Capturing Tomorrow's Air: An Innovative Solution

This document outlines combining Climatech's innovative CO_2 decomposition solution, revolutionizing corporate responsibility and environmental progress.

METHODOLOGY FOR THE QUANTIFICATION, MONITORING, REPORTING AND VERIFICATION OF GREENHOUSE GAS EMISSIONS REDUCTIONS AND REMOVALS OF

DIRECT AIR CARBON CAPTURING & UTILIZATION PROJECT

VERSION 1.0

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We want to extend our gratitude to the dedicated teams and organizations whose contributions have been instrumental in developing our methodology. While our approach has been inspired by established methodologies from UN, ACR, and other respected sources, we emphasize that our methodology is a product of meticulous in-house development.

Our methodology has been crafted by drawing insights from various scientific methodologies and conducting comprehensive reviews to ensure its robustness and alignment with global standards. The valuable input from experts, peer reviewers, and stakeholders has played a crucial role in shaping our methodology and DPR into effective tools for addressing carbon emissions and climate change challenges.

We deeply appreciate the collaborative efforts of the entire team involved in this process and the individuals who dedicated their time and expertise to provide valuable feedback and recommendations during the review stages. Their commitment to environmental stewardship and their passion for advancing sustainable solutions have been pivotal in refining our methodology.

As we move forward, we remain committed to transparency, continuous improvement, and adherence to the highest standards of scientific rigour. Together with our partners and collaborators, we are confident that our methodology and DPR will contribute significantly to the global endeavour to combat climate change and create a more sustainable future for all.

Thank you for your unwavering support and dedication to our shared mission.

ACRONYMS AND DEFINITIONS

TERM	ACRONYM (if applicable)	DEFINITION
Bioenergy with Carbon Captureand Storage	BECCS	Energy generation through combustion of sustainable biomass with capture and sequestrationof associated GHG emissions
Biomass Carbon Removal and Storage	BiCRS	CO_2 removal from the atmosphere through sustainable biomass and permanent sequestration ingeologic reservoirs or long-lived products.
Carbon Captureand Storage	CCS	Capture, transport, and permanent storage of CO_2 ingeologic reservoirs.
Carbon Dioxide	CO_2	Greenhouse gas and the primary gas to be geologically sequestered. Increased levels of CO_2have been measured in the atmosphere and attributed to burning of fossil fuels and other industrial processes and the interruption of naturalsinks' ability to remove and store CO_2.
Carbon Dioxide Removal	CDR	General term used for removal of CO_2 directly from the atmosphere through biological or technologicalmeans.
Carbon dioxide equivalent	CO_2e	CO_2e is a metric to compare other GHGs based on their GWP relative to CO_2 over the same timeframe.The IPCC publishes GWP values for converting all GHGs to a CO_2e basis (see "Global Warming Potential").

ACRONYMS AND DEFINITIONS

TERM	ACRONYM (if applicable)	DEFINITION
Carbon offset credit	Offset	A carbon offset is a reduction in emissions of GHG made to compensate for or to offset an emission of GHG made elsewhere (one offset = 1 Metric Ton CO_2e).
Direct Air Capture	DAC	Technological method for removal of CO_2 directly from the atmosphere.
Global Warming Potential	GWP	Global warming potential is a relative scale translating the global warming impact of any GHG into its CO_2e over the same timeframe. This methodology references the 100-year GWPs consistent with the ACR Standard.
Greenhouse Gas	GHG	A natural or anthropogenic gas that absorbs and emits thermal energy, causing atmospheric heating. The primary greenhouse gases are carbon dioxide (CO_2), methane (CH_4), water vapor (H_2O), nitrous oxide (N_2O), and ozone (O_3).
Methane	CH_4	The primary component in “natural gas”, can be biogenic (released from natural processes, livestock and agriculture, and anerobic breakdown of biomass)or thermogenic (released during production and transportation of fossil fuels).

ACRONYMS AND DEFINITIONS

TERM	ACRONYM (if applicable)	DEFINITION
Metric ton	MT	The metric unit of measurement for one carbon offset. 1 MT = 2,204.62 pounds or 1.10 US tons.
Monitoring, Reporting, and Verification	MRV	Term which encompasses all activities undertaken tomeasure, report, and verify emissions and atmospheric leakage for a project.
Nitrous oxide	N_2O	Sources of N_2O include agriculture, fossil fuel combustion, wastewater management, and industrial processes.
Sources and Capture Emissions	SCE	Sources: Any process that releases carbon into theatmosphere is known as a carbon source. Capture Emissions: Any emission which is generating due to capture of carbon from air or emission due to decomposition.
Sustainable Biomass		Forestry – slash or waste from forest, shrub/chaparral management, and sawmill residue. Agriculture – crop residue, manure, and energy cropscultivated on marginal or degraded land. Waste – municipal, landfill gas, and wastewater.

METHODOLOGY

3.1 INTRODUCTION

In an era marked by increasing concern over climate change and its detrimental impacts on our planet, Climatech emerges as a pioneering force dedicated to environmental stewardship and sustainable solutions. Our company stands at the forefront of the battle against rising carbon dioxide (CO_2) levels in the atmosphere, as well as the control of sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) emissions. With unwavering commitment and cutting-edge technology, we have embarked on a mission to mitigate the effects of greenhouse gases, improve air quality, and contribute to a greener, healthier world.

As the global community recognizes the urgent need to address climate change, we have dedicated ourselves to creating innovative solutions that address two critical environmental challenges: the reduction of CO_2 concentrations in the atmosphere and the removal of harmful SO_2 and NO_2 emissions from industrial processes. Our work is not merely a response to a crisis; it is a proactive endeavor to safeguard the future of our planet for generations to come.

3.1.1 Project Scope

This methodology outlines the specific measurement and reporting methodology for the capture component of a capture-decomposition project and is intended to be used alongside a decomposition methodology to create a complete methodology for the capture-decomposition project. The methodologies are to be used to provide technology-specific quantification of the emissions and monitoring of captured and decomposed and released/escaped CO_2.

This methodology describes how CO_2 captured from the atmosphere, composed into pure graphitic carbon is measured and adjusted for emissions resulting from the project to quantify the net carbon dioxide removal (CDR) resulting from the project. The basic principles of the methodologies are as follows:

1. Based on ISO 14064-2:2019 Standards for quantifying greenhouse gas emissions.

2. Project operational and embodied emissions are subtracted from the decomposed CO_2 quantities to determine the CDR credited.

