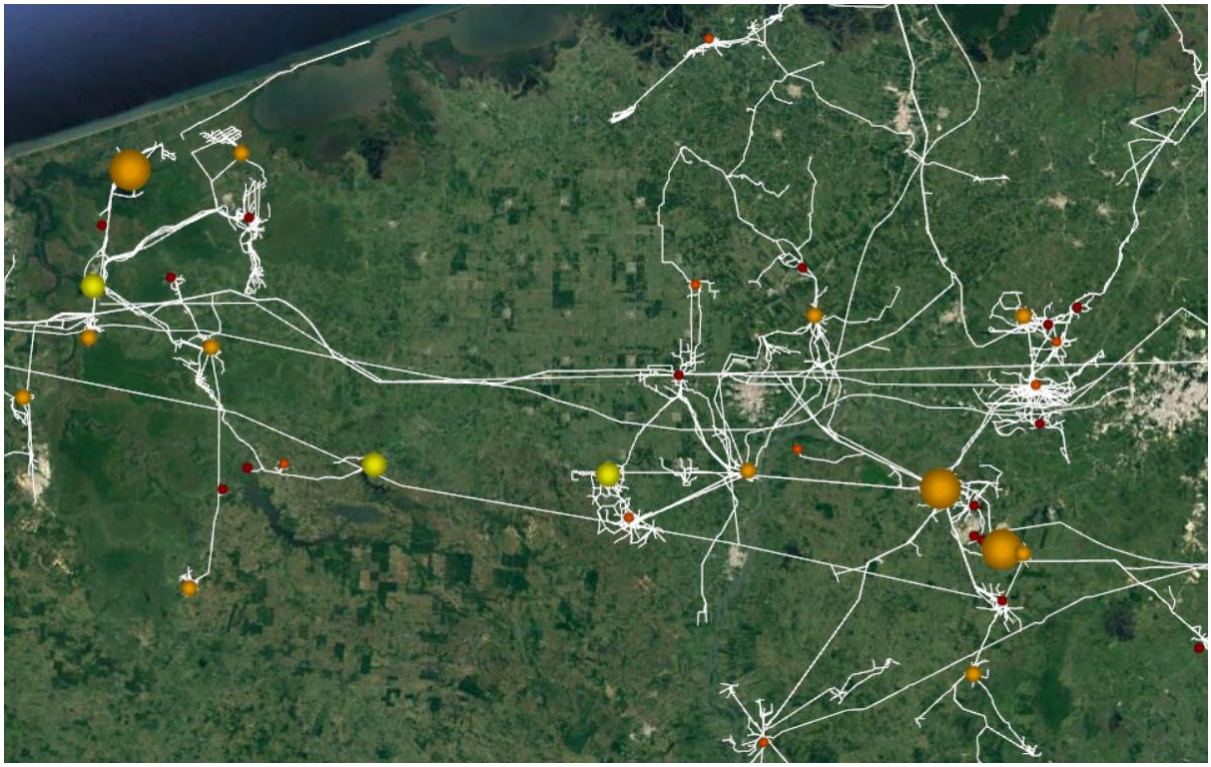

# We must minimise flaring gas near existing gas pipelines

A thought piece by capterio

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# Executive summary

- **Pipelines are one of the key solutions to tackling flaring. Our research highlights that 54% of the 150 BCM flared annually by the oil and gas industry is within 20 km of a gas pipeline, and is therefore by definition, close to a connection to a market.**

- **We are aware of many situations where pipelines have more than sufficient spare capacity to transport nearby flared gas profitably. The industry, therefore, needs to take a deeper look to explore how to leverage these existing networks and ensure that its capacity is optimised.**

- **A data-led approach, coupled with creative solutions and third-party access to existing infrastructure, will enable the oil and gas industry to create value and reduce emissions.**

## Today considerable flaring is close to existing gas pipelines

Gas flaring happens, we are often told, sometimes because of a lack of infrastructure. Whilst many flares are undoubtedly "stranded", and far from transport networks, our new research highlights a surprising fact. 54% of the volume flared is within 20 km of a gas pipeline. By definition, this gas has ready access to a market. And since pipelines are the simplest of gas monetisation options (both technically and commercially), it is time to take a deeper look to explore how we can better leverage existing infrastructure.

