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Application of the Oeko-Institut/WWF-US/ EDF methodology for assessing the quality of carbon credits

This document presents results from the application of version 3.0 of a methodology, developed by Oeko-Institut, World Wildlife Fund (WWF-US) and Environmental Defense Fund (EDF), for assessing the quality of carbon credits. The methodology is applied by Oeko-Institut with support by Carbon Limits, Greenhouse Gas Management Institute (GHGMI), INFRAS, Stockholm Environment Institute, and individual carbon market experts. This document evaluates one specific criterion or sub-criterion with respect to a specific carbon crediting program, project type, quantification methodology and/or host country, as specified in the below table. Please note that the CCQI website Site terms and Privacy Policy apply with respect to any use of the information provided in this document. Further information on the project and the methodology can be found here: www.carboncreditquality.org

Sub-criterion:	1.1.4 Barriers
Project type:	Leak repair in natural gas transmission and distribution systems
Date of final assessment:	31 January 2023
Score:	3

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Assessment

Relevant scoring methodology provisions

Some mitigation activities are financially viable but still face other obstacles such as information deficits or capacity constraints that hinder their implementation. In some instances, the institutional set-up of carbon crediting projects and the issuance of carbon credits can help to overcome these barriers. The methodology therefore employs an expert judgment on the likelihood that barriers prevent the implementation of a project type and that these barriers indeed can be overcome through the incentives of carbon credits. In arriving at this judgment, the aspects in the following should be evaluated:

Question
Does the project type face considerable non-financial barriers that can be identified in an objective and verifiable manner?
Is it possible to produce objective and verifiable evidence that the identified barriers are unique to the project type and do not apply to alternatives?
Is the market uptake of the technology underpinning the project type low although it is financially viable/competitive?
Can the barriers for this project type not be mitigated by additional financial means (and hence be assessed through the investment analysis)?
Is it possible to produce objective and verifiable evidence that carbon credits are indeed decisive for overcoming the barrier and does the incentive of carbon credits matches the strength of the barrier? (Note that this criterion can be assessed by analyzing the ΔIRR in the analysis of financial viability. The higher the Delta IRR is in relation, the more likely it may be that the revenues from the carbon credits are help overcoming the barriers.)

The scores are applied as follows:

	Score
It is very likely that barriers prevent the implementation of this project type and that the incentives through carbon credits will overcome these barriers.	5
It is very likely that barriers prevent the implementation of this project type and it is likely that the incentives through carbon credits will overcome these barriers. OR It is likely that barriers prevent the implementation of this project type and it is very likely that the incentives through carbon credits will overcome these barriers.	4
It is likely that barriers prevent the implementation of this project type and that the incentives through carbon credits overcome these barriers.	3
It is likely that barriers prevent the implementation of this project type, but it is uncertain that the incentives through carbon credits will overcome these barriers.	2
It is likely that barriers do not prevent the implementation of this project type and that the incentives through carbon credits do not help the project to overcome these.	1

Note that the application of this sub-criterion is optional. This sub-criterion should be used in combination with the sub-criterion on *financial attractiveness*. It may function as an additional criterion for activities where the assessment of the financial attractiveness has shown a high financial attractiveness even without carbon credits.

Information sources considered

1 ICF International (2014). *Economic Analysis of Methane Emission Reduction Opportunities in the U.S. Onshore Oil and Natural Gas Industries*. Report prepared for Environmental Defense Fund. https://www.edf.org/sites/default/files/methane_cost_curve_report.pdf

2 EDF (2017). Find and Fix: Job creation in the emerging methane leak detection and repair industry. Report prepared by Datu research. https://www.edf.org/sites/default/files/find-and-fix-datu-research.pdf

3 Cheadle, L.C., Travis, T., Nyarady, F. Lozo, C. (2022). Leak detection and repair data from California's oil and gas methane regulation show decrease in leaks over two years. Environmental Challenges, Volume 8, 100563 https://www.sciencedirect.com/science/article/pii/S2667010022001202

Scott, R.P., Scott, T.A., and Greer, R.A. (2022). Who owns the pipes? Utility ownership, infrastructure conditions, and methane emissions in United States natural gas distribution. RPR, Volume 39, Issue 2. https://onlinelibrary.wiley.com/doi/epdf/10.1111/ropr.12463

Ravikumar & Brand (2017). Designing better methane mitigation policies: the challenge of distributed small sources in the natural gas sector. *Environ. Res. Lett.* **12** 044023. https://iopscience.iop.org/article/10.1088/1748-9326/aa6791/meta

