




Why flare capture projects make sound ESG investments

A thought piece by  **capterio**

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Executive summary

- **The ESG focus is right. Whilst many large investors are reducing their exposure to the fossil fuel industry, they also need to be mindful of the material decarbonisation opportunities that need investment within the oil and gas industry;**
- **Flare gas capture projects are some of the most effective and attractive decarbonisation investments available globally. With strong negative marginal abatement costs (up to \$40 per tonne), flare investments create value, reduce emissions (by up to 80%) and accelerate the energy transition;**
- **Flare capture projects are therefore intrinsically ESG-compliant. Additional private and public investment capital is urgently needed to maximise impact and accelerate the energy transition towards net-zero.**

ESG-led investment policies are right, but they should not ignore the decarbonisation opportunities in the oil and gas industry

Delivering a "net-zero" society by 2050 is arguably *the* most important long-term challenge of our lifetimes. To deliver "net-zero", we need to wind down our dependence on (unabated) fossil fuels. These ambitions are driving an intense focus on "ESG" (Environmental, Social, and Governance) principles in the minds of investors, consumers, governments and regulators alike. This pressure has led central banks to seek to minimise their exposure to climate risk, legacy portfolios and potentially stranded assets. In response, several institutions (e.g. the World Bank, the [European Investment Bank](#), [UK's Export Finance](#) and [Norway's Government Pension Fund](#)) have committed to curtailing their investments into fossil fuels.

This ESG focus is right. Yet the public discourse appears, in some circles, to consider ESG and "responsible investing" synonymous with "green" or low carbon industries. If ESG investments were directed only to the likes of *Beyond Meat*, *Tesla*, *Jinko Solar* and *Vestas* (etc.) they would not be maximising their planetary impact. And since (even in 1.5 degree-compliant scenario), fossil fuel extraction is likely to be significant for decades, there is a world in the middle between "*green-is-good*" and "*fossils-are-bad*". This world needs capital investment. By *selectively* directing capital towards the oil and gas industry's brownfield sites, ESG-conscious investors can have an immediate impact, decarbonise, create value and accelerate the energy transition.

Specifically, a significant decarbonisation opportunity comes from natural gas. Globally, 297 BCM of gas (7% of the end-use consumption) is wasted through flaring, venting and leaking. Collectively, this waste creates 7.8 billion tonnes of CO₂-equivalent greenhouse gas emissions per year (10x the emissions from aviation), leading to revenue losses up to \$34 billion (assuming \$3 per mmbtu). Note in our CO₂-equivalent calculations we account for the fact that some of the emissions from flaring, and all of the emissions from venting and leaking, are in the form of methane. Since methane is a strong climate-forcing greenhouse gas (84x potent than CO₂ per tonne over a 20-year timescale, according to the [IPCC](#)), it has material impact.

When the 7.8 billion tonnes of CO₂-equivalent emissions from flaring, venting and leaking are added to those from combustion of "end-use" gas (some 7.2 billion tonnes), total emissions double, to 15 billion CO₂-equivalent tonnes. It is perhaps no surprise, therefore, that a Shell executive said: *"unless the industry solves the problem of methane, natural gas will not even be a transition fuel, let alone a destination fuel"*.

Figure 1 outlines the principal sources of waste of natural gas and their magnitudes (and a [related article](#) further details our methodology). Note that flaring and venting are predominantly associated with oil production. When we consider the total impact of emissions from natural gas, it is therefore important to consider *both* the gas and the oil supply chains.

