Supplementary Material

Modular Construction in the Digital Age: A Systematic Review on Smart and Sustainable Innovations

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Abbreviations

The following abbreviations are used in this manuscript:

BIPV	Building-Integrated Photovoltaic
EPS	Expanded Polystyrene
GWP	Global Warming Potential
HVAC	Heating, Ventilation and Air Conditioning
LCA	Life Cycle Assessment
nZEB	nearly-Zero Energy Buildings
PCM	Phase Change Material
PET	Polyethylene terephthalate
PIR	Polyisocyanurate
PUR	Polyurethane
PV	Photovoltaic
PV/T	Photovoltaic and Thermal
PVC	Polyvinyl chloride
RC	Reinforced Concrete
STS	Solar Thermal System
U	Thermal transmittance coefficient
XPS	Extruded Polystyrene

Including the following Köppen-Geiger climate zones:

Af	tropical rainforest
Aw	tropical savanna
BSh	hot arid steppes
BSk	cold arid steppes
BWh	hot desert climate
Csa	hot-summer Mediterranean climate
Csb	warm-summer Mediterranean climate
Cwa	dry-winter humid subtropical climate
Cwb	subtropical highland climate (temperate oceanic climate with dry winters)
Cfa	humid subtropical climate
Cfb	oceanic climate
Dwa	dry-winter humid subtropical climate
Dfa	hot-summer humid continental climate
Dfb	warm-summer humid continental climate

Buildings’ Construction Solutions

Table S1.1. Article distribution by climate zone and building material information

