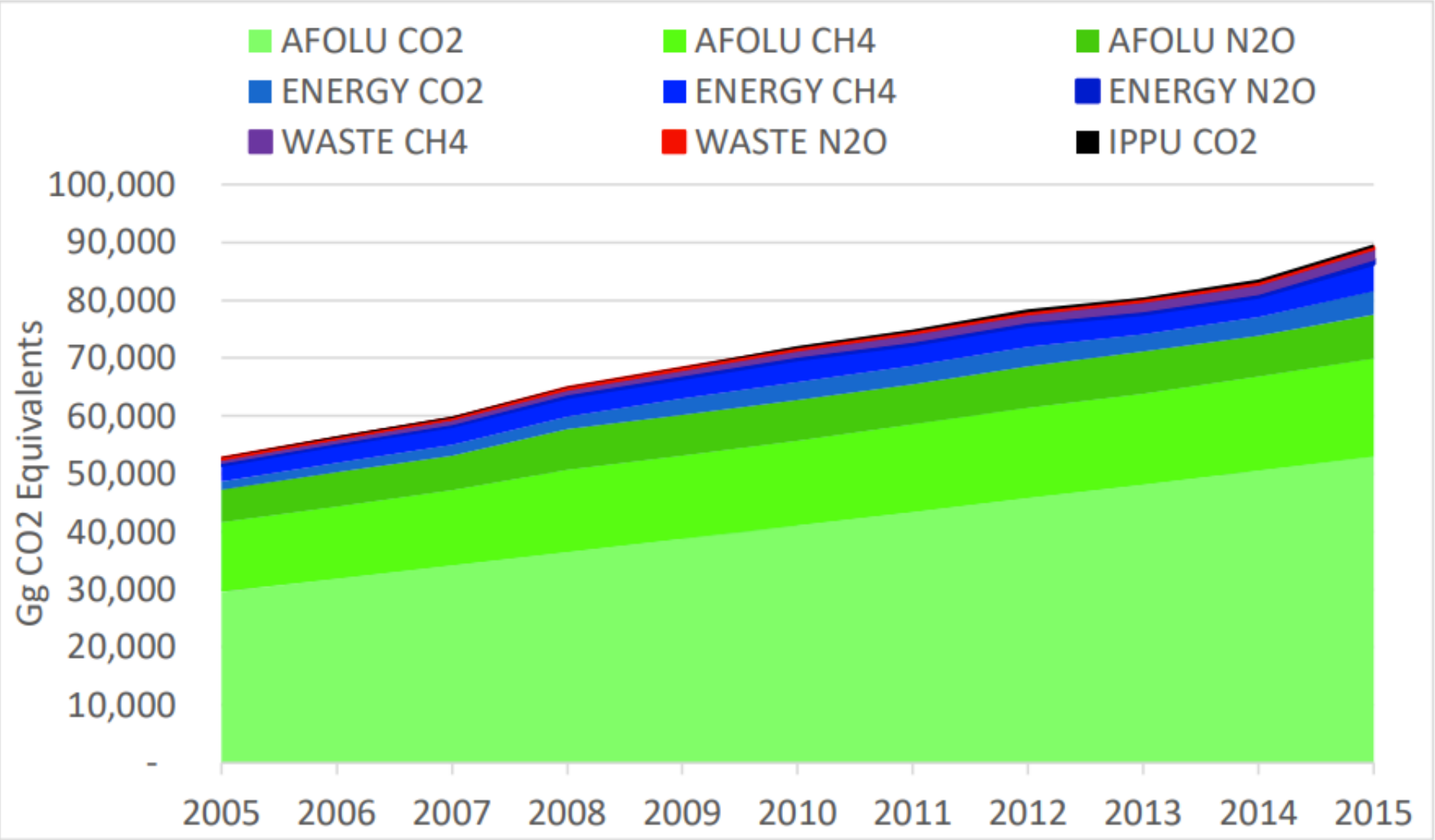


## Biomass

Measured emissions (ranging from 5–28 mg m<sup>-2</sup> hr<sup>-1</sup>) were found to be an order of magnitude greater than those simulated by land surface models (ranging from 0.6–3.9 mg m<sup>-2</sup> hr<sup>-1</sup>), suggesting much greater emissions from tropical wetlands than currently accounted for.

<https://doi.org/10.1029/2021GB007261>

# Uganda GHG Inventory Report 2019



MWE. (2019). Uganda’s First Biennial Update Report to the United Nations Framework Convention on Climate Change. Ministry of Water and Environment, Kampala.

