PURO STANDARD OUTPUT AUDIT REPORT

Orca

Puro Standard General Rules Edition 2023 (Version 3.1 published in 1.6.2023)

Audit Start - End date: 20.11.2024 - 29.11.2024

DNV Project Number: PRJN-701040

DNV Team: Ali Daoud, Xiangkun Cao, Heidi Kakela

Facility ID: 631817

Puro Standard: Geologically Stored Carbon Methodology Edition 2021, V1.1

Table of contents

Attachments:

ATTACHMENT 1 GSC Compliance Checklist Edition 2023 – v1.1 – Monitoring Period July-Oct24 - Final

Introduction

This report summarises the results and conclusions from the performed facility audit and output audit. The audit is performed as a formal part of the Puro Standard certification process. The key objective is to determine the compliance of the operations with the Puro requirements.

DNV

DNV is one of the world's leading certification, assurance, and risk management providers.

Whether certifying a company's management system or products, providing training, or assessing supply chains, and digital assets, we enable customers and stakeholders to make critical decisions with confidence.

We are committed to support our customers to transition and realize their long-term strategic goals sustainably, collectively contributing to the UN Sustainable Development Goals.

Production facility standing data

(PURO General rules 3.1)

General information

Facility unique identity	631817
CO2 Removal Supplier registering the Production Facility	Climeworks AG.
Name	Orca
Location	Nordurvellir 4, 816 Ölfus, Iceland
Date on which the Production Facility became eligible to receive CORCs	01/12/2023
Removal Method(s) for which the plant is eligible to receive CORCs	Geologically Stored Carbon Edition 2021, v1.1
Production Facility has benefited from public support	No
Removal Method specific information as may be specified in the relevant Removal Method specific Methodology	Direct Air Capture and Geologically Stored Carbon

Base for calculations in Output report

Contributions Level 1	Total over period, tonne CO2-eq
C captured*	364.91
C loss**	0.03
C stored	364.88
E capture	-74.04
E injection***	-0.94
E equipment	0.00
CORCs	289.91

* C captured is equal to C injected (gross) and therefore includes potential losses from venting or fugitive emissions prior to CO_2 injection

** During the verified monitoring period some small losses occurred, detailed below:

- On the 21st of July restart of the system following maintenance resulted in the bubble point pressure exceeding the conservative limit for two minutes. All CO_2 injected in this time (26 kg) was conservatively accounted for as a release from the injection system.

The total CO_2 loss for July-October adds to 26 kg CO_2 (0.03 tn CO_2).

*** This figure includes energy use while injection system is on standby (not receiving CO_2)

Short description of facility and any exclusions from verification scope observed

The Climeworks Orca facility is a Direct Air Capture plant in Iceland, where CO_2 is captured from the atmosphere using a sorbent. Captured CO_2 is transported and stored through Climeworks' partner, Carbfix. Here, the CO_2 is dissolved in water and injected into the subsurface to achieve permanent storage of CO_2 through rapid in-situ mineralisation. Climeworks AG, as the project applicant, has the relevant contractual agreements in place with all parties involved to ensure ownership of produced CORCs.

Statement of confidentiality

The contents of this report, including any notes and checklists completed during the audit will be treated in strictest confidence, and will not be disclosed to any third party without the written consent of the customer, except as required by the appropriate accreditation authorities.

Disclaimer

An audit is based on verification of a sample of available information. Consequently, there is an element of uncertainty reflected in the audit findings. An absence of nonconformities does not mean that they do not exist in audited and/or other areas. Prior to awarding or renewing certification this report is also subject to an independent DNV internal review which may affect the report content and conclusions.

