

Thor Office buildings - Life-cycle assessment, EN-15978 [Project basic information](#)

Result report: Thor Office buildings

Project	Thor - Thor Office buildings
User	Jiachen LEI - 2022.11.23
Tool	Life-cycle assessment, EN-15978
Details	Building life-cycle assessment according to the European Standard EN 15978. This LCA software covers life cycle stages from cradle to grave with separate reporting to product stage, construction process, use stage, operational energy, and end of life. This LCA software and related datasets are compliant with ISO 14040/14044 or EN 15804. It is compliant with the Active House Specification requirements.
General information	
Type	Office buildings
Country	China
Address	HKUSTGZ
Gross Floor Area (m²)	7472
Number of above ground floors	2
Frame type	concrete
Certifications pursued	China Green Building Label / Three Star

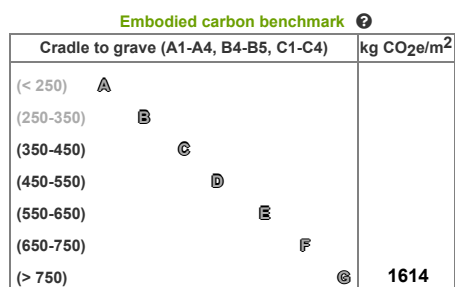
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 **50,445 Tonnes CO₂e**

 **135.02 kg CO₂e / m² / year**

 **2,522,266 € Social cost of carbon**

Carbon Heroes Benchmark



CH Q3 2021 Global - office 
 Download as image

Results

Life cycle assessment results

[Download Results Summary](#)

Result category	Global warming kg CO _{2e}	Acidification kg SO _{2e}	Eutrophication kg PO _{4e}	Ozone Depletion kg CFC11e	Formation of ozone of lower atmosphere kg Ethenee	Total use of primary energy ex. raw materials MJ	Biogenic carbon storage kg CO _{2e} bio	
A1-A3 Construction Materials	1.17E7	5.26E4	1.42E4	4.27E-1	5.01E3	1.2E8	0E0	Details
+ A4 Transportation to site	6.25E4	1.68E2	3.95E1	1.42E-3	-4.5E1	9.95E5		Details
A5 Construction/installation process								Hide empty
B1-B5 Maintenance and material replacement	5.96E4	2.9E2	8.06E1	2.01E-2	2.07E1	2.38E5		Details
B6 Energy consumption	3.82E7	3.08E5	7.03E4	7.46E-1	1.08E4	5.02E8		Details
B7 Water use	2.28E5	1.6E3	4.58E3	2.3E-2	6.7E1	4.12E6		Details
+ C1-C4 End of life	1.99E5	1.02E3	2.18E2	3.82E-2	1.83E1	5.2E6		Details
+ D External impacts (not included in totals)	-8.33E6	-3.8E4	-5.43E3	-3.71E-1	-4.16E3	-1.08E8		Details
Total	5.04E7	3.64E5	8.94E4	1.26E0	1.59E4	6.33E8	0E0	
Results per denominator								
Gross Internal Floor Area (IPMS/RICS) 7472.0 m ²	6.75E3	4.87E1	1.2E1	1.68E-4	2.13E0	8.47E4	0E0	
User hours 16.0	3.15E6	2.27E4	5.59E3	7.85E-2	9.95E2	3.95E7	0E0	
Number of users 500.0	1.01E5	7.28E2	1.79E2	2.51E-3	3.18E1	1.27E6	0E0	

Completeness (-) and plausibility checker (grade: D)

! No scope selected for this design

👍 LCA Checker overall grade: D. Grade is based on data you have provided.

LCA Checker overall grade: D

LCA Checker checks the embodied impacts plausibility. These results reflect plausibility for 7472.0 m² project of type new construction, whole building with frame type steel frame with scope consisting of foundations and substructure, structure and enclosure, finishings and other materials, external areas, services. To edit these parameters open LCA Parameters query. The result is intended as indicative of the plausibility; and exceptions may occur.

