

# 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

# Implementation overview

**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 m<sup>2</sup> gross area

~12 000 m<sup>2</sup> A<sub>temp</sub>

# Considered life cycle phases

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

# 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

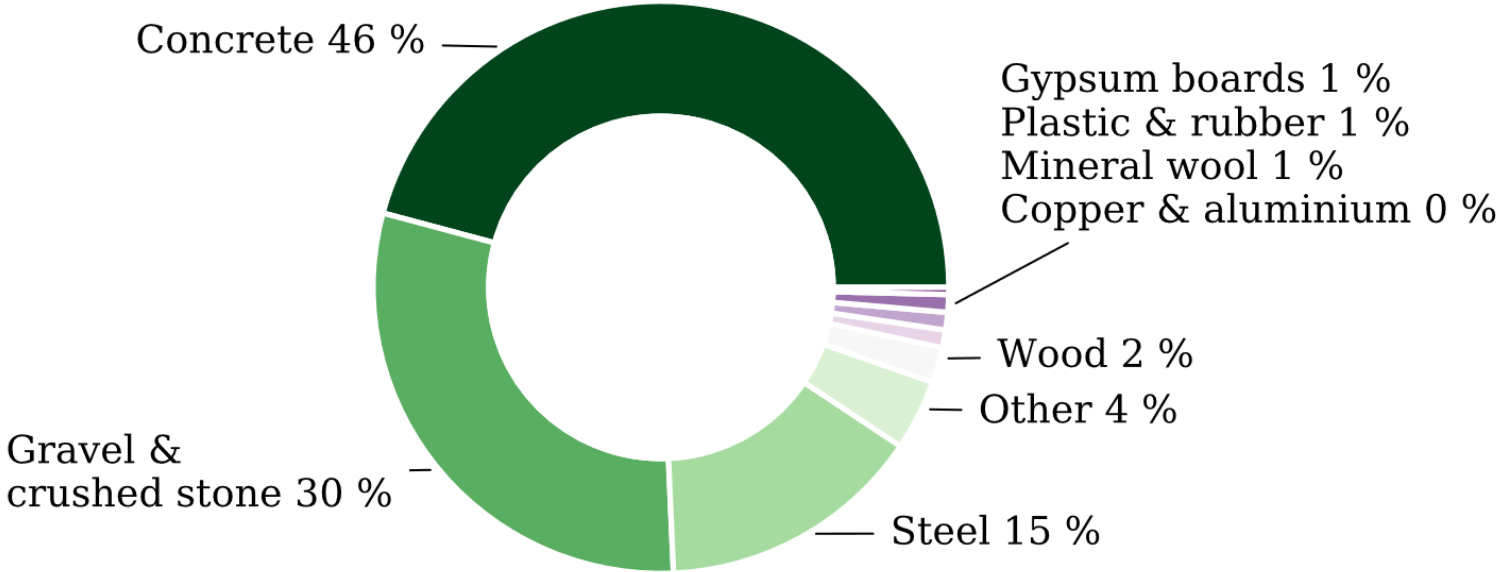
Vard	Material														Transport				Arbetsmaterial		Arbetskraft				
	Namn/beskrivning	Byggnadsbörning (BVB)	ID-nummer BVB	Ingående material	Ingående material, levererad mängd	Ingående material, uppl	Placering i byggnad	Underhållsinstruktioner	Teknisk tvärsnitt	Densitet	Värmelåslöshet	Brandklass	Fuktvidstånd	Övrigt	Transporttill	Antal transporter	Förbrukning	Transportvärd	Arbetsid monter	Förbrukningsmaterial	Anläggningsenergi	Materialkostnad	Arbetskraft		
	(t.ex. "OSBEC 68Räpplatta P 30" vite "Solering")		ID-nummer (från Byggnadsbörning)	(typ av material)	(mängd i kg/ton/etc)				(kg/m³)	(W/m²K)				(ange vad och varför)	Typ av fordon (bil, lastbil etc)		Antal (typ/rim) samt typ av bränsle	strömvärde anges i kWh	Arbets timmar	Utvald och hur mycket	Bränsle, arbetskraft etc.	Kostnad anges i kr	Kraftkostn. anges i kr		
Skivskivor med 100 mm tjocklek	100x100x100 mm	Skivskivor	4000	Skivskivor	1000 kg				1000																
	100x100x100 mm	Skivskivor	4000	Skivskivor	1000 kg				1000																
	100x100x100 mm	Skivskivor	4000	Skivskivor	1000 kg				1000																
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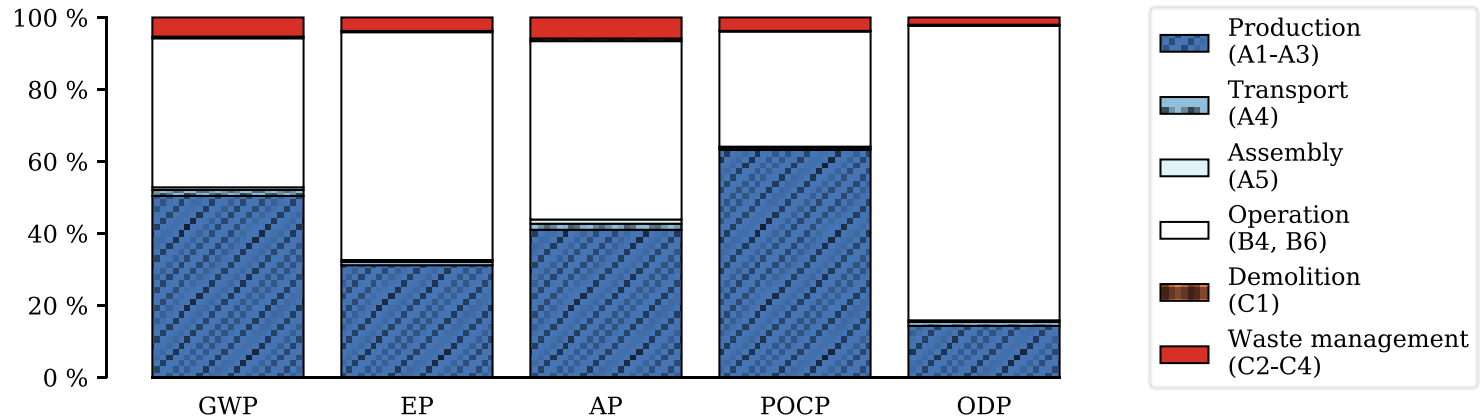