# Greenwashing?



- The environmental, social, and governance (ESG) data provided in firms' sustainability reports is often **unaudited**. If ESG information disclosed by firms is not reliable, a firm's greenwashing behavior can be a barrier to integrating ESG factors into investment decisions.
- ..... “greenwashers” are firms which seem very transparent and reveal large quantities of ESG data but perform poorly in ESG aspects. By creating peer-relative greenwashing scores for a cross-country dataset comprised by **1925 large-cap firms**, we measure the extent to which large-cap firms engage in greenwashing.
- We find evidence that greenwashing behavior in ESG dimensions can be deterred by scrutiny from
  - (a) independent directors,
  - (b) institutional investors,
  - (c) influential public interests via a less corrupted country system, and
  - (d) being cross-listed. Our results suggest that the two firm-level governance factors are most effective at attenuating firms' misleading disclosure

<https://www.sciencedirect.com/science/article/abs/pii/S0275531919309523>

# The O&G Majors GHG Reporting 2020



Item\Company	A	B	C	D	E	F
1. 2020 GHG Report						
2. Linkage to 2020 Executive Remuneration						
3. ~3 Year GHG Ambitions						
4. Link to ~3 Year Executive Remuneration						
"Greenwashing" Overview						

Table 2 – FEP evaluation of European Majors 2020 GHG emissions report



	Clear - Comprehensive - Quantitative
	Debateable – Partial - Qualitative
	Questionable - Absent

Table 1 – FEP "traffic-light" system to identify European Majors 2020 GHG Emissions Reporting performance



# Methane Elimination Plans- BP



## Methane measurement

Our plans to install methane measurement at all our existing major oil and gas processing sites continued in 2021 with the ongoing installation of enhanced metering, software for flare efficiency and predictive emissions monitoring on gas turbines in line with our three-year timeframe.

At our US onshore operations we trialed new technologies for site level emissions detection and continued using drones and aircraft with methane sensors.

## Methane reduction activity

Across our US onshore operations, we are working to achieve zero routine flaring by 2025 or sooner. This includes installing air assisted flares to improve combustion efficiency and thermocouple sensors on all flare stacks that notify bp operations teams of unlit flares. All bpx flares have auto-ignitors to attempt to remotely reignite extinguished flames.

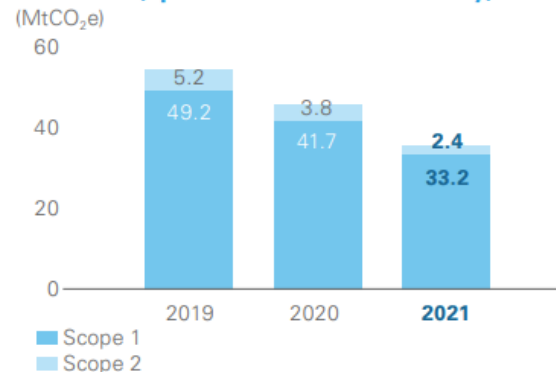
At a number of our North Sea assets, we made improvements such as optimizing the restart sequence of our operations and changing operational parameters to minimize the potential for flares to extinguish under high winds.

Our actions on methane reduction enable our businesses to capture value by supplying the gas to customers. Otherwise the gas would be wasted with both an economic loss and an adverse impact on emissions.

## Technology improvements

Technologies to detect and measure methane are evolving at pace. A flexible approach to using different technologies allows us to move towards increased continuous site and source-level measurement systems as more advanced technology becomes available. We use different methods, including drones, aircraft, satellites and fixed video monitoring. We continue to monitor emerging technologies to assess their potential as methane measurement tools.

## Scope 1 (direct) and Scope 2 (indirect) GHG emissions (operational control boundary)<sup>a</sup>



## Our progress in 2021

We made further progress against our operational emissions reduction targets in 2021. Our combined Scope 1 and Scope 2 emissions, covered by aim 1 were 35.6MtCO<sub>2</sub>e, a decrease of 35% from our 2019 baseline of 54.4MtCO<sub>2</sub>e.

The total decrease of almost 19MtCO<sub>2</sub>e includes 14.7MtCO<sub>2</sub>e in divestments and 2.6MtCO<sub>2</sub>e in sustainable emission reductions (SERs)<sup>b</sup>.