Audit results

Detailed output removal verified

Contributions		Total over period, tonne CO2-eq
Level 1	**Level 2**	
C stored	C captured*	-364.91
C stored	C loss**	0.03
E capture	Energy capture	50.45
E capture	Sorbent	17.76
E capture	Water	5.83
E injection***	Energy storage	0.94
E equipment	Injection + transport equipment	0.00
E equipment	DAC project equipment	0.00
	CORCs	289.906
	CORC factor (net removed / gross stored)	0.79
	Carbon stored (deducting losses)	-364.88
	Grey emissions / loss to LCA	75.0

* C captured is equal to C injected (gross) and therefore includes potential losses from venting or fugitive emissions prior to CO_2 injection

** During the verified monitoring period some small losses occurred, detailed below:

- On the 21th of July restart of the system following maintenance resulted in the bubble point pressure exceeding the conservative limit for two minutes. All CO_2 injected in this time (26 kg) was conservatively accounted for as a release from the injection system.

The total CO_2 loss for March-June adds to 26 kg CO_2 (0.03 tn CO_2).

*** This figure includes energy use while injection system is on standby (not receiving CO_2)

Positive indications

• Maintained detailed and organised approach to data management. The people involved in the audit have expertise and detailed understanding of the operations, coupled with strong systems in place throughout.

Recommendations for improvement

• No recommendations for improvement with current operations

Audit findings

Detailed findings requiring corrective actions:

No corrective actions were required.

Conclusion

Conclusion	
The company is found compliant towards CORC requirement, and a certificate can be issued	Yes
The company is found NOT to be fully compliant towards CORC requirement and corrective actions are needed before a certificate can be issued	

Please refer to the Geologically Stored Carbon Methodology Edition 2021 for additional details and supporting references.

