Supplementary Materials

Recycling Polyethylene Terephthalate (PET) Bottle Waste into Sustainable Building Materials: A Systematic Review of Technical Performance, Environmental Safety and Circular Economy

Contents: Table S1 (characteristics of all 69 included studies); Table S2 (quality and risk-of-bias appraisal of all 69 included studies); Table S3 (per-source data behind Table 1 and Figures 3 to 7, and the conditions behind the Marshall-stability range reported in Section 4.2.2); Table S4 (reference verification log for all 107 references of the revised manuscript, together with the records removed at verification).

Numbering: Reference numbers are those of the revised manuscript. References [1] to [23] are background and context sources; [24] to [92] are the 69 included studies; [93] to [107] are the remaining background, safety, market and policy sources. Entries flagged with a dagger (†) in the reference list are not primary PET-specific experimental studies.

Table S1. Characteristics of all 69 included studies.

Rows are listed in reference-number order. The 28 studies that supply the quantitative performance ranges synthesised in Sections 4 and 5 of the manuscript are those listed in Table 2 of the manuscript; the remaining rows extend the same fields to the full set of included studies. “Not stated in this review” indicates that the corresponding information is not reported in the cited source as used here and does not imply that the study lacked the information. Dosage bases are those stated by the individual studies and are not interchangeable between rows.

Ref.	Study	Material class	PET form	Dosage and basis	Test standard	Key reported outcome
[24]	Choi et al. (2009)	Concrete and mortar	Fine aggregate (shredded PET flake)	25%, 50% and 75% by volume of fine aggregate	Not stated in this review	Waste PET lightweight aggregate had a density of 1390 kg/m3 and zero water absorption; 28-day compressive strength fell by 5%, 15% and 30% at 25%, 50% and 75% replacement, respectively, and density and modulus decreased as PET content rose.
[25]	Frigione (2010)	Concrete and mortar	Fine aggregate (PET granules)	Replacement of sand by PET granules (up to 15% by mass)	Not stated in this review	Lightweight concrete was produced with lower density than the control; compressive and splitting tensile strength decreased progressively as PET content increased.
[26]	Oliveira et al. (2011)	Concrete and mortar	Short fibre (recycled PET, cut from bottle waste)	Fibre addition at several volume fractions	Not stated in this review	PET fibre addition improved post-cracking behaviour and toughness of mortar; compressive and flexural strength decreased at high fibre content.
[27]	Albano et al. (2009)	Concrete and mortar	Fine aggregate (PET particles, two particle sizes)	PET content and particle size varied at three water/cement ratios	Not stated in this review	Density, compressive strength and elastic modulus fell as PET content and particle size increased; water absorption increased at high PET content.
[28]	Ferreira et al. (2012)	Concrete and mortar	Fine and coarse aggregate (recycled plastic, including PET)	0%, 7.5% and 15% by volume of natural aggregate	Not stated in this review	Compressive strength, splitting tensile strength and modulus of elasticity fell as the replacement ratio and aggregate size increased, whereas abrasion resistance improved; the best curing environment depended on the property.
[29]	Saikia et al. (2013)	Concrete and mortar	Aggregate (three PET aggregate types)	PET aggregate as partial replacement of natural aggregate	Not stated in this review	Compressive strength was significantly lower than the control for all PET aggregate types; toughness improved, and the improvement depended on aggregate shape.
[30]	Saikia et al. (2014)	Concrete and mortar	Fine aggregate (three PET shapes and sizes)	5%, 10% and 15% by volume of natural aggregate	Not stated in this review	Slump increased slightly and hardened density fell with PET content; strength loss grew with the replacement ratio and abrasion resistance was reduced.
[31]	Bui et al. (2018)	Concrete and mortar	Fibre (PET bottle strips) in recycled aggregate concrete	Fibre addition at several volume fractions	Not stated in this review	PET fibre addition improved splitting tensile strength and toughness of recycled aggregate concrete while reducing workability.
[32]	Yesilata et al. (2009)	Concrete and mortar	Aggregate (waste PET and rubber pieces)	PET pieces added at several volume fractions up to about 15%	Not stated in this review	Thermal conductivity was reduced by about 30% at the highest PET content, with an associated reduction in compressive strength.
[33]	Hannawi et al. (2010)	Concrete and mortar	Fine aggregate (PET and polycarbonate waste aggregates)	Aggregate replacement by volume (up to 50%)	Not stated in this review	Density, compressive strength and elastic modulus decreased with increasing PET and polycarbonate aggregate content, and porosity and thermal conductivity changed accordingly.
[34]	Remadnia et al. (2009)	Concrete and mortar	Aggregate (recycled PET) with protein foaming agent	PET aggregate replacement by volume	Not stated in this review	Lightweight cementitious composites were produced with a protein-based foaming agent; density and strength fell as PET aggregate content increased.

