



Waloryzacja właściwości środowiskowych konstrukcji stalowych

MAKROKOMPONENTY: APLIKACJE *IPHONE* I *ADNROID*



Agenda

1) Podejście makro-komponentowe

- Ocen środowiskowa elementów i całych budynków jako suma elementów

2) Aplikacje

- Instrukcja użytkowania













3) Końcowe uwagi



LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES



MAKROKOMPONENTY+ Budynki o konstrukcjach stalowych

	Category 1	Category 2	Category 3
Single & multi-family building			
Apartment blocks			
Office buildings			
Commercial/Industrial buildings			

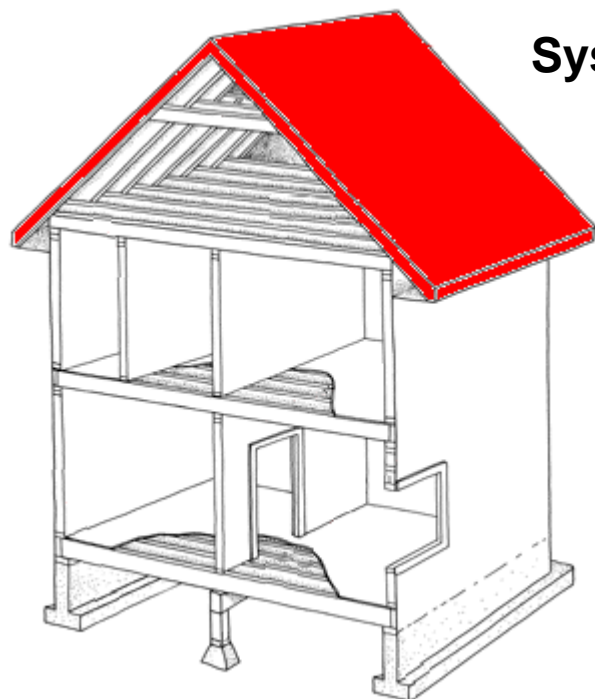
**Jedynie budynek
jednorodzinny na dzisiaj**

<https://play.google.com/store/apps/details?id=com.onesource.lvs3>

http://download.cnet.com/Steel-LCA-for-iPhone/3000-2094_4-75862311.html



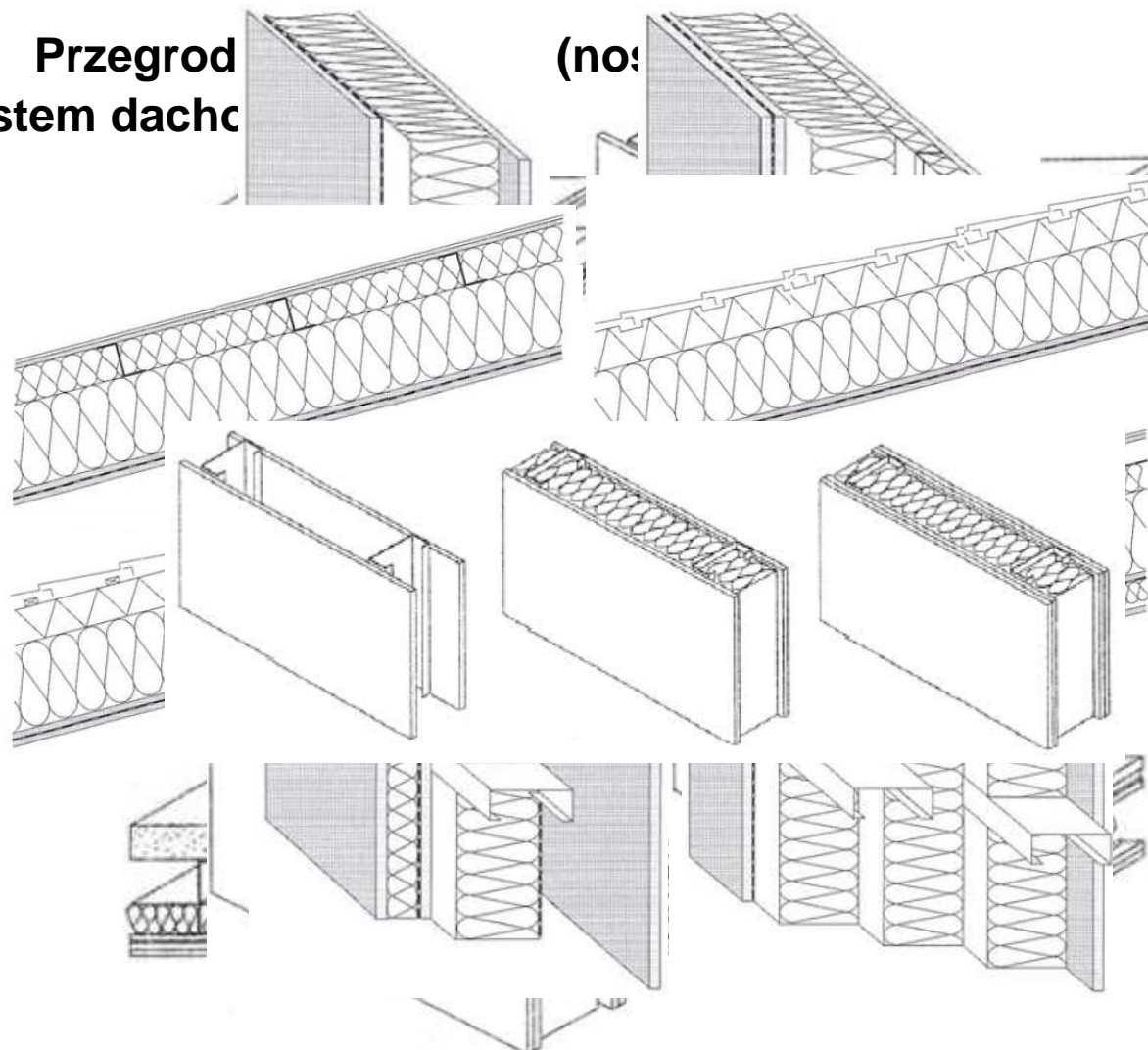
MAKRO-KOMPONENTY



Przegrod
System dachowy

(noszący)

SYSTEM PRZEGRÓD
STALOWY/PRZEMYSŁOWYCH
(ściany nośne)





PODEJŚCIE METODYCZNE

Uwzględniane moduły cyklu życia

Product stage			Construc stage		Use stage							End-of-life stage				
Raw material supply	Transport	Manufacturing	Transport	Construction process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal	Reuse/Recycling
<u>A1</u>	<u>A2</u>	<u>A3</u>	<u>A4</u>	<u>A5</u>	<u>B1</u>	<u>B2</u>	<u>B3</u>	<u>B4</u>	<u>B5</u>	<u>B6</u>	<u>B7</u>	<u>C1</u>	<u>C2</u>	<u>C3</u>	<u>C4</u>	D
X	X	X	X	-	-	X	X	X	X	-	-	X	X	X	X	X