Topic Area	Guideline Reference	Requirement	Requirement Met Y/N or Not Applicable (NA)	Compliance Evidence Provided Insert evidence used to verify requirement	Site Visit Findings If applicable	Verification Remarks Insert auditors comments	Value Insert numerical value or description (if applicable)	Units Insert unit (if applicable)
Production Facility Standing Data Confirmation - The following standing data has been collected from Puro and checked for consistency against other evidence:								
Facility Data	Puro General Rules v3.0 (PGR) - 2.2	Verification of the CO2 Removal Supplier that is registering Production Facility	Y		Production facility audit conducted onsite in Iceland	Production facility audit conducted onsite in Iceland		
		A certified trade registry extract (business license/registration, etc.) for the CO2 Removal Supplier	Y	Climeworks Trade Registry Certificate		Document shows registration		
		Evidence of the location of the Production Facility	Y	Invoices addressed to Climeworks	Inspection of onsite facilities in Iceland	Visible from onsite inspection		
		Evidence of the Volume of Output for the full calendar year prior to registration	N/A			Not applicable, not registered with Puro Standard before this period		
		Evidence of the Removal Method(s) for which the facility is eligible to receive CORCs	Y	Site Visit	Inspection of onsite Direct Air Capture and storage facilities in Iceland	Visible from onsite inspection		
		Evidence of the date on which the Facility became eligible to receive CORCs	N/A	Pending approval/registration of production facility		Conducting production facility audit as part of this verification		
		If the Production Facility has benefited from public support, evidence to show this	N	Additionality Questionnlare Email Correspondence		The climeworks Orca project relies solely on carbon finance. No public support has been received for this project.		
Y								
General Eligibility Requirements	Puro Geologically Stored Carbon Methodology - 2021 - (GSCM) 1.1 Eligible capture & storage types	The production facility is technologically capable of increasing geologically stored carbon stock by storing CO2 or other GHGs captured directly from atmosphere or from biogenic sources.	Y	Climeworks production report	Inspection of onsite facilities showed active operation of the direct air capture plant	Deploying a DAC project, baseline is a business as usual scenario with no CO2 removal.		
		The production facility utilizes eligible geological storage type: A. Direct injection of CO2 into geological formations EPA Class VI or EU CCS); B. Injection of carbon containing substance in reservoir (EPA Class I, II); or C. Storage in oil and gas reservoirs as part of EOR+ (EPA Class II well storage with more CO2 injected than CO2e in oil extracted).	Y	Orca Submission Storage permit application		Site utilizes type A direct injection of CO2. The operations are confirmed by the competent authority, the Environment Agency of Iceland (EAI), to be exempt from requiring a storage permit at this stage due to low cumulative injected CO2. The EU Directive on geological storage of CO2 has been transposed into Icelandic law with an amendment of law no. 7 from 1998, as listed in Article 33.a to 33.j. Regulation 1430/2022 details further requirements of the law and of the Directive, as stipulated in Article 33.b in law no. 7/1998. The EAI has submitted a draft storage permit for statutory review by the EFTA Surveillance Authority. Prior to this, Carbfix has already received the opinion on the Environmental Impact Assessment for storage activities at this site from the National Planning Agency of Iceland, including the option of further expansion of their storage activities.		
		The production facility utilizes eligible carbon capture types: A. Direct air capture; B. Biogenic CO2 from combustion of biomass, bioliquids, or biogas (i.e. BECCS, bio-CCS); C. Biogenic CO2 fraction from incineration of biomass mixed with other substances; D. Biogenic CO2 from biogas upgrading process; E. Biogenic CO2 capture from oxidization of biogenic materials in industrial processes; or F. Biogenic carbon-containing substance.	Y	Visible from onsite inspection	Inspection of onsite facilities i.e. the direct air capture plant	Visible from onsite inspection		
	GSCM 1.2.2	Evidence of geological storage permanence - eligible geological storages are controlled by EU or US laws and authorities or following similar requirements as set out by those legislations (See Row 13)	Y	Orca Submission CCS Directive storage permit application	Inspection of onsite injection facilities and monitoring wells	CO2 is injected by Climeworks' Transport and Storage partner Carbfix, who will hold the relevant storage permit, issued by the Environment Agency of Iceland, allowing for injection of CO2.		
	GSCM 1.2.3	Evidence of biogenic CO2 source sustainability (see also GSCM Section 5.1.3)	NA	NA	NA	Not applicable as DAC is being used.		
	GSCM 1.2.4	Only biogenic CO2 source is counted if a mixed fossil-biogenic flue gas or similar mixed sources is used	NA	NA	NA	Not applicable as DAC is being used.		
	GSCM 1.2.5	The activities should do no net harm to environment, e.g. cause deforestation, loss of biodiversity or to society through loss of arable land and decreased food security, chemical emissions or health risks.	Y			Monitoring in place for CO2 storage activities. DAC facilities on site near the existing geothermal plant where land reclamation processes are in place. Including mass distribution, turf replantation etc		
	GSCM 1.3.1, 5.1.3	The CO2 Removal Supplier is capable of metering CO2e injected reliably and consistently via appropriate metering technology and C content of injected CO2 or biomass stream (see also Section 4)	Y	Climeworks monitoring reports Carbfix Injection reports Climeworks calibration QA/QC procedure	CO2 is metered at both the capture site and at the injection site. The values taken are from the CO2 meter at the injection site. CO2 quality is measured at the capture site, and captured stream is treated to meet purity requirements.	Appropriate calibration is taken, where meters are calibrated as per manufacturer's standard.		
	GSCM 1.3.1, 5.2	The CO2 Removal Supplier is capable of calculating the net CO2 removal using an appropriate lifecycle emissions approach, providing all calculation details, assumptions, and results reliably and consistently	Y	LCA reports: Injection and Transport System Capture Solvent		CO2 Removal supplier provides LCA reports for elements of the value chain. Including construction and commissioning related emissions through EcoInvent and GaBi databases		
	GSCM 1.3.2, 2.2, 2.3	The CO2 Removal Supplier can prove with contracts or authorization its sole ownership of the carbon removal attribute of the permanently stored carbon.	Y	Climeworks Statement of Ownership		The statement of ownership outlines that "any rights with or without monetary value generated by Climeworks having Carbfix provide Permanent Mineral Storage and Monitoring under this Project Agreement shall solely vest in Climeworks. In particular, Carbfix shall not be entitled to generate for its own use, sell or otherwise use any certificates"		

