The background of the slide is a photograph of an industrial facility, likely a power plant or refinery, featuring a complex network of large, dark-colored pipes and several tall, cylindrical towers. The scene is captured in a slightly desaturated, blue-toned style, giving it a professional and technical appearance. The pipes are arranged in various directions, some running horizontally and others vertically, creating a sense of depth and complexity. The towers are positioned in the background, with one being particularly prominent on the right side. The overall atmosphere is one of industrial scale and engineering precision.

Our Carbon Credit Ratings Framework For **CCUS-EOR** Projects

Incentivizing investment in real climate action

Introduction

Sylvera carbon credit ratings are the most reliable and trustworthy in the market.

Sylvera has developed a rigorous bottom-up approach in order to produce the most accurate ratings and analyses for carbon projects in the VCMs.

What sets Sylvera apart

- **Project-type-specific frameworks:** We build rigorous frameworks and production systems for every project category to accurately test project design, carbon accounting, and climate impact claims. Sylvera's frameworks are peer-reviewed by a committee of experts and carbon market stakeholders – including project developers & registries – to ensure scientific consensus. We publish our frameworks so buyers understand exactly what we test and how we do it. [Read our white paper for more information.](#)
- **Unparalleled depth & accuracy:** We extract, clean and organize data from project design documentation (PDD) and every monitoring report. Then we meticulously build carbon, strength of baseline and financial additionality models from the ground up to validate emissions reductions or removals claims and evaluate project economics. Our project assessments are the most comprehensive in the market, providing granular analysis of core project characteristics, insightful data visualizations and interactive maps.
- **Independent data validation:** Our expert analysts leverage advanced machine learning (ML) technology, verified, independent data and proprietary field data to test the accuracy of credit issuances and claims. The comparison of independent data specific to each project against the data reported in the project's documentation is the cornerstone of high quality due diligence. For example, we use market-leading geospatial ML models when rating nature-based solutions.