Compared with 2020 (45.5MtCO<sub>2</sub>e), Scope 1 and 2 emissions in 2021 decreased by 22%.

This means that while we have exceeded our 2025 target, we have more work to do to achieve our overall net zero aim by reducing emissions while bringing new projects online.

Scope 1 (direct) emissions, covered by aim 1, were 33.2MtCO<sub>2</sub>e in 2021, a decrease of 20% from 41.7MtCO<sub>2</sub>e in 2020. Of those Scope 1 emissions 32.0MtCO<sub>2</sub>e were from CO<sub>2</sub> and

1.1MtCO<sub>2</sub>e from methane<sup>c</sup>. Emissions decreased due to divestments, delivery of SERs and other permanent operational changes.

Scope 2 (indirect) emissions decreased by 1.4MtCO<sub>2</sub>e, to 2.4MtCO<sub>2</sub>e in 2021, a 37% reduction compared with 2020. This decrease resulted from lower carbon power agreements, including at our Gelsenkirchen site, and the divestment of our petrochemicals business at the end of 2020.

In 2021 compared with 2020:

- Divestments accounted for 9.3MtCO<sub>2</sub>e of the Scope 1 and Scope 2 emissions decrease including the divestment of our operations in Alaska, our petrochemicals business and bpx energy divestments.
- The delivery of SERs reduced Scope 1 and 2 emissions by 1.6MtCO<sub>2</sub>e (in addition to the 1MtCO<sub>2</sub>e delivered in 2020).
- Other permanent reductions in 2021 included the repurposing of Kwinana refinery (0.7 MtCO<sub>2</sub>e. reduction) and cessation of production at Foinaven FPSO (0.2 MtCO<sub>2</sub>e. reduction).
- Temporary production-related changes accounted for an increase of 1.1MtCO<sub>2</sub>e associated with higher activity levels, particularly in refining, and temporary flaring increases in 2021.
- Total hydrocarbons flared increased from 831kt to 967kt in 2021 due to operational variances including temporary flaring associated with a new production start-up.

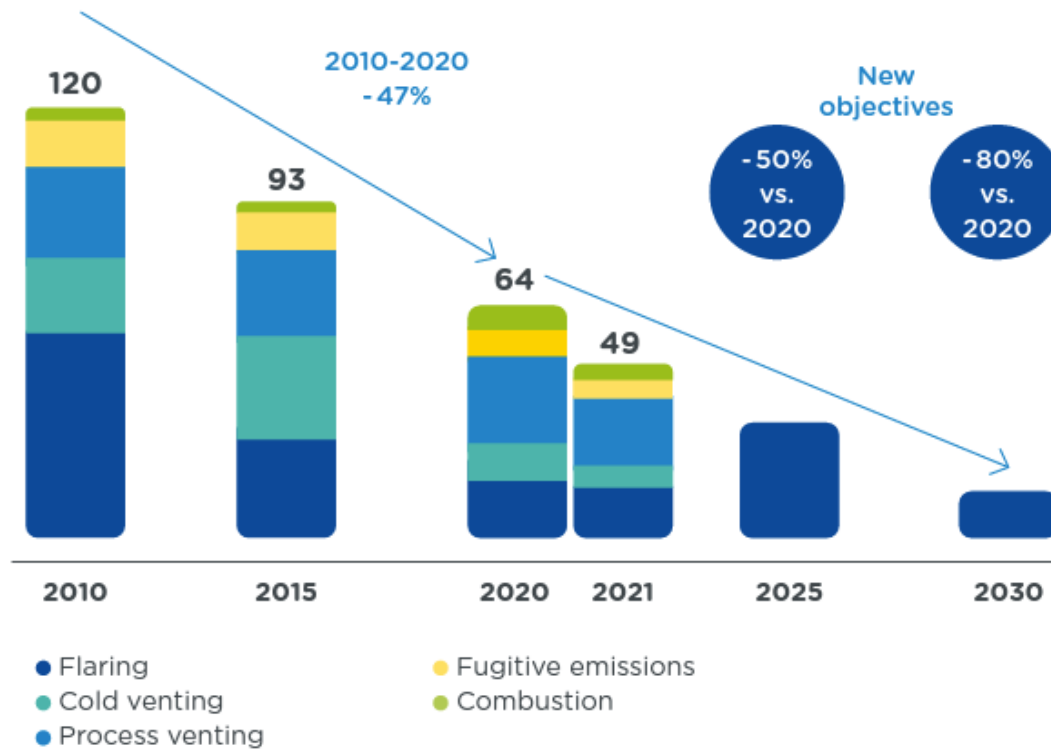


# TotalEnergies is Addressing Methane Emissions



## METHANE EMISSIONS (OPERATED)

In kt CH<sub>4</sub>



## Measuring methane emissions more accurately

Methane emissions have numerous and dispersed sources. TotalEnergies is a pioneer in detecting and quantifying emissions across the entire value chain.

