New Climate Tools for Financial Institutions:

Methane Data Transparency for Targeted Investments

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Executive Summary

Banks and other financial institutions (FIs) have an opportunity to leverage emissions models and detection and measurement technologies to inform near-term investment decisions that reduce methane in their energy portfolios. This is part of FIs' broader strategy to transition oil and gas portfolios in line with climate goals. Methane is a highly potent greenhouse gas (GHG) that is routinely emitted by the oil and gas industry, which accounts for an estimated one-half of their corporate GHG emissions. Yet, equivalent barrels of oil and gas have wide-ranging methane emissions. Combining asset-level emissions modeling — using publicly available, peer-reviewed tools such as RMI's Oil Climate Index plus Gas (OCI+) — with top-down emissions detection via satellites and aircraft offers climate intelligence to pinpoint methane hot spots and mitigate leakage.

Whether intentional or not, methane leakage is bad for business. Wasting gas reduces company profits and jeopardizes energy security, while also exacerbating climate change and sickening citizens. New policies regulating operations and placing fees on methane can help remedy this wasteful situation. The good news is that many investments in methane reduction today are cost neutral or profitable. This underscores the role finance can play to abate methane now.

FIs can leverage new emissions tools to (1) better manage their exposure to the climate risks posed by methane, (2) enhance their target setting and disclosure of financed emissions reduction to include methane, and (3) steer client engagement and financing efforts toward the most effective and, in many cases, profitable near-term opportunities to decarbonize and enable the energy transition. Although addressing GHGs throughout the entire oil and gas life cycle (including consuming petroleum products) is critical to ensure a 1.5°C future, an immediate opportunity exists for FIs to invest in detecting and abating methane emissions.

Methane Accumulations Around Earth

Source: https://climate.nasa.gov/news/2961/

Tackling Methane in This Decisive Decade

Record-breaking heat and extreme weather around the world have made the consequences of climate change even more evident this year. Near-term action to curb the pace of warming is critical. Although carbon dioxide emissions have historically dominated the climate conversation, rapid action to curb methane emissions — a climate pollutant with a warming potential over 80 times that of carbon dioxide over 20 years — could move the world closer to meeting durable climate targets in this decisive decade. The International Monetary Fund (IMF), for example, points to methane reduction as a critical lever to "lower the *stock* of greenhouse gases in the atmosphere and cut the very scary risks of 'tipping points' — when climate change becomes self-perpetuating." The ambition to take meaningful action on methane is rising; 150 countries signed the Global Methane Pledge at COP26 in 2021, committing to reduce their methane emissions 30% by 2030. However, much more remains to be done as atmospheric methane concentrations continue to rise.

Tackling methane emissions in the oil and gas sector — which is responsible for an estimated 1 in 4 tons of total global methane emissions — will be critical to reversing this trend. Systemwide methane releases across the oil and gas value chain, even at relatively low leakage rates, are one of the most harmful — and preventable — emissions drivers today, in some cases on par with the net emissions impact of coal in the short term. Though methane leakage — through the loss of salable product, worker exposure to air toxins, and increased risk of fire and explosion — is bad for business, it remains a prevalent problem throughout the industry.

Drivers of methane emissions across the oil and gas industry vary. Some of the preventable causes include inefficient flares, storage tanks designed to vent methane, pipelines and compressors that leak, and a multitude of loose fittings that allow gas to escape throughout the system.

Studies find that a significant share of the industry's methane emissions can be mitigated at no net cost. The industry is seeing some voluntary action to demonstrate methane reduction today, with some companies proactively and openly opting to openly and verifiably certify that their gas is low leakage. With new regulatory actions and increasing shareholder expectations on the horizon, however, voluntary action by industry players is unlikely to be sufficient to meet the scope of the challenge. According to the International Energy Agency (IEA), "a zero-tolerance approach to [methane] emissions from all assets in which [entities] hold an equity stake [is needed]."

This underscores the important role the financial sector can play. As the Climate Policy Initiative notes, "methane abatement finance has one of the highest ratios of global warming benefit per dollar of capital invested." To realize this opportunity, financial actors must effectively engage with and evaluate risk exposure across the companies and assets in which they invest.

