Sara Culture Centre

Carbon budget

white

Summary

Total emissions

5631
ton CO_2-e

Total balancing

-10190
ton CO_2-e

Carbon budget for Sara Cultural Centre has been carried out with funds from White Research Lab (WRL) by White arkitekter AB. WRL is White's research and development organization and aims to support knowledge development.

We would like to thank you HENT Sverige AB for providing LCA-data included in the carbon budget, as well as Incoord and Skellefteå kraft for providing operational energy data.

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Contact, carbon budget: Tania Sande Beiro

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GENERAL INFORMATION

Projekt	Sara Culture Centre
Client	Skellefteå Kommun
Property owner	Samhällsbyggnadsbolaget (SBB)
Place	Skellefteå, Sweden
Completion	2021
Area (temp)	27867 m^2
Floors	20
PV	374 modules (PV installed in the building, but the system is owned by Skellefteå Kraft)
About	Housing venues for arts, performance and literature as well as a hotel, the cultural centre is one of the world's tallest timber buildings to date.

METHODOLOGY

Carbon budget for Sara Culture Centre is based on White arkitekter´s definition of carbon neutrality. Carbon emissions data was provided by HENT Sverige AB, excluding PV´s data and updated operational energy data.

Materials (A1-A3)
Greenhouse gas emissions from the manufacture of the materials and products necessary for the construction and maintenance of all heated floor space and the plant rooms that serve the building with heat, cooling and/or electricity. Building components covered are as follows: building envelope, loadbearing structural components and non-loadbearing interior walls. Life-cycle data from materials, products and building components are retrieved from open access databases with generic data, or from product-specific Environmental Product Declarations (EPD's).

Transportation (A4)
Greenhouse gas emissions linked transportation of products and materials to the building site. Generic data is used, unless for transportation of wood and concrete that is calculated with project-specific data.

Building process (A5)
Greenhouse gas emissions linked to energy use on the construction site. Emissions are calculated with generic data.

Operational energy (B6)
Greenhouse gas emissions that are linked to the building's operational energy demand. The calculations are based on input from the energy simulations in "*Rapport preliminär energiberäkning bygghandling, rev 20200612*". However, the energy simulation does not include a heat pump installed in the building which reduces the heating demand. The heat pump is owned by Skellefteå kraft but is installed with an EPC type concept (with the ownership of the heat pump changing over time). Based on information from Skellefteå kraft the heat pump is designed to cover approximately 90% of the heating demand with an average COP of approximately 3,5. This results in a decreased district heating demand of 1623 MWh/år and an increased electricity demand of 464 MWh/år (compared to the demand in the energy simulation).

Balancing measures
The calculated climate impact from materials, construction and operation is balanced by renewable energy production and carbon sequestration.

The electricity from PVs is assumed to replace electricity in the residual mix, which electricity that has a high climate impact per kWh. The displacement effect used here is -410 g CO2e / kWh, and is taken from the methodology in the swedish NollCO2 certification system. This certification system uses a factor for displaced electricity which is 820 g CO2 / kWh and follows a scenario of a future fossil-free electricity system by 2045, which with straight phasing gives an average of -410 g CO2 / kWh.

RESULTS

Total emissions, 50 years

5631 ton CO_2-e

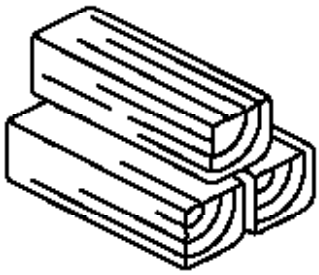
202 kg CO_2-e/ m^2

Total balancing, 50 years

10190 ton CO_2-e

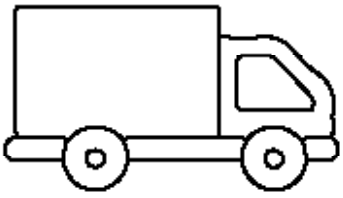
366 kg CO_2-e/ m^2

Materials (A1-A3)



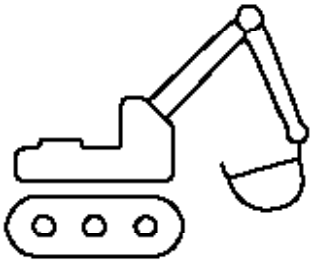
3550 ton CO_2e

Transportation (A4)