Supplier Contractual Arrangements	GSCM 2.3.2.2, 1.3.2.3, 1.3.2.4	**Where the CO2 Removal Supplier does not manage and own all aspects of the removal process (i.e. capture, transport logistics, injection & storage), evidence is provided for any contracted entities or partners including (1) the CO2 capture operator OR feedstock supplier, (2) the Storage or Injection site owner and operator, (3) the logistics / transportation operator that:** **- each entity is properly registered as a business and a certified trade registry extract (business license or registration) is provided for each;** **- each entity is properly licensed, permitted, and in compliance with laws of the host country** **- the entity is in a contractual agreement with the CO2 Removal Supplier with the intent to produce permanent carbon removal and storage** **- the capture or biogenic source operator has sole ownership of the CO2 or carbon containing substance** **- the entity attests or is contractually obligated to not claim any carbon removal attributes** **- contracts require allowance for the auditing of the entity facilities, equipment, and documents for Carbon Removal Certificate issuance purposes** **- the contract durations are appropriate for the duration of the project, with storage contracts being valid for at least a 5 year period and the storage contract dates align with the permit dates**	**Y**	Climeworks Statement of Ownership Climeworks and Carbfix Trade Registry certificates		Climeworks is responsible for the capture through their Direct Air Capture plant. The Transport and Storage element is undertaken through their partner Carbfix, in which they have an agreement to store the CO2 captured by climeworks. Carbfix are contractually obligated not to claim any carbon removal activities.		
	GSCM 1.3.2.3	**The storage facility operator is properly permitted as an eligible facility (See 1.1 Row 13) under relevant national requirements to store the amount of CO2 or carbon containing substance contracted for the life of the project**	**Y**	Orca Submission CCS Directive storage permit application		CO2 is injected by Climework's Transport and Storage partner Carbfix, who will have the relevant Storage permits from the Icelandic environmental agency allowing for injection of CO2.		
Additionality	PGR 2.1.3, Puro Additionality Assessment Requirements v1.0	CO2 Removal Supplier demonstrates additionality, meaning that the project must convincingly demonstrate that the CO2 removals are a result of carbon finance. Even with substantial non-carbon finance support, projects can be additional if investment is required, risk is present, and/or human capital must be developed. To demonstrate additionality, CO2 Removal Supplier must: - Provide full project financials and counterfactual analysis based on Baselines that shall be project-specific, conservative and periodically updated. - Provide calculated internal rate of return (IRR) for the project (with and without carbon finance) and counterfactual baseline, as well as alternatives, if applicable, that are market relevant - Provide IRR analysis as spreadsheet with all cells, formulas, and assumptions unprotected and available for review - Provide a public version of the IRR analysis, unless clear justification is provided - Utilize CORC prices in the IRR analysis based on the available CORC Index - Provide a sensitivity analysis to demonstrate the impact of variation in key assumptions on the improved IRR - Show that the project is not required by existing laws, regulations, or other binding obligations.	**Y**	Orca Cost Overview Additionality Orca		The project relies solely on carbon financing, as evidenced by the cost overview provided.		
Production (Capture & Storage) Facility Checklist (Desktop, Verbal, or Site Visit Confirmation)								
Environmental & Social Safeguards	**PGR - 2.1.2** **GSCM 1.2.6**	**Evidence to demonstrate Environmental and Social Safeguards and proper environmental permitting and practices (e.g. environmental impact statement, air permit, wastewater permit, proper recycling or disposal of solid wastes, and compliance status of all)**	Y	Climeworks HSSE modules and approaches Stakeholder engagement report submitted to EU Innovation fund for project Silverstone Environmental Impact Assessment Waiver		Carbfix completed an Environmental Impact Assessment and received an opinion from the National Planning Agency of Iceland		
		Evidence is provided that the CO2 Removal Supplier has engaged relevant stakeholders and the public regarding the CO2 removal storage project. This may include, for example, evidence of public notification, public meetings, or input during injection well permitting process, documentation of complaints process, including any complaints and responses, or other similar activities	Y	Stakeholder engagement report submitted to EU Innovation fund for project Silverstone Project Design Document		Stakeholder engagements were conducted prior to production facility registration with Puro. Carbfix have conducted stakeholder engagement throughout. Climeworks conducts stakeholder engagements through inviting stakeholders to site and hosting engagements		
Lifecycle Analysis / Activity Boundary for Net Negativity	**Annex G - 3 (Lifecycle GHG Emissions Boundary & Method**	**GHG emissions have to be assessed and reported following the LCA calculation principles of ISO, WRI or PAS2050**	Y	LCA reports covering all elements of the value chain		ISO 14040 cradle-to-gate and gate-to-grave LCAs		
	GSCM 3.1	**The activity boundary includes all activities existing solely for the purpose of CO2 Removal. These include the carbon capture, transportation and storing into the geological storages, and biomass cradle to gate if biomass is purpose-grown for carbon removal.**	Y	Project Design Document		Project boundary considers		
	GSCM 3.2, 3.3, 3.4	**Emissions within the activity boundary include:** **- All activities related to capturing (e.g. capture, liquefaction),** **- transporting (e.g. through pipelines or by shipping) and** **- storing (e.g. intermediate storages, injection) of the CO2** **- CO2 emissions resulting from these activities;** **- Purpose-grown biomass (e.g. emissions from cultivation, harvesting and transportation of the biomass cradle-to-gate) if the biomass is solely grown for CO2 removal purposes;** **- Purpose-built equipment and facilities (e.g. emissions from materials and construction), and;** **- Other activities that do not exist solely for the purpose of CO2 removal even if they are physically connected to carbon capture.**	Y	Project Design Document		As outlined in the PDD, Climework consider Operational GHG and Embodied GHG emissions across CO2 capture transport and storage. Information is gathered from LCAs, supplier invoices and metering activities		
	PGR 2.1.4	**The Supplier has assessed all potential sources of leakage (i.e. increases in fossil emissions) outside of the project boundary but due to the development and operation of the project. Where identified, leakage sources are quantified and included in the LCA.**	Y	Project Design Document		No sources of leakage identified.		
	GSCM 3.5	**The LCA boundary does NOT include any of the following:** **- biomass cradle to gate if NOT purpose grown for carbon removal** **- emissions from any process creating biogenic carbon to be captured (e.g. waste treatment, bioenergy plant, biogas processing) that do not exist solely for the purpose of CO2 removal**	NA	NA	NA	Not applicable as capture is via Direct Air Capture.		