With methane garnering focused attention at COP28, analytical tools, remote detection, regulations, and fees can help break the logjam and accelerate action to curtail methane emissions. For example, in the United States, the Inflation Reduction Act's (IRA's) new methane fee will raise the financial stakes for low performers. And both EU and US regulators are devising new rules to monitor, report, verify, and mitigate methane from domestic and international oil and gas supplies.

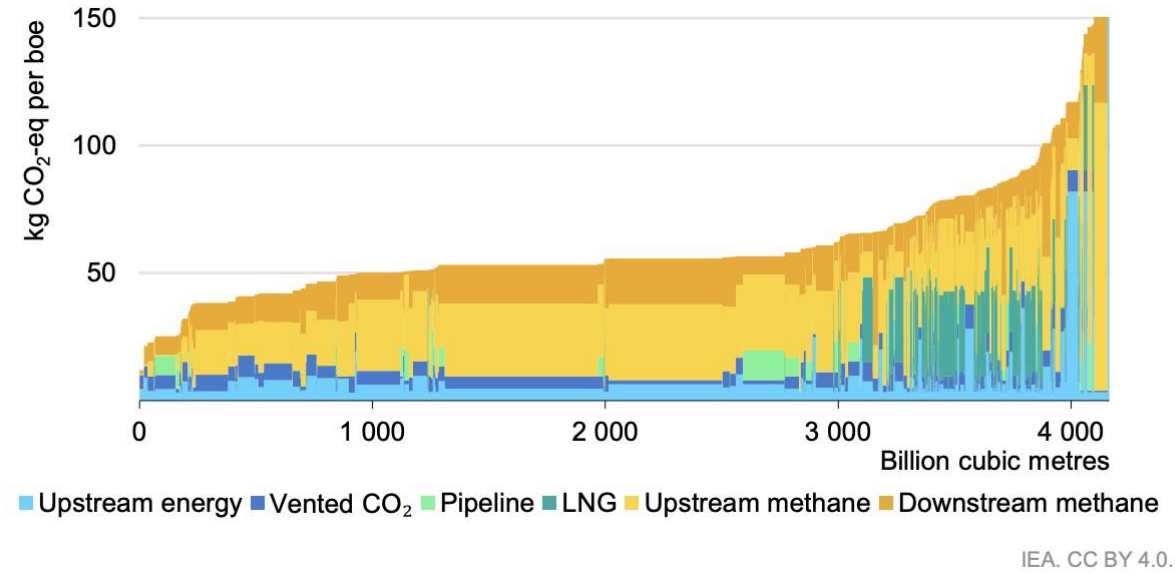
At the same time, tools like RMI's OCI+ provide both industry and financial actors with the granular, asset-specific data they need to pinpoint and address leading leakage sources. OCI+ also offers FIs estimates of methane emissions for planned assets that are in the development stage.

Quantifying Oil and Gas Emissions Using Models

GHG emissions intensities from oil and gas assets vary widely. Methane — the main ingredient in natural gas and a common constituent in light oils and condensates — is a major driver of these differences. The Scope 1 and 2 emissions produced by equivalent barrels of oil or gas depend on underlying resource conditions (its composition, depth, pressure, etc.), operations employed (how that barrel was extracted, processed, and transported), and system-wide methane leakage.

Publicly available, peer-reviewed models like OCI+ estimate life-cycle emissions from oil and gas production, refining and petrochemicals processing, storage and transportation, and end-use consumption. OCI+'s underlying upstream production model was developed by Stanford University for the California Air Resources Board to analyze the state's Low Carbon Fuel Standard. Stanford's Oil Production Greenhouse Gas Emissions Estimator (OPGEE) estimates methane and other GHGs using asset-specific inputs including reservoir conditions and field operations. The underlying downstream model (PRELIM) was developed by the University of Calgary and provides emissions estimates for refineries (and is undergoing expansion to model petrochemical facilities).