The Company operates a site for testing methane emissions measurement technology. Known as the TADI complex<sup>2</sup>, it is unparalleled in Europe; only one comparable site exists worldwide, in the United States<sup>3</sup>.

In addition, TotalEnergies is speeding up deployment of its drone-mounted methane detection technology, AUSEA<sup>4</sup>, at all of its operated sites starting in 2022 (see sidebar).

Ausea consists of a miniature dual sensor mounted on a drone, capable of detecting methane and carbon dioxide emissions, while at the same time identifying their source.

# TotalEnergies Reported Methane Emissions



		Operated				Equity Share			
GHG EMISSIONS		2021	2020	2019	2015	2021	2020	2019	2015
Scope 1 – Direct GHG emissions	Mt CO <sub>2</sub> e	34* (33)	38* (36)	41	42	49	52	55	50
Methane emissions	kt CH <sub>4</sub>	49	64	68	94	51	-	-	-
<b>BREAKDOWN BY PRODUCT</b>									
Upstream Oil & Gas Operations	kt CH <sub>4</sub>	48	62	66	92	48	-	-	-
Integrated Gas, Renewables & Power, excluding upstream gas operations	kt CH <sub>4</sub>	<1	<1	<1	0	2	-	-	-
Refining & Chemicals	kt CH <sub>4</sub>	1	1	1	1	1	-	-	-
Marketing & Services	kt CH <sub>4</sub>	0	0	0	0	0	-	-	-
<b>BREAKDOWN BY REGION</b>									
Europe: E.U. 27 + Norway + UK + Switzerland	kt CH <sub>4</sub>	7	12	15	9	5	-	-	-
Eurasia (including Russia)/Oceania	kt CH <sub>4</sub>	1	3	3	33	16	-	-	-
Africa	kt CH <sub>4</sub>	23	31	39	49	18	-	-	-
Americas	kt CH <sub>4</sub>	18	18	10	3	12	-	-	-



## Current realities!

- The Oil & Gas Industry is under intense scrutiny regarding GHG Emissions and Flaring:
- Of all locations, the Permian Basin of Texas and New Mexico is the one most under the spotlight:
- ***And yet, under-reporting by companies operating there – not just by a few % but by at least several 10s of %, sometimes much more, is widely observed in work by independent bodies (using satellites, fixed wing aircraft etc).***
- By extrapolation, we might assume that under-reporting of GHG Emissions is a problem across all industries....



# Must do better!

## ‘Public’ Reporting:

- Found in Annual Reports, Sustainability Reports, sometimes on Websites:
  - Majors = Reasonably comprehensive but diverse, heterogeneous
  - E&Ps = with one or two exceptions, partial, incomplete, non-existent
  - ‘Foundation Industries’ = indistinguishable from E&Ps