Climate	Climate Zones	Article	Panels	Insulation	Framing	U_{ext_walls} (W/m²·K)	U_{floor} (W/m²·K)	U_{roof} (W/m²·K)	$U_{windows}$ (W/m²·K)	U_{door} (W/m²·K)
A (Tropical)	Af	[122]	Precast Concrete	-	-	-	-	-	-	-
		[105]	-	-	-	-	-	-	-	-
	Aw	[64]	Metal	-	Steel	-	-	-	-	-
		[85]	PVC	PUR (ext.) + Rock wool	Steel	0.73	-	0.43	-	-
B (Arid)	BSh	[85]	PVC	PUR (ext.) + Rock wool	Steel	0.73	-	0.43	-	-
		[131]	Wood + Precast Concrete	PUR	Steel	0.28	0.32	0.26	2.00	-
	BSk	[115]	Metal + Aluminium (container)	Rock wool	Steel	0.24 (min.)	0.3 (min.)	0.19 (min)	1.80	1.80
		[123]	Metal	PUR + Mineral wool	Steel	0.26 0.10	0.99 0.13	0.26 0.10	2.80 0.71	2.80 0.71
	BWh	[117]	Fiberglass	PUR	Steel	-	-	-	-	-
C (Temperate)	Csa	[4]	Wood + Precast Concrete	PUR	Steel	-	-	-	-	-
		[85]	PVC	PUR (ext.) + Rock wool	Steel	0.58	-	0.26	-	-
		[136]	Wood	Cork	Wood	0.34	0.34	0.34	2.00	2.08
		[142]	Metal Sheet + Wood	-	Steel	-	-	-	-	-
		[126] [125]	Metal Sheet + Wood	XPS + EPS + Glass wool	Steel	≈ 0.24 – 0.35	≈ 0.08 – 0.09	≈ 0.24 – 0.35	≈ 3.70	≈ 5.40 ≈ 3.70
	Csb	[9]	Wood	Mineral wool	Wood	≈ 0.33	≈ 0.32	≈ 0.18	1.10	-
		[85]	PVC	PUR (ext.) + Rock wool	Steel	0.58	-	0.26	-	-
		[97]	3D Printed Concrete	PUR	RC	-	-	-	-	-
		[95]	Wood + Fiber cement (Ventilated Façade)	EPS	RC	0.37	0.31	0.31	2.41	-
		[138]	Wood (Ventilated Façade)	Rock wool	Wood	≈ 0.45	-	-	≈ 3.20	≈ 3.20
		[139]	Fiber cement (Ventilated Façade)	Rock wool + Mineral wool + Rigid Insulation	Steel	≈ 0.26	≈ 0.40	≈ 0.31	≈ 3.54	≈ 3.54
	Cwa	[116]	Metal sheet	Rock wool + EPS	-	≈ 0.72	≈ 3.82	≈ 0.44	-	-
		[118]	Wood	-	Steel	-	-	-	-	-
		[103,120]	Precast Concrete	-	Steel	-	-	-	-	-
		[99,111] [113]	Precast Concrete	-	RC	- (*)	- -	- (*)	- (*)	- -
		[107]	Precast Concrete	-	-	-	-	-	-	-
		[28]	3D Printed Concrete	-	-	-	-	-	-	-
		[109,112]	-	-	RC	-	-	-	-	-
		[119]	-	-	-	-	-	-	5.78	-
		[106,108,110,124]	-	-	-	-	-	-	-	-
	Cwb	[123]	Metal	PUR + Mineral wool	Steel	0.26 0.10	0.99 0.13	0.26 0.10	2.80 0.71	2.80 0.71
	Cfa	[10,96]	Precast Concrete	-	-	-	-	-	-	-
		[64]	Metal	-	Steel	-	-	-	-	-
		[123]	Metal	PUR + Mineral wool	Steel	0.26 0.10	0.99 0.13	0.26 0.10	2.80 0.71	2.80 0.71
		[140]	Fiber cement (Ventilated Façade)	PIR + EPS + Recycled PET Bottles	Steel	0.31 – 0.36	0.27	0.19	0.88	0.88
		[127]	Wood	-	-	0.18	0.14	0.15	≈ 0.80	-
		[114]	Metal	Rock wool	Steel	0.20	-	0.18	1.40	-
		[87]	-	-	Steel	-	-	-	-	-
		[128]	-	-	-	-	-	-	-	-
	Cfb	[131]	Wood + Precast Concrete	PUR	Steel	0.28	0.32	0.26	2.00	-
		[85]	PVC	PUR (ext.) + Rock wool	Steel	0.22	-	0.18	-	-
		[129]	Wood	-	Wood	-	-	-	-	-
		[129]	Wood	-	Recycled Concrete	-	-	-	-	-
		[133]	Wood	Wood wool	Wood	0.12	-	-	1.20	-
		[132]	Wood	PIR + EPS + Mineral wool	Steel	≈ 0.18	-	-	-	-
		[95]	Wood + Fiber cement (Ventilated Façade)	EPS	RC	0.37	0.31	0.31	2.41	-
		[141]	Fiber cement	-	Steel	-	-	-	-	-
		[130]	Precast Concrete	-	RC	-	-	-	-	-
		[134]	Glass (Curtain Wall)	-	RC	0.89	-	-	-	-
		[64]	Metal	-	Steel	-	-	-	-	-
		[137]	-	-	RC	-	-	-	-	-
		[128,129]	-	-	-	-	-	-	-	-

D (Continental)	Dwa	[115]	Metal + Aluminium (container)	Rock wool	Steel	0.30 (min.)	0.30 (min.)	0.40 (min.)	1.80	1.80
		[100]	Metal (container)	-	Steel	-	-	-	-	-
		[123]	Metal	PUR + Mineral wool	Steel	0.26 0.10	0.99 0.13	0.26 0.10	2.80 0.71	2.80 0.71
		[118]	Wood	-	Steel	-	-	-	-	-
		[11]	-	-	-	-	-	-	-	-
	Dfa	[94]	Wood	-	Wood	-	-	-	-	-
	Dfb	[88,89]	Wood	-	Wood	-	-	-	-	-
		[92]	-	-	Steel	-	-	-	-	-
		[91]	-	-	-	-	-	-	-	-
N/A	-	[84]	3D Printed Compressed Earth	-	-	-	-	-	-	-
		[101]	Gypsum	Straw	Steel	-	-	-	-	-
		[104]	Wood	-	RC	-	-	-	-	-
		[135]	Wood	Cork	Wood	-	-	-	-	-
		[90]	-	-	Steel	-	-	-	-	-
		[86,93,98,102,121]	-	-	-	-	-	-	-	-

NOTE: An article can have multiple case studies, so each one is assessed individually, including the conceptual studies in different climate zones. If an estimated location could not be assessed from an article, it was not considered for this categorization and, thus, grouped as "N/A" (not available). That is the case, for instance, of Zhang et al. [84], as no information was given other than being implemented in Morocco. This African country has several climate zones; therefore, it was impossible to classify this paper on this topic.

