Quick Take: Unpicking the alarming increase (despite some pockets of progress) in global gas flaring

A thought piece by capterio

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Gas flaring has again increased, driven by higher flaring intensity, indicating challenged operational performance.

Yesterday, the Energy Institute released its flagship *Statistical Review of World Energy*, a treasure trove of insights. We delve into the data on gas flaring, which is sourced from the World Bank.

Like our own data at Capterio, the World Bank's flaring estimates are derived from satellite detection of thermal anomalies caused by flares. This paper – our sixth annual independent analysis – includes insights that are shaped not only by extensive engagement with operators, investors, and governments, but also by our award-winning FlareIntel platform, which tracks every flare, for every asset, in every country – every day.

The headline: gas flaring[1] continued its upward trend in 2024, rising by 1.1% compared to 2023. This is particularly concerning because, according to the statistical review, oil and condensate production – the main driver of flaring – declined by 0.1%. As a result, the world's "flaring intensity" (flaring per barrel of oil, a measure of performance) increased by 1.2%.

The overwhelming majority of flaring occurs at upstream oil assets operated by oil and gas companies, though some also takes place at gas fields. However, flaring is not insignificant at downstream facilities – including refineries, terminals, and liquefaction or regasification plants. Readers may be interested that Capterio will soon publish a paper highlighting a 100-fold variation in flaring intensity across LNG plants worldwide.

Both the rise in absolute flaring and in flaring intensity are worrying – especially in the context of mounting global commitments. These include the World Bank's *Zero Routine Flaring by 2030* initiative (endorsed by over 100 entities), the 56 signatories to the Oil and Gas Decarbonisation Charter, and the 150 companies reporting under the Oil and Gas Methane Partnership.

Still, while the headline trend is disappointing, the picture varies significantly by region, country, company, and project. Many are making real efforts to cut flaring – and, as we highlighted in a recent paper, these actions are already delivering measurable emissions reductions. Notably, flaring by members of the Oil and Gas Climate Initiative (for operated assets[2]) continues to decline.

In total, global flaring and associated emissions reached 173 BCM in 2024 – comprising 159 BCM from flaring and another 14 BCM from unburnt gas due to incomplete combustion[3]. This represents a staggering value loss of around $31 billion annually (at

[1] One caveat on the figures provided above it the numerator (gas flaring) is here presented as *all* flaring. In previous years, we have presented the data for *upstream* flaring only. We however do not think that the distinction, whilst important, changes the narrative.
[2] Although, some of the reduction is inevitably driven by divestment of high flaring intensity assets, e.g. in Nigeria. Non-operated assets, however generally show greater challenges.
[3] According to the IEA's Global Methane Tracker: https://www.iea.org/reports/global-methane-tracker-2025/key-findings

modest "old Europe" prices of $5 per MMBtu) – gas that could otherwise power over 340 million average UK homes[4]. Moreover, it results in roughly 1 billion tonnes of CO_2-equivalent emissions. Figure 1 shows the decadal trends in flaring, oil production, and flaring intensity.

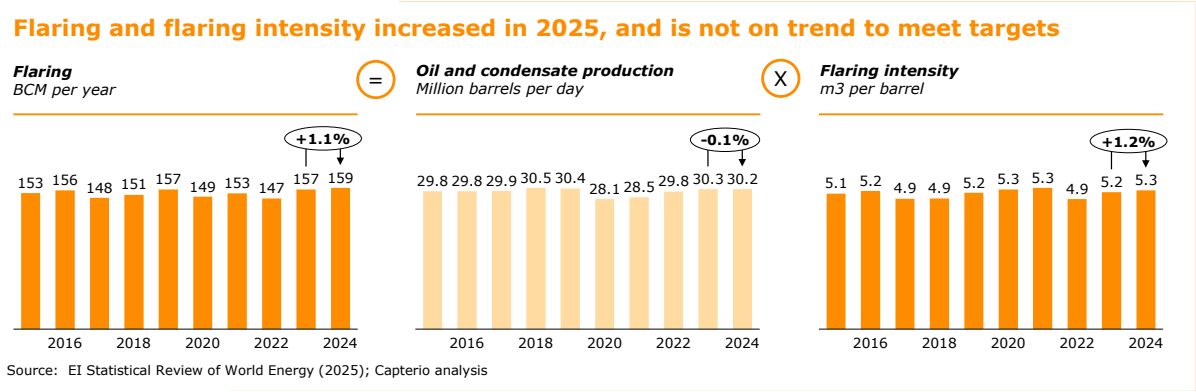

Figure 1: global gas flaring (derived by satellite), liquids production and calculated gas "flaring intensity". Gas flaring is materially increased, hinting at poorer operational performance.