[35]	Pelisser et al. (2012)	Concrete and mortar	Short fibre (recycled PET, 10-20 mm)	Fibre volume fractions of 0.05%, 0.18% and 0.30%	Not stated in this review	PET fibre addition changed the post-cracking flexural behaviour of concrete and produced only limited change in compressive strength at the dosages tested.
[36]	Almeshal et al. (2020)	Concrete and mortar	Fine aggregate (recycled plastic, PET)	0%, 10%, 20%, 30%, 40% and 50% by volume of sand	Not stated in this review	Workability and density decreased as PET replacement increased; compressive strength fell progressively above 10% replacement.
[37]	Borg et al. (2016)	Concrete and mortar	Short fibre (recycled PET)	Fibre addition at several volume fractions	Not stated in this review	PET fibre addition improved early-age and post-cracking performance; workability and compressive strength decreased at high fibre dosage.
[38]	Araghi et al. (2015)	Concrete and mortar	Fine aggregate (PET particles)	0%, 5%, 10% and 15% by volume	Not stated in this review	Resistance to sulfuric acid erosion improved as PET particle content increased, with lower crushing-load reduction and mass loss than the control.
[39]	Sadrmomtazi et al. (2016)	Concrete and mortar	Fine aggregate (PET particles)	PET particles combined with pozzolanic materials	Not stated in this review	PET particles reduced fresh and hardened density of self-compacting concrete; the pozzolanic materials partly offset the associated strength loss.
[40]	Ge et al. (2014)	Concrete and mortar	Aggregate (recycled PET) in polymer mortar	PET aggregate content varied	Not stated in this review	Plastic mortar made with recycled PET achieved usable mechanical strength at reduced density; properties depended on PET content and binder formulation.
[41]	Meza et al. (2021)	Concrete and mortar	Short fibre (recycled PET)	Fibre dose and aspect ratio varied in a statistical-experimental design	Not stated in this review	Fibre dose had a greater influence than the fibre aspect ratio; tensile toughness and equivalent flexural strength were improved at optimised dosage.
[42]	Jaskowska-Lemańska et al. (2022)	Concrete and mortar	Fine aggregate (recycled PET aggregate)	0%, 5%, 10%, 15% and 20% of fine aggregate	Not stated in this review	20% PET replacement failed the self-compacting requirement and reduced compressive strength by almost 50%, whereas 5% replacement did not significantly change the measured properties.
[43]	Campanhão et al. (2021)	Concrete and mortar	Fine aggregate (PET sand, crushed bottle waste)	10%, 20% and 30% replacement of quartz sand	Not stated in this review	PET sand was viable up to 10% replacement and improved mechanical properties; above 20% workability and incorporated air deteriorated sharply (24% incorporated air at 30%).
[44]	Coviello et al. (2023)	Concrete and mortar	Fine aggregate (recycled PET)	1%, 2% and 3% by mass	Not stated in this review	Screeds containing fine recycled PET aggregate were lighter and had lower thermal conductivity than the reference screed, with a progressive reduction in compressive and flexural strength.
[45]	Lerna et al. (2023)	Concrete and mortar	Aggregate and fibre (chemically and mechanically recycled PET)	PET as partial sand replacement and as fibre in premixed screeds	Not stated in this review	Both chemically recycled PET aggregate and mechanically recycled PET fibre reduced thermal conductivity of mortars and screeds, with different mechanical penalties.
[46]	Islam (2022)	Concrete and mortar	Coarse aggregate (PET and polypropylene waste plastic)	10%, 20% and 30% replacement of coarse aggregate	Not stated in this review	Compressive strength decreased as plastic content increased; PET gave higher strength than polypropylene at the same replacement level.
[47]	Bachtiar et al. (2020)	Concrete and mortar	Artificial coarse aggregate (melted PET, produced at about 300 C)	0%, 25%, 50%, 75% and 100% of coarse aggregate	Not stated in this review	Compressive strength, flexural strength and unit weight decreased as the proportion of PET artificial coarse aggregate increased.
[48]	Aocharoen et al. (2023)	Concrete and mortar	Coarse flake-shaped PET aggregate	0-10% volumetric replacement of gravel	Not stated in this review	PET aggregate reduced compressive strength and elastic modulus and lowered resistance to water and chloride penetration; the effect depended on the water/cement ratio.
[49]	Kangavar et al. (2022)	Concrete and mortar	Granular PET (fine aggregate)	0%, 10%, 30% and 50% by volume of fine aggregate	Not stated in this review	Ten percent volumetric replacement improved several fresh and hardened properties, whereas higher replacement reduced density, strength and elastic modulus.
[50]	Qaidi et al. (2023)	Concrete and mortar	Fine aggregate (recycled PET)	0%, 25% and 50% replacement at water/cement ratios of 0.40, 0.45 and 0.55	Not stated in this review	Density and thermal conductivity fell substantially (11−47%); at 50% PET the concrete reached a thermal conductivity below 0.71 W/(m K) and was classified as a bearing insulator.
[51]	Kunthawatwong et al. (2022)	Concrete and mortar	Fine aggregate (PET) in geopolymer and cement mortars	PET fine aggregate replacement in fly ash geopolymer and cement mortars	Not stated in this review	Density and compressive strength decreased with PET content in both geopolymer and cement mortars.
[52]	Foti et al. (2020)	Concrete and mortar	Aggregate (chemically depolymerised PET)	Different PET percentages in mortar mixes	Not stated in this review	Mortars containing chemically depolymerised PET aggregate showed reduced density and acceptable flexural

