Table S1. Case study characteristics

Ref.	Country of case	CE temporality	CE cycles [#]
(Bonoli et al., 2020)	Italy	Up front	1
(van Stijn et al., 2021)	The Netherlands	Both	1-4, depending on design and component part
(Wiprachtiger et al., 2020)	Switzerland	Prospective	1
(Romnée et al., 2019)	Belgium	Both	1
(Sanchez et al., 2019)	Canada	Up front	1
(Sandanayake et al., 2022)	United Kingdom	Up front	1
(Russo et al., 2021)	Not Specified	Up front	1
(Meek et al., 2021)	Australia	Up front	1
(Lopez-Garcia et al., 2021)	Spain	Up front	1
(Toniolo et al., 2021)	Germany	Both	1
(Vandewalle et al., 2020)	Portugal	Both	5 phases, however defined as maintenance for the same road
(Caneda-martínez et al., 2021)	Spain	Up front	1
(Caldas et al., 2021)	Brazil	Up front	1
(Vitale et al., 2021)	Italy	Up front	1
(Nußholz et al., 2019)	Sweden and Denmark	Up front	1
(Al-Hamrani et al., 2021)	Qatar	Up front	1
(Silva et al., 2021)	Brazil	Up front	1
(Mostert et al., 2021)	Germany	Up front	1
(Zhang et al., 2018)	China	Up front	1, but in metabolism
(Saadé et al., 2022)	France	Both	1
(Colangelo et al., 2020)	Italy	Up front	1
(Rodrigo-Bravo et al., 2022)	Spain	Up front	1
(Uceda-Rodríguez et al., 2022)	Spain and Portugal, deliver clay and wastes	Up front	1
(Lozano-Miralles et al., 2018)	Spain	Up front	1

(L. Eberhardt et al., 2019a)	Denmark	Prospective	2
(Nasir et al., 2017)	United Kingdom and France (production facility placement of alternatives)	Up front	1
(Tsioka & Voudrias, 2020)	Greece	Up front	1
(Diaz-Piloneta et al., 2021)	Spain	Up front	1
(Buyle et al., 2019a)	Belgium	Prospective	1
(Liikanen et al., 2019)	Finland	Up front	1
(van Stijn et al., 2020)	The Netherlands	Both	1
(Brütting et al., 2019)	Switzerland	Up front	1
(Hossain et al., 2021)	Hong Kong	Up front	1
(Terrones-Saeta et al., 2021)	Spain	Up front	1
(Joensuu et al., 2022)	Finland	Prospective	2 and 3 respectively, see above
(Di Maria et al., 2018)	Belgium	Up front	1
(L. Eberhardt et al., 2019b)	Denmark	Prospective	2
(Wang et al., 2017)	China	Up front	1
(Zhang et al., 2021)	Spain, the Netherlands and Sweden	Both	1
(Dias et al., 2021)	Portugal	Up front	1
(Cuenca-Moyano et al., 2019)	Spain	Up front	1
(Kakkos et al., 2019)	Switzerland	Both	1
(Brambilla et al., 2019)	United Kingdom	Prospective	2
(Eberhardt et al., 2021)	Denmark	Both	1, 3 or 4, depending on scenario design
(Weimann et al., 2021)	Germany	Up front	1
(Antunes et al., 2021)	Portugal	Prospective	1
(Ma et al., 2021)	China	Both	1
(Gravagnuolo et al., 2020)	Italy	Up front	1
(Suarez-Macias et al., 2021)	Spain	Up front	1
(Minunno et al., 2020)	Australia	Both	1
(Kim & Kim, 2020)	Korea	Up front	1
(Kucukvar et al., 2021)	Qatar	Prospective	1

(Kio & Ali, 2021)	United States of America	Up front	1
(Hossain & Ng, 2019)	Hong Kong	Prospective	1
(Monteiro & Soares, 2022)	Portugal	Prospective	1
(Cascione et al., 2022)	United Kingdom	Both	1 and 2
(Peceno et al., 2020)	Spain	Up front	1
(Zimmermann et al., 2020)	Denmark	Up front	½ + 1
(Zanni et al., 2018)	Italy	Up front	1
(L. C. M. Eberhardt et al., 2019)	Denmark	Prospective	1 assessed cycle (but DfD impact are divided over 2 and 3 cycles respectively, but not assessed)
(Rivero et al., 2016)	EU-27	Both	1
(Rajagopalan et al., 2021)	Belgium	Prospective	60, 6 and 4 respectively
(Ghisellini et al., 2021)	Italy	Up front	1
(Niu et al., 2021)	Finland	Prospective	2
(Finch & Marriage, 2018)	New Zealand	Prospective	1
(Marconi et al., 2020)	Not Specified	Up front	
(Rios et al., 2019)	United States of America	Prospective	3
(Brütting et al., 2021)	Switzerland	Up front	1
(Peceno et al., 2021)	Spain	Up front	1
(Buyle et al., 2019b)	Belgium	Prospective	1 building cycle of 60 years, however 1-4 wall cycles, refurbishment rates, introduced several cycles of e.g. reusable walls, with a life span of 30 years, thus reuse twice, and replace once after 30 years:
(Simoes et al., 2021)	Portugal	Up front	1
(Cassiani et al., 2021)	Colombia	Up front	1
(Pešta et al., 2020)	Czech Republic	Both	1-2 (scenario 2-4 assess Two life cycles of wall, life span of one wall: 50 years)

