ISOMETRIC

Biochar Storage in the Built Environment 1.0.0 Module

Public Consultation Summary

Published on Aug 8th, 2025

Context

Isometric held a public consultation on its Biochar Storage in the Built Environment v1.0 Module to receive stakeholder input on this Module

The public consultation was announced on the 30th of June, 2025. The period of consultation lasted 30 days, with the final day as the 30th of July, 2025

After the initial public consultation, the feedback received was considered for incorporation into the Module. All stakeholders have received responses to the submitted feedback.

This document summarizes the feedback received during the public consultation and the revisions included as a result of the comments. Content in italics and brackets are excerpts from the public consultation version of the protocol to give the reader necessary context behind the comment.

We thank all participants for their time.

Summary of feedback received

Section	Comment	Resolution
Biochar Storage in the Built Environment v1.0		
3.2.3.1 Types of Built Assets and Associated Design Life	*[The design life of a built asset is the assumed period for which it can be used for its intended purpose. Examples of common asset types and design lives (as defined in EN 1990:2023 and CD 226) are summarized in Table 1.]* While the overall design life for asphalt pavement is typically 40 years, it's important to differentiate between layers. The surface and binder course layers are generally assumed to be recycled after 25 to 40 years. However, the sub-base/base layers, where biochar is more likely to be incorporated (e.g., in loose-bound systems or low-strength concrete), have a significantly longer lifespan, often exceeding 40 years and typically only replaced or repaired due to significant damage.	[No Change]: Thank you for your comment. To clarify, for the purposes of this Module, a 40-year design life was selected as a conservative and standardized assumption that reflects common replacement timelines across a range of built asset types. This approach helps ensure crediting is not overestimated and provides a consistent baseline across projects. Project Proponents with site-specific evidence demonstrating longer asset lifespans are welcome to submit this data for review under a project-specific scenario, pending validation.
3.2.3.2.2 Asphalt	[*In addition to recycling and landfilling of asphalt, it is important to note that some material is removed from road surfaces due to abrasion caused by friction between tire treads and the pavement, generating tire wear particles (TWP) and road pavement wear particles (RPWP).*] Asphalt wear primarily affects the surface layer. If biochar is exclusively used in the binder or sub-layers, then surface wear is	[Changed]: Thank you for your comment. We agree that if biochar is used exclusively in deeper layers—such as the binder course or base—it would be less susceptible to mechanical wear and loss through tire friction but could still be lost through abrasion. So it will be treated the same way as biochar used in concrete when assessing reversal risk. Following text are added:

	not a direct concern for biochar degradation. However, the methodology might still need to clarify how this distinction is handled.	If biochar is used exclusively in sub-surface layers (e.g., binder or base courses), it is generally not exposed to direct mechanical wear and thus less susceptible to particle loss through abrasion. Project Proponents are recommended to specify the location of biochar within the pavement structure. However, it should be noted that the approach for assessing reversal will still be consistent with the approach used for concrete applications (See Section 10.0).
4.0 Environmental and Social Safeguards	[*adapt to any changes in soil conditions due to the CDR project*] Is this referring to adverse soil conditions due to runoff from biochar-enhanced building materials?	[Changed]: Thank you for your comment. The reference to “adverse changes in soil conditions” is intended to broadly cover potential environmental impacts resulting from the use of biochar in built materials, including scenarios where leachate or runoff could influence surrounding soils. To clarify, some potential adverse soil changes associated with biochar use in CDR projects may include: soil pH increases, nutrient imbalances, heavy metal or contaminant accumulation, elevated soil salinity, changes in soil physical structure and shift in microbial community composition etc. Revised text: "The Project Proponent must provide technical support, training, and resources to help relevant stakeholders adapt to any adverse changes in soil conditions resulting from the CDR project, including scenarios such as runoff or leaching from biochar-enhanced materials. This support could include optimizing biochar properties to facilitate remediation and minimize environmental impacts."
6.0 Biochar Characterization	Requirements for physical characterization of biochar: calculation of Cbiochar	[Changed]: We are updating the measurements in the biochar characterization table in section 6. Clarifying that: Cbiochar = Corg = Total carbon content - inorganic carbon content So measurement of inorganic carbon is required to quantify this.
7.2 Quantification of CO2eRemoval	The term ""CO2e counterfactual"" in Equation 2 currently targets only the biomass aspect, not the broader construction emissions. When biochar	[No Change]: Thank you for your comment, We acknowledge the potential for biochar to displace construction materials with higher