A side note on the methodology used to quantify gas flaring: Flare volumes are estimated – by both the World Bank and independently by Capterio – based on thermal anomalies generated by the combustion of gas. These anomalies are compared against predictive models using the well-established principles of black body radiation across multiple wavelengths. Despite the solid underlying physics, flare quantification is technically complex. Flare signals can be obscured or dampened by atmospheric conditions such as cloud cover, making detection and analysis challenging. To address this, Capterio has developed a proprietary methodology that processes satellite data (with just a few hours' delay), quantifying both flaring activity and the impact of cloud interference. Capterio's FlareIntel platform integrates near-real-time flaring data with high-resolution satellite imagery and detailed base maps – including license blocks, field outlines, pipelines, power lines, liquefaction plants, and more. This comprehensive view helps companies, governments, financial institutions, and others enhance transparency, drive operational excellence, and identify investment opportunities to reduce flaring.

Dramatically reducing gas flaring is key to delivering net zero – indeed, the IEA has clearly demonstrated that there is no net zero without delivering on this critical metric. The good news is that reducing gas flaring is not only a "quick win" decarbonisation lever, but by capturing this wasted gas, companies can not only increase revenues and improve energy security, but also generate cash to support their energy transition and improve their ability to attract foreign investment and deliver health benefits.

Our recent paper with Columbia University "*Igniting Action to Reduce Gas Flaring: Real Opportunities, Real Projects, Real Results*" offers inspiration. In this paper we profile six flare reduction opportunities in countries ranging from Algeria, Angola, Argentina, Egypt, Kurdistan and Federal Iraq, and unpick the "story behind their story" that led to their success.

[4] For a helpful table that shows the equivalence of flaring volumes in terms of other units (value, volume, etc., please see our conversion tables). https://flareintel.com/insights/table-of-practical-conversion-factors

Country performance varies widely

As usual, the global story masks the details that differ by country – and within this – by asset. Figure 2 shows the global league table on an absolute basis (in Billion Cubic Metres of flared gas per year) and on a relative basis (i.e. flaring intensity).

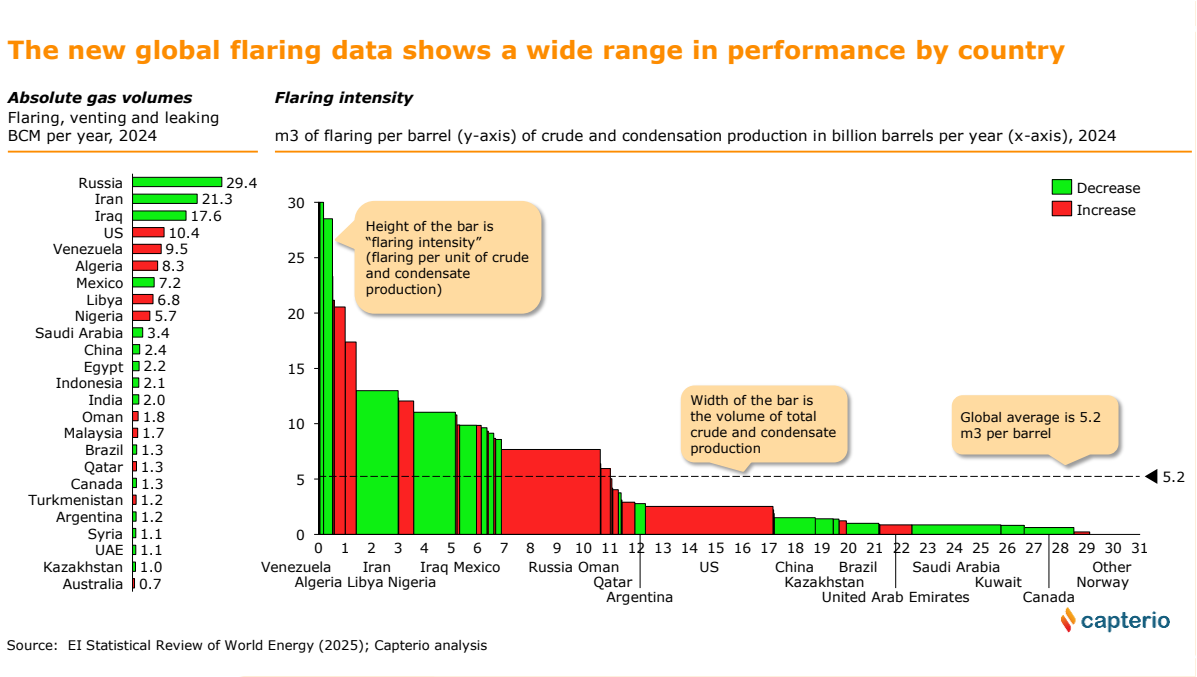

Figure 2: League table of gas flaring on an absolute basis (left chart) and a relative basis (right chart – here shown as flaring per barrel of crude and condensate production). There is a very large "span of performance" which is partly due to intrinsic properties of the oil and gas fields, but partly due to operational performance – which is a result of policy and practice.