						and compressive strength at moderate dosage.
[53]	Alani et al. (2019)	Concrete and mortar	Aggregate (recycled PET) in ultra-high-performance concrete	PET aggregate replacement in ultra-high-performance concrete	Not stated in this review	Ultra-high-performance concrete containing recycled PET aggregate was reported to retain favourable strength and durability performance.
[54]	Babafemi et al. (2022)	Concrete and mortar	Eco-aggregate (Resin8 and PET)	5%, 10% and 15% by volume for sand	Not stated in this review	Ten percent PET replacement slightly increased compressive strength (2.4%); strength was largely retained after exposure to 250 C.
[55]	Hassani et al. (2005)	Asphalt	Coarse aggregate replacement (PET granules), dry route	Five coarse aggregate replacement percentages, up to 20% by volume	Marshall method (stability, flow, Marshall quotient, density)	Twenty percent volumetric replacement reduced compacted bulk density by 2.8%; Marshall stability and Marshall quotient were almost the same as the control.
[56]	Ahmadinia et al. (2011)	Asphalt	Additive to stone mastic asphalt, wet route (PET, 2−4 mm)	PET added to the mixture at several contents	Not stated in this review	Stiffness and resistance to permanent deformation improved at high service temperature, while flexibility at low temperature was reduced at high PET content.
[57]	Moghaddam et al. (2014)	Asphalt	PET particles in asphalt (dry and wet routes)	PET contents varied by mass of binder or mixture	Dynamic creep test	PET modification increased resistance to permanent deformation, and stiffness increased with PET content.
[58]	Rahman et al. (2013)	Asphalt	Partial fine aggregate replacement (PET, 1.18−2.36 mm)	5−25% by weight of asphalt mixture	Not stated in this review	Permanent deformation resistance reached a maximum at 20% PET replacement, identifying an optimum PET content for the mixture tested.
[59]	Sreeram et al. (2018)	Asphalt	Binder modifier (PET-based additive), wet route	2% PET additive	Marshall stability and indirect tensile stiffness tests	Mixtures containing 2% PET additive, together with reclaimed asphalt pavement, showed improved stability and Marshall quotient, indicating better resistance to permanent deformation.
[60]	Leng et al. (2018)	Asphalt	Chemically recycled PET in crumb rubber modified asphalt	PET-derived additive blended into crumb rubber modified binder	Not stated in this review	Chemically recycled PET improved the rutting and fatigue performance of crumb rubber modified asphalt.
[61]	Alzuhairi et al. (2018)	Asphalt	Additive to bitumen (degraded PET), wet route	2%, 4%, 6%, 8%, 10% and 12% by weight of bitumen	Marshall method of mix design	Marshall stability improved relative to the unmodified mixture, and flow value, air voids and water absorption were better than the control.
[62]	Xu et al. (2021)	Asphalt	Chemical modifier (amine-treated PET-derived additive)	PET-derived additive blended with the binder	Not stated in this review	Amine-treated waste PET additives increased rutting and fatigue resistance of asphalt mixtures, with performance dependent on the amine used.
[63]	Padhan et al. (2020)	Asphalt	Functionalised PET additive combined with SBS	PET additive content varied in the binder	Not stated in this review	Waste PET functionalised additives combined with styrene-butadiene-styrene improved binder rheology and mixture performance.
[64]	Ameli et al. (2020)	Asphalt	Binder modifier (waste PET) with ground tyre rubber	PET content varied in stone matrix asphalt	Not stated in this review	PET-modified binders and stone matrix asphalt mixtures showed improved stiffness, and moisture damage resistance improved when anti-stripping agents were added.
[65]	Mashaan et al. (2021)	Asphalt	Waste PET plastic modifier, wet route	PET content varied by mass of binder	Not stated in this review	Waste PET improved stiffness and permanent deformation resistance of asphalt mixes at lower cost than commercial polymers.
[66]	Mashaan et al. (2022)	Asphalt	Hybrid PET and nano-silica additive	PET/nano-silica blend in C320 bitumen	Not stated in this review	The hybrid PET−nano-silica additive improved rutting and fatigue performance of stone mastic asphalt.
[67]	Majka et al. (2023)	Asphalt	Recycled PET recyclate additive	Recycled PET blended into the asphalt mixture	Not stated in this review	Recycled PET modification increased mixture stiffening and rutting resistance, with the effect depending on the PET form used.
[68]	Hao et al. (2025)	Asphalt	Recycled plastics in porous asphalt	Plastic content varied; 360 specimens tested	Not stated in this review	Long-term ageing reduced the performance benefit of recycled plastics, but the porous asphalt mixtures retained acceptable functional properties.
[69]	Silva et al. (2021)	Bricks and blocks	PET added to soil-cement bricks	PET content varied in the brick mixture	Not stated in this review	PET addition reduced the density and mechanical strength of soil−cement bricks, with acceptable performance at low PET content.
[70]	Deraman (2021)	Bricks and blocks	Partial sand replacement (PET)	PET content varied in cement-sand bricks	Not stated in this review	PET replacement reduced thermal conductivity, producing cement-sand bricks of low thermal conductivity.
[71]	Bamigboye et al. (2019)	Bricks and blocks	PET combined with river sand	10%, 20%, 30%, 40%, 50%, 60% and 100% PET in the sand-PET blend	Not stated in this review	Increasing PET content reduced water absorption and bulk density; compressive and flexural strength varied with the PET fraction.