## ‘Bottom-up’ Reporting:

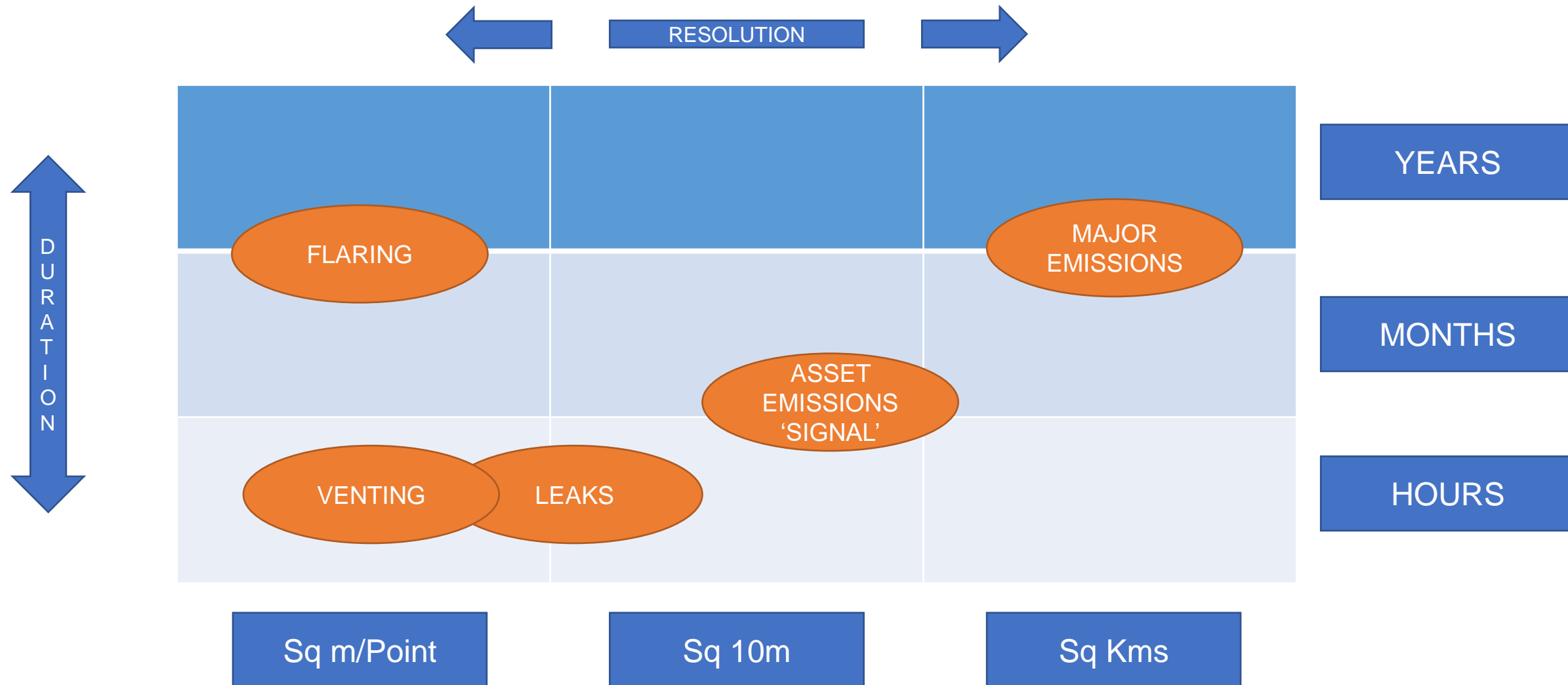
× Usually based on ‘engineering estimates’, not operational measurements

?? How can a company Measure - and thus accurately