No.	Check description	Project value	Threshold value	Typical value	Unit	Type	Validated ?
1	Embodied carbon credible (steel frame): Embodied carbon value is unusual (steel frame)	1570.661	150 - 780		kg CO _{2e} /m ²	✗	🔍
2	Finishes mass credible: Has no materials	0.0	greater than 10		kg/m ²	✗	🔍
3	Services mass credible: Has no materials	0.0	greater than 2		kg/m ²	✗	🔍
4	External areas mass credible: Has no materials	0.0	greater than 10		kg/m ²	✗	🔍
5	Insulation mass credible: Has no materials	0.0	1 - 21		kg/m ²	✗	🔍
6	Horizontal materials mass: Has no materials	0.0	100 - 1300		kg/m ²	✗	🔍
7	Mortar mass credible: Has no materials	0.0	0.4 - 50		kg/m ²	✗	🔍
8	Roofing bitumen mass credible: Has no materials	0.0	0.5 - 4		kg/m ²	✗	🔍
9	Replacements share credible: Project has unusual amount of replacements	0.508	10 - 100		%	✗	🔍
10	Embodied carbon credible: Embodied carbon value is unusual	1613.63	150 - 1000		kg CO _{2e} /m ²	✗	🔍
11	Project mass credible (steel frame): Project mass is unusual (steel frame)	140.863	250 - 1250		kg/m ²	✗	🔍
12	Too few materials to be credible: Project has unusually little data	12	greater than 20		nr.	✗	🔍
13	Glass mass credible: Glass mass is unusual	17.944	1 - 13		kg/m ²	✗	🔍
14	Gypsum board mass credible: Gypsum board mass is unusual	1.915	3 - 40		kg/m ²	✗	🔍
15	Structure mass credible: Value seems unusual but is within allowable deviation range	140.863	greater than 150		kg/m ²	⚠️	🔍

Validated checks

帮助

No.	Check description	Project value	Threshold value	Typical value	Unit	Type	Validated ?
16	Foundation mass credible	2014.134	greater than 100		kg/m ²	✓	<input type="radio"/>
17	Project mass credible	2160.099	300 - 3500		kg/m ²	✓	<input type="radio"/>
18	Ready mix and reinforcement ratio	6.285	1 - 7		%	✓	<input type="radio"/>
19	Too dominant single material	37.888	less than 50		%	✓	<input type="radio"/>
20	Steel mass credible (steel frame)	69.287	40 - 250		kg/m ²	✓	<input type="radio"/>
21	Gypsum board and plaster mass credible (no cement)	11.411	0.0 - 80		kg/m ²	✓	<input type="radio"/>
22	Glass and openings mass credible	17.944	2 - 25		kg/m ²	✓	<input type="radio"/>
23	Vertical materials mass	140.863	50 - 700		kg/m ²	✓	<input type="radio"/>
24	Wood mass credible (steel frame)	0.0	0.0 - 50		kg/m ²	✓	<input type="radio"/>
25	Brick mass credible	0.0	0.0 - 100		kg/m ²	✓	<input type="radio"/>

Most contributing materials (Global warming)

Compare data (12)