[72]	Alighiri et al. (2019)	Bricks and blocks	PET as the main matrix (melted bottle waste)	Four mix variations of PET and sand	Not stated in this review	Lightweight bricks were produced with lower density than conventional bricks, with compressive strength dependent on the sand-to-PET ratio.
[73]	Muyen et al. (2016)	Bricks and blocks	Whole PET bottles filled with dry waste (bottle bricks)	Bottle-brick construction; no cementitious binder	Not stated in this review	Bottle bricks achieved compressive strengths suitable for low-rise, non-structural walling.
[74]	Ikechukwu et al. (2021)	Bricks and blocks	Melted PET plastics with crushed glass	PET and crushed glass content varied in masonry bricks	Not stated in this review	Masonry bricks produced with melted PET and crushed glass achieved adequate strength and durability for non-load-bearing masonry.
[75]	Aneke et al. (2021)	Bricks and blocks	Scrap plastic waste (including PET) with foundry sand	Plastic and foundry sand proportions varied	Not stated in this review	Green-efficient masonry bricks produced from scrap plastic and foundry sand met strength requirements for non-load-bearing applications.
[76]	Yousaf et al. (2025)	Bricks and blocks	PET dissolved in solvent and mixed with sand	PET content varied in the composite brick	Not stated in this review	Solvent-based PET-sand composite bricks reached usable compressive strength at lower energy input than melt-processed PET bricks.
[77]	Ashraf et al. (2024)	Bricks and blocks	Polyethylene and PET waste	PE/PET content varied in interlocking bricks	Not stated in this review	Lego-like interlocking bricks made from PE and PET waste met the strength requirements for non-load-bearing walls.
[78]	Nnorom et al. (2023)	Bricks and blocks	PET and LDPE with sand, no cement binder	PET/LDPE content varied in interlocking paving bricks	Not stated in this review	Interlocking paving bricks produced by hot mixing achieved adequate compressive strength and low water absorption.
[79]	Intini et al. (2011)	Insulation	Polyester fibre from post-consumer PET bottles (insulation panel)	Product-level life cycle assessment	Not stated in this review	Life-cycle assessment of a polyester-fibre insulation panel showed that using recycled PET reduces the environmental burden relative to virgin fibre.
[80]	Ingrao et al. (2014)	Insulation	Recycled-PET fibre panels for thermal insulation	Product-level life cycle assessment	Not stated in this review	The environmental impact of recycled-PET fibre insulation panels was quantified and improvement options were identified for the production stage.
[81]	Koh et al. (2018)	Insulation	rPET aerogel produced from recycled PET fibres	PET fibre concentration 0.5−2% (w/v) with PVA and glutaraldehyde cross-linkers	Not stated in this review	rPET aerogels achieved very low thermal conductivity and good acoustic absorption, with performance governed by fibre concentration and the cross-linker ratio.
[82]	Marof et al. (2025)	Insulation	Recycled PET combined with silica aerogel in cement mortar	Surface-modified silica aerogel and recycled PET content varied	Not stated in this review	Adding silica aerogel and recycled PET reduced the thermal conductivity of cement mortar while retaining usable mechanical strength.
[83]	Mousakhani et al. (2022)	Insulation	Whole PET bottles used as wall insulation	Insulation layer of used PET bottles compared with fibreglass	Not stated in this review	PET bottle insulation performed comparably to fibreglass in a wall assembly, with lower embodied cost.
[84]	Gawłowski et al. (2017)	Insulation	PET nonwoven (flame-retardant impregnated)	Flame-retardant impregnation of recycled PET nonwoven	Not stated in this review	Flame-retardant impregnation increased the thermal insulation performance of the PET nonwoven and reduced its flammability.
[85]	Xanthos et al. (2001)	Composite panels	PET foam core in sandwich panels	PET foam core density varied	Not stated in this review	PET foam core sandwich panels provided useful stiffness-to-weight ratios for building and transport applications.
[86]	Jiang et al. (2020)	Composite panels	Recycled PET foam core with flax/PP skins	Recycled PET core with natural-fibre skins	Not stated in this review	Sandwich composites with recycled PET core and flax/polypropylene skins achieved mechanical properties comparable to conventional cores.
[87]	Mazzuca (2024)	Composite panels	PET foam core with GFRP skins	Eco-friendly PET foam core with glass-fibre reinforced polymer skins	Not stated in this review	GFRP sandwich panels with PET foam core showed adequate flexural stiffness and strength for the rehabilitation of building floors.
[88]	Kassab et al. (2023)	Composite panels	Recycled PET foam core with PET fibre composite facings	PET foam core and PET fibre facings	Not stated in this review	Material non-linearity governed the structural performance of PET foam-core sandwich beams; the analytical model was validated against experimental results.
[89]	Bethke et al. (2020)	Composite panels	PET foam core with epoxy face sheets (flame-retarded)	Flame-retarded PET foam core	Not stated in this review	Flame-retardant treatment improved the fire behaviour of sandwich structures containing PET foam cores and epoxy face sheets.
[90]	Oliveira et al. (2020)	Composite panels	Recycled bottle-cap core sandwich panel	Bottle-cap core with sustainable skins	Not stated in this review	The eco-friendly sandwich panel with a recycled bottle-cap core showed competitive static and dynamic specific properties.
[91]	Filho et al. (2022)	Composite panels	Recycled/perforated PET foam core with aluminium skins	PET foam core density and perforation varied	Not stated in this review	Multi-objective optimisation of aluminium-skinned PET foam panels under impact identified configurations with improved energy absorption.
[92]	Mandegarian et al. (2024)	Composite panels	Recycled PET foam core with thermoplastic skins	Recycled PET foam core in a thermoplastic sandwich	Not stated in this review	Thermoplastic sandwich panels with recycled PET foam core could be manufactured from recyclable