3. Any CO_2 released into the atmosphere during the process or post process is subtracted from the CDR credited.

4. CDR is accurately accounted for and not double counted.

3.1.2 Methodology Components

The scope of this methodology focuses on a Hybrid model know as DACC+U (Direct Air Carbon Capture & Utilization) based on the combination of Direct Air Capture (DAC) and Carbon Capture & Utilization and their post-capture treatment components of the overall project but identifies the overarching framework methodology applicable to the overall project and requirements in which the compatible decompose methodologies would comply.

In addition to quantifying carbon dioxide removal, the methodology also outlines the monitoring and measurement requirements of the project as well as data management.

3.2 SUMMARY AND DESCRIPTION OF METHODOLOGY

DACCU (Direct Air Carbon Capture & Utilization), a groundbreaking technology pioneered by Climatech, which is a Hybrid Model based on DAC(S) and CCU(S). It represents a transformative approach to combat global climate change. This innovative process entails two core components:

- **Capture**: Using advanced CCD technology, the separation and capture of carbon dioxide (CO2) molecules from various sources, including industrial emissions and atmospheric CO2.

- **Decomposition**: The efficient and sustainable decomposition of the captured CO_2 into environmentally benign byproducts, thus effectively removing it from the atmosphere.

This Methodology outlines the quantification and accounting frameworks, eligibility criteria, and monitoring requirements for generating carbon offset credits from CO_2 removal and emissions reduction achieved through eligible DACCU projects. These projects encompass the capture and decomposition of CO_2, as indicated in Table 5. The Methodology is designed to serve as an incentivizing tool within relevant industries, promoting increased adoption of CCD (Carbon Capture & Decomposition) technology. It employs a flexible additionality framework, based on either a performance standard or UN's three-prong additionality test, as outlined in Section 3. The Methodology draws inspiration from the accounting framework initially developed by the Center for Climate and Energy Solutions.1

Climatech is committed to advancing CCD technology and contributing to a sustainable, carbon-neutral future. Our innovative approach not only captures CO_2 emissions but also actively decomposes them, addressing climate change at its source. By utilizing this Methodology, we aim to encourage the wider adoption of CCD solutions and drive meaningful reductions in carbon emissions, ultimately safeguarding our planet for generations to come.

3.2.1 Scope of Application

This methodology pertains specifically to the capture component within the framework of Climatech's CO_2 Capture and Decomposition technology. The core process involves the direct air capture (DAC) of carbon dioxide (CO_2) from the atmosphere, followed by its subsequent decomposition.

3.2.2 Project Conditions

This methodology is applicable under the following project conditions:

- ✓ CO_2 measurement at the last monitoring point as defined.
- ✓ Evaluation of net Carbon Dioxide Removal (CDR) credited using Equation 7.
- ✓ Project activities aimed at decreasing global CO_2 concentration over their lifecycle, assessed through cradle-to-grave life cycle assessment (LCA).
- ✓ Commitment to "do no net harm" to the environment and society.
- ✓ Transparent and rigorous quantification of CO_2 removal, allowing for unique identification and tracing throughout the value chain.
- ✓ Compliance with local environmental, ecological, and social statutory requirements.
- ✓ Installation in accordance with national best practices and statutory requirements.
- ✓ Calibration of measurement devices per manufacturer recommendations or industry best practices, ensuring measurements with an uncertainty of 5% or better.
- ✓ Access to water according to local permits.

3.2.3 Capture Conditions

This methodology applies to project and operation activities satisfying the following capture conditions:

- ✓ Atmospheric CO_2 capture employs a chemical absorption process relying on amine-base solvent.
- ✓ Atmospheric CO_2 capture for the decomposition of CO_2 into pure graphitic carbon.
- ✓ Atmospheric CO_2 capture via a chemical absorption process, with a desorption step temperature swing not exceeding 120°C.

- ✓ Delivery of atmospheric carbon to the decomposition tank with a minimum purity level of 95% if transported in gaseous or liquid state.

3.2.4 Decomposition Conditions

- ✓ This methodology extends to project and operation activities meeting the subsequent decomposition conditions:
- ✓ Transfer of captured CO_2 by pipeline into Decomposition tank at higher purity.
- ✓ Transfer of CO_2 to decomposition tank that adheres to the following characteristics:
- ✓ Site criteria approval by national/local authorities.
- ✓ Compliance with site criteria outlined in the UN Directive, in the absence of national/local legislation.

3.2.5 Exclusions

This methodology explicitly excludes any form of geological CO_2 storage methods such as solubility trapping and in-situ carbon mineralization and also methods like pure-phase injections like Enhanced Oil Recovery (EOR) and applications in sedimentary basins, among others.

3.2.6 Start Date:

The initiation date, as defined by the UN standard, marks the beginning of GHG emissions reduction efforts from the baseline. Given the intricacies of financing DACC+U projects, Project Proponents have the option to designate a start date at the conclusion of the project's design phase to establish eligibility, subject to third-party validation based on the project's design. Projects adopting this approach will necessitate an additional validation post-construction. Alternatively, developers may opt for a start date coinciding with the initial CO_2 injection, requiring a single project validation. DACC+U projects that are built but not yet operational at the time of UN latest Carbon Removal methodology's publication can seek credit generation, except in cases of regulatory non-compliance-induced non-operability. Likewise, projects under construction, though not yet operational at UN publication, remain eligible. Active projects undergoing significant operational enhancements, such as the integration of new CO_2 sources or additional carbon capture/compression equipment, or initiating injection into a different reservoir, also qualify. The expanded project capacity is deemed eligible for credit generation under this methodology.

3.2.7 **Post-Decomposition Monitoring**:

The minimum post-decomposition monitoring period for Climatech's projects is one (1) year. During this time, we closely observe the environmental impacts and ensure that there is no release of CO_2 into the atmosphere. This period of vigilance is essential to guarantee the effectiveness of our CO_2 decomposition process and to assess the absence of any unintended consequences.

3.2.8 **Extension of Monitoring**:

The duration of post-decomposition monitoring may be extended beyond the initial five years, based on the results obtained during this period. If our monitoring reveals any concerns or uncertainties about the possibility of CO_2 leakage, we will extend the Project Term in two-year increments until we can confidently assure that no CO_2 is escaping into the atmosphere.

