

Supplementary material B to the article “Environmental saving potentials of a smart home system from a life cycle perspective: How green is the smart home?”
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Supplementary material B contains information on the modelling of the smart home system, i.e. on the composition of the proxy device, and on inputs for life cycle inventory for the different energy use models.

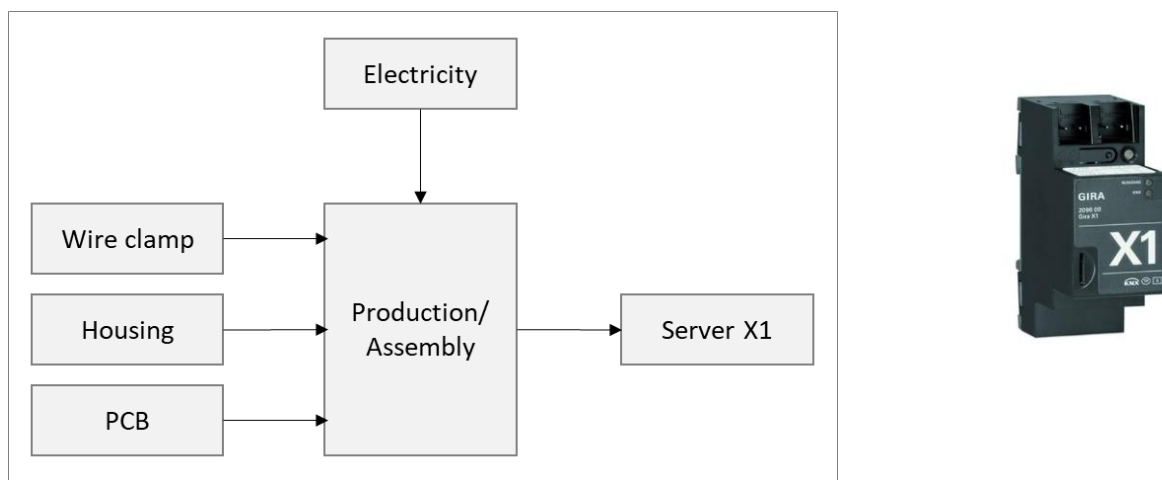


Fig. B1 Composition proxy device Gira X1

Table B1 Composition proxy device and reference data sets in GaBi

Component	Weight-based share	Reference data sets
Wire clamp	0.032	GLO: electric connector, wire clamp (ecoinvent)
Housing	0.431	DE: Polymethylmethacrylate granulate (PMMA) mix (Gabi) DE: Polycarbonate Granulate (PC) (GaBi) DE: Polyethylene High Density Granulate (HDPE/PE-HD) Mix (GaBi)
Populated Circuit Board (PCB)	0.536	GLO: printed wiring board, mounted mainboard, laptop computer, Pb free (ecoinvent)
Electricity	.	DE: Electricity grid mix ts (GaBi); for downstream energy use EU-28 electricity grid mix (GaBi); for upstream energy use

Table B2 Upstream energy use: energy intensity of data transmission

ICT infrastructure	Energy intensity of data transmission [kWh/GB]	Reference year	Reference
Home and access network	0.004	2014	(Krug et al. 2014)
Core and edge network	0.02	2014	(Schien and Preist 2014)
Data center	0.015	2020	(Andrae 2019)

Table B3 Heating energy use: heating energy sources and reference heating appliances in GaBi

Heating energy source	[Share Sample]	[Share w/o Electricity] ¹	Reference heating appliances	
			1 - 2 family home (share of 61.6%)	Apartment building (share of 38.4%)
Gas	58.9	66.2	Gas low temperature boiler < 20 kW (EN15804 B6)	Gas low temperature boiler 20-120 kW (EN15804 B6)
Oil	19.2	21.5	Oil low temperature < 20 kW (EN15804 B6)	Oil low temperature boiler 20-120 kW (EN15804 B6)
Coal ²	1.3	1.5	Europe without Switzerland: heat production, hard coal briquette, stove 5-15kW ecoinvent 3.5	
Wood	2.5	2.8	Pellet boiler < 20 kW (EN15804 B6)	Pellet boiler 20-120 kW (EN15804 B6)
Other ³ (District Heating)	7.1	8	District heating 20-120 kW (EN15804 B6)	
Electricity	11.0		excluded ¹	excluded ¹

¹ Electricity was excluded as heating energy source, as no clear reference heating appliance could be assigned.

² The share of coal was taken from German heating energy statistics (AGEB 2019), as only the share of solid heating energy source (coal and biomass) was known.

³“Other” heating energy sources was interpreted as 100% district heating. Theoretically, other heating energy sources and appliances are possible.

Table B4 Energy Saving Scenarios SHS over time

t(a)	Saving Scenario 2% [kWh]	Saving Scenario 4% [kWh]	Saving Scenario 6% [kWh]	Saving Scenario 10% [kWh]	Saving Scenario 20% [kWh]
0	0	0	0	0	0
1	296.23	592.46	888.69	1481.15	2962.3
2	592.46	1184.92	1777.38	2962.3	5924.6
3	888.69	1777.38	2666.07	4443.45	8886.9
4	1184.92	2369.84	3554.76	5924.6	11849.2
5	1481.15	2962.3	4443.45	7405.75	14811.5
6	1777.38	3554.76	5332.14	8886.9	17773.8
7	2073.61	4147.22	6220.83	10368.05	20736.1
8	2369.84	4739.68	7109.52	11849.2	23698.4
9	2666.07	5332.14	7998.21	13330.35	26660.7
10	2962.3	5924.6	8886.9	14811.5	29623

Table B5 Green Energy Mix (UBA 2017)

Energy Source	Share [.]	GaBi Reference data set
Wind power	0.41	DE: Electricity from wind power
Photovoltaic	0.20	DE: Electricity from photovoltaic
Hydro power	0.11	DE: Electricity from hydro power
Biomass - gas	0.18	DE: Electricity from biogas
Biomass - solid	0.06	DE: Electricity from biomass (solid)
Biomass - waste	0.03	DE: Electricity from waste

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