A thought piece by capterio

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Executive summary

- **The EU released its methane strategy last month. This is a good act of strategic leadership with some clear recommendations for the oil and gas industry. But the closely-related topic of gas flaring needs an equally clear approach. So we also need an "EU Gas Flaring Strategy".**

- **The EU imports more than 80% of its gas. But imported gas has an *average gas flaring rate 33 times higher than rates associated with indigenous production*. The EU must, on behalf of an increasingly-informed consumer base, act to reduce gas flaring.**

- **We identify 12 actions that the EU should take. In doing so, the EU can lead the global agenda, shape the direction – for supplying countries, and the world – and accelerate progress towards net zero.**

Gas is currently a key element of the EU's energy mix

The EU as a gas importer:

The EU consumes 10% of the world's natural gas, and gas provides around 18% of the EU's electricity and 23% of the EU's primary energy needs[1]. In the first half of 2020, the EU consumed 203 BCM, according to the latest quarterly report by the EU Commission. Over this period, 80% of the EU's gas was imported (115 BCM by pipeline and 48 BCM via LNG), with 15% (31 BCM) supplied from indigenous production (and the difference, c. 5% being net storage changes). These imports cost the EU €16 billion in the first half of 2020 alone.

Whilst the EU's gas demand has been increasing steadily since 2014[2] (in part, driven by coal-to-gas fuel switching), the global supply of gas has increased materially (driven by US, Australia, East Africa and others). Gas is now a buyers' market. This means that the EU, as it develops its gas strategy under the European Green Deal, has choices on where it sources imported gas. Whilst the outlook for gas in the EU is somewhat uncertain, what is certain is that the EU has considerable leverage which it will use to deliver the energy transition and net zero.

[1] According to the bp Statistical Review of World Energy (2020); data for 2019.
[2] According to Eurostat.

Time to focus on quality:

One of the choices the EU has is around the "quality" (here meaning the end-to-end carbon intensity) of its gas, be it imported or indigenous. Conventional wisdom has historically focussed on the molecule-as-a-commodity, as opposed to the molecule-as-a-differentiated-product based on its "heritage". But as consumers, regulators, governments and producers are now much more focussed on the climate crisis, the energy transition and net-zero targets, the carbon intensity associated with the end-to-end natural gas supply chain is sharply in focus.

To be comprehensive, any assessment of the carbon intensity of gas available to consumers would account for all sources of greenhouse emissions along the value chain. Any assessment needs to incorporate not only the CO2 emissions from combustion, but also those of methane, a much more potent greenhouse gas (according to the IPCC, it is 84x that of CO2, on a mass basis, over a 20-year timescale) and other sources. Emissions of methane and CO2 from the oil and gas industry typically come from each of upstream (from operations, leakage, flaring and venting), through to midstream transportation (which, for LNG must include emissions from liquefaction, boil-off and regasification) and distribution.

This is a complex area, but one with many players. Of particular relevance to this paper is the work done by MIQ ("Methane Intelligence"), a group established by SYSTEMIQ and RMI to develop a global methane-based certification standard for gas.

But quality is more than just methane:

Last month, the EU announced its Methane Strategy, which outlines a clear need to set standards and create a data-driven approach to differentiate gas based on its emissions quality. Supporting this data-led approach, members of the UN-led "Oil and Gas Methane Partnership", as part of their "OGMP 2.0" launch yesterday, made some extended commitments. This voluntary group of 62 members, which represent 30% of the world's oil and gas production, have committed to measure, report and reduce *methane* emissions from both operated and non-operated operations.

But, as their names suggest, both the EU's *Methane* Strategy and the Oil and Gas *Methane* Partnership focus mostly on emissions of *methane* (CH4). The EU Methane Strategy is rather light on a key, and related, emissions source: that of gas flaring (the process that produces CO2, through the deliberate combustion, of waste methane, mostly from oil and gas fields). Most flares emit not only CO2 (from the combustion of gas) but also methane as so-called "methane slip", from inefficient or incomplete combustion at flare tips. Given that most flares have significant "methane slip", most flares probably emit more CO2-equivalent tonnes of *methane* than CO2 (see article "*Flaring's Billion Tonne Methane Secret*"). Yet unlike most other emissions of

methane, those from flares are highly concentrated at point sources, making them potentially easier to identify and fix.

