Evaluation and Analysis of Hemp Carbon Standard's Farmers Application on the Carbon Space's Net Ecosystem Exchange (NEE) Methodology

Client: ClimaFi Limited / Hemp Carbon Standard

Date of Verification: 25, 26 and 27 March 2024

PART 1: VERIFIED COMPANY DETAILS

1.1 Company Contact Details	
Company Name	ClimaFI Limited / Hemp Carbon Standard
Contact Person	Tim de Rosen
Business Address	85 Great Portland Street, London W1W 7LT, London, United Kingdom
Office Contact Number	-
E-mail	tim@climafi.org
Website	https://climafi.org

1.2 Facilities included in the Scope of the Assessment		
Name of site	**Location address**	**Visited**
The Ohio Hemp Company	USA	Remote Assessment
Terpene Belt Farms	USA	Remote Assessment
Federowich Farms	Canada	Remote Assessment
Cedar Meadow Farm	USA	Remote Assessment
Eric Tiezen	USA	Remote Assessment
Sarahsway Farm LLC	USA	Remote Assessment
Bosville Farms	USA	Remote Assessment
Dibrova Farms	Ukraine	Remote Assessment
Winfield Farm and Seed Ltd	USA	Remote Assessment
Agro Hemp Iberia UG	Spain	Remote Assessment
Trevor Richardson	USA	Remote Assessment
John Butkiewicz	Canada	Remote Assessment
Siksika Irrigation Lands Corp	Canada	Remote Assessment
Tjark Stikker	Canada	Remote Assessment
Aaron Dublenko	Canada	Remote Assessment

1.3 Assessment Overview		
Assessment Type	**Year**	**Assessment date**
The independent assurance for Hemp Carbon Standard's farmers using the Carbon Space's Net Ecosystem Exchange (NEE) methodology.	2024	25, 26 and 27 March 2024

1.4 Assessment objective

- The assessment aims to ensure the accuracy and reliability measurement of carbon flux reading within the Hemp Carbon Standard framework, using the Carbon Space's NEE methodology, specifically the Carbon Space Technology Version 1.0. This Carbon Space innovative methodology harnesses remote sensing technology, utilizing machine learning algorithms trained on multispectral satellite imagery, meteorological data, and NEE data sourced from Eddy Covariance ground stations to achieve accurate carbon accounting.

- In the evaluation, four farmers under Hemp Carbon Standard's client from diverse geographic regions with different planting schedules were selected as samples. The assessment was executed through remote evaluation, utilizing submitted documents to analyze and verify compliance of the Hemp Carbon Standard's farmers with Carbon Space's carbon accounting standards within the specified assessment period.

1.5 Opening and Closing Meeting

Attendees

Name	Role
Tim de Rosen	CEO & Co-Founder, ClimaFi Limited
Dr Geza Toth	CEO, Carbon Space
Robert Granat	Carbon Space's Personnel

PART 2: INTRODUCTION

- ClimaFi has created "Hemp Carbon Standard," a blockchain-based platform for the digital measurement, reporting, and verification (dMRV) of industrial hemp farming data.

- Hemp Carbon Standard incentivizes farmers to engage in regenerative hemp farming by planting industrial hemp. The Hemp Carbon Standard has appointed Carbon Space as a service provider to conduct carbon flux quantification for 15 hemp farmers from different geographical location. The carbon flux quantification is carried out using Carbon Space Technology Version 1. The procedure and the process of carbon flux reading at the project level are verified through various documentation sources from Hemp Carbon Standard and explanations provided by Mr. Robert Granat, the person in charge of the system at Carbon Space.

- This assessment report provides an overview of the verification process of carbon flux readings conducted for Hemp Carbon Standard's farmers, in accordance with Carbon Space Technology Version 1.0 and ISO 14064-3 standard. The assessment encompasses the use of Carbon Space Technology Version 1.0 at the project level, including the estimations of land NEE, a net carbon flux corresponding to carbon removals or emissions on the ecosystem level.

