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.

The *PA Public Summary* 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	CarbonZero.Eco Inc.
Company address	280 2nd St, Unit 270 Los Altos CA 94022, United States
Business ID	*99-4438915*
KYC status	Completed (2024-10-24)
CO_2 Removal Project	
Methodology	**Biochar, Edition 2022, Version 3**
Production Facility name	CarbonZero.Eco Williams Biochar Facility
Facility registration date	2025-04-01
Production Facility ID	951745
Production Facility location	1833 Evans Road Williams CA 95987, United States
Host Country of removal	United States
Has this facility been registered in another registry?	☒No ☐Yes, additional information:
Assessment details	
Date of assessment	2025-01-20
Status of assessment	Completed
Conclusion of assessment	Passed

2. Non-Technical Project Summary*

CarbonZero.eco, a Silicon Valley based startup, will convert almond shells into biochar through a process of pyrolysis using the BST-50S (a Beston unit), where the shells are heated in a low-oxygen environment. This process produces both biochar and synthetic gas (syngas), which will be cleaned and filtered before being used as a renewable energy source to power the Beston unit, ensuring the operation is self-sustaining.

The project, set to be operational in April 2025, will be located at the Cortina facility in Williams, CA, on land owned by the local almond co-op. The facility is designed to process 6 tonnes of biomass per hour and will operate 310 days each year. It is expected to begin handling 20,000 tonnes of biomass annually. This biochar will be distributed at no cost to the local almond farms, supporting sustainable agricultural practices in the region.

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 won't 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.**

Overall evaluation: Preliminary Assessment is **passed.**

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

ID	Criteria / Sub-Criteria	Outcome	Comment	Evidence Received	Required to be Listed	Purpose of Criteria
C1	**Planned biomass feedstock(s) is(are) eligible**	**Passed**			*Passed if required sub-criteria are met*	
C1.1	*Biomass feedstocks are identified and compatible with EBC positive list*	**Passed**	Almond residues (shells) are used as biomass feedstock and are compatible with category N-02 (food processing residues) of the EBC/WBC Positive List of Feedstock.	C1. CarbonZero_Biomass types and origins list_v1.xlsx	Required to be passed	Technical eligibility

C1.2	*Biomass feedstock sustainability and chain-of-custody can be demonstrated, if applicable*	**Passed**	• Almond shells are supplied by Cortina Hulling, a California based company located in Colusa County, which is already operational. • The supplier has provided evidence of its feedstock chain-of-custody (i.e., offtake contract between CarbonZero and Cortina Hulling). • For this type of feedstock, proof of sustainability is not applicable/required.	C1. CarbonZero_Biomass types and origins list_v1.xlsx; Cortina Lease_Offtake.pdf	Required to be passed	Technical eligibility
C1.3	*Bioenergy leakage related to feedstock use is minimal*	**Assessed**	• Almond shells are typically left in-field to decompose and recoup potassium losses. Whilst there are alternative uses for almond shells, some of which could entail energy production (e.g., almond shells combustion), the bio-energy market from almond shells remains under-developed. Hence, bioenergy leakage is deemed minimal. • It remains unclear whether the facility will be equipped to produce excess bioenergy for use in other applications.	CarbonZero Additionality Questions_vSigned.pdf; Cortina Lease_Offtake.pdf; CarbonZero_Biochar production equipment questionnaire.xlsx; CarbonZero_Mass and energy balance of production process .xlsx; C8. Environmental Evaluation Report_CarbonZero.docx	Required to be assessed	Technical eligibility
C1.4	*Land use change related to feedstock use is minimal*	**Assessed**	The sustainability and traceability of the selected feedstock are deemed sufficiently demonstrable to ensure minimal to no effects on land use change.	C1. CarbonZero_Biomass types and origins list_v1.xlsx	Required to be assessed	Technical eligibility
C1.5	*Sourcing of biomass is secured (e.g. letters of intent, contracts)*	**Assessed**	An offtake agreement between CarbonZero and their biomass provider was shared. Cortina Hulling was provided, in which Carbon Zero agrees to purchase, and Cortina agrees to sell to CarbonZero a minimum of 20,000 tons of almond shells per year.	Cortina Lease_Offtake.pdf	Not required	Maturity & Quality
C2	**Planned biochar production equipment is technically sound**	**Passed**			*Passed if required sub-criteria are met*	
C2.1	*Several options of reactor design have been identified*	**Passed**	CarbonZero has selected a reactor from Beston, namely the BST-50S reactor in a configuration declared to operate without tar condensation and with the use of an advanced flue gas treatment system.	CarbonZero Biochar Facility Details and Drawings.pdf	Required to be passed	Technical eligibility
C2.2	*Reactor design has been decided, contracted, or purchased*	**Assessed**	The equipment is currently being manufactured, implying that the supplier has already purchased it. However, it is not operational yet.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero_Biochar production equipment questionnaire.xlsx	Required to be assessed	Maturity & Quality