Most flaring happens when so-called "associated gas" (which is frequently co-produced, as a by-product, of oil production) is neither consumed to power local operations nor sent to a market. Where flaring happens, it typically for at least one of three reasons: Firstly, flaring is often "not sufficiently on the radar" of operators; for many oil producers, gas is a non-core business (and gas flaring is sometimes ignored or denied). Secondly, there can be "perceived economic challenges"; sometimes it is prohibitively expensive to install additional equipment to capture the gas (so the regulator permits flaring of this "waste" instead). Thirdly, there are frequently "resource constraints" (especially in today's world where capital and staff are in short supply), meaning that even highly attractive projects just don't get done (see article "*How To Fix Flaring Perceptions*").

Why gas flaring is a big deal for the EU

The scale of embedded flaring is large:

The scale of the global flaring challenge is considerable: the World Bank estimates that 150 BCM is flared annually (which is roughly equal to the EU's total gas imports). We estimate this leads to emissions of at least 1.2 billion CO2-equivalent tonnes when "methane slip" is included. This puts flaring on par with the (pre-COVID) aviation sector (see article *"New Flaring Data Accelerates Global Call To Action*). Yet material action on this emission source is critical in order to meet net-zero ambitions. The IEA's sustainable development scenario predicates a 90% reduction in flaring by 2025, and the EU can help make it happen.

Given the scale of the EU's imports – and their high level of flaring – gas flaring is a big deal for the EU. Surprisingly perhaps, flaring is often overlooked – perhaps because it is mostly a by-product of the *oil* (not gas) supply chain. But – in our view at least – this distinction is a somewhat irrelevant technicality. The industry needs to consider sources of emissions in the round. *After all, wouldn't it be perverse for a country to claim it had high-quality gas if its supplies from a gas field with a low carbon intensity were next to a neighbouring oil field which was abundantly flaring gas?*

Figure 1 (left-hand side) shows the sources of the 163 BCM of imports in H1 2020 (which are dominated by Russia, Norway and, increasingly, the United States) in comparison to indigenous supplies. It is interesting to note that, since late 2018, there has been a significant uptick in imports via LNG, with the US leading the pack, followed by Russia and Qatar in H1 2020.

The increasing diversity of gas imports, whilst bringing helpful diversification, therefore again raises the issue of quality. Figure 1 (right-hand side) shows *a* flaring-

focussed index for the "quality" of that gas, being the "gas flaring rate" (i.e. gas flaring as a percentage of total gas production). We reiterate flaring is only one of many possible measures of gas "quality", and this analysis excludes other emission sources.

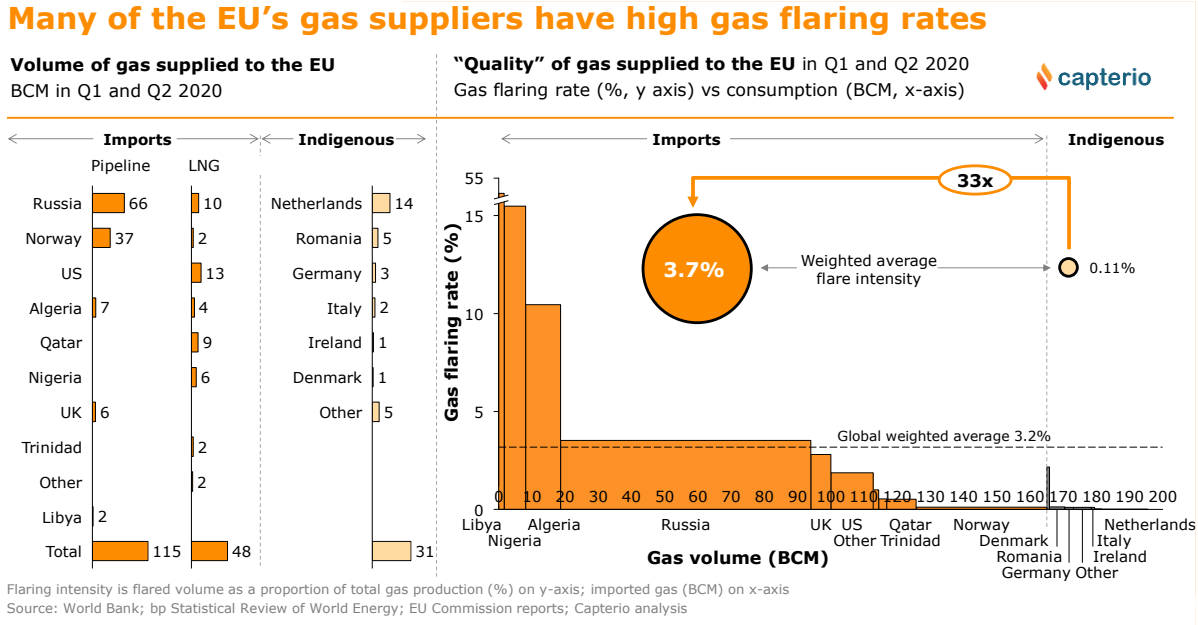

Figure 1: Left-hand side: overview of the sources of gas imported and indigenous to the EU and their route. Right-hand side: illustration of one measure of the "quality" of gas (y-axis) vs the volume (y-axis). The quality metric here is the "gas flaring rate", which we define as the flared gas as a percentage of total gas produced. The weighted average gas flaring rate associated with imports to the EU is 3.7%. Indigenous production has a flaring intensity 33x lower than imported gas, at a weighted average of 0.11%.