RMI has modeled two-thirds of global oil and gas assets with OCI+ and has consistently found that methane emissions from equivalent volumes of oil and gas assets can vary by as much as a factor of 10 or more using a 20-year global warming potential (GWP). Methane emissions (leakage from routine operations) are responsible for an estimated one-half of today's oil and gas industry (Scope 1 and 2) emissions. IEA confirms this finding: in a May 2023 report, IEA used OCI+ to model GHG emissions from all global oil and gas assets, plotted in Exhibit 1 in rank order by the industry's emissions assuming a 100-year GWP of 30 for methane.



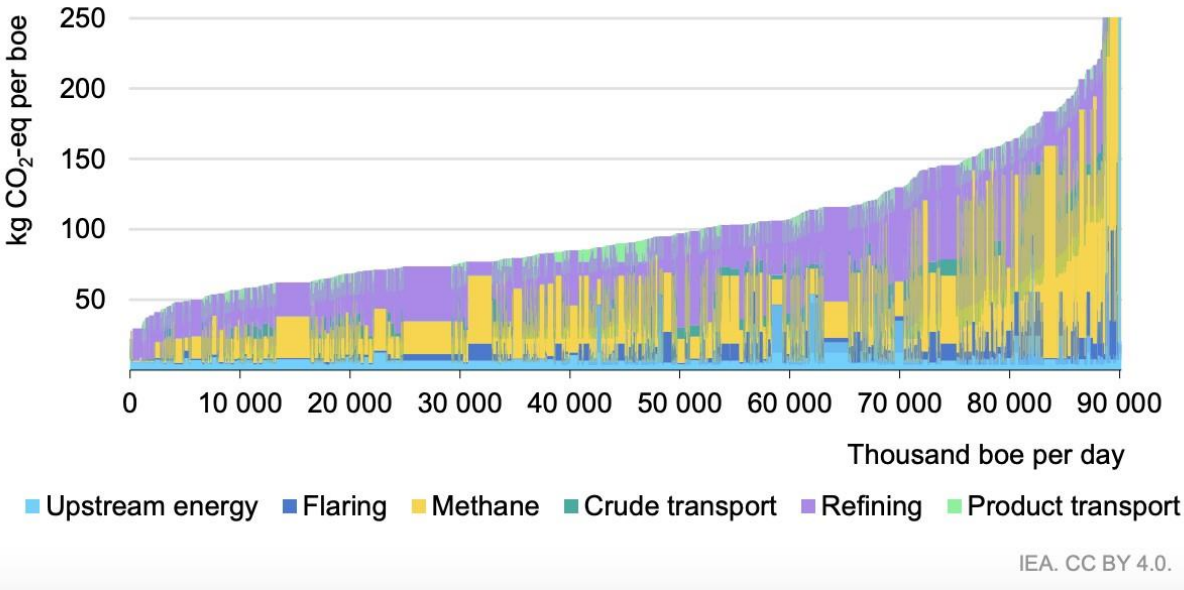


Exhibit 1. Methane Share of Industry Emissions Intensities for Global Gas (top) and Oil (bottom) Assets, 2022

Note: IEA constructed these plots using the OCI+ model.

Source: IEA, May 2023, https://www.iea.org/reports/emissions-from-oil-and-gas-operations-in-net-zero-transitions

The Intergovernmental Panel on Climate Change (IPCC) provides GWPs for fossil fuel sources of methane of 82.5 when considering its impact over a 20-year time frame (GWP_{20}) and 29.8 when considering its impact over a 100-year time frame (GWP_{100}). However, individual decision makers have the flexibility to select their preferred GWP time frame (20 or 100 years) when analyzing climate impacts. While most climate modelers have historically focused on the year 2100 and defaulted to a 100-year GWP, the importance of incentivizing near-term warming reductions to keep long-term targets in reach – as well as the 2030 deadline of the Global

Methane Pledge – are driving a growing chorus of experts to call for more attention on near-term metrics. As such, assuming a 20-year GWP time frame for methane in Exhibit 1 would, in effect, elongate the yellow bars by a factor of three on the *y*-axis. It behooves FIs and other actors to calculate carbon dioxide equivalent (CO_2e) emissions using 20-year GWP to make informed business decisions.