25 ton CO_2e

Construction process (A5)

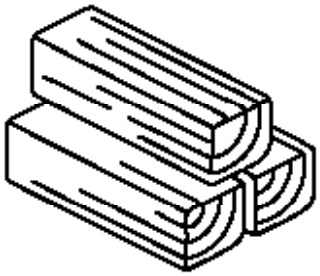


520 ton CO_2e

Operational energy (B6)

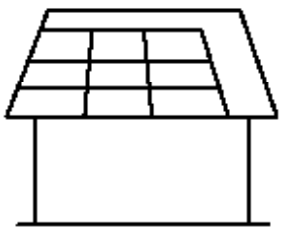
1540 ton CO_2e

Carbon sequestration



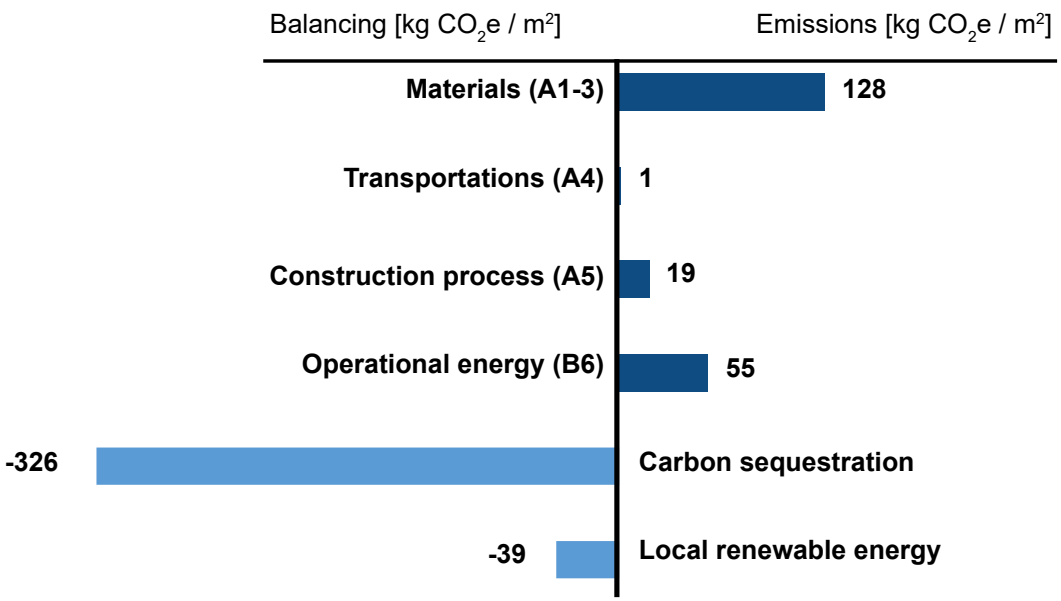
-9095 ton CO_2e

PV

