

bio.inspecta AG
q.inspecta AG

Ackerstrasse 117
CH - 5070 Frick
Tel. +41 (0)62 865 63 00
Fax +41 (0)62 865 63 01
international@bio-inspecta.ch
www.bio-inspecta.ch



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Audit Report 2023

In accordance with the following requirements:

Puro.earth - Biochar Methodology

Nordgau Carbon GmbH & Co. KG
92533 Wernberg-Köblitz
Operator's No.: PE-70848

Contact details operator

Name and address

Nordgau Carbon GmbH & Co. KG
Maierhof 3
DE-92533 Wernberg-Köblitz

Phone/Fax

Fixnet: +49 9604 9324485
Mobile: +49 9604 9324493
Fax: -
Email: info@nordgau-carbon.de

Contact person(s)

Audit visit details

Date

02.10.2023

Duration

16 h 45 m

Persons present including their function

RICHTHAMMER Michael, Production manager
GMEINER Kerstin, Production Assistant
Philipp Seitz, bio.inspecta AG, Auditor

very good

not satisfactory

Clarity of documentation

| | | | | | | |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|

Audit visit preparation:

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| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
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O.K
 Corrective action required
 Not verified
 Not relevant

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| | | | | 1 | Audit Description |
|-------------------------------------|-------------------------------------|--------------------------|--------------------------|----------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.01 | Audited Standard: <i>Puro.earth CO2 Removal Marketplace General Rules 3.0 – Biochar Methodology (Annex A)</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.02 | Type of Audit: <i>Output Audit</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.03 | Auditing Body: <i>Ceres-Cert, Ackerstrasse 117, CH-5070 Frick www.ceres-cert.de</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.04 | Audit order assigned to an impartial auditor, free from any conflicts of interest, capable and qualified to complete this audit according to Puro Standard. <i>Auditor (name/surname): Philipp SEITZ</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.05 | Audit ID: <i>PE-70848</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.06 | Audit Date: <i>05.05. - 12.12.2023</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.07 | Production Facility Location: <i>Maierhof 3, 92533 Wernberg-Köblitz, Germany</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.08 | Production period: <i>01.04.22 - 31.03.23</i> |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1.09 | Audit could be finished within the scheduled time frame <i>Audit could not be finished within the scheduled time frame. Validator requests of 01.10.23, response on 29.11.23.</i> |
| | | | | 2 | Standing Data Confirmation |
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 Corrective action required
 Not verified
 Not relevant

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| | | | | 2 Standing Data Confirmation |
|-------------------------------------|--------------------------|--------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>2.01 The standing data has been collected from Puro and checked for consistency against other evidence. (GL Ref.1.2.5.)</p> <p><i>Trade registry available; location evidenced; removal method eligible; no public support! Evidence of output volume:</i> <i>From April 2022 to Mar 2023, corresponding to EBC batch ba-de-8-1-3 and the validation period, the output is well documented in m3 in monthly production protocols (attached). For calculation of tonnage, the bulk densities (dry) of the last two reference analyses AR-22-FR-020111-01 (258 kg/m3) and AR-23-FR-027023-01 (224 kg/m3), corresponding to EBC batches ba-de-8-1-3 and ba-de-8-1-4, were considered and averaged. 199 t (dry) were produced during the period April 2022 - March 2023.</i></p> |
| | | | | 3 Evidence Confirmation |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>3.01 All necessary evidence has been provided to the auditor by the Production facility and has been used to complete the compliance checklist. (GL Ref. 5.)</p> <p><i>Proof of product quality: EUROFINS laboratory analyses AR-22-FR-020111-01 (corresponding to ba-de-8-1-3) and AR-23-FR-027023-01 (corresponding to ba-de-8-1-4) considered. Evidence of output volume:</i> <i>From April 2022 to Mar 2023, corresponding to EBC batch ba-de-8-1-3, the output is well documented in m3 in monthly production protocols. Proof of sales: Sales are recorded in m3. A total of 251 dry tons biochar were sold in the period from April 2022 - March 2023.</i></p> <p><i>For the purpose of issuance of CORC certificates, the dry mass of sold biochar was used to ensure account-ability for the end usage of the biochar (for calculation of tonnage, the bulk densities (dry) of the last two reference analyses AR-22-FR-020111-01 (258 kg/m3) and AR-23-FR-027023-01 (224 kg/m3), corresponding to EBC batches ba-de-8-1-3 and ba-de-8-1-4, were considered and averaged). Proof of no double counting: Carbon Cycle, EBC certified, is the main buyer and accounts for app. 55% of sales; the balance is purchased by VERORA, an EBC certified producer and trader. Nordgau's sales terms require that the char is not sold as fuel and that the customer does not get the carbon rights. Both traders have withdrawn from reporting CO2eq of purchased volumes from any carbon accounting.</i></p> |
| | | | | 4 Eligibility Checklist |