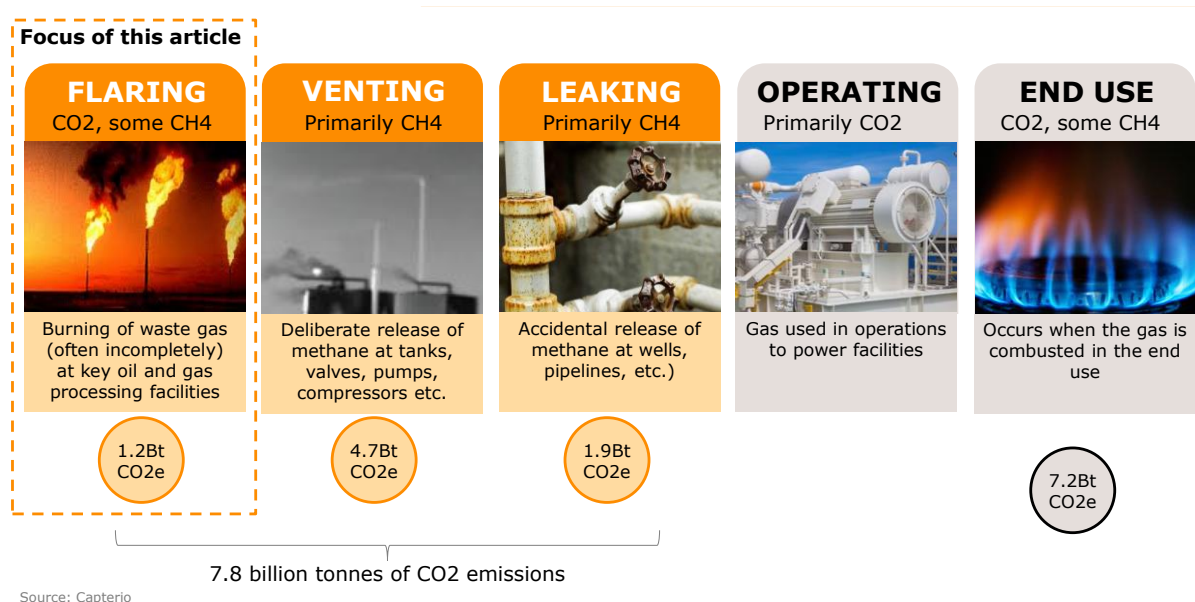


Figure 1: Overview of the primary sources of waste from natural gas in the oil and gas supply chain. Flaring, venting and leaking are significant sources of potentially avoidable waste. By capturing this waste, the industry can not only reduce emissions but also create value.

The emissions gas waste will only get worse if the industry is starved of capital. Petrostates will likely continue to produce oil (and flare gas) for a couple of decades,

at least. Withdrawing funding (*even if it were only directed to flare capture projects*) would materially increase CO₂ and methane (CH₄) emissions.

Why flared gas is a material decarbonisation opportunity

Of the three sources of wasted gas, flaring is the easiest to abate commercially at scale. This is because unlike venting and leaking, flaring is highly visible, easy to detect and measure (including from space) and is relatively concentrated at "point" sources. Nevertheless, projects that tackle flaring will likely also address venting and leaking, and the [IEA](#) has shown that it can also be profitable to address these sources.

The latest data from the World Bank (see [article](#)) highlights that flaring increased in 2019, to 150 BCM per year, the highest it has been in a decade. Flaring generates some 280 million tonnes of CO₂ emissions per year. But, as Figure 1 implies, flares also release significant volumes of methane (so-called "methane slip", due to incomplete and inefficient combustion). Assuming, somewhat conservatively, a methane slip rate of 10% (meaning that flares have, on an average, a combustion efficiency of 90%), methane from flaring adds another 950 million tonnes of CO₂-equivalent emissions, bringing the total emissions from flaring to 1.2 billion tonnes of CO₂-equivalent emissions (see [article on methane slip](#)).

Solving the problem of gas flaring is, therefore, an urgent global priority. Fortunately, the European oil and gas majors (and some others) are signalling a clear pathway, each with a version of "net-zero" commitments. But an inevitable wave of divestments from the majors will put higher carbon intensity assets in the hands of companies that are both harder to influence and less committed to the energy transition.

We also need solutions for faster and deeper impact in both the OECD countries (of which the USA has the highest absolute flaring) and non-OECD countries (which are responsible for 82% of all flaring globally, led by Russia, Iraq, Iran, Venezuela, Algeria, Nigeria). After all, in non-OECD countries, few of the so-called national oil companies (which are mostly unlisted and untransparent) have "net-zero" as a priority. Instead, their priorities are mostly about delivering revenues to bolster stressed and undiversified economies.

So-called "flare capture projects", however, can be part of the solution and provide a Paris-compliant pathway for oil and gas producers. These projects recover and monetise flared gas through one of a range of options including reinjection/disposal/storage, distribution to market (via pipeline, in compressed or liquid form) or power generation (and other options).

