CCQI
Carbon Credit Quality Initiative

UNDERSTANDING CCQI SCORES

Landfill gas utilization

September 2023
Version 1.0

Key CCQI findings

Additionality risks for this project type are low. Our analysis finds that revenues from carbon credits often boost internal rates of return significantly and help clearing financial benchmarks. However, we find that application of available quantification methodologies is likely to overestimate emissions reductions by about 10 to 30 percent and/or to involve significant uncertainty. The project type uses best available technology and has a low risk of locking-in continuous greenhouse gas emissions. It has positive SDGs impacts on air, soil, and water pollution.

What is this project type about?

Capture and utilization of gas from an existing and closed solid waste disposal site. The collected gas is mainly used for energy purposes, such as for electricity and/or heat generation. A smaller fraction of the gas may be flared (e.g., during maintenance of an on-site electricity generation plant). The project type reduces emissions by destroying methane and displacing more greenhouse gas intensive energy generation.

Carbon market background

All major carbon crediting programs allow registration of this project type. Projects in developing countries are predominantly registered with the Clean Development Mechanism (CDM), the Gold Standard (GS) and the Verified Carbon Standard (VCS). The American Carbon Registry (ACR), the Climate Action Reserve (CAR) and the VCS allow registration of projects located in the United States.

CCQI score summary

Additionality/Vulnerability

Quantification Methodologies

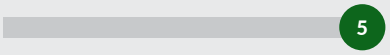
ACR Landfill Gas Destruction and Beneficial Use Projects
Version 2.0

CAR U.S. Landfill Protocol
Version 5.0

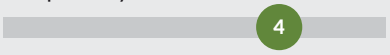
CDM ACM0001
Version 19.0

CDM ACM-III.G
Version 10.0

Non-permanence



Compatibility with net zero



SDG Impacts

Why do I see a range of scores for some quality objectives?

In these cases, scores differ between carbon crediting programs, quantification methodologies, countries or other circumstances. The range represents the spectrum that applies for all possible combinations.

CCQI resources

- CCQI Methodology & Definitions
- FAQ on our assessments
- Directory of assessment sheets

www.carboncreditquality.org

This factsheet was commissioned by Foundation Development and Climate Alliance.

FOUNDATION Development and Climate Alliance

Main factors driving project type scores

Additionality/Vulnerability

Additionality risks are likely low

Here we assess the likelihood that the mitigation activity typically would not have taken place in the absence of the added incentive created by the carbon credits (additionality).

In cases where the market for the type of carbon credit has collapsed (e.g., CDM for some project types), we assess whether the mitigation activity typically is at risk of discontinuing greenhouse gas abatement without ongoing revenues from carbon credits (vulnerability).

How do other project types score?

Graph shows the range of scores for nine project types assessed by CCQI.

Our evaluation of investment analyses from registered projects shows that revenues from carbon credits have a high impact on clearing financial benchmarks and improving internal rates of return. The project type has high upfront investment costs, mainly associated with installing wells or trenches to collect methane emissions as well as with purchasing combustion engines to produce energy.

Some countries regulate landfills. It is therefore important to assess whether regulations already mandate landfill operators to collect and destroy methane emissions. Where this is the case, the emission reductions from the projects might not be additional. This is especially relevant for industrialized countries that have often adopted more advanced waste regulation. Our assessments find that the stringency of provisions that project developers must follow to demonstrate that proposed activities go beyond legal requirement differ between carbon crediting programs. This is the main reason for the range of scores illustrated in the figure on the left.

In the case of CDM projects, the carbon credit market has collapsed. However, it is very likely that most projects registered with the CDM continue operation given that revenues from other sources than carbon credits typically exceed operating expenditures.

Quantification Methodologies

3
ACR Landfill Gas Destruction and Beneficial Use Projects
Version 2.0

3
CAR U.S. Landfill Protocol
Version 5.0

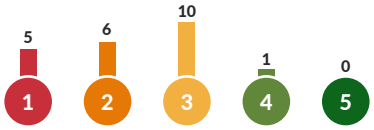
2
CDM ACM0001
Version 19.0

2
CDM ACM-III.G
Version 10.0

All methodologies use oxidation factors that likely lead to overestimation of baseline emissions

Carbon crediting programs adopt methodologies for calculating the emission impact of a project. The methodologies prescribe, inter alia, equations, data sources and monitoring approaches. Here we assess whether quantification methodologies mitigate overestimation risks by applying conservative approaches for estimating emission reductions.