No.	Resource	Cradle to gate impacts (A1-A3)	Of cradle to gate (A1-A3)	Sustainable alternatives	
1.	Slim-floor composite steel beam, painted, 7850 kg/m ³ , linear density 30-800 kg/m ?	4,446 tonnes CO _{2e}	37.9 %	Show sustainable alternatives	Add to compare
2.	Reinforcement steel (rebar) bolt, polypropylene and powder coated, Ø20mm, HRB500E, 2.47 kg/m, 7850 kg/m ³ ?	2,148 tonnes CO _{2e}	18.3 %	Show sustainable alternatives	Add to compare
3.	Ready-mix concrete, normal-strength, generic, C40/50 (5800/7300 PSI), 50% recycled binders in cement (400 kg/m ³ / 24.97 lbs/ft ³) ?	1,724 tonnes CO _{2e}	14.7 %	Show sustainable alternatives	Add to compare
4.	Solid aluminum panels, 2660 - 2840 kg/m ³ ?	1,490 tonnes CO _{2e}	12.7 %	Show sustainable alternatives	Add to compare
5.	Structural hollow steel sections (HSS), cold rolled, generic, 30 % recycled content, circular, square and rectangular profiles, S235, S275 and S355 ?	534 tonnes CO _{2e}	4.5 %	Show sustainable alternatives	Add to compare
6.	Structural steel plates, 7850 kg/m ³ ?	522 tonnes CO _{2e}	4.4 %	Show sustainable alternatives	Add to compare
7.	Façade glazing element (curtain wall) with aluminium profiles, with triple layer glass, 43.6 kg/m ² ?	443 tonnes CO _{2e}	3.8 %	Show sustainable alternatives	Add to compare
8.	Concrete facade elements, glassfibre reinforced, 12mm, 23.4 kg/m ² , 1950 kg/m ³ ?	382 tonnes CO _{2e}	3.3 %	Show sustainable alternatives	Add to compare
9.	Tufted carpet tiles with recycled nylon 6.6 face fiber, 4.310 kg/m ² ?	16 tonnes CO _{2e}	0.1 %	Show sustainable alternatives	Add to compare
10.	Cement bound terrazzo paving cast-in-place, 41.92 kg/m ² ?	16 tonnes CO _{2e}	0.1 %	Show sustainable alternatives	Add to compare
11.	Glazed ceramic tiles, Bll, 7.5 mm, 13.74 kg/m ² ?	11 tonnes CO _{2e}	0.1 %	Show sustainable alternatives	Add to compare
12.	White granite slab, for façade or floor, 3 cm, 78.6 kg/m ² , 2620 kg/m ³ ?	3.7 tonnes CO _{2e}	0.0 %	Show sustainable alternatives	Add to compare

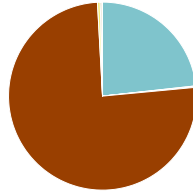
Graphs

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[Sankey](#)
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[Stages - stacked](#)
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[Classifications](#)
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Life-cycle overview of Global warming

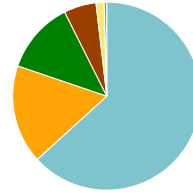
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Global warming kg CO₂e - Life-cycle stages



A1-A3 Materials - 23.3%
 B1-B5 Maintenance and replacement - 0.1%
 B6 Energy - 75.6%
 B7 Water - 0.5%
 C2 Waste transport - 0.3%
 C3 Waste processing - 0.0%
 C4 Waste disposal - 0.1%

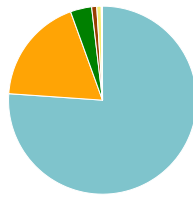
Global warming kg CO₂e - Classifications



Electricity use - 63.2%
 Fuel use - 12.4%
 Internal walls and non-bearing structures - 1.39%
 Foundation, sub-surface, basement and retaining walls - 16.96%
 External walls and facade - 5.55%
 Total water consumption - 0.45%

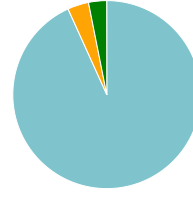
Global warming kg CO₂e - Resource types

This is a drilldown chart. Click on the chart to view details



Utilities - 76.1%
 metal - 18.4%
 concreteReadyMix - 3.7%
 concretePrecast - 0.8%
 bricksCeramics - 0.0%
 earthMasses - 0.0%
 glass - 0.3%
 flooring - 0.1%
 gypsumPlasterCement - 0.0%

Mass kg - Classifications



Foundation, sub-surface, basement and retaining walls - 16.96%
 External walls and facade - 5.55%
 Internal walls and non-bearing structures - 1.39%

Show data table: Global warming kg CO₂e - Life-cycle stages Global warming kg CO₂e - Classifications Global warming kg CO₂e - Resource types Mass kg - Classifications

Global warming kg CO₂e - Life-cycle stages

Item	Value	Unit	Percentage %
A1-A3 Materials	12,000,000	kg CO ₂ e	23.26 %
A4 Transport	63,000	kg CO ₂ e	0.12 %
B1-B5 Maintenance and replacement	60,000	kg CO ₂ e	0.12 %
B6 Energy	38,000,000	kg CO ₂ e	75.65 %
B7 Water	230,000	kg CO ₂ e	0.45 %
C2 Waste transport	160,000	kg CO ₂ e	0.31 %
C3 Waste processing	6,900	kg CO ₂ e	0.01 %
C4 Waste disposal	33,000	kg CO ₂ e	0.07 %