The *absolute* flaring league table (Figure 2) has changed little over multiple years, with the largest countries in 2024 being Russia, Iran, Iraq, United States, Venezuela, Algeria, Libya and Nigeria and Mexico (although the order has changed at the margins). That said, flaring reduced in Russia, Iran, Iraq and Mexico but increased in US, Venezuela, Algeria, Libya and Nigeria.

Equally, the *relative* flaring league table (i.e. on a flaring intensity basis, which is a measure of operational performance) basis, still demonstrates a very large ranges in performance from Norway at 0.2 m3 per barrel to Venezuela at 123x higher, at 28.5 m3 per barrel. The low flaring intensity of, e.g. Norway, Saudi and UAE is to a large part attributable the implementation of anti-flaring policies – coupled with practices that monetise the otherwise-wasted gas – over decades. But since flaring intensity is a proxy for operational performance, increased flaring intensity is worrying.

For the most part, flaring intensity increased are likely to be driven by poorer operational performance (although some of the increase may reflect something more positive –

namely an increased combustion efficiency of existing flares, or the conversion of vents to lit flares[5]).

Most countries with increased flaring show poorer underling "operational performance"

Diving into the detail, the largest increases in flaring were observed in the US, Nigeria, and Libya – partially offset by reductions in Mexico, Iran, and Russia (Figure 3). Notably, flaring in the US has risen consistently over the past two years, making it the only country in the top five with this trend.

Equally important is understanding the underlying drivers of this increase. For instance, was the rise in flaring due to higher production levels, or a deterioration in operational performance? To answer this, we decompose the change in flaring into two components: changes in oil production and changes in flaring intensity. The results, shown in Figure 3, are as revealing as they are thought-provoking.

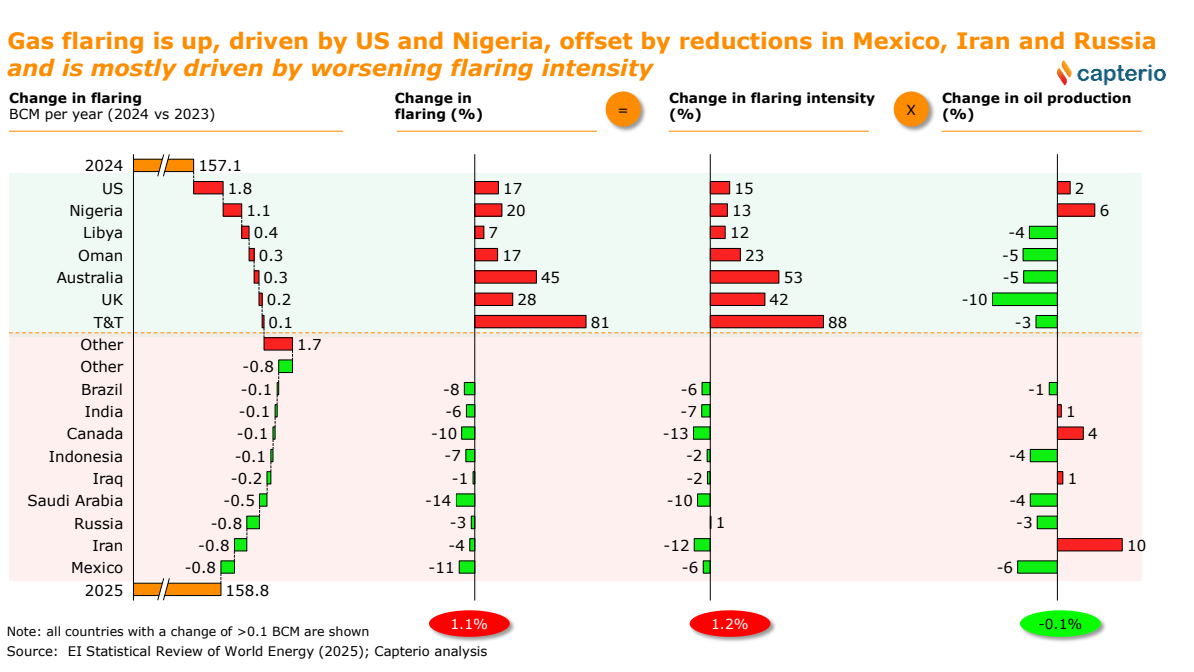

Figure 3: Analysis of the change in flaring in 2025 vs 2024 by country, showing only the countries with changes greater than 0.1 BCM per year (i.e. 10 million scf/day). For each country, we have decomposed the change in flaring to a change in flaring intensity and a change in liquid production (its primary driver). The majority of countries that have increased flaring have done so, at least in part, by degradation in their operational

