Environmental profile of building elements details per variant

1. Load-bearing interior wall

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9. *Summary*
Building professionals and the government currently have to resort to foreign environmental classification systems to acquire an insight into the Environmental Performance of Materials used in Buildings and Building Elements (MMG: Milieugerelateerde Materiaalprestatie van Gebouw(element)en). However, often the tools and information involved are not transparent and/or not specifically related to the Flemish-Belgian building context. This publication proposes a database of environmental profiles of 115 variants of building elements, all of which are specific for the Flemish-Belgian building context. It offers an open and transparent presentation of the MMG method of determination that was used as the basis for the calculation of the environmental profiles. Although the resulting building materials methodology is far from final, it is a dynamic model (including a determination method) that will be fine-tuned and expanded in the future. In that context, this publication should be perceived as a communication tool to facilitate the dialogue with stakeholders in the future.

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12. *Other titles on this subject*
Milieugerelateerde Materiaalprestatie van Gebouwelementen (MMG report) (www.ovam.be/bouwmaterialenmethodiek)

Environmental profile of building elements: details per variant

3. Load-bearing interior wall

Table V 3: overview of the composition of the variants “load-bearing interior wall”

(22)+ interior wall (load-bearing and non-load-bearing):environmental impact per m² wall, 8 types load-bearing and 12 non-load-bearing							
1	Lblw1_hollow brick	acrylic paint	gypsum plaster	hollow brick (brickwork) 14 cm clay	gypsum plaster	acrylic paint	load-bearing
2	Lblw2_concrete	acrylic paint	gypsum plaster	concrete (in situ) 14 cm new	gypsum plaster	acrylic paint	load-bearing
3	Lblw3_timber frame	acrylic paint	gypsum plaster	timber frame (14 cm, filled with glass wool)	gypsum plaster	acrylic paint	load-bearing
4	Lblw4_calcarinite	acrylic paint	gypsum plaster	calcarenite (glued) 14 cm	gypsum plaster	acrylic paint	load-bearing
5	Lblw5_aircrete	acrylic paint	gypsum plaster	aircrete 15 cm	gypsum plaster	acrylic paint	load-bearing
6	Lblw6_hollow concrete	acrylic paint	gypsum plaster	hollow concrete 14 cm	gypsum plaster	acrylic paint	load-bearing
7	Lblw7_fair-faced concrete block	/	/	fair-faced blocks (concrete)	/	/	load-bearing

Table CEN 3: overview of the individual CEN indicators for the variants 'load-bearing interior walls'

	Climate change	Ozone depletion	Acidification (land)	Eutrophication	Photochem. oxidant form.	Depletion - non-fossil	Depletion - fossil
	kg CO2 eq	kg CFC-11 eq	kg SO2 eq	kg PO4--- eq	kg C2H4	kg Sb eq	MJ, net cal
Load-bearing interior wall							
Lblw1_hollow brick	7,03E+01	6,20E-06	2,27E-01	7,67E-02	1,22E-02	1,44E-04	7,91E+02
Lblw2_concrete	8,66E+01	5,94E-06	2,87E-01	1,17E-01	2,12E-02	1,75E-04	9,28E+02
Lblw3_timber frame	4,99E+01	5,92E-06	2,36E-01	9,28E-02	1,22E-02	1,07E-03	7,67E+02
Lblw4_calcarinite	7,09E+01	7,19E-06	2,32E-01	7,57E-02	1,27E-02	2,06E-04	8,07E+02
Lblw5_aircrete	7,72E+01	6,21E-06	2,19E-01	7,60E-02	1,12E-02	2,26E-04	7,51E+02
Lblw6_hollow concrete	8,02E+01	5,66E-06	2,47E-01	8,01E-02	1,06E-02	2,02E-04	7,08E+02
Lblw7_fair-faced concrete block	4,91E+01	2,77E-06	1,29E-01	3,74E-02	4,77E-03	1,18E-04	3,30E+02

Table CEN+ 3: overview of the individual CEN+ indicators for the variants 'load-bearing interior wall'

	human toxicity	particulate matter formation (PM)	Ionising radiation (humans)	ecotox. (terrestrial)	ecotox. (fresh water)	ecotox. (marine)	land occupation (forest)	land occupation (urban)	land transf. (nature)	land transf. (rainforest)	water
	DALY	DALY	DALY	kg 1,4-DB eq	kg 1,4-DB eq	kg 1,4-DB eq	species.yr	species.yr	species.yr	species.yr	m^3
Load-bearing interior wall											
Lblw1_hollow brick	7,95E-06	9,33E-05	1,47E-07	1,76E-02	2,36E-01	2,36E-01	1,30E-02	8,93E-09	1,27E-08	1,58E-09	4,18E-01
Lblw2_concrete	1,82E-05	1,58E-04	2,15E-07	2,01E-02	5,39E-01	5,48E-01	1,30E-02	1,43E-08	1,75E-08	1,24E-09	1,08E+00
Lblw3_timber frame	1,06E-05	1,16E-04	2,00E-07	2,73E-02	4,00E-01	4,11E-01	1,30E-02	3,05E-08	2,98E-08	7,47E-09	4,17E-01
Lblw4_ calcarinite	7,96E-06	1,02E-04	1,58E-07	1,96E-02	2,48E-01	2,58E-01	1,30E-02	1,19E-08	1,84E-08	2,98E-09	7,37E-01
Lblw5_aircrete	8,25E-06	8,94E-05	1,82E-07	1,75E-02	2,47E-01	2,45E-01	1,30E-02	9,90E-09	6,05E-09	1,84E-09	5,86E-01
Lblw6_hollow concrete	9,02E-06	1,08E-04	1,83E-07	1,81E-02	2,57E-01	2,60E-01	1,30E-02	1,30E-08	1,66E-08	2,52E-09	8,84E-01
Lblw7_fair-faced concrete block	4,90E-06	7,04E-05	1,02E-07	2,80E-03	1,25E-01	1,34E-01	2,91E-08	8,90E-09	1,25E-08	2,20E-09	5,60E-01

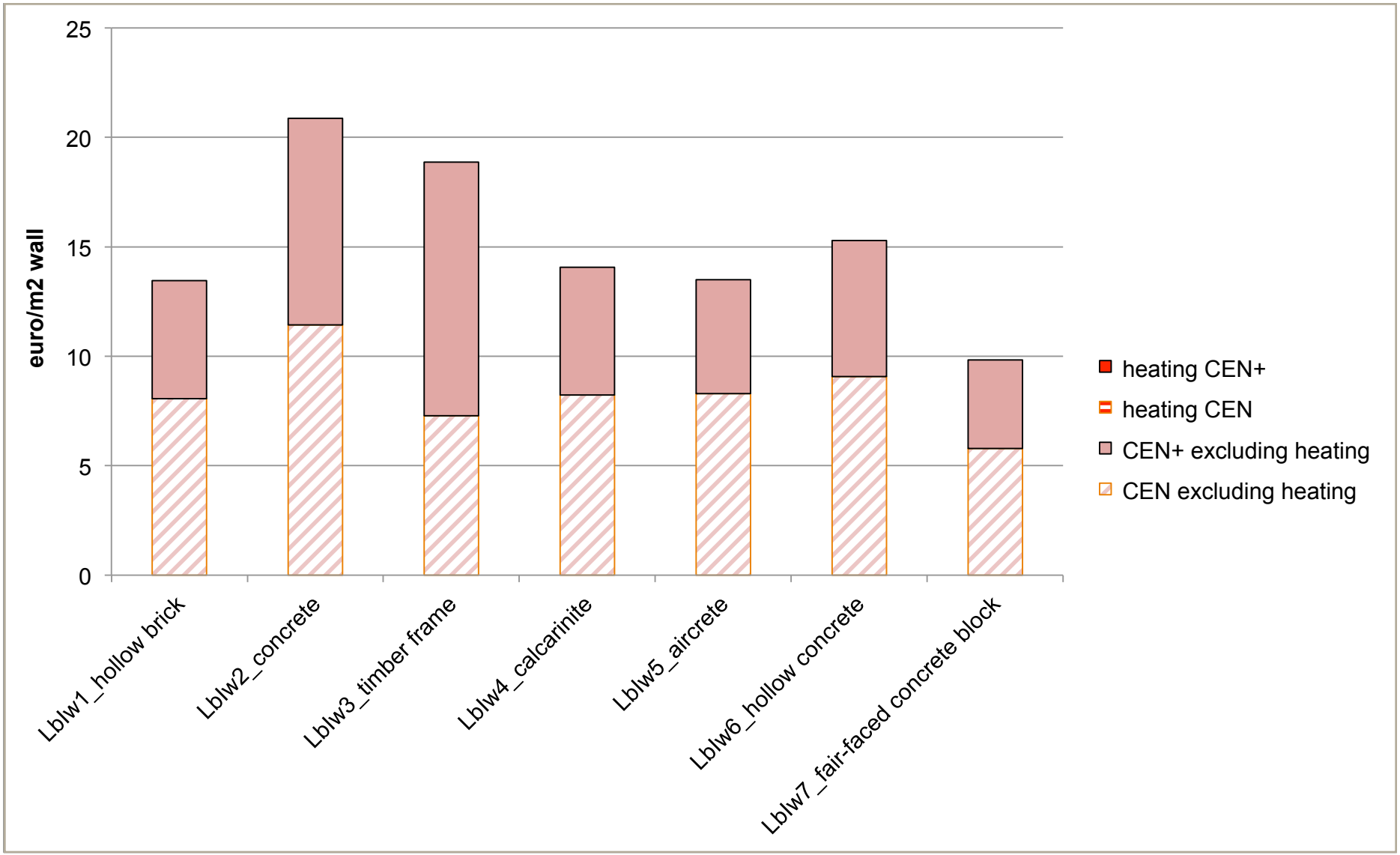

Figure E 3: Aggregated environmental profiles (split up into CEN and CEN+) of several building element variants 'load-bearing interior wall', expressed in monetary units and distinguishing between purely materials-related and heat-transfer-related environmental impact.

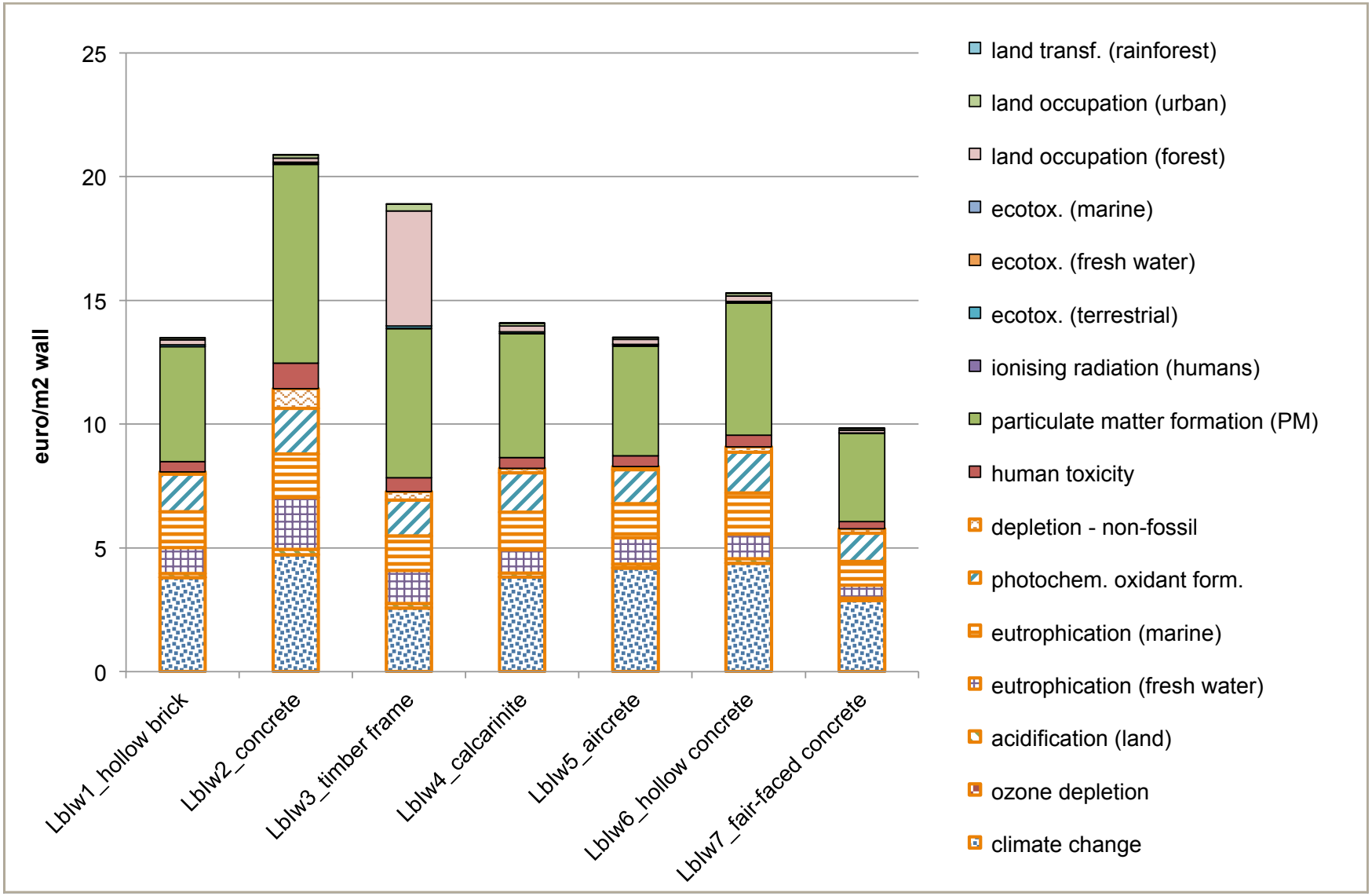

Figure I 3: Aggregated environmental profiles (split up into CEN and CEN+) for several building element variant 'load-bearing interior wall' per environmental indicator, expressed in monetary units.

