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Item	Description	Responsible
Name of the data / code	Dummy data sets for calculating carbon content of timber and emissions in timber supply (harvester/forwarder/truck)	Author
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Owner of the material	Kaulen, Alexander https://orcid.org/0009-0006-2633-8132	Author
Publisher	Kaulen, Alexander Kuratorium für Waldarbeit und Forsttechnik e.V. Center of Competency for forest work and forest technology Spremberger Straße 1 64823 Groß-Umstadt, Germany	Author
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Description	1 Dummy data set for calculating carbon content of timber: The wood density of the timber is required to calculate the species-specific carbon content. This indicates how much kiln-dried timber is contained in 1 m^3 of freshly cut timber. The timber properties of the tree species provided by Wagenführ and Wagenführ (2003) and Lohmann and Blosen (2021) are kiln density (d0) and total shrinkage of the volume (sV), which result in the species-specific wood density of fiber-saturated timber (dfs), as shown in Eq. 1 (Lohmann and Blosen 2003; Wagenführ and Wagenführ 2021). Since it was not possible to monitor the moisture content of the wood during the study, we assumed that the timber was fiber-saturated. The amount of CO^2 accumulated in the supplied timber was calculated by multiplying the tree species-specific wood density by the carbon content of timber at 51.9%, and the factor for converting carbon(C) to CO^2 (3.67 or 44/2, which corresponds to the molar mass of CO^2 vis-a-vis carbon) (see Eq. 2 and Eq. 3) (Lohmann and Blosen 2003; Scholz et al. 2018; Kollmann 2013; Bloche-Daub et al. 2016). Setting the carbon content of timber at 51.9% was as per Diestel and Weimar (2014), who suggested that the percentage is more precise. The carbon content is usually set around 50%. The possible variations depending on tree species and provenance are addressed in the discussion. We use the term carbon content to indicate the content of biogenic carbon in wood, following Lamlom and Savadige (2003). For the calculation of the carbon content of the bark, the raw density of the respective timber was used for simplification purposes and the same carbon content of the specific species (see Table 2) was assumed for the following calculations (Werner 2017; Hagauer et al. 2009). 2 Dummy data set emissions in timber supply (harvester/forwarder/truck) :	Author

	The CO^2 emissions from timber harvesting result from the combination of real variable data from forestry machines (.hpr and .mom of the harvester and .mom of the forwarder) and constant parameters (constants) from averaged values that are difficult to determine from real data, as displayed in Table 3. As can be seen from equation 4, the diesel consumption of the harvester and forwarder (from .mom, in l) is first added, divided by the amount of wood (from .hpr, in m^3), and multiplied by the conversion factor (diesel to CO^2, 3.28 kg CO^2/l) to calculate the emissions by fuel combustion (Handler et al. 2014). The constants for fabrication, supply, and maintenance (0.538 kg CO^2/m^3) (Handler et al. 2014), for lubricants (0.118 kg CO^2/m^3), transport of the machine to stand (0.013 kg CO_2/m^3), and transport of the operator to the operation (0.079 kg CO^2/m^3) (Kühmaier et al. 2022) are added to this to calculate the grey emissions. Generally, grey emissions are defined as the form of emissions required for the production and provision of goods or services (Paschotta 2023). Here, in particular, we refer to emissions not directly measurable in the form of diesel consumption as grey emissions. The values are included twice in the equation as they are used for forwarders and harvesters. The emissions of fuel combustion and grey emissions from timber logistics are added to this. These result from the distance traveled (km) multiplied by the constant for emissions from diesel consumption (0.16 per km and m^3) (Klvac et al. 2013) and the amount of wood transported, added to the product of the quantum of wood transported and the constants for loading (0.963 kg CO^2/m^3) and fabrication, supply and maintenance of the machine (0.538 kg CO^2/m^3), again, added to the product of the distance traveled and the constant for lubricants (0.00422 kg CO^2/m^3) (Handler et al. 2014).	
Methods	Highly mechanized timber harvesting and timber logistics emit CO^2. In turn, the provided timber stores CO^2 from the atmosphere as biogenic carbon. This basic assumption resulted in the calculation of net carbon storage of supplied timber. For this, we first developed a formula that represents the carbon content of freshly harvested timber. Coniferous wood contains about 734 kg CO^2/m^3 and deciduous wood about 1000 kg CO^2/m^3. Contrary to this, CO^2 emissions from trucks, harvesters, and forwarders were calculated using the variable parameters for actual diesel consumption and the distance to the sawmill and constant parameters for the transport of the machine to the stand, lubricants, transport of operators, loading, and fabrication, supply, and maintenance. The combination of variable parameters and constant parameters is because some data are easy to determine while others are not. The data that are easy to determine are managed as variables. The data that are difficult or impossible to determine are managed as constants. By combining them, the calculated value of CO^2 emissions comes very close to reality. The constants were selected from a comprehensive literature review of common methods for determining CO^2 emissions in timber harvesting. The input values listed in Table 3 include variables that come directly from the forest machines OBC in the form of StanForD files and constants that are in turn derived from the literature analysis in Chapter 2.4. In case of doubt, the parameters that are geographically and procedurally closer to the German forestry are selected, if more than one would have been suitable. Moreover, in case of doubt, the more conservative parameter is selected. One reason for the choice of these parameters is that they contain CO^2 and roughly the same CO^2-equivalent GHGs. The specific conversion factor for CO^2 emissions from diesel combustion was set at 3.28 kg/l and the corresponding value for lubricant combustion at 4.22 kg/l (Handler et al. 2014), which also included the	Author