c2.3	*Reactor design is vetted, regarding production of biochar with H/C ratio below 0.7*	**Passed**	• CarbonZero has provided a laboratory analysis of an almond shell-based biochar sample from Control Laboratories, an IBI-accredited biochar laboratory testing service provider. The analysis exhibits an H/C ratio around 0.5, with the biochar sample produced under controlled laboratory conditions at 600°C. • For the selected equipment (BST-50S), the supplier declared aiming for a pyrolysis temperature of 800°C, with residence times of 10-30 minutes. • Hence, the equipment and feedstock selected are deemed possible to produce biochar with H/C below 0.7.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero_Mass and energy balance of production process .xlsx; C2: 4100028 IBI Biochar Report_CarbonZero.pdf	Required to be passed	Technical eligibility
c2.4	*Reactor design is vetted, regarding risk for CH_4 emissions*	**Passed**	• If operated according to its specification, the BST-50S reactor is expected to have negligible CH_4 emissions, as demonstrated by measurements performed by the manufacturer on a similar reactor operating with wood chips. • In the event of a flame extinction, the operator must have procedures in place to halt operations or re-ignite the flame manually.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero_Biochar production equipment questionnaire.xlsx; Flue Gas Emission Test Results.pdf	Required to be passed	Technical eligibility
c2.5	*Reactor design is vetted, regarding air pollutant emissions in line with local regulation*	**Passed**	• The BST-50S is declared to be equipped with combustion systems that minimize air pollutant formation (e.g. air-fuel mixing burners, flue-gas recirculation) and a flue gas treatment system that includes in this order a heat exchanger, a pulse bag filter, a desulfurization tower, an activated carbon filter, and a chimney. • Flue gas test results are provided for all air pollutants mandated by California's air regulations, including VOCs, NOx, CO, SOx, and PM, on a similar reactor operating with wood chips. However, the tests were performed in China rather than on-site in	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero_Biochar production equipment questionnaire.xlsx; Flue Gas Emission Test Results.pdf; C8. Environmental Evaluation Report CarbonZero.docx; C8. Puro Environmental and Social Safeguard.docx	Required to be passed	Technical eligibility