Report - Operated (and Equity) flaring and GHG emissions?

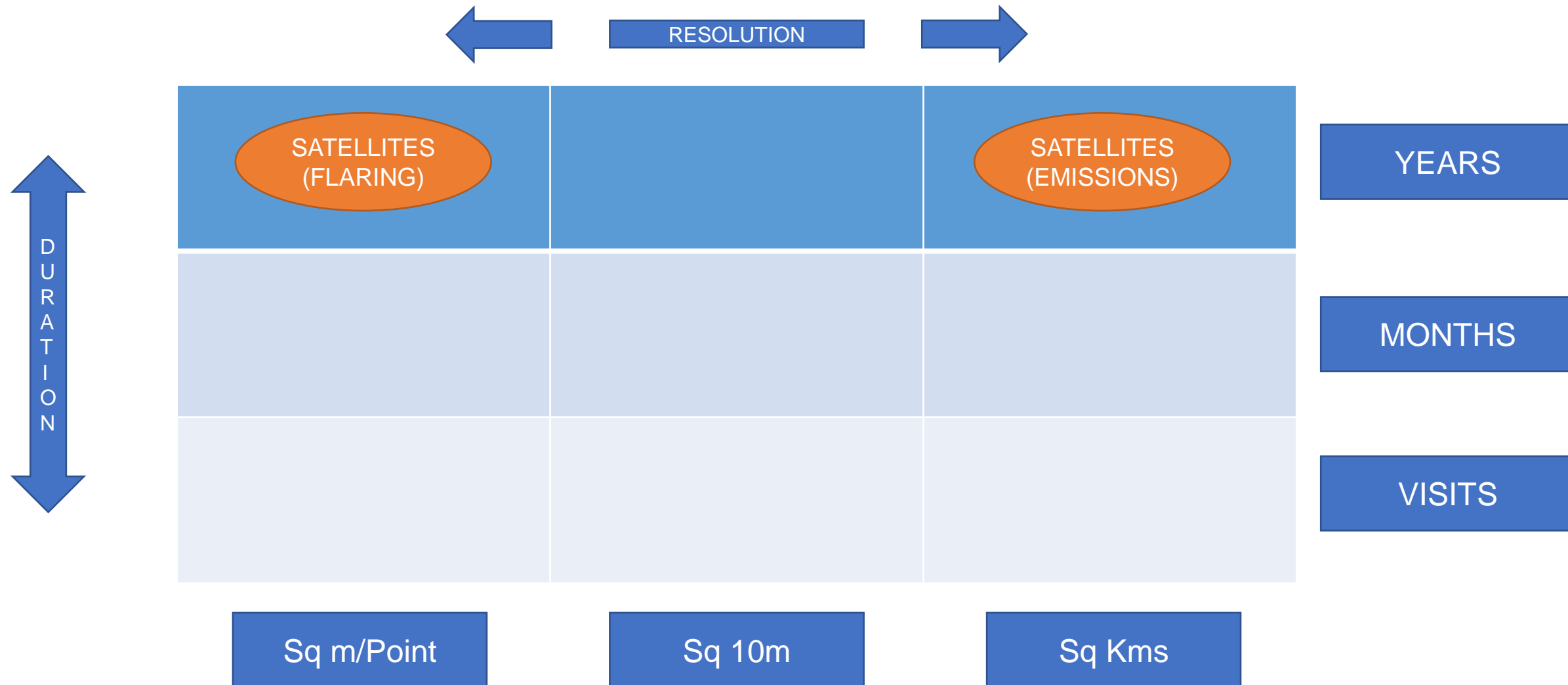
?? How can a company accurately document – and report – GHG emissions within its Supply Chain?