Making Methane Visible and Accounting for It

Models offer new climate intelligence for FIs about routine oil and gas operations and their emissions. However, routine operations do not tell the whole climate story. Nonroutine, superemitting sources of methane emissions from oil and gas systems are increasingly drawing attention. These super-events are unaccounted for in today's emissions inventories, and in the simple emissions factors on which financial firms typically rely to estimate the emissions of their financial portfolios.

When methane modeling tools are combined with empirical data from methane satellites, aircraft, and ground-based sensors, real-time, actionable, low-cost, and even profitable mitigation actions become evident (as visualized in Exhibit 2). This presents oil and gas operators — as well as their financiers — with two key opportunities: (1) a multibillion-dollar investment opportunity to improve operations and steer the sector toward a lower-emissions future, and (2) the opportunity to increase transparency and accountability for historically unaccounted methane emissions.

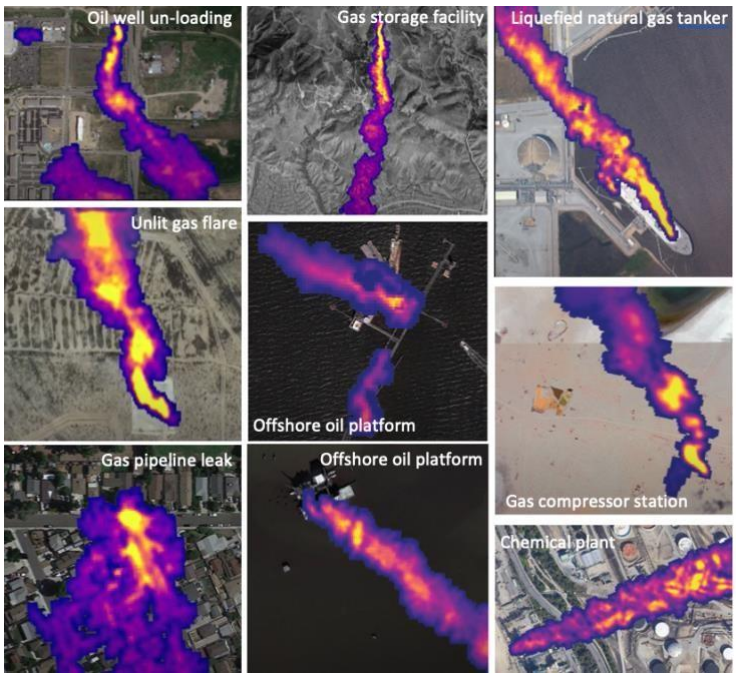


Exhibit 2. Aerial Methane Super-Emitter Leaks Detected During Sample Campaigns in the United States

RMI Graphic. Source: Carbon Mapper, 2021–22, https://data.carbonmapper.org/#1.5/25/0

Public data repositories are making more data on remotely-sensed methane emissions from oil and gas and other sources readily available to climate and industry practitioners. Currently, NASA's EMIT satellite is spotting major oil and gas methane super-emissions from locations around the equator, as mapped in Exhibit 3. However, EMIT's instrument was designed to monitor Earth's desert mineral dust sources from space from dry, arid regions and therefore cannot spot methane from Russia, Alaska, and other wet regions. To remedy this, other actors such as the climate nonprofit Carbon Mapper have begun to launch new point-source satellites that can detect both intermittent and persistent methane super-emitters worldwide. The growing array of methane satellites will complement EMIT and Carbon Mapper's ongoing methanedetecting aircraft campaigns.