Levi Marks (2022). The Abatement Cost of Methane Emissions from Natural Gas Production. Journal of the Association of Environmental and Resource Economists Volume 9, Number 2 https://www.journals.uchicago.edu/doi/abs/10.1086/716700

IEA (2021) Driving Down Methane Leaks from the Oil and Gas Industry – A regulatory roadmap and toolkit. International Energy Agency. https://www.iea.org/reports/driving-down-methane-leaks-from-the-oil-and-gas-industry

IEA (2022). Global Methane Tracker https://www.iea.org/data-and-statistics/data-tools/methane-tracker

4 ERIA (2022). Technology List and Perspectives for Transition Finance in Asia. Economic Research Institute for ASEAN and East Asia. https://www.eria.org/uploads/media/2022_September_ERIA_Technology-List-and-Perspectives-for-Transition-Finance-in-Asia.pdf

5 Carbon Limits (2014) Quantifying Cost effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras

https://www.carbonlimits.no/wp-content/uploads/2015/06/Carbon_Limits_LDAR.pdf

Assessment outcome

The project type is assigned a score of 3.

Justification of assessment

Implementation of a system to inspect, measure and repair leaks of above ground components of natural gas transmission and distribution systems. In the baseline scenario, advanced leak detection

and repair is not be performed on all infrastructure and leaks. The project type reduces emissions by reducing the amount of methane leaking into the atmosphere."

Financial attractiveness considerations

Literature suggests that marginal abatement costs for most leak detection and repair system projects are negative and that it is often economic to repair identified leaks even at low gas prices. A study by Carbon Limits, assessing oil and gas facilities in the U.S. and Canada, for example, concludes that at a gas value of 3 USD per Mcf, leaks amounting to more than 97% of total leak emissions are worth repairing and that for 90% the payback period is less than a year. The recent increase in gas prices will have an additional positive impact on the attractiveness of these measures.

There are several options for leak detection that use different technologies and equipment. A common approach is to use infrared cameras. Leak detection can be applied across the supply chain and at different frequencies such as on a monthly or yearly basis. The IEA notes that "overall, leak detection tends to be more cost-effective for upstream operations, considering a market for the gas is available, since it takes longer to inspect compressors on transmission pipelines (IEA Methane Tracker, 2022). The more frequently transmission and distribution systems are surveyed, the less effect an individual survey will have on the amount of methane that can be avoided as operators will use initial survey results to repair large leaks.

Although most measures are deemed economically viable, leak detection and repair systems are not uniformly applied. The main reasons for this are the absence of respective regulatory requirements[1] as well as non-financial barriers that prevent a more systematic implementation of these measure across the industry. Several countries have introduced or are in the process of adopting regulations that include requirements for leak detection and repair. The following section will assess the existence of barriers that have the potential to hinder the implementation of the project type.

Existence of non-financial barriers

Typical barriers to leak repair in natural gas transmission and distribution systems projects include the following:

- *Split incentives:* Firms operating transmission and distribution systems might not be the owners of the gas. Saving gas through effective leak detection and repair systems will therefore not directly benefit them but the owners of the gas. Network operators will get paid by the volume of gas that they transport through their system, providing no incentives for installing a more effective leak detection system.
- *Diminishing returns:* Research shows that most methane emissions from oil and gas production facilities are from a small number of high emitting sources. While the cost for each individual survey is largely identical, the amount of gas that will be captured – and monetized – as result of repair measures decreases over time as major leaks will be detected and repaired after the initial survey (as the initial survey will likely identify all of the high emitting sources). There might be less incentives to maintain a high frequency for leak detection surveys once the initial survey has been conducted as marginal abatement cost increases.

[1] The influence of regulation on the additionality of this project type is assessed in criterion 1.1.1.