The data above highlights the stark difference in the quality of gas (on this measure) between imports and indigenous gas. Imported gas has a gas flaring rate of 3.7%, whereas indigenous gas (mostly from Netherlands, Romania, Germany, Poland Denmark, followed by Ireland, Croatia, Hungary and Austria) has a dramatically lower gas flaring rate of 0.11%. Figure 2 is a map view of the same metric. Countries that supplied the EU in the first half of 2020 are shown with an asterisk.

It is perhaps worth noting that our metric does not discriminate between gas from the *oil* supply (which is responsible for most of the flaring) and gas the from *gas* supply chain. As cited above, we think – especially at a country level – that this distinction is unnecessary and unhelpful. Countries cannot claim to supply low carbon intensity gas whilst being simultaneously significantly flaring. We note that individual companies might argue with this point of view.

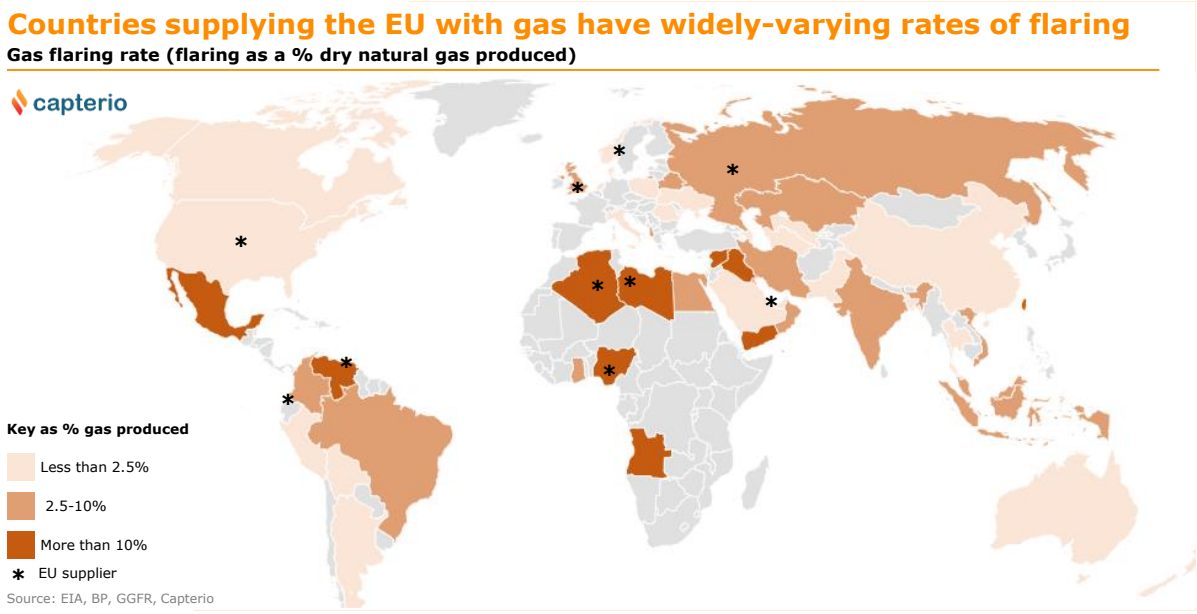

Figure 2: Map illustrating the gas flaring rate by country. The major indigenous gas producers are Netherlands, Romania, Denmark, Germany, Italy and Ireland. The EU imports gas from countries with an asterisk.

Recent market moves focus on quality:

This focus on quality was also starkly made apparent, in October 2020, by the rejection by the French government of a cargo of LNG from the United States because it was "too dirty". [Incidentally, it is notable that France, the biggest importer of LNG in H1 2020, unloaded most of its cargo from Russia, Algeria and Nigeria, countries which probably have gas with similar, or higher, end-to-end carbon intensities.]

The actions of the French government, perhaps the first example of a transatlantic carbon war, sets a clear precedent of which governments should take note: relaxing regulations (as happened under Trump presidency) can make your product uncompetitive. Conversely, it really does pay to improve gas product quality, especially in an oversupplied world.