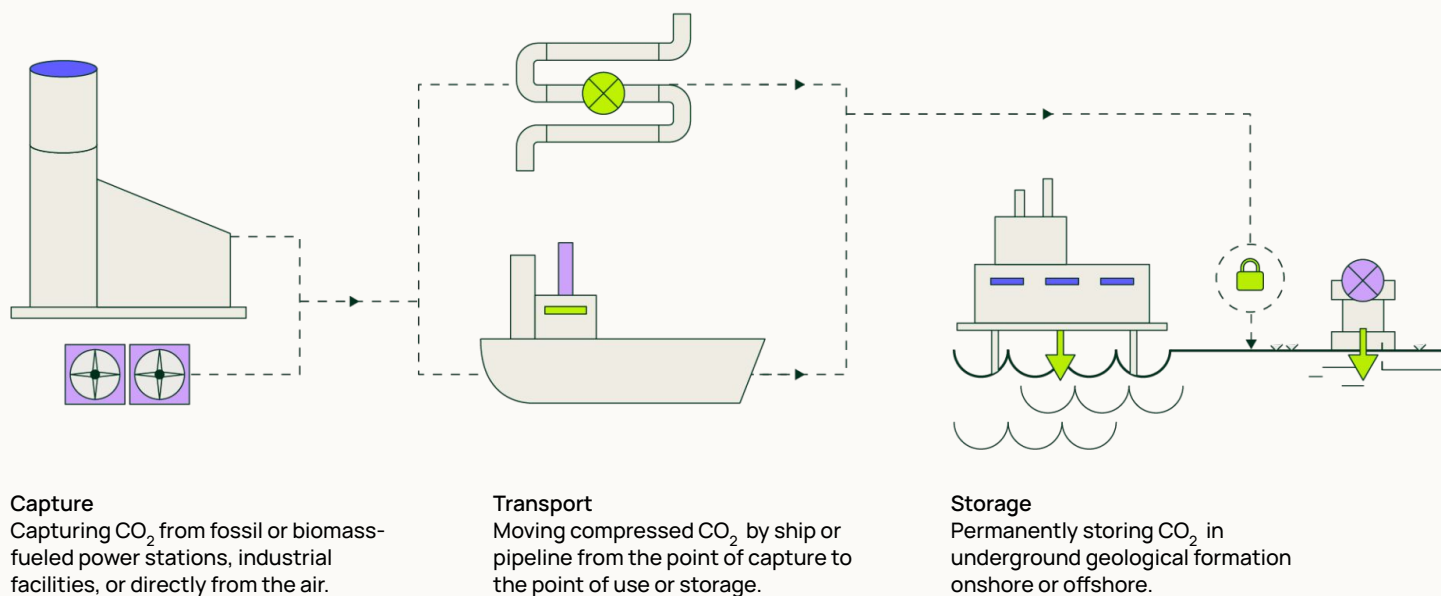
Key Terms and Concepts

Key accounting variables and concepts

CCUS	Projects that consist of capturing CO ₂ from waste from industrial facilities and fossil fuel generated power plants. The CO ₂ is then either utilized in other processes and/or stored underground in geological formations.
Atmospheric leakage pathway	Any structure, natural or man-made, that acts as a conduit for CO ₂ to return to the surface. Examples include abandoned oil and gas wells, monitoring wells and geologic faults and fractures.
Carbon capture	The process of separating CO ₂ from other gases emitted by industrial facilities.
Carbon credit	A tradable unit representing one metric ton of carbon dioxide (CO ₂), or an equivalent amount of another greenhouse gas (GHG), avoided or removed from Earth's atmosphere.
Enhanced oil recovery	The process of injecting CO ₂ into an oil field to increase the amount of oil that can be extracted.
IRR	Internal Rate of Return used for investment analysis to estimate the return on an investment.
Over-crediting risk	This refers to the risk that the project has issued credits in excess of what is justifiable against the business as usual scenario.
Life Cycle Assessment (LCA)	This refers to the analysis conducted to estimate the amount of emissions associated with the electricity consumption, the transport, the losses and the incremental oil production.
Project emissions	Emissions associated with ongoing operations of the carbon credit project.
Storage	The long-term, safe, and secure underground storage of CO ₂ in depleted oil and gas reservoirs, deep saline formations, or unmineable coal seams.
Storage formation	Subsurface geologic reservoir that stores CO ₂ after enhanced oil recovery has concluded.
Utilization	The use of captured CO ₂ for various purposes, such as enhanced oil recovery or making products like fuels, chemicals, or building materials.
Vintage	This refers to the year, or timeframe, associated with an issued carbon credit.

What are CCUS projects?

CCUS stands for Carbon Capture, Utilization, and Storage. It's a set of technologies and processes that are used to reduce carbon dioxide (CO₂) emissions from industrial sources, such as conventional power plants, cement factories, etc., and use the captured CO₂ to make products or store it in underground formations so that it doesn't enter the atmosphere.



A CCUS project typically involves several steps:

1. Carbon capture: CO₂ is separated from other gases emitted by industrial facilities using a variety of technologies, such as amine solvents, solid sorbents or membrane separation.
2. Utilization: The captured CO₂ can be used for various purposes, such as enhanced oil recovery, where the CO₂ is injected into an oil field to help extract more oil, or for making products like fuels, chemicals, or building materials.
3. Storage: The CO₂ that is not used for utilisation is stored in underground formations, such as depleted oil and gas reservoirs, deep saline formations, or unmineable coal seams, where it is expected to remain for millions of years.

The main goal of CCUS is to reduce greenhouse gas emissions and mitigate the effects of climate change by removing large amounts of CO₂ from the atmosphere. It's also seen as a valuable technology that could help support low-carbon industries and promote economic development.

On average, 73% of CO₂ captured globally for CCUS projects each year is used for Enhanced Oil Recovery (EOR) and projects with issued credits at this stage are all CCUS-EOR **therefore we are basing our initial CCUS framework and white paper on CCUS-EOR.**

As of today, all CCUS credits issued in the VCMs are CCUS-EOR projects.

Direct Air Capture (DAC) and Bioenergy with Carbon Capture and Storage (BECCS) are other CCUS categories that will be covered in their own frameworks.