Evidence of Quantification - Captured & Injected CO2	GSCM 4.2.2, 5.1.1	**In the case of direct air capture, the Supplier demonstrates that the origin of their CO2 is atmospheric by providing operational data records that are able to rule out other origins of the CO2.** **- Evidence should include directly measured process data indicating the amount of CO2 captured and the plant performance (i.e. CO2 capture efficiency or CO2 material balance)** **- evidence must demonstrate that the CO2 amount delivered by the DAC plant is not greater than the actual plant performance would allow.**	Y	CImeworks PDD Section 2 CImeworks Production Report		CImeworks Production report outlines the production 'waterfall' in which the captured co2 based on the nameplate capacity is the start point, and CDR generated factors in the losses throughout the entire process. Captured value is not above nameplate capacity for plant.		
	GSCM 1.2.3, 4.2.2, 3.3, 5.1.3	**In the case of biogenic CO2 capture, the biomass is documented as sustainable (e.g. meets the requirements of EU directive REDII for sustainable biomass or similar).** **Where applicable, the monitoring and verification of sustainable biomass is done according to the process determined by RED II directive or similar and as implemented by national authorities, or via similar process if in an area where RED II is not applied.**	NA	NA	NA	Not applicable as capture is via Direct Air Capture.		
	GSCM 4.2.2, 5.1.2	**In the case of biogenic CO2 capture, the Supplier utilizes radiocarbon isotope analysis (14C, C-14, Carbon-14) (C14) results based on ISO 13833 or ASTM D6866 methods demonstrating biogenic fraction of the captured CO2.** **- analysis is performed periodically or continuously** **- analysis is performed by qualified persons** **- analysis is performed using properly calibrated equipment** **- for facilities using multiple or variable carbon containing sources, samples should typically be completed for each source type and delivery** **Note: Capture via DAC is excluded from this requirement.**	NA	NA	NA	Not applicable as capture is via Direct Air Capture.	NA	NA
	GSCM 4.2.4	**For EOR+ applications, the CO2e in the extracted oil must be monitored and reported and deducted in the LCA from the total CO2 injected** **- evidence must be provided of accurate measurement of oil produced via EOR activity** **- evidence must be presented regarding total carbon content of the produced oil by appropriate analytical methods, using qualified laboratories and representative samples of produced oil**	NA	NA	NA	Not applicable as EOR is not used	NA	NA
	GSCM 4.2.5, 5.2.2	**The CO2 Removal Supplier has provided the total volume of CO2 captured or amount of carbon containing source (in kg and in kg CO2e) and supporting data and documentation. Documentation should clearly indicate any significant changes in capture process, process upsets, or stops.**	Y	Puro CORC output report CImeworks Production Report July-Nov 2024 V1.1 2024-07 to 10 Orca Injection Monitoring reports	NA	CO2 captured volumes as informed by carbfix meter measurements. Noting that this value is equivalent to the CO2 injected volume.	560.39	tnCO2e
	GSCM 5.2.3	**The CO2 Removal Supplier has provided the total transported volume of CO2 or carbon containing source (in kg) and supporting data and documentation. Documentation should clearly indicate each amount fed into a pipeline or loaded into a carrier vessel or vehicle AND the amount delivered and handed over to the CO2 Storage Operator.**	Y	Puro CORC output report CImeworks Production Report July-Nov 2024 V1.1 2024-07 to 10 Orca Injection Monitoring reports	NA	CO2 transported volume, measured by Carbfix meters. Noting that this value is equivalent to the CO2 injected volume.	560.39	tnCO2e