O.K
 Corrective action required
 Not verified
 Not relevant

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| | | | | 4 Eligibility Checklist |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4.01 Biochar is used in applications other than energy. (GL Ref. 1.1.1.) <i>Verification of sales has not triggered any suspicion about the use of biochar for energy purposes. Use for non-energetic purposes confirmed for both customers, Carbon Cycle and Verora, through EBC onsite audits. No phone research required.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4.02 Biochar is produced from sustainable forest or waste biomass raw materials (consult positive list of biomasses). (GL Ref. 1.1.2) <i>Coniferous wood (80% pine, 20% spruce) extracted through sustainable forest management. PEFC certificate uploaded for both suppliers: Piehler & Bayerische Staatsforsten. Included in EBC list of permissible inputs.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4.04 Pyrolysis reactor input fuel for heating is not a fossil fuel. Unless only used for ignition/pre heating or in a mobile unit and the emissions are fully included in the LCA. The use of waste heat from other industrial processes (eg. Biodigesters, cement production) is permitted. (GL Ref. 1.1.4.) <i>Fossil fuel (propane) only used for ignition of the burner, turned off after burner reaches 6-700 degree Celsius (EBC and Puro.earth allow fossil fuels as starter).</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4.05 Pyrolysis gases are combusted or recovered. Bio-oil and pyrolysis gases can be stored for later use as renewable energy or materials. (GL Ref. 1.1.5.) <i>No storage of bio-oil and pyrolysis gases. Syngases recovered and burnt in the eflox for generation of heat to maintain pyrolysis</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4.06 The molar H/Corg ratio is less than 0.7. <i>The molar H/Corg ratio significantly below 0.7 according to analytical reference report AR-23-FR-027023-01 (=0.22).</i> |

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 Corrective action required
 Not verified
 Not relevant

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| | | | | 4 Eligibility Checklist |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4.07 Evidence of safe handling and transport is provided and adequate for the production facility. (GL Ref. 1.1.7.) <i>Biochar is moistened up to 28-32% prior to bagging (average moisture level 30%). Average moisture recorded on production protocols. Moisture readings are conducted regularly at intervals of a few days.</i> |
| | | | | 5 LCA Checklist |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5.01 LCA complete and shows: carbon footprint of the biomass production and supply , emissions from the biochar production process , carbon footprint of the biochar end use - cradle to grave. (GL Ref. 1.1.3) <i>The LCA study considers the full product life cycle (system boundary A1-A4, B1 & Infrastructure), referred to as "cradle to grave", as per new Puro earth requirements, for the entire validation period (01.04.22 - 31.03.23). Respective emissions revised according to system boundaries.</i> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5.02 The CO2 Removal Supplier provides a life cycle assessment (LCA) for biochar activity including disaggregated information on the emissions arising at different stages. The system boundary is set cradle-to-grave and includes emissions from production and supply of the biomass, from biomass conversion to biochar, and from biochar distribution and use. (GL Ref. 3.1) <i>The LCA study provided by the CO2 Removal Supplier considers the full product life cycle (system boundary A1-A4, B1 & Infrastructure), referred to as "cradle to grave", as per new Puro earth requirements, for the entire validation period (01.04.22 - 31.03.23). The entire production process of wood harvesting, chipping, transport and handling of feedstock, drying, biochar manufacturing, transport of biochar to the application site and biochar application have been included in the system boundary. Regarding the infrastructure, the reactors manufacturing, installation and disposal are considered as part of the operation, and included in the assessment. The system boundary of this study accords to the Puro earth requirements. Respective emissions revised according to system boundaries.</i> |

