Automation of the carbon footprint of construction project materials

Summary of the pilot report 1/2023, the CO2 DataHub project

Name of the pilot	Automation of the carbon footprint of construction project materials
Project team	Vastuu Group Oy and VTT Technical Research Centre of Finland
Participants	HUS Kiinteistöt Oy, YIT Corporation, Saint-Gobain Finland Oy, Granlund Oy, Finnish Electrotechnical Trade Association (STK), CarinaFour and Aalto University

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Finland aims for carbon neutrality by 2035.

The CO 2 DataHub research and development project supports this goal by developing methods for the gathering, evaluation and data-based management of carbon dioxide emissions in the supply chains of companies and cities.

The pilot focused on identifying how the emission data for construction site materials are currently managed and how they should be managed in the future. The interior materials of the Tammisairaala hospital (a future eye hospital) of HUS kiinteistöt were chosen as the target. The research was carried out as a case study, utilising information generated through expert workshops and interviews. In addition, the results of group work from the ESG ecosystem were used in the research study.

The study focused on determining both direct and indirect emissions by using reliable data. Today, larger companies already have to report their environmental impacts. National and international emission reduction goals will probably become more detailed in the near future with respect to calculations and reporting, and emission regulation will become stricter. In addition to complying with rules and regulations, companies want to monitor their emissions to generate information for their customers and also to be able to manage their environmental measures as efficiently as possible on the basis of calculated data.

HUS has specified energy efficient buildings as one of the goals of its climate roadmap. In addition, HUS aims to reduce the carbon footprint of construction work by choosing low-

carbon design solutions, materials and construction site procedures. This means, for instance, aiming to choose low-carbon

concrete products and castable concrete structures in the future. The goal is to follow the principles of circular economy whenever possible.

On the basis of the experiences from the workshops arranged, it can be said that managing the carbon footprint of materials in construction projects is still something new and needs development in many respects. The carbon footprint information of materials and products should be transferred with other product information from the product manufacturer all the way to the owner and/or user of the building. The information should be transferred in a structured format, so that the necessary analyses could be performed on the data mass to support low-carbon construction and produce low-carbon buildings. A major challenge at the moment is that carbon footprint information is not yet available for all products.

What is currently important for HUS Kiinteistöt as a developer is that the designers used by the organisation can compare products at the designing stage to be able to choose low-carbon structure solutions and materials. It must be possible to compare different product characteristics, and the carbon footprint is one of them. Products also have other characteristics, such as technical and functional properties. If it were possible to easily compare products on the basis of their different features, it would be easier, for instance, to set carbon footprint goals for products. Today, however, it is difficult to define emission limit values for products since carbon emissions cannot be easily seen for all products. It is important for HUS Kiinteistöt to be able to perform comparisons that are based on reliable data.

The workshops developed ideas for combining the information of products purchased by contractors with the EPD data of these products. It was found challenging that the same EPD may cover a number of the manufacturer’s products that have different dimensions or package sizes and are sold with individual GTIN identifiers, but the link between the EPD and the GTIN identifiers is not available in a machine-readable format. Manufacturers should provide this information and publish it, at least, on national product information services. The national product information standard of these services can be changed more easily than the EPD services, which are based on international standards. The standardised EPD data are shown in a structured format, and it is not currently possible to itemise all the GTIN identifiers that the EPD concerns. This can be done only as text, which is not a structured data type.

One suggested development was that, where possible, product manufactures would provide carbon footprint information for different product entities, such as structure types or building

services systems. This would make it easier to perform carbon footprint analyses and comparisons during the design stage of a building, particularly if these types could be used directly as structures or objects in data modelling. It may sometimes be a good idea to focus the carbon footprint analysis on larger entities, instead of analysing the carbon footprints of individual products. Saint-Gobain already has carbon footprint calculations for some structures and

their structure types[1]. Data models could be used more efficiently for carbon footprint comparisons of systems if standardised facility type names could be used in the modelling, such as a double occupancy patient room. This would make it easier to compare different patient room solutions.

During the pilot, Vastuu Group developed a technical solution proposal for transmitting the carbon footprint data of the interior phase of the Tammisairaala hospital project into the system designated by HUS Kiinteistöt. In the proposed solution, product information is delivered from Carina Four's CALS system to Platform of Trust. After this, Platform of Trust retrieves the emission data of the products from EPD databases and performs the required unit conversion on the emission data. Finally, the emission data are delivered to CALS to be linked to the products, and the emissions calculation is performed.

The pilot case report was prepared in co-operation by VTT Technical Research Centre of Finland and Vastuu Group Oy. In accordance with the principles specified by the project steering group, the full report is only available to the organisations that participated in the research and development project.

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1 The Saint-Gobain structure selector, available at https://www.rakennekirjasto.fi/, referred on 15 December 2022.