(Ferriss, 2021)	United States of America	Up front	1
(Ali et al., 2020)	United States of America	Up front	1
(Ramos et al., 2021)	Not Specified	Up front	1
(Aversa et al., 2019)	Italy	Up front	1
(Kakkos et al., 2020)	Switzerland	Prospective	1,
(Moreno-Juez et al., 2020)	the Netherlands and Spain ("The EoL concrete wastes were collected from two European locations")	Up front	1
(Rasmussen et al., 2019)	Denmark	Both	1
(Bertolini & Guardigli, 2020)	Vancouver, Durban, Chennai (however, performed at a desktop study, with lit references)	Up front	1
(Mostert et al., 2020)	Germany	Up front	1
(Zhao et al., 2020)	Belgium	Up front	1
(Capuano et al., 2020)	Not Specified	Up front	"1, however also ""The reclaimed asphalt from each maintenance cycle is reintroduced in the BC
(Quintana-Gallardo et al., 2021)	Spain	Up front	production process in the proportion of 20% for wear layer and of 30% for binder and base

Table S2. LCA characteristics

Ref.	LCA reference	LCA approach	LCA scope/System boundary	LCA scope	LCI	LCIA method applied	PS modelling (software)
					Background		
(Bonoli et al., 2020)	ISO 14040	Inconclusive	Cradle-to-gate	Embodied	Several	CML	SimaPro
(van Stijn et al., 2021)	EN 15804/15978	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	OpenLCA

(Wiprachtiger et al., 2020)	Inconclusive	CLCA	Cradle-to-grave w. potentials beyond system boundary	Embodied	Several	Several	Brightway
(Romnée et al., 2019)	Inconclusive	ALCA	Cradle-to-grave w. potentials beyond system boundary	Embodied	Ecoinvent	ReCiPe	SimaPro
(Sanchez et al., 2019)	ISO 14040/44	CLCA	Cradle-to-gate w. options	Embodied	Inconclusive	TRACI	Tally ® aInconclusive ATHENA ®
(Sandanayake et al., 2022)	ISO 14040/44	Inconclusive	Cradle-to-gate	embodied	Several	Inconclusive	Manual calculations
(Russo et al., 2021)	ISO 14040	Inconclusive	Cradle-to-gate w. options	Embodied	Several	ReCiPe	SimaPro
(Meek et al., 2021)	ISO 14044 and EN15804	ALCA	Cradle-to-gate	Embodied	Several	IPCC	OpenLCA
(Lopez-Garcia et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	Several	SimaPro
(Toniolo et al., 2021)	ISO 14067	Inconclusive	Cradle-to-grave wo. potentials beyond system boundary	Full	Ecoinvent	IPCC	Manual calculations
(Vandewalle et al., 2020)	ISO 14040	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	Impact 2002+	SimaPro
(Caneda-martínez et al., 2021)	EN 15804	Inconclusive	Cradle-to-gate	Embodied	ELCD	CML	OpenLCA
(Caldas et al., 2021)	EN 15978	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	Several	Inconclusive
(Vitale et al., 2021)	ISO 14040/44	ALCA	Cradle-to-gate	Embodied	Ecoinvent	Impact 2002+	SimaPro