NOTE (*): Ansah et al. [113] initially analysed simulated results through their methodology and, later, they implement it on a case study. Nonetheless, the presented U-values for the exterior walls, roof and windows are from the simulation, not from the real building. The simulated U-values are as follows: U_{ext_walls} = 2.30 W/m²·K, U_{roof} = 0.35 W/m²·K and $U_{windows}$ = 5.99 W/m²·K.

Table S1.2. Thermal insulation characteristics by the case studies' construction elements

Climate	Climate Zones	Article	External Walls		Floor		Roof	
			Material	Thickness (cm)	Material	Thickness (cm)	Material	Thickness (cm)
A (Tropical)	Aw	[85]	PUR + Rock wool	4 + 6	-	-	PUR + Rock wool	4 + 6
B (Arid)	BSh	[85]	PUR + Rock wool	4 + 6	-	-	PUR + Rock wool	4 + 6
		[131]	PUR	-	-	-	PUR	-
	BSk	[115]	Rock wool	16 (min.)	Rock wool	10.4 (min.)	Rock wool	20 (min.)
		[123]	Mineral wool	5	PUR	2	Mineral wool	5
		[123]	Mineral wool	6	PUR	2	Mineral wool	6
	BWh	[117]	PUR	-	PUR	-	PUR	-
C (Temperate)	Csa	[4]	PUR	-	-	-	PUR	-
		[85]	PUR + Rock wool	10 + 8	-	-	PUR + Rock wool	10 + 8
		[125,126]	XPS + Glass wool + XPS	3 + 1.5 + 3	XPS + EPS	3 + 0.4	XPS + Glass wool + XPS	3 + 1.5 + 3
		[136]	Cork	6 + 6	Cork	12	Cork	6 + 6
	Csb	[9]	Mineral wool	9	Mineral wool	9	Mineral wool	18
		[85]	PUR + Rock wool	10 + 8	-	-	PUR + Rock wool	10 + 8
		[95]	EPS	10	EPS	8	EPS	8
		[97]	PUR	-	PUR	-	PUR	-
		[138]	Rock wool	7.5	-	-	-	-
		[139]	Mineral wool	15	Rock wool	10	Rock wool + Rigid Insul. (PIR or PUR)	10 + 3
	Cwa	[116]	Rock wool	5	-	-	EPS	7.5
	Cwb	[123]	Mineral wool	5	PUR	2	Mineral wool	5
		[123]	Mineral wool	6	PUR	2	Mineral wool	6
	Cfa	[114]	Rock wool	22	Rock wool	15	-	-
		[123]	Mineral wool	5	PUR	2	Mineral wool	5
		[123]	Mineral wool	6	PUR	2	Mineral wool	6
		[140]	PET	15 – 20	PET + XPS	20 + 4	PET + PIR	20 + 12
	Cfb	[85]	PUR + Rock wool	15 + 10	-	-	PUR + Rock wool	15 + 10
		[95]	EPS	10	EPS	8	EPS	8
		[131]	PUR	-	-	-	PUR	-
		[132]	EPS + Mineral wool	11 + 10	PIR	-	PIR	-
		[133]	Wood wool	31	-	-	-	-
D (Continental)	Dwa	[115]	Rock wool	12.8 (min.)	Rock wool	7.2 (min.)	Rock wool	12.8 (min.)
		[123]	Mineral wool	5	PUR	2	Mineral wool	5
		[123]	Mineral wool	6	PUR	2	Mineral wool	6
N/A	-	[101]	Straw	-	-	-	-	-
		[135]	Cork	adaptable	Cork	adaptable	Cork	adaptable