# Results

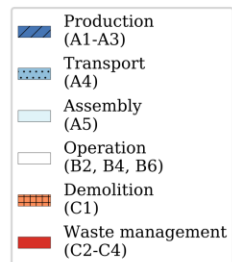
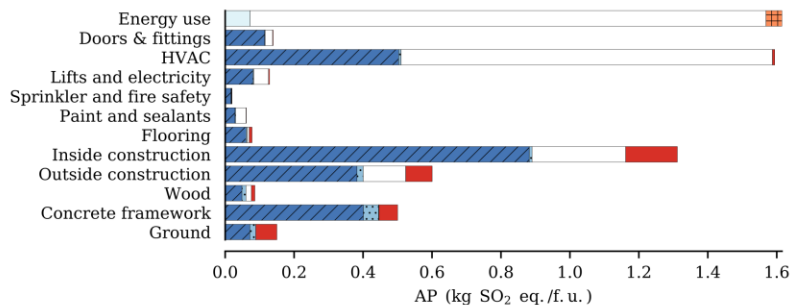
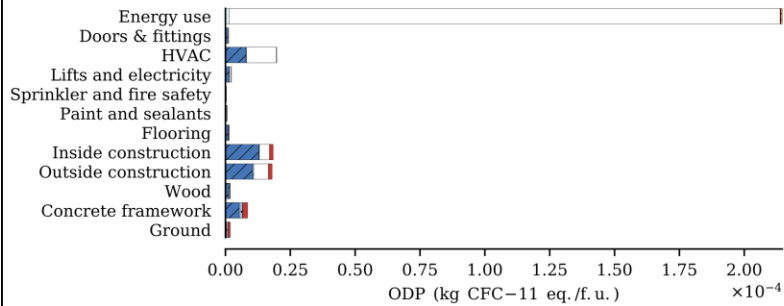
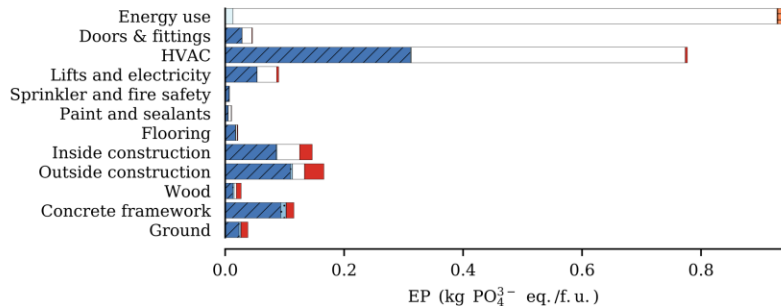
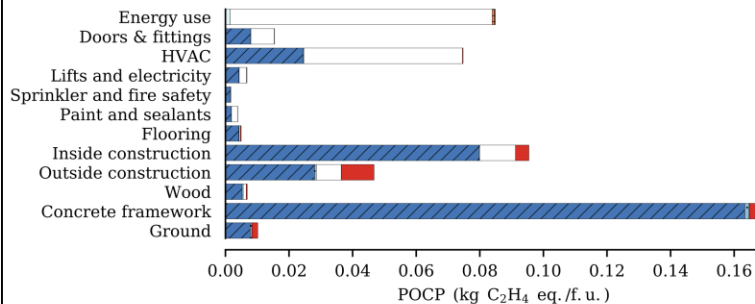
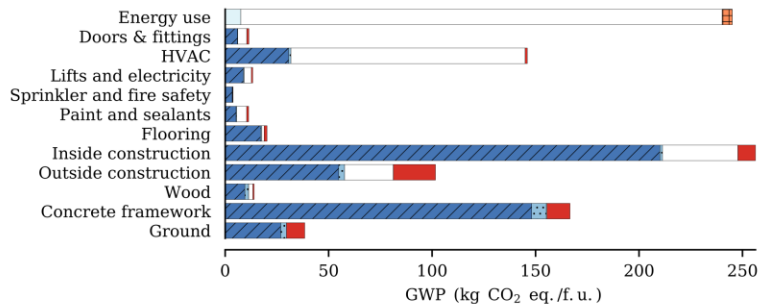
# Material mass composition in building



# 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**.

## More information

### Article:

Life Cycle Assessment of an Office Building Based on Site-Specific Data

Energies 2019, 12(13), 2588; <https://doi.org/10.3390/en12132588>

### Report:

Livscykelstudie av kontor med kombinerad betong- och träkonstruktion

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