DANE WEJŚCIOWE LCA- DANE PRODUCENTÓW

	Time coverage		Geographical coverage	Technology coverage	Completeness
Steel section	2007,	annual average	Europe	European producers	> 99% of mass and energy
Steel rebar	2007,	annual average	World	World producers	> 99% of mass and energy
Steel coil	2007,	annual average	Europe	European producers	> 99% of mass and energy
Concrete C20/25	2011,	annual average	Germany	German producers	> 95% of mass and energy
Oriented strand board OSB	2008,	annual average	Germany	German producers	> 99% of mass and energy
Gypsum plasterboard	2008,	annual average	Europe	European producers	> 95% of mass and energy
Bricks	2011,	annual average	Germany	German producers	> 95% of mass and energy
Rock wool	2011,	annual average	Europe	European producers	> 95% of mass and energy
Expanded polystyrene EPS	2011,	no data	Europe	No data	No data
Extruded polystyrene XPS	2011,	annual average	Germany	German producers	> 95% of mass and energy
Polyurethane rigid foam PUR	2011,	annual average	Germany	German producers	> 95% of mass and energy
Expanded Cork	2011,	annual average	Germany	German producers	> 95% of mass and energy
Glass wool	2011,	annual average	Europe	European producers	> 95% of mass and energy
Polyethylene foam PE	2011,	annual average	Germany	German producers	> 95% of mass and energy

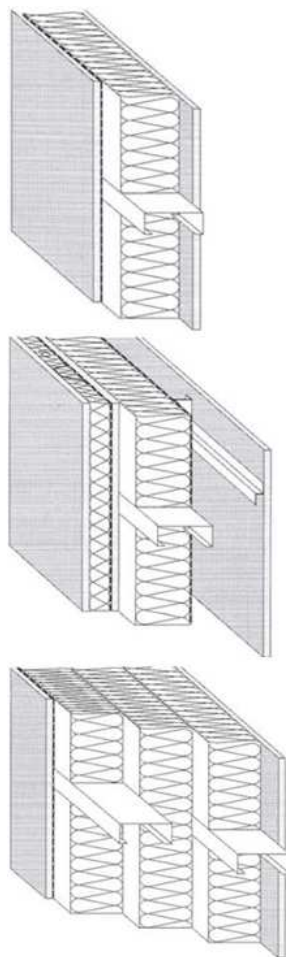


LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES

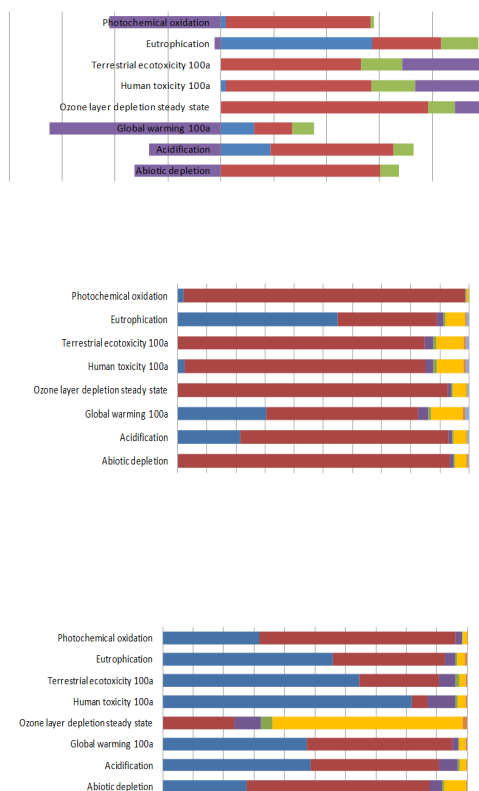


BAZA DANYCH ŚRODOWISKOWYCH MAKROKOMPONENTÓW

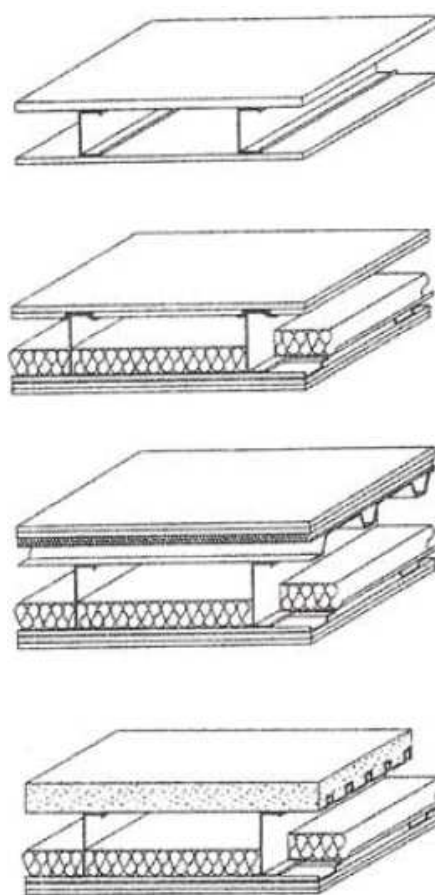
Przegroda



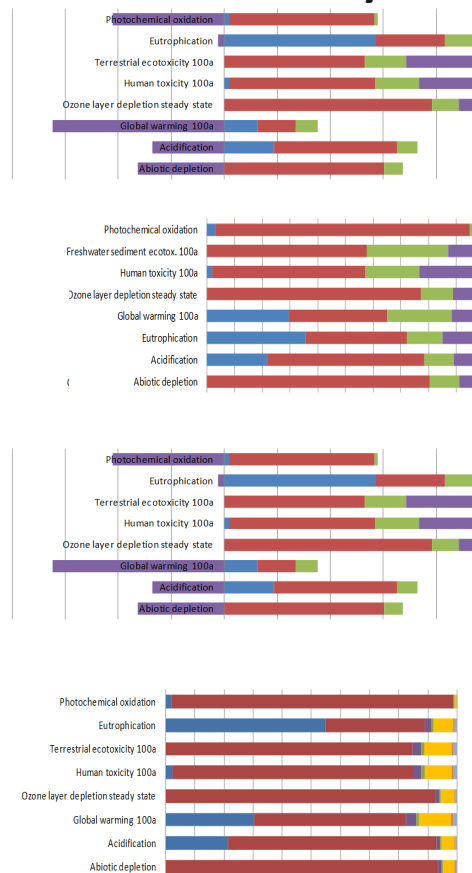
Profil środowiskowy



Podłoga/strop



Profil środowiskowy





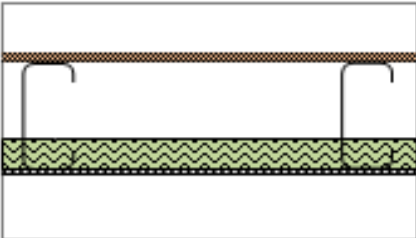
KLASYFIKACJA MAKRO-KOMPONENTÓW ZGODNIE Z ASTM E1557

