Life cycle study of an office building with site specific data

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Acknowledgement

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Project partners

Vasakronan

Peab



Implementation



Developed a template and work process in order to **collect data** from the **contractors** in an efficient way.

Collected data and configured a **calculation structure** based on the obtained data.

Supplemented missing data.

Conducted LCA for the **whole building** considering **five** environmental midpoint impact categories: GWP, AP, EP, POCP, ODP.



The building



Office

- 7 floors prefabricated concrete
- 2 smaller floors in wood, partly prefabricated
- ~16 000 m² gross area
- ~12 000 m² A_{temp}



Considered life cycle phases

Life cycle phase	Module	Part of study
Product stage	A1 Raw material supply	Х
	A2 Transport	Х
	A3 Manufacturing	Х
Construction process stage	A4 Transport	Х
	A5 Construction installation process	Х
Use stage	B1 Use	
	B2 Maintenance	
	B3 Repair	
	B4 Replacement	Х
	B5 Refurbishment	
	B6 Operational energy use	Х
	B7 Operational water use	
End of life stage	C1 Demolition	Х
	C2 Transport	Х
	C3 Waste processing	Х
	C4 Disposal	Х



Data gathering template

What

Who

Name/id

Manufacturer

Material type

Material, delivered amount Material, spillage Placement in building Maintenance instructions

Technical life span

Density Heat conductivity Fire classification Moisture resistance Other

> Mode of transportation Number of transports Fuel consumption (amount and type) Transport distance Manhours for installation process Consumable materiel Energy site establishment Material cost Work cost



Example data gathering

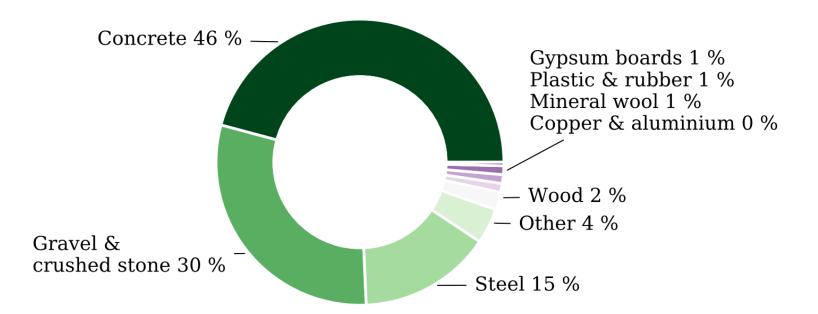
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Results

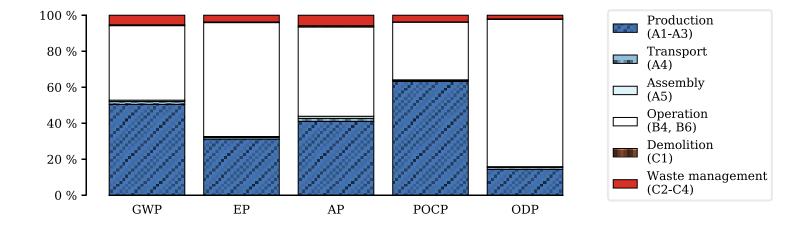


Material mass composition in building



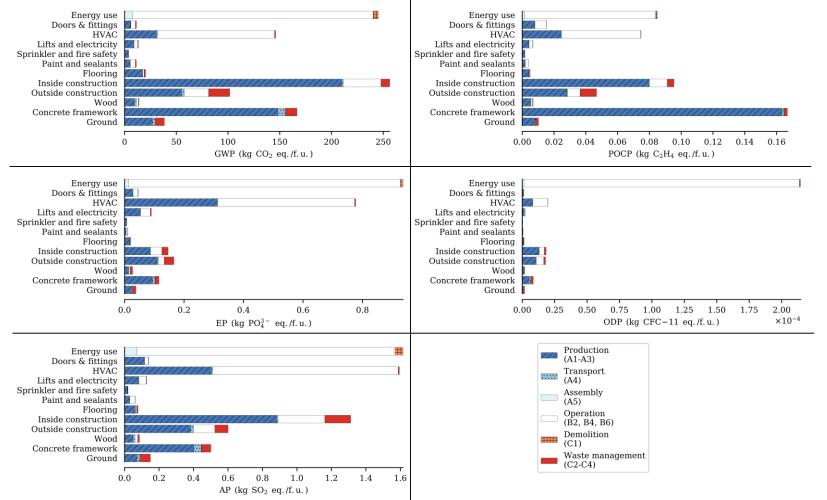


Normalised results for different life cycle phases





Detailed results



Conclusions



Conclusions

Production has large environmental impact in most of the investigated impacts.

Production and replacement of **technical installations** have **large impact** in most of the investigated environmental impacts.

Energy consumption has large impact in all the investigated impact categories.

Metals and insulation materials have large impact in several impact categories.

To fully **monitor all transport** to the building site **isn't practically feasible**. However, transports have relatively **low environmental impact**.

It worked well to let the contractors fill in the product data.

To fill in the **data** in the **right format** (units, atomic values) would have made the LCA **easier**, but **increased** the **burden** for the **contractors**.

The **main part of the work** was to **transform the collected data** to the correct unit (often mass) and **connect** these to the **correct environmental data**.



Article: Life Cycle Assessment of an Office Building Based on Site-Specific Data Energies 2019, 12(13), 2588; <u>https://doi.org/10.3390/en12132588</u>

Report: Livscykelstudie av kontor med kombinerad betong- och träkonstruktion

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