What we look for in high quality CCUS-EOR projects

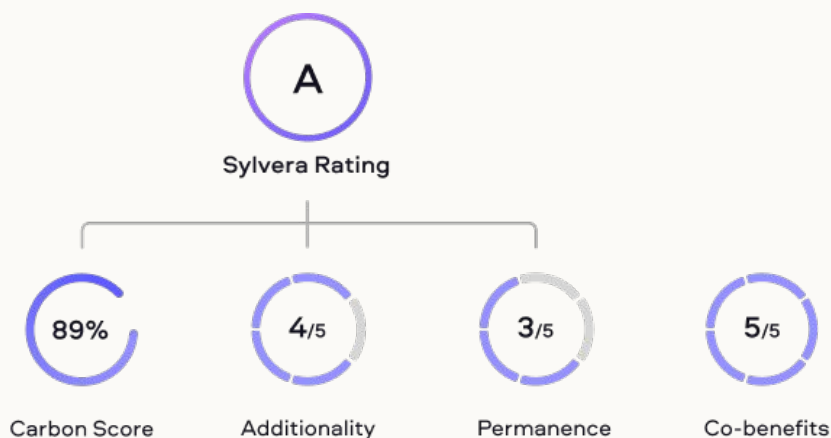
A reminder of our scoring pillars

Given the current state of data availability, it is not possible to produce project specific carbon score for CCUS-EOR credits. If the necessary data were provided by developers and registries to fully assess the quality of CCUS-EOR projects, we would follow our defined processes and frameworks, as outlined in this [white paper](#).

Our Sylvera Ratings span from AAA-D and reflect whether each credit associated with the project is likely to remove 1 metric ton of CO₂e emissions.

This rating is derived from a combination of scores that assess the **carbon performance**, **additionality** and **permanence** of the project. The scores in these three core pillars are combined in a series of matrices to ensure that underperformance in one key area does not get overshadowed by high performance in others.

Co-benefits are also assessed but they do not feed into the Sylvera Rating, as they do not have a direct bearing on the climate impact of carbon credits. Including them in the Sylvera Rating could lead to a high co-benefits score obscuring poor performance on carbon removal. Aspects of the project relating to co-benefits that could materially impact the project's ability to deliver its stated climate benefit are, however, reflected in the Sylvera Rating.



Carbon score

Sylvera's carbon score verifies whether the project has delivered on its carbon claims by comparing permanence adjustment factors to Sylvera's calculated factor using third-party data.

Additionality score

Sylvera's additionality score assesses the likelihood the project activities would have been implemented in absence of the carbon revenues. It also verifies whether a project is accurately reporting on the emissions reductions achieved by the activity during the credit history.

Permanence score

Sylvera's permanence score assesses whether the carbon removed by the project is likely to stay sequestered based on geologic risks and anthropogenic risks.

Co-benefits score

Sylvera's co-benefits score assesses the scope and relative impact of project activities on local biodiversity and communities - which are linked to UN Sustainable Development Goals (SDGs).

Carbon score

What is it?

Sylvera's carbon score verifies whether a project is accurately reporting on the carbon removals achieved by the activity. If multiple vintages have been permitted, the carbon score is a vintage-weighted average score. Sylvera's models rebuild carbon accounting from the ground-up, utilizing third party grid data.

Note: The carbon score must be considered alongside the additionality score, which considers the overcrediting risk, to understand the climate impact of the project.

Why does it matter?

Accurate carbon accounting underpins the validity of a project's issuance and material under or over reporting of emissions will impact the number of credits that have been issued. This could either reduce the risk of overissuance or call into question whether too many credits were issued. If raw gas sales from third party, the Sylvera's CO₂ concentration factor or Sylvera's project emissions are significantly lower than the project's reported figure, there is a higher risk of overissuance.

How do we calculate the carbon score?

Sylvera Carbon Score verifies whether a project is accurately reporting on the emissions reductions achieved by the activity during the credit history. Sylvera audits the raw gas sales, the CO₂ concentration and the project emissions reported by the offset project by comparing reported data with third-party, independent data from regulators, and governmental entities to verify whether the project is accurately reporting on emissions that are attributable to the project.

$$\text{Carbon Score} = \frac{\text{Sylvera Audited Removals}}{\text{Verified Removals}} = \frac{[(\text{Raw Gas Sales} * \text{Sylvera CO}_2 \text{ Concentration Factor}) - \text{Sylvera Project Emissions}]}{\text{Reported Baseline Emissions} - \text{Reported Project Emissions}}$$

	Raw Gas Sales	Sylvera CO ₂ Concentration Factor	Project Emissions	CORC
Definition	Amount of gas sequestered by the project	Concentration of CO ₂ in the sequestered gas	Project emissions due to electricity consumption, the transport, the losses and the incremental oil production	Carbon Removals
Source	Reported & Sylvera Verified	Reported & Sylvera Verified	Sylvera Verified	Calculated
Reported	293	99%	10	280
Sylvera	293	95%	10	269
			Carbon score	96%

Additionality score

What is it?