Our analysis compares the location of every gas flare (using data from our "Global Flaring Intelligence Tool", GFIT), with the location of every gas pipeline worldwide. For sure, significant flaring happens because the nearby gas pipeline lacks capacity (e.g. in the US Permian). But we can also cite many examples where flares are not only close to partly-full pipelines, but where it is also profitable to make the connection. There has even been a first-of-a-kind legal case where pipeline operator (Williams) filed a lawsuit against the regulator (the Texas Railroad Commission) for permitting a gas producer (Exco) to flare "needlessly". In an example of the “polluter pays” principle, Williams argued that Exco had a responsibility to recover the gas, even if it negatively impacted the economics of their main (oil) operation.

Given that short interconnecting flowlines are relatively cheap to build, in today's ESG-focussed world, flaring valuable gas – especially when it can be profitably recovered – is unsustainable. We must find solutions, and, if they require us to unlock "market dysfunctions" creatively, then surely, the answer is yes, we can.

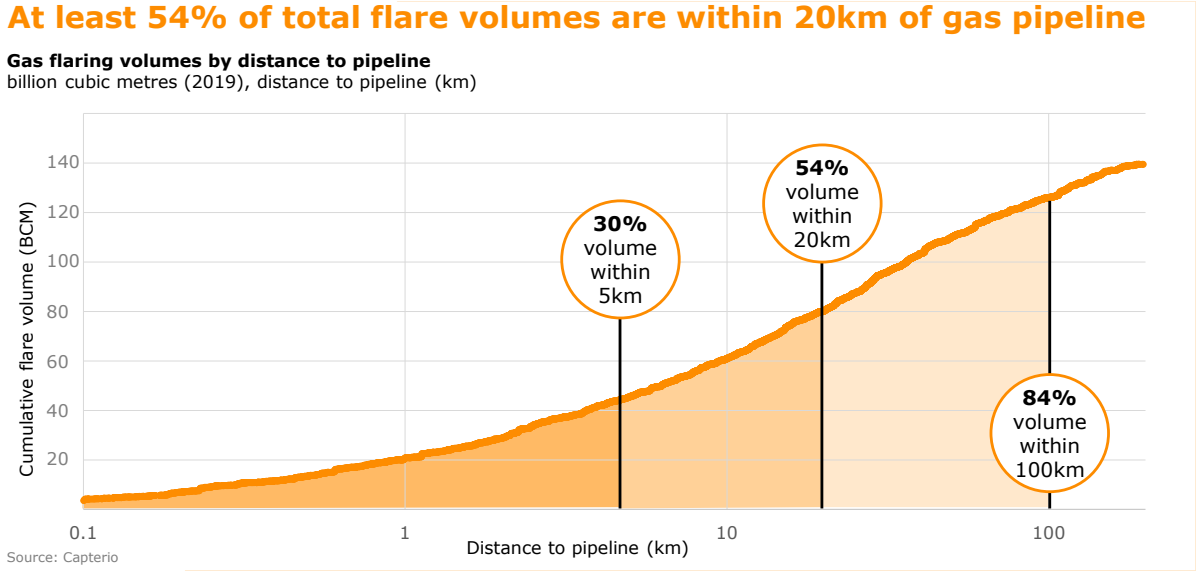


*Figure 1: Breakdown of minimum distance to the most proximal pipeline for all flares worldwide. We find that 80 BCM, 54% total flare volume, is less than 20 km from a pipeline.*

Some examples make this more tangible: in Egypt, a report for the EBRD in 2017 highlighted that 50% of gas flares are within 5 km of an existing pipeline (which is confirmed by our analysis). In Mexico (which features on our cover image), 90% of flared volumes are within 1 km of a gas pipeline. This dataset critically helps us to identify investable opportunities (see example below).