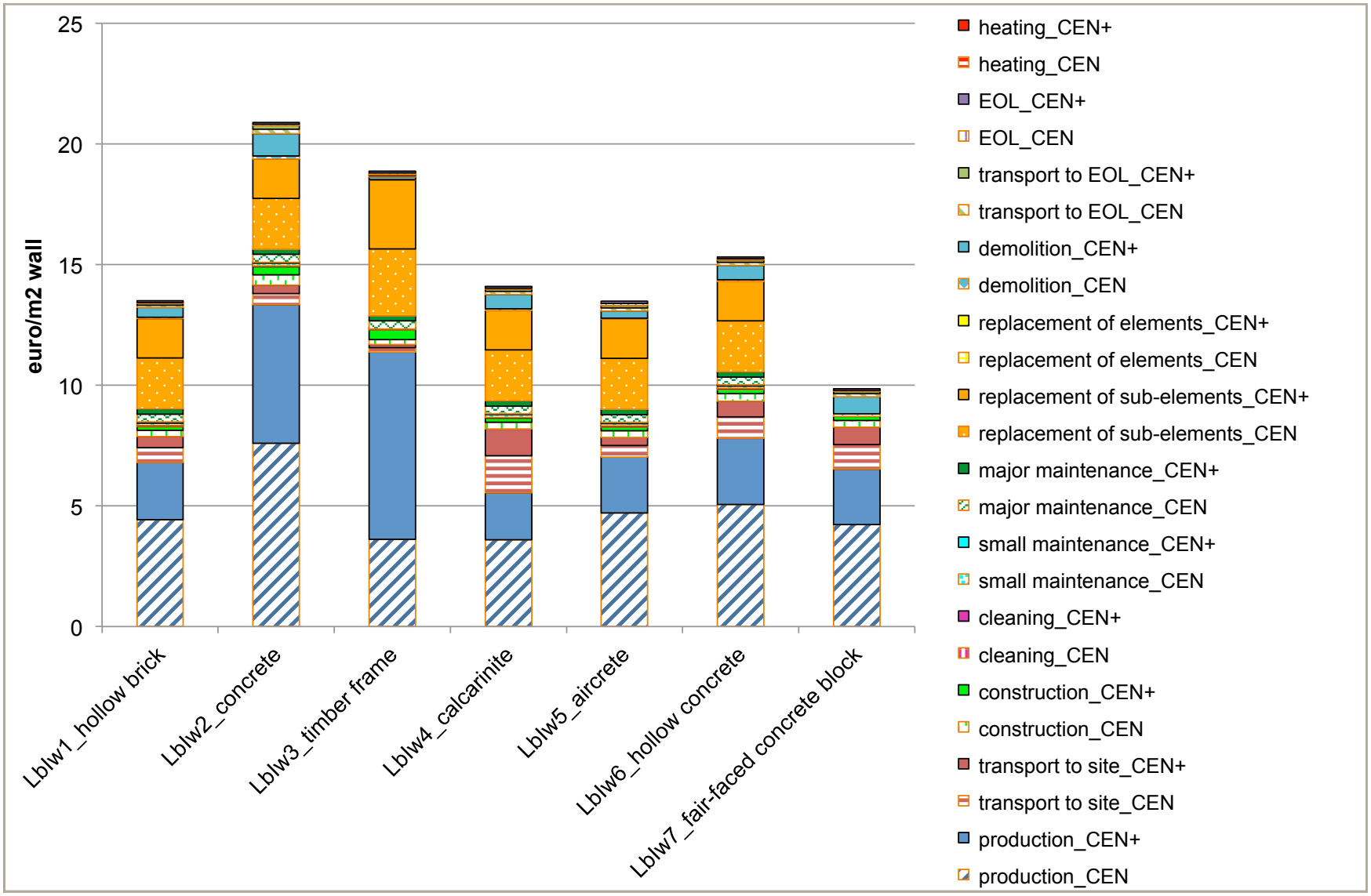

Figure L 3: Aggregated environmental profiles (split up into CEN and CEN+) for several building element variants 'load-bearing interior wall' per life cycle stage, expressed in monetary units.

3.1. Lblw1_hollow brick

Table 3.1: overview of the detailed composition of variant 'Lblw1_hollow brick'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw1_hollow brick									
Internal wall - loadbearing - primary part - blocks/stones - building bricks (290x140x140), incl. mortar	m²			120	necessary	1	0,14	0,353	0,400
Wall finishes, internal - plaster - gypsum on brickwork - with machine (for paint or wall paper)	m²	5	10	40	aesthetic	2	0,01	0,520	0,020
Wall finishes, internal - treatment of closing sub-element - painting on gypsum plaster - acrylic paint	m²		5	10	aesthetic	2		na	

- u: unit;
- MiM: minor maintenance frequency;
- MaM: major maintenance frequency;
- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

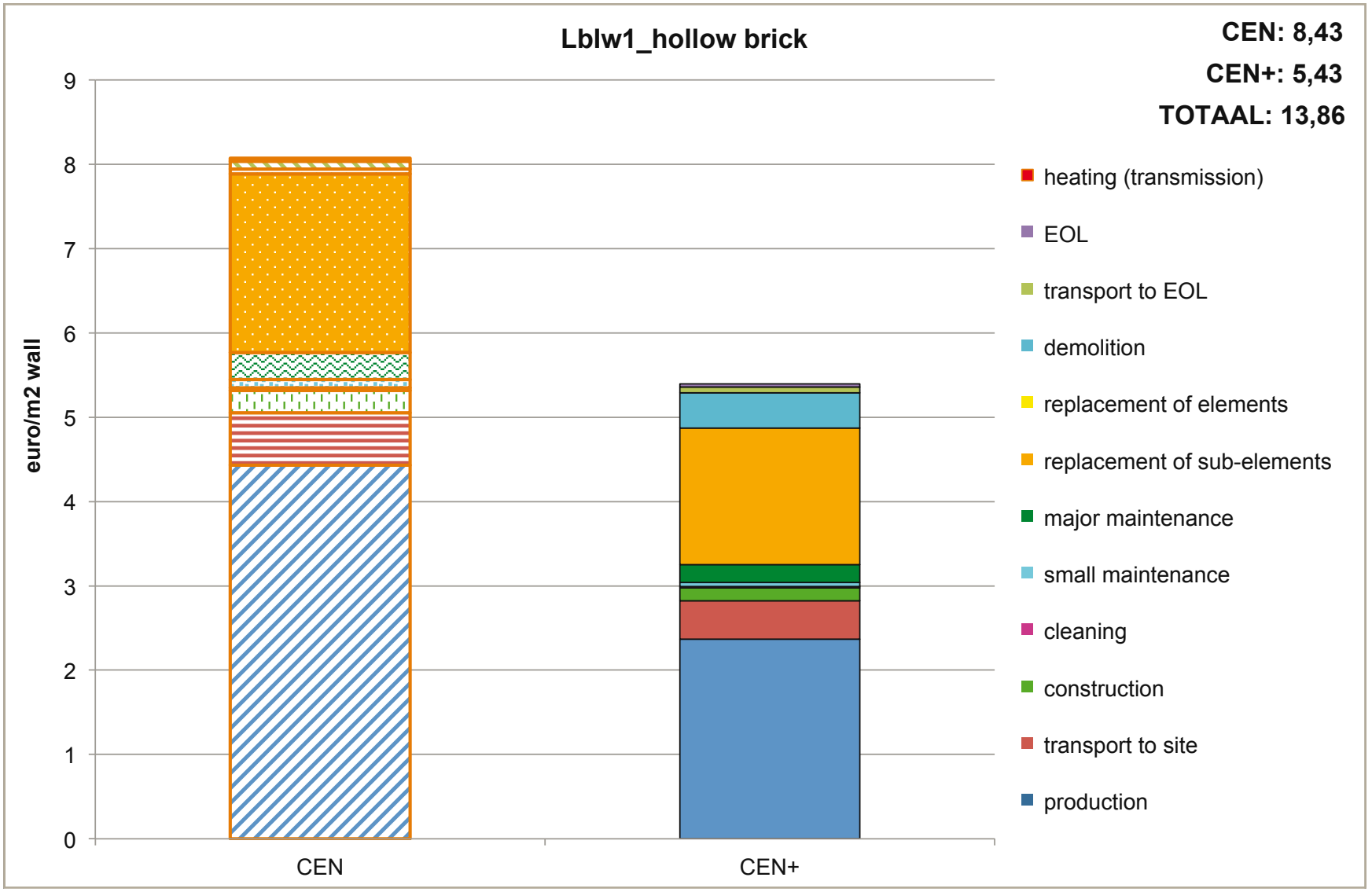

Figure interior wall 3.1.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw1_hollow brick' per life cycle stage, expressed in monetary units.

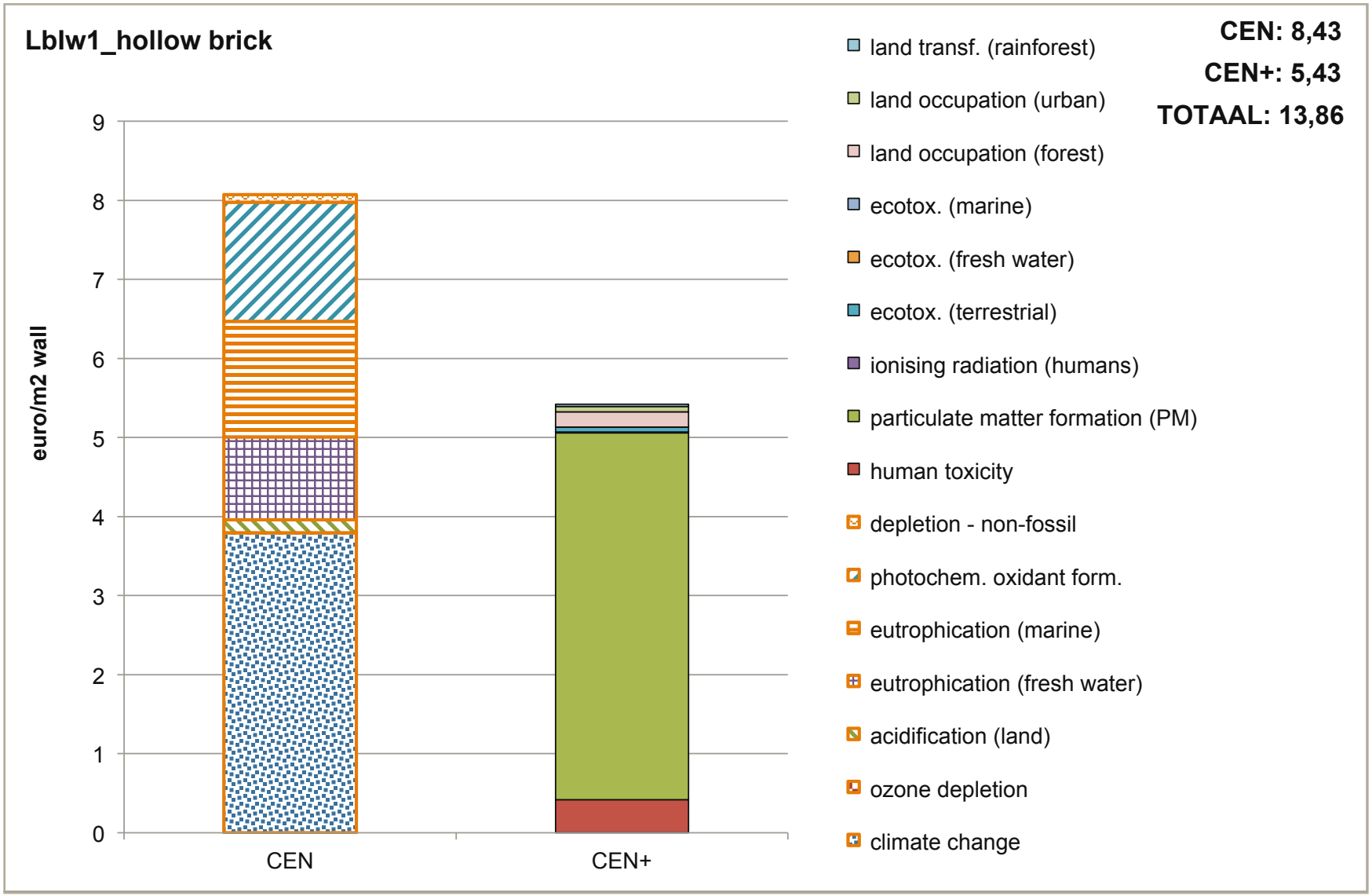

Figure interior wall 3.1.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw1_hollow brick' per environmental indicator, expressed in monetary units.