Sylvera's additionality score assesses whether (1) the projects' activities would only have taken place as a result of the carbon project revenue and (2) the project has sold too many credits due to LCA underestimation or baseline overestimation.

Why does it matter?

If the carbon removals claimed by a project would have occurred without revenue from the sale of carbon credits then they are not additional. Additionality underpins the validity of credits issued by a project. If the project is not additional, then one credit purchased does not equate to 1 metric ton of carbon avoided and, therefore, yields no climate benefit above the business as usual (BAU) scenario. A measure of the likely additionality of carbon credits is essential to understand their climate impact.

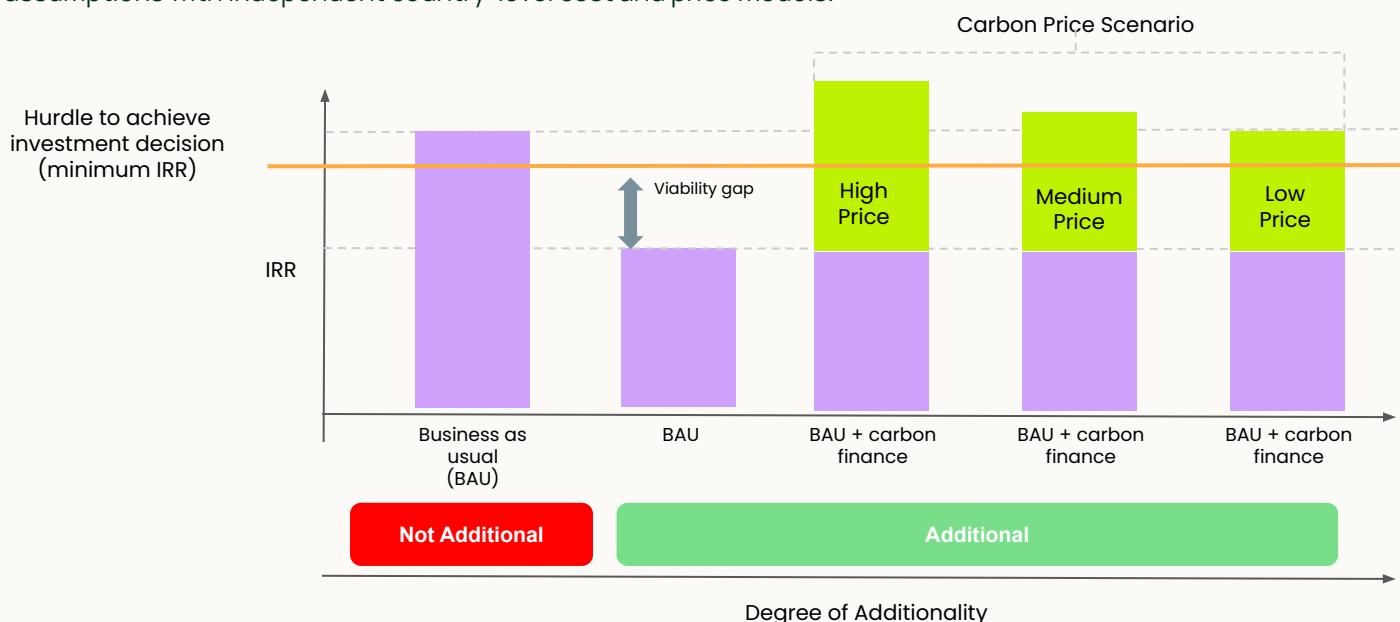
A project would score high in additionality if Sylvera's financial analysis proves the need for carbon finance to make the project economic (where project IRR is greater than the hurdle rate). This is not a binary test and the degree of additionality depends on the carbon price required to make it economic. On the other hand, a project would score low in additionality if the revenues from CCUS-EOR and any possible co-products (oil) are enough alone to make the project economically viable.