At Climatech, our commitment to environmental responsibility extends from the moment we initiate CO_2 decomposition to the years that follow. We are dedicated to ensuring that our innovative technology not only effectively decomposes CO_2 but also safeguards the environment for a sustainable and cleaner future.

3.2.9 **Reporting Period**:

Climatech's methodology for reporting and verification offers flexibility to the Project Proponent in defining the reporting period, as long as it aligns with UN's established guidelines. According to the UN Standard, a verifier is mandated to conduct a field visit at least once every five years. Between these on-site visits, verification may alternatively be conducted through a desktop assessment. This desktop assessment can occur annually or at any other interval that suits the Project Proponent's preferences. However, it is crucial to emphasize that verification must be successfully completed before any issuance of Emission Reduction Tonnes (ERTs) can take place. This ensures that Climatech's reporting and verification processes maintain a rigorous and reliable standard in line with UN's requirements.

3.2.10 **Crediting Period**:

For Climatech's DACC+U methodology, the project term is set at 5 years, aligning with the nature of the project. Given the innovative and efficient nature of the DACC+U technology, its crediting period is set at 1 year. This duration allows for timely generation of offsets against the baseline scenario. It's important to note that hybrid DACC+U projects (DAC + CCU model), which involve significant infrastructure investment, are typically long-term endeavors with crediting periods of 10 years. This provides stakeholders with assurance regarding offset generation, contingent on successful verification in line with the approved GHG Project Plan. At the conclusion of each 10-year period, Project Proponents have the opportunity to seek renewal by adhering to current UN requirements. This involves re-evaluation of the baseline scenario and the use of the latest emission factors, tools, and methodologies. Additionally, an additionality assessment ensures that emissions reductions and carbon capture remain beyond regulatory requirements or common industry practices. Importantly, UN does not impose a limit on the number of crediting period renewals, enabling continued progress in emissions reduction efforts.

3.2.11 **Project Duration**:

Given that we are not engaged in EOR activities or traditional CO_2 sequestration, our project duration differs from conventional CCS projects. Our commitment extends beyond the initial decomposition process. The Project Term for Climatech includes the period of CO_2 decomposition, as well as a crucial phase following the completion of the decomposition, during which we rigorously monitor for any potential atmospheric impact. Therefore, the project duration will be at least 5 years to recover CapEx of the project. Although, we don't have any risk after post decomposition. Still to recover the CapEx of the project, we will tenure the Project duration at least for five

(5) years.

3.2.12 Periodic Reviews and Revisions:

Periodic reviews and revisions are integral to Climatech's methodology for Direct Air Carbon Capture and Utilization (DACC+U) projects. UN may necessitate adjustments to the methodology to ensure that monitoring, reporting, and verification systems accurately encompass alterations in project activities. Additionally, the methodology is subject to regular updates in response to regulatory modifications, technological advancements, revisions in emission factors, or broader applicability criteria. To commence a project, the Project Proponent must ensure they are employing the most current version of the methodology. This proactive approach guarantees that the methodology remains aligned with the latest industry standards and best practices, ensuring the accuracy and effectiveness of DACC+U projects undertaken by Climatech.

3.3 PROJECT BOUNDARIES

Consistent with UN Standard requirements, the project boundary for Climatech's CO_2 capture and decomposition project is established to encompass critical aspects, including a physical boundary, a temporal boundary, and a greenhouse gas (GHG) assessment boundary. This document provides an overview of the project's physical boundary, which delineates the scope of the project, and its alignment with established guidelines.

3.3.1 Physical Boundary

The physical boundary for Climatech's CO_2 capture and decomposition project is carefully defined to encompass specific elements vital to the project's objectives. The installation of CO_2 capture may impact different sources of emissions at a facility. To ensure the emissions reduction calculation approach reflects the relevant change in emissions due to the project, the physical boundary shall incorporate all GHG sources affected by the project in the baseline and project scenarios (i.e., the change in overall emissions due to capturing CO_2). This may require the inclusion of one or more emission sources from the Primary Process creating the captured CO_2. The primary focus of this boundary is to delineate the GHG emission sources directly related to the project and establish the baseline emissions calculation, as elaborated in Section 4 of this document.