			California, as required by California's air regulations. ● If operated according to its specification, using a clean feedstock like almond shell, the BST-50S reactor is expected to meet the local air pollutant regulation, a fact that will need to be further demonstrated with on-site measurements once operations starts.			
c2.6	*Facility design is vetted, regarding disposal of waste streams, including any liquid streams (wastewater, oil, tars)*	**Passed**	● According to CarbonZero, the pyrolysis equipment manufactured by Beston has been modified to limit waste streams (pyrolysis oil/tars). ● A dry desulfurization tower is used to minimize wastewater generation during flue gas treatment. ● Biochar quenching produces wastewater, the quantity of which is being currently quantified by CarbonZero. ● If operated according to specification, the facility is deemed to generate minimal waste and have suitable management plans. This will have to be verified during the audit.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero_Mass and energy balance of production process .xlsx; C8. Environmental Evaluation Report CarbonZero.docx; C8. Puro Environmental and Social Safeguard.docx	Required to be passed	Technical eligibility
c2.7	*Facility is co-producing bioenergy (e.g. heat, power) for internal use*	**Assessed**	Thermal energy is recovered from the pyrolysis syngas and oil and used to sustain the pyrolysis process.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero_Biochar production equipment questionnaire.xlsx; CarbonZero_Mass and energy balance of production process .xlsx	Required to be assessed	Maturity & Quality
hc2.8	*Facility is co-producing bioenergy (e.g. heat, power, fuel) for external use*	**Assessed**	It is not yet clear whether the facility is planning to produce bioenergy for external use. Additional equipment for energy recovery might be added in the future.	CarbonZero_Biochar production equipment questionnaire.xlsx; CarbonZero_Mass and energy balance of production process .xlsx; Cortina Lease_Offtake.pdf	Required to be assessed	Maturity & Quality
c3	**Biochar planned end-use(s) is(are) eligible**	**Passed**			*Passed if required sub-criteria are met*	
c3.1	*Biochar end-uses are eligible*	**Passed**	Biochar will be used as a soil amendment for almond growers in Colusa County. It will be sold in a variety of forms including compost mix or pure biochar. The intended end uses are eligible.	CarbonZero Biochar Facility Details and Drawings.pdf; C3. Summary of Planned Biochar End Use.docx	Required to be passed	Technical eligibility
c3.2	*Plans of biochar end-uses are tangible*	**Assessed**	CarbonZero is in a contractual agreement with Cortina Hulling to work with their network of growers to integrate biochar into their compost	C3. Summary of Planned Biochar End Use.docx; Cortina Lease_Offtake.pdf	Required to be assessed	Maturity & Quality

			and directly on their fields. Evidence demonstrating that the end-use plans are tangible is therefore provided.			
c3.3	*Biochar environmental quality thresholds are known for the identified end-uses*	**Assessed**	Carbon Zero has conducted tests on almond shell-based biochar to demonstrate its environmental quality, which is compliant with USDA regulations for soil applications. However, explicit monitoring procedures have not been described yet.	4100028 IBI Biochar Report_CarbonZero.pdf	Required to be assessed	Maturity & Quality
c4	**Additionality is demonstrated**	**Passed**			*Passed if required sub-criteria are met*	
c4.1	*Carbon storage additionality to baseline*	**Passed**	The baseline and alternative scenarios would not result in carbon storage, neither anthropogenic nor natural. Therefore, the carbon storage is deemed additional to the baseline.	CarbonZero Additionality Questions_vSigned.pdf	Required to be passed	Technical eligibility
c4.2	*Financial additionality of facility*	**Passed**	Despite the sale of biochar as soil amendment, the supplier has demonstrated with a cash flow model that the project would not be economically viable without CORCs revenues. Sensitivity analysis was conducted to test the robustness of the conclusion.	CarbonZero Additionality Questions_vSigned.pdf; CarbonZero.ECO, Inc. IRR_with sensitivity.xlsx	Required to be passed	Technical eligibility
c4.3	*Regulatory additionality*	**Passed**	The carbon removal activity is not mandated or required by Californian laws, regulations, or other binding obligations.	CarbonZero Additionality Questions_vSigned.pdf	Required to be passed	Technical eligibility
c4.4	*Production equipment is newly built (i.e. not an existing facility or a retrofit of existing facility)*	**Assessed**	The pyrolysis equipment will be fabricated new for this project.	CarbonZero Additionality Questions_vSigned.pdf; CarbonZero Biochar Facility Details and Drawings.pdf	Required to be assessed	Maturity & Quality
c5	**Facility has monitoring, reporting, and LCA capabilities or tangible plans**	**Passed**			*Passed if required sub-criteria are met*	
c5.1	*Protocol for biomass and biochar record keeping is prepared*	**Assessed**	Carbon Zero has provided a plan to monitor and report its day-to-day activities. In particular, the supplier will implement a record management system in partnership with Offstream to ensure traceability and transparency throughout the biochar production process. The plan needs to be converted into actionable operating procedures.	CarbonZero MRV Plans_12.4.24.docx	Required to be assessed	Maturity & Quality

