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Puro Standard

Bio-based Construction  
Materials Methodology

Edition 2019

## Annex C: Wooden Building Element Methodology

This methodology quantifies the CO2 Removal achieved by production of **wooden building elements**.

CO2 Removal results from the wooden building elements storing the carbon captured by trees. The CO2 removal is considered long-term, when used in construction of buildings.

This methodology is applicable to certificates issued for the Puro.earth Standard.

### 1 Eligible activity types

#### 1.1 Requirements for activities to be eligible under the methodology

- 1.1.1. Production of engineered wooden building elements (mass timber elements, glued laminated timber, cross-laminated timber, laminated veneer lumber or cellulose fiber insulation CFI), sourced from sustainably managed forests and plantations in Europe, and used for the construction of buildings.
- 1.1.2. Elements need to be installed-to-measure, pre-cut and ready for construction when shipped from the production facility, so that there is no material loss at the construction site which would decrease the CO2 Removal captured by and embedded in the product.
- 1.1.3. The eligibility of the production facility is determiner in the **Production Facility Audit**

#### 1.2 Requirements for the Production Facility Audit

- 1.2.1. The Production Facility Auditor checks the Production Facility against the Eligible activity types (section 1), and the Proofs and evidence needed from the CO2 Removal Supplier (section 5). The main requirements include:
  - The raw materials used in the production of the elements are sustainably sourced (see section 1.1 and 5.2.1.)
  - The Production Facility has a valid Environmental Product Declaration or similar certificate, Auditor checks date of certificate issuance (see section 5.3.1.);
  - The building elements are of eligible type and the elements are pre-cut and ready for construction when shipped from the production facility, so that there is no material loss at the construction site which would decrease the CO2 Removal impact after shipping.
- 1.2.2. The Production Facility Auditor checks that the Production Facility is capable of metering and quantifying the Output in a reliable manner, for the Quantification of CO2 Removal (section 4). This check also prepares the CO2 Removal Supplier for producing the periodic Output Report.
  - The quantity of the wooden building elements produced and shipped is quantified and documented in a reliable manner (sections 4.1.1., 5.3.2. and 5.4.)
  - Relevant meters are in place and they are calibrated;
  - The energy use of the Production Facility can be quantified and the emissions from the process calculated (section 4.4.2.);
  - The emissions from the harvesting and transporting of the raw material are estimated and calculated in a reliable manner (section 4.4.4.)

- The size of the buffer for uncertainty (section 4.3.3.) is correct for the Production Facility in question
- The auditor goes through the Quantification of CO<sub>2</sub> Removal requirements with the CO<sub>2</sub> Removal Supplier, so that the Supplier is able to calculate the CO<sub>2</sub> Removal independently in its Output Report.

### 1.2.3. Collection of standing data of the Production Facility

The Production Facility Auditor collects and checks the standing data of the Production Facility and the CO<sub>2</sub> Removal Supplier. The data to be collected by the Auditor includes:

- CO<sub>2</sub> Removal Supplier registering the Production Facility;
  - o A certified trade registry extract or similar official document stating that the organization is validly existing and founded under the laws of the mother country.
- Location of the Production Facility;
- Volume of Output during the full calendar year prior to registration;
- Removal Method(s) for which the plant is eligible to receive CORCs;
- Date on which the Production Facility becomes eligible to receive CORCs;
- Whether the Production Facility has benefited from public support.

## 2 Point of creation of the CO<sub>2</sub> Removal Certificate (CORC)

### 2.1 Point of creation

2.1.1. The point of creation of the CO<sub>2</sub> Removal Certificate is the production process of engineered wooden building elements, when the elements are produced and shipped. The end use of the product in construction needs to be proven.