						constituents, supporting end-of-life reprocessing.

Note. The 69 rows above are the full set of included studies. Twenty-eight of them (those listed in Table 2 of the manuscript) report quantitative performance data on a dosage basis that could be extracted; the remaining forty-one contribute supporting, qualitative or single-property evidence and are cited where that evidence is used. No row is a placeholder: every row corresponds to a verified publication listed in the reference list of the manuscript.

Table S2. Quality and risk-of-bias appraisal of the 69 included studies

Each included study was scored on six items, each rated 0 (not reported), 1 (partially reported) or 2 (fully reported). Total scores are interpreted as low (10-12), moderate (7-9) or high (6 or below) risk of bias. Item definitions: I1, PET feedstock and dosage basis clearly stated; I2, mix proportions reported; I3, specimen preparation and curing reported; I4, recognised test standard used; I5, replicate numbers and dispersion reported; I6, comparison against a PET-free reference mix. Item 4 is scored 2 only where the record identifies the standard by name or number; it is scored 1 where a recognised test method is identified but the standard is not cited, and 0 where no laboratory method applies. For the three product-level life-cycle studies (references [79], [80] and [83]), the laboratory items are not applicable and are scored 1; those studies are used for environmental evidence only and are not the source of any mechanical range quoted in Section 4.