[5] For completeness, we also acknowledge – but we believe, allay – an important concern. Flaring as measured by the World Bank (or indeed, independently by Capterio) is determined from the thermal anomaly associated with combustion. One possible alternative explanation for higher flaring intensities is that the combustion efficiency of flares has increased. Globally, the IEA estimates the weighted average flare has a 92% combustion efficiency (although we suspect it is lower). However, we substantially rule this out.

performance (flaring intensity). Note that in some countries, the change in (weighted average) "flaring intensity" actually reflects a change in the mix of assets with low vs high flaring intensity.

Take the US. Flaring is up 17% whilst underlying crude oil and condensate production is only up by 2%, so suggesting that the underling flaring intensity (a proxy for "operational performance") has become poorer by 15%.

We suspect that this reflects in part challenges to developing gas gathering and transport infrastructure (such as the 580 km Matterhorn Express Pipeline which became operational in September 2024) quickly enough to keep pace with production (which, in the Permian basin, increased by 8% in 2024 versus prior year), coupled with a general increasing in the "gassiness" of shale oil in the Permian basin. Interestingly, the Texas Railroad Commission approved materially more flaring exemption requests early in 2024, triggered in part by the low (sometimes negative) prices for gas.

Nigeria's surge in flaring was driven by dramatic increases in flaring at onshore assets, partly linked to the trends of divestment by international majors, leading to exploitation by local companies with less stringent environmental and reporting requirements.

Since this paper is a "quick take", a subsequent paper will detail our insights into some of the other major countries identified.

Wider implications and opportunities

The economic and environmental impact of gas flaring is substantial, and action is needed quickly to reduce emissions while also improving energy security, energy access, and pollution. Based on our extensive work with companies over many years, we believe that flaring can be solved with proven technology *and* create commercial value. Whilst there are many *perceived* "blockers", we believe that most can be overcome.

Encouragingly, we observe that countries with enduring policies and enforcement by credible and independent regulators (e.g. Saudi Arabia, UAE and Norway) do particularly well on this flaring intensity. Norway has an implicit carbon price embedded in its anti-flaring policy, and for good reason, as flared gas can be put to productive use that creates real economic value (and reduces emissions).

Conversely, countries with very high flaring intensities are not always stable politically and/or often do not adopt strong processes or policies. Nigeria, for example, has a punitive flaring penalty equivalent to $38 per tonne, however public data suggest that only 25% of flaring penalties are collected (and anyway, they are tax deductible). Similarly, Algeria's flaring penalty (some $49 per tonne) appears not to be enforced by the semi-independent regulator.

Solutions fall into two camps: those where operational improvements reduce flaring (through better maintenance, equipment reliability, planning or process controls) and those where structural investments can be made.

Structural solutions/investments to capture the gas range from gas reinjection (for disposal, storage or Enhanced Oil Recovery), gas to pipe, gas to "virtual pipeline" (e.g. as Compressed Natural Gas or Liquefied Natural Gas), gas to power (for local oilfield operations, or for the grid) and as to other "exotic" solutions (such as vertical farming or cryptocurrency mining)[6].

Our June 2025 paper with Columbia University "*Igniting Action to Reduce Gas Flaring: Real Opportunities, Real Projects, Real Results*" showcases a range of successful flare capture projects and synthesises some major learnings that lead to a set of actionable recommendations for oil and gas companies, national oil companies, governments, regulators, financing entities and more.

Reducing flaring, however, will inevitably require collaboration across multiple parties in this complex ecosystem, including politicians, regulators, governments, operators, service companies, equipment manufacturers, consultants, funding bodies and consumers. It is likely that dramatic reform of political systems (to remove subsidies, and create incentives, build capacity and leadership) will also be required.

Above all, this challenge requires us to reform how we think about this topic and be creative about innovating quickly and working together across boundaries to share best practices and help out underperforming companies and countries with reform, cash and capabilities as required. Solving gas flaring is essential for achieving net zero, so now is the time to act.

[6] Strikingly, over 54% of all flared volumes are within 20 km of an existing gas pipeline or demand centre. Our research finds that significant volumes of this wasted gas is close to existing markets and can be captured with proven technology, can dramatically reduce greenhouse gas emissions (by up to 72%) and deliver very attractive commercial returns.