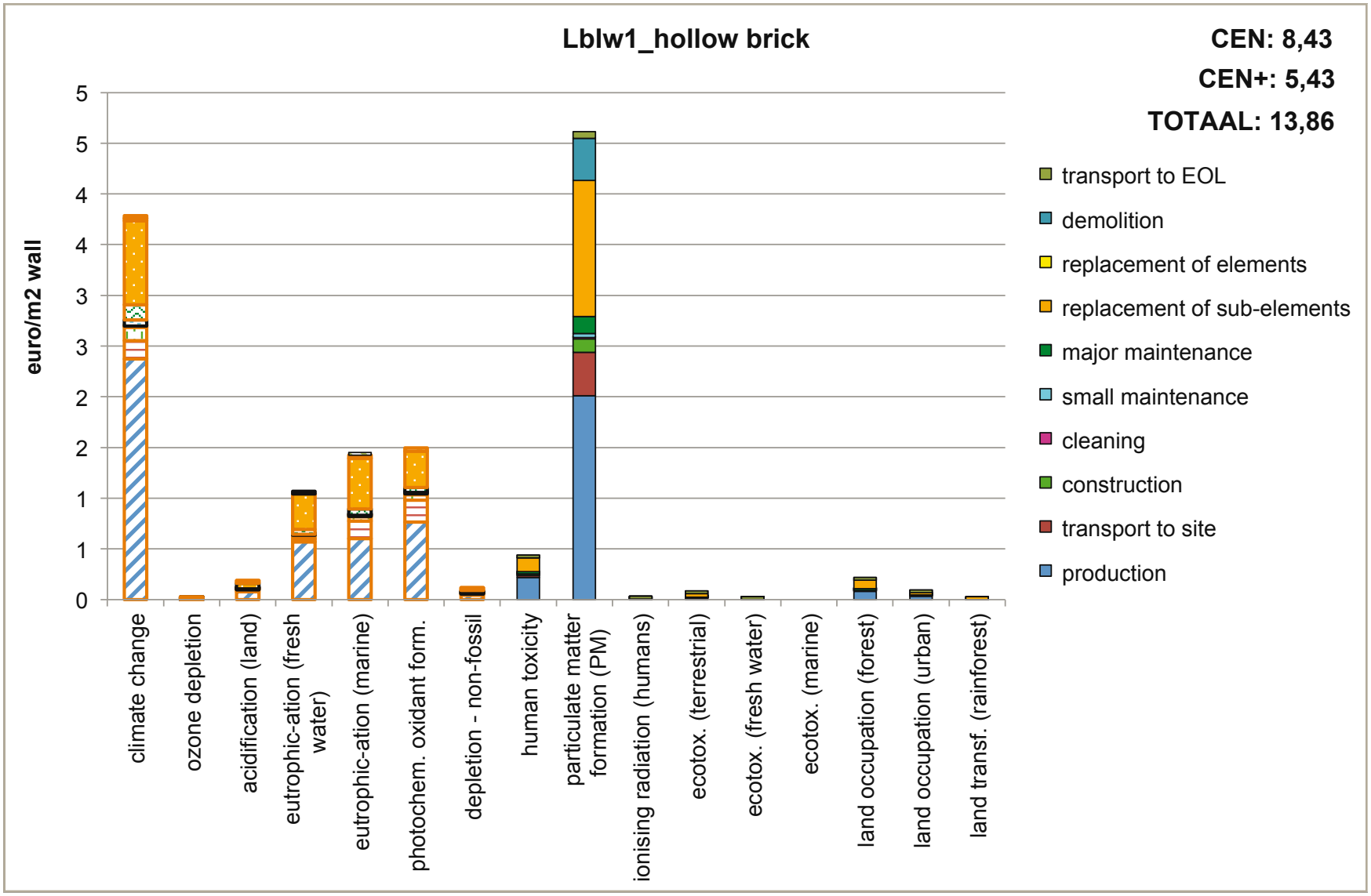

Figure interior wall 3.1.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw1_hollow brick' per life cycle stage and per individual environmental indicator, expressed in monetary units.

3.2. Lblw2_concrete

Table 3.2: overview of the detailed composition of variant 'Lblw2_concrete'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw2_concrete									
Internal wall - loadbearing - primary part - in situ/reinforced concrete	m^3			120	necessary	0,14		1,700	
Wall finishes, internal - plaster - gypsum on brickwork - with machine (for paint or wall paper)	m^2	5	10	40	aesthetic	2	0,01	0,520	0,020
Wall finishes, internal - treatment of closing sub-element - painting on gypsum plaster - acrylic paint	m^2		5	10	aesthetic	2		na	

- u: unit;
- MiM: minor maintenance frequency;
- MaM: major maintenance frequency;
- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

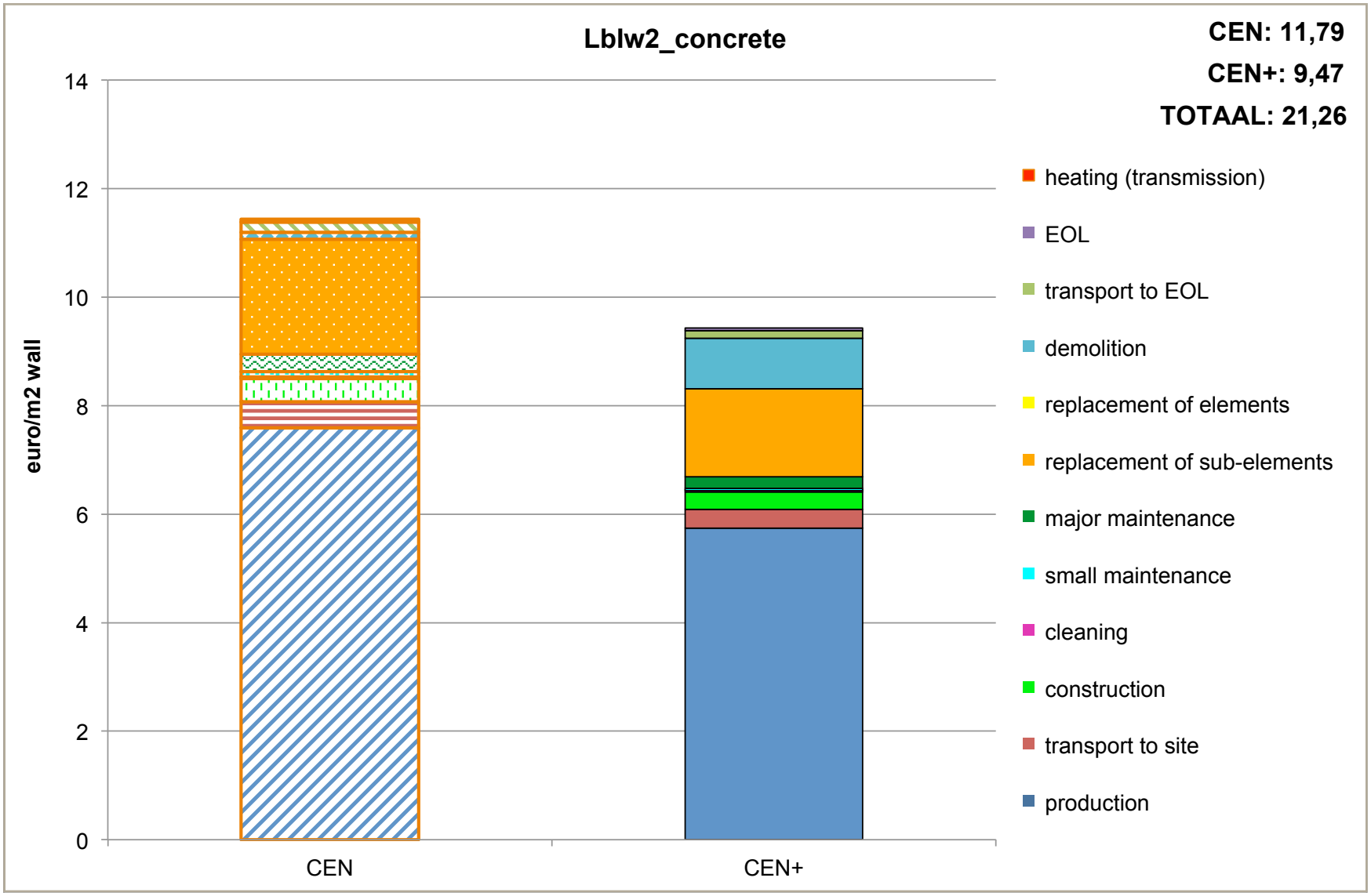

Figure interior wall 3.2.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw2_concrete' per life cycle stage, expressed in monetary units.

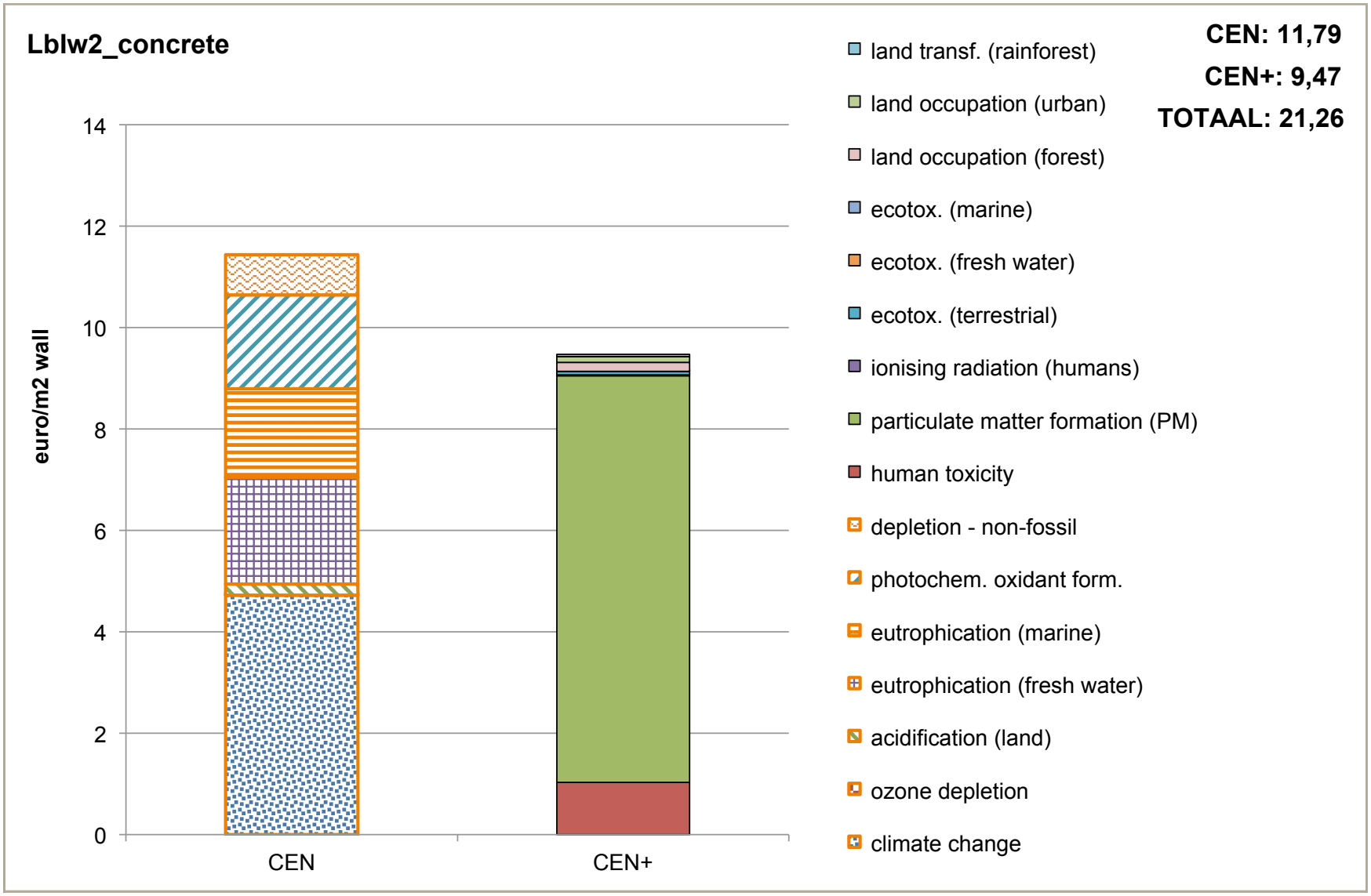

Figure interior wall 3.2.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw2_concrete' per environmental indicator, expressed in monetary units.