Figure 5: Sources and Capture Emissions

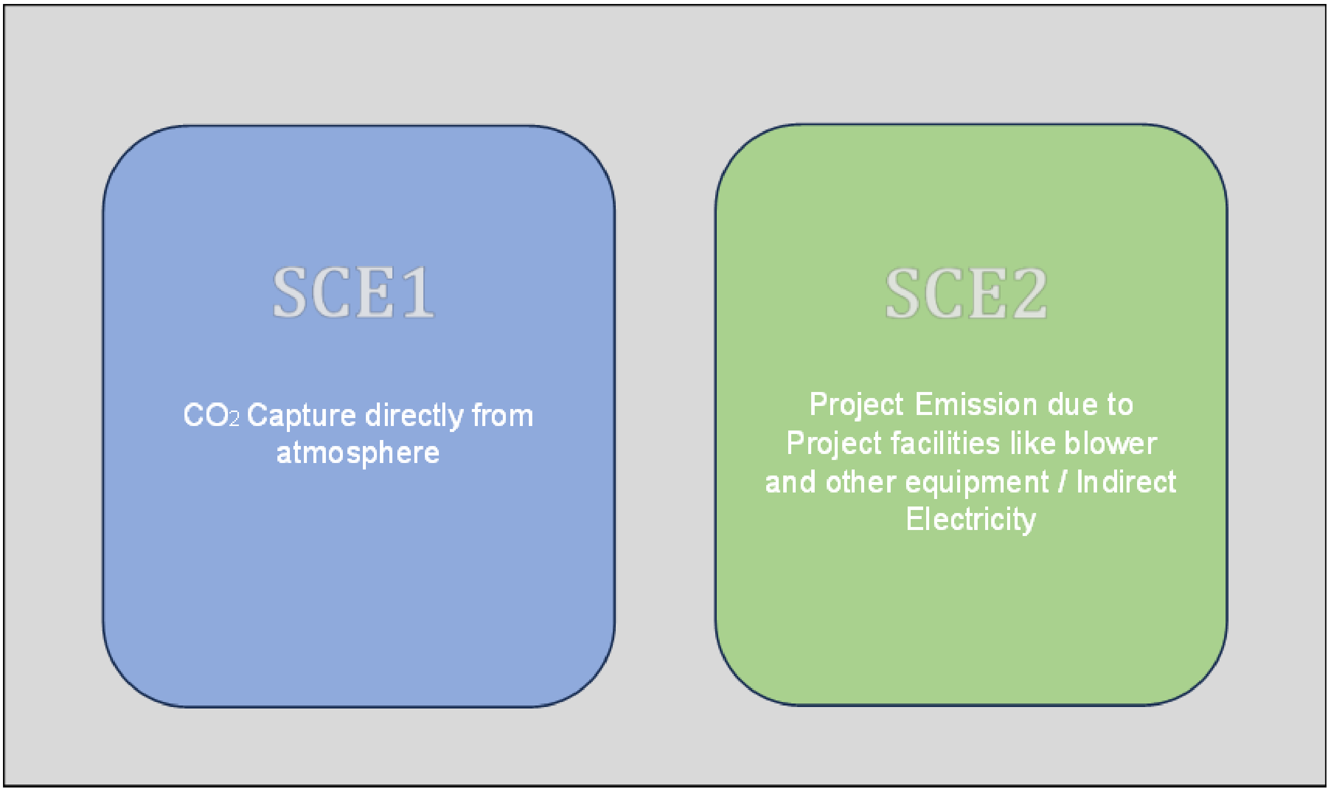

Table 6: Sources and Capture Emissions

SCE		DESCRIPTION	GHG	BASELINE (B) PROJECT (P)	INCLUDED OR EXCLUDED
1	Facility emissions	Primary process emissions from chemical process or energy generation and consumption	CO_2	B	Included
			CH_4	n/a	Excluded
			N_2O	n/a	Excluded
2	Indirect Electricity or Project Emissions	Emissions from capture and decomposition of CO_2 from primary process	CO_2	P	Included
			CH_4	n/a	Excluded
			N_2O	n/a	Excluded

Comprehensive Inclusion: The project boundary is intentionally drawn broadly to ensure that all relevant emissions associated with the CO_2 capture and decomposition process are considered. This includes emissions related to CO_2 capture and decomposition, as well as activities related to methanol production at thermal power plants and separation of components from sludge, if applicable.

Multiple Processes or Facilities: In scenarios where CO_2 is captured from multiple processes or facilities, the project boundary allows for their inclusion within a consolidated boundary that encompasses the capture site. Downstream emissions related to these processes are allocated to the project for comprehensive accounting.

Consideration of Impact: The installation of CO_2 capture technology may have a discernible impact on various emission sources within a facility. To ensure an accurate calculation of emissions reductions attributable to the project, the physical boundary comprehensively incorporates all GHG sources affected by the project in both baseline and project scenarios. This inclusion enables the assessment of the net change in emissions due to the capture and decomposition of CO_2.

Specific Examples: For instance, the physical boundary for CO_2 capture at thermal power plant units which would encompass the systems associated with the methanol production process. However, it might exclude downstream units that utilize the methanol, such as for fuel combustion, or other systems unaffected by the CO_2 capture system. Notably, emissions stemming from the CO_2 capture systems themselves are considered as project emissions.

Regulatory Compliance: Operating sites, if applicable, must adhere to local, state/provincial, and federal regulations that are in effect at the time of project registration. Ongoing compliance with these regulations is imperative throughout the project's duration to ensure its environmental and operational integrity. By defining the physical boundary in a comprehensive manner, Climatech ensures that its CO_2 capture and decomposition project adheres to established standards, accurately accounts for emissions reductions, and contributes to global efforts to combat climate change while promoting sustainable environmental practices.

3.3.2 Temporal Boundary:

In the context of Climatech's innovative CO_2 decomposition technology, the Temporal Boundary takes on a unique significance. Our process does not involve traditional injection for sequestration, as we are focused on the decomposition of CO_2 rather than its storage or Enhanced Oil Recovery (EOR). Therefore, the Start Date for our projects marks the initiation of the CO_2 decomposition process.

3.3.3 Greenhouse Gas Assessment Boundary

Climatech's methodology hinges on a comprehensive assessment of greenhouse gas emissions, with a clear delineation of gases included for calculation. Capturing CO_2 and decomposing are factored in as project emissions, starting five years post-project initiation or from January 1, 2030, whichever occurs first. This approach ensures that DACC+U aligns with lower carbon footprint goals. By capturing and decomposing anthropogenic CO_2 that would otherwise be released into the atmosphere, the methodology promotes a net atmospheric benefit, providing a sustainable solution to carbon emissions.

TABLE 7: Justification for Greenhouse Gases Considered in the Assessment Boundary

	EMISSION SOURCE	GAS	INCLUDED?	JUSTIFICATION/ EXPLANATION
BASELINE	Gas stream captured from the primary process	CO_2	Yes	CO_2 is major emission from source
		CH_4	No	Emission is negligible and exclusion is conservative
		N_2O	No	Emission is negligible and exclusion is conservative

	EMISSION SOURCE	GAS	INCLUDED?	JUSTIFICATION/ EXPLANATION
PROJECT	Electricity usage	CO_2	Yes	CO_2 is major emission from source
		CH_4	Yes	Included for completeness
		N_2O	Yes	Included for completeness

4. Quantification Methodology:

4.1 BASELINE EMISSIONS:

The methodology available for determining baseline CO_2 emissions from the primary removals is Projection-based. As a precautionary measure, these procedures do not account for methane (CH4) or nitrous oxide (N2O) emissions. In the case of DACC+U projects, it is advised to consider CO_2 removals as part of baseline emissions, as outlined in Equation 1.

4.1.1 Calculation Procedure for Projection-based Baseline:

The Projection-based baseline method employs actual, measured greenhouse gas (GHG) removals by the project to simulate what would be the CO_2 decomposed by the Direct Air Carbon Capture & Utilization (DACC+U), assuming a consistent level of production or activity. This process entails precise measurement or calculation of the CO_2 quantity generated by the primary process, immediately downstream. As mentioned earlier, an adjustment factor is a critical component of the equation, ensuring functional equivalence is maintained between the baseline and project emissions.

For DACC+U facilities deemed eligible, baseline emissions are defined as the volume of gas captured, along with its CO_2 concentration, measured at a strategically selected location. This meticulous approach ensures accuracy and reliability in determining baseline emissions for DACC+U facilities.