	GSCM 5.2.4	**The CO2 Removal Supplier has provided the total injected volume of CO2 (in kg CO2e) and supporting data and documentation. The Storage Operator must provide documentation of:** **- the CO2 amount received from the logistics operator** **- the amount of CO2 injected into geologic storage** **- the date of injection of the full amount from the CO2 Removal Supplier (which is the date the amount is eligible for CORCs)**	Y	Puro CORC output report CImeworks Production Report July-Nov 2024 V1.1 2024-07 to 10 Orca Injection Monitoring reports	NA	Injected CO2 volume as measured by Carbfix Meters. Note this does not include the later releases of CO2. See row 54.	560.39	tnCO2e
Additional Supporting Evidence from CO2 Removal Supplier	GSCM 5.2.1	**GHG emissions are assessed and reported following the LCA calculation principles of ISO, WRI or PAS2050.**	Y	Puro Carc output report LCA reports		LCA Databases are used in calculations. ISO 14040 cradle-to-gate and gate-to-grave LCAs for sorbents. Cradle-to-gate and gate-to-grave.		
	GSCM 5.2.1	**The carbon balance assessment over the life-time of the project (LCA) covers the activity boundary set in GSCM section 3 and has been independently verified.**	Y	Orca Project Design Document		As outlined in the PDD, CImework consider Operational GHG and Embodied GHG emissions across CO2 capture transport and storage		
	GSCM 5.3	**Evidence of permanent storage is provided, including:** **- shipping documents for the delivery of the captured CO2 or carbon containing source to a properly permitted eligible injection and storage site, indicating it is to be used for permanent storage of carbon** **- documentation that the storage site is classified and permitted under EU CCS Directive or EPA criteria (see GSCM 1.1) or under similar criteria for locations where neither criteria is applicable.**	Y	2024-07 to 10 Orca Injection Monitoring reports		CImeworks is responsible for the capture through their Direct Air Capture plant. The Transport and Storage element is undertaken through their partner Carbfix, in which they have an agreement to store the CO2 captured by climeworks. Carbfix are contractually obligated not to claim any carbon removal activities. CO2 is injected by CImework's Transport and Storage partner Carbfix, who will hold the relevant Storage permit, issued by the Environment Agency of Iceland, allowing for injection of CO2. The amount of delivered CO2 is metered continuously by CImeworks and Carbfix		
	GSCM 5.4.1	**Verified contracts or attestations of no double counting on the carbon removed by another party or by CO2 Removal Supplier. This should demonstrate that the CO2 removals are solely owned by the supplier. And no claims can be made by other parties. (See GSCM 2.3.2.2)**	Y	CImeworks Statement of Ownership	NA	The statement of ownership outlines that "any rights with or without monetary value generated by CImeworks having Carbfix provide Permanent Mineral Storage and Monitoring under this Project Agreement shall solely vest in CImeworks. In particular, Carbfix shall not be entitled to generate for its own use, sell or otherwise use any certificates"		
	GSCM 5.4.2	**Attestations of no double counting on the carbon removed by CO2 Removal Supplier. This should demonstrate that** **- the CO2 Removals Supplier does not include the CO2 removals as part of its own carbon balance** **- the Supplier makes no marketing or branding claims or carbon neutrality or net negativity with other services provided by the supplier (such as waste treatment) if the CO2 removal certificates are sold or to be sold.**	Y	CImeworks Statement of Ownership		No potential for double counting		