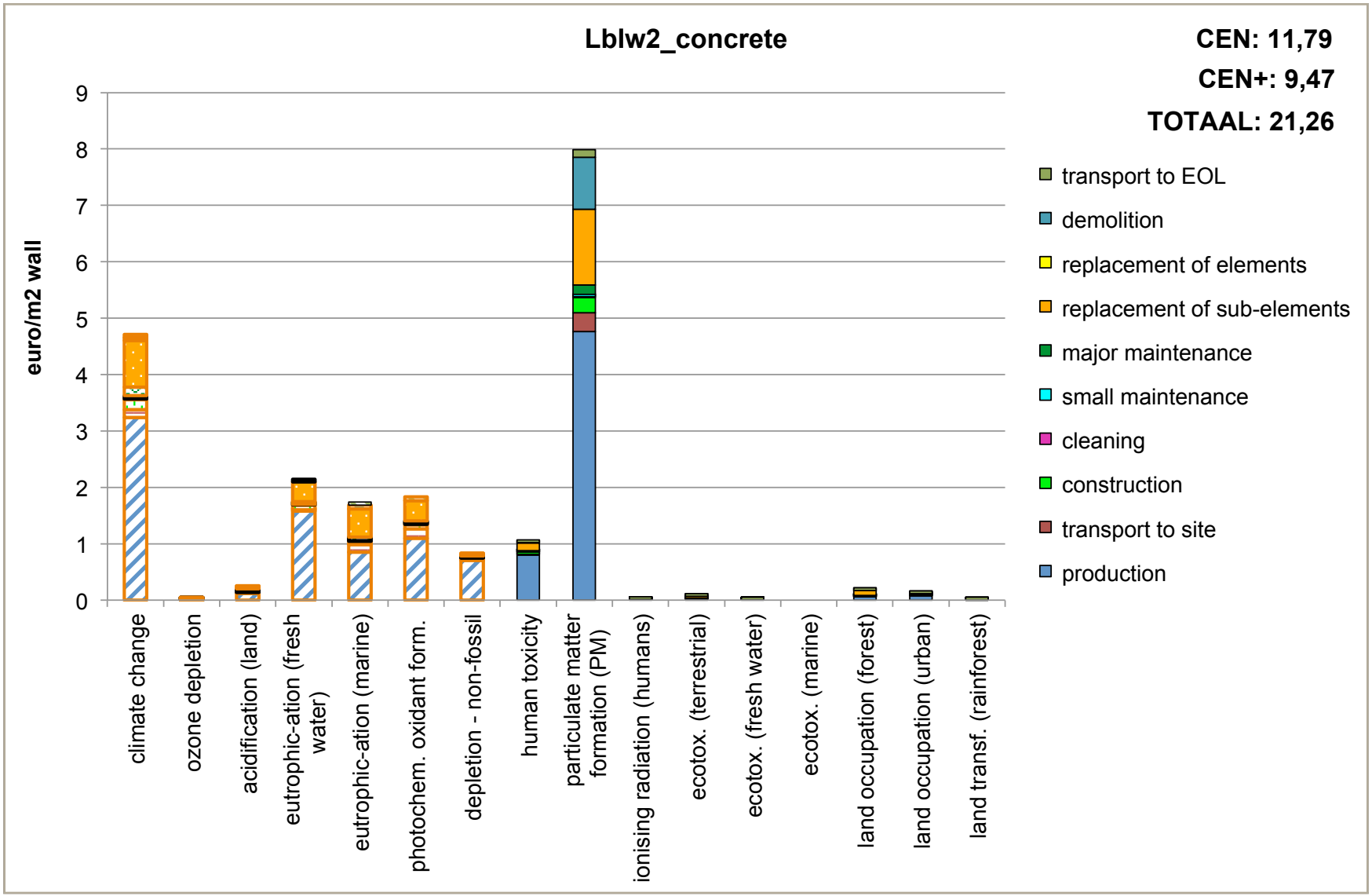

Figure interior wall 3.2.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw2_concrete' per life cycle stage and per individual environmental indicator, expressed in monetary units.

3.3. Lblw3_timber frame

Table 3.3: overview of the detailed composition of variant 'Lblw3_timber frame'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw3_timber frame									
Internal wall - loadbearing - primary part - blocks/stones - building bricks (290x140x140), incl. mortar	m²			120	necessary	0,027	0,14	0,353	0,400
Internal wall - loadbearing - primary part - wood skeleton (on site) - 14 cm - belgian mix	m²			120	necessary	0,973		na	
Thermal insulation between wood skeleton - blanket, batt - anorganic fiber - glass wool - 14cm	m²			120	necessary	1	0,14	0,054	2,590
Wall finishes, internal - board - gypsum (1,25cm) - screwed (excl. supporting construction) - width 60 cm - inclusive joint filler	m²		10	30	necessary	2	0,01	na	0,050
Wall finishes, internal - support structure for boards -profiles (0,022x0,047)- Belgian mix	m²			30	necessary	2	0,02	na	0,170
Wall finishes, internal - treatment of closing sub-element - painting on gypsum board - acrylic paint	m²		5	10	aesthetic	2		na	

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- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

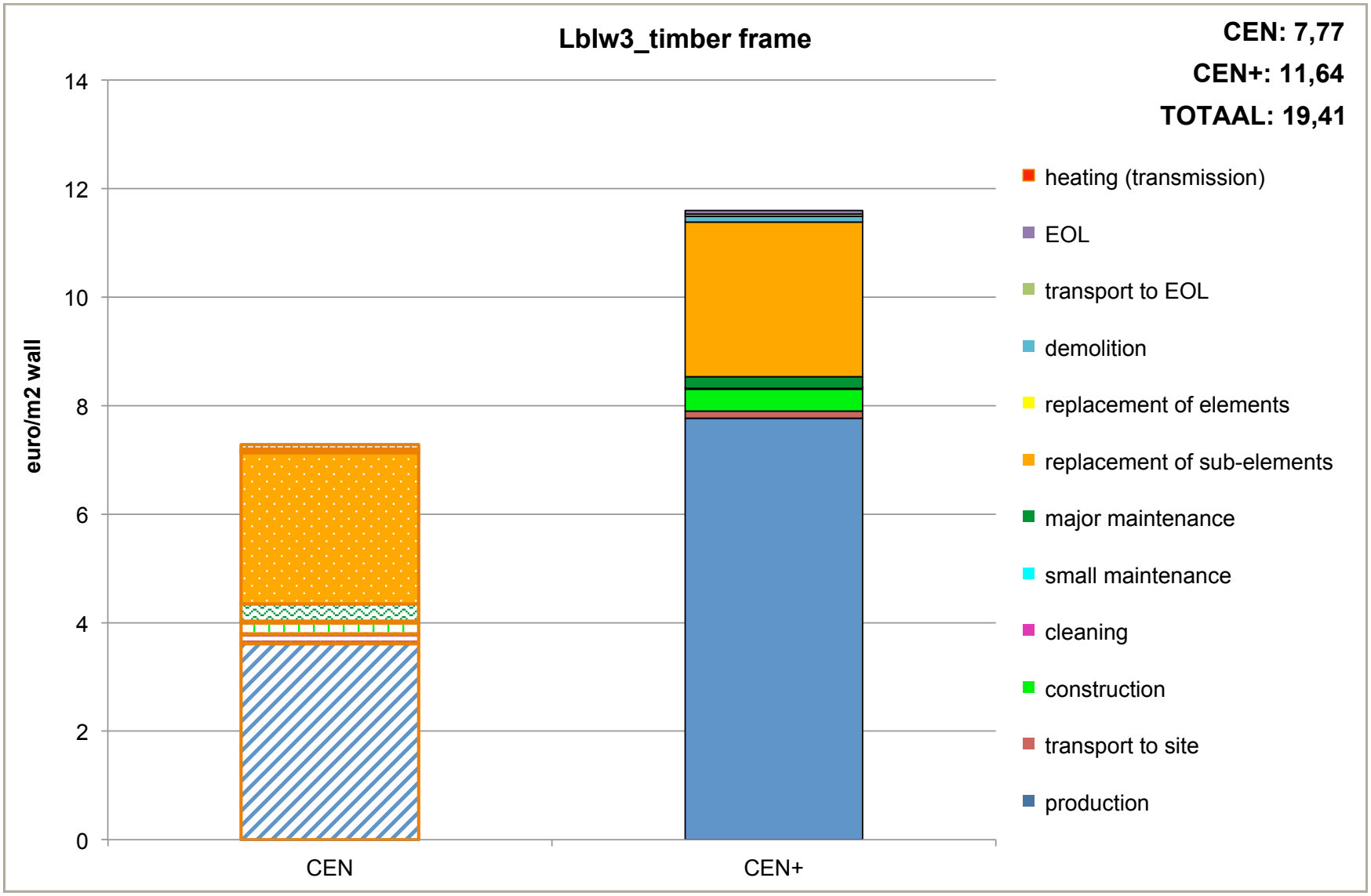

Figure interior wall 3.3.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw3_timber frame' per life cycle stage, expressed in monetary units.

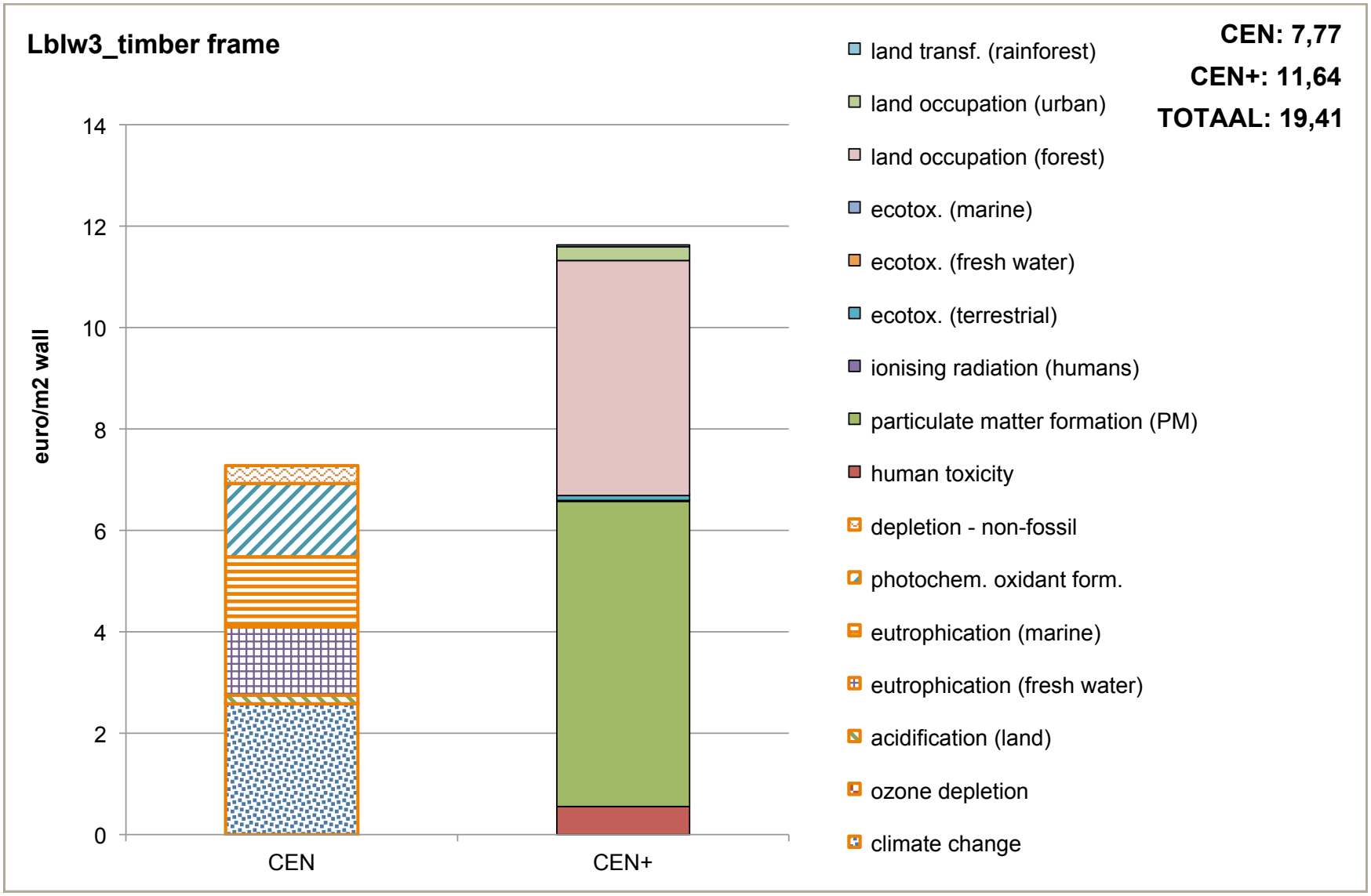

Figure interior wall 3.3.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw3_timber frame' per environmental indicator, expressed in monetary units.

