stripe

Finnish Log House Industry Association (via Puro.earth)

APPLICATION FOR STRIPE 2020 NEGATIVE EMISSIONS PURCHASE

Section 1: Project Info and Core Approach

1. Project name

Laminated logs

2. Project description. ***Max 10 words***

Laminated log production from lumber feedstock with CO2 sequestration certified by Puro

3. Please describe your negative emissions solution in detail, making sure to cover the following points:
   a) Provide a technical explanation of the project, including demonstrations of success so far (preferably including data), and future development plans. Try to be as specific as possible: all relevant site locations (e.g. geographic regions), scale, timeline, etc. Feel free to include figures/diagrams if helpful. Be sure to discuss your key assumptions and constraints.
   b) If your primary role is to enable other underlying project(s) (e.g. you are a project coordinator or monitoring service), describe both the core underlying technology/approach with project-specific details (site locations, scale, timeline, etc.), and describe the function provided by your company/organization with respect to the underlying technology/approach.
   c) Please include or link to supplemental data and relevant references.

Max 1,500 words *(feel free to include figures)*

Laminated log structure is a basic element of a modern log house. The structure contains laminated (glued) logs, connected with wooden dowels and metal connecting parts, sealing strips and insulation between the logs. The laminated log is made of kiln dried dimensioned lumber of pine (Pinus sylvestris L.) or spruce (Picea abies L.) and glued together from two or more pieces, with either a vertical, horizontal or cross seams. Typical thickness of a laminated log is between 88 to 275 mm,

regular height is 170 mm but can be up to 275 mm. Log thickness or height has no considerable impact on the relative environmental load of the wall structure per volume.

Product standard: SFS 5973 Massive and laminated logs for buildings.

It is no coincidence that very old log buildings can often be seen in Finland. The oldest still standing log building in Finland is thought to be St. Henry's Chapel in Kokemäki, built in the 1400s. In the same way, a log building built today can be standing 500 years from now.

Nowadays log building know-how is state of the art in Finland. Excellent raw materials, design skills founded on a strong tradition of log building and strong technological know-how have made Finland the world leader in log construction quality.

The turnover of Finnish log house manufacturers in 2019 was approximately EUR 250 million and it is growing.. Exports accounted for about 25 per cent of turnover. Traditionally, log homes have been used as holiday homes. Today, most of the production is in single-family houses. (1200 pc./year) Over the last five years, schools, children's day care centers and elderly care homes are increasingly being built from log in Finland (more than 50 pc./year).

Pictures of a log buildings and more information http://www.hirsikoti.fi/en/home

The basis for the calculation of LCA is the Environmental product declaration (EPD) of the logs, which has been prepared according to the European standards EN 15804 + A1 and ISO 14025.

The logs produced by our factories have been drafted, audited and published as a pan-European Environmental Product Declaration (EPD) and are valid throughout the EU. Link to EPD:
https://cer.rts.fi/wp-content/uploads/rtsepd_31-19_suomenhirsitaloteollisuus_laminatedlogwallstructures_ver3-1.pdf

Section 2: 2020 Net-Negative Sequestration Volume

See Stripe Purchase Criteria 1: The project has volume available for purchase in 2020.

4. Based on the above, please estimate the **total net-negative sequestration volume** of your project (and/or the underlying technology) in 2020, in tons of CO2. (Note: We're looking for the net negative amount sequestered here, net lifecycle emissions. In Section 3; you'll discuss your lifecycle and why this number is what it is).

stripe

Currently 25 000 tons. The verification of the mills is still partly completed. Work is advancing.

5. Please estimate how many of those tons are still available for purchase in 2020 (i.e. how many tons not yet committed). This may or may not be the same as the number above.

35 000 tons. The verifications of the almost all mills are completed in the end of year 2020.

6. (Optional) Provide any other detail or explanation on the above numbers if it'd be helpful. ***Max 100 words.***

The total annual production capacity of the mills is currently around 40 000 tons. Production is expected to increase in the coming years.