Global warming kg CO₂e - Classifications

Item	Value	Unit	Percentage %
Electricity use	32,000,000	kg CO ₂ e	63.24 %
Foundation, sub-surface, basement and retaining walls	8,600,000	kg CO ₂ e	16.96 %
Fuel use	6,300,000	kg CO ₂ e	12.4 %
External walls and facade	2,800,000	kg CO ₂ e	5.55 %
Internal walls and non-bearing structures	700,000	kg CO ₂ e	1.39 %
Total water consumption	230,000	kg CO ₂ e	0.45 %

Global warming kg CO₂e - Resource types

Item	Value	Unit	Percentage %
utilities	38,000,000	kg CO ₂ e	76.1 %
metal	9,300,000	kg CO ₂ e	18.38 %
concreteReadyMix	1,800,000	kg CO ₂ e	3.66 %
glass	440,000	kg CO ₂ e	0.88 %
concretePrecast	380,000	kg CO ₂ e	0.76 %
flooring	65,000	kg CO ₂ e	0.13 %
bricksCeramics	23,000	kg CO ₂ e	0.05 %
gypsumPlasterCement	16,000	kg CO ₂ e	0.03 %
earthMasses	4,000	kg CO ₂ e	0.01 %

Mass kg - Classifications

Item	Value	Unit	Percentage %
Foundation, sub-surface, basement and retaining walls	15,000,000	kg	93.24 %
Internal walls and non-bearing structures	590,000	kg	3.63 %
External walls and facade	510,000	kg	3.13 %

Data sources

Sources

Resource name	Technical specification	Product	Manufacturer	EPD program	EPD number	Environment Data Source	Standard	Verification	Year	Country	Upstream database
Cement bound terrazzo paving cast-in-place	41.92 kg/m ²	Lykke	Herrjunga Terrazzo	EPD Norge	NEPD-3153-1797-EN	EPD Herrjunga Terrazzo, HT - Lykke (ver2-111021)	EN15804+A1	Internally verified	2021	sweden	ecoinvent
Concrete facade elements, glassfibre reinforced	12mm, 23.4 kg/m ² , 1950 kg/m ³		BB fiberbeton A/S	EPD Danmark	MD-21008-EN	EPD BB fiberbeton A/S	EN15804+A1	Third-party verified (as per ISO 14025)	2021	denmark	GaBi
District cooling, Finnish average				One Click LCA		LCA for country specific district cooling based on Energiateollisuus 2020 and COP factor estimates, OneClickLCA 2022	ISO14040	Internally verified	2020	finland	ecoinvent
Electricity, China				One Click LCA		LCA study for country specific electricity mixes based on IEA, OneClickLCA 2022		Internally verified	2019	china	ecoinvent