	GSCM 4.5.3	The relevant meters for CO2 capture and injection measurements are in place and they are calibrated in accordance with manufacturer specifications and frequency.	Y	2024_07 Carbfix Orca Monitoring Plan 2024_07 Climeworks Orca Monitoring plan And associated calibration and data sheets Climeworks calibration QA/QC procedure	CO2 is metered at both the capture site and at the injection site. The values taken are from the CO2 meter at the injection site.	The meters in place are as required. Appropriate calibration is taken, where meters are calibrated as per manufacturer's standard.		
Quantification and Calculation Checklist - Output Audit								
Verified Calculated Values	GSCM 4.1	**CORCs are calculated in accordance with the GSCM Methodology as** **CORCs (kgCO2e) = $C_{captured}$ - $E_{project}$ - C_{loss}**	Y	CORC Output report, verified through injection monitoring reports dated July through October.		Calculated as Ccaptured minus Eproject and Closs. Improved performance through increased availability/uptime at the plant.	289.91	CORCs
	GSCM 4.4	**$C_{captured}$ = CO2 measured at the capture site (in kg CO2e). Eligible fraction is calculated following Sections 4.2.2-4.2.4. (see rows 34-38)**	Y	CORC Output report, verified through injection monitoring reports dated July through October.		As measured through metering, noting that for the Climeworks project C Captured is equivalent to C Injected.	364.91	tnCO2e
	GSCM 4.4	**$E_{project}$ = $E_{capture}$ + $E_{transport}$ + $E_{injection}$ + $E_{equipment}$**	Y	CORC Output report		Calculated as Eproject = Ecapture + Etransport+Einjection +Eequipment	74.98	tnCO2e
	GSCM 4.4	**Ecapture = includes all emissions from Capture phase, including energy use in capture, compression, and liquefaction, emissions from purpose grown biomass sourcing and conversion (i.e. to bio-oil), emissions related to capture chemicals (sorbents) or membranes, and system maintenance and regeneration.**	Y	CORC Output report Supplier invoices		As outlined in the CORC output report. Verified through invoices and LCA data.	74.04	tnCO2e
	GSCM 4.4	**Etransport includes all emissions from transportation of captured CO2 from capture site to injection site, including those associated with vehicle fuel use, pumping energy, etc. Emission factors used should be documented and well accepted.**	NA	CORC Output report	NA as Zero	NA as Zero	0.00	tnCO2e
	GSCM 4.4	**Einjection should include all emissions associated with injection, such as energy use for compression, pumping, injection, or any intermediate related activities such as storage.**	Y	CORC Output report Supplier invoices		As outlined in the CORC output report. Verified through invoices and LCA data.	0.94	tnCO2e
	GSCM 4.4	**Eequipment should include emissions from construction and delivery of capture and injection equipment, and associated with production and delivery of materials used to manufacture such equipment. Such emissions may be calculated using documented emission factors for the construction and materials processes or via a cost-based emission factor and the equipment capital costs.**	NA	CORC Output report	NA as Zero	NA as Zero	0.00	tnCO2e
	GSCM 4.4	**C_{loss} = $C_{captured}$ - $C_{injected}$** **Carbon losses are accounted for in the CORC calculation.** **Cinjected is the amount of carbon measured at the point of injection (for a single user / storage site or with separate injection wells and measurements at a multi user site).** **For a multi-user injection site where injected amount is not monitored directly or unambiguously (separate from other injections), Cinjected may be calculated based on calculated losses during transportation and injection as $C_{captured}$ $C_{transport}$($C_{efficiency logistic}$)($C_{efficiency injection}$)**	Y	CORC Output report		As outlined in the CORC output report.During the verified period monitoring some small losses occurred, detailed below: On the 21th of July restart of the system following maintenance resulted in the bubble point pressure exceeding the conservative limit for two minutes. All CO2 injected in this time (26 kg) was conservatively accounted for as a release from the injection system The total CO2 loss for June-October adds to 26 kg CO2 (0.03 tn CO2).	0.03	tnCO2e
	GSCM 4.3.1	**Emissions from the Project is the sum of GHG emissions from the activity (geo-stored carbon) included within the activity boundary. Those are: direct emissions (scope 1 and 2) from capture, transport and injection as well as emissions from chemicals, membranes and purpose-built equipment including the construction and materials for the equipment.**	Y	CORC Output report		Full lifecycle within the project boundary conducted.		