These flare capture projects deliver both economic and environmental value:

- **Firstly, flare capture projects lower emissions and improve environmental health.** Abatement of a moderately-large flare of a 10 million scf/day reduces CO₂ emissions by up to 77%, by 1.0 million tonnes per year (see Figure 2). Where "additionality" can be proven, flare projects also create opportunities for carbon-based financing, emissions offsetting and trading, with additional upside should markets enable methane-based emissions credits;
- **Secondly, flare capture projects generate additional revenue and can lower operational and financing costs.** Recovered gas (and associated liquids) generate additional revenue streams (and/or operational cost savings, e.g. by replacing on-location diesel-fired power generation with that from gas). There may also be upside from extending the commercial life of the asset;
- **Thirdly, flare capture projects have reputational value, create jobs, stimulate economies** that can help companies and countries meet their "net zero" / Paris commitments and boost economies. Especially in hard-pressed petrostates, these factors will make a valuable contribution. Where net cashflows are redirected to low carbon sources any concerns that "flare capture projects further the profits of, and therefore sustain, the fossil fuel industry" can be mitigated.

Detailing the environmental prize:

Whilst most monetisation options lead to the gas being burned (with associated CO₂ emissions, unless they are sequestered), they deliver two advantages. Firstly, the end product (which is often gas-fired power) will often end up displacing lower-quality power sources, such as coal. Secondly, total emissions are dramatically lowered by eliminating emissions of methane at inefficient flares (offset by marginally increased CO₂ emissions from more efficient combustion).

We illustrate below the difference in emissions between two cases. In the "as is" case, a 10 million scf/day flares whilst power (perhaps in the end-use market) is generated by coal. In the "after capture" case the flare is eliminated, and so too is the coal-fired power generation. The net impact is up to 77% emission reduction (or 1 million tonnes of CO₂-equivalent emissions per year, see Figure 2).

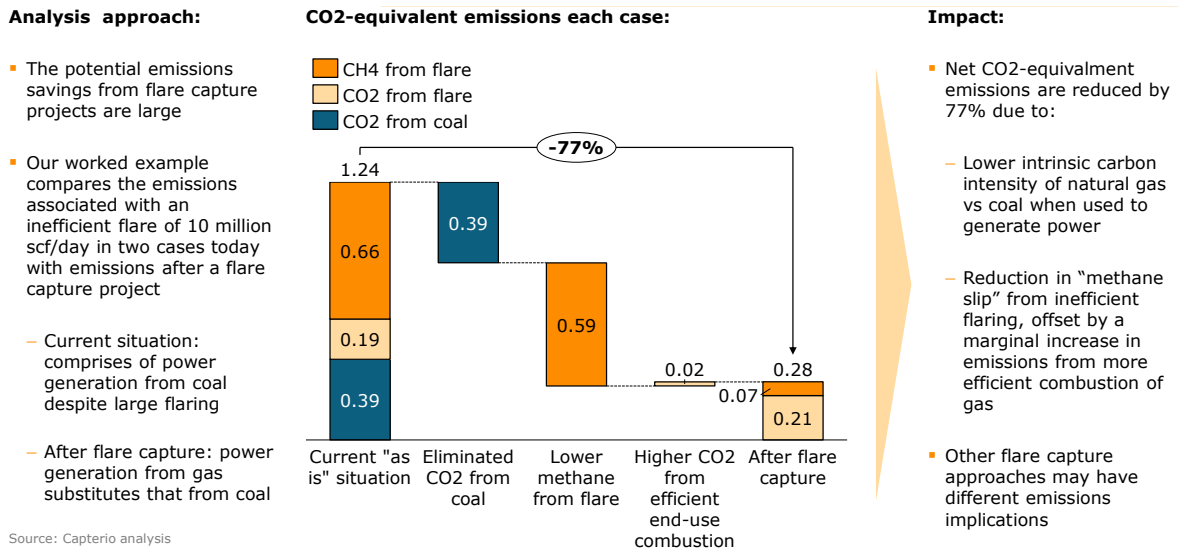


Figure 2: emissions impact resulting from a 10 million scf/day flare where recovered gas replaces coal-fired power generation. CO₂-equivalent emissions are reduced by up to 77% through a combination of lowering the level of methane slip and substitution of coal with intrinsically cleaner-burning natural gas. Slightly lower emissions reduction may apply if the captured flare replaces, for example, diesel used to support oilfield operations. Note we calculate CO₂-equivalent emissions of methane assuming over a 20-year basis. This analysis also highlights that efficiently-combusting flares have significantly lower emissions.

