Preliminary Assessment Public Summary

This *Preliminary Assessment Public Summary*, prepared by Puro.earth, contains general information about the CO_2 Removal Supplier and its project, as evaluated at the time of the Preliminary Assessment (PA). It also includes a *Non-Technical Project Summary* and a *Criteria Assessment Report* detailing: i) key criteria assessed and their associated outcomes, ii) Puro's comments, and iii) evidence provided by the CO_2 Removal Supplier. This document serves as a transparent communication tool, enabling potential investors, buyers, and stakeholders to quickly understand the supplier's carbon removal capabilities and assessment status.

The supplier has also received an extended *Preliminary Assessment Report*. This confidential document offers in-depth insights, including specific remarks and actionable recommendations to guide the supplier's progression through the certification journey.

1. Supplier and Project Information

CO_2 Removal Supplier	
Company name	Karbonetiq Inc.
Company address	819 Reddick St, Santa Barbara, California 93103, USA
Business ID	88-4378851
KYC status	Completed (12/15/2024)
CO_2 Removal Project	
Methodology	**Carbonated Materials Edition 2022 v.2**
Production Facility name	Contrecoeur CDR
Facility registration date	12/27/2024
Production Facility ID	832026
Production Facility location	1200 Rte des Aciéries, Contrecoeur, QC J0L 1C0, Canada
Host Country of removal	Canada
Has this facility been registered in another registry?	☒No ☐Yes, additional information:
Preliminary Assessment Details	
Date of assessment	19/03/2025
Status of assessment	Completed
Conclusion of assessment	Passed

2. Non-Technical Project Summary*

Karbonetiq is building a global network of projects, co-located with ongoing industrial operations, that contribute to broader industrial decarbonization by valorizing waste streams. Specifically, Karbonetiq enhances mineralization of alkaline industrial byproducts (slag, lime, ashes) to capture and store atmospheric CO_2. Our engineered system maximizes gas-solid reaction surface area and minimizes energy inputs to provide the greatest net-removal by any performance metric (cost per ton of CDR, CDR per unit of energy, etc.). Gigatons of legacy byproducts exist today, and essential industries (steel manufacturing, power generation, etc.) continuously produce vast quantities of new byproducts, leading to global CDR potential of hundreds of millions of tons.

Karbonetiq is the project proponent for Contrecoeur CDR with full responsibility for project design, engineering, operations, and crediting. We are partnered with Harsco Environmental to access land and feedstock and to operate the project. Contrecoeur CDR began operations in April 2025, and we anticipate initial credits to be issued in Q4 of the same year.

The definition of CO_2 Removal Supplier and Production Facility can be found in the Puro Standard.

3. Criteria Assessment Report

Reminder: Criteria/Sub-criteria assess either the *technical eligibility* of the facility or its *maturity and quality*, determining whether the facility qualifies for CO_2 Removal Certificates (CORCs) and evaluating its development stage and operational quality. There are three types of sub-criteria:

- **Required to be Passed**: These core criteria are crucial for determining the Supplier's facility eligibility as they may be otherwise impossible or costly to change at a later stage. For example, if the supplier is at a such an early stage of development that the *capture technology is not yet identified*, the PA will not be able to provide useful insights regarding the facility's eligibility.

- **Required to be Assessed**: These criteria are important for evaluation, but they do not necessarily determine whether the facility will pass or fail at this stage. Suppliers may be at different stages of development, and some criteria (e.g., demonstrating the necessary permits) may not yet be fully met. In such cases, disclosing the status of permit acquisition is sufficient.

- **Not Required**: These criteria are optional and do not impact the facility's eligibility for listing at this stage. They may provide additional context or information about the facility's maturity but are not essential for passing the preliminary evaluation.

For a facility to be considered eligible for listing, all the sub-criteria that condition eligibility must be met (i.e. passed or assessed), as specified in Table 1. **If any of these critical sub-criteria are not met, the facility will not be eligible for listing in its current development stage.**

Disclaimer: The assessment has been made against the criteria in the current version of the methodology. Puro.earth relied on the CO_2 Removal Supplier for the correctness of the provided information during the time of the PA and will make no representation as to the accuracy or completeness of this report. The CO_2 Removal Supplier must undergo a third-party audit before issuing CO_2 Removal Credits (CORCs). **Passing the PA does not guarantee a success in the third-party audit.**

Table 1. Criteria and sub-criteria assessment by Puro based on the documents submitted in the Audit Package.