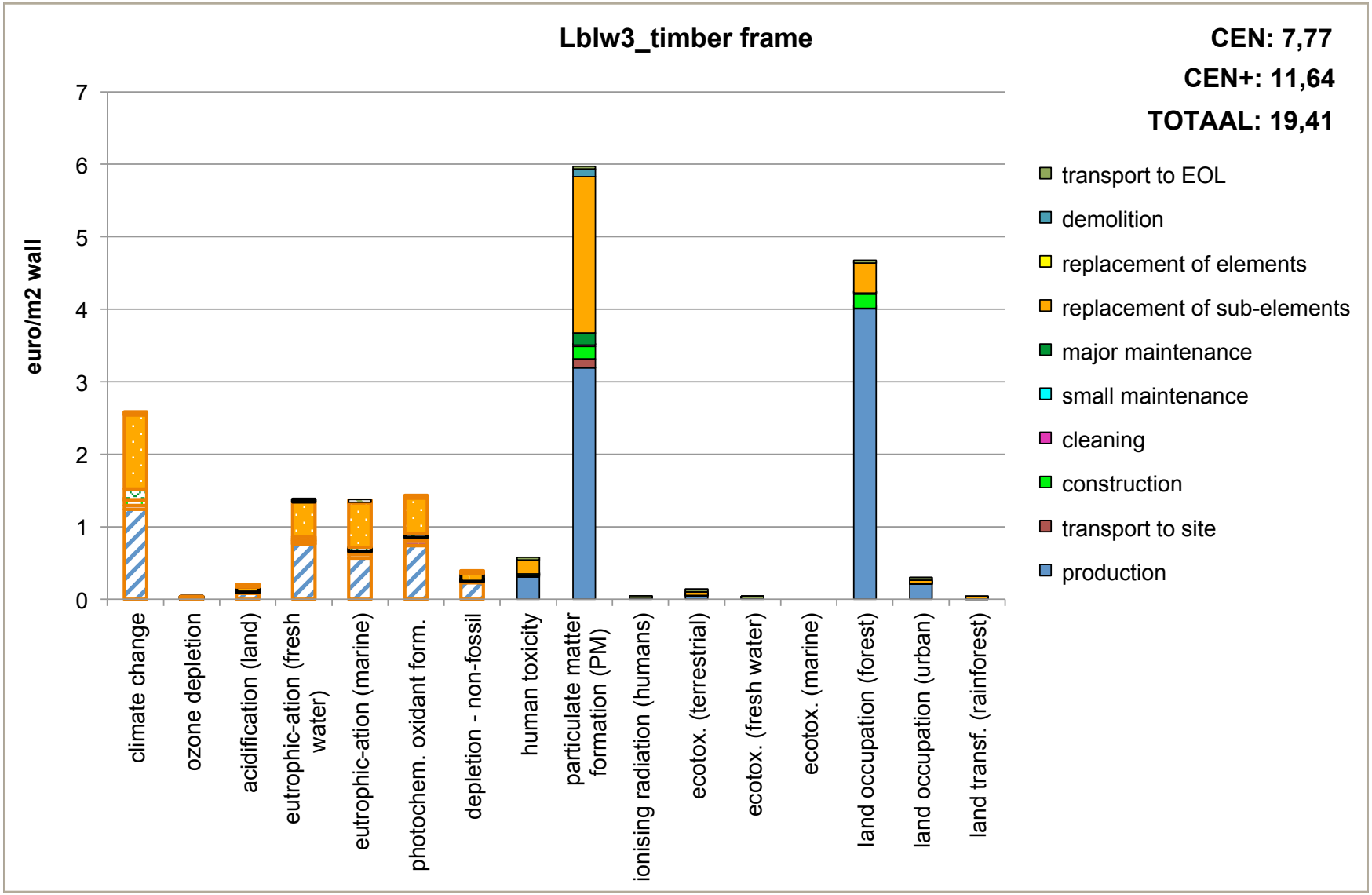

Figure interior wall 3.3.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw3_timber frame' per life cycle stage and per individual environmental indicator, expressed in monetary units.

3.4. Lblw4_calcarenite

Table 3.4: overview of the detailed composition of variant 'Lblw4_calcarenite'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw4_calcarenite									
Internal wall - loadbearing - primary part - blocks/stones - sand-lime brick - hollow - (300x150x150), glued	m²			120	necessary	1	0,15	0,520	0,290
Wall finishes, internal - plaster - gypsum on brickwork - with machine (for paint or wall paper)	m²	5	10	40	aesthetic	2	0,01	0,520	0,020
Wall finishes, internal - treatment of closing sub-element - painting on gypsum plaster - acrylic paint	m²		5	10	aesthetic	2		na	

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- MiM: minor maintenance frequency;
- MaM: major maintenance frequency;
- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

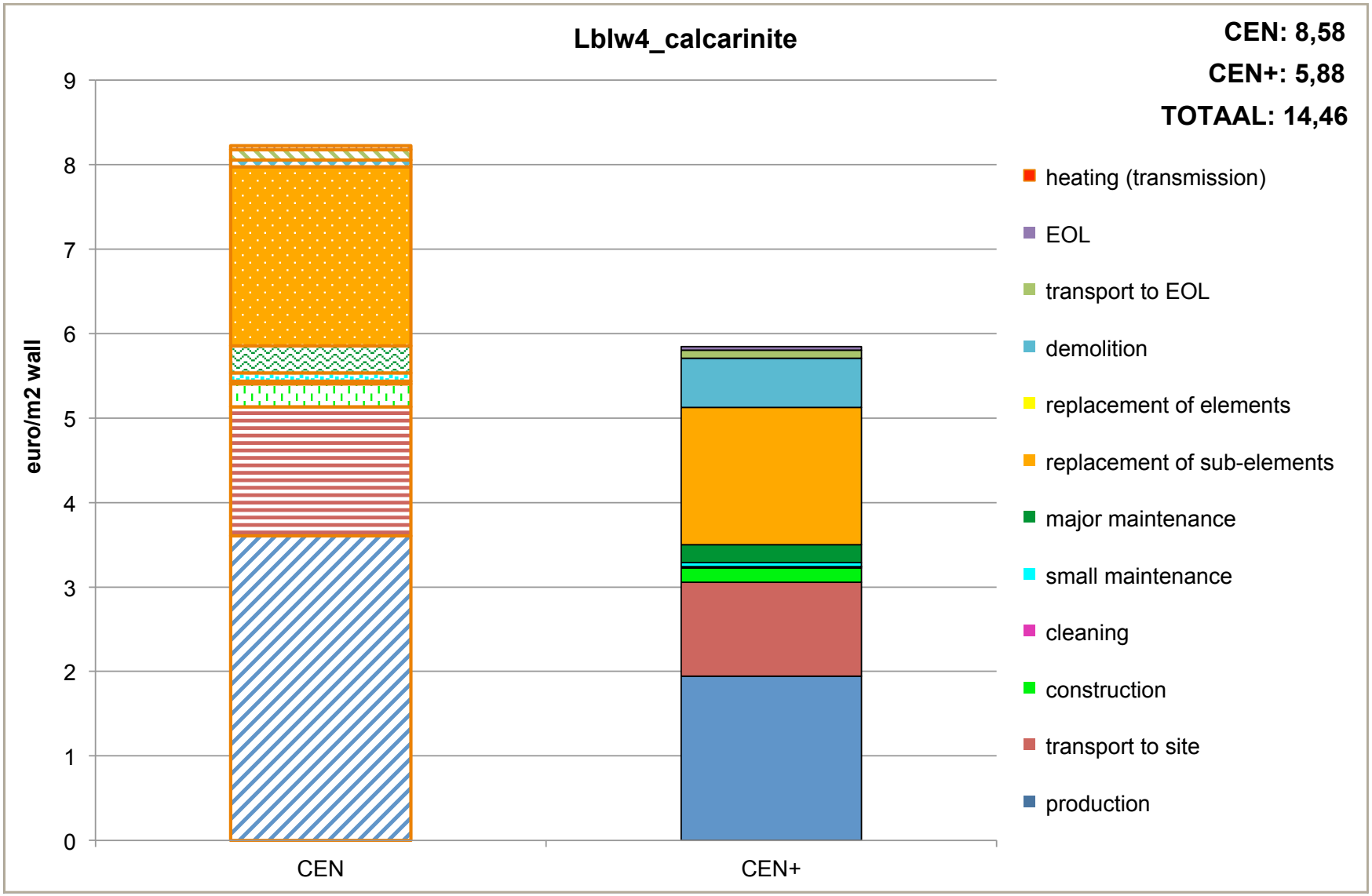

Figure interior wall 3.4.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw4_calcarenite' per life cycle stage, expressed in monetary units.

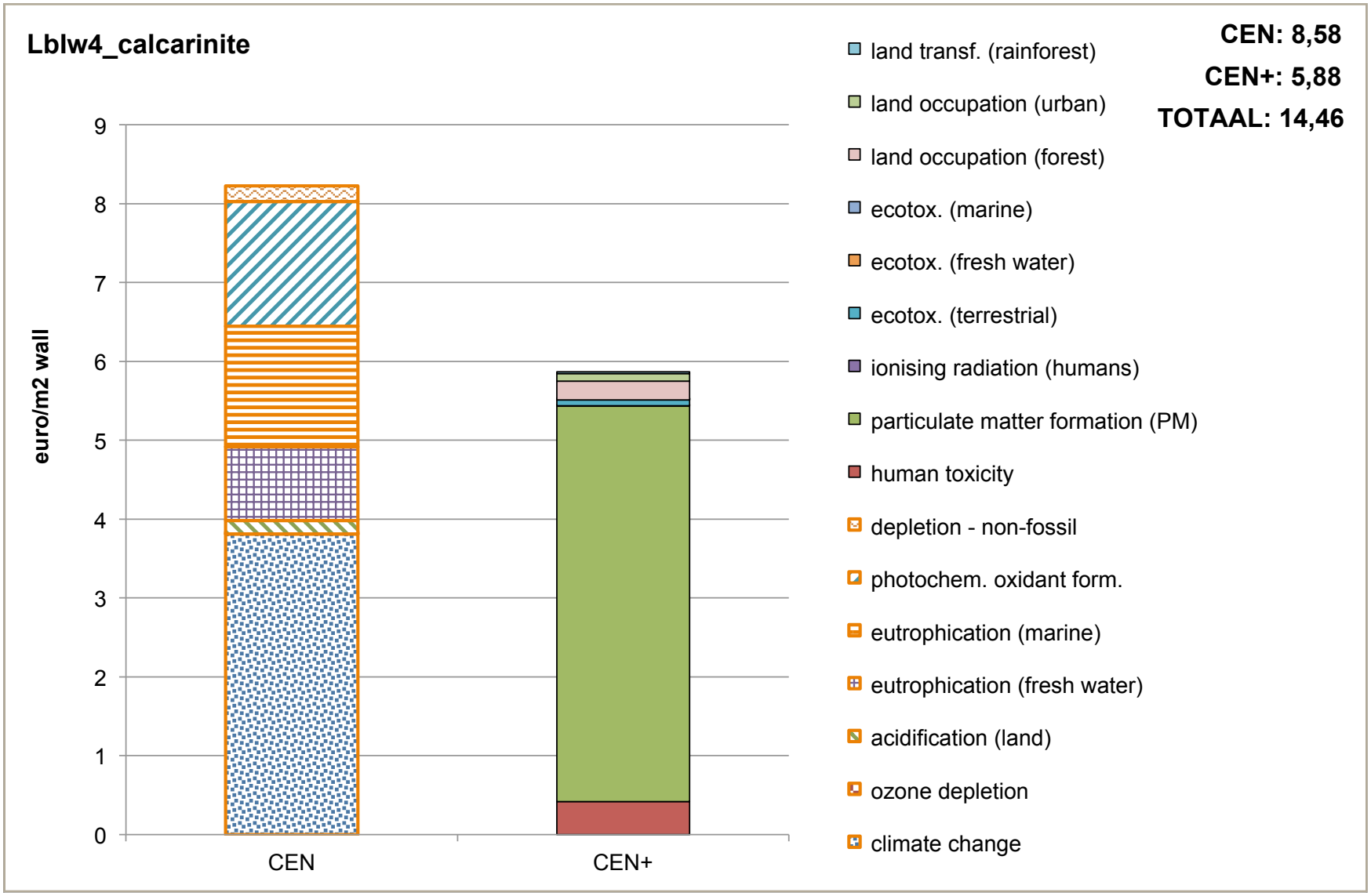

Figure interior wall 3.4.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw4_calcarenite' per environmental indicator, expressed in monetary units.

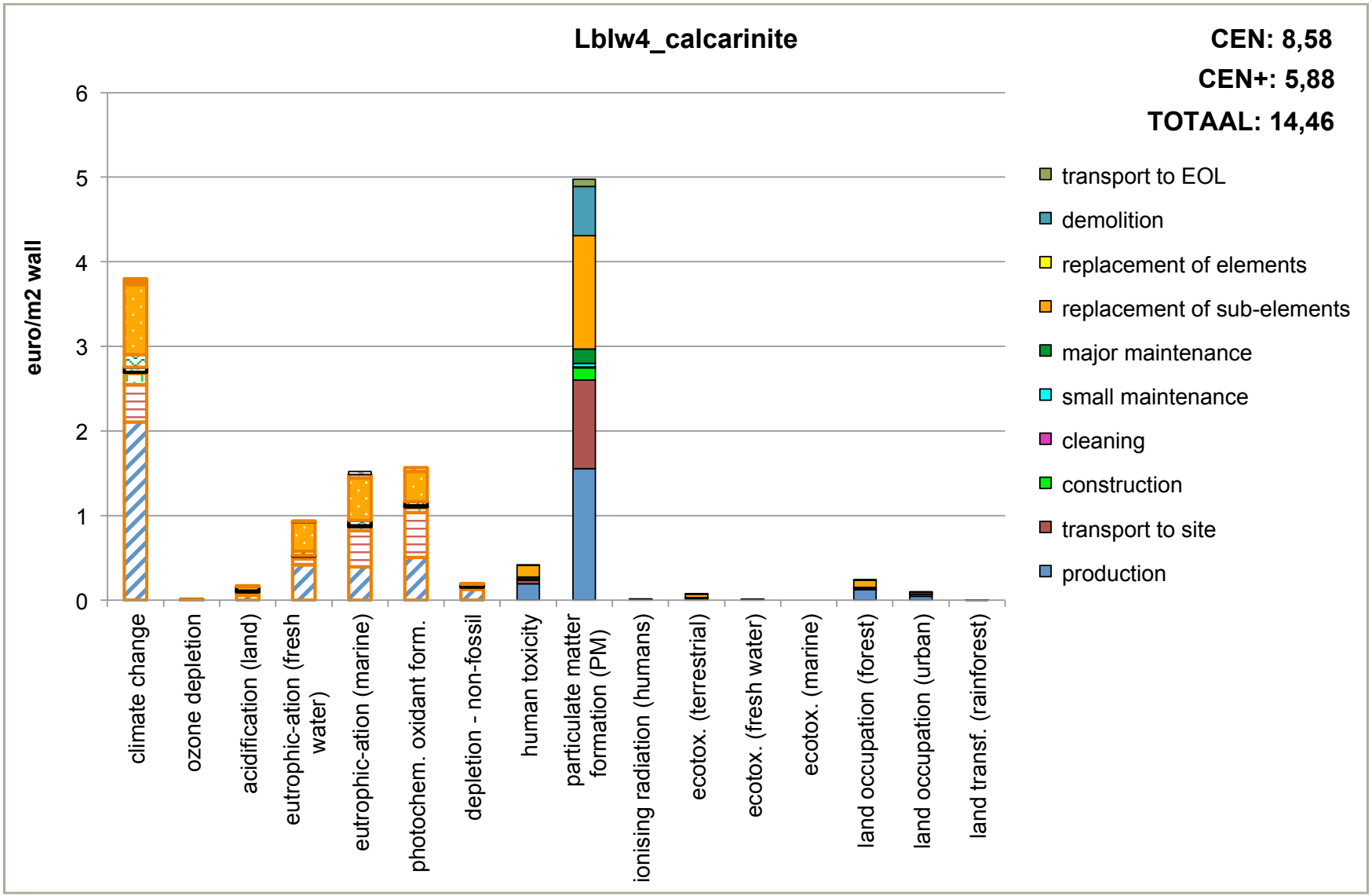

Figure interior wall 3.4.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw4_calcarenite' per life cycle stage and per individual environmental indicator, expressed in monetary units.