The baseline emissions are calculated as per Equation (1)

$$BE_{Projection-Based,\ y} = CFM * 28 \cdot 3 * 60\ * 24 * 365 * \%\ CO_2\ /\ 22.4\ *\ 44\ /\ 10^6 \quad (1)$$

WHERE,

$BE_{Projection-Based,\ y}$	Baseline emissions for a DACC+U project where the baseline scenario is defined using a Projection-based approach in each year (tCO_2 / year).
CFM	Volume of actual CO_2 gas captured and decomposed by the process. The blower draw the air calculated in CFM (Cubic Feet Per Minute). Note: 28.3 is multiply for Cubic Feet to Litre Conversion, 60 is for minute to hour conversion, whereas 24 is for conversion of hour to day. And 365 is for day to year conversion.
$\%\ CO_2$	$\%\ CO_2$ in the gas stream, monitored immediately downstream of the primary process, or for DACC+U facilities monitored immediately downstream of the captured gas volume measurement location, in each year (% volume). Note: The value is divided with 22.4 for litres of CO_2 to moles of CO_2. And multiplied with 44 for moles to gram conversion of CO_2 intake/yr. Then, again is divided by 10^6 for gram/year to ton/year conversion.

4.2 PROJECT EMISSIONS

According global standard, Project Emission is divided into 3 categories:

TABLE 8: Type of Scope for Emissions

Type of Scope	Description
Scope 1	Emissions from sources that an organization owns or controls directly – for example from burning fuel in our fleet of vehicles (if they're not electrically-powered)
Scope 2	Emissions that a company causes indirectly and come from where the energy it purchases and uses is produced. For example, the emissions caused when generating the electricity used in our buildings would fall into this category.
Scope 3	Emissions that are not produced by the company itself and are not the result of activities from assets owned or controlled by them but by those that it's indirectly responsible for up and down its value chain. Scope 3 emissions include all sources not within the scope 1 and 2 boundaries.

DACC+U project emissions equal the sum of CO_2e emissions from CO_2 capture and Decomposition, as shown in Equation (2)

Total Project Emissions

$$PE_y = PE_{capture,\ y} + PE_{transport,\ y} + PE_{storage,\ y} \tag{2}$$

WHERE,

PE_y	Project emissions from DACC+U project in year y (tCO_2 e/yr).
$PE_{capture,\ y}$	Project emissions from CO_2 capture and compression in year y (tCO_2 e/yr). Refer to Section 4.2.1.
$PE_{transport,\ y}$	Project emissions from CO_2 transport in year y (tCO_2 e/yr). As we are decomposing. It will be 0 (zero).

$PE_{storage,\ y}$	Project emissions from CO_2 injection and storage in year y (tCO_2 e/yr). As we are decomposing. It will be 0 (zero).

4.2.1 Calculation Procedures for CO_2 Capture and Decomposition

The provided equation delineates the procedures for quantifying atmospheric emissions stemming from the capture phase of CCS endeavors. It is pertinent to note that this equation applies to a broad spectrum of capture techniques, including pre-combustion, post-combustion, and oxy-fuel capture, encompassing both industrial installations and Direct Air Capture (DAC) facilities. It is crucial to underscore that emissions that undergo successful capture and subsequent sequestration do not fall under the purview of project emissions. This distinction arises from the fact that they do not find their way into the atmosphere. However, it is imperative to acknowledge that despite this capture and sequestration, they do not translate into the generation of carbon credits. But, as a DACC+U company we will capture and decompose it in one process and less carbon is emitted in the atmosphere. So no need of Calculating Decomposition separately because there is no chance of Transport or Storage. Decomposition is done by the use of propellant to generate friction which helps to break bonding of CO_2.

4.2.1.1 Total Annual Project Emissions from the Capture Segment

$$PE_{capture,\ y} = PE_{C-PP,\ y} + PE_{C-Comb,\ y} + PE_{C-Indirect,\ y} \quad (3)$$

$PE_{capture,\ y}$	Project emissions from CO_2 capture and compression in each year (tCO_2 e/yr).
$PE_{C-PP,\ y}$	Project emissions from the primary process (physical CO_2 emissions) that have not been captured by the CO_2 capture process, including project emissions from venting of CO_2 during capture and compression, and project emissions from fugitive releases of CO_2 during capture and compression in each year (tCO_2 e/yr). It is assumed to be zero. As there is no

	direct or indirect transportation of CO_2.
$PE_{C-Comb,\ y}$	Project emissions from on-site use of fossil fuels to operate support equipment for the CO_2 capture and compression facilities in each year (tCO_2 e/yr). It is assumed to be zero. As there is no direct or indirect Fuel dependence.
$PE_{C-Indirect,\ y}$	Project emissions from purchased electricity and thermal energy used to operate the CO_2 capture and compression systems in each year (tCO_2 e/yr). Refer to Equation (4).

Aligned with the objective of offering a comprehensive evaluation of the DACC+U project's impact, this quantification methodology encompasses all emissions from the primary process that escape into the atmosphere.

4.2.1.2 Emission Factor for Electricity Generation ($EF_{ELECTRICITY}$)

The emission factor for electricity generation, which is derived from the USEPA's Emissions & Generation Resource Integrated Database (eGRID). This database serves as a comprehensive repository of data regarding the environmental attributes of electric power generated in the United States. It encompasses key information such as emissions of nitrogen oxides, sulfur dioxide, carbon dioxide, methane, and nitrous oxide, as well as net generation, resource mix, and other relevant parameters. As of the adoption of this methodology, the most recent release is eGRID2019, which contains data up to 2019. It is imperative to utilize the latest published version of eGRID for accurate assessments.

eGRID2019 offers data categorized by Balancing Authority Area (BAA), North American Electric Reliability Corporation (NERC) region, eGRID subregion, U.S. state, and various other levels of aggregation. The BAA, eGRID subregion, and NERC region data are based on areas encompassing electricity generation, transmission, and distribution, effectively representing the emissions associated with the mix of GHG-emitting and non-emitting resources utilized to meet electricity demands in those regions.

However, if there arises a need to deviate from eGRID emission factors, for instance, due to the project's reliance on alternative energy sources, it becomes the responsibility of the project proponent to monitor and report electricity usage along with associated emissions.

The selection of the emission factor adheres to a specific order of preference. Ideally, if the BAA can be identified, the emission factor from this level of aggregation must be used. Only in instances where this preferred level of granularity cannot be employed should one resort to the next available option.