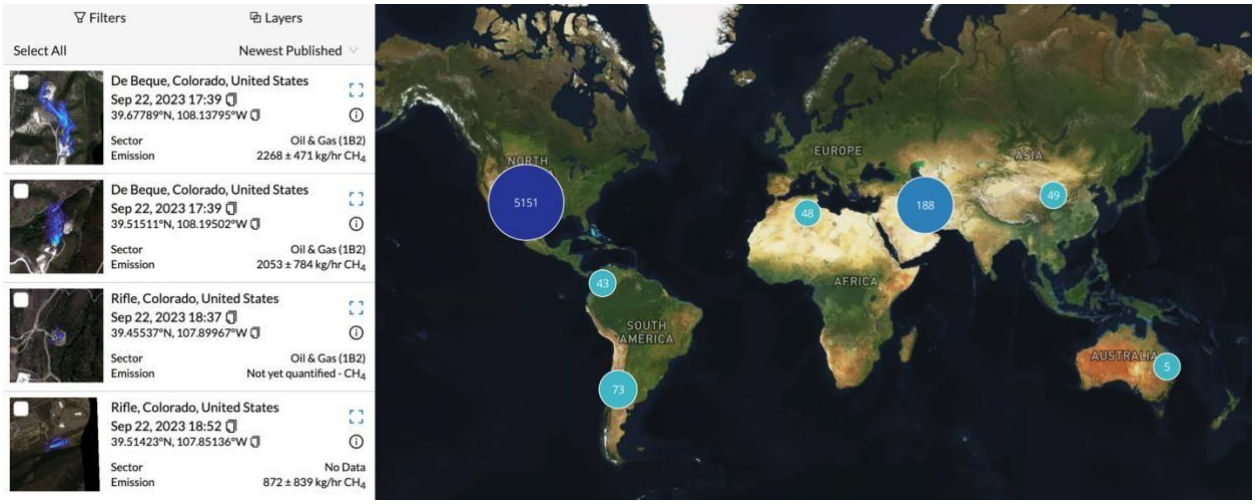


Exhibit 3. Carbon Mapper Methane Super-Emitter Data Portal (September 2023)
Note: The numbers in the bubbles represent the total count of super-emitting methane sources currently detected in that country. The table to the left is sorted by largest global methane emissions and shows US oil and gas sources with some of the highest methane levels detected.
Source: Carbon Mapper, https://data.carbonmapper.org/?sort=emissions_desc#1.15/25/0

In the year ahead, data from Carbon Mapper (and other remote sensors) can help reconcile topdown observed emissions with the OCI+'s bottom-up modeled emissions estimates. Continued satellite funding will be needed to combine these data to provide a more complete picture encompassing both routine and nonroutine methane emissions. This new climate intelligence will be critical for FIs to make fully informed decisions about their engagement with and exposure to the oil and gas sector.

Methane Abatement Is Feasible and Cost-Effective

Although methane leakage poses a major climate threat, it is also fundamentally solvable. According to IEA, methane emissions from oil and gas could be reduced by 75% with existing technologies. These constitute a mix of capital upgrades to oil and gas assets as well as operational changes to extraction practices. By capturing additional gas that can be sold instead

of wasted, many individual mitigation measures are themselves profitable. Operational changes such as instituting robust leak detection and repair programs, as well as replacing pumps, installing vapor recovery units, and using air instead of gas to run instruments, all constitute lowhanging fruit that could reduce methane leakage at no net cost. Numerous other strategies, including installing electric motors to extract, pump, and process oil and gas, can result in large methane reductions while achieving efficiency improvements that partially offset costs (plotted in Exhibit 4).