## Why do operators flare close to pipelines?

Our discussions with operators have illuminated why flaring occurs near existing gas pipelines, and – for the avoidance of doubt – it is rarely because operators lack the capabilities. Yet most of the challenges that do exist are inherently fixable, both technically and commercially. The five most common challenges are:

1. **Pipeline capacity is insufficient**. Capacity constraints are typical as pipelines are often full. The US Permian is a typical example (73% of companies survey by the Federal Reserve Bank of Dallas cited this reason). However, this is not universally true. Algeria, Libya, Ghana (to name a few) all have flaring near partly-full pipelines.

2. **Nearby flaring is underestimated or ignored.** For some operators, flaring is an "inconvenient truth" which they would rather not acknowledge (or worse, ignore or deny). For some, flaring is simply not measured (many NOCs and IOCs, for example, do not routinely meter their flares in many countries, including in the US Permian), and flaring is often underestimated. Yet commercial flare capture opportunities frequently materialise when the actual measurements are properly understood and a commercial case can be made.

3. **Other priorities take precedence.** In today's post-COVID capital- and resource-constrained environment, operators are often even more focussed on their core business (which is usually oil production). Typically, these companies prioritise delivering large projects and drilling wells over "non-core" activities such as capturing flares. Whilst many oil and gas companies may have strong balance sheets, most have strict capital allocation priorities, and most choose not to finance flare capture projects – even if they create positive net present value.

4. **Economics are not (perceived to be) attractive**. In some cases, even the presence of a nearby pipeline doesn't unlock development (which often requires the development of additional gas treatment and processing facilities). Economics can sometimes be challenged by low perceived volumes, low pricing (for gas, power, or other products), punitive fiscal regimes, inappropriate technology, suboptimal engineering design or costly internal processes. Some operators struggle to justify the investment required to treat and compress low pressure flares into high pressure pipelines.

5. **The market is not efficient, having challenges around access**, meaning that operators do not always "play nice". Some pipeline operators fail to offer reasonable tariffs for tie-ins; instead, they hold operators, who often want to do the right thing, to ransom.

Figure 2 below illustrates the data more specifically, highlighting the size of all 10,000 flares globally and their distance from existing pipelines. A key finding is that the largest volumes are indeed closest to existing gas pipelines.

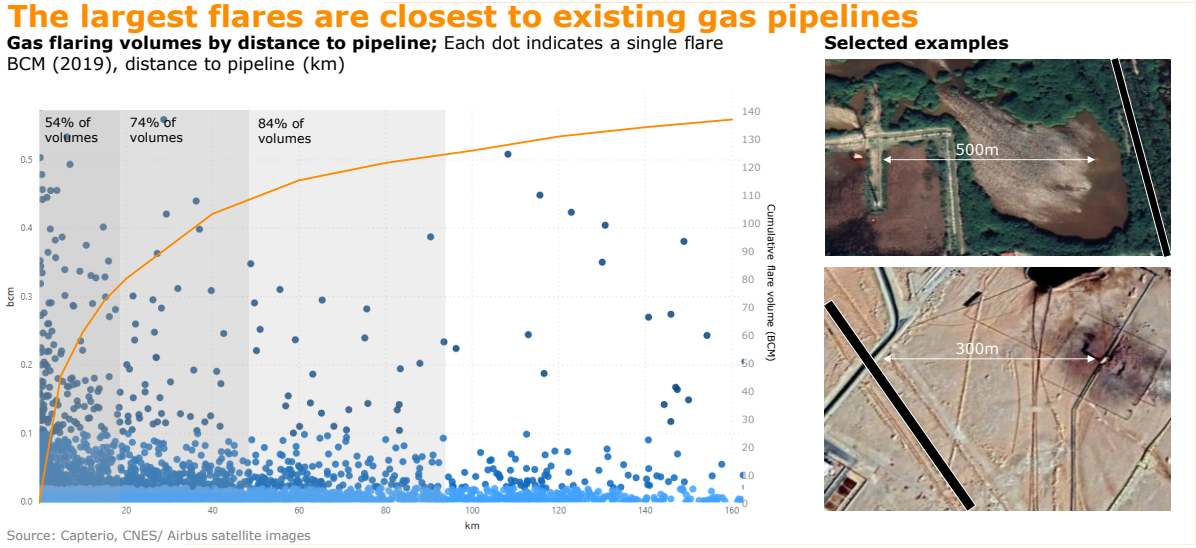


*Figure 2: Details on specific flare sites (with volume on y-axis) plotted against distance from the closest pipeline (x-axis). Satellite images show how close the example flares are from existing pipelines.*