Detailing the economic prize:

Table 1 illustrates metrics for a range of real flare capture projects we have analysed in the MENA region under a range of innovative commercial structures. As shown, these opportunities are not only intrinsically attractive (with positive project NPVs), but they are also commercially attractive to investors (with investable post-tax IRRs and significant marginal abatement costs).

	Peak flare (mmscf/d)	Pre-tax project NPV (\$M)	Post-tax IRR (%)	NPV \$ per discounted tonnes CO ₂ abated
Large, country A	35	60	27%	-25
Medium, country B	15	39	29%	-38
Small, country C	2	9	25%	-31

Table 1: Summary of the economics, informed by real (but confidential investment cases), for a typical flare capture project at scales of 30, 15 and 2 million scf/day. Note that opportunities inevitably need detailed case-by-case consideration as many factors drive the valuation.

We do however make an important caveat: each opportunity needs a case-by-case evaluation as the revenue and cost structure varies widely due to technical and non-technical factors, e.g. gas composition, production outlook, technical solution, infrastructure, market, fiscal environment and commodity prices. Nevertheless, our

analysis suggests that 30-50% of global flaring can be abated at *negative* marginal costs, leading to potentially commercially attractive solutions that save up to 600 million tonnes per year.

This *negative* marginal abatement cost compares favourably versus other examples with *positive* abatement costs, e.g., \$0-50 per tonne for low-cost afforestation, \$50-100 per tonne for the iron and steel industry, \$100-160 for cement, and \$150-400 for direct air capture (according to a 2019 Goldman Sachs paper, "[Carbonomics](#)"). Of course, it is worth noting other (albeit less effective) abatement options also exist in the oil and gas industry. A recent [McKinsey report](#) highlights projects which improve operational efficiency, drive electrification or reduce the requirement for gas-fired power by displacement with solar, wind or hydropower.

How the financing community can accelerate flare capture

Public and private financing can help to create value, reduce emissions and accelerate the energy transition, in two ways:

- Firstly, **multilateral organisations can "lean on" governments and national oil companies and urge them to accelerate flare capture projects as part of their energy transition contribution.** This community can help national oil companies to find creative commercial solutions (within existing legal frameworks) which unlock system barriers and link funding to post-COVID, "green" or "build back better" stimulus packages;
- Secondly, **the public and private capital financiers can help by "stepping in" and support ESG-compliant flare capture projects** as part of a transition-financing policy. Players such as the World Bank, IFC, IMF, EBRD can continue to be instrumental in supporting projects (or providing seed funding) which will enable other development and commercial banks to follow.

Naturally, flare capture projects also need creative thinking and support in non-financial areas too. Outside the OECD countries, the challenges are mostly "non-technical" in nature. Collectively we need to resolve challenges including unattractive fiscal regimes, complex and bureaucratic decision-making processes, lack of leadership bandwidth and political will, inertia and risk aversion, etc. The industry needs creative thinkers, innovative commercial structures and agile and specialist approaches. The prize is material. Flare capture projects offer a compelling a "triple win" (for asset owners, for national oil companies and their governments, and for the planet) and help to deliver the Paris agreement and "net-zero" ambitions.

There is a limited window of opportunity to make these ESG-compliant flare capture projects happen. The time to act is now.

The authors would like to thank several national and international oil companies for their help to shape the views in this article, which are our own.

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About Capterio: Capterio is an agile and specialist project developer focused on monetising waste gas in oil & gas energy systems. We build solutions to capture and use waste gas by taking it to pipelines, injecting it (for storage, enhanced recovery or disposal), converting it to power, liquids (e.g. CNG, LPG, GTL, LNG, etc.) or other creative solutions.

We screen and source opportunities powered by our bespoke tools, e.g. our Global Flaring Intelligence Tool (GFIT) which provides real-time insights into flaring for every asset, operator and non-operated partner worldwide. We select and procure technology, we negotiate commercial contracts, we provide project financing, and oversee construction and operations. We bring together assets together with technologies, know-how and financing to deliver on-the-ground, real-world, safe and reliable solutions.

We are actively seeking pioneering partners who seek to drive value and decarbonise. Since we build and finance on-the-ground solutions, our offer is uniquely attractive to operators and governments and delivers revenue, production and reserves (see [article](#)). See our [website](#) for more information on our proven track record and financing options.

List of interesting articles authored by Capterio:

- [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](#)