Calculation Details & Considerations	GSCM 4.3.2	**CO2 losses are regarded as any difference between CO2 captured (total in kgCO2e) and CO2 injected to storage (total in kgCO2e) (see section 4.4 calculation parameters). See Row 56**	Y	CORC Output report 2024-07 to 10 Orca Injection Monitoring reports		As outlined in the CORC output report. During the verified period monitoring some small losses occurred, detailed below: On the 21th of July restart of the system following maintenance resulted in the bubble point pressure exceeding the conservative limit for two minutes. All CO2 injected in this time (26 kg) was conservatively accounted for as a release from the injection system The total CO2 loss for June-October adds to 26 kg CO2 (0.03 tn CO2).	0.03	tnCO2e
	GSCM 4.3.3	**All emissions from energy use are within the activity boundary and are accounted for when quantifying the net CO2 Removal. Energy used for geo-stored carbon activities is not required to be 100 % carbon free.**	Y	Puro CORC output report Energy supplier invoices		Emissions factors for energy usage are included. Geothermal energy is utilised for operations		
Uncertainty Quantification	GSCM 4.5.1	**If there is uncertainty in measurement of $C_{CAPTURED}$, $C_{INJECTED}$ or $C_{TRANSPORT}$ the lower end of the range is used in the quantification. Document uncertainty value and range.**	Y	Meter calibration reports. Monitoring plan with listed meters at both climeworks and carbfix plant	NA	Mass flow meter for CO2 injection into well: Uncertainty range 0.15%-0.46%	0.15-0.46	%
	GSCM 4.5.2	**If there is uncertainty in metering or analyzing the carbon content of carbon-containing substance biogenic fraction of the captured CO2 due to sampling or testing techniques, the lower end of the range is used in the quantification. Document the observed range or uncertainty**	NA	NA	NA	Not applicable as no biogenic fraction in captured CO2.	NA	NA