2.1.2. The producer of the engineered wooden building elements is the CO<sub>2</sub> Removal Supplier.

## 3 Activity boundary for CO<sub>2</sub> Removal Certificate

### 3.1 Activity boundary

The blue box in the figure 1 below illustrates the activities included in the activity boundary. Emissions from the raw materials, transport of raw materials and production of the wooden building elements are included in the quantification and calculation of CO<sub>2</sub> Storage of the wooden building elements.

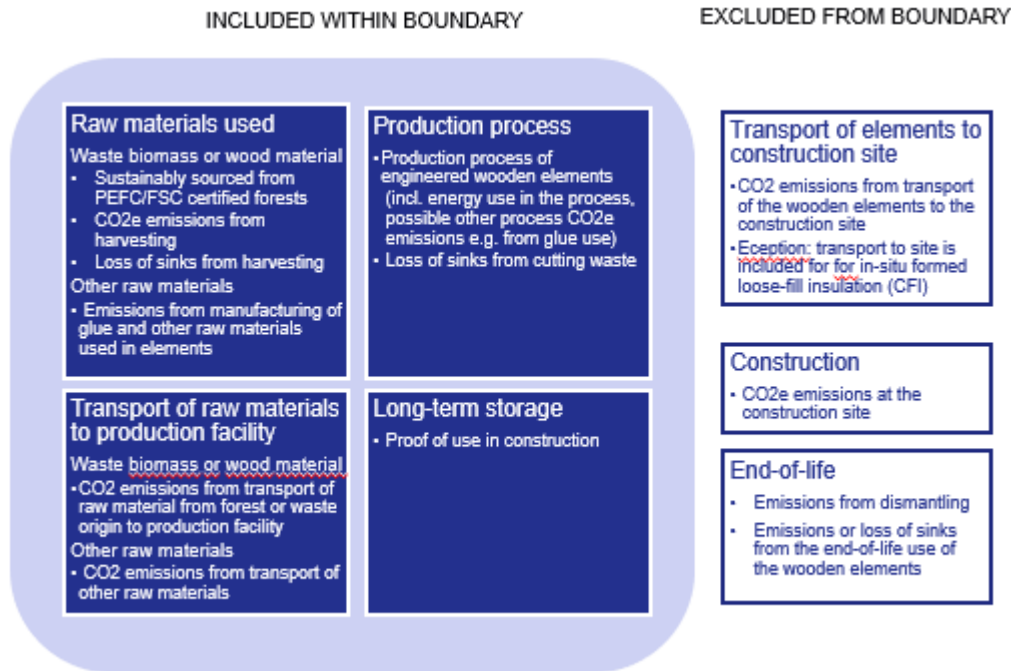


Figure 1: Activity boundary

### 3.1.1. Included within the boundary:

- Waste biomass or wooden raw material needs to be sourced from forest or plantations in the European Union that are certified with Programme for the Endorsement of Forest Certification (PEFC) Sustainable Forest Management Standard or Forest Stewardship Council (FSC) Forest Management Certification.
- Waste biomass or wooden raw materials sourcing: Quantify emissions and possible loss of sinks from sourcing or harvesting of the raw material, as included in the Environmental Product Declaration (EPD) requirements for construction products<sup>5</sup> and described in the EPD of the engineered wooden building element.
- Other raw materials like glues, adhesives, resins, finishing, fire retardants etc.: Quantify the emissions caused by manufacturing the amount of other raw material used in the wooden building element.
- Emissions from the transport of raw materials to the production facility, as included in the EPD of the engineered wooden building element.
- Quantify emissions of the production process of the engineered wooden building elements including energy use in the process and potential other emissions from the production process, such finishing or blowing in-situ.
- Quantify CO2 storage or carbon content (kg CO2eq.) in the finished element as defined in the Environmental Product Declaration, laboratory tests or other similar verified documents.
- Quantify Duration of the CO2 storage, related to the construction use in specific type of building.