3.5. Lblw5_aircrete

Table 3.5: overview of the detailed composition of variant 'Lblw5_aircrete'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw5_aircrete									
Internal wall - loadbearing - primary part - blocks/stones - cellular concrete (600x150x250)	m²			120	necessary	1	0,15	0,125	1,200
Wall finishes, internal - plaster - gypsum on brickwork - with machine (for paint or wall paper)	m²	5	10	40	aesthetic	2	0,01	0,520	0,020
Wall finishes, internal - treatment of closing sub-element - painting on gypsum plaster - acrylic paint	m²		5	10	aesthetic	2		na	

- u: unit;
- MiM: minor maintenance frequency;
- MaM: major maintenance frequency;
- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

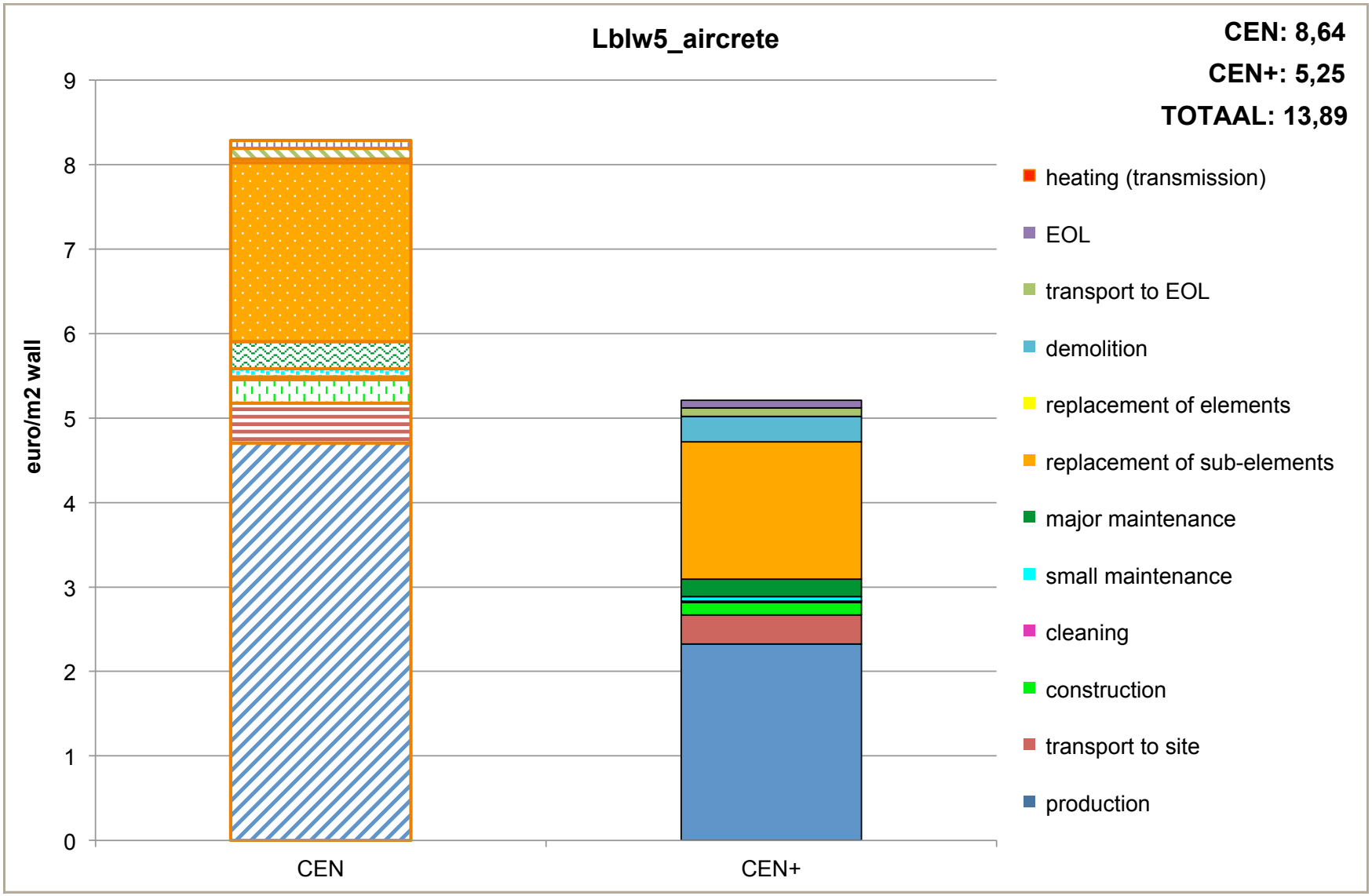

Figure interior wall 3.5.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw5_aircrete' per life cycle stage, expressed in monetary units.

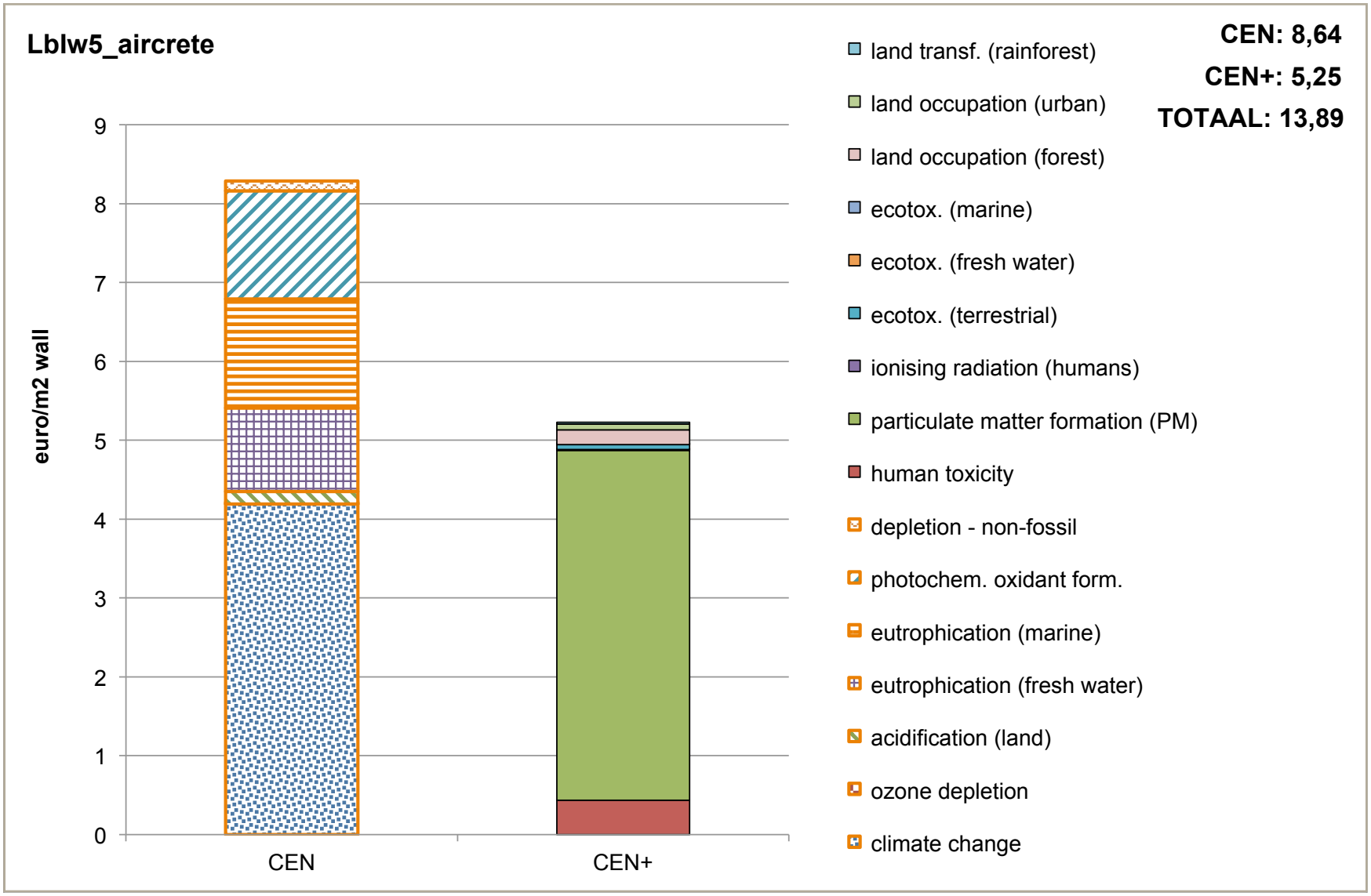

Figure interior wall 3.5.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw5_aircrete' per environmental indicator, expressed in monetary units.

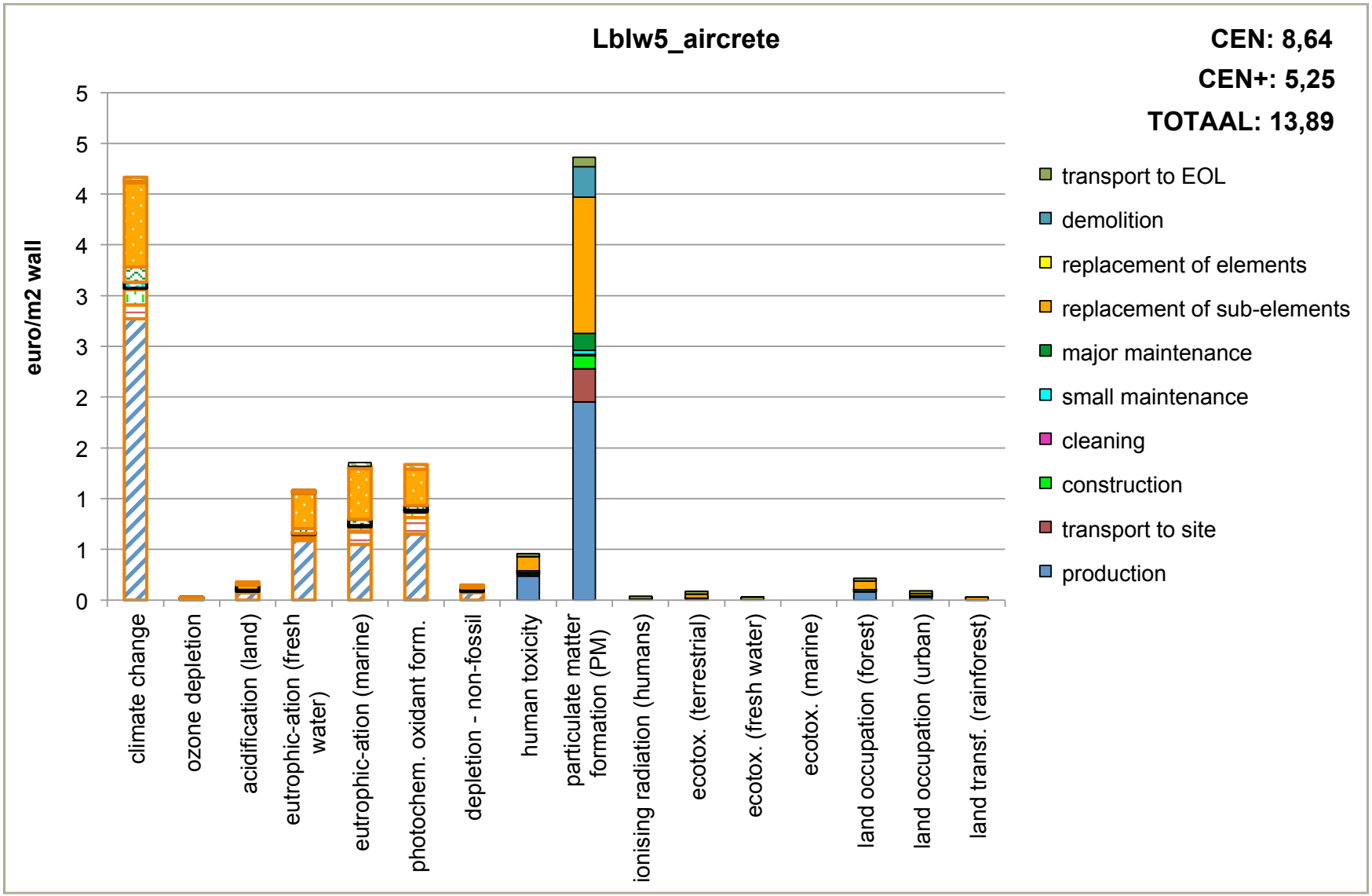

Figure interior wall 3.5.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw5_aircrete' per life cycle stage and per individual environmental indicator, expressed in monetary units.