Section 3: Life Cycle Analysis

See Stripe Purchase Criteria 2: The project has a carbon negative complete lifecycle (including energy use, etc).

7. Provide a life cycle analysis of your negative emissions solution demonstrating its carbon negativity, as complete as possible given limited space, and making sure to cover the following points:

a) Include a flow sheet diagram of direct ingoing and outgoing flows (GHG, energy, materials, etc) that bear on the LCA.
b) Please be explicit about the boundary conditions of your LCA, and implications of those boundaries on your life cycle. Let us know why the conditions you've set are appropriate to analyze your project.
c) Make sure to identify assumptions, limitations, constraints, or factors that relate to ingoing and outgoing flows, citing values and sources (for example: land and resource scarcity, limitations on a required chemical, energy requirements). Also identify key sources of uncertainty in determining these values.
d) If your solution results in non-CO2 GHG emissions, please be sure to separately specify that (e.g. in units of GWP 20 or 100 years, ideally both).
e) For solutions that rely on modular components (for example: incoming energy flows or outgoing CO2 streams), feel free to cite values associated with those interfaces instead of fully explaining those components. For these values, please identify the upstream and downstream life cycle emissions of the component.
f) Explain how you would approach a more comprehensive LCA by citing references and underlying data needed for the analysis.

Max 1,000 words *(feel free to include figures or link to an external PDF)*

a) More information in Log EPD: https://cer.rts.fi/wp-content/uploads/rtsepd_31-19_suomenhirsitaloteollisuus_laminatedlogwallstructures_ver3-1.pdf
b) The system boundary is as required by Puro.earth Cradle-to-gate i.e. from sourcing the feedstock to putting the product in our warehouse. Boundary conditions: we do not include the transportation from our production site to the customer, as those emissions are covered by the carbon accounting of the

customer.

c) Allocation of CO2 emissions to various output products from the same production line is based on the energy content (in MJ). This is in line with the ISO 14044 recommendation that the inputs and outputs of the system shall be allocated between the different products by reflecting the underlying physical relationships between the products

Carbon sequestered i.e. Negative emissions NETS calculation (CO2-stored (minus) emissions, from LCA]:

x tons CO2eq embodied per tonne product – y tons CO2eq emitted in manufacturing = z tonnes CO2eq sequestered per tonne product.

Link to Puro.earth audit statement https://puro.earth/methodologies/

d) Link to https://cer rts fi/wp-content/uploads/rtsepd_31-19_suomenhirsitaloteollisuus_laminatedlogwallstructures_ver3-1.pdf

e) --

f) The LCA is made by a 3rd party, who is experienced in reporting carbon footprints according to GHG Protocol. The LCA is verified by Puro.earth and its auditing partner DNV GL

Puro.earth methodologies for quantification of carbon sequestered in Biochar, carbonated or bio-mass based building elements https://puro.earth/supplier-verification/

8. Based on the above, for your project, what is the ratio of emissions produced as any part of your project life cycle to CO2 removal from the atmosphere? For true negative emissions solutions, we'd expect this ratio to be less than 1.

Carbon sequestered i.e. Negative emissions NETS calculation (CO2-stored (minus) emissions, from LCA (EPD)]:

X tons CO2eq embodied per tonne product – Y tons CO2eq emitted in manufacturing = z tonnes CO2eq sequestered per tonne product.

from the equation above: Y/X < 1

Section 4: Permanence and Durability

See Stripe Purchase Criteria 3: The project provides durable, long-term storage of carbon.

stripe

9. Provide an upper and lower bound on the likely durability / permanence of sequestered carbon provided by your project, in years:

50 to 200 (,even more) years

10. Please provide a justification for your estimates, and describe sources of uncertainty related to: the form of storage, effects of environmental or climatic variability, difficulty in monitoring or quantification, etc. Specifically, discuss the risks to permanence for your project, the estimated severity/frequency of those risks (e.g. 10% of the acres of forest in this forest type are burned by fire over a 100 year period), and the time-horizon of permanence given those risks.