ID	Criteria / Sub-criteria	Outcome	Comment	Evidence reviewed	Required to be listed	Purpose of criteria
C1	**Raw material(s) is(are) eligible**	**Passed**			Passed if required sub-criteria are met	
C1.1	Raw material(s) is(are) identified (e.g. slag, mine tailings, rock powder, cement)	Passed	The material identified to produce carbonated material is ladle slag, a by-product from the ladle refining process during secondary steelmaking.	Karbonetiq_ContreCoeur_Carbon dioxide and Raw Materials Sources List.xlsx; Karboentiq_ContreCoeur_Project Description.pdf	Required to be passed	Technical eligibility

C1.2	Raw material(s) sourcing is legal and rightful (e.g. permits, authorizations)	Passed	As a byproduct of existing secondary steelmaking operations, the material is expected to comply with all applicable legislation.	Karbonetiq_ContreCoeur_Carbon dioxide and Raw Materials Sources List.xlsx	Required to be passed	Technical eligibility
C1.3	Leakage effects related to raw material(s) use is minimal, where applicable	Assessed	Economic leakages related to raw materials are deemed minimal, as the supplier indicated that these materials have limited market value and are produced in excess. The raw materials intended to be used are typically stored in piles at industrial sites, when not used for agricultural lime application or road construction.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment.pdf; Karbonetiq_ContreCoeur_Carbon dioxide and Raw Materials Sources List.xlsx; Karbonetiq_ContreCoeur_Permanence Risk Assessment and Mitigation Report.pdf	Required to be assessed	Technical eligibility
C1.4	Land use change effects related to raw material use is minimal, where applicable	Assessed	Slag is an industrial by-product; thus, no land-use change is expected from this feedstock sourcing. Construction of the carbonation facility is not expected to cause direct land use change, as the supplier intends to locate the facility on existing industrial land.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment.pdf	Required to be assessed	Technical eligibility
C1.5	Sourcing of raw material(s) is secured (e.g. letters of intent, contracts)	Assessed	The raw material is planned to be sourced from two steelmaking companies in Quebec, Canada. As part of their standard operations, these companies already send ladle slag to Harsco Environmental's slag retention site, which is part of the facility. An agreement is being prepared with Harsco Environmental, who will operate the facility.	Karbonetiq_ContreCoeur_Carbon dioxide and Raw Materials Sources List.xlsx; Karboentiq_ContreCoeur_Project Description.pdf	Required to be assessed	Maturity & Quality
C2	**Carbon dioxide is sourced from eligible sources**	**Passed**			Passed if required sub-criteria are met	
C2.1	Carbon dioxide is from biogenic origin or from direct air capture	Passed	CO_2 will be sourced directly from atmospheric air.	Karbonetiq_ContreCoeur_Carbon dioxide and Raw Materials Sources List.xlsx; Karboentiq_ContreCoeur_Project Description.pdf	Required to be passed	Technical eligibility
C2.2	Sourcing of carbon dioxide is secured (e.g. letters of intent, contracts)	Assessed	Since CO_2 is passively captured from ambient air through natural carbonation reactions in the open-air carbonation unit (i.e., the Karbonator), this is not applicable to the project.	Karbonetiq_ContreCoeur_Carbon dioxide and Raw Materials Sources List.xlsx; Karboentiq_ContreCoeur_Project Description.pdf	Required to be assessed	Maturity & Quality
C3	**Production process is known, and production facility is planned**				Passed if required sub-criteria are met	
C3.1	Production process is technically described (e.g. flowcharts, mass and energy balances)	Passed	Process flowchart, technical drawings, scientific graphics, and tables show that the main operational boundaries include crushing and transporting the slags from their source to the Karbonator, where CO_2 from atmospheric air is sequestered through passive reactions with the slag's chemical compounds, forming calcium carbonate.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Baseline Report.pdf; Karbonetiq_Contrecoeur_LCA Report_2025-02-03.docx; Karbonator System Deep Dive_b.pdf	Required to be passed	Technical eligibility