Additionality of activities	<p>Financial additionality: When financial information is disclosed in project documentation, we compare revenue, costs, and economic KPIs from the reported information to Sylvera's proprietary economic model. We ensure revenue and costs are in line with market figures to validate revenue wasn't understated and costs weren't overstated in the reported figures, so as to make the BAU economics appear subeconomic.</p>
	<p>Common practice analysis: The greater the number of similar CCUS-EOR projects there are in the region at project start year ($t=0$), the less additional the project is as it is common practice and part of a BAU scenario without carbon finance.</p>
	<p>Policy & regulatory barriers: If subsidies or capital is provided by the government to construct CCUS-EOR projects, then the project may have diminished additionality if these subsidies caused the business as usual scenario to be economic.</p>
Over-crediting risk	<p>Life cycle assessment: We assess the emissions reported by the project for electricity, combustion, transport and losses as well as assessing the excess emissions caused by increased oil production due to EOR.</p>
	<p>Strength of baseline: We compare the baseline provided by the project to third party data. The concentrations of CO₂ in sales gas and volume of gas sold to the EOR field should reflect the baseline value reported.</p>

Spotlight on financial additionality

How does Sylvera assess financial additionality?

A project is financially additional if the carbon credit revenue bridges the economic viability gap, meaning that the removals provided by the CCUS-EOR plant would have not otherwise been realized without carbon financing. Sylvera's proprietary economic model assesses the business as usual (BAU) economics, or the project without carbon revenues, and the project's economic scenario, (in other words, the project with the carbon revenues). We independently assess the project economics within our own proprietary financial models. We test the reasonableness of the modelling assumptions with independent country-level cost and price models.



CCUS-EOR projects have multiple revenue streams. The captured carbon dioxide can be sold to industries for various purposes, such as for enhanced oil recovery or for use in industrial processes. Additionally, the incremental oil produced through enhanced oil recovery can be sold at market prices, generating additional revenue for the project.

These various revenue streams can help the project to meet the hurdle rate required for economic viability. However, if the revenues from these streams are not enough, the project may need to rely on carbon finance to bridge the gap.

A high quality project demonstrates the need for carbon finance to make the IRR of the project breach the hurdle rate with low carbon prices. Furthermore, the project should take into account any emissions associated with incremental production of oil and other products made possible through carbon finance.

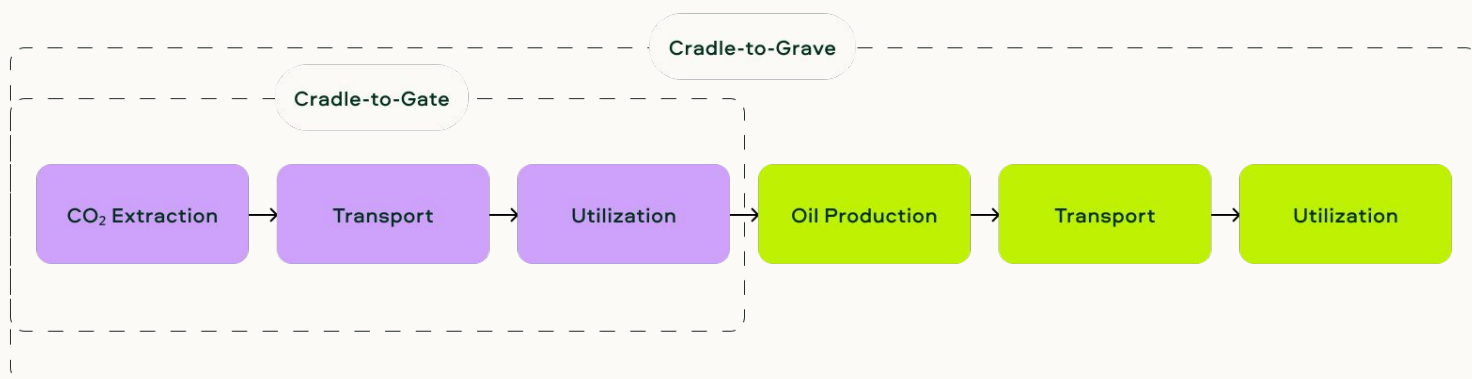
Financial additionality	Financial inputs: Are the economics derived from the reported financial information consistent with the economics from Sylvera's proprietary economic model?
	Business as usual (BAU) scenario analysis: Is the Sylvera calculated BAU IRR less than the regional benchmark hurdle rate?
	Project Scenario analysis: If the BAU scenario is sub-economic, is the Sylvera calculated project scenario IRR more than the regional benchmark hurdle rate?