***Without reliable measurement, how can Mitigation plans and promises be assessed and delivered?***

# Temporal & Spatial Dimensions of monitoring & measurement

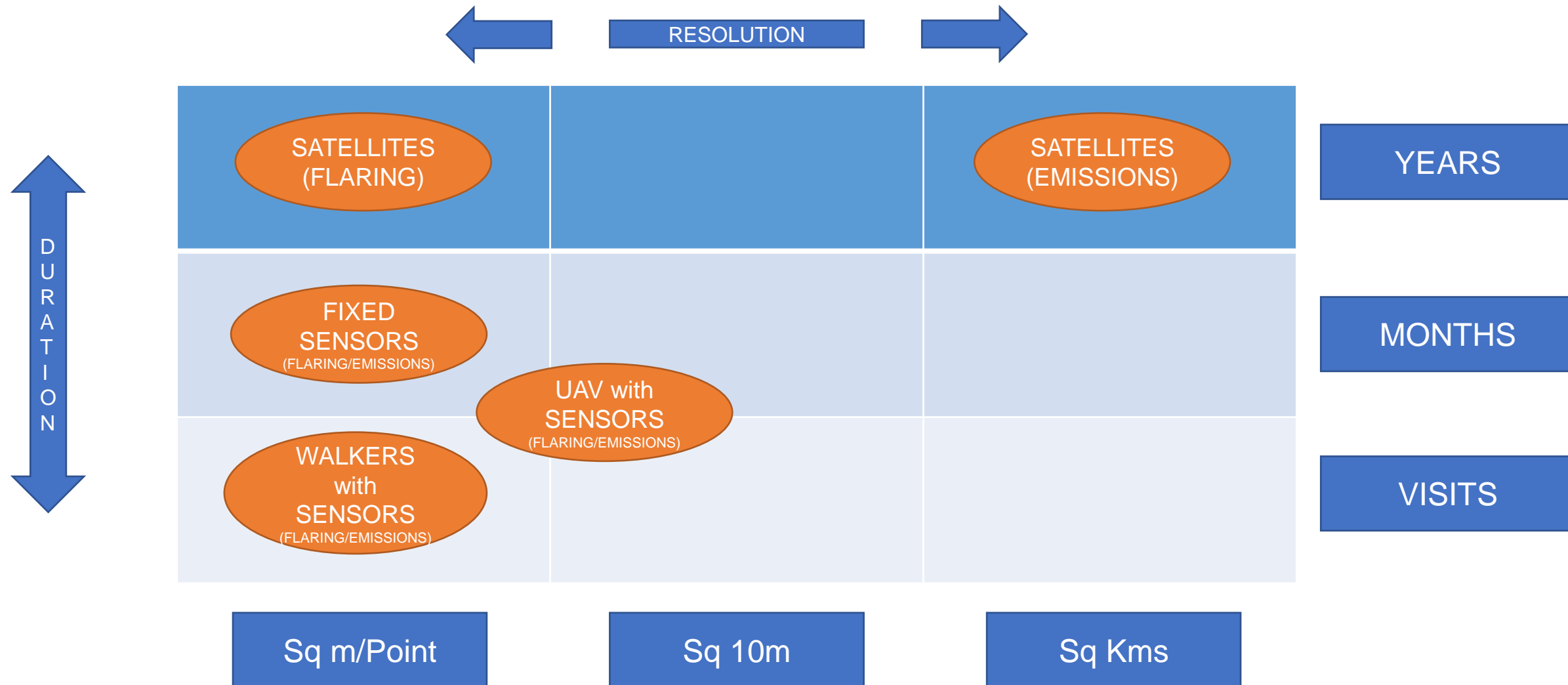


# Temporal & Spatial Dimensions of monitoring & measurement

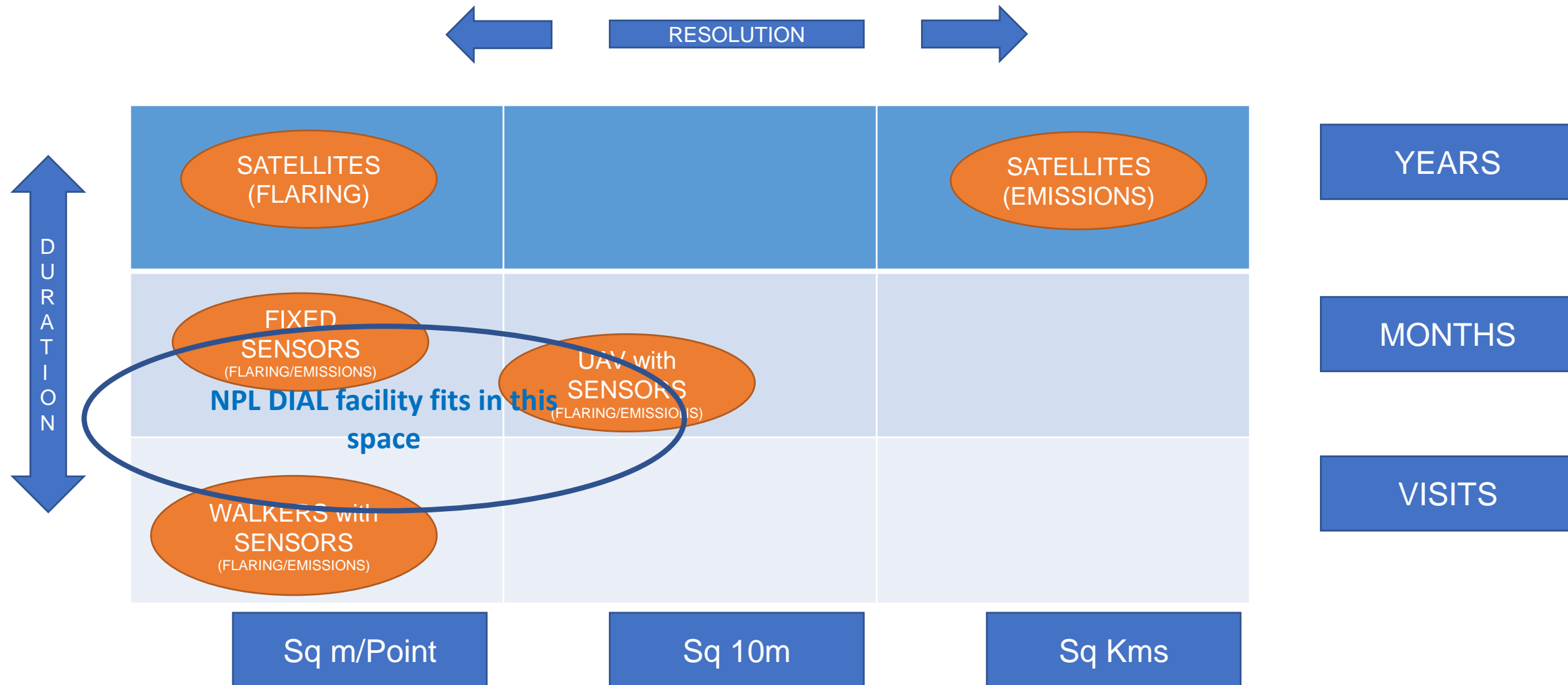




# Temporal & Spatial Dimensions of monitoring & measurement



# Temporal & Spatial Dimensions of monitoring & measurement



# Digital Technologies



Digital Twin



Geospatial Intelligence