In the eGRID2019 database, the BA19 tab furnishes data for 76 BAAs UNoss the United States. According to this methodology, the emission factors from these BAAs are deemed the most accurate representation of emissions. Thus, it is mandatory to utilize the BAA emission rate provided the BAA can be identified. In the BA19 tab, locate the pertinent BAA in the left-hand column and refer to the column titled "BAA annual CO_2 equivalent total output emission rate (lb/MWh)". To convert this value into units of tCO_2 e/MWh, divide it by 2,205.

If the specific BAA is unknown, one should resort to the eGRID subregion data available in the SRL19 tab. This section includes emission factors for 27 eGRID subregions covering the United States. Find the relevant eGRID subregion in the left-hand column and proceed to the column named "eGRID subregion annual CO_2 equivalent total output emission rate (lb/MWh)". To convert this figure into units of tCO_2 e/MWh, divide it by 2,205.

In cases where the BAA is unknown and it is not feasible to conclusively assign the project site to a specific eGRID subregion (e.g., due to proximity to a boundary between two subregions), one can resort to the data aggregated by U.S. state available in the ST19 tab. This option is considered the least precise due to variations in electricity generation, transmission, and distribution regions that may not align with state boundaries. Identify the state in which the project site is located in the left-hand column and consult the column labeled "State annual CO_2 equivalent total output emission rate (lb/MWh)". To convert this value into units of tCO_2 e/MWh, divide it by 2,205.

4.2.2 CO_2 Emissions from Purchased and Consumed Electricity, Steam, and Heat

$$PE_{C-Indirect,\ y} = PE_{Elec,\ y} + PE_{Cogen,\ y} \tag{4}$$

$PE_{C-Indirect,\ y}$	Project emissions from purchased electricity and thermal energy used to operate the CO_2 capture and compression facilities in each year (tCO_2 e/yr).

$PE_{Elec,\ y}$	Project emissions from grid electricity used to operate the CO2 capture and decompose facilities in each year (tCO_2 e/yr).
$PE_{Cogen,\ y}$	Project emissions from thermal energy and/or electricity purchased from third party operated heat and/or power generation facilities used to operate the CO2 capture and compression facilities in each year (tCO_2 e/yr).

4.2.3 CO_2 Emissions from Purchased and Consumed Electricity

$$PE_{Elec,\ y} = Electricity_y + EF_{Electricity} \tag{5}$$

$PE_{Elec,\ y}$	Project emissions from grid electricity used to operate the CO_2 capture and compression facilities in each year (tCO_2 e/yr).
$Electrcity_y$	Total metered grid electricity usage from equipment used to operate the CO_2 capture and compression facilities in each year (MWh).
$EF_{Electricity}$	Emission factor for electricity generation in the relevant region, by (in order of preference) BAA, eGRID subregion, or State (tCO_2 e/ MWh).

4.2.4 CO_2, CH_4, N_2O Emissions from Purchased and Consumed Steam and Heat

$$PE_{Cogen,\ y} = \Sigma \cdot (Fuel_i \times EF\ CO_{2Fuel_i}) + \Sigma \cdot (Fuel_i \times EF\ CH_{4Fuel_i}) \times$$

$$CH_4 - GWP_i + \Sigma \cdot (Fuel_i \times EF\ N_2O_{Fuel_i}) \times N_2O - GWP_i \tag{6}$$

$PE_{Cogen,\ y}$	Project emissions from thermal energy and/or electricity purchased from third party operated heat and/or power generation facilities used to operate the CO_2 capture and compression facilities in each year (tCO_2 e/yr).

$Fuel_i$	Proportionate volume or mass of each type of fuel, by fuel type i, combusted by the third-party cogeneration unit to supply electricity or thermal energy to the CO_2 capture and compression facilities in each year (e.g., m^3/yr or kg/yr).
$EF\ CO_{2Fuel_i}$	CO_2 emission factor for combustion of fuel i (e.g., tCO_2 /m^3 or tCO_2 /kg of fuel).
$EF\ CH_{4Fuel_i}$	CH_4 emission factor for combustion of fuel i (e.g., tCH_4 /m^3 or tCH_4 /kg of fuel).
$EF\ N_2O_{Fuel_i}$	N_2O emission factor for combustion of fuel i (e.g., tN_2O/m^3 or tN_2O / metric ton of fuel).
$CH_4 - GWP_i$	Global Warming Potential of CH_4 .
$N_2O - GWP_i$	Global Warming Potential of N_2O.

4.3 EMISSION REDUCTIONS

As shown in Equation 7, overall GHG emission reductions (ERs) from the DACC+U project equal Baseline Emissions minus Project Emissions. For eligible CDR facilities, baseline emissions are equivalent to the volume of gas captured and its CO_2 concentration.

4.3.1 Total Annual GHG Reductions

$$GHG\ ER_y = BE_y - PEy \qquad (7)$$

$GHG\ ER_y$	Total annual GHG reductions from the DACC+U project (tCO_2 e/yr).
BE_y	Baseline CO_2 e emissions in each year (tCO_2 e/yr).
PEy	Project CO_2 e emissions in each year (tCO_2 e/yr).

5 DATA COLLECTION AND MONITORING

The tables in Section 5 provides a concise overview of the key parameters and considerations for measuring Projection based baseline emissions and Project calculation methodologies. For a comprehensive understanding of the calculation processes, please refer to Section 4, where detailed procedures are outlined.

5.1 BASELINE EMISSIONS MEASUREMENT

Baseline emission measurement parameters and considerations are summarized in Table 7 for the Projection-based Baseline emissions calculation procedures. Details of the calculation procedures are included in Section 4.

Table 9: Overview of Baseline Emissions Calculation Procedures

TYPE OF BASELINE	GHGS	DESCRIPTION	MONITORING CONSIDERATIONS
PROJECTION BASED BASELINE	CO_2 to be conservative, CH_4 and N_2O excluded from the baseline quantification	Baseline emissions for a Projection-based baseline are calculated by measuring total CO_2 produced by the primary process in the actual project. In certain cases, the amount of CO_2 used to calculate baseline emissions may need to be adjusted to account for the incremental CO_2 generated to meet the energy requirements of the capture process. This could occur if the energy required to operate the CO_2 capture process equipment is provided by electricity or thermal energy generated from the same process producing the captured CO_2. Quantify the incremental mass of CO_2 generated at the capture site (to adjust the measured CO_2 value and properly account for the parasitic load from the CO_2 capture equipment) by calculating the CO_2 emissions from using steam to regenerate the CO_2 absorber according to facility engineering design information or from metered steam usage and steam conversion factors appropriate for the facility. Determine excess CO_2 emissions	Total volume of CO_2 produced by the actual project's primary process. Steam used to meet the parasitic loads from the CO_2 capture and compression equipment, if necessary.

		from violations to facility permit conditions and deduct from baseline as indicated in Equation 1	

5.2 PROJECT EMISSIONS MEASUREMENTS

Project emission sources and GHG measurement parameters are summarized in Table 7. Details of the calculation procedures are included in Section 4. In addition to measurement parameters shown in Table 8, a detailed monitoring, reporting, and verification (MRV) plan must be developed for each operating site used in the DACC+U project. The MRV plan is discussed in Section 6.