In another demonstration of the focus on emission quality, in June 2019, Shell was the first producer to offer carbon-neutral LNG, in a deal with TOKYO Gas and GS Energy in Japan, with offsets provided by nature-based solutions in Indonesia and Peru. Similarly, in October 2020, Total, in a deal in China with CNOOC provided a certified carbon-neutral cargo of LNG from its Ichthys field in Australia with offsets in China and Zimbabwe. [Incidentally, the Ichthys field is one of Australia's largest flarers. Our "Global Flaring Intelligence Tool" identifies regular flaring at this asset of up to 50 million scf/day. We trust these emissions are fully incorporated in the offsets).]

Flaring can be solved:

As the EU increasingly focusses on gas quality, the good news is not only that it has options. There are a range of gas flaring solutions (so-called "flare capture projects") which recover and monetise flared gas – with technically and commercially viable approaches – through reinjection, disposal, storage, distribution to market (via pipeline, in compressed or liquid form) or power generation. There are also more "exotic" solutions, e.g. Bitcoin mining or the manufacture of proteins.

Such projects can reduce emissions by up to 77% (see article "*Why Flare Capture Projects Make Sound ESG Investments*"), whilst creating value and accelerating the energy transition. We have used our unique "Global Flaring Intelligence Tool" (GFIT) to measure flaring by asset, by field and by operator in real-time. We have identified scores of flare capture projects which are technically feasible and commercially attractive.

12 things the EU should do about gas flaring

We commend the EU's Methane Strategy for its clear statements around methane. The strategy also makes a significant contribution to the European Green Deal. The strategy also called out a few specific recommendations on flaring, such as the need to set standards, the imperative to reduce "methane slip" (from inefficient combustion), the intent to legislate against routine flaring and the recommendation to step up diplomatic efforts with extra-EU partners.

Policymakers should build on this excellent work and define the EU's "Gas Flaring Strategy". To help, we propose "***12 things the EU should do about gas flaring***". Whilst the EU does not have legislative jurisdiction over extra-EU supplying countries, it can offer substantial incentives (some of which we discuss in more detail in our paper with Chatham House ("*Flaring in MENA*"). Options include changing the supply mix by restricting their imports, establishing pricing penalties (or premium market pricing mechanisms for higher-quality gas), or by linking financial support (such as development loans from EIB or EBRD other others, especially "post-COVID) to demonstrated performance improvement. We think EU-initiative would provide further impetus – and increase the effectiveness – of the voluntary initiatives that are underway (e.g. via the OGCI, OGMP, etc.).

Our 12 items (*perhaps one for each day of Christmas – or other seasonal festive event*?) divide into two groups. Firstly, we outline 3 recommendations that the EU can either apply internally (where, clearly, it holds legislative power) or with its member countries. Secondly, we outline 9 recommendations that the EU should consider regarding its imports.

Key actions the EU can take within member states

1. **Mandate that companies that buy/import gas demand transparency (and report) on the quality of this gas**, including full life-cycle emissions analysis, supported by clear reporting standards and independent verification or certification. As suggested in the EU's methane strategy, buyers could also team up with their peers from other extra-EU "fossil fuel buyer countries" to collectively put pressure on high-flaring countries.

2. **Mandate that operators report data on combustion efficiency measurements/assumptions *at an asset level*, and apply these within the EU ETS.** We note that most operators simply assume (and are allowed to, by the EU-ETS) that their flares operate at best-in-class rates of methane slip, of 2%. Yet, most flaring globally is probably far from this best practice. And any flare that has a methane slip rate greater than 3% emits more CO2-equivalent tonnes as methane (CH4) than through its combustion as CO2 (see article "*Flaring's Billion Tonne Methane Secret*").

3. **Impose carbon border pricing on imports into the EU** *for countries that do not apply effective or enforceable flaring penalties*, should WTO rules allow. The ultimate sanction would be to block (or enforce penalties on) imports from countries where flaring is unacceptably high. Penalties should be based on independent and credible flaring datasets (such as the NOAA VIIRs flare-detection satellite).

Key actions the EU can take with extra-EU exporting countries

4. **Demand that all countries that export gas to the EU endorse – and deliver on – the World Bank's Zero Routine Flaring (ZRF) initiative**, which includes firm commitments by 2030 (and was mentioned in the EU Methane Strategy document). Qatar, Algeria, the UK, Trinidad & Tobago and Libya need to join – and the EU should consider rejoining itself. However, endorsement is not sufficient, nor does it give license for inaction. We are told that more than 70% of ZRF endorsing countries are already not delivering on their ZRF commitments. But we would go further: as much as the definition of "routine" vs "non-routine" flaring is arbitrary, it is also perhaps irrelevant. Apart from when it is safety-related, all flaring should be minimised.