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 Not verified
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| | | | | 5 LCA Checklist |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>5.03 Life cycle assessment (LCA) follows ISO standard, WRI GHG protocol or similar method. (GL Ref. 3.2)</p> <p><i>The carbon footprint calculation for the biochar produced during the validation period uses a life cycle assessment approach per ISO 14040 and 14044, ISO 14067 and the Puro Earth methodology for biochar edition 2022 version 2, where applicable. Ecoinvent 3.9.1 database cut-off version was used as secondary data, while whenever data was not available from the plant logs, other external sources and the Ecoinvent database were used (secondary data). For Ecoinvent datasets, the method "IPCC 2021 < global warming potential (GWP100)" is used.</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>5.04 The default baseline emission scenario for the project activity feedstock is zero, which is a conservative assumption since it is not taking into account methane emissions derived from decay of manure or combustion of waste biomass. If a non-zero baseline presented, needs to be accepted by Puro.earth</p> <p><i>No non-zero baseline emission claims for feedstock submitted. The feedstock does not stay on site more than a few days, which means that no pile emissions occur.</i></p> |
| | | | | 6 Production Facility Checklist (Desktop and Verbal Confirmation). |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.01 Evidence of Production Facility eligibility under the general rules of Puro Standard. (GL Ref. 1.2.1)</p> <p><i>Proof of product quality: EUROFINS laboratory analyses AR-22-FR-020111-01 and AR-23-FR-027023-01 considered; Proof of output volume: 199 t; Proof of sales: 251 t. The reported volumes were sold to 2 major clients: Carbon Cycle and Verora, both EBC certified producer and trader. Delivery notes and invoices checked on a random basis; Proof of no double counting: Carbon Cycle, EBC certified, is the main buyer and accounts for app. 55% of sales; the balance is purchased by VERORA, an EBC certified producer and trader. Nordgau's sales terms require that the char is not sold as fuel and that the customer does not get the carbon rights. Both traders have withdrawn from reporting CO2eq of purchased volumes from any carbon accounting. Additionality statement available.</i></p> |

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 Corrective action required
 Not verified
 Not relevant

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| | | | | 6 Production Facility Checklist (Desktop and Verbal Confirmation). |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.02 The Production Facility demonstrate Environmental and Social Safeguards. (GL Ref. 1.2.2.)</p> <p><i>Operational permit available, which implies that environmental safeguards are being met. Emission measurements conducted on a regular basis as per local regulations (last in 2021). No environmentally and socially harmful effect apparent. The production facility is known and has been visited several times.</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.03 CO2 Removal Supplier shall be able to demonstrate 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. Suppliers must also show that the project is not required by existing laws, regulations, or other binding obligations. (GL Ref. 1.2.3)</p> <p><i>An additionality questionnaire submitted by Puro has been filled which demonstrates that CO2 removals are a result of carbon finance. The underlying financial analysis has been submitted (attached).</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.04 The Production Facility's documentation system is accurate and reliable (GL Ref. 1.2.4)</p> <p><i>From April 2022 to Mar 2023, corresponding to EBC batch ba-de-8-1-3 and the validation period, the output is well documented in m3 in monthly production protocols (attached). For calculation of tonnage, the bulk densities (dry) of the last two reference analyses AR-22-FR-020111-01 (258 kg/m3) and AR-23-FR-027023-01 (224 kg/m3), corresponding to EBC batches ba-de-8-1-3 and ba-de-8-1-4, were considered and averaged. 199 t (dry) were produced during the period April 2021-March 2022.</i></p> |