- The report delineates the exact objectives and extent of the verification assessment for the Hemp Carbon Standard, detailing the pivotal stages undertaken, and provides the assurance findings, ultimately leading to a conclusive verification opinion. These elements are further expounded upon in subsequent sections.

PART 3: CONTENT AND ROLES

- Hemp Carbon Standard, also known as ClimaFi, is an incentive program for industrial hemp farmers to engage in regenerative hemp farming. These farmers are bound by an agreement under Hemp Carbon Standard and are monitored in their hemp planting procedures by ClimaFi. ClimaFi has appointed Carbon Space Limited to conduct independent carbon quantification for the 15 hemp farmers within a specific monitoring and evaluation period requested by Hemp Carbon Standard.

- Carbon Space Limited, a service provider, specializes in conducting carbon assessments for a variety of client-owned projects. Utilizing advanced remote sensing technology, they utilize data sourced from machine learning algorithms trained on multispectral satellite imagery, meteorological data, and net ecosystem exchange (NEE) data obtained from Eddy Covariance ground stations. This method is known as Carbon Space Technology Version 1.0.

- Carbon Space Technology Version 1.0 falls under the purview of Carbon Space Limited, signifying their direct responsibility for its implementation and outcomes. The Hemp Carbon Standard's carbon quantification is conducted focussing on the technology of Net Ecosystem Services established by Carbon Space Technology.

- The responsibility for assessing the sufficiency of the methodology and procedures lies entirely with the intended Carbon Space Technology's user, underscoring their obligation to evaluate and ensure the effectiveness of the chosen approach.

- The verifier holds no accountability for potential inadequacies in the Hemp Carbon Standard or its affiliated hemp farmers, nor for any deficiencies in Carbon Space Technology Version 1.0's methodology and procedures, as such responsibility solely rests with their respective farmers.

- To ascertain the robustness of Hemp Carbon Standard's carbon quantification, as evaluated by Carbon Space Technology Version 1.0's methodology and procedures, ClimaFi has engaged the expertise of Control Union Malaysia to verify the assessment and provide independent assurance. The verification process will entail thorough scrutiny of submitted documentation, compliance with standards, rigorous quality checks, adherence to procedural manuals, assessment of carbon accounting, and evaluation of the final carbon quantification and analysis report submitted by Carbon Space Technology to Hemp Carbon Standard.

PART 4: METHODOLOGY

- The assessment and verification of Carbon Space Technology Version 1.0 of the NEE system was applied to 15 hemp sites, comprising a total of 45 assets. These assets are defined as sub-farmers under each of the 15 sites across 4 different countries. The hemp planting is considered monoculture cropland, which entails the practice of growing a single crop species in a field at a time. The monitoring of carbon flux assessment for Hemp Carbon Standard was conducted from January 2023 to November 2023.

- Carbon flux quantification was performed across 15 sites, covering a total assessed area of 1380.3 hectares. Below are the specifics for each site:

No.	Sites	Location	Total Assets	Total Site Area (Ha)
1	The Ohio Hemp Company	USA	1	94.1
2	Terpene Belt Farms	USA	2	61.4
3	Federowich Farms	Canada	3	236.1
4	Cedar Meadow Farm	USA	1	1.7
5	Eric Tiezen	USA	1	23.0
6	Sarahsway Farm LLC	USA	9	14.4
7	Bosville Farms	USA	2	25.8
8	Dibrova Farms	Ukraine	4	262.0
9	Winfield Farm and Seed Ltd	USA	4	209.9
10	Agro Hemp Iberia UG	Spain	1	5.1
11	Trevor Richardson	USA	4	38.5
12	John Butkiewicz	Canada	2	110.4
13	Siksika Irrigation Lands Corp	Canada	1	59.4
14	Tjark Stikker	Canada	4	199.2
15	Aaron Dublenko	Canada	6	39.2

- For the verification assessment of the Hemp Carbon Standard in compliance with the Carbon Space Technology NEE system, 4 sample sites were selected to assess the accuracy and conduct application analysis by Carbon Space.