Buildings' Active and Passive Systems

Table S2. Active and passive building solutions

Climate	Climate Zone	Refs.	Active Systems	Passive Solutions: Direct Solar Gains	Natural Ventilation	Shading Systems	Natural Lighting	Water Harvesting	Thermal Insulation	Green Roof	PCM	Air Tightness	Automation Systems	Off-Grid
A (Tropical)	Af	[105,122]	-	-	-	-	-	-	-	-	-	-	-	-
	Aw	[64]	-	X	X	-	X	-	-	-	-	-	-	-
		[85]	Heat Pump	-	-	-	-	-	X	-	-	-	-	-
B (Arid)	BSh	[85]	Heat Pump	-	-	-	-	-	X	-	-	-	-	-
		[131]	Hybrid PV/T System + HVAC + Heat Pump	X	X	X	X	-	X	-	-	X	X	-
	BSk	[115]	HVAC	-	X	-	-	X [230]	X	-	-	X	-	-
		[123]	Applied PV + HVAC + Hybrid PV/T System + Heat Pump + Applied STS + Radiant Floor	X	X	X	X	X	X	-	-	-	X	X
	BWh	[117]	-	-	X	-	-	-	X	-	-	-	-	-
C (Temperate)	Csa	[4]	BIPV + Applied STS	X	X	X	X	-	X	-	-	X	X	X
		[85]	Heat Pump	-	-	-	-	-	X	-	-	-	-	-
		[125,126]	Radiant Floor + Active PCM + HVAC	X	-	-	-	-	X	-	X	-	X	-
		[136]	-	X	X	X	X	-	X	-	X	X	-	-
		[142]	Applied PV	X	-	-	X	-	X	-	-	-	-	-
	Csb	[9]	Heat Pump	X	-	X	X	-	X	-	-	-	-	-
		[85]	Heat Pump	-	-	-	-	-	X	-	-	-	-	-
		[95]	Applied STS + HVAC + Biomass	X	X	X	X	X	X	X	-	X	-	-
		[97]	-	-	-	-	-	-	X	-	-	-	-	-
		[138]	Applied PV + Applied STS	-	X	X	-	X	X	-	-	-	-	-
		[139]	-	-	-	X	-	X	X	-	-	X	-	-
	Cwa	[99]	-	-	-	-	-	-	X	X	-	-	-	-
		[106]	-	-	-	-	X	-	-	-	-	-	-	-
		[113]	-	X	-	-	X	-	-	-	-	-	-	-
		[116]	-	X	-	X	X	-	X	-	-	-	-	-
		[118]	Applied PV + Applied STS + HVAC + Geothermal	X	X	X	X	X	X	X (Wall)	-	X	X	X
		[119,120]	HVAC	-	-	-	-	-	-	-	-	-	-	-
		[28,103,107–112,124]	-	-	-	-	-	-	-	-	-	-	-	-
	Cfa	[64]	-	X	X	-	X	-	-	-	-	-	-	-
		[96]	HVAC	X	X	X	X	-	X	-	-	-	-	-
		[114]	Applied PV + HVAC	X	-	X	X	-	X	-	-	-	-	-
		[123]	Applied PV + HVAC + Heat Pump + Applied STS + Radiant Floor	X	X	X	X	X	X	-	-	-	X	X
		[127]	Applied PV + HVAC + Heat Pump	X	X	X	X	-	-	X	-	-	-	-
		[132]	Applied PV	-	-	-	-	-	X	-	-	-	-	-
		[140]	Applied PV + Wind Turbine	X	X	X	X	-	X	-	-	X	-	X
		[10,87]	-	-	-	-	-	-	-	-	-	-	-	-
	Cfb	[64,128]	-	X	X	-	X	-	-	-	-	-	-	-
		[85]	Heat Pump	-	-	-	-	-	X	-	-	-	-	-
		[95]	Applied STS + HVAC + Biomass	X	X	X	X	X	X	X	-	X	-	-
		[129]	Applied PV + HVAC + Heat Pump + Radiant Floor	-	-	-	-	-	-	-	-	-	-	-
		[129]	HVAC + Heat Pump + Radiant Floor	-	-	-	-	-	-	-	-	-	-	-
		[129]	HVAC + Heat Pump	X	-	-	X	-	X	-	-	X	-	-
		[131]	Hybrid PV/T System + HVAC + Heat Pump	X	X	X	X	-	X	-	-	X	X	-
		[133]	HVAC + Radiant Floor	X	-	X	X	-	X	-	-	-	-	-
		[134]	HVAC	X	-	-	X	-	-	-	-	X	-	-
		[91,130,137,141]	-	-	-	-	-	-	-	-	-	-	-	-