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 Not verified
 Not relevant

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| | | | | 6 Production Facility Checklist (Desktop and Verbal Confirmation). |
|-------------------------------------|--------------------------|--------------------------|--------------------------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.05 The quantity of the biochar produced and sold is quantified and documented in a reliable manner (GL Ref. 1.2.4)</p> <p><i>From April 2022 to Mar 2023, corresponding to EBC batch ba-de-8-1-3 and the validation period, the output is well documented in m3 in monthly production protocols (attached). Sales are recorded in m3 and converted into tons by taking the average bulk densities of the 2 EUROFINS reference analyses AR-22-FR-020111-01 and AR-23-FR-027023-01. A total of 251 dry tons biochar were sold in the period from April 2022 – March 2023.</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.06 Relevant meters are in place and they are calibrated (GL Ref. 1.2.4)</p> <p><i>Production is indicated in volume (m3); no weight figures available. To make the conversion from volume into weight more robust because of the high variability of analytical data, the dry bulk densities of the last 2 reference analyses were averaged. Moisture readings, which are taken for every 5-10 big bags, are recorded. Electricity: Separate meter for the pyrolysis unit exists (entrepreneurial), separated from the meter that accounts for the agricultural business on the same compound. The electricity emissions have been calculated using the electricity consumption from the electricity supplier EON as stated on the invoices. CO2e emissions from electricity amount to 57,8 kg per declared unit of output. Use of propane gas only for kick starting the process. Propane gas consumption traceable through invoices of tank fillings.</i></p> |

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 Corrective action required
 Not verified
 Not relevant

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| | | | | 6 | Production Facility Checklist (Desktop and Verbal Confirmation). |
|-------------------------------------|--------------------------|--------------------------|--------------------------|----------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6.07 | <p>The emissions from the cultivating, harvesting and transporting of the biomass are estimated and calculated in a reliable manner (GL Ref 1.2.4)</p> <p><i>List of biomass purchases can be extracted from accounting in form of an excel document; feedstock generally indicated in bulk cubic meter (SRM); correct conversion if alternative measurement unit is used (solid meter by Bay. Staatsforsten). Two feedstock supplier. Total volume accounted for harvesting and transport.</i></p> <p><i>Emission factor for harvesting drawn from Ecoinvent: Softwood forestry, pine, sustainable forest management (Reference product: wood chips, wet, measured as dry mass); INCLUDES CHIPPING. To arrive at dry mass required for calculation of emissions from harvesting, the respective bulk densities of the prevalent species were weight in direct proportion to supply (see Conversion Table attached). Changes of supply pattern which saw a 80% shift towards pine (remainder 20% spruce) factored in, entailing an increase of bulk density from 250 to 289 kg/m3. In a second step, the moisture of 40% was discounted. CO2e emissions from harvesting has therefore climbed from 104 to 120.5 kg per declared unit of output. Supply distances calculated from delivery records and verified on google maps. The volume-weighted average distance corrected in the course of validation (previous calculations had mistakenly taken the chipper into account); moisture included for accurate transport emission calculation. Emission calculation based on weighted average transport distance and ton km. Emissions from transport data are from the Ecoinvent 3.6 Market for transport Euro 5 dataset. The CO2e emissions from feedstock transport amount to 8.70 kg CO2e per declared unit of output. Tansport distance for big bags is: 500 km. Emissions related to big bag transport amounts to 8.91 Kg CO2e per unit.</i></p> |