(A) Substructure	(A40) Slabs-on-grade	(A4010) Standard slabs-on-grade	
(B) Shell	(B10) Superstructure	(B1010) Floor construction	(B1010.10) Floor structural frame
			(B1010.20) Floor decks, slabs and toppings
		(B1020) Roof construction	(B1020.10) Roof structural frame
			(B1020.20) Roof decks, slabs and sheathing
	(B20) Exterior vertical enclosures	(B2010) Exterior walls	(B2010.10) Ext. wall veneer
			(B2010.20) Ext. wall construction
		(B2020) Exterior windows	
		(B2050) Exterior doors	
	(B30) Exterior horizontal enclosures	(B3010) Roofing	
		(B3060) Horizontal openings	
(C) Interiors	(C10) Interior construction	(C1010) Interior partitions	
	(C20) Interior finishes	(C2010) Wall finishes	
		(C2030) Flooring	
		(C2050) Ceiling finishes	



BAZA DANYCH ŚRODOWISKOWYCH MAKROKOMPONENTÓW

PRZYKŁAD:

B1010.10 Floor structural frame					
B1010.10.1a	Materials	Thickness/ density	End-of-life scenario	RR (%)	
	OSB (mm)	18	Incineration	80	
	Air cavity (mm)	160			
	Rock wool (mm)	40	Recycling	80	
	Gypsum board (mm)	15	Recycling	80	
	LWS (kg/m2)	14	Recycling	90	
B1010.10.1a - LCA					
	A1-A3	A4	C2	C4	D
ADP elements [kg Sb-Equiv.]	2,83E-05	1,76E-09	1,54E-09	3,37E-08	-1,96E-04
ADP fossil [MJ]	5,48E+02	6,54E-01	5,72E-01	1,31E+00	-3,35E+02
AP [kg SO2-Equiv.]	1,70E-01	2,11E-04	1,83E-04	5,74E-04	-4,45E-02
EP [kg Phosphate-Equiv.]	1,41E-02	4,86E-05	4,20E-05	8,79E-05	-1,01E-03
GWP [kg CO2-Equiv.]	5,12E+01	4,71E-02	4,12E-02	3,86E-01	-1,46E+01
ODP [kg R11-Equiv.]	7,65E-07	8,25E-13	7,21E-13	7,21E-11	1,76E-07
POCP [kg Ethene-Equiv.]	2,53E-02	-6,89E-05	-5,95E-05	1,49E-04	-1,07E-02

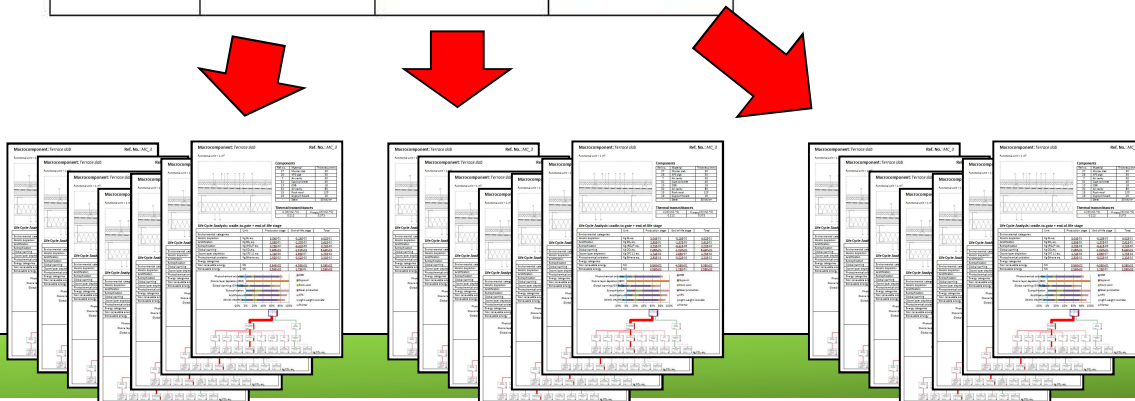
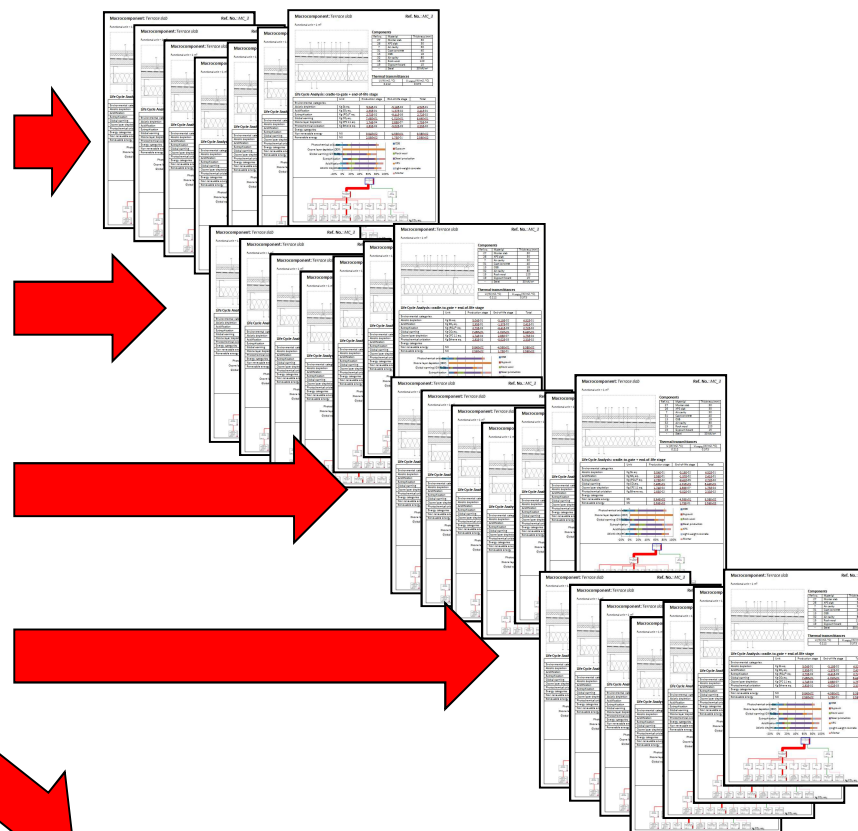


LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES



BAZA DANYCH MAKROKOMPONENTÓW

	Category 1	Category 2	Category 3
Single & multi-family building			
Apartment blocks			
Office buildings			
Commercial/Industrial buildings			





2) Aplikacja LCA STEEL iPad i Android

Menu

Steel_LCA

Katalog

Manual

Raporty

Ustawienia



Menu

Steel_LCA

Katalog

Manual

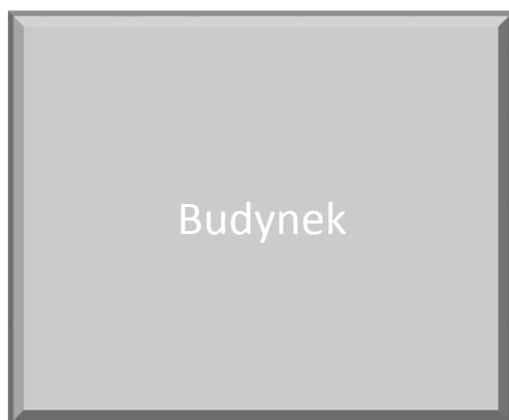
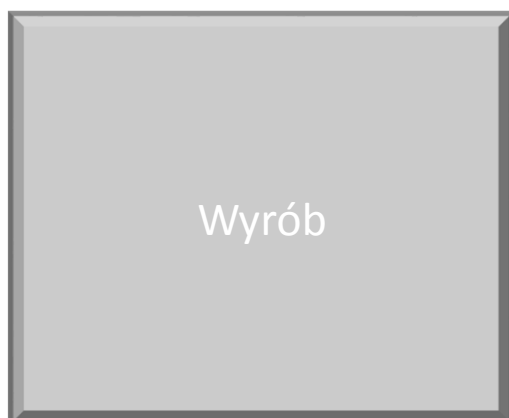
Raporty

Ustawienia



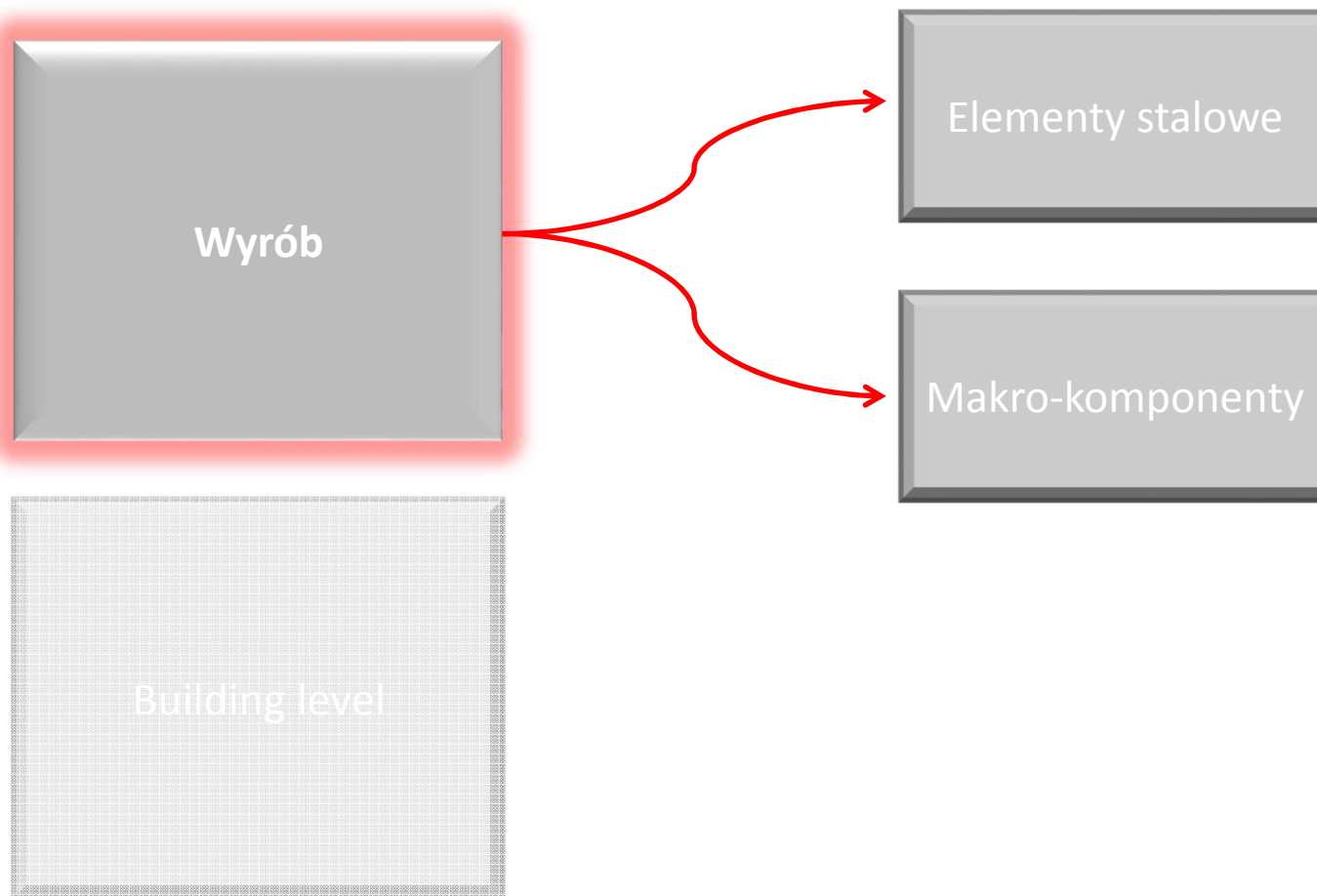
Menu >> Steel_LCA

Dwa poziomy:



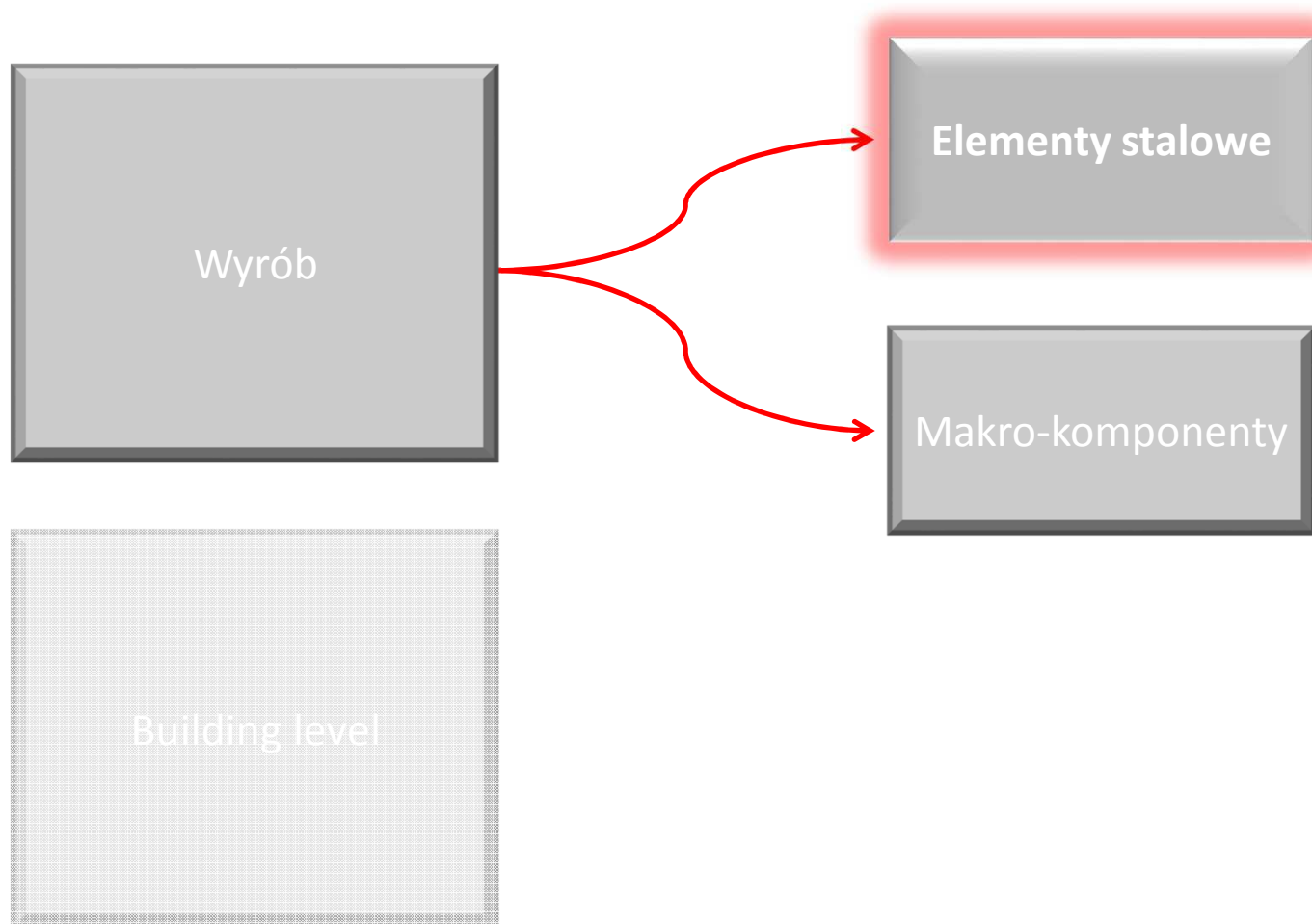


Menu >> Steel_LCA >> Wyrób





Menu >> Steel_LCA >> Wyrób





LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES



Menu >> Steel_LCA >> Wytroby

No SIM
16:59
69%

I or H sections
CALCULATE

HE
HE 100 AA
HE 100 A
HE 100 B
HE 100 M
HE 120 AA
HE 120 A
HE 120 B
HE 120 M
HE 140 AA
HE 140 A
HE 140 B
HE 140 M

HE 100 AA

add your company

Designation		
G	12.24	[kg/m]
Dimensions		
h	91.00	[mm]
b	100.00	[mm]
t.w	4.20	[mm]
t.f	5.50	[mm]

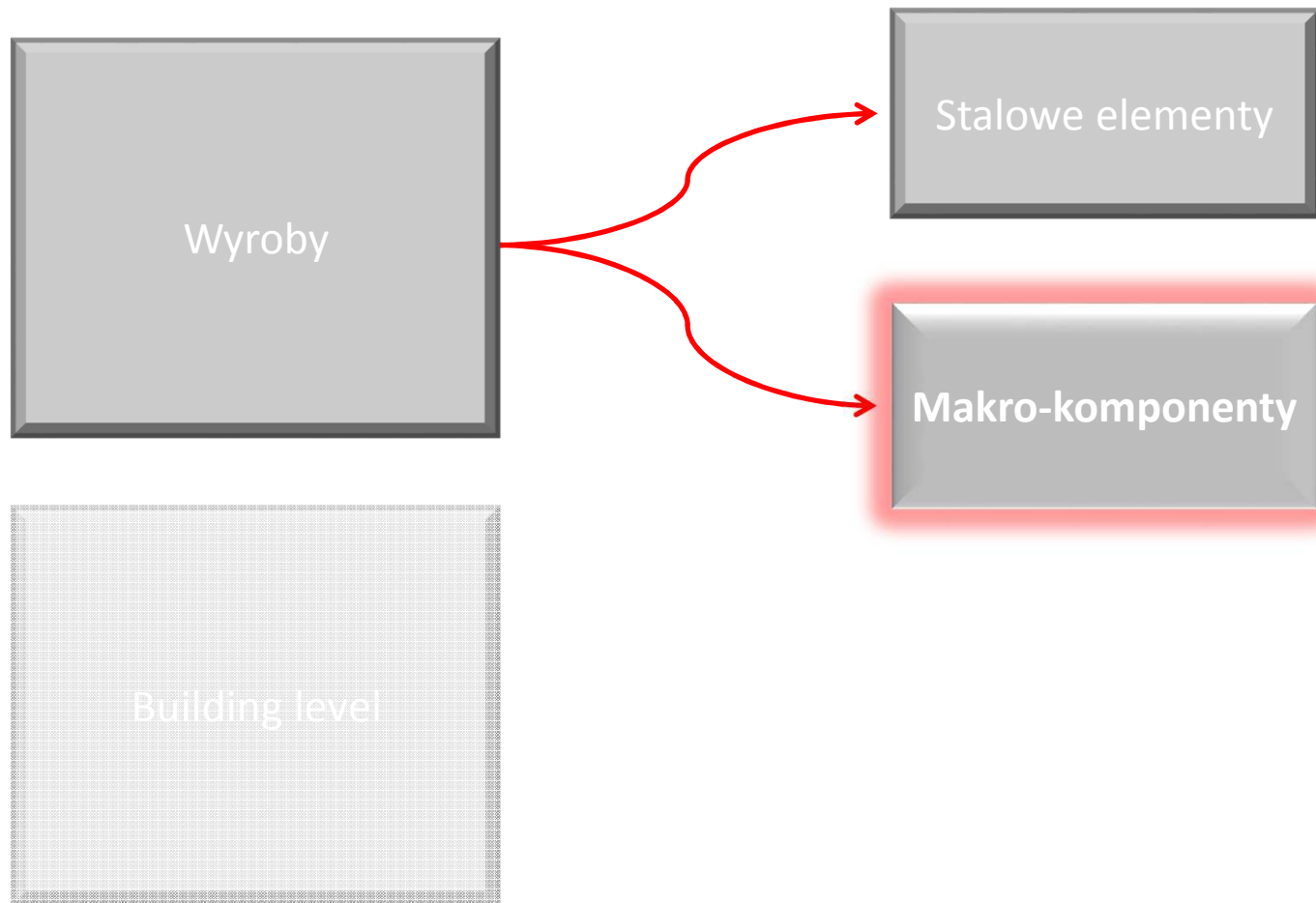
Inputs parameters

Length [m] 0
Lifespan [years] 0
Steel Grade S235
Quality JR
Fabrication Procedure Hot Rolled