Additionality score (continued)

How we assess the Life Cycle Assessment

The project should demonstrate that an appropriate life cycle assessment was conducted to account for any emissions associated with the combustion, transport, venting and losses during the CCUS-EOR process. Further emissions should also be accounted for due to the increase in oil production from EOR.

This should be conducted for cradle to grave rather than cradle to gate. Cradle to grave covers the whole lifecycle of the product including the final usage of the product. For CCUS-EOR, this means any emissions from oil use after its sale must be accounted for. Cradle to gate calculations would stop once the oil has been sold to the consumer which poses an over-crediting risk as not all emissions are accounted for. These values should be in-line with the market and scientific literature.

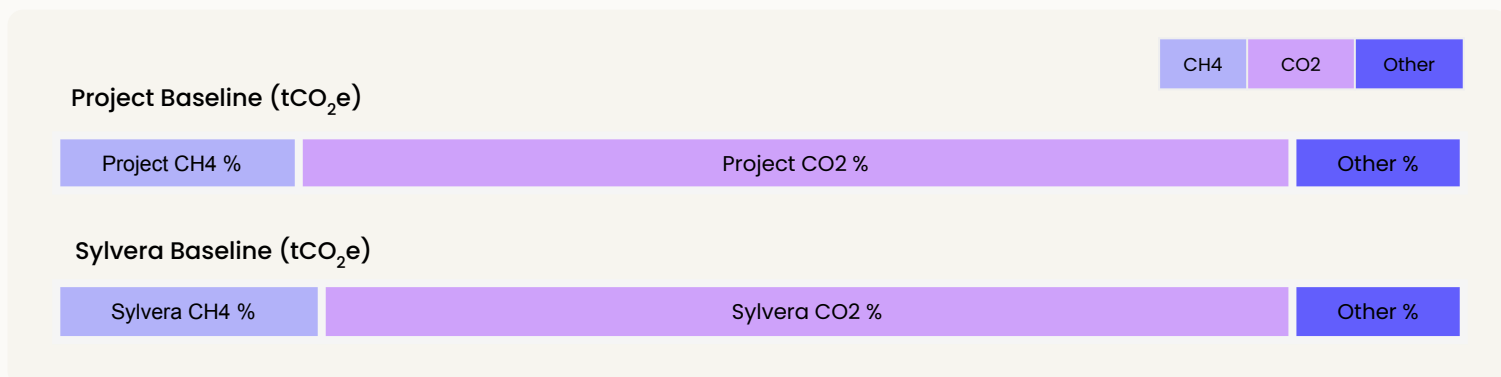


How we assess Strength of Baseline

CCUS-EOR project baselines are dependent on reducing the amount of CO₂ vented from a gas plant and instead being utilised for EOR and subsequently stored underground. If the CO₂ at the gas plant would not be otherwise vented without the sale to the EOR field or the EOR field was already purchasing the CO₂ in a BAU case and therefore is not making any new change with the project, then the baseline is invalid and no carbon reductions are taking place.

If the project purchasing the sales gas for CCUS-EOR is a practice which stops the carbon dioxide being vented, then the project should demonstrate that the baseline calculated by the project agrees with third-party data. The baseline is assessed as the sales gas volume multiplied by the concentration of CO₂ equivalent in the sales gas.

Sales Gas: the purified form of natural gas that has been processed to remove Liquefied Petroleum Gas (LPG) and condensate, and is composed mainly of methane and carbon dioxide.



Permanence score

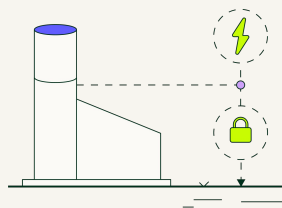
What is it?

Sylvera's permanence score refers to the risk that the avoided emissions will later be reversed and released back into the atmosphere. **CCUS-EOR credits have a low permanence risk given the high stability of geologic storage.**

Permanence comparison: nature-based solutions vs CCUS-EOR



In **nature-based avoided emissions projects**, such as REDD+, there is an inherent risk of reversal associated with an ecological life cycle. Carbon stored in natural systems is exposed to wildfire, drought, and long-term climatic changes that can result in complete loss or partial reduction in carbon storage capacity.



In **CCUS-EOR projects**, the risk of significant reversal is extremely low. Properly-sited, undisturbed storage projects are anticipated to effectively sequester carbon dioxide upwards of 10,000 years.