Table 10: Overview of Project Emissions Calculation Procedures

EMISSION SOURCES TYPE & GHGS	DESCRIPTION	KEY MONITORING PARAMETERS
CO_2 CAPTURE & DECOMPOSITION		
Total Capture Emissions CO_2 ; CH_4 ; N_2O	Total project emissions from CO_2 capture processes, including direct and indirect emissions.	N/A

Electricity and Thermal Energy Use CO_2 ; CH_4 ; N_2O	Indirect emissions from purchased and consumed electricity and thermal energy (steam) used to operate the CO_2 capture and compression equipment. Electricity may be used to operate the CO_2 compressors, dehydration units, refrigeration units, circulation pumps, fans, air separation units and a variety of other equipment. Purchased steam may be used for various purposes, including regeneration of the CO_2-rich absorbent used for a post-combustion capture configuration.	Total quantities of electricity and steam used to operate the CO_2 capture equipment

6. MONITORING, REPORTING, AND VERIFICATION (MRV) PLAN

The Monitoring, Reporting, and Verification (MRV) process is a critical component in ensuring the effectiveness and transparency of carbon capture initiatives. In the case of the DACC+U company, external regulatory bodies play a crucial role in overseeing and verifying the entire process. This external oversight provides an additional layer of assurance to stakeholders and the wider public that the carbon capture efforts are being conducted in a responsible and accountable manner.
One of the distinguishing features of the DACC+U process is its unique approach to carbon capture. Unlike many traditional carbon capture methods, which involve the storage or injection of captured CO_2, the DACC+U process directly addresses the carbon dioxide by absorbing and decomposing it into Amorphous Carbon. This key distinction significantly reduces the potential risks associated with post-capture challenges. There is no need for extensive verification or monitoring of storage and transport, as the captured carbon is promptly and efficiently converted into a stable form. This approach not only enhances the efficiency of the carbon removal process but also minimizes potential environmental risks associated with long-term storage or injection.

The near-zero risk potential of the DACC+U process is a testament to its innovative and sustainable nature. By eliminating the need for extensive storage infrastructure and ensuring that captured carbon is transformed into a stable and environmentally benign form, the

DACC+U process sets a new standard for carbon capture technology. This approach not only aligns with global efforts to combat climate change but also demonstrates a commitment to responsible and accountable environmental stewardship. The involvement of external regulatory bodies further reinforces the transparency and credibility of the entire process, providing stakeholders with the confidence that carbon capture efforts are being conducted with the highest standards of integrity and effectiveness.

In summary, the Monitoring, Reporting, and Verification process is an essential element in the DACC+U company's carbon capture efforts. Through the involvement of external regulatory bodies, the process ensures that carbon capture activities are conducted transparently and in compliance with established standards. The innovative approach of directly absorbing and decomposing carbon distinguishes the DACC+U process from traditional carbon capture methods, significantly reducing potential post-capture risks. This near-zero risk potential not only enhances the efficiency of carbon removal but also underscores a commitment to responsible environmental practices. The DACC+U process represents a milestone in carbon capture technology, offering a sustainable and effective solution to address the challenges of climate change.

6.1 MRV Plan Framework

A MRV framework for DACC+U projects shall include the following:

- A plan for monitoring the parameters.
- A plan for reporting within intervals.
- A plan for Validation Verification by an external body (VVB)

6.1.1 MONITORING PLAN

For our innovative DACC+U technology, the monitoring strategy is distinct in its simplicity and effectiveness. Given that our process involves the direct absorption and decomposition of carbon dioxide (CO_2) without the need for storage, transportation, or injection, the monitoring requirements primarily revolve around ensuring the proper functioning of the essential components. Our focus is on maintaining the reliability and efficiency of the system, making it a robust and sustainable solution for carbon capture.

One crucial aspect of our monitoring strategy involves tracking the performance of key components. This includes monitoring the operating time of the blower, the Electricity Consumption by the process and maintenance of Motor. Ensuring that the blower assembly and Motor operate efficiently and consistently is essential for the overall success of the carbon capture process. And additionally, we monitor the proper cycle of the entire DACC+U process to confirm that each stage is functioning as intended. This regular monitoring of component performance helps us identify any potential issues or anomalies promptly.

To maintain the integrity of our carbon capture system, we have established a monitoring schedule that includes reporting and maintenance activities at three-month intervals. This periodic assessment allows us to address any maintenance needs promptly and conduct surveys to ensure the continued effectiveness of the technology. By proactively monitoring and maintaining the system, we can minimize downtime, optimize performance, and extend the lifespan of our equipment.

Importantly, since our DACC+U process does not involve the injection of captured CO_2 into geological reservoirs, there is no need for complex monitoring associated with storage or injection. Our approach simplifies the monitoring requirements, reducing complexity and potential risks. Instead, our focus remains on the efficiency and reliability of the system's components.

In summary, our monitoring strategy for the DACC+U technology emphasizes the proper functioning of key components, including the blower and the overall process cycle. Regular monitoring and maintenance activities are conducted at three-month intervals to ensure the system's reliability and effectiveness. By simplifying the monitoring requirements and eliminating the need for storage or injection, we have created efficient approach to carbon capture, contributing to a more sustainable and environmentally friendly solution for combating climate change.

6.1.2 REPORTING PLAN

In the case of our DACC+U technology, the reporting strategy differs significantly from traditional carbon capture methods. Since there is no storage or transportation involved, as the captured carbon is promptly decomposed, there is no need for post-treatment reporting related to storage or injection. Instead, our focus lies in monitoring the functionality of the components involved in the process. This includes ensuring that the blower operates efficiently and that the overall process cycle is functioning as intended. To maintain optimal performance, we have established a reporting schedule at three-month intervals for maintenance and survey purposes.