c5.2	*Protocol for dry mass determination of biochar is prepared*	**Assessed**	Supplier is aware of the need for a biochar dry mass determination protocol. This protocol is still in planning phase.	CarbonZero MRV Plans_12.4.24.docx	Required to be assessed	Maturity & Quality
c5.3	*Protocol for biochar sampling and laboratory analysis is prepared (permanence and environmental quality)*	**Assessed**	CarbonZero is planning to follow EBC's 'European Biochar Certificate - Guidelines for a Sustainable Production of Biochar' sampling protocols. The plan needs to be converted into actual operating procedures.	CarbonZero MRV Plans_12.4.24.docx	Required to be assessed	Maturity & Quality
c5.4	*Monitoring and reporting plan of facility emissions is prepared*	**Assessed**	A monitoring and reporting plan has been prepared. It needs to be expanded to include a more comprehensive evaluation of the biochar supply chain emissions before being converted into actual operating procedures.	CarbonZero MRV Plans_12.4.24.docx	Required to be assessed	Maturity & Quality
c5.5	*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, although the scope of the LCA is expected to be broadened for full alignment with the methodology.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero MRV Plans_12.4.24.docx	Not required	Maturity & Quality
c6	**Facility has likely co-benefits and positive SDG impacts**	**Passed**			*Passed if required sub-criteria are met*	
c6.1	*Facility-specific co-benefits have been identified*	**Assessed**	The project's co-benefits include enhancing soil fertility, moisture retention, and nutrient availability. When combined with fertilizers, biochar can also increase crop yields.	CarbonZero_Puro SDG Report Template.docx	Required to be assessed	Maturity & Quality
c6.2	*Facility-specific SDG targets or indicators have been identified*	**Assessed**	Positive impacts on SDGs include 2.4, i.e. improved agricultural productivity using biochar. Measured increase in yield remains to be demonstrated, once the facility is operational.	CarbonZero_Puro SDG Report Template.docx	Required to be assessed	Maturity & Quality
c7	**Facility team has access to relevant knowledge and skills**	**Passed**			*Passed if required sub-criteria are met*	
c7.1	*Relating to biomass sourcing, handling, processing*	**Assessed**	CarbonZero engaged with a number of experts in carbon capture and carbon offset. The company's Chief Scientific Officer brings critical expertise to the team as a postdoctoral scholar—his research focuses on waste-derived biochar, soil quality improvement, and carbonaceous materials for nutrient capture.	CarbonZero Executive Summary.pdf	Not required	Maturity & Quality
c7.2	*Relating to thermochemical processes*	**Assessed**			Not required	Maturity & Quality
c7.3	*Relating to biochar use*	**Assessed**			Not required	Maturity & Quality
c7.4	*Relating to monitoring and carbon accounting*	**Assessed**			Not required	Maturity & Quality

c8	Environmental and social safeguards	Passed			*Passed if required sub-criteria are met*	
c8.1	*Stakeholder consultations have been planned or conducted*	**Assessed**	Some stakeholder consultation activities have been conducted. It is not clear whether all relevant stakeholders have been identified. Procedures for continued dialogue with stakeholders have not been described yet.	C8. Stakeholder Engagement Report_CarbonZero	Required to be assessed	Maturity & Quality
c8.2	*Regulation applicable to facility has been identified*	**Assessed**	Carbon Zero has identified all California regulations and permits relevant to the biochar activities. This includes both health & safety requirements, as well as air quality and environmental compliance standards.	CarbonZero Biochar Facility Details and Drawings.pdf; CarbonZero Safety Protocols Plan .docx; Puro Environmental and Social Safeguards.docx	Required to be assessed	Maturity & Quality
c8.3	*Procedures to acquire relevant permits have been identified, started, or completed*	**Assessed**	Carbon Zero has applied to the relevant permits for the construction of the biochar facility and its operation. One permit has been already obtained; for the others, applications are in progress.	CarbonZero Biochar Facility Details and Drawings.pdf; Resolution No. 24-012 Adopting a CEQA exempt and approving Use Permit PD-24-29 for Cortina Hulling and shelling biochar facility (1).pdf; CarbonZero CCAPCD ATC Application & Information Form Revison 1.0 20241020 (1).pdf	Required to be assessed	Maturity & Quality