Why does it matter?

Ensuring that carbon dioxide remains permanently stored is essential for validating emissions reductions. CCUS-EOR projects may further decrease permanence risks by: identifying project sites with demonstrated geologic storage capability, remediating improperly plugged wells that could serve as atmospheric leakage pathways, and developing robust frameworks for monitoring stored carbon dioxide after enhanced oil recovery has concluded.

Geologic Risk	Storage Formation: Properties of the storage volume, or the rock formation intended to store injected CO ₂ , can impact the likelihood of CO ₂ migration.
	Potential Atmospheric Leakage Pathways: If migration occurs, CO ₂ may leak to the atmosphere through other CO ₂ injection wells, oil or gas production wells, monitoring wells, abandoned wells, or faults and fractures.
Anthropogenic Risk	Monitoring Strategy: Projects are typically required to submit a plan for monitoring potential CO ₂ migration post-injection.
	Proponent Experience: Previous experience with CO ₂ injection is likely to result in more robust injection and monitoring plans.

Co-benefits rating

What is it?

Sylvera's co-benefits rating examines whether the project is implementing activities to support local biodiversity and communities, as well as the scale and likely impact of these activities.

How do we assess the co-benefits of CCUS-EOR credits?

Sylvera measures the impact CCUS-EOR project activities have on biodiversity. We leverage data provided by project developers, International Union for Conservation of Nature (IUCN) data, and data from the Integrated Biodiversity Assessment Tool (IBAT).

When assessing community impact, we utilize data disclosed by project developers and the Sustainable Development Goals (SDGs) framework to triangulate a project's community impact.

BIODIVERSITY

THREATS

We assess the extent to which the project has contributed to biodiversity loss and whether its infrastructure is located in key conservation areas.

CCUS-EOR projects are used to displace the carbon dioxide emissions from the oil and gas industry. Their activities may cause surface and groundwater contamination that is harmful to local wildlife.

COMMUNITIES

SUSTAINABLE DEVELOPMENT GOALS

We independently identify which UN SDGs the project is contributing towards by assessing the activities implemented by the project.

SCHEME

We determine whether the scheme is novel or ongoing, and if it goes beyond activities currently implemented in the region. We also assess whether the project makes a foundational contribution to activities that support SDGs.

IMPACT

We determine the relative impact of activities on local communities by scaling the SDG impact against country-level performance, the size of the population affected, and the carbon removals achieved by the project.

Interpreting the Sylvera Rating

Our rating scale



Sylvera issues a Complete Rating when we have access to all the key data (ranging from earth observation data to monitoring reports provided by project developers and restries) required to rigorously assess a project according to our proprietary, bottom-up framework.

Each project we rate receives a discrete letter rating (AAA-D) with sub-scores for carbon, additionality, permanence and co-benefits, in addition to an in-depth report.

When key data required to fully evaluate a project is missing or is incorrect, Sylvera does not issue a complete Sylvera rating. Instead Sylvera has developed a provisional ratings framework to provide an assessment of the carbon credits based on the best information available to date. When new data is issued and if it satisfies all our criteria for rigorous analysis, Sylvera will reassess the project and issue a complete Sylvera rating.

Interpreting the carbon score



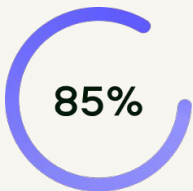
The project has delivered more carbon removals relative to the amount verified.

Sylvera calculates higher removals than the project has reported.



The project has delivered the carbon removals equal to the amount verified.

Sylvera calculates the same level of removals as the project.



The project has under delivered on carbon removals relative to the amount verified.

Sylvera calculates less removals that are attributable to the project than the project reports.



The project has not delivered any carbon removals and should not be issuing credits.

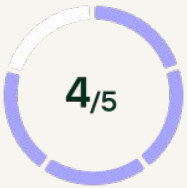
Sylvera detects significantly more emissions than the project reports.

Interpreting the additionality score

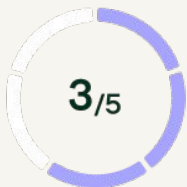


Indicates very high confidence that a project is additional.

Example: The project has a very low risk of over crediting. There is a significant difference in activities between the “business as usual (BAU)” and the “with project” scenario. The project activities implemented were a direct result of the revenue derived from the carbon project.



Indicates high confidence that the project is additional.