D (Continental)	Dfa	[94]	-	-	-	-	-	-	-	-	-	X	X	-
	Dfb	[92]	-	-	-	-	-	-	X	-	-	-	-	-
	Dwa	[115]	HVAC	-	X	-	-	-	X	-	-	X	-	-
		[118]	Applied PV + Applied STS + HVAC + Geothermal	X	X	X	X	X	X	X (Wall)	-	X	X	X
		[123]	Applied PV + HVAC + Hybrid PV/T System + Heat Pump + Applied STS + Radiant Floor	X	X	X	X	X	X	-	-	-	X	X
		[11,100]	-	-	-	-	-	-	-	-	-	-	-	-
	Dwb	[123]	Applied PV + HVAC + Heat Pump + Applied STS + Radiant Floor	X	X	X	X	X	X	-	-	-	X	X
	Dfb	[89]	Applied PV	-	-	-	-	-	-	-	-	-	-	-
		[88]	-	-	-	-	-	-	-	-	-	-	-	-
		[92]	-	-	-	-	-	-	X	-	-	-	-	-
N/A	N/A	[101]	BIPV + Applied STS + Radiant Floor	X	X	X	X	X	X	X	-	-	X	X
		[135]	Applied PV	-	-	-	-	X	X	-	X	-	-	-
		[84,86,90,93,98,102,104,121]	-	-	-	-	-	-	-	-	-	-	-	-