	replaces aggregates like sand, gravel, or lightweight aggregates in asphalt or concrete, it leads to avoided emissions from the production of those replaced materials. This avoidance should be reflected as a negative value in the equation. Currently, this can lead to misleading results where CO2eRemoved>CO2eStored, overstating the removed totals. Instead of ""removal,"" a more accurate term for the overall carbon benefit, especially for replacement scenarios, might be ""overall carbon benefit"" or ""avoided emissions"" calculated separately from a counterfactual. While replacing sand and gravel offers relatively low avoidance, replacing lightweight aggregates (e.g., expanded clays, pumice, expanded glass) can lead to significantly higher avoided emissions.	embodied emissions, such as lightweight aggregates. However, consistent with Isometric's accounting principles, this module credits only net CO2 removal—defined as biogenic carbon physically removed from the atmosphere and stored stably in the built environment. As outlined in Section 7, Equation 2 calculates CO_2eStored based solely on the carbon removed via photosynthesis and retained in biochar, minus a counterfactual baseline representing emissions that would have occurred had the biomass followed an alternative fate (e.g., decomposition or combustion). The module does not account for avoided emissions from material substitution, and these are therefore excluded from crediting. While substitution of high-emission materials may offer additional environmental benefits, these fall outside the system boundary of this removal-focused methodology. Project Proponents are welcome to document such co-benefits qualitatively, but they do not affect credit issuance.
7.2.3 Calculation of CO2eEmissions,RP	A major benefit of using biochar in the built environment is its ability to reduce embodied emissions in construction, particularly when not sold as a separate Carbon Dioxide Removal (CDR) credit. Project developers would likely want to allocate some biochar to the built environment while selling the majority as a credit. This dual approach incentivizes concrete/asphalt producers to adopt innovative materials, even if they don't directly receive the carbon benefits. This necessitates increased tracking to differentiate between biochar sold for CDR credits and biochar used within the concrete/asphalt system boundary without a CDR claim. Additionally, it's crucial to address the potential impact of biochar on material properties. If biochar weakens concrete, a mix design might require more cement to compensate. Similarly, in asphalt, it might necessitate more bitumen or admixtures to maintain stiffness. The increased emissions from these compensatory measures are	[No Change]: Thank you for your comment. While we recognize the climate impact of switching to construction materials with lower embodied emissions, Isometric does not credit avoided emissions at this time. We agree that ensuring the structural integrity of built materials produced with biochar is essential. This is currently addressed in the applicability requirements (Section 2.0): "Projects seeking Credits under this Module must meet the following criteria: -Construction materials produced with incorporated biochar must meet the same performance requirements of a conventional product for the intended use case. Any required admixtures or processing steps should be standard industry practice and not result in disproportionately greater resource use or emissions compared to conventional materials. -Construction materials produced with incorporated biochar do not require

	not always clearly outlined and need to be accounted for in the overall assessment.	additional products or activities related to installation and maintenance as compared to conventional products." Specific requirements on demonstrating this are given in Section 9.0 (Compliance with product standards).
7.2.1.3.1 Calculation of FInertinite Using Random Reflectance	If this equation is related to number of point measurements (500 points) of random reflectance, then it is not correct. If it is related to N sampling frequency, then very large percentage will be deducted.	[Changed]: Thank you for your comment, we have incorporated changes to this effect in the module. We have updated the calculation of Fdurable using random reflectance, discounting the reactive fraction. To ensure a conservative approach when crediting biochar durability, we account for uncertainty in both R_0 measurement, and the proportion of carbon that is non-reactive.Specifically, the credited durable fraction (Fdurable) is calculated using the mean values for each parameter reduced by one standard deviation. This method ensures that the durability estimate reflects a lower-bound confidence level, mitigating the risk of overestimating long-term carbon storage. Refer to equation 6 for changes
9.0 Compliance with product standards	Current asphalt and concrete standards (e.g., BS/EN) generally do not explicitly permit biochar use. However, it's often possible to proceed with a ""departure from standard,"" which requires acceptance from producers and clients. Biochar will almost certainly alter the fire performance of concrete in specific applications. For example, a concrete block typically rated A1 for fire performance might become A2 with biochar inclusion. The methodology needs to clarify whether such changes in fire rating are acceptable within its framework.	[Changed]: Thank you for your comment and for raising this important topic. We have added the following text: "Departures from standard may be permissible on a case-by-case basis. Project Proponents seeking a departure from standard must submit documentation on the requested departure and proof of approval by the relevant regulatory body to Isometric and the VVB." Note that several recent studies have found that biochar addition has neutral to positive impacts on the fire performance of concrete at modest amendment rates.
9.0 Compliance with product standards	ISO EN 15804: The standard cited is likely EN 15804, not ISO EN 15804.	[Changed]: Thank you for your comment, this has been revised in the Module accordingly
10.2.2 Asphalt	It's unclear whether biochar impacts the labile fraction of asphalt. Furthermore, there's no assumption about the amount	[No Change]: Thank you for your comment. To clarify, the “labile fraction” referenced here pertains to