### 3.1.2. Outside the activity boundary:

<sup>5</sup> EN 15804:2012+A1:2013 Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

- Emissions from transport of the wooden building elements to the construction site, as they should be calculated in the carbon footprint of the constructing activity
- Emissions from the construction process, as they should be calculated in the carbon footprint of the constructing activity. Exception: in case of in-situ formed loose-fill CFI the emissions of transport of the CFI insulation material and the installation equipment to construction site is included.
- Use of the wooden material after the dismantling of the building. Depending on the recycling method the CO<sub>2</sub> storage of the wooden building element may remain or be decomposed. The CO<sub>2</sub> removal impact after life-time of the building is therefore not included in the CO<sub>2</sub> Removal Certificate.

## 4 Quantification of CO<sub>2</sub> Removal – calculation methodology

This calculation can be done with using corresponding figures from an existing Environmental Product Declaration (EPD) of the engineered wooden building elements, using Sections A1-A3 of the EPD. Alternatively, other figures can be used, e.g. from an LCA or carbon footprint calculation, if proof of their quality can be presented.

### 4.1 Production volume

- 4.1.1. The producer of the wooden building element (CO<sub>2</sub> Removal Supplier) provides data and documentation on the production volume (in kg) of the elements produced in the production process of the eligible production facility.

### 4.2 CO<sub>2</sub> storage volume (CO<sub>2</sub> captured and embedded in the product)

- 4.2. Calculation of the CO<sub>2</sub> storage volume (biogenic carbon content) can be based on data from the Environmental Product Declaration (EPD) or similar certification/declaration of the product. In the EPD the biogenic carbon content of wood is calculated by EN 16449 standard, which is based on the ISO 14067 standard.

### 4.3 Buffer for uncertainty assessment

- 4.3.1. A Buffer is used to correct the Output to account for possible uncertainties in e.g. metering inaccuracies, losses of the CO<sub>2</sub> storage after production, or other losses that may occur. A correction in the form of a buffer in percentage (%) is used to reflect the uncertainty and to reduce the volume of CO<sub>2</sub> removal Output to be certified i.e. uncertainty-corrected CO<sub>2</sub> Removal Output=Output\*(100%-Buffer)
- 4.3.2. During production: Metering inaccuracies in production volumes, in CO<sub>2</sub> content in the element due to sampling or testing techniques, or other metering used in quantification needs to be estimated and a corresponding buffer-percentage defined.
- 4.3.3. During use: Possible decomposing or re-emitting during the life-time of the product: In case of wooden building elements there is a small risk that the CO<sub>2</sub> is re-emitted to the atmosphere before the end of life of the building (see section 4.8.2.). Such unlikely incidents include fire in the building, flooding causing building elements decomposing, and other unlikely incidents.

4.3.4. In case of wooden building elements, the buffer is set at 10%. The buffer can later be amended by the Issuing Body.

## 4.4 Emissions from the activity of producing wooden building elements and for the supply chain that is included within the boundary

### 4.4.1. Emissions from sourcing or harvesting the raw material

Wood material:

- Estimate of CO<sub>2</sub> emissions from sourcing or harvesting the raw material (as per EPD or similar)
- Estimate of CO<sub>2</sub> emissions from transport of the wood material from the forest to the production facility (as per EPD of other similar).

Other raw material (e.g. adhesives, finishing, fire retardant etc.):

- Estimate of CO<sub>2</sub> emissions from the manufacturing of the raw material
- Estimate of CO<sub>2</sub> emissions from the transport of the raw material to the production facility

### 4.4.2. Emissions from the activity of production of the product

- Calculation of emissions from the production process for the reported Output period
  - Energy use in the production process, calculation from actual data
  - Other possible Green House Gas emissions from the production process (in ton CO<sub>2</sub>eq.)

## 4.5 Use of existing EPD or LCA as proof

4.5.1. Existing Life Cycle Analysis (LCA) or Environmental Product Declaration (EPD) that has the same scope and boundaries as described above (A1-A3) and which has been verified by a third party can be used as sufficient proof for (4.2 – 4.4).