## How can we capture flares close to pipelines?

We identify 5 practical approaches to reducing flaring through better use of existing pipelines and associated infrastructure:

- **Consider improving the existing pipeline capacity (or build a new one) to recover more gas**. Firstly, pipeline maintenance and compression should be checked to ensure that proactive maintenance programmes minimise shut-downs and keep pressures close to maximum design/safe operating limits. Secondly, pipeline throughput sometimes suffers from pressure drops due to liquid drop out that slugs the line – yet the hydraulics can often be improved by better gas pre-treatment and liquid removal. Thirdly, pipelines that have been derated (on safety grounds) could be potentially be retrofitted with a new internal liner that safely restores pressure ratings (and may improve throughput). Alternatively, some flaring is sufficient to justify the building of a new pipeline. Pipelines that run close to existing pipelines can benefit from cost savings (e.g. from sharing construction costs).

- **Improve regulatory oversight for metering, permitting, access and coordination.** Firstly, mandatory metering programmes should be instituted by regulators, especially since meters can be installed cheaply with no adverse impact on flow rates or safety. Secondly, by mandating developers to predefine gas utilisation plans before developing fields (as is now common in the US), regulators can create the right environment for gas pipelines to be built. Thirdly, regulators can remove barriers to entry and enabling third-party access to improve coordination. Where pipeline operators demand unfair or punitive tariffs in exchange for access, regulators should intervene. The UK's Oil and Gas Authority has does just that. Canada similarly has an arbitration process to ensure fair play.

- **Consider clustering flare developments** to drive economies of scale. Most operators are focussed on their own operations, and often they miss the opportunities for broader collaboration with others. Yet by using data from our "Global Flaring Intelligence Tool", we have identified clusters of flares which can be co-developed prior to being tied into existing pipelines. This regional approach is often a commercial gamechanger. The same lack of data also hinders pipeline operators; whilst they routinely optimise tie-ins and flowlines, they may not be fully aware of the broader upside from flare capture.

- **Engage new business and operating models using agile and specialist companies**. Many flare reduction projects require "small" investments and are "non-core", especially in a capital-constrained environment. To deliver flare capture projects, the industry needs more innovative, nimble, and efficient

approaches that bring third-party capital and resources. New agile and specialist players can bring innovative development concepts and commercial structures which themselves can unlock value (see a recent article).

- **Impose a carbon price on flaring** and venting. As the Williams vs Texas RRC case implies, there is an argument that profitable oil projects should be required, by the regulator, to bear for any additional costs required to transport flared gas into nearby pipelines – the so-called "polluter pays principle". An alternative approach would be to impose (and enforce, with independent and capable regulators) stronger penalties, or better, a price on carbon (as a penalty or a carbon credit). To ensure that flaring is not substituted by venting, carbon pricing must be levied on total CO2-equivalent emissions. A carbon price of $50 per tonne is equivalent to $2.62 per mmbtu – meaning that a rational operator would prefer to bear costs up to $2.62 per mmbtu than pay a carbon tax at $50 per tonne on CO2.

Figure 3 illustrates several of the concepts outlined above in a real case from the MENA region (which accounts for 40% of the world's flaring, see article). This field has been flaring at over 15 million scf/day for more than 8 years. Yet the project has a pre-tax NPV around $40 million, and a post-tax IRR of the order of 30%. We think this is attractive enough to merit action.