c3.2	Production process is eligible and likely net-negative	Passed	Karbonetiq's process requires minimal crushing due to the highly reactive nature of the slag. As crushing energy is provided by hydropower at the facility, the overall production process is likely to be carbon net-negative.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Baseline Report.pdf; Karbonetiq_ContreCoeur_LCA Model_2025-01_28.xlsx; Karbonator System Deep Dive_b.pdf	Required to be passed	Technical eligibility
c3.3	The production facility is designed, under construction, or built and operational	Assessed	In January 2025, Karbonetiq formally approved the manufacturer to begin construction and installation of the Karbonator at Harsco Environmental's facility.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Baseline and Additionality Assessment.pdf	Required to be assessed	Maturity & Quality
c4	**Carbon materials are used as product or for permanent storage**	**Passed**			Passed if required sub-criteria are met	
c4.1	Type of end-use of the carbonated material is identified (product or storage)	Passed	The identified end-uses of the carbonated materials include their use in road construction, or permanent storage in on-site piles or in landfills.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Permanence Risk Assessment and Mitigation Report.pdf	Required to be passed	Technical eligibility
c4.2a	For product end-use, the end-use is described, product lifetime is estimated, and reversal risks are discussed	Assessed	A preliminary risk assessment and mitigation report has been drafted for product end-use, with end-use product and reversal risks being briefly described. Product lifetime remains to be estimated. Further work is required.	Description.pdf; Karbonetiq_ContreCoeur_Permanence Risk Assessment and Mitigation Report.pdf	Required to be assessed	Technical eligibility
c4.2b	For storage end-use, the storage system is described, reversal risks are discussed, and a long-term management plan is drafted	Assessed	A preliminary risk assessment and mitigation report has been drafted for storage end-use, with long-term storage and reversal risks being briefly described. Long-term management plan is outlined. Further work is required.	Description.pdf; Karbonetiq_ContreCoeur_Permanence Risk Assessment and Mitigation Report.pdf	Required to be assessed	Technical eligibility
c5	**Carbon storage in the material and the baseline are reliably quantified**	**Passed**			Passed if required sub-criteria are met	
c5.1	Protocol for determining carbon content of the carbonated material is drafted	Passed	Preliminary protocol was drafted, outlining the analytical methods and procedures used for carbon content determination. Further work is required to include operational details and equations.	Karbonetiq_ContreCoeur_Protocol for Carbonation Analysis.pdf; Karbonator System Deep Dive_b.pdf	Required to be passed	Technical eligibility
c5.2	Measurement of carbon stored in the carbonated material has been performed with adequate analytical methods	Assessed	Test measurements on a carbonated slag sample demonstrated adequate analytical methods. The planned analytical methods are capable of accurately identifying the chemical composition of both reagents and products. Although the carbonation method used in this test was similar to that of the planned carbonation unit, further tests using the facility's carbonation unit at scale will be necessary for the audit.	Karbonetiq_ContreCoeur_Baseline Report.pdf; Karbonator System Deep Dive_b.pdf	Required to be assessed	Maturity & Quality

c5.3	Baseline carbon removal has been described, conservatively quantified, including uncertainties	Passed	The alternative scenario for feedstock use involves storage in piles adjacent to primary operations. Measurements performed on a sample taken from a historical pile (0–5 years old) indicate natural carbonation of 0.94% by mass. The supplier plans to conduct regular measurements to monitor the baseline carbonation of feedstock materials with a history of pile storage.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment; Karbonetiq_ContreCoeur_Baseline Report	Required to be passed	Technical eligibility
c5.4	Baseline carbon removal is shown to be lower than 50% of carbon stored in the material	Passed	Sample collected from a historical pile (approximately 5 years old) showed a carbonation extent of 0.9%. If this percentage can be extrapolated over 50 years, assuming the piles are covered with additional material, the process would be additional to the baseline. Further work is needed to confirm this for the audit.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment; Karbonator System Deep Dive_b.pdf	Required to be passed	Technical eligibility
c6	**Project has monitoring, reporting, and LCA capabilities/plans**	**Passed**			Passed if required sub-criteria are met	
c6.1	Information system used to keep data records is planned or prepared	Assessed	Information system for data record-keeping has not been yet prepared. Further work is required prior to audit.	No information provided	Required to be assessed	Technical eligibility
c6.2	A monitoring plan is drafted for monitoring parameters needed for LCA calculations	Assessed	A monitoring plan has been drafted characterizing the different parameters used for the calculation of the emissions that impact the project.	Karbonetiq_ContreCoeur_Protocol for quantification of CORCs.pdf	Required to be assessed	Technical eligibility
c6.3	An LCA model specific to the facility's operation is prepared	Assessed	A preliminary LCA model was provided, with a supporting spreadsheet model, illustrating that LCA modelling has started. At this stage, project emissions have been estimated, with adequate type of emission factors, a high level of detail, and in-line with methodology requirements.	Karbonetiq_ContreCoeur_LCA Model_2025-01_28.xlsm; Karbonetiq_Contrecoeur_LCA Report_2025-02-03.docx	Not required	Technical eligibility
c7	**Additionality is demonstrated**	**Passed**			Passed if required sub-criteria are met	
c7.1	Carbon storage additionality to baseline is demonstrated	Passed	Laboratory tests comparing the materials processed by the Karbonetor with samples from an existing historical pile at the facility have demonstrated carbon storage additionality to the baseline.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment.pdf	Required to be passed	Technical eligibility
c7.2	Financial additionality of project is demonstrated	Passed	The supplier has demonstrated with a simple cost analysis that the carbonated material project is financially additional. Carbon revenue (from the sale of CORCs) will be the only source of income for this project.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment.pdf; Karbonetiq_Contrecoeur_Cost Structure 2025.01.06.xlsx	Required to be passed	Technical eligibility
c7.3	Regulatory additionality is demonstrated	Passed	The project is not required by existing laws, regulations, or other binding obligations.	Karbonetiq_ContreCoeur_Baseline and Additionality Assessment.pdf	Required to be passed	Technical eligibility
c8	**Environmental and social safeguards**	**Passed**			Passed if required sub-criteria are met	