3.6. Lblw6_hollow concrete

Table 3.6: overview of the detailed composition of variant 'Lblw6_hollow concrete'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw6_hollow concrete									
Internal wall - loadbearing - primary part - blocks/stones - concrete - hollow (290x140x190)	m²	0	0	120	necessary	1	0,19	na	0,110
Wall finishes, internal - plaster - gypsum on brickwork - with machine (for paint or wall paper)	m²	5	10	40	aesthetic	2	0,01	0,520	0,019
Wall finishes, internal - treatment of closing sub-element - painting on gypsum plaster - acrylic paint	m²	0	5	10	aesthetic	2	0	na	0,000

- u: unit;
- MiM: minor maintenance frequency;
- MaM: major maintenance frequency;
- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

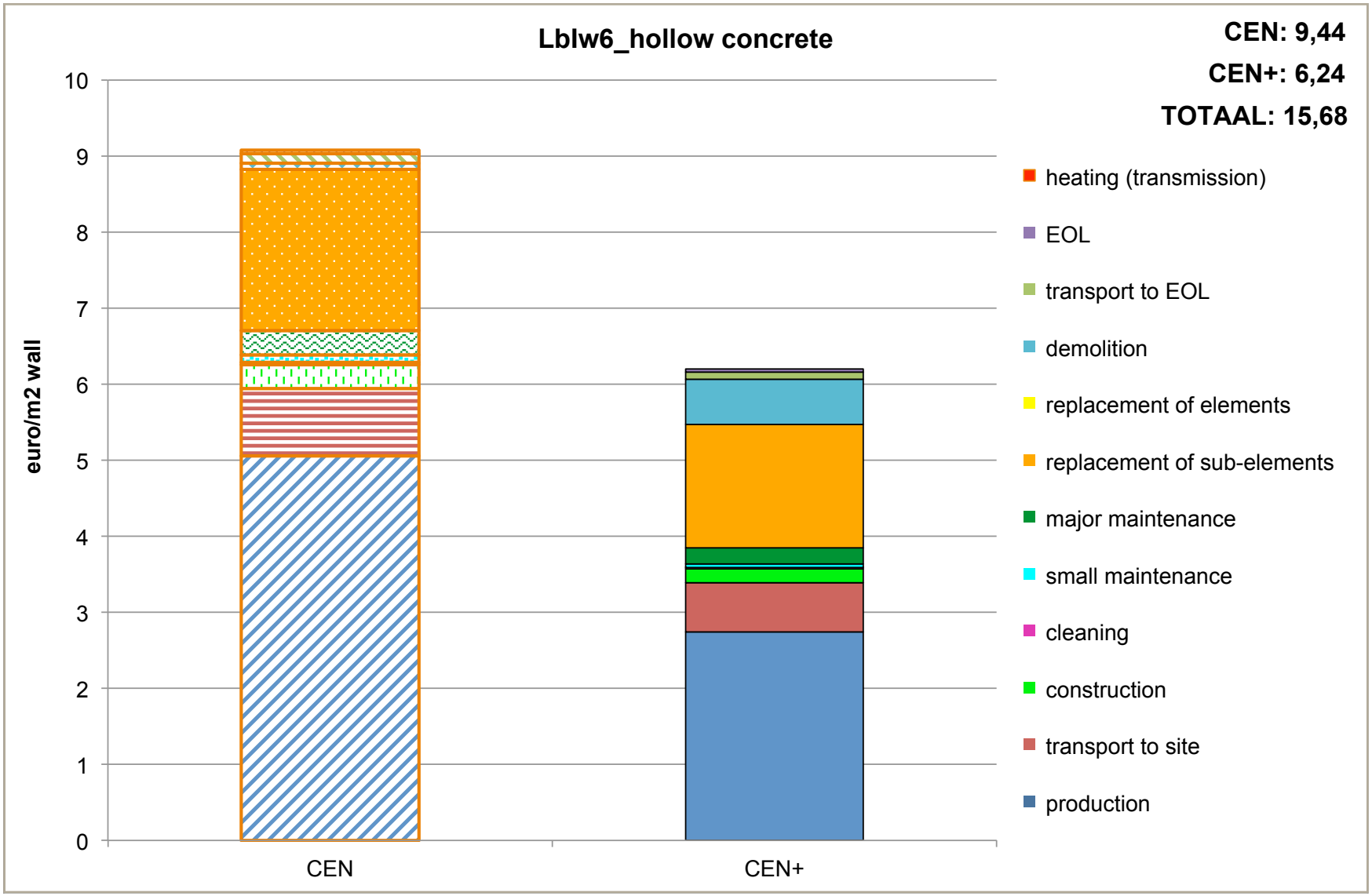

Figure interior wall 3.6.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw6_hollow concrete' per life cycle stage, expressed in monetary units.

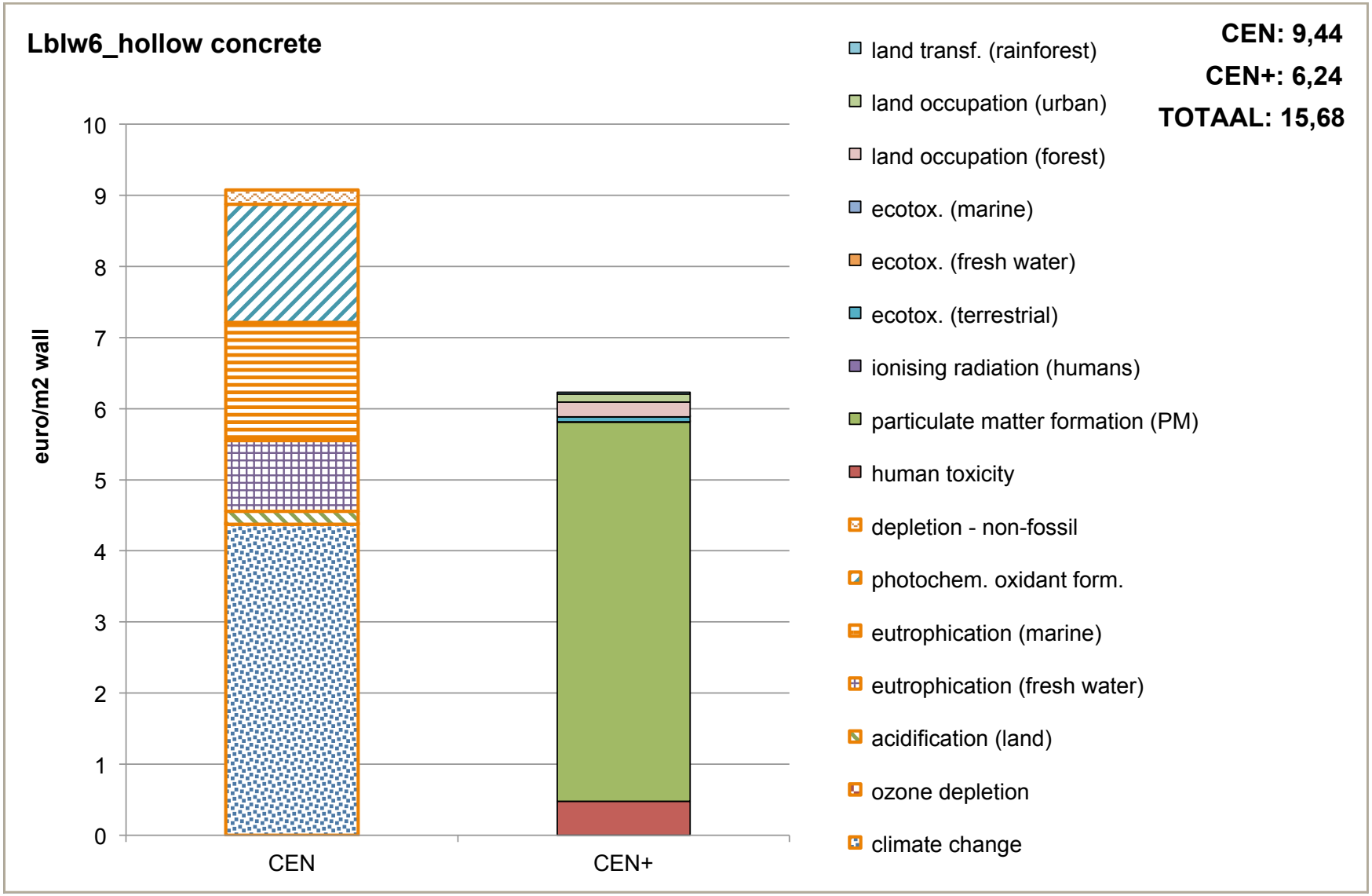

Figure interior wall 3.6.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw6_hollow concrete' per environmental indicator, expressed in monetary units.

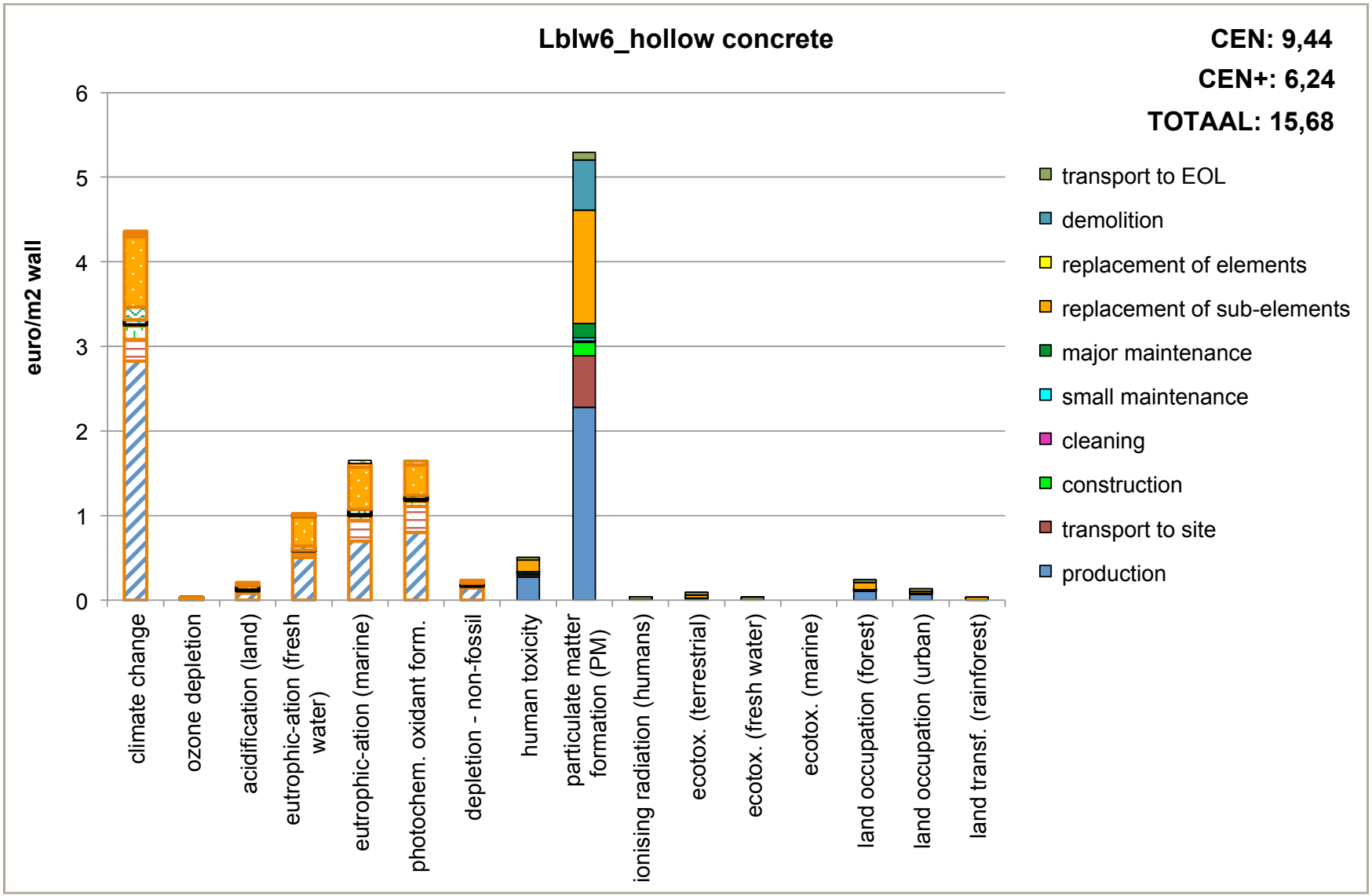

Figure interior wall 3.6.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw6_hollow concrete' per life cycle stage and per individual environmental indicator, expressed in monetary units.