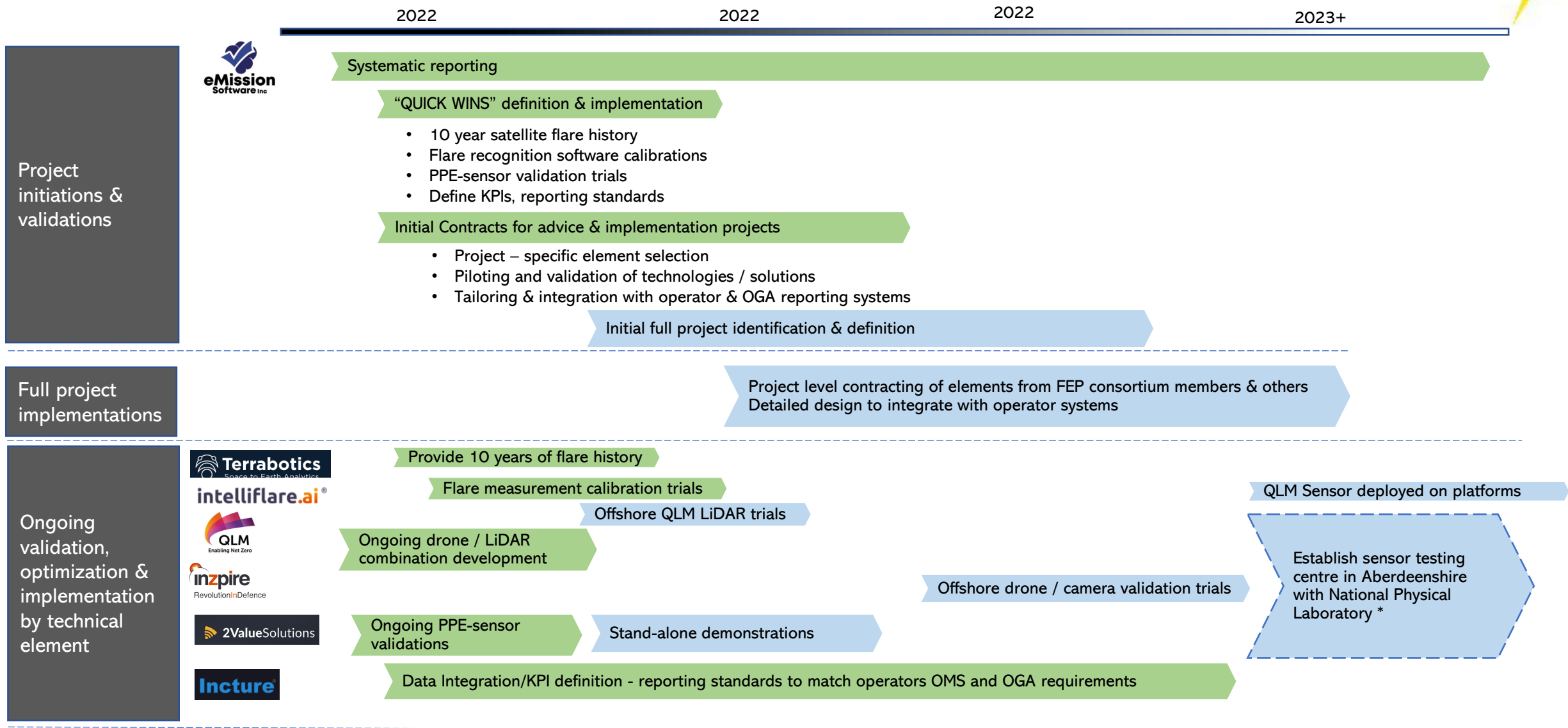
Control Centre



Physical Measurement to Digital Integration

Integrated Digital to Actionable Display

# Future Energy Partners Flaring & Venting Outline Program



\* Sensor testing centre is subject to funding.

# Conclusion



- What gets measured gets done!
- Reporting needs simplification and consistency and \$\$\$



Energy solutions for a changing world

*Measuring and Eliminating Flaring & CH<sub>4</sub> emissions*

*Thank you!!*