Scope of the Analysis
Cradle-to-gate
Coating System
Transportation
End-of-life recycling



Menu >> Steel_LCA >> Material level





Menu >> Steel_LCA >> Wytroby>> Makro-komponenty

Makro-komponenty



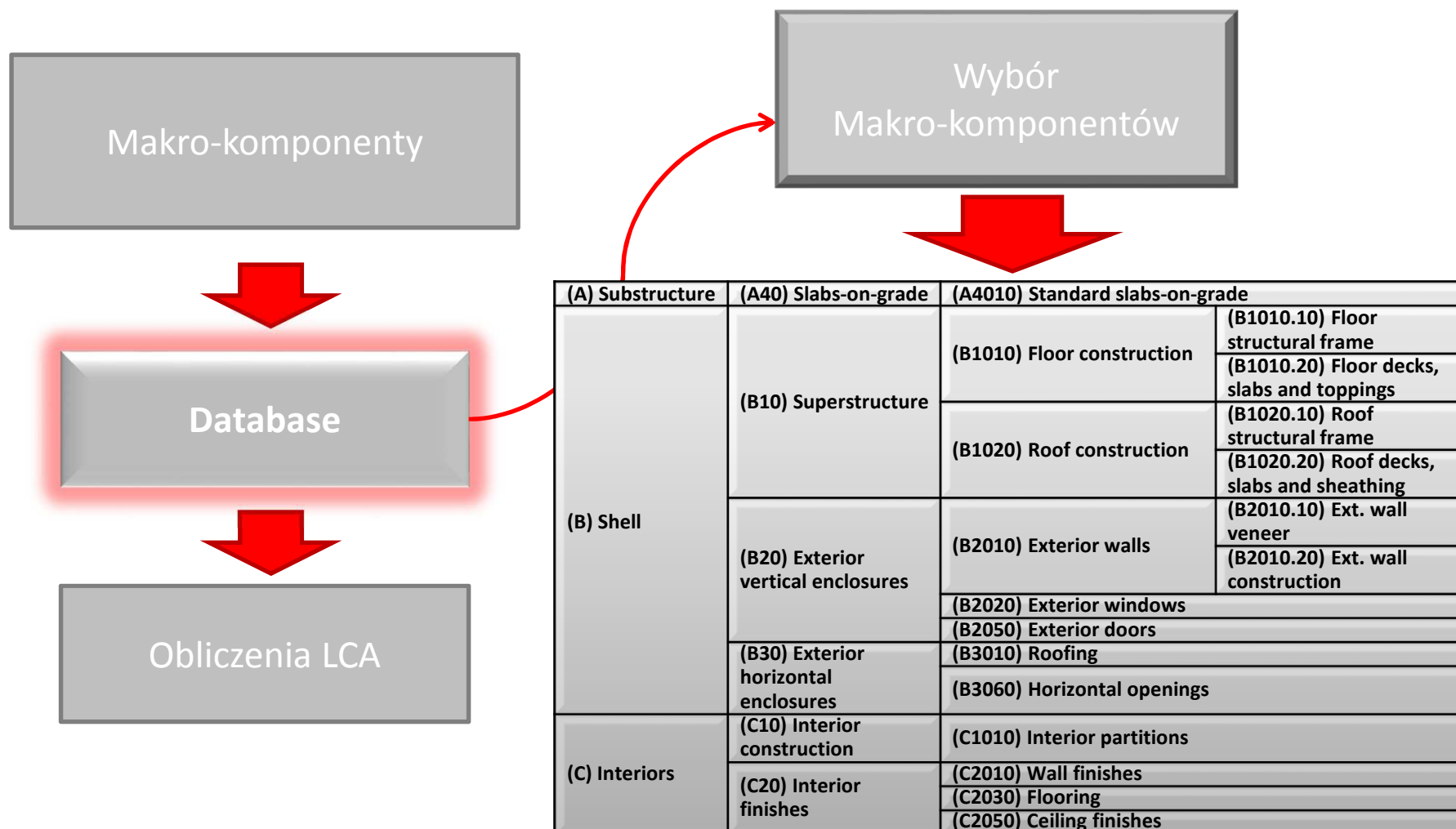
Database



Obliczenia LCA

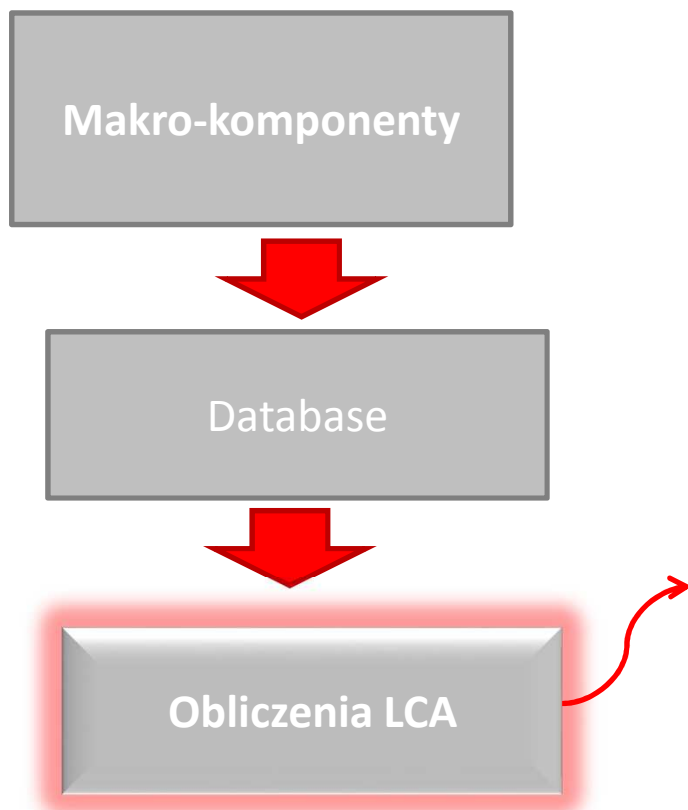


Menu >> Steel_LCA >> Wytroby>> Makro-komponenty





Menu >> Steel_LCA >> Wytroby>> Makro-komponenty



VO SIM 17-02 00:70

< (B1010.10) Floor structur... (B1010.10) Floor structural frame CALCULATE

B1010.10.1 – Light-weight steel slabs

- B1010.10.1a
- B1010.10.1b
- B1010.10.1c
- B1010.10.1d
- B1010.10.1e

B1010.10.1a

add your company

Rock wool

Density 150 [kg/m²]