Resource name	Technical specification	Product	Manufacturer	EPD program	EPD number	Environment Data Source	Standard	Verification	Year	Country	Upstream database
Façade glazing element (curtain wall) with aluminium profiles, with triple layer glass	43.6 kg/m2	Fasad, REDUXA	Hansen, 2020	EPD Danmark	MD-18001-EN_rev1	EPD Hansen A/S	EN15804+A1	Third-party verified (as per ISO 14025)	2020	denmark	GaBi
Fibre cement boards	1300 kg/m3 (81.16 lbs/ft3)			One Click LCA	-	One Click LCA	EN15804+A1	Internally verified	2019	LOCAL	ecoinvent
Glazed ceramic tiles	BII, 7.5 mm, 13.74 kg/m2		Kerama Marazzi, Orel plant	International EPD System	S-P-01479	EPD CERAMIC TILES EN 14411:2016 GLAZED AND UNGLAZED CERAMIC TILES OF MEDIUM SIZE	EN15804+A1	Third-party verified (as per ISO 14025)	2020	russia	ecoinvent
Gypsum plaster board, regular, generic	6.5-25 mm (0.25-0.98 in), 10.725 kg/m2 (2.20 lbs/ft2) (for 12.5 mm/0.49 in), 858 kg/m3 (53.6 lbs/ft3), 90% recycled gypsum			One Click LCA	-	One Click LCA	EN15804+A1, EN15804+A2	Internally verified	2022	LOCAL	ecoinvent
Natural gas				One Click LCA		LCA inventory for heat production from natural gas (OneClickLCA 2016)	ISO14040	Third-party verified (as per ISO 14025)	2016	world	ecoinvent
Ready-mix concrete, normal-strength, generic	C40/50 (5800/7300 PSI), 50% recycled binders in cement (400 kg/m3 / 24.97 lbs/ft3)			One Click LCA	-	One Click LCA	EN15804+A1	Internally verified	2018	LOCAL	ecoinvent
Reinforcement steel (rebar) bolt, polypropylene and powder coated	Ø20mm, HRB500E, 2.47 kg/m, 7850 kg/m3	Pc-Coat®	Pretec Norge	EPD Norge	NEPD-2725-1422-EN	EPD NC bolt M20 Pc-Coat® Pretec Norge AS	EN15804+A1	Internally verified	2021	china	ecoinvent
Slim-floor composite steel beam, painted	7850 kg/m3, linear density 30-800 kg/m	DELTABEAM®	Peikko Group Corporation, China plant	EPD Hub	EPD HUB-00001	EPD DELTABEAM® Composite Beam, Painted Peikko Group Corporation	EN15804+A1, EN15804+A2	Third-party verified (as per ISO 14025)	2022	OCLEPD, china	ecoinvent

Resource name	Technical specification	Product	Manufacturer	EPD program	EPD number	Environment Data Source	Standard	Verification	Year	Country	Upstream database
Solid aluminum panels	2660 - 2840 kg/m3		Guangdong Gaoli Aluminium Industry	ASTM	EPD-118	EPD Solid Aluminum Panels	ISO 14040	Third-party verified (as per ISO 14025)	2019	china	ecoinvent
Structural hollow steel sections (HSS), cold rolled, generic	30 % recycled content, circular, square and rectangular profiles, S235, S275 and S355			One Click LCA	-	One Click LCA	EN15804+A1	Internally verified	2018	LOCAL	ecoinvent
Structural steel plates	7850 kg/m3	Q235GJB/C/D/E, Q345GJB/C/D/E, Q390GJC/D/E, Q420GJC/D/E, Q460GJC/D/E, A572 Gr.42, A572 Gr.50, A572 Gr.55, A572 Gr.60, A572 Gr.65, A573 Gr.58/65/70, A633 Gr.A/C/D, A633 Gr.E, SN400A/B, SN400C, SN490B, SN490C, Q195, Q215A/B, Q235A/B/C/D, Q275A/B/C/D, A36, A283 Gr.A/B/C/D, S235JR/J0, S235J2, S275JR/J0, S275J2, S275N/NL, S275M/ML, SS330, SS400, SS490, SM400A/B, SM400C, 0870, 20Mn65Mn, XG05, 08A1.	Minmetals Yingkou Medium Plate Co. Ltd.	ASTM	EPD-078	EPD Minmetals Yingkou Medium Steel Plate	ISO 14040	Third-party verified (as per ISO 14025)	2018	china	ecoinvent

Resource name	Technical specification	Product	Manufacturer	EPD program	EPD number	Environment Data Source	Standard	Verification	Year	Country	Upstream database
Tufted carpet tiles with recycled nylon 6.6 face fiber	4.310 kg/m2	China modular carpet on CushionBacRE, Nylon 66 styles	Interface	UL Environment	4787521006.127.1	EPD MODULAR CARPET	EN15804+A1	Third-party verified (as per ISO 14025)	2017	china	GaBi
White granite slab, for façade or floor	3 cm, 78.6 kg/m2, 2620 kg/m3		Naturstein Montering	EPD Norge	NEPD-1635-653-NO	EPD Granitt (G-358) fasade- og gulvstein fra Shandong provinsen i Kina Naturstein Montering AS	EN15804+A1	Third-party verified (as per ISO 14025)	2018	china	ecoinvent

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