3.7. Lblw7_fair-faced concrete block

Table 3.7: overview of the detailed composition of variant 'Lblw7_fair-faced concrete block'

Description	u	MiM	MaM	Repl	Repl Type	Ratio	t (m)	λ (W/m.K)	R (m².K/W)
Lblw7_fair-faced concrete block									
Internal wall - loadbearing - primary part - blocks/stones - concrete - hollow (290x140x190)	m²	0	0	120	necessary	1	0,190	na	0,11

- u: unit;
- MiM: minor maintenance frequency;
- MaM: major maintenance frequency;
- Repl: replacement frequency;
- type Repl: type of replacement (necessary or aesthetic);
- ratio: quantity per m²;
- t: layer thickness (in m);
- λ: heat conduction coefficient (in W/m.K);
- R: thermal resistance = t/λ (in m2.K/W)

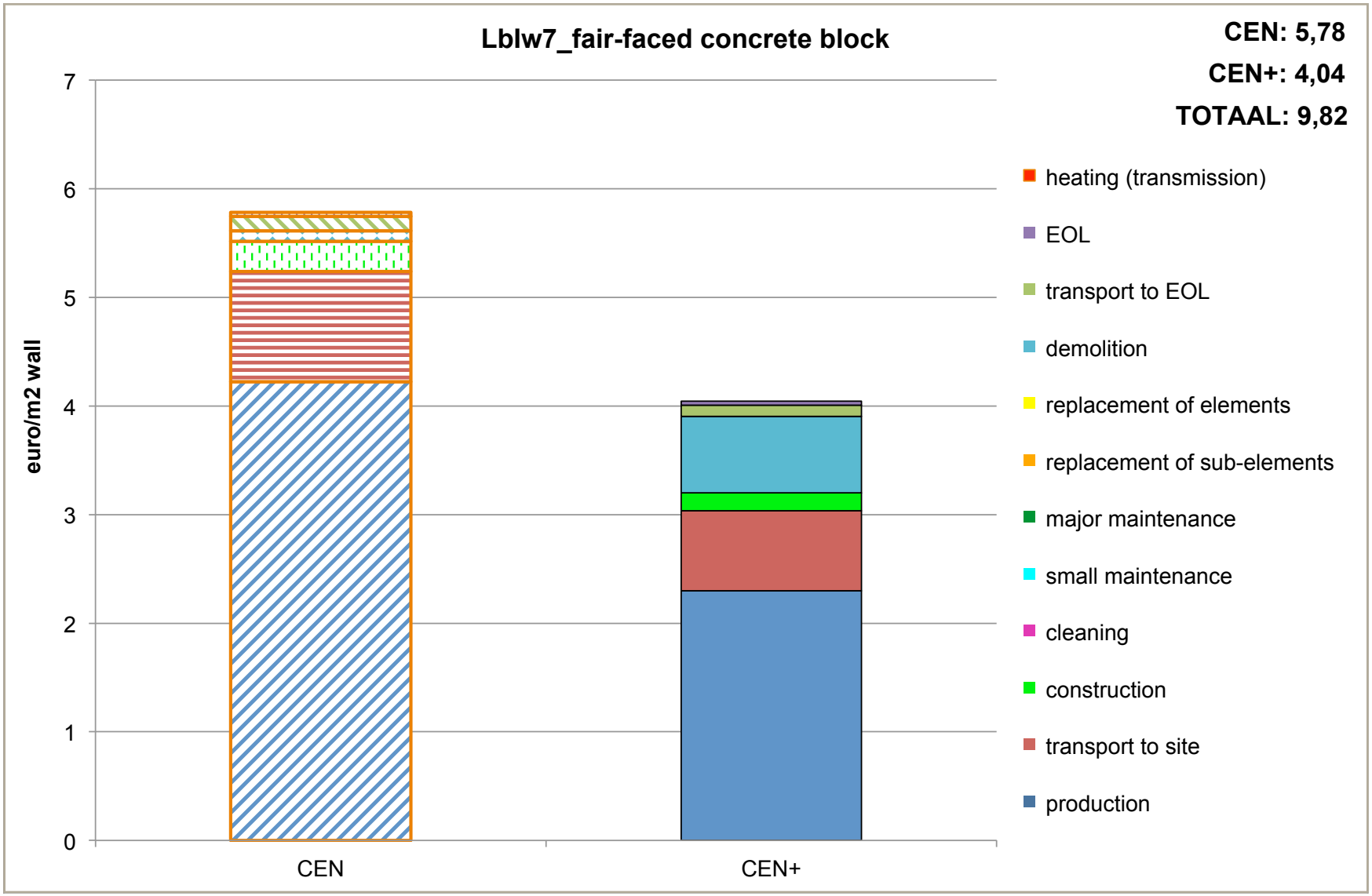

Figure interior wall 3.7.1: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw7_fair-faced concrete block' per life cycle stage, expressed in monetary units.

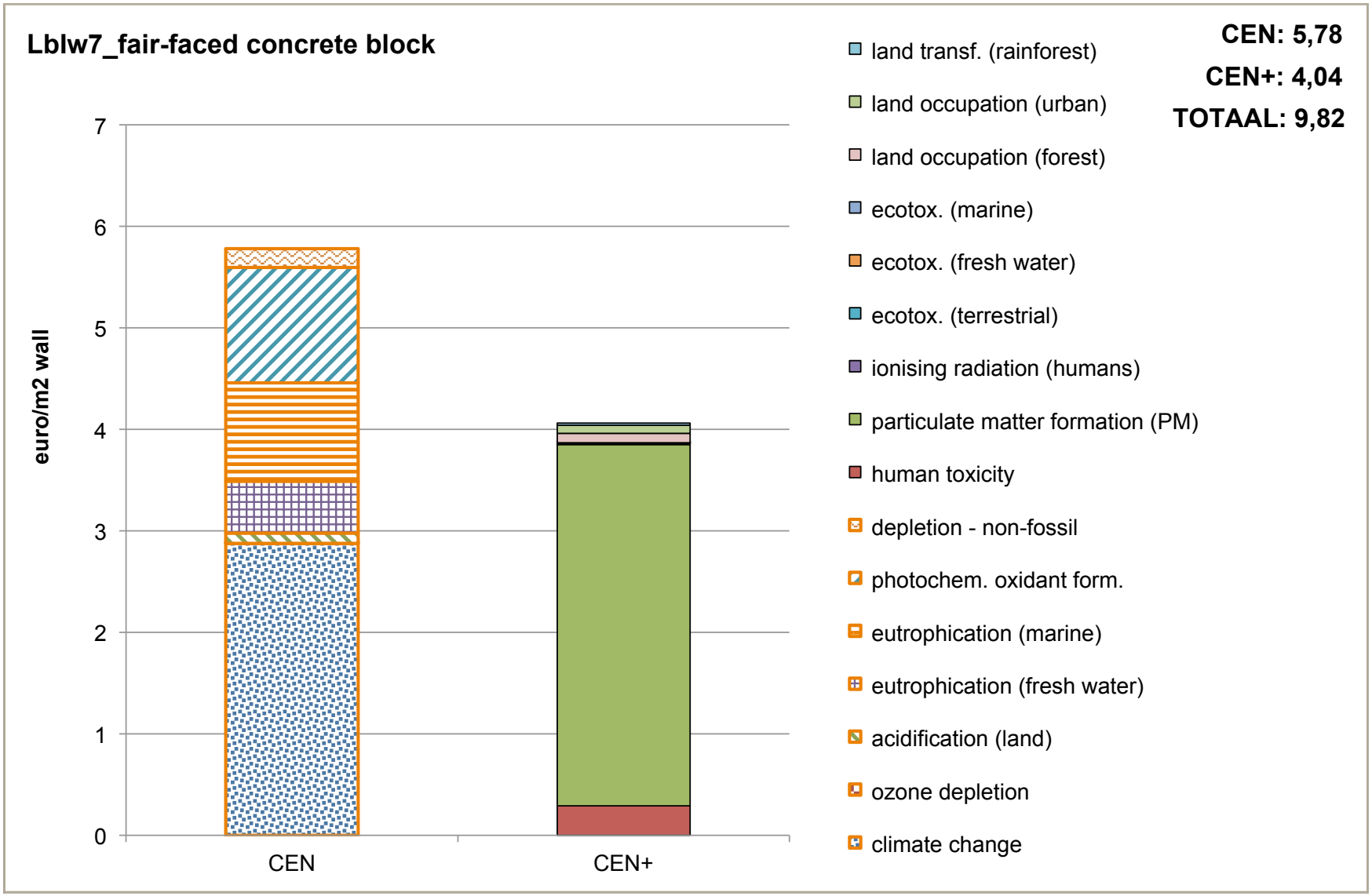

Figure interior wall 3.7.2: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw7_fair-faced concrete block' per environmental indicator, expressed in monetary units.

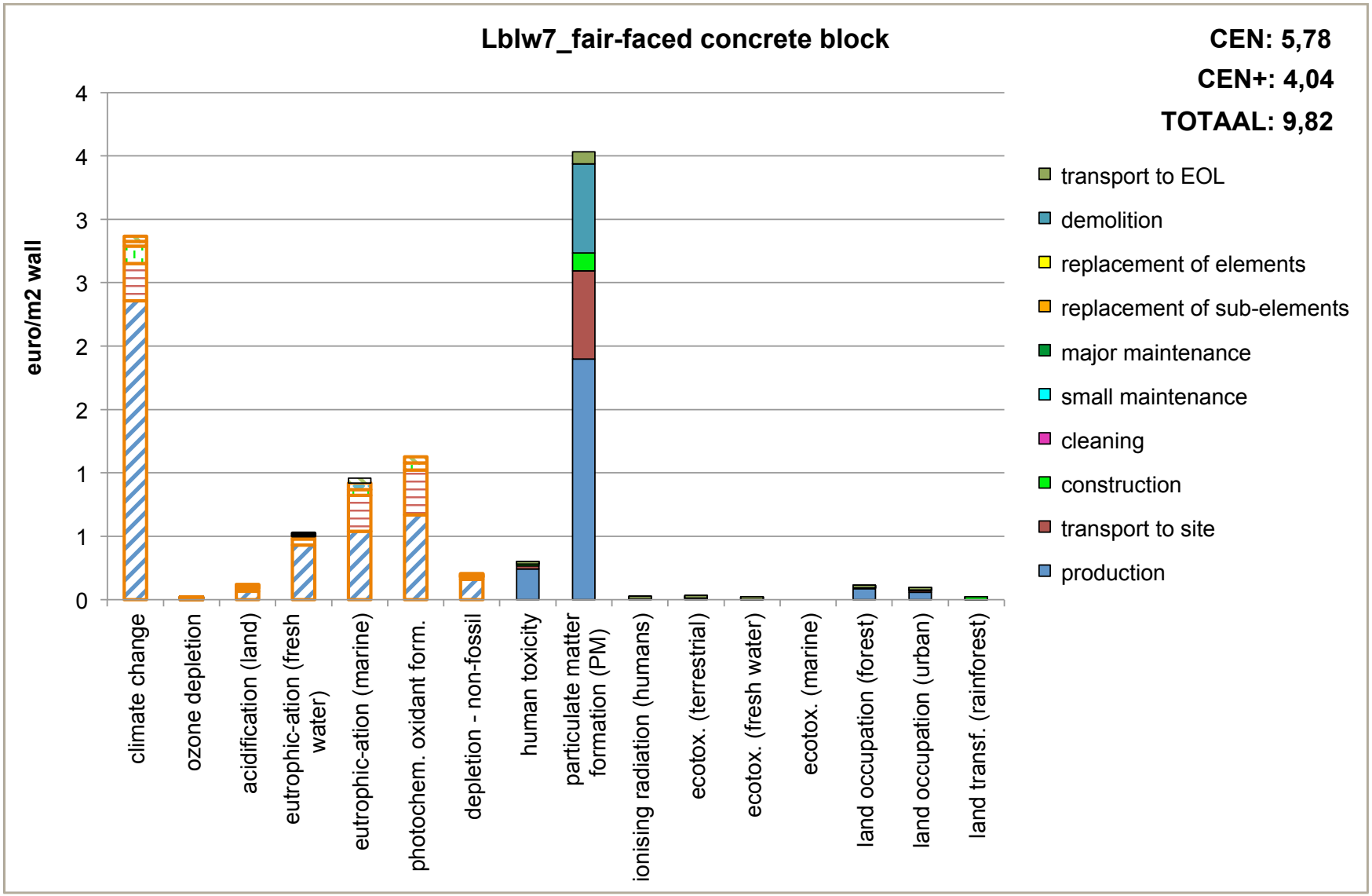

Figure interior wall 3.7.3: Aggregated environmental profile (divided into CEN and CEN+) of variant 'Lblw7_fair-faced concrete block' per life cycle stage and per individual environmental indicator, expressed in monetary units.

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