Thickness 40 [mm]

Weight

Inputs parameters

Rock wool [mm] 60

Scope of the Analysis

Cradle-to-grave + EOL

ADPelements

A1-A3	2.90e-5
A4	1.89e-9
B	0.00e+0
C2	1.65e-9

Full Report



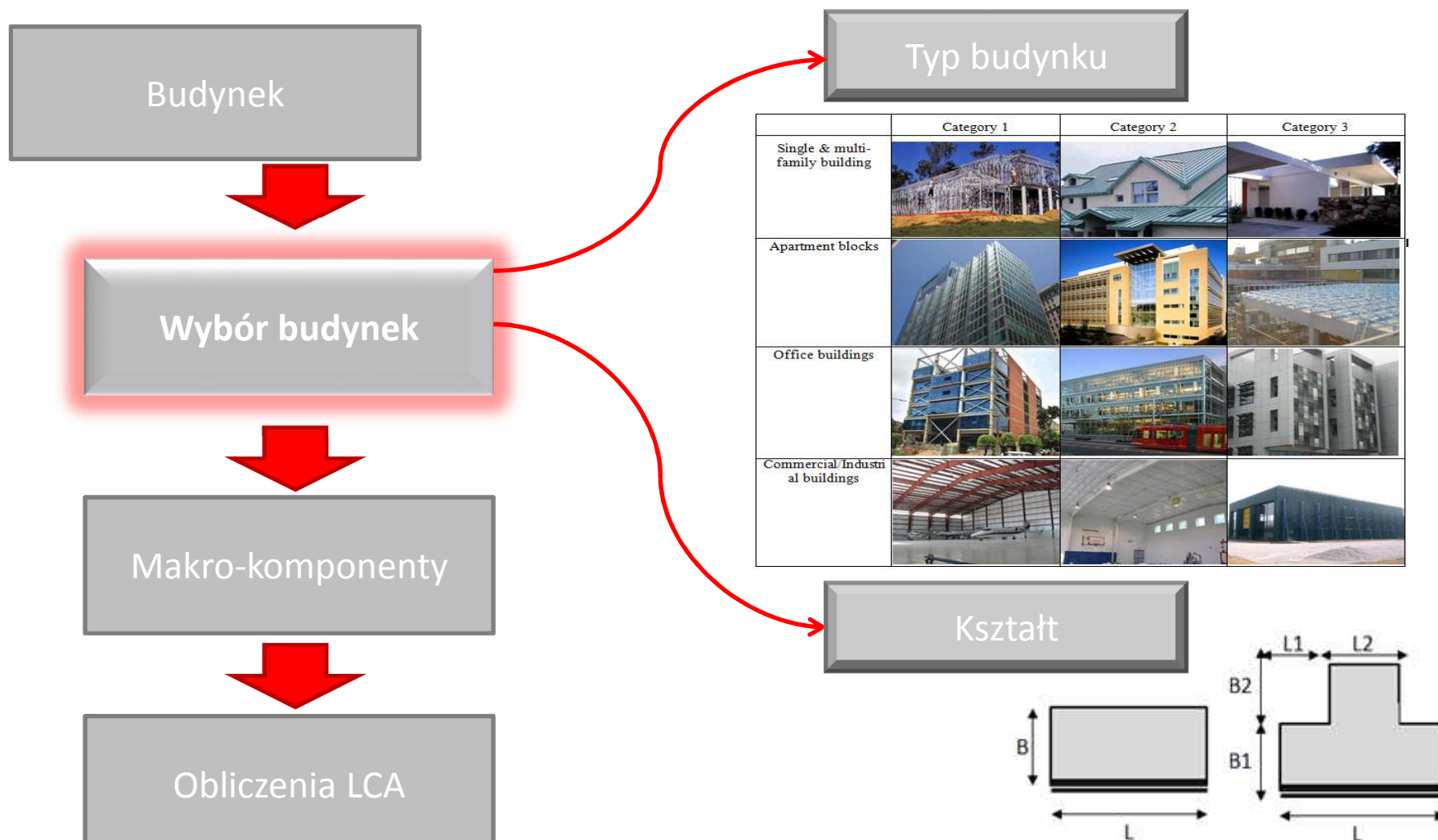
Menu >> Steel_LCA >> Budynek

Material level

Budynek

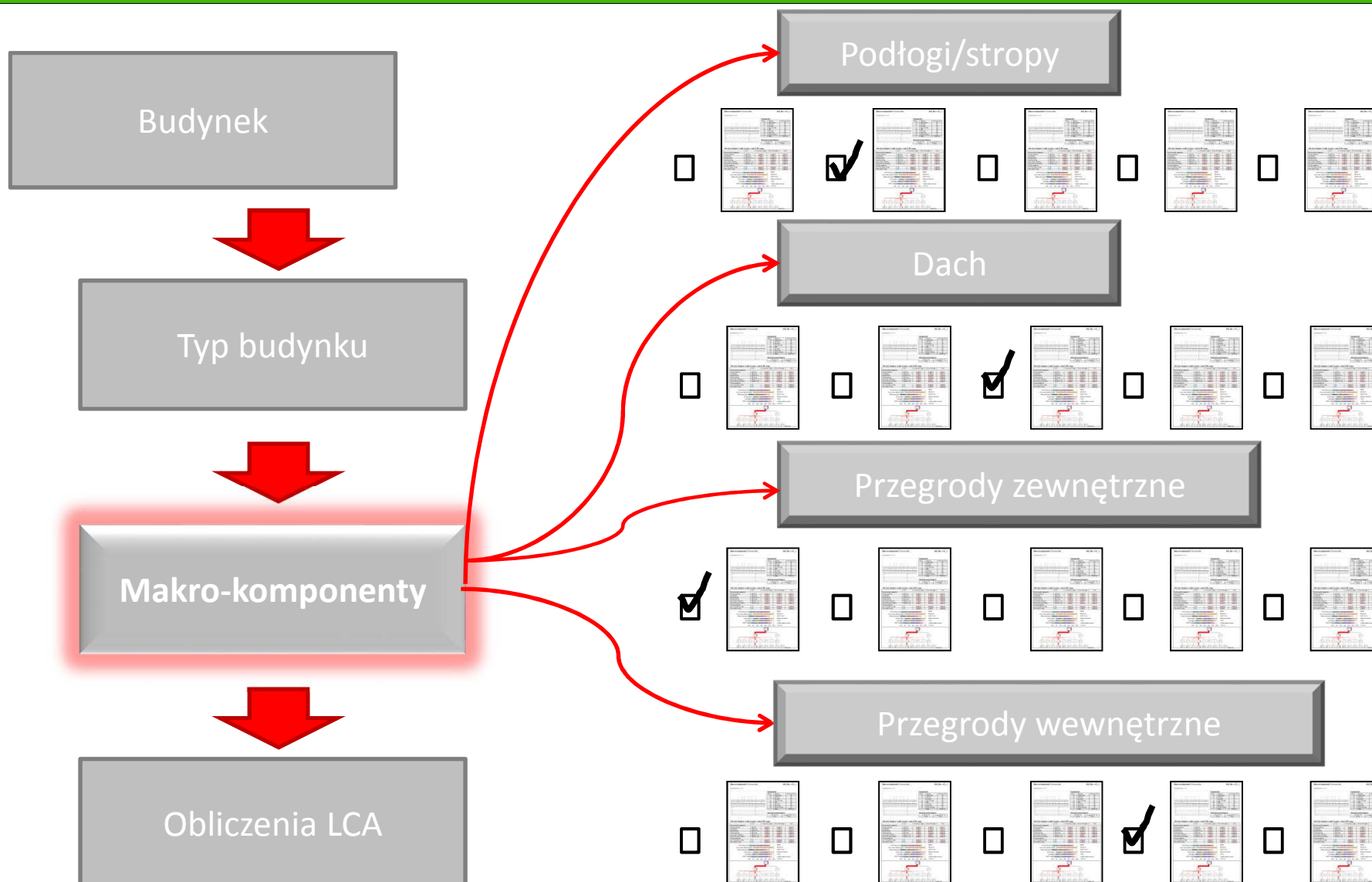


Menu >> Steel_LCA >> Budynek>> Wybór typu budynku



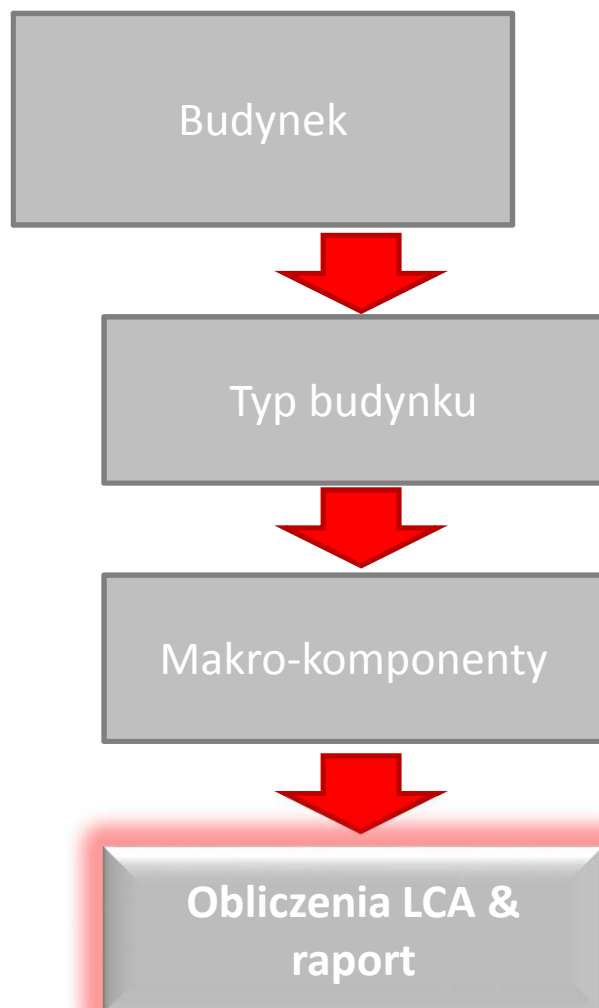


LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES





Menu >> Steel_LCA >> Budynek>> Obliczenia LCA



LCA REPORT FOR STEEL BUILDINGS

SUMMARY

Scope: Cradle-to-grave + EOL
Lifespan: 50 years
Environmental Impacts
LCA index: -1.42E-11
Global Warming Potential (GWP): 41 kg CO2 eq
Primary Energy Demand
Total Primary Energy Demand: 679 MJ

DETAILED RESULTS

LCA Input Data

B1010.10 Floor structural frame

	Materials	Thickness (mm)	End-of-life scenario	RR (%)
	Light weight steel (LWS)		Recycling	90
	OSB	18	Incineration	80
	Gypsum plasterboard	15	Recycling	80
	Rock wool	40	Recycling	80