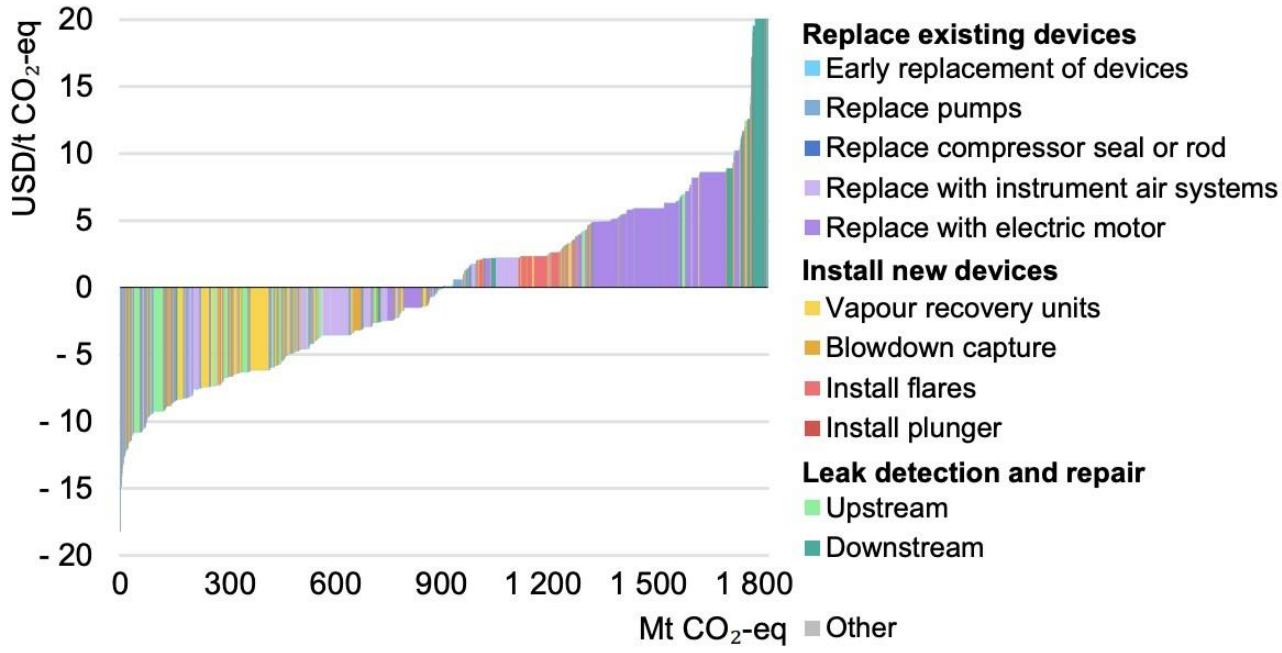


Exhibit 4. Costs from Avoiding Methane Emissions at Oil and Gas Operations, by Technology, 2022
Note: Income from gas sales based on 2017–21 average gas prices.
Source: IEA, May 2023, https://www.iea.org/reports/emissions-from-oil-and-gas-operations-in-net-zero-transitions

By combining these opportunities, the IEA estimates that emissions reduction measures available today that are either net profitable or cost neutral could reduce the sector's overall methane emissions by 40% or more. Despite these cost-saving opportunities, methane abatement activities are not happening fast enough today. Many factors contribute to the slow pace of action, including the complexity and heterogeneity of oil and gas operations, ownership, economics, and contracts. These factors may help explain why the industry itself is calling for regulation that would apply to all parties, and therefore set common expectations around methane reduction.

Government Action on Methane Will Further Raise the Stakes

Although regulators have allowed methane emissions in the past, a wave of new policies is reprioritizing methane. For example, in the United States, the IRA passed in 2022 will impose the first-ever direct fee on oil and gas methane leakage. The US Environmental Protection

Agency (EPA) is in the midst of writing new rules and reporting requirements for oil and gas methane.

The EU recently began implementing a bloc-wide price on carbon emissions through a Carbon Border Adjustment Mechanism, with the possibility of expanding fees in the future to cover other GHGs like methane. In the lead-up to COP28, the United Arab Emirates presidency has further called for accelerated efforts to reach near-zero methane emissions by 2030 — suggesting additional ambition outside of traditional climate-leader geographies to step up policy action on methane.

However, these new regulations and fees will require greater data transparency to be effective. Methane emissions self-reported by operators tend to significantly undercount methane. OCI+ together with satellite data can remedy this oversight using shadow pricing.

The OCI+ tool converts methane emissions into methane fees using a shadow price for global oils and gases. An example using US assets is given in Exhibit 5. A blanket methane fee of $900 per metric ton of methane can impact different operators at different rates, depending on their methane emissions profile. For example, an average producer in the Haynesville field is estimated to pay $0.72 per barrel oil equivalent (boe) for methane emissions, while the average shipper would pay $0.54 per boe. However, in the Texas Western Gulf, the average producer would pay a similar rate of $0.65 per boe whereas shippers would pay relatively less, only $0.06 per boe.

Exhibit 5. OCI+ Estimates of Methane Shadow Pricing for Two US Gas Assets
RMI Graphic. Source: RMI, OCI+, 2023

Although further US EPA rulemaking will determine the final prices paid by operators, it is clear this fee will directly impact operator competitiveness in a tight gas market — in addition to providing additional motivation to invest in methane emissions reduction. This further illustrates the value of precise modeling for financial actors to estimate the commercial impact and risk exposure for different oil and gas players in the value chain. The IMF has also called a global methane fee a "promising and practical instrument to lower emissions."