- Every farmer/site engaging with ClimaFi will be registered under the Hemp Carbon Standard as part of the blockchain registry for issuing verified credits and carbon standards. The business and planting licenses are verified for the 4 selected samples.

Sites selected	Country	Business Registration Details
Agro Hemp Iberia UG	Spain	BN: DE362585565 Business purpose: Agro Hemp Iberia UG
Dibrova Farms	Ukraine	Identification code of the legal entity: 40856404 Information about main type of business activity: Cultivation of cereals (except rice), legumes and oilseeds Date register: September 27th, 2016
Winfield Farm and Seed Ltd	USA	License Holder: Winfield Farms & Seed Ltd License No: LIC-OYFWI3DHH-2022 Activities listed is for industrial hemp cultivation. Expiry date: April 29th, 2027
Aaron Dublenko	Canada	Applicant Name: Fiber Source Processing Inc. Farm registration for agriculture operation. BN: 740139803NS0001 Expiry date: March 31st, 2024

- Onboarding process for NEE carbon flux accounting evaluation, Carbon Space Technology personnel will ask the client for a KML shape file of the assessed sites. The quality and consistency of the KML provided by the Hemp Carbon Standard are verified against the actual ground situation for ensuring the precise location and size of the Hemp Carbon Standard farmer's land assets. It is essential for the KML shape file to ensure that there are no overlapping boundaries or buildings

within the assessed boundary area. The validation process for the KML shape file provided by the client follows the quality procedure outlined in Carbon Space Technology Version 1.0, documented under "Validating Customer Input Data".

- Land classification is determined prior to generating the shape file for the NEE system. Personnel from Carbon Space Technology also validated the shape file provided by Hemp Carbon Standard meets the requirement of each asset having a minimum area of 1 hectare, with a field width of at least 43 meters. Additionally, the asset must consist of homogeneous planting of hemp crop to ensure accuracy of the results. The total area evaluated for the carbon flux assessment is below:

Sites selected	Total Assets	Total Sites Area (Ha)
Agro Hemp Iberia UG	1	5.1
Dibrova Farms	4	262.0
Winfield Farm and Seed Ltd	4	209.9
Aaron Dublenko	6	39.2

- As a result of the ongoing war crisis in Ukraine during the NEE assessment conducted, the KML shape file could not be provided by the Hemp Carbon Standard for Dibrova Farms. Therefore, Carbon Space Technology is actively utilizing remote technology systems to obtain the accurate shape file from reliable sources such as Google Earth. Sample of KML shape file provided from Hemp Carbon Standard that meet Carbon Space Technology shape file's requirement:

i. Site: Agro Hemp Iberia UG
Assets: Florencia 1 (5.1 Ha)

ii. Site: Winfield Farm and Seed Ltd
Assets: Sandy Acres (140 acres)

iii. Site: Aaron Dublenko
Assets: Hunter Field 3 (15.65 acres)

- The monitoring and evaluation of carbon flux readings conducted on a monthly basis by Carbon Space, allowing for a comprehensive understanding of the dynamic changes in NEE levels over time. These readings, which can be either positive or negative, are significantly influenced by the planting and harvesting cycles of hemp. The carbon flux readings fluctuate in response to the stages of the hemp growth cycle, including periods of active growth, maturation, and harvest.

Sites selected	Planting Date	Harvesting Date	NEE Monitoring Period
Agro Hemp Iberia UG	May 27th, 2023	July 25th, 2023	May to July 2023
Dibrova Farms	April 28th, 2023	August 28th, 2023	May to September 2023
Winfield Farm and Seed Ltd	April 25th, 2023	September 20th, 2023	May to October 2023
Aaron Dublenko	April 15th, 2023	August 20th, 2023	April to September 2023

- Carbon Space Technology furnishes the assessment outcome of NEE carbon flux accounting for the Hemp Carbon Standard with the report assessment result of carbon flux quantification analysis. The document, titled "Ecosystem Carbon Footprint Monitoring Report by Carbon Space Ltd. to ClimaFi," is provided to the client. The verification of deliverables and acceptance of the report by the client is conducted through the quality procedure outlined in the "Carbon Space Product and Services Delivery Procedure."