Unlike CCS projects, which require a detailed MRV plan encompassing various aspects such as reservoir description, model parameters, site characterization, monitoring strategy, and contingency plans for potential leakage scenarios, our DACC+U technology operates on a more streamlined reporting approach. The absence of injection or storage processes simplifies the reporting requirements, allowing us to focus primarily on the proper functioning of the equipment and systems involved. This approach aligns with our innovative carbon capture method, which directly absorbs and decomposes carbon.

While traditional CCS projects necessitate a project-specific MRV plan developed by a seasoned professional with expertise in geologic storage and relevant earth science disciplines, our reporting strategy is tailored to the unique characteristics of the DACC+U process. Our focus lies in ensuring the efficiency and functionality of the components involved in the carbon capture and decomposition process. This includes regular checks on the blower's performance, motor’s performance and the overall cycle of the system including electricity consumption. By adopting this approach, we maintain a streamlined reporting process that is well-suited to the specific requirements of our innovative carbon capture technology.

In summary, the reporting strategy for our DACC+U technology centers around the efficient operation of the components involved in the process. As there is no storage or transportation of captured carbon, the reporting requirements are simplified, focusing on the functionality of equipment like the blower and the overall process cycle. This approach aligns with the unique characteristics of our carbon capture method, which directly absorbs and decomposes carbon, eliminating the need for extensive monitoring of storage facilities or injection processes. By adopting this streamlined reporting strategy, we ensure that our carbon capture efforts remain effective, transparent, and aligned with the goals of combating climate change.

6.1.3 VALIDATION & VERIFICATION

In the case of our DACC+U technology, which involves the direct decomposition of captured carbon without the need for storage, transportation, or injection, the focus shifts towards the verification of operational components. This includes monitoring critical elements such as blower uptime, motor maintenance, electricity consumption and ensuring the proper functioning of the entire process cycle. To maintain the system's efficiency and integrity, a comprehensive reporting and maintenance routine is established at three-month intervals.

While the traditional MRV plan is typically oriented towards projects involving carbon storage and injection, our approach necessitates a tailored verification strategy.

Instead of focusing on storage goals and potential leakage scenarios, the emphasis lies in ensuring the flawless operation of the essential components within the DACC+U system. This includes scrutinizing the performance of the blower assembly and confirming the consistent execution of the carbon decomposition process.
To oversee this unique MRV plan, a qualified third-party Validation and Verification Body (VVB) with expertise in CCS and DAC+S and relevant earth science disciplines is engaged. The appointed VVB plays a critical role in validating the effectiveness of our monitoring and verification strategies. This professional is selected based on their extensive experience in monitoring CO_2 -storage projects and their proficiency in earth science disciplines such as reservoir engineering, geophysics, geology, hydrology, and more. Their expertise is validated through a track record of at least three years in monitoring CO_2 storage projects or by having published pertinent, peer-reviewed academic research in the field.

The validation process is a collaborative effort, with the appointed professional working as an independent third party within the VVB team. They may be subcontracted to the VVB, provided that the VVB assumes full responsibility for their contributions. The selected professional also undergoes a thorough Conflict of Interest evaluation conducted by the VVB. Their approval of the project-specific MRV Plan at the initial validation stage is crucial, and their continued involvement is integral to subsequent verifications and validations. This ensures that the project-specific MRV Plan is consistently adhered to in every reporting period when credits are claimed.

6.2 MONITORING PARAMETERS

Table 11: Overview of the Monitoring Parameters

PARAMETER	DESCRIPTION	UNITS	CALCULATED [C], MEASURED [M], OPERATING RECORDS [O]	MEASUREMENT FREQUENCY	COMMENT

PROJECTION BASELINE EMISSION

% CO_2	% CO_2 in the gas stream from the primary process in the project condition, measured immediately downstream of the primary process, in each year.	% CO_2 by volume	[m]	Monthly	Direct measurement of the composition of the gas stream on a monthly basis. Gas analyzers shall be calibrated in accordance with manufacturer's specifications.
CFM	Cubic feet per minute (CFM) is a volumetric unit of measurement while expressing gas, air or liquid flow It states the volumetric rate of flow of any gas or air in or out of a space.	Cubic Feet per Minute	[o]	Yearly	It is as per requirement of air flow into the reactor. It is already recorded as an operating parameter. As it does not change with time, we will test the efficiency of the blower every year. To maximize the inflow of air. Flow meters shall be calibrated quarterly or according to manufacturer

					specifications if more frequent calibrations are recommended by the manufacturer.

INDIRECT CO_2 EMISSIONS FROM PURCHASED AND CONSUMED ELECTRICITY, STEAM, HEAT

PARAMETER	DESCRIPTION	UNITS	CALCULATED [C], MEASURED [M], OPERATING RECORDS [O]	MEASUREMENT FREQUENCY	COMMENT
Electricity	Metered electricity usage from equipment used to operate electrically driven components (capture & decomposition) in the DACC+U project in year y.	MWh	[m], [o], [c]	Continuous or monthly	Continuous measurement of electricity consumption or monthly billing records from utility suppliers, or reconciliation of maximum kW rating for each type of equipment and operating hours. Electricity meters shall be calibrated by an accredited party per manufacturer's specifications. Electricity consumption shall be metered continuously.

PARAMETER	DESCRIPTION	UNITS	CALCULATED [C], MEASURED [M], OPERATING RECORDS [O]	MEASUREMENT FREQUENCY	COMMENT
Heat Cogen	Total quantity of process energy (e.g., process steam) generated by the third-party cogeneration unit in year y.	MWh	[m], [o]	Daily or monthly	Daily metering of total process energy generated using a utility meter. Steam meters, or similar, shall be calibrated by an accredited party per manufacturer's specifications. Cogen operator's monthly records can be used as a source of data.
Electricity Cogen	Total quantity of electricity generated by the third-party cogeneration unit in year y.	MWh	[m], [o]	Daily or monthly	Daily measurement of total electricity sales/purchases. Electricity meters shall be calibrated by an accredited party per manufacturer's specifications. Cogen operator's monthly records can be used as a source of data.

6.3 ADDRESSING REVERSALS

Activity participants shall minimize the risk of reversals of removals over multiple nationally determined contribution implementation periods and, where reversals [that lead to release of stored carbon] [of removals] occur, ensure that these are addressed in full, following requirements to be developed by the Supervisory Body. But as our process doesn't require any form of storage in that case, Reversal Risk Assessment is not needed.