

The carbon footprint of energy consumption in buildings

Summary of the pilot report 2/2023, the CO2 DataHub project

Name of the pilot	The carbon footprint of energy consumption in buildings
Project team	Vastuu Group Oy and VTT Technical Research Centre of Finland
Participants	Senate Properties, Helen Oy, Oulun Energia Sähköverkko Oy, Ilmarinen Mutual Pension Insurance Company, Varma Mutual Pension Insurance Company, Antilooppi Ky, Newsec, Granlund Oy, Local Power Association and Sitowise Group Oy

Finland aims for carbon neutrality by 2035.

The CO2 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 ways for automating the calculation and reporting of the carbon footprint of energy consumption in buildings. The research was carried out as a case study, utilising information generated through expert workshops and interviews. In addition, the results of group work in the ESG ecosystem were used in the research study.

The pilot studied how the property owners participating in the pilot are now managing the energy consumption data of their buildings and reviewed the types and formats of the currently available energy consumption emission data. Furthermore, the pilot studied the preparedness of the energy companies participating in the pilot to produce electricity and district heating emission coefficients at the monthly level.

The study focused on determining both direct and indirect emissions by using reliable data. 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.

Senate Properties has a large property stock of approximately 8,900 buildings. It has approximately 100,000 customers – government offices and institutions, ministries, prisons, research institutes and cultural institutes. Senate Properties also leases premises from the market and subleases them to its customers. According to Senate Properties' corporate social responsibility report of 2021, the work to reduce emissions in state properties has been systematic. For instance, direct emissions and emissions from purchased energy have been reduced even to one tenth from the level of 2012. The largest reduction in emissions was achieved by increasing the proportion of renewable energy in energy purchasing. This has led to a situation in which 82% of the total emissions are attributable to indirect emissions in the value chain.

Currently, electricity consumption data can be obtained at an hourly level for each address from Fingrid's Datahub via the data transfer interface. Senate Properties has an integration into Datahub, from where the energy consumption data of properties are transferred address-specifically into the property management system used by Senate Properties (Granlund Manager). If electricity consumption must be determined specifically for each premises, the data must be separately gathered from the sub-metering points.

The availability of district heat consumption data varies depending on the district heat company. Helen sends address-specific district heat consumption data to Granlund Manager every day. Helen has the Company Helen service, which provides customers with monthly address-specific district heat consumption data. Oulu Energy has a similar service, Energiatili ('Energy account'). With respect to other energy sources – oil, wood briquettes, solar panels, geothermal heat and heat pumps – consumption data are largely available only manually. For instance, if a property uses solar power generated by the property, the property caretaker reads the data from the consumption data panel. A cloud service for obtaining data is already available for some systems. As Senate Properties has many buildings and the availability of energy consumption data varies, the management of energy consumption data has largely been outsourced to consultants.

Real-time information about direct emissions caused by electricity production in Finland is available via Fingrid's emission data website. Annual data of direct emissions from district

heat can be obtained manually from the website of each district heat supplier. In addition, the emissions calculator on the Local Power website provides district heat emission data and coefficients centrally for the previous year. District heat suppliers enter the data in the emissions calculator themselves. It is hoped that the Local Power emissions calculator will be developed so that, in the future, it would be possible to obtain via an interface district heat company-specific monthly emission data presented in carbon dioxide equivalents.

On the basis of the pilot, it is evident that, in the future, property owners would also like to receive information on the indirect emissions of electricity and district heat, such as the construction of a solar power plant or emissions from maintenance. Emissions should be reported monthly or quarterly, instead of the current annual reporting, and emissions reporting could constitute part of the monthly energy consumption reporting. Today, laws and regulations do not require so frequent emissions reporting; the need has arisen among property owners who are pioneers of environmental sustainability.

Monthly emissions reporting could help to find out what energy consumption-related measures could be taken in buildings during the months in which emissions are particularly high. Emissions data should be available in carbon dioxide equivalents (CO₂ekv). Property owners would like to receive emissions data automatically via a data transfer interface, similar to Fingrid's emissions data website that provides total emissions data of electricity consumption in Finland (updated every three minutes). However, this website does not yet provide the monthly emissions data of different power companies.

In addition, there are company tenants who would need more information about the emissions of their premises. If the electricity contract is in the lessor's name, the tenant should provide electricity consumption information at an adequately detailed level as well as monthly emissions information for carbon footprint calculation. If the electricity contract is in the tenant's name, the lessor needs to know, for the emissions calculation, how much the tenant has used electricity.

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.

Further information:

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