- According to the quality procedure; Net Ecosystem Exchange (NEE) - the net carbon dioxide exchange between an ecosystem and the atmosphere. Negative NEE indicates that CO_2 accumulated in the ecosystem. Positive NEE indicates that CO_2 was emitted into the atmosphere. From the assessment result, the NEE carbon flux reading as following:

Sites selected	Total CO_2 flux in Jan - Nov 2023 (tCO_2)	CO_2 intensity per ha in Jan - Nov 2023 (tCO_2/ha)	Total uptakes (tCO_2)
Agro Hemp Iberia UG	- 3	- 0.7	- 11.7
Dibrova Farms	- 2,158	- 8.2	- 2,739
Winfield Farm and Seed Ltd	- 1,484	- 7.1	- 2,086.9
Aaron Dublenko	- 214	- 5.5	- 303.6

PART 4: VERIFICATION AND VALIDITY PROCEDURE

The verification process encompassed several essential Carbon Space Technology Version 1.0's procedures and Hemp Carbon Standard's documents, comprising:

- A comprehensive review of the methodology and procedural documents of Carbon Space Technology Version 1.0 at the user level of Hemp Carbon Standard farmers.
- Detailed evaluation of the KML shape file map, inventory data, and data sources, involving a thorough assessment of the farmers' documentation and verification of referenced activities and system processes.
- Evaluation of the NEE system's compliance and quality management systems to ensure accurate application for the Hemp Carbon Standard.
- Intensive scrutiny of the final carbon flux quantification and analysis report provided by Carbon Space Technology to the Hemp Carbon Standard.

PART 5: ASSURANCE FINDINGS

- After independently verifying the analysis data and thoroughly examining the methodologies and procedures employed by Carbon Space Technology Version 1.0 for Hemp Carbon Standard, Control Union confidently asserts that the application of Net Ecosystem Exchange (NEE) by Carbon Space Technology Version 1.0 is both substantively accurate and consistently applied at the project user level. The conclusive carbon flux and analysis report, skilfully prepared by Carbon Space Limited, rigorously adheres to accepted methodologies governing the development of greenhouse gas (GHG) projects for its esteemed clients in the Hemp Carbon Standard.

PART 6: VERIFICATION OPINION

- In accordance with the defined scope, objectives, and assessment criteria, the application of NEE carbon flux quantification analysis by Carbon Space Technology Version 1.0 has been thoroughly evaluated. Utilizing advanced remote sensing technology and machine learning algorithms trained on multispectral satellite imagery, meteorological data, and NEE data from Eddy-Covariance ground stations, the analysis has been verified to a satisfactory level of assurance.
- The verification process of the Hemp Carbon Standard conforms to the guidelines outlined in Carbon Space Technology's system Version 1.0 for the 15 specified sites listed, along with the monitoring period detailed in this report. Any additional sites or subsequent monitoring assessments carried out by Carbon Space Technology to the clients in Hemp Carbon Standard will undergo separate verification assessments. This ensures that the integrity and accuracy of the data and methodologies employed in the assessment are consistently upheld across all evaluations, providing stakeholders with reliable and credible information regarding carbon flux quantification within the Hemp Carbon Standard framework.

PART 7: VALIDATION AND ACKNOWLEDGE

Verification by		
Name	Aini Nazurah Mohd Zi	
Role	Assessor	
Date	April 6th, 2024	
Acknowledged by		
Name	Shahizzudin bin Mohd Said	
Role	Climate Change Mitigation Program Manager	
Date	April 6th, 2024	