(Nußholz et al., 2019)	Inconclusive	Inconclusive	Cradle-to-gate	embodied	Several	Inconclusive	Manual calculations
(Al-Hamrani et al., 2021)	Inconclusive	Inconclusive	Cradle-to-gate	Embodied	Several	Inconclusive	Manual calculations
(Silva et al., 2021)	ISO 14040/44	ALCA	Cradle-to-gate	Embodied	Several	Several	GaBi
(Mostert et al., 2021)	ISO 14040 and EN15804/EN15978	Inconclusive	Cradle-to-gate w. options	Embodied	GaBi	Several	OpenLCA
(Zhang et al., 2018)	Inconclusive	Inconclusive	Cradle-to-gate w. options	Embodied	Several	Inconclusive	Manual calculations
(Saadé et al., 2022)	Inconclusive	Inconclusive	Other	Full	Ecoinvent	Several	PLEIADES®
(Colangelo et al., 2020)	ISO 14040/44	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	Impact 2002+	SimaPro
(Rodrigo-Bravo et al., 2022)	ISO 14040/44	Inconclusive	Cradle-to-grave wo. potentials beyond system boundary	Embodied	Inconclusive	CML	SimaPro
(Uceda-Rodríguez et al., 2022)	ISO 14040	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	CML	SimaPro
			0	0			
(Lozano-Miralles et al., 2018)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Inconclusive	Several	SimaPro
(L. Eberhardt et al., 2019a)	EN 15978	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	OpenLCA
(Nasir et al., 2017)	ISO 14040	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	IPCC	Manual calculations
(Tsioka & Voudrias, 2020)	ISO 14044 and specified guidelines	ALCA	Cradle-to-gate	Embodied	Ecoinvent	Several	SimaPro

(Diaz-Piloneta et al., 2021)	ISO 14040	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	IPCC	SimaPro
(Buyle et al., 2019a)	ISO	CLCA	Cradle-to-gate w. options	Embodied	Ecoinvent	ReCiPe	Inconclusive
(Liikanen et al., 2019)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	GaBi	ReCiPe	GaBi
(van Stijn et al., 2020)	EN 15978	ALCA	Cradle-to-grave wo. potentials beyond system boundary	Embodied	Ecoinvent	CML	OpenLCA
(Brütting et al., 2019)	Inconclusive	Inconclusive	Cradle-to-gate	Embodied	EPDs	Inconclusive	Manual calculations
(Hossain et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Several	IPCC	SimaPro
(Terrones-Saeta et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	CML	SimaPro
(Joensuu et al., 2022)	ISO 14044 and specified guidelines	Inconclusive	Cradle-to-grave wo. potentials beyond system boundary	Full	Several	Inconclusive	Manual calculations
			0	0			
(Di Maria et al., 2018)	Inconclusive	ALCA	Cradle-to-gate	Embodied	Ecoinvent	ReCiPe	GaBi
(L. Eberhardt et al., 2019b)	EN 15978	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	OpenLCA
			0	0			
(Wang et al., 2017)	Inconclusive	Inconclusive	Cradle-to-gate w. options	Embodied	World Resources Institute	IPCC	Manual calculations
			0	0			

(Zhang et al., 2021)	ISO	Inconclusive	Cradle-to-gate w. options	Full	Ecoinvent	Several	OpenLCA
(Dias et al., 2021)	Inconclusive	ALCA	Cradle-to-gate w. options	Embodied	Inconclusive	Inconclusive	Inconclusive
(Cuenca-Moyano et al., 2019)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Several	Several	SimaPro
(Kakkos et al., 2019)	EN 15804	Inconclusive	Cradle-to-gate w. options	Both	Ecoinvent	Several	SimaPro
(Brambilla et al., 2019)	ISO 14040/44	Inconclusive	Cradle-to-gate w. options	Embodied	Several	CML	Manual calculations
(Eberhardt et al., 2021)	EN 15978	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	OpenLCA
(Weimann et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	Several	Umberto
(Antunes et al., 2021)	EN 15978	Inconclusive	Other	Embodied	Ecoinvent	ILCD	SimaPro
(Ma et al., 2021)	ISO 14040	Inconclusive	Cradle-to-gate w. options	Embodied	OneClick LCA	Chinese National Standard "Building carbon emission calculation standard (GB/T51366-2019)"	OneClick LCA
(Gravagnuolo et al., 2020)	ISO 14044 and specified guidelines	Inconclusive	Cradle-to-gate w. options	Embodied	OneClick LCA	Inconclusive	OneClick LCA
(Suarez-Macias et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	CML	SimaPro
(Minunno et al., 2020)	ISO 14040/44	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	SimaPro