Buildings' Environmental Sustainability

Table S3. Environmental sustainability indicators, by climate zone

Climate Zone	Use	Article	Assessment Level	Environmental Indicators										
				Article Focused on	Life Cycle Stage	GWP (kg CO_2e/m^2)	Energy Use (kWh/m^2/year)	Green Roof	Water Reuse	Reused Materials	Recycled Materials	Renewable Energies	nZEB	Off-Grid
Aw	Residential	[64]	Building	Bioclimatic Architecture + Energy	Energy use	-	-	-	-	-	-	-	-	-
		[85]	Building and Components	Bioclimatic Architecture + Energy + LCA	Cradle to Practical Completion + Use Stage	≈ 632	≈ 50 (Rio de Janeiro, Brazil)	-	-	-	-	(**)	-	-
BSh	Residential	[85]	Building and Components	Bioclimatic Architecture + Energy + LCA	Cradle to Practical Completion + Use Stage	≈ 646	≈ 38 (Luanda, Angola)	-	-	-	-	(**)	-	-
		[131]	Building	Energy + Thermal Comfort	Use Stage + Energy use	-	103.8 (Larnaca, Cyprus)	-	-	-	-	Solar	-	-
BSk	Temporary Housing	[115]	Building (950 m)	Thermal Comfort	Product Stage + Use Stage + Energy use	≈ 174	113.9 (Yanqing, China)	-	X [230]	X	X (after Games)	Solar + Wind [230] (***)	X	-
	Prototype	[123]	Building (Base Case)	Bioclimatic Architecture + Energy + Thermal Comfort	Use Stage	-	131.8 (Lanzhou, China)	-	X	X	(Potential)	Solar	X	X
			Building (Compact Case)				140.1 (Lanzhou, China)	-	X	X	(Potential)	Solar	X	X
Csa	Residential	[4]	Building	Energy + Daylight Analysis + Circular Construction	Cradle to Cradle + Energy use	-	53.7 (Nicosia, Cyprus)	-	-	-	X	Solar	X	X
		[9]	Building	Thermal Comfort	Use Stage	-	-	-	-	-	-	(**)	-	-
		[85]	Building and Components	Bioclimatic Architecture + Energy + LCA	Cradle to Practical Completion + Use Stage	≈ 570	≈ 68 (Lisboa, Portugal)	-	-	-	-	(**)	-	-
						≈ 576	≈ 69 (Faro, Portugal)	-	-	-	-	(**)	-	-
						≈ 584	≈ 57 (Casablanca, Morrocco)	-	-	-	-	(**)	-	-
	Temporary Housing	[135]	Building	LCA	Cradle to Grave	-	35.4 (Reggio Calabria, Italy)	-	X	-	-	Solar	-	-
		[136]	Building (LTH)	LCA	Cradle to Grave	152 (*)	35.4 (Reggio Calabria, Italy)	-	-	-	-	-	-	-
			Building (Container)	LCA	Cradle to Grave	348 (*)	51.4 (Reggio Calabria, Italy)	-	-	X	(Potential)	-	-	-
	Prototype	[125]	Building	Energy + Thermal Comfort	Use Stage	-	-	-	-	-	-	-	-	-
		[126]	Building	Thermal Comfort	Use Stage	-	-	-	-	-	-	-	-	-
		[142]	Building	Circular Construction	Cradle to Cradle	-	-	-	-	X	X	Solar	-	-
Csb	Residential	[85]	Building and Components	Bioclimatic Architecture + Energy + LCA	Cradle to Practical Completion + Use Stage	≈ 563	≈ 83 (Aveiro, Portugal)	-	-	-	-	(**)	-	-
		[95]	Building	Energy	Energy use	-	27.9 (Concepción, Chile)	X	X	-	-	Solar + Biomass	-	-
	Prototype	[138]	Building	-	Use Stage	-	-	-	X	(Potential)	-	Solar	-	-
		[139]	Building	Circular Construction	Cradle to Cradle	-	-	-	X	(Potential)	(Potential)	-	-	-
Cwa	Multi-Storey Residential	[99]	Building	LCA	BEAM Plus: Cradle to Cradle + Energy use + Water use	-	-	X	-	(Potential)	(Potential)	-	-	-
		[103]	Building, Flats, Assemblies, Components and Materials	LCA	Cradle to Practical Completion	561	-	-	-	-	-	-	-	-
		[113]	Building, Flats, Assemblies, Components and Materials	Energy + LCA	Cradle to Grave	642	123.5 (Hong Kong)	-	-	-	-	-	-	-
	Student Residence	[119]	Building	Energy + Daylight Analysis	Energy use	-	133.3 (Hong Kong)	-	-	-	-	-	-	-
	Temporary Housing	[116]	Building	Thermal Comfort	Use Stage	-	-	-	-	-	-	-	-	-