## 4.6 Calculation parameters

**Q<sub>element</sub>** = Quantity of wooden building elements produced and shipped to construction company (in kg or m<sup>3</sup>)

**C<sub>element</sub>** = Carbon content of the wooden building elements (in kg CO<sub>2</sub> / kg or m<sup>3</sup> of product)

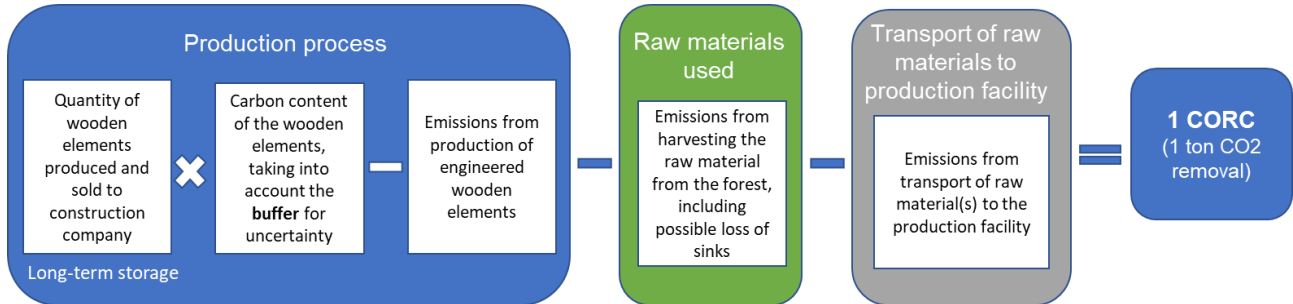
**B<sub>element</sub>** = Buffer for possible CO<sub>2</sub> re-emitted during Product life-time (in percentage)

**E<sub>element</sub>** = Emissions from production of wooden building elements

**E<sub>rawmaterial</sub>** = Emissions from sourcing or harvesting the raw material from the forest, including possible loss of sinks from harvesting

$ET_{\text{rawmaterial}}$  = Emissions from transport of raw material to the production facility

### 4.7 Calculation formula of CO2 removal



#### 4.7.1. Mathematical formula

$$Q_{\text{element}} \times (C_{\text{element}} (100\% - B_{\text{element}})) - (E_{\text{element}} + E_{\text{rawmaterial}} + ET_{\text{rawmaterial}}) = \text{CO}_2 \text{ Removal (in kg)}$$

Note: 1 certificate = removal of 1000 kg CO<sub>2</sub>

### 4.8 Long-term CO2 storage

- 4.8.1. The element withholds CO<sub>2</sub> captured in the waste biomass or wooden biomass in the forest. The stored amount of CO<sub>2</sub> is calculated with the formula above deducting the production process emissions and other emissions from the stored CO<sub>2</sub> content in the element.
- 4.8.2. The wooden building element functions as a long-term CO<sub>2</sub> storage, when used in a building with long lifetime. Buildings are designed for a lifetime for over 50 years, as required in the European Standard EN 1990 (2002): Eurocode - Basis of structural design<sup>6</sup>. According to the Eurocode standard, the minimum designed lifetimes for all buildings in the EU are the following:

Design working life category	Working life in years
4. Building structures and other common structures	Minimum 50 years
5. Monumental building structures, bridges and other civil engineering structures	Minimum 100 years

<sup>6</sup> EN 1990 (2002) (English): Eurocode - Basis of structural design [Authority: The European Union Per Regulation 305/2011, Directive 98/34/EC, Directive 2004/18/EC]. Available at: <https://www.phd.eng.br/wp-content/uploads/2015/12/en.1990.2002.pdf> Page 28.

Because buildings in the EU designed to last over 50 years, the CO<sub>2</sub> storage in a wooden building is considered long-term.