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 Not relevant

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| | | | | 6 Production Facility Checklist (Desktop and Verbal Confirmation). |
|-------------------------------------|--------------------------|--------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.08 The energy use of the Production Facility can be quantified and the emissions from the process calculated (GL Ref. 1.2.4)</p> <p><i>Electricity: Separate meter for the pyrolysis unit exists (entrepreneurial), separated from the meter that accounts for the agricultural business on the same compound. The electricity emissions have been calculated using the electricity consumption from the electricity supplier EON as stated on the invoices. CO2e emissions from electricity amount to 57,8 kg per declared unit of output. Use of propane gas for kick starting the process supported by invoices. Diesel consumption based tentatively on daily machine requirements (front loader for biomass and biochar transport).</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>6.09 The auditor goes through the Quantification of CO2 Removal requirements with the CO2 Removal Supplier, so that the Supplier is able to calculate the CO2 Removal independently in its Output Report</p> <p><i>With the LCA provider.</i></p> |
| | | | | 7 Calculation Checklist |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>7.01 Qbiochar = Quantity of biochar produced and sold to end user. (dry char) (GL Ref. 4.2.)</p> <p><i>Proof of output volume: 199 t; Proof of sales: 251 t. The reported volumes were sold to 2 major clients: Carbon Cycle and Verora. Delivery notes and invoices checked on a random basis.</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>7.02 $FpTHTs = c + m \times H/Corg$ (GL Ref. 4.2.)</p> <p><i>Provided in the Gross embodied CO2 calculator at given soil temperature and selected time horizon (CORC calculator for biochar attached).</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>7.03 C Biochar = carbon content of biochar (GL Ref. 4.2.)</p> <p><i>Carbon content 88.15% averaged from last tqo EUROFINS analytical reference reports AR-22-FR-020111-01 & AR-23-FR-027023-01.</i></p> |

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 Not relevant

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| | | | | 7 | Calculation Checklist |
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| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7.04 | <p>Estored = biochar carbon storage = Qbiochar x Cbiocharorg x FpTHTs x 44/12 (GL Ref. 4.2.)</p> <p><i>Provided in the LCA calculator as Gross embodied CO2, at given soil temperature and selected time horizon. Value: 3.19.</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7.05 | <p>Ebiomass = LCA emissions of production and supply of biomass (GL Ref. 4.3.)</p> <p><i>The calculation of the emissions from the forestry and harvesting of the wood chip includes loss of sinks. The data source is "Softwood forestry, pine, sustainable forest management (Reference product: wood chips, wet, measured as dry mass)" from Ecoinvent 3.6, 2020. The inventory is from a German study. A mismatch between feedstock used (3.050m3) and purchased (2.041m3) volumes because of wrong allocation of chipper volumes to the supplier was outbalanced in the course of validation, resulting in an increase of feedstock consumption and hence CO2 emissions linked to the extraction of raw material from 104 to 120,50 kg co2e/unit. In addition, the emissions related to the production of the packaging have been accounted for. Nordgau Carbon uses big bag s made from polypropylene for the storage and transportation of the output. The emissions related to the production of these bags are calculated using a global emission set from Ecoinvent 3.6 for polypropylene. Emissions related to the production of the bags is 12.5 kg CO2e per declared unit of output.</i></p> |

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 Corrective action required
 Not verified
 Not relevant

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| 7 Calculation Checklist | | | | |
|-------------------------------------|--------------------------|--------------------------|--------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <p>7.06 Eproduction = LCA emissions from biochar manufacturing (GL Ref. 4.4)</p> <p><i>Emissions from the production process of the biochar are limited to electricity, propane used to prime the reactors after a production stop, diesel for vehicle usage and exhaust emissions from the process. The electricity emissions have been calculated using the electricity consumption and the residual mix from the electricity supplier EON as stated on the invoices. Nordgau had a 100% renewable tariff during 2022. So for 2022 the 4th quarter renewable energy mix in Germany was used to calculate the electricity emission factor, while the 2023 1st quarter energy mix in Germany was used to calculate the 2023 electricity emission factor (Fraunhofer-Institut für Solare Energiesysteme ISE). CO2e emissions from electricity amount to 57,82 kg per declared unit of output. A total of 8.652 litres of propane were consumed during the period. Lifecycle CO2e emissions from propane have been calculated using a global dataset for propane combustion from Ecoinvent 3.6. The CO2e emissions are 104,3 kg per declared unit of output. Nordgau Carbon use a forklift truck and a front loader in order to move feedstock and output on the site. Both vehicles use diesel fuel which is delivered to the site. The calculation is based on usage, rather than the invoices (= number of hours for each machine; they also use the diesel for other purposes on the farm). The assumption is that the number of operating hours is the same as last year. The emissions from diesel usage have been calculated using a global data set from Ecoinvent 3.6 and amount to 32,51 kg per unit of output. The GHG exhaust gases calculated from the feedstock drying and pyrolysis process are biogenic methane, N2O and CO2. CO2 emissions are considered to be carbon neutral, so only biogenic methane and N2O are included in the LCI. They are calculated considering the tonnes of wood chips input in the process and emissions data from a P1500 pyrolysor, conducted by the pyrolysor manufacturer, PYREG, in 2022. (Lufthygieneamt beider Basel, 2022). Using GWP values for 100-year time horizon from the IPCC Sixth Assessment Report (Smith et al, 2021) the exhaust emissions amount to 29.45 kg CO2e/t of dry biochar produced.</i></p> |