Max 500 words

Puro.earth methodologies uses an uncertainty buffer of 2,5% - 10% which is deducted from the verified volume of sequestered carbon dioxide.

Section 5: Verification and Accounting

See Stripe Purchase Criteria 4: The project uses scientifically rigorous and transparent methods to verify that they're storing the carbon that they claim, over the period of time they claim to.

11. Provide detailed plans for how you will measure, report, and verify the negative emissions you are offering. Describe key sources of uncertainty associated with your monitoring, and how you plan to overcome them.

Max 500 words

We are using the PURO.earth methodology for verification and accounting. The audit will be done by DNV GL as suggested by PURO.earth.

12. Explain your precise claim to ownership of the negative emissions that you are offering. In particular, explain your ownership claim: 1) in cases in which your solution indirectly enables the direct negative emissions technology and 2) when, based on the LCA above, your solution relies on an additional upstream or downstream activity before resulting in negative emissions. Please address the notion of "double counting" if applicable to your project, and how you'll prevent it.

Max 200 words

Double counting is prevented by Puro.earth rules. When the carbon removal attribute is attached from the physical biochar product, the physical product is then accounted for as carbon neutral. The verification process checks that the packages or web-page do not present biochar as carbon net-negative.

Section 6: Potential Risks

This section aims to capture Stripe Purchase Criteria 5: The project is globally responsible, considering possible risks and negative externalities.

stripe

13. Describe any risks or externalities, any uncertainties associated with them, and how you plan to mitigate them. Consider economic externalities, regulatory constraints, environmental risk, social and political risk. For example: does your project rely on a banned or regulated chemical/process/product? What's the social attitude towards your project in the region(s) it's deployed, and what's the risk of negative public opinion or regulatory reaction?

Max 300 words

We don't see big social or political risks for our production or application in this country.

Section 7: Potential to Scale

This section aims to capture Stripe Purchase Criteria 6: The project has the potential to scale to high net-negative volume and low cost (subject to the other criteria).

14. Help us understand how the cost and net-negative volume of your solution will change over time. Note that we aren't looking for perfect estimates. Instead, we're trying to understand what the long-term potential is and what the general cost curve to get there looks like. (Note: by "cost" here we mean the amount Stripe or any other customer would pay for your solution):

	Today	In ~5 years	In ~20 years
Est. Cost per net-negative ton (in $)	20	30	
Est. Net-negative volume (in tons of CO2)	25 000	50 000	

15. What are the drivers of cost? Which aspects of your costs could come down over the next 5 years, and by how much? Do you think your eventual scale potential is limited by cost or by volume? Why? Refer to any relevant constraints from question #7, like land or materials scarcity, and specify the boundary conditions for which you consider those constraints.

Max 300 words

Net-negative sequestration volume, carbon capture is a by-product of log manufacturing. Certification of commercial forests is already included in the pricing of raw wood and lumber in Finland. The certification systems currently in use in Finland are the PEFC and FSC. Most of the commercial forest area in Finland, about 90 per cent, is certified under Finland's PEFC scheme, while about 10 per cent is certified under the FSC standard.

Section 8: Only for projects with significant land usage

See Stripe's Purchase Criteria 2: The project has a net cooling effect on the climate (e.g. carbon negative complete life cycle, albedo impact, etc.) ***This section is only for projects with significant land usage requirements: Forest, Soil, and BECCS/Biochar/Biomass sequestration projects.***

stripe

16. Location: Please provide baseline information about the geographic location(s) of your project; and link shapefile(s) of project area(s).

Max 100 words

The factories are located all over Finland. Raw wood and sawn timber are procured throughout Finland.

17. Land ownership: Please describe the current (and historical as relevant) land ownership and management for the area(s) provided in (16). If your project is not the landowner, describe your relationship to the landowner.

Max 150 words

We are not the land owner. We purchase biomass from certified FSC-PEFC forests and that is a requirement in the Puro.earth methodology as well.

In Finland the private sector holds 52% of the forest area, the state 35% and the forest industry 8%. The remaining 5% is distributed among municipalities, parishes, joint forests and other communities.