Call to Action for the Financial Community to Invest in Methane Abatement

FIs can play a pivotal role to hasten the pace of change in the oil and gas sector, both as providers of investment capital and through their long-term relationships with industry operators.

They can identify near-term emissions mitigation opportunities such as methane abatement, while ensuring these are embedded alongside other critical solutions and strategies that are aligned with 1.5ºC climate targets.

Meeting methane leakage reduction goals in the near term will require additional investment in three areas: improved infrastructure, ongoing operational improvements, and actionable intelligence to stop and prevent super-emitting events. For banks and other FIs that serve the energy sector, action on methane is critical in this decade to stave off the most catastrophic outcomes of climate change while enabling the world to transition to cleaner energy sources.

Continuing to finance the sector with a business-as-usual approach could lock in a bank's exposure to assets incompatible with 1.5°C goals or take them further from their own portfolio targets. However, immediate, targeted, and credible action to address methane reduction, *alongside* a comprehensive strategy to align portfolios with net-zero targets could present a significant opportunity for the financial sector to help reduce emissions in the real economy fast. As cited above from IEA's Methane Tracker (2023), 40% of the methane reduction needed could be achieved through cost-neutral or net-profitable investments.

Data tools like OCI+ together with remote sensing data demonstrate how investment opportunities could open new possibilities for FIs to engage effectively with the oil and gas sector. Enabled by more granular intelligence on the sources of methane leakage, FIs could:

- ***Enhance risk assessment and management:*** FIs need tools and expertise to assess and manage the climate risks confronting their oil and gas investments. Methane emissions have a direct bearing on the risk profile of oil and gas investments. For example, clients with better methane management will face less risk of unexpected cost increases from new methane fees, and should be seen as higher performing due to greater success at monetizing their current production and future reserves. Better near- or real-time indicators of methane leakage, such as those provided by OCI+ and satellite measurements, will enable finance to pinpoint and manage transition risk hot spots.

- ***Set targets and disclose effectively:*** To meet their own ambitious net-zero pledges, FIs must measure and disclose the climate alignment of their portfolios — or the extent to which the emissions associated with the companies and assets they finance are in line with a 1.5°C trajectory. This requires accurately accounting for the large variance of emissions intensities in the oil and gas sector. Comprehensive visibility of methane emissions is a critical piece of this puzzle. Emissions-based data and alignment metrics can be complemented by robust forward-looking assessments to determine whether future capital investment and production plans will bring a company's emissions in line with a net-zero trajectory.

- ***Strengthen client engagement and abatement finance strategies:*** FIs must actively manage portfolios in order to achieve alignment in time to meet decade-end emissions reduction goals. FIs should deploy intelligence and tools to engage with their clients more effectively on aligning their business models with climate goals based on concrete and cost-effective opportunities for abatement, such as near-term opportunities for methane reduction. Different financial actors should leverage their respective relationships with clients to influence operating and investment plans. By deploying capital to near-term operational investments in key improvements like leak detection and equipment replacement, FIs can enable important emissions reductions while supporting their clients in navigating the longer-term energy transition and the implications this will have on their business strategies.

The oil and gas industry is at an inflection point. Methane leakage is a bigger warming threat than has been historically acknowledged. It is costly and must not continue to grow. Operators can no longer afford — neither reputationally nor financially — to ignore their methane problem.

The financial sector is deeply entwined in the oil and gas sector's continued operations, exposure to climate risk, and quest for more sustainable practices. It therefore has a critical role to play in financing the needed investments to tackle methane leakage. With more granular, asset-specific data on the sources of leaks, provided by tools like OCI+, financial actors can deploy targeted investment and engagement to address this critical milestone on the path to a net-zero energy sector while continuing to manage the longer-term transition of the industry. With record heat, severe storms, and unprecedented fires making the impact of climate change unavoidable across the world, immediate action to slash methane emissions is a critical lever to slow the pace of continued warming.