5. **Ensure that all countries independently and transparently establish and– and own – a credible and data-driven flaring baseline for 2020**. Countries should consider the World Bank's annualised satellite-derived estimate of flaring (which are publicly-available) as a starting point. Where NOCs substantially dispute these numbers (we could name a few), the baseline

should only be changed if credible supporting data (e.g. from metered flare measurements) is supplied. Ultimately, a basin-by-basin level of definition will be helpful. Capterio's real-time asset-by-asset Global Flaring Intelligence Tool can provide useful input.

6. **Mandate that all countries (and companies) submit a credible, data- and science-based, flare reduction programme to the World Bank Global Gas Flaring Reduction programme** (or UNEP). Plans should outline the specific steps countries will take to deliver on their zero routing flaring commitments. This especially should apply to countries such as Russia, US and Nigeria (who are already ZRF endorsers) which have not yet demonstrated material reductions. Programmes should be supported by actual flare measurements. Countries should ensure that they maximise the use of their existing infrastructure, especially given that 54% of flaring is within 20 km of an existing gas pipeline (see article "*We Must Minimise Gas Flaring Near Existing Gas Pipelines*").

7. **Assist countries to establish commercial incentives for in-country flare reduction programmes**, by adjusting the fiscal terms for *ringfenced* flare capture projects to accelerate action (similar incentives are common for "small fields" or "marginal assets" already). Countries also need to reduce subsidies for domestic gas and power as they tend to distort the market, encourage wasteful usage and inefficiency and suppress the commercial incentive to asset owners and operators to recover the gas.

8. **Encourage countries to accelerate the initiation of specific on-the-ground flare capture projects**. We have identified many projects which are commercially attractive and can be delivered quickly with proven technology whilst substantially reducing CO2-equivalent emissions. At least 10 substantial projects need to be underway in advance of COP26. Capterio is actively discussing specific material flare capture projects with each of Equinor, bp, Total, Repsol, Eni and Shell and several leading NOCs and others. EU-centric multi-laterals such as the EIB and the EBRD can play a role in financing such projects with development loans.

9. **Help countries to make it easier for investors to deliver flare capture projects.** Local dysfunctions can make on-the-ground action very difficult to deliver. Countries need to reduce the complexity and cost of in-country operations and remove excessive, rigid, or redundant regulations. By enabling greater "third-party" access to gas and power projects and infrastructure, new players can deploy new technologies and operating models (see article "*Agile and Specialist Approach*"). Improved third-party access will also unlock ideas, capital, skills and project-specific financing options.

10. **Support countries in stepping-up the effectiveness of their regulator(s), encourage the metering of all flares and help countries to implement strict flaring penalties.** Most countries (including in the US Permian basin) do not measure actual flaring with a modern, well-calibrated and properly-functioning flow meter. Many major flaring countries do not have a genuinely independent regulator. Most countries do not have sufficiently-punitive (or properly enforced) flaring penalties. Whilst Nigeria's new flaring policy imposes material penalties (up to $2 per thousand scf, which is equivalent to $38 per tonne of CO2 when combusted), it is critical that this penalty is enforced. The EU can help, e.g. by leveraging Norway's robust legal framework around flaring and carbon taxes, to assist countries in designing and implementing effective anti-flaring policies and penalties (see article "*Tackling Flaring: Lessons from the North Sea*").

11. **Encourage all extra-EU countries to measure the "methane slip" associated with flaring** using standards similar to those in point #2. Groups such as EDF and CCAC can deploy aerial-based measurement programmes focussed explicitly on this issue.

12. **Promote peer-to-peer sharing of best practices** between countries, industry and government by creating working groups that radiate best practices, build capacity, deploy technology and local content. Inspiration can be drawn from the flare minimisation programme in Saudi Arabia, which created a whole petrochemicals industry from flared gas. The EU can help the World Bank's GGFR group to convene such meetings as part of its international diplomatic efforts.

There is much to do to reduce gas flaring globally, and as a major buyer with choices and leverage, the EU has a pivotal role in making it happen. Now it's time for action.

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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 bring together assets with technologies, know-how and financing to deliver on-the-ground, real-world, safe and reliable solutions. We support our work with our unique Global Flaring Intelligence Tool (GFIT) which provides real-time insights into flaring for every asset, operator and non-operated partner worldwide.