	of recycled asphalt containing biochar. With recycled asphalt typically used at a rate of approximately 15%, the concentration of biochar in the surface level would significantly decrease over a long period (e.g., 1000 years), suggesting more biochar would be stored in lower layers. Further calculations are needed to determine the impact of this long-term concentration change.	the degradable portion of the biochar, not the asphalt itself. Regarding the recycling assumption, we acknowledge the complexity introduced by recycling rates and the redistribution of materials in asphalt pavements. The current methodology applies a simplified and intentionally conservative scenario in which biochar is assumed to be evenly distributed throughout all pavement layers and lifecycles, and subject to full abrasion over time. This approach ensures that potential uncertainties—such as the dilution of biochar in recycled mixes or its redistribution to sub-layers—do not result in an overestimation of credited carbon storage. While more detailed modeling may indeed show lower exposure and slower degradation of biochar in practice, the methodology errs on the side of caution by applying a full deduction of the labile fraction within 100 years. Project-specific modeling that incorporates more granular data on material layering and recycling outcomes is encouraged where available.
Other comments	Thermal Performance: Biochar in concrete masonry could improve thermal performance, leading to greater carbon savings from reduced energy consumption. The methodology should account for this benefit.	[No Change]: Thank you for your comment. Biochar in masonry may indeed improve thermal performance of the concrete itself, however this is viewed as a co-benefit and not within the scope of this module, which focuses on the removal of carbon rather than the avoidance (caused by increased thermal performance).
Other comments	Urban Heat Island Effect: Biochar's darkening effect on concrete in urban environments can reduce albedo, contributing to the urban heat island effect. This has multiple implications, including increased energy and water consumption for cooling, which are directly related to carbon emissions. These effects need to be considered.	Thank you for your comment, there is research to suggest that biochar incorporated into concrete may decrease the albedo: [1] Mensah, R. A., Wang, D., Shanmugam, V., Sas, G., Försth, M., & Das, O. (2024). *Fire behaviour of biochar-based cementitious composites*. *Composites Part C: Open Access, 14*, 100471. https://doi.org/10.1016/j.jcomc.2024.100471 [2]:Pang, X., Qin, Y., Wei, P., & Huang, C. (2024). *Enhancing fire resistance: Investigating mechanical properties of biochar-infused concrete under elevated temperatures*. *Construction and Building Materials, 435*, Article 136813.

		https://doi.org/10.1016/j.conbuildmat.2024.136813 That being said, the rates of change are minimal at realistic dosing rates, other factors such as vegetation cover, building density and pavement coverage and material (i.e., replacing concrete with asphalt) are likely to have a more significant effect. Therefore we do not think we need to consider this at this time, however, if the scientific consensus on this changes then we will update the module accordingly.
Other comments	End-of-Life Scenarios (EN 15804): EN 15804 requires end-of-life scenarios (Module C) for products containing biogenic carbon. If carbon removals are not accounted for in Module A, emissions from end-of-life will still appear in Module C of Environmental Product Declarations (EPDs). If a whole-life carbon assessment of a building with biochar concrete does not utilize Module A for removals, the calculated building emissions will appear higher due to the standard's stipulation that biogenic emissions are released in Module C. Clarification is needed on what project developers must do in their EPDs to avoid this.	[No Change]: Thank you for your comment: 1. Removals should not be double counted and where possible biochar attributes should be excluded from the EPD to ensure this is the case. 2. If this is not possible, the crediting claim must be clearly reported in the EPD to ensure that the removals (under module A) and emissions (under module C) are excluded from any form of carbon accounting that relies on the EPD for information. 3. Following production of the EPD, the Project Proponent has less control over how the information within the EPD is actually used in carbon accounting, but the transparent reporting of the crediting claim within the EDP should serve to ensure double counting does not take place. An example of good practice may be: - In corporate accounting organizations must exclude removals when reporting the upfront embodied carbon of purchased buildings - For end-of-life scenario requirements in building LCAs, the clause in the EPD could justify exclusion of module C emissions associated with the product.
Other comment	Addressing Accounting Complexities - Our approach utilizes virtual emissions based on IPCC 6 guidance. This accounting issue is highly complex and requires careful consideration to ensure that the net total removed from the atmosphere is not misrepresented as 0 kg CO2.	[No Change]: Thank you for your comment and for highlighting the complexity of this accounting issue. We agree that accurately reflecting net atmospheric removals is critical. We believe our current treatment appropriately reflects the scientific context

		and consensus. We appreciate your engagement on this important topic