How do methodologies for other project types score?



Graph shows the score distribution for all 23 quantification methodologies assessed by CCQI.

We assessed four methodologies for quantifying emission reductions for the project type: *CDM ACM0001* and *AMS-III.G* as well as *CAR U.S. Landfill* and *ACR Landfill Gas Destruction and beneficial use projects*.

The application of the two CDM methodologies likely leads to overestimating emission reductions, with the degree of overestimation being in the range of 10 to 30 percent. The application of the CAR and ACR methodologies likely lead to accurate estimates of emission reductions, but the estimates are associated with significant uncertainty.

The main element that drives our scores for all four methodologies is the prescription of unplausible values for the fraction of methane that oxidizes in the baseline scenario when passing through the topsoil layer of a landfill. CDM and CAR methodologies prescribe that project developers must apply a default value of 10 percent, with the CAR methodology prescribing a value of 0 percent for landfills with synthetic covers. Recent literature suggests, however, a global mean of 36 percent for landfills without synthetic covers. Using an oxidation factor of 10 percent for these landfills therefore likely leads to an overestimation of emission reductions. The ACR methodology prescribes different oxidation factors, ranging from 0 to 35 percent. The applicable value depends on the landfill cover type and methane flux rate, with 0 percent applying to landfills with a synthetic cover. While this is an improvement compared to the CDM and CAR approaches, the ACR methodology allows using a default value of 10 percent in cases where landfills do not measure methane flux, which creates similar overestimation risks. Furthermore, the range of oxidation factors applied by the ACR methodology lies below the global mean value of 36 percent observed in the literature.

Considering that many landfills in the US may have a synthetic cover, we assess the overestimation risks from applying inaccurate oxidation factors to be lower for the ACR and CAR methodologies. An oxidation factor of 0 percent for landfills with synthetic covers is a plausible assumption. Without actual data on shares of U.S. landfills using synthetic covers there remains however significant uncertainty whether methodologies indeed estimate emissions accurately. Projects applying the CDM methodologies on the contrary often take place in countries where synthetic layers are not common practice. We consider it therefore likely that CDM methodologies overestimate emission reductions. The ACR and CAR methodologies are more conservative than the CDM methodologies because they do not account for emission reductions resulting from displacing fossil fuels.

Non-permanence

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The project type has no material non-permanence risks

Non-permanence means that emission reductions or removals achieved by a project are later reversed e.g., due to a natural disaster or project mismanagement.

We assess whether the project type has significant non-permanence risks.

For project types that do have significant non-permanence risks we assess the robustness of carbon crediting program provisions to address these risks.

There are no material risks that emission reductions achieved by the project type are reversed. Combusting landfill gas to generate energy permanently destroys methane emissions.

How do other project types score?

Graph shows the range of scores for nine project types assessed by CCQI.

Compatibility with net zero

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Reducing landfill methane emissions is key for achieving net zero emissions

Here we assess whether the technology or practices applied by the project type facilitate the transition towards net zero emisisons.

How do other project types score?

Graph shows the range of scores for nine project types assessed by CCQI.

Landfill gas emissions are a considerable source of global methane emissions. In the United States, for example, they are the third largest methane emission source. In a world with net zero emissions there is no room for these emissions to continue. While we do not consider landfilling to be a practice that is compatible with net zero emissions, capturing and destroying methane from already existing landfills addresses a sizeable source of emissions. In addition, the energy generated by combusting landfill gas often replaces other, more emission intensive forms, of energy generation. We therefore classify the project type as a low emission, best available technology for which the risk of locking-in investments that lead to continuous greenhouse gas emissions is low.

SDG Impacts

2.7 3.7

Pollution reduction as main benefit of landfill gas utilization

Here we assess whether the project type contributes to the achievement of the Sustainable Development Goals (SDGs).