- *Lack of awareness about global warming impact of methane emissions*: Oil and gas operators may be unaware of methane emissions as a climate forcer and global warming impact of methane as a greenhouse gas. As a result, methane emissions have been traditionally neglected, and leak prevention has been concentrated on just safety issues. Limited awareness of the prevalence of methane emissions in the absence of advanced identification techniques may cause reluctance to embark on methane abatement efforts.
- *Unfamiliarity with leak detection and repair technologies:* Systems operators might be unfamiliar with – and unaware of – latest technological developments and equipment available for leak detection and repair. The degree of familiarity will vary between countries, with a higher degree being observed in industrialised countries and emerging markets.
- *Cost of capital and competing priorities:* Projects will need to compete with other investment opportunities and investors might chose different investment options that are promising a higher return. In addition, the management of the operators might not rank these projects as a priority given other tasks at hand.
- *Upfront investment cost:* In developing countries, upfront investments for the leak detection equipment such as for Hi-flow samplers, cameras and other materials might prevent the implementation of the project. Additional upfront costs include the training of staff in the use of the equipment. Project owners might be able to mitigate this barrier by hiring a service company instead of purchasing the equipment itself.

Market uptake of the project type

Although significant technical abatement potential exists and available technologies have reached a high degree of maturity, the IEA notes that the penetration rate of leak detection and repair activities has been limited, inter alia due to some of the barriers outlined above (Source 7). This might however not apply on a global level, as other reports indicate that the majority of multi-national and national oil companies have implemented advanced leak detection and repair measures at least in some of their operations (Source 9). In addition, a few states in the U.S. have adopted new regulatory policies requiring leak detection and repair measures that will further impact their market penetration rate.

Overcoming of barriers through carbon credits

The following table assesses the likelihood of carbon finance to contribute to overcoming each of the barriers identified above on a barrier-by-barrier basis:

Table 1 Assessment of likelihood that incentives through carbon credits overcome barriers

Barrier	Assessment outcome	Justification
Split incentives	High	Carbon finance would create a direct incentive for operators of distribution or transmission systems to implement more effective leak detection and repair regimes. There is thus a high likelihood for carbon credits to provide an effective means for overcoming this barrier as now both, the system operators and the owners of the gas would directly profit from leak repair.

Barrier	Assessment outcome	Justification
Diminishing returns	High	The institutional set-up that carbon credits provide, create an additional incentive for operators to ensure that further emission reductions are achieved and verified over the full crediting period. The likelihood that carbon credits can contribute to overcoming this barrier is therefore deemed to be high.
Lack of awareness about global warming impact of methane emissions	High	Through collaborative efforts between civil society, academia and businesses, general awareness on the impact of methane on global temperature rise significantly increased in some key markets like the U.S. and the EU. Initiatives like the global methane pledge provide platforms to also create more awareness on a global level. Trainings and training materials prepared by project developers are an important input for alleviating this barrier.
Unfamiliarity with leak detection and repair technology	High	The technical and institutional support that carbon credits constitute is an important input for overcoming this barrier. Projects will raise awareness of available technologies and equipment for leak detection and repair measures. They will also diffuse new technologies. Carbon crediting projects under the CDM were for example instrumental in introducing the Hi-Flow sampler to markets outside of industrialized countries.
Cost of capital and competing priorities	Medium	Whether or not carbon credits can overcome this barrier depends on the specific context of the project. Benchmark rates will vary between countries and firms operating the transmission and distribution system. As there are no public data available on the internal rate of return that typically applies for this project type, it is not possible to derive a statement that is applicable on a global level. Carbon credits further provide an institutional framework for operators to get public recognition of their actions to mitigate the climate change impact of their operations. The fact that achieved emission reductions are independently verified can lead to management attaching greater priority to advanced leak detection and repair projects given that public verification of emission reductions provides an additional value for operators from a strategic corporate perspective. As there is no data available on the typical internal rate of return some uncertainty remains to what degree revenues from carbon credits can contribute to overcoming his barrier. The likelihood is therefore deemed to be medium.

Barrier	Assessment outcome	Justification
Upfront investment cost	Medium	Carbon credits will provide an additional revenue stream that can help overcome this barrier. As research indicates that most individual projects are economically viable with short payback periods, there might be other options to mobilize the required investment that are more effective than carbon credits. Furthermore, governments, private sector entities and academia are currently actively investing into research and technology pilots that would reduce the cost of leak detection, further decreasing the importance of this barrier. In addition, operators might overcome this barrier by hiring a third party to conduct the surveys, thus mitigating the effect of upfront capital costs. The likelihood that carbon credits can contribute to overcoming this barrier is therefore deemed to be medium.

Conclusion

Overall, the available information suggests that in some countries important barriers exist for the implementation of leak detection and repair systems in distribution and transmission lines and that carbon credits can be a vehicle to overcome some of these barriers. In practice, it seems likely that the implementation of such systems is accelerated through the additional incentives that carbon credits provide.