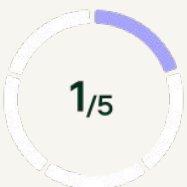


Indicates the project is likely additional.

Example: There is potential risk of over crediting. There is a difference in activities between the “business as usual (BAU)” and the “with project” scenario. The projects activities implemented may be a direct result of the carbon revenues.



Indicates uncertainty about the project's additionality claim.



Indicates we found a serious red flag questioning the project's claims of additionality.

Example: The project has a high likelihood of severe over crediting and/or the activities implemented to increase carbon stock would have occurred in the absence of carbon revenues.

Interpreting the permanence score



Indicates high permanence and minimal risk, the project carbon credits are very likely to remain valid long-term.

Example: The project is exposed to minimal permanence risk and may have taken additional steps to ensure the long-term integrity of carbon dioxide storage.



Indicates high permanence and low risk, the project carbon credits are likely to remain valid long-term.



Indicates moderate risks to permanence, the project carbon credits may remain valid long-term.

Example: The project is exposed to moderate permanence risks and may have documented emissions reversals.



Indicates high risks to permanence, the project carbon credits are unlikely to remain valid long-term.



Indicates we found a serious red flag questioning the project's claims of permanent carbon storage.

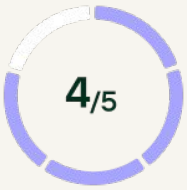
Note: Given the stability of geologic carbon storage, it is extremely unlikely that a project would receive this score.

Interpreting the co-benefits rating

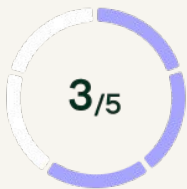


Indicates exceptional progression of targeted SDGs, as well as extraordinary protection or increase in biodiversity.

Example: The project implements a broad range of SDG activities with extensive reach in the community, and has strong biodiversity benefits.



Indicates strong progression of targeted SDGs, as well as mitigates biodiversity risk.

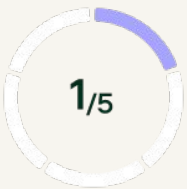


Indicates average progression of targeted SDGs, as well as adequate activities benefitting biodiversity.

Example: The project implements SDG activities with moderate reach in the community and takes acceptable action to reduce pressures on biodiversity.



Indicates narrow progression of targeted SDGs, or low species richness and limited activities to benefit biodiversity.



Indicates very limited progression of targeted SDGs, as well as deficient activities to benefit biodiversity.

Example: The project implements limited SDG activities with limited reach in the community, while not taking meaningful action to benefit biodiversity.

Disclaimer

Sylvera Limited (“Sylvera”) provides ratings and other information relating to carbon offset projects. Sylvera’s ratings are indications of the likelihood that the claimed carbon impact of a project is a true representation of its real impact (a “Rating”). Sylvera also provides other information, including narrative, analytical and geospatial assessment of, and information relating to, specific aspects of the Rating and project (the “Content”).

Ratings are, and will be construed solely as, a statement of opinion on the carbon impact of a project at a certain point in time, and not statements of current or historical fact, investment or financial advice, nor recommendations to take or not take a particular action by Sylvera or its directors, employees, contractors, agents or shareholders (collectively, the “Sylvera Parties”). Ratings are expressed in relative rank order, which is to say they are ordinal measures of the expected carbon impact and are not predictive of a specific outcome. Ratings do not address any other risk or assessment, including but not limited to market value risk or price volatility, and do not take account of any objectives or requirements of a user of the Rating and/or Content (a “User”). Ratings are the collective work product of Sylvera, and no individual, or group of individuals, is solely responsible for a rating. Ratings are not facts and, therefore, cannot be described as being “accurate” or “inaccurate.”

Each User will, with due care, make their own study and evaluation of a project before taking any decisions or actions, and nothing provided by the Sylvera Parties should be a substitute for the exercise of independent judgement, skill and expertise by a User.

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Sylvera is the leading carbon credit ratings platform. We help corporate sustainability leaders, traders and exchanges confidently evaluate and invest in the best carbon credits. By creating the first carbon intelligence platform, Sylvera is raising the bar on project accounting and analysis, and introducing a much needed source of truth for carbon markets. We are backed by renowned investors like Index Ventures, Insight Partners, LocalGlobe and Salesforce Ventures.

To learn more about Sylvera, [contact us](#).