18. Land use: For forest projects, please provide details on forest composition as well as forest age and basal crop area/density. For soil projects, please provide details on land use and crop type (if agricultural), soil organic carbon baselines, and regenerative methodology. For BECCS, biochar, or wooden building materials projects, please provide details on biomass crop type and methodology as applicable.

Max 500 words

In Finland, since 1851, a strict forest law has been in place to control the total use of forests. Particular care has been taken to ensure that the amount of forests in Finland is not reduced. The annual growth of trees in Finland exceeds the volume of felling and natural loss by over 20 million cubic metres. The age of our forests is developing in a manner that makes the sustainable removals exceed 85 million cubic years of stem wood in the next few decades, when annual removals have been 60–65 million cubic metres in recent years.
Linksto Finnish forestry
https://www.luke.fi/en/natural-resources/forest/forest-resources-and-forest-planning/
and
https://mmm.fi/en/forests/forestry/sustainable-forest-management/calculations-concerning-sustainability

19. Net effect on climate: Please discuss the non-CO2 impacts of your project that may not be covered in your LCA, such as your impact on albedo.

Max 150 words

LCA system boundary as required by Puro.earth covers cradle-to-gate GHG impact. In addition to the removed and stored CO2, our production has the following climate impacts:

1) Replacement of materials and their emissions: Use of our product can displace use of

other materials that would have caused emissions.

2) Together the Puro.earth ecosystem companies create jobs in the new carbon net-negative economy and enable recycling business.

3) avoided decomposing of feedstock biomass to GHG: The biomass we use would otherwise decompose naturally or be used for energy. Those emissions are avoided by stabilizing the GHG into our product.

4) Harvesting and managing forests sustainably decreases risk of forest fires, insects and diseases.

5) For biochar: Short-lived impact on albedo: Biochar when applied to farmlands needs to be ploughed down into the soil. This is typically done when normal tillage is carried out and the land is already “black”. It can decrease the albedo effect (reflectivity) slightly. However, this is typically a short period (day of spreading).

6) For biochar: Yield increase impacts: 10% yield increases reported with biochar. Crop productivity impacts carbon sequestered in crop biomass as well as reduction in land-use requirements for food production.

7) For bio-mass based building element: Our products improve the indoor air quality and provide healthier living conditions.

Section 9: Other

20. What one thing would allow you to supercharge your project’s progress? This could be anything (offtakes/guaranteed annual demand, policy, press, etc.).
Max 100 words

Guaranteed annual demand for carbon removal credits (Puro CORCs). This would enable investing in rapid capacity increase of biochar production.

21. (Optional) Is there anything else we should know about your project?
Max 500 words

--

Section 10: Submission details

*This section **will not** be made public.*

22. Please insert below the name and title of the person submitting this application on behalf of your company (or, if you are submitting this application on your own behalf, your own details). By submitting this application,

you confirm that you have read and accept the Project Overview (available HERE), as well as the further conditions set out below. As a reminder, all submitted applications will be made public upon Stripe's announcement. *Once you've read and completed this section, submit your application by March 20th by clicking the blue "Share" button in the upper right, and share the document with* ***nets-review-2020@stripe.com****.*

Name of company or person submitting this application

[redacted]

Name and title of person submitting this application (may be same as above)

[redacted]

Date on which application is submitted

[redacted]

We intend to make the selection process as informal as possible. However, we do expect that (a) the content of your application is, to the best of your knowledge, complete and correct; (b) you do not include any content in your application that breaches any third party's rights, or discloses any third party's confidential information; (c) you understand that we will publicly publish your application, in full, at the conclusion of the selection process. You also understand that Stripe is not obliged to explain how it decided to fund the projects that are ultimately funded, and - although extremely unlikely - it is possible that Stripe may decide to not proceed, or only partially proceed, with the negative emissions purchase project. Finally, if you are selected as a recipient for funding, Stripe will not be under any obligation to provide you with funding until such time as you and Stripe sign a formal written agreement containing the funding commitment.