c8.1	Regulation applicable to project has been identified	Assessed	The supplier confirmed that the facility complies with all applicable regulations for the existing industrial site.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Environmental and Social Safeguards.pdf; *Karbonetiq_ContreCoeur_Certificate of Incorporation.pdf*	Required to be assessed	Maturity & Quality
c8.2	Procedures to acquire relevant permits have been identified, started, or completed	Assessed	Existing permits have been deemed sufficient to cover the CO_2 removal project.	Karbonetiq_ContreCoeur_Environmental and Social Safeguards.pdf; Certificat d'autorisation Broyeur à barres Plan G Montée Lapierre.pdf; Certificat d'autorisation concasseur à mâchoires Plan A Montée Lapierre.pdf ; Certificat d'autorisation site Montée Lapierre.pdf; ENV-9822-Melri - CA monté lapierre final-final,pdf	Required to be assessed	Maturity & Quality
c8.3	Occupational health and safety measures have been planned	Assessed	The project will take place on an existing industrial site, with ongoing large-scale slag processing operations that already adhere to comprehensive occupational health and safety protocols.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Environmental and Social Safeguards.pdf	Required to be assessed	Maturity & Quality
c8.4	Stakeholder consultations have been planned or conducted	Assessed	The project will take place on an existing industrial site, owned and operated by Karbonetiq's operational partner Harsco Environmental. They are the only stakeholders in the immediate environment; thus, aside from regulators and investors, no other stakeholders have been identified. Procedures for continued dialogue with stakeholders are planned.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Stakeholder Engagement Report.pdf	Required to be assessed	Maturity & Quality
c8.5	Raw material(s) sourcing is environmentally safe	Assessed	As a by-product of existing secondary steelmaking operations, the material is expected to be environmentally safe.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Environmental and Social Safeguards.pdf	Required to be assessed	Maturity & Quality
c8.6	Carbon dioxide sourcing is environmentally safe	Assessed	CO_2 will be sourced directly from atmospheric air; thus, CO2 sourcing is environmentally safe.	Karboentiq_ContreCoeur_Project Description.pdf; Karbonetiq_ContreCoeur_Environmental and Social Safeguards.pdf	Required to be assessed	Maturity & Quality
c9	**Project has likely co-benefits and positive SDG impacts**	**Passed**			Passed if required sub-criteria are met	
c9.1	Project-specific co-benefits have been identified	Assessed	The production of carbonated materials is expected to support local employment, contribute to sustainable infrastructure development and operations.	No information provided	Not required	Maturity & Quality
c9.2	Project-specific SDG targets or indicators have been identified	Assessed	Positive impacts on SDGs include Goal 9: Industry, innovation, and infrastructure, Goal 12: Responsible consumption and	Karboentiq_ContreCoeur_Project Description.pdf	Not required	Maturity & Quality

			production, and Goal 13: Climate action. However, none can currently be pursued for certification under the existing Puro SDG Attributes.			
C10	**Project team has access to relevant knowledge and skills**	**Passed**			Passed if required sub-criteria are met	
C10.1	Relating to raw materials and CO_2 sourcing, handling, and processing	Assessed	Karbonetiq plans to utilize ladle slag, a by-product of large-scale steelmaking sourced from existing industrial sites. The supplier collaborates with Harsco Environmental a company that operates and manages the facility; experienced operators from Harsco Environmental will handle and process the steel slag.	Karboentiq_ContreCoeur_Project Description.pdf	Not required	Maturity & Quality
C10.2	Relating to mineral carbonation reactions, carbonated products and/or storage	Assessed	Karbonetiq has developed their own mineral carbonation pilot device, the Karbolith/Karbonator. Co-Founder & CEO Michael Wyrsta holds a PhD in Materials Science with specialized expertise in mineral carbonation reactions, carbonated products, and carbon storage technologies.	Karboentiq_ContreCoeur_Project Description.pdf	Not required	Maturity & Quality
C10.3	Relating to environmental monitoring and carbon accounting	Assessed	Karbonetiq has engaged a LCA consultant, Scope 3 Consulting, to develop the LCA.	Karboentiq_ContreCoeur_Project Description.pdf	Not required	Maturity & Quality