LCA Results

LCA of 1m2 of a Roof macro-component

Parameters describing enviromental impacts

Indicator	Unit	A1-A3	A4	B1-B5	C2	C4	D	TOTAL
ADP elements	[kg Sb Eq.]	2.90e-5	1.89e-9	0.00e+0	1.65e-9	3.67e-8	-1.97e-4	-1.68e-4
ADP fossil	[MJ]	5.88e+2	7.02e-1	0.00e+0	6.14e-1	1.43e+0	-3.36e+2	2.55e+2
AP	[kg SO2 Eq.]	1.93e-1	2.27e-4	0.00e+0	1.97e-4	6.25e-4	-4.45e-2	1.50e-1
EP	[kg PO4- Eq.]	1.66e-2	5.22e-5	0.00e+0	4.51e-5	9.59e-5	-1.01e-3	1.58e-2
GWP	[kg CO2 Eq.]	5.48e+1	5.06e-2	0.00e+0	4.41e-2	4.20e-1	-1.46e+1	4.05e+1
ODP	[kg CFC-11 Eq.]	7.65e-7	8.86e-13	0.00e+0	7.73e-13	7.85e-11	1.76e-7	9.42e-7
POCP	[kg C2H4 Eq.]	2.70e-2	-7.40e-5	0.00e+0	-6.38e-5	1.62e-4	-1.07e-2	1.63e-2



3) Uwagi końcowe

- Program jest darmowy!
- Uproszczona ocena uwalnia od stosowania skomplikowanych i drogich narzędzi LCA (zwłaszcza do zastosowań akademickich)
- Badanie dokładności programu w porównaniu z komercyjnym GaBi6 wskazuje na nieznaczne tylko odchylenia wyników
- Porównanie wyników wskazuje sporą precyzję wyników LCA