Note that projects implemented in Small Island Developing States (SIDS) and Least Developed Countries (LDCs) receive an upgrade to the score by one point due to the special circumstances of these countries.

How do other project types score?

Graph shows the range of scores for nine project types assessed by CCQI.

Landfill gas utilization projects have positive, but limited interactions with SDGs. Utilizing landfill gas provides energy/electricity using a resource that would otherwise be wasted. The project type further supports the development of sustainable, reliable, and resilient infrastructure, sustainable industrialization, as well as the adoption of clean technologies. Reduced air, soil, and water pollution compared to a baseline of an uncovered landfill reduces the risk for related illnesses. Especially in cities, the project type reduces environmental health impacts for the population through improved waste management. However, formalizing the waste management sector to have sustainable landfills instead of dumps can negatively impact people with low income making a living through informal waste segregation.

Starting points for further due diligence

This factsheet summarizes key risk factors for the quality of carbon credits from this project type, as identified in CCQI's detailed assessments. Individual projects might outperform any of our scores by making project-design choices that mitigate these risks. CCQI scores therefore do not apply to individual projects. They can however inform further due diligence when assessing the quality of individual projects. Questions to ask might include:

- Are there any legal requirements in the project area that mandate the implementation of systems to collect and destroy methane at a landfill? If yes, the emission reductions might not be additional.
- Did the landfill have a synthetic cover before the implementation of the project? For these projects, the risk that emission reductions are overestimated is lower.

For assessments of specific projects, you may contact specialized rating agencies such as BeZero, Calyx Global or Sylvera.

CCQI
Carbon Credit
Quality Initiative

www.carboncreditquality.org

About CCQI

The Carbon Credit Quality Initiative (CCQI) was established to provide free, transparent information on the quality of different types of carbon credits, enabling users to understand what types of carbon credits are more likely to deliver actual emission reductions as well as social and environmental benefits.

CCQI was founded and is managed by Environmental Defense Fund (EDF), World Wildlife Fund (WWF-US) and Oeko-Institut, a leading European research and consultancy institution working for a sustainable future. Scores published by CCQI are derived from applying the CCQI assessment methodology. The assessment is led by Oeko-Institut, with support from experienced carbon market experts from Carbon Limits, Greenhouse Gas Management Institute (GHGMI), INFRAS and Stockholm Environment Institute (SEI). Draft results are reviewed by the full CCQI team before public release. All experts involved in CCQI have deep expertise in carbon markets and are not employed by project developers or carbon crediting programs.

This factsheet was commissioned by

FOUNDATION Development and Climate Alliance

www.allianz-entwicklung-klima.de

How does CCQI assess quality?

CCQI assesses quality aspects of different types of carbon credits. The following main features define a type for our assessments:

- The type of project (e.g., landfill gas utilization)
- The carbon crediting program (e.g., Verified Carbon Standard)
- The quantification methodology used to estimate emission reductions for the project activity
- The country in which the activity takes place

We assess each type against several criteria, sub-criteria and indicators that are clustered around seven quality objectives.

Each assessment follows our publicly available methodology.

In this factsheet we present results for selected quality objectives, criteria and sub-criteria whose scores depend primarily on characteristics of the type of project.

To see how this project type scores against all our criteria, explore our scoring tool.

Quality Objectives	
	1 Robust Determination of the GHG Emissions Impact
2 Avoiding Double Counting	3 Addressing Non-permanence
4 Facilitating a Transition Towards Net Zero Emissions	5 Strong Institutional Arrangements
6 Environmental and Social Impacts	7 Host Country Ambition

VISIT CCQI SCORING TOOL

www.carboncreditquality.org/scores.html

How to interpret CCQI Scores?

Our scores use an interval scale from 1-5, with 5 representing the highest score.

Scores are risk-based and indicative of the confidence or likelihood that the assessment subject meets the quality objective.

We do not provide an aggregated score for types of carbon credits to provide users with a nuanced picture on different quality aspects.

CCQI Score Scale

Level of confidence that the assessment subject meets the criterion or quality objective