	CO^2-equivalent GHGs. The other GHGs cover methane, nitrous oxide, carbon monoxide, nitrogen oxide, and volatile non-methane carbon compounds. Combining CO^2 and other GHGs as CO^2-equivalents follows the Intergovernmental Panel on Climate Change (IPCC) guidelines (Solomon et al. 2008). The calculation of CO^2 equivalents instead of just CO^2 increases the output value marginally. We have not differentiated between the individual GHGs in the presentation of results. The method and the equation was tested with a real cut. The method is described in and is related to: Kaulen et. al.: Net carbon storage of supplied timber in highly mechanized timber harvest. Silva Fennica 2024, in press.	
Variables	kiln density (d0) species-specific wood density of fiber-saturated timber (dfs), carbon content of timber at 51.9% the factor for converting carbon(C) to CO^2 (3.67 or 44/2) diesel consumption of the harvester and forwarder (from .mom, in l) conversion factor (diesel to CO^2, 3.28 kg CO^2/l) constants for fabrication, supply, and maintenance (0.538 kg CO^2/m^3), lubricants (0.118 kg CO^2/m^3), transport of the machine to stand (0.013 kg CO_2/m^3), transport of the operator to the operation (0.079 kg CO^2/m^3), emissions from diesel consumption for truck (0.16 per km and m^3), amount of wood transported, constants for loading (0.963 kg CO^2/m^3), fabrication, supply and maintenance of the machine (0.538 kg CO^2/m^3), distance traveled and the constant for lubricants (0.00422 kg CO^2/m^3).	Author
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Vocabulary keywords (community standard)	.	Author
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Justification for access restrictions		Author
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Connections with other research materials	2) The material is a part of another material (IsPartOf): Kaulen, A.; Mayer, D.; Franz M.; Purfürst, T.: Application of CO2-Balances of the Timber Supply Chain using Forest Machine Data. Croation Journal of Forest Engineering 2025, in review. And the harvest CO2-WebApp	Author

	https://kwf2020.kwf-online.de/harvestco2/	
Access to the connected research materials	Kuratorium für Waldarbeit und Forsttechnik e.V. Center of Competency for forest work and forest technology Spremberger Straße 1 64823 Groß-Umstadt, Germany Department od Timber Supply and Data Handling https://kwf2020.kwf-online.de/harvestco2/ The related article is under review	Author
Codes only: hardware/software requirements for running the code	No requirements.	Author
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Confidential or secret data	onfidential or secret information	Author
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Preservation policy	The preserving of the material is permanently guaranteed until 2030.	Author
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