(Kim & Kim, 2020)	Inconclusive	Inconclusive	Cradle-to-grave wo. potentials beyond system boundary	Embodied	Korean LCI DB	Inconclusive	Manual calculations
(Kucukvar et al., 2021)	Inconclusive	Inconclusive	Cradle-to-grave wo. potentials beyond system boundary	Full	Ecoinvent	ReCiPe	Manual calculations
			0	0			
(Kio & Ali, 2021)	Inconclusive	Inconclusive	Cradle-to-gate w. options	Embodied	Tally ®	Inconclusive	Tally aInconclusive WARM
(Hossain & Ng, 2019)	ISO 14040/44	Inconclusive	Cradle-to-grave wo. potentials beyond system boundary	Embodied	Several	Impact 2002+	SimaPro
(Monteiro & Soares, 2022)	ISO 14040/44	ALCA	Cradle-to-gate w. options	Full	Inconclusive	CED	Inconclusive
(Cascione et al., 2022)	EN 15804	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	EuGeos	OpenLCA
(Peceno et al., 2020)	ISO 14040/44	ALCA	Cradle-to-grave wo. potentials beyond system boundary	Embodied	Ecoinvent	CML	SimaPro
(Zimmermann et al., 2020)	EN 15978	Inconclusive	Cradle-to-gate w. options	Full	Several	CML	LCAbyg
(Zanni et al., 2018)	Inconclusive	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	Impact 2002+	SimaPro
(L. C. M. Eberhardt et al., 2019)	ISO 14040/44 and EN 15978	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	OpenLCA
(Rivero et al., 2016)	Inconclusive	Inconclusive	Cradle-to-gate w. options	Embodied	Several	IPCC	Manual calculations

			0	0			
(Rajagopalan et al., 2021)	PEF	Inconclusive	Cradle-to-gate w. options	Embodied	Inconclusive	Inconclusive	Inconclusive
(Ghisellini et al., 2021)	ISO 14040	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	CED	SimaPro
(Niu et al., 2021)	Inconclusive	ALCA	Cradle-to-gate w. options	Embodied	Ecoinvent	Several	Inconclusive
			0	0			
(Finch & Marriage, 2018)	Inconclusive	Inconclusive	Cradle-to-gate	Embodied	SCION	Inconclusive	Inconclusive
			0	0			
(Marconi et al., 2020)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	ReCiPe	SimaPro
(Rios et al., 2019)	ILCD	ALCA	Cradle-to-gate w. options	Embodied	Several	Inconclusive	Inconclusive
(Brütting et al., 2021)	Inconclusive	Inconclusive	Cradle-to-gate w. options	Embodied	Swiss Federal LCA database, KBOB	Inconclusive	Manual calculations
(Peceno et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	ReCiPe	SimaPro
(Buyle et al., 2019b)	ISO 14040/44	CLCA	Cradle-to-gate w. options	Embodied	Ecoinvent	ReCiPe	Inconclusive
(Simoes et al., 2021)	ISO 14040/44 and specified guidelines	Inconclusive	Cradle-to-gate w. options	Embodied	Inconclusive	Several	Inconclusive
(Cassiani et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	PaLATE	PaLATE	PaLATE
(Pešta et al., 2020)	ISO 14044 and specified guidelines	Inconclusive	Cradle-to-grave w. potentials beyond system boundary	Embodied	Ecoinvent	Several	GaBi

(Ferriss, 2021)	Inconclusive	Inconclusive	Cradle-to-gate w. options	Both	GaBi	Inconclusive	Tally, REVIT plugin
(Ali et al., 2020)	ISO	Inconclusive	Cradle-to-gate	Embodied	Literature	Inconclusive	Manual calculations
(Ramos et al., 2021)	ISO 14040/44	Inconclusive	Cradle-to-gate w. options	Embodied	Several	CML	GaBi
(Aversa et al., 2019)	ISO 14044 and EN 15804	Inconclusive	Cradle-to-gate	Embodied	EPDs	CML	Manual calculations
			0	0			
(Kakkos et al., 2020)	EN 15804 and specified guidelines	Inconclusive	Cradle-to-gate w. options	Full	Ecoinvent	Several	SimaPro
(Moreno-Juez et al., 2020)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Several	CML	OpenLCA
(Rasmussen et al., 2019)	EN 15978	Inconclusive	Cradle-to-gate w. options	Embodied	Ökobau	CML	LCAbyg
(Bertolini & Guardigli, 2020)	EN 15978	ALCA	Cradle-to-gate w. options	Embodied	EPDs	CML	Inconclusive
(Mostert et al., 2020)	EN 15804	Inconclusive	Cradle-to-gate w. options	Embodied	GaBi	Several	OpenLCA
(Zhao et al., 2020)	ISO 14040/44	Inconclusive	Cradle-to-gate	Embodied	Ecoinvent	ILCD	SimaPro
(Capuano et al., 2020)	ISO 14040/44	Inconclusive	Cradle-to-gate w. options	Embodied	Ecoinvent	CML	OpenLCA
(Quintana-Gallardo et al., 2021)	ISO 14040 and EN 15804	CLCA	Cradle-to-gate	Embodied	Ecoinvent	Several	SimaPro