

Top-Emitters

IMEO has developed a Top 50 Emitters list identifying the largest methane sources worldwide through MARS. The aim of this list is to support and prioritize mitigation efforts at locations where emission reductions can have the greatest impact.

The Top Emitters list is generated through queries to the [Eye on Methane data platform](#). The query sorts and selects the top 50 most well-known (persistence uncertainty ≤ 0.15) persistent sources (persistence ≥ 0.4) with the largest emission flux rates. The list is updated monthly on the Eye on Methane data platform. For detailed explanation of the underlying metrics, refer to the [MARS Technical Documentation](#).

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Shared information

The information below summarises the content of the table of the Top 50 Emitters (*unep_methanedata_topemitter_sources*).

Column name	Definition	Type	Example
Country	Name of the country where the source is located	string	United States of America
Sector	Industry sector of the emission source (e.g., 'Oil and Gas', 'Waste', 'Met Coal', 'Thermal Coal', 'Thermal and Met Coal' or 'Other').	string	Oil and Gas
Potential Source Type	Category of the infrastructure or piece of equipment identified as the potential origin of the detected plume based on MARS analysts' visual inspection. If the infrastructure cannot be identified based on the available information, the label includes the suffix '(generic)'.	string	Flare
Source ID	ID of the source, formatted as {ISO3CD}_S_{number}*. The ID is consistent with the information in	string	ALG_S_002

* ISO3CD refers to the three-letter codes defined in ISO 3166-1 and the number is the 3-digit identification number.

** The timestamp of satellite observation in ISO 8601 format, which refers to a standardized way of representing the exact date and time when the observation occurred. The Time Zone is UTC.

	the interactive map of the Eye on Methane data platform.		
Latitude	Latitude coordinate of the source location (north-south direction) in decimal degrees (WGS84), rounded to 5 decimal places.	float	12.34567
Longitude	Longitude coordinate of the source location (east-west direction) in decimal degrees (WGS84), rounded to 5 decimal places.	float	12.34567
Number of plumes detected (2024-present)	Number of plumes attributed to this source since 2024 to present.	integer	12
Plumes notified (Y/N)	<p>Indicates whether a plume attributed to this source has been notified to the relevant government or facility operator:</p> <ul style="list-style-type: none"> • “Y”: At least one plume over this source has been notified. • “N”: No plumes on this source have been notified. <p>Note that only plumes emitted less than 15 days from detection are notified. Since 2024, ll oil and gas sector plumes that meet this criteria are notified. Certain coal and waste sector sources with rapid mitigation potential (e.g., malfunctioning flares) are notified from May 2026.</p>	string	Y
Feedback received (Y/N)	<p>Combined feedback status from both operator and government:</p> <ul style="list-style-type: none"> • "Y": feedback received from either operator or government (or both). • "N": no feedback received from either operator or government. 	string	Y
Av. half-year flux rate (t/h)	Mean methane emission rate estimated from all plumes attributed to the source over a rolling 6-month period, expressed in tonnes per hour (t/h) and rounded to 2 decimal places.	float	1.23

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Av. half-year flux rate std. dev. (t/h)	Standard deviation of the methane emission rate estimated from all plumes attributed to the source over a rolling 6-month period, in tonnes per hour (t/h) and rounded to 2 decimal places.	float	0.12
Av. annual flux rate (t/h)	Mean methane emission rate estimated from all plumes attributed to the source over a rolling 12-month period, expressed in tonnes per hour (t/h) and rounded to 2 decimal places.	float	1.23
Av. annual flux rate std. dev. (t/h)	Standard deviation of the methane emission rate estimated from all plumes attributed to the source over a rolling 12-month period, in tonnes per hour (t/h) and rounded to 2 decimal places.	float	0.12
Date of the last plume detected	Timestamp of the satellite observation in ISO 8601 format** for the last detected plume.	string (datetime)	2020-01-01T12:00:00
Half-year persistency category	<p>Categorical classification of emission frequency based on the half-year persistency:</p> <ul style="list-style-type: none"> • "Undetermined": insufficient observations. • "absent": no emissions detected, persistency is equal to 0. • "sporadic": persistency within the interval (0, 0.2]. • "frequent": persistency within the interval (0.2, 0.8]. • "persistent": persistency larger than 0.80. 	string	frequent
Half-year emission persistency	Estimates how often emissions are detected from a specific source over time. It looks at the number of times emissions were detected compared to the number of high-quality observations over the last 180 days. Values range between 0	float	0.65

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	and 1, or null if insufficient observations are available.		
Half-year persistency std. dev.	Standard deviation of the half-year persistency estimate. Values range between 0 and 1, or null if insufficient observations are available.	float	0.1
Annual persistency category	<p>Categorical classification of emission frequency based on the annual persistency:</p> <ul style="list-style-type: none"> • "Undetermined": insufficient observations. • "absent": no emissions detected, persistency is equal to 0. • "sporadic": persistency within the interval (0, 0.2]. • "frequent": persistency within the interval (0.2, 0.8]. • "persistent": persistency larger than 0.80. 	string	frequent
Annual emission persistency	Estimates how often emissions are detected from a specific source over time. It looks at the number of times emissions were detected compared to the number of high-quality observations over the last 365 days. Values range between 0 and 1, or null if insufficient observations are available.	float	0.65
Annual persistency std. dev.	Standard deviation of the annual persistency estimate. Values range between 0 and 1, or null if insufficient observations are available.	float	0.1
Estimated half-year CH4 emissions (t)	Estimated total mass of methane emitted over the last 6 months, derived from the combination of the mean emission rate, the source persistency and hours in a year, expressed in tonnes (t).	integer	12345
Estimated annual CH4 emissions (t)	Estimated total annual mass methane emitted, derived from the	integer	12345

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	combination of the mean emission rate, the source persistency and hours in a year, expressed in tonnes (t).		
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Additional considerations

The Top 50 Emitters list reflects the largest point-source emitters among those identified to date by MARS and is based on the most recent 6 months of observations. The ranking is derived from the emission persistence and average emission flux rate computed over that period. Because both metrics depend directly on the availability of high-quality, cloud-free imagery, the list is subject to seasonal and regional variability in observation conditions.

Strong seasonal cloud patterns in some regions can significantly reduce the number of observations for certain sources. When the available data falls below the minimum threshold required to estimate persistence, those sources cannot be included in the ranking—not because they are minor emitters, but because MARS lacks sufficient recent observations to characterize them. Other parameters that can also create a seasonality effect or affect observation frequency include, for example, the solar zenith angle, which can affect surface radiance levels, influencing the probability of detecting emissions, especially in offshore and desert areas, or the surface type surrounding the source, e.g., desert regions with typically high observation frequency, vs. vegetated or heterogeneous with fewer available high-quality satellite images.

As a result, the Top 50 Emitters list should be interpreted as the set of major emitters that MARS is able to detect currently, given the most up-to-date and seasonally dependent data coverage.

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