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| | | | | 7 | Calculation Checklist |
|-------------------------------------|--------------------------|--------------------------|--------------------------|----------|--|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7.07 | <p>Euse = LCA emissions of the use of biochar, including distribution up to the point of final use (GL Ref 4.5)</p> <p><i>The volume-weighted average distance traveled for biochar to customers is 317 km. For biochar that gets transported to the application site, greenhouse gas emissions from biochar transport have been calculated using the factor 0.10 kg CO2e/tkm, from the Ecoinvent 3.9.1 freight transport Euro V lorry > 32 metric ton dataset. Total biochar transport emissions (Module A4), including the biochar and packaging mass, are 43.6 kg CO2e per tonne of dry biochar transported. The biochar is mainly mixed with manure or compost for use as a soil improvement medium. So to assess application emissions it is assumed that the biochar is spread on fields by mechanical means.</i></p> <p><i>The emissions arising from the application of biochar to soil using tractors have been modelled using the Ecoinvent v3.9.1 dataset, "solid manure loading and spreading, by hydraulic loader and spreader".</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7.08 | <p>CORCs = Estored - Ebiomass - Eproduction - Euse</p> <p><i>692 CORC for 251 t dry matter shipped and accounted for within ba-de-30-1-3 (01.04.22 - 31.03.23).</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7.09 | <p>Quantity of CORCs (in evidence).</p> <p><i>692 CORC for 251 t dry matter shipped and accounted for within ba-de-30-1-3 (01.04.22 - 31.03.23).</i></p> |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7.10 | <p>Confirm consistency.</p> <p><i>All inconsistencies have been resolved with the responsible LCA provider.</i></p> |
| | | | | 9 | Overall conclusion |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9.01 | <p>Overall conclusion:</p> <p><i>The validator confirms that the LCA calculation 01.04.22 - 31.03.23 provides a credible and faithful account of output volumes and emissions, and thus of declared carbon dioxide removals from sales which have occurred in the same period, as stated in the Output statement. The validator is confident that the conservativeness has been applied to a sufficient degree to say that declared CO2 removals are fully justified.</i></p> |

Auditor's evaluation and recommendation

| Non-compliance | Corrective action | Deadline |
|----------------------------------|-------------------|----------|
| Puro.earth - Biochar Methodology | | |
| None | | |

The Right to be Heard

The undersigned has reviewed the outcome of the audit documented in this report and confirms the completeness and accuracy of the information provided in the audit and the content of this report.

He/ she has taken note of the non-conformities, measures, deadlines and sanctions described in this report.

The undersigned has the option of submitting a counter-notification in writing to bio.inspecta AG within three working days of receipt of this report. If no reply is received within this period, the contents of this report shall be deemed to be acknowledged.

Frick, 21.12.2023

Wernberg-Köblitz,

bio.inspecta AG / q.inspecta GmbH
International Department

Nordgau Carbon GmbH & Co. KG



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Philipp Seitz

name, first name.....

Auditor

function.....