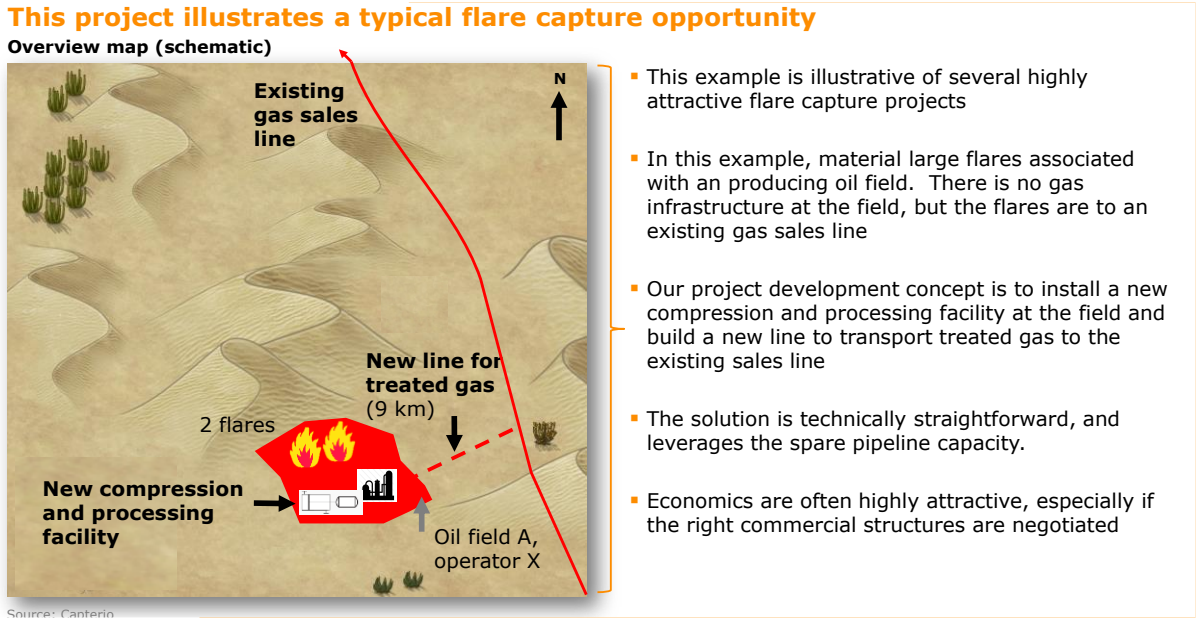


*Figure 3: Illustration of a typical clustered flare development project which is unlocked by a data-driven approach to developing a clustered flare development under an innovative commercial structure.*

## We must minimise flaring gas close to existing gas pipelines

The implications of this analysis are good news for oil and gas and pipeline companies. Better use of pipelines can make it easier for producers to reduce flaring, create value and accelerate the energy transition. Pipeline companies could process more volume, at lower unit cost and generate higher revenues. The industry could be helped by more coordination and integrated planning between operators, regulators and governments. The theoretical prize is huge: up to $10 billion of additional revenue could be generated annually, saving up to 500 million tonnes of CO2-equivalent emissions.

Global gas flaring reduction is a priority. The world needs reductions of more than 90% by 2025 to meet the IEA's sustainable development scenarios. Yet more than 50% of this volume is within 20 km of a gas pipeline, and a significant fraction of this volume is likely highly solvable and commercially attractive. In today's world of increased focus on "net zero" and "ESG-led" investment, it's important to make zero flaring concept a reality, create value, reduce emissions (by up to 77%, see article), and accelerate the energy transition.

Let's get innovative and make gas flaring solutions work for the industry and for wider society.

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*About Capterio*

Capterio is a project developer that is mission-driven to reduce flaring, create value and improve reputations. We are engaging with a range of IOCs and NOCs to identify and deliver flare capture projects. We use our unique real-time "Global Flaring Intelligence Tool" to identify, screen and prioritise projects, and then deliver on-the-ground solutions by bringing together the right combination of assets, technologies and financing.

*List of interesting articles authored by Capterio:*

- Why flare capture projects make sound ESG investments
- New Flaring Data Accelerates Global Call To Action
- Flaring in MENA: The Multi-Billion Dollar Decarbonisation Lever, co-authored with Chatham House
- Agile And Specialist: The Right Approach To Flare Capture
- Post-COVID: Flaring Helps Deliver The Energy Transition
- Risk-Free, Low Cost, Low Emission Barrels
- How Flaring Helps Deliver Paris
- Flaring's Billion Tonne Secret: Methane
- Why Europe Needs Low Carbon Gas