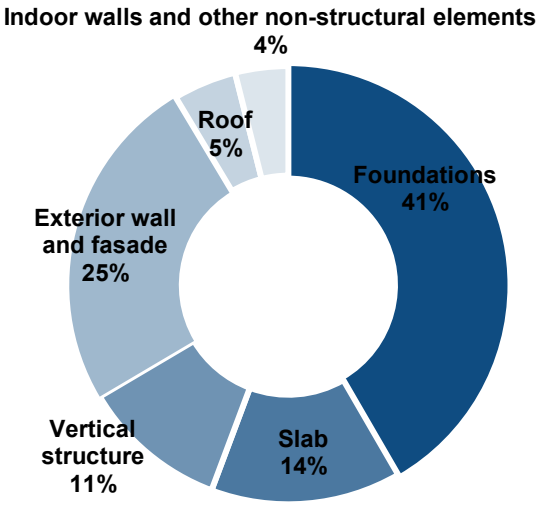


-1095 ton CO_2e

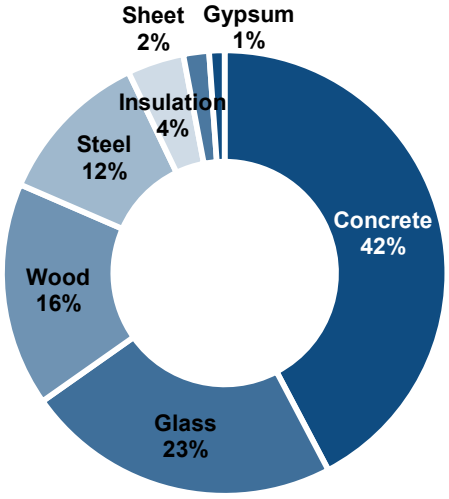
CARBON EMISSIONS PER LIFE CYCLE STAGES

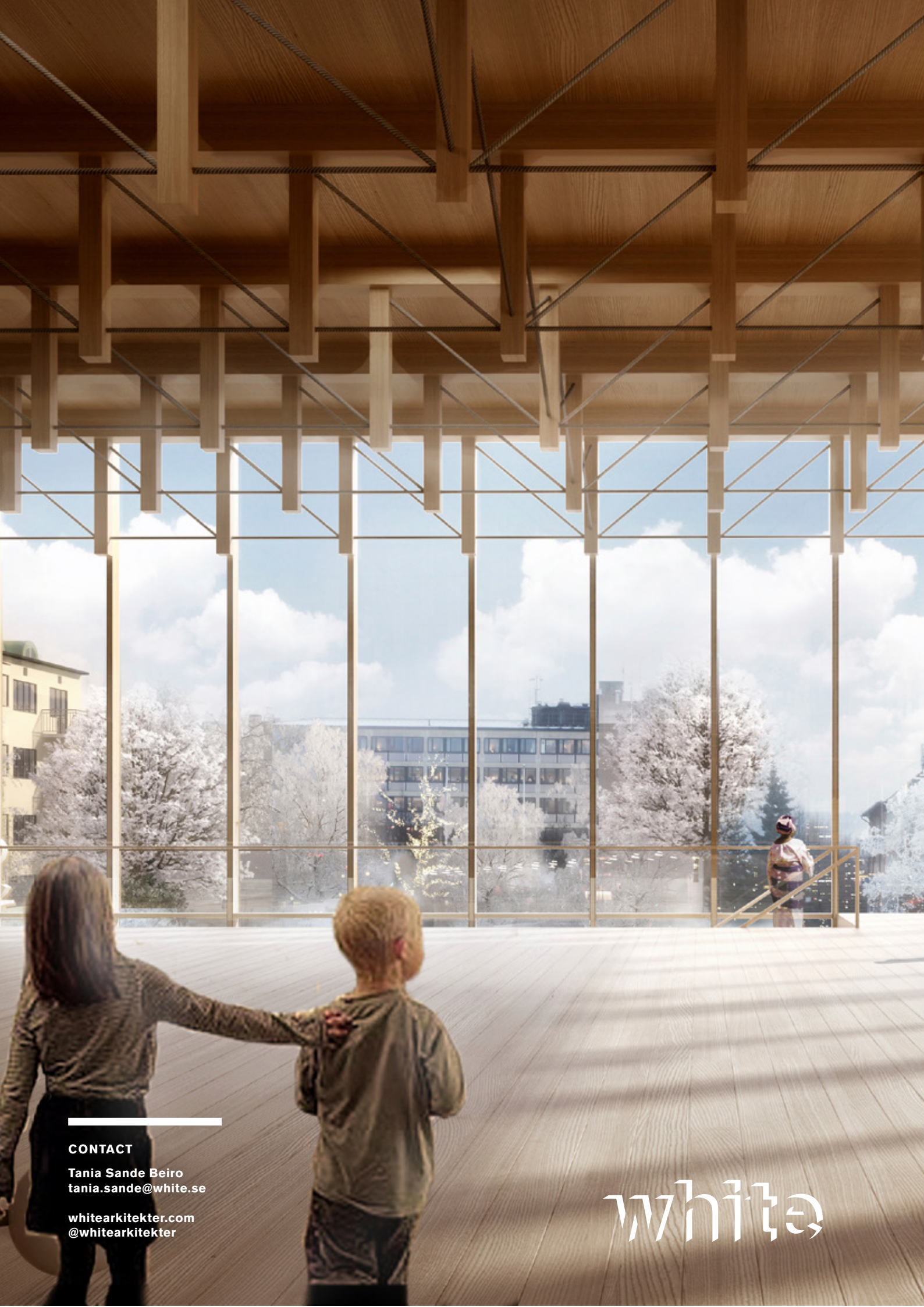


CARBON EMISSIONS PER BUILDING PART



CARBON EMISSIONS PER MATERIAL





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