Cwb	Prototype	[123]	Building (Base Case)	Bioclimatic Architecture + Energy + Thermal Comfort	Use Stage	-	98.3 (Kunming, China)	-	X	X	(Potential)	Solar	X	X
			Building (Compact Case)				133.0 (Kunming, China)	-	X	X	(Potential)	Solar	X	X
Cfa	Residential	[64]	Building	Bioclimatic Architecture + Energy	Energy use	-	-	-	-	-	-	-	-	-
		[127]	Building	Energy + LCA	Cradle to Cradle	≈ -158	≈ 109 (Budapest, Hungary)	X	-	(Potential)	(Potential)	Solar	-	-
	Multi-Storey Residential	[114]	Building, Modules, Components and Materials	LCA	Cradle to Cradle + Energy use + Water use	432	-	-	-	-	(Potential)	Solar	-	-
	Prototype	[123]	Building (Base Case)	Bioclimatic Architecture + Energy + Thermal Comfort	Use Stage	-	130.3 (Guangzhou, China) 121.8 (Shanghai, China)	-	X	X	(Potential)	Solar	X	X
			Building (Compact Case)				136.5 (Guangzhou, China) 134.1 (Shanghai, China)	-	X	X	(Potential)	Solar	X	X
		[140]	Building	Energy	Energy use	-	110.3 (Timişoara, Romania)	-	-	(Potential)	X	Solar + Wind	-	X
Cfb	Residential	[64]	Building	Bioclimatic Architecture + Energy	Energy use	-	-	-	-	-	-	-	-	-
		[85]	Building and Components	Bioclimatic Architecture + Energy + LCA	Cradle to Practical Completion + Use Stage	≈ 625	≈ 155 (Paris, France)	-	-	-	-	(**)	-	-
		[129]	Building	-	Use Stage	-	-	-	-	-	-	Solar	-	-
		[131]	Building	Energy + Thermal Comfort	Use Stage + Energy use	-	133.4 (Bolzano, Italy)	-	-	-	-	Solar	-	-
		[132]	Building, Components and Materials	LCA	Cradle to Cradle	Standard: 290 Refresh: 254	-	-	-	-	(Potential)	Solar	X	-
	Multi-Storey Residential	[128]	Building	Energy	Energy use	-	12.0 (***) (Vienna, Austria)	-	-	-	-	-	-	-
		[129]	Building	Design	Use Stage	-	-	-	-	-	X	-	-	-
		[133]	Building	Thermal Comfort	Use Stage	-	-	-	-	(Potential)	(Potential)	-	-	-
		[134]	Building and Components	LCA	Cradle to Grave	1076	-	-	-	-	-	-	-	-
Dwa	Residential	[100]	Building	Project	Use Stage	-	-	-	-	X	-	-	-	-
	Temporary Housing	[115]	Building (2177.5 m)	Thermal Comfort	Product Stage + Use Stage + Energy use	≈ 250	193.3 (Yanqing, China)	-	X [230]	X	X (after Games)	Solar + Wind [230] (***)	X	-
	Senior Residences	[118]	Building	Energy	Energy use	-	-	X (Wall)	X	-	-	Solar + Geothermal	X	X
	Prototype	[123]	Building (Base Case)	Bioclimatic Architecture + Energy + Thermal Comfort	Use Stage	-	157.8 (Harbin, China)	-	X	X	(Potential)	Solar	X	X
			Building (Compact Case)				161.7 (Harbin, China)	-	X	X	(Potential)	Solar	X	X
Dfa	Senior Residences	[94]	Building	-	Use Stage	-	-	-	-	(Potential)	-	-	-	-
Dfb	Residential	[89]	Building and Components	LCA	Cradle to Gate	-	-	-	-	-	-	Solar	-	-
N/A	Residential	[101]	Building	Bioclimatic Architecture + Circular Construction	Cradle to Cradle	-	-	X	X	-	X	Solar	-	X
	Multi-Storey Residential	[104]	Building and Modules	LCA	Cradle to Gate	85	-	-	-	-	-	-	-	-

GWP – Global Warming Potential (normally in kg CO_2e/m^2, but some papers used other units and did not disclose necessary information to convert them (e.g., missing areas)); LTH – Lightweight Temporary Housing.

NOTE (*): The global warming potential of the temporary housing is equivalent to 3.52 ton CO_2e (at 10 years), while for the container housing is equivalent to 8.53 ton CO_2e (at 10 years). They are classified as Category A and C, respectively, at the Carbon Heroes Benchmark [231]

NOTE (**): Delgado et al. [9] noted the use of natural gas in their thermal comfort evaluation assessment. In addition, also Tavares and Freire [85] opted for this energy source on their multi-location conceptual study. According to EN 15804+A2 [194], natural gas is not considered a renewable energy resource but rather a fossil fuel. However, the European Union considers natural gas as a green energy in some circumstances [200,201]

NOTE (***): Only considers heating energy needs, not the total energy

NOTE (****): The legacy report of the 2022 Winter Olympic and Paralympic Games [230], published by the organizing committee, reveals, among others, some sustainability information regarding Yanqing's Olympic and Paralympic Village. As such, it is possible to complement the data from the article of Tong et al. [115], particularly in terms of using rainwater harvesting systems and purified residual water. Nevertheless, the paper mentioned that renewable energy had been used during the Games without disclosing which kind. In turn, the official report notes that Zhangjiakou's Olympic and Paralympic Village adopted both wind and solar as renewable energy sources. Moreover, it adds that it was the first time in Olympic history that all locations within the Games managed to use green energy only, although still dependent on the electrical grid [230]. Therefore, it will be considered the implementation of wind and solar energy as well for both Yanqing's Olympic and Paralympic Village (at 950 m) and the Top Starting Area (at 2177.5 m)