## 5 Proofs and evidence needed from the CO<sub>2</sub> Removal Supplier

### 5.1 Principle

- 5.1.1. Output from a production facility is determined as eligible for issue of CO<sub>2</sub> Removal Certificates once the facility has undergone a process of third-party verification by an auditor against the specific methodology for the wooden building element. This verification is done in a **Production Facility Audit**.
- 5.1.2. For the activity to be eligible for producing wooden building elements for which a CO<sub>2</sub> removal certificate can be issued, the following proofs (5.2- 5.4) need to be presented by the CO<sub>2</sub> Removal Supplier, in this case, the producer of wooden building elements.

### 5.2. Raw material use

5.2.1. Proof of the sustainability of the raw material used. Proof to be presented:

- Programme for the Endorsement of Forest Certification (PEFC) Sustainable Forest Management Standard: National standard under the PEFC, such as PEFC Finland Standard ([PEFC FI 1002:2014](#)); or
- Forest Stewardship Council (FSC) Forest Management Certification, e.g. FSC Standard for Finland ([FSC-STD-FIN-\(Ver1-1\)-2006](#));
- or similar

### 5.3. Production process of the engineered wooden building elements and the quality of the product

5.3.1. Product quality

Proof of CO<sub>2</sub> removing production – proof that the production technology of the product is net CO<sub>2</sub>-removing

Proof to be presented:

- Ecological Balance Sheet and/or
- Environmental Product Declaration (EPD) for the wooden building element or the product



- In the case of the EPD, standards EN 15804<sup>7</sup> and EN 16485<sup>8</sup> serve as the core product category rules for the assessment. Biogenic carbon content of wood is calculated by EN 16449<sup>9</sup> standard.

or

- LCA results of the production process, if possible, including information on the carbon sink qualities of the timber; and/or
- Lab results on the quality of the timber, e.g. carbon content of the product.

#### 5.3.2. Proof of production volume

The production volume needs to be proven, as it is the basis of the amount of Certificates to be issued to the Production Facility.

Producer provides Output Report, containing data and documentation on the amount of engineered wooden building elements produced (in kg or m<sup>3</sup>)

Proof to be presented:

- Continuous production documentation for the whole period (book-keeping), taking into account any significant changes or stops in production

### 5.4. Proof of the end use of CO<sub>2</sub> removing product

#### 5.4.1. Proof of long-term CO<sub>2</sub> storage: proof that the end-use of the product does not cause CO<sub>2</sub> returning to the atmosphere

Proof to be presented:

- Shipping documentation of the delivery of the product to a building site, indicating that it is going to be used in construction of buildings.

### 5.5. Proof of no double counting

#### 5.5.1. Proof of no double counting on product level: Proof that the final end-use product (e.g. building) will not be sold as “carbon positive/sink” if the certificate is removed from the activity and sold to another organization.

- A statement is needed from the Removal Supplier that the underlying physical product in which the CO<sub>2</sub> is stored will not be sold or marketed as “carbon positive/sink” if the certificate

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<sup>7</sup> EN 15804: Sustainability of construction works, Environmental product declarations, Core rules for the product category of construction products

<sup>8</sup> EN 16485: Round and sawn timber. Environmental Product Declarations. Product category rules for wood and wood-based products for use in construction

<sup>9</sup> EN 16499: Wood and wood-based products. Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

associated with the underlying physical product is removed from the underlying product and sold to another stakeholder not associated with the underlying product.

- No marketing and branding claims can be made by the end-user (construction company) that a building constructed with the underlying physical product is a carbon sink if the decoupled CO<sub>2</sub> certificate has been sold to and cancelled by another stakeholder.

## Annex D: List of Issuing Body's Agents

### **List of Output Auditors:**

DNV GL Business Assurance

EnergyLink Services Pty Ltd

Bio.Inspecta AG

### **List of Production Facility Auditors:**

DNV GL Business Assurance

EnergyLink Services Pty Ltd

Bio.Inspecta AG