Ref.	Study	I1	I2	I3	I4	I5	I6	Total (0-12)	Risk of bias
[24]	Choi et al. (2009)	2	2	2	1	1	1	9	Moderate
[25]	Frigione (2010)	2	2	2	1	1	2	10	Low
[26]	Oliveira et al. (2011)	1	2	2	1	1	1	8	Moderate
[27]	Albano et al. (2009)	1	2	2	1	2	1	9	Moderate
[28]	Ferreira et al. (2012)	2	2	2	1	1	1	9	Moderate
[29]	Saikia et al. (2013)	1	2	2	1	1	2	9	Moderate
[30]	Saikia et al. (2014)	2	2	2	1	1	1	9	Moderate
[31]	Bui et al. (2018)	1	2	2	1	1	1	8	Moderate
[32]	Yesilata et al. (2009)	2	2	2	1	1	1	9	Moderate
[33]	Hannawi et al. (2010)	2	2	2	1	1	1	9	Moderate
[34]	Remadnia et al. (2009)	1	2	2	1	1	1	8	Moderate
[35]	Pelisser et al. (2012)	2	2	2	1	1	1	9	Moderate
[36]	Almeshal et al. (2020)	2	2	2	1	1	1	9	Moderate
[37]	Borg et al. (2016)	1	2	2	1	1	1	8	Moderate
[38]	Araghi et al. (2015)	2	2	2	1	1	2	10	Low
[39]	Sadrmomtazi et al. (2016)	1	2	2	1	1	1	8	Moderate
[40]	Ge et al. (2014)	1	2	2	1	1	1	8	Moderate
[41]	Meza et al. (2021)	1	2	2	1	2	1	9	Moderate
[42]	Jaskowska-Lemańska et al. (2022)	2	2	2	1	2	1	10	Low
[43]	Campanhão et al. (2021)	2	2	2	1	1	1	9	Moderate
[44]	Coviello et al. (2023)	2	2	2	1	1	2	10	Low
[45]	Lerna et al. (2023)	1	2	2	1	1	1	8	Moderate
[46]	Islam (2022)	2	2	2	1	2	1	10	Low
[47]	Bachtiar et al. (2020)	2	2	2	1	2	1	10	Low
[48]	Aocharoen et al. (2023)	2	2	2	1	1	1	9	Moderate
[49]	Kangavar et al. (2022)	2	2	2	1	2	1	10	Low
[50]	Qaidi et al. (2023)	2	2	2	1	2	1	10	Low
[51]	Kunthawatwong et al. (2022)	1	2	2	1	1	1	8	Moderate
[52]	Foti et al. (2020)	1	2	2	1	1	1	8	Moderate
[53]	Alani et al. (2019)	1	2	2	1	1	1	8	Moderate
[54]	Babafemi et al. (2022)	2	2	2	1	1	1	9	Moderate
[55]	Hassani et al. (2005)	2	2	2	2	1	2	11	Low
[56]	Ahmadinia et al. (2011)	1	2	2	1	1	1	8	Moderate
[57]	Moghaddam et al. (2014)	1	2	2	2	1	1	9	Moderate
[58]	Rahman et al. (2013)	2	2	2	1	1	1	9	Moderate
[59]	Sreeram et al. (2018)	2	2	2	2	1	1	10	Low
[60]	Leng et al. (2018)	1	2	2	1	1	1	8	Moderate
[61]	Alzuhairi et al. (2018)	2	2	2	2	1	2	11	Low
[62]	Xu et al. (2021)	1	2	2	1	1	1	8	Moderate
[63]	Padhan et al. (2020)	1	2	2	1	1	1	8	Moderate
[64]	Ameli et al. (2020)	1	2	2	1	1	1	8	Moderate
[65]	Mashaan et al. (2021)	1	2	2	1	1	1	8	Moderate
[66]	Mashaan et al. (2022)	2	2	2	1	1	1	9	Moderate
[67]	Majka et al. (2023)	1	2	2	1	1	1	8	Moderate
[68]	Hao et al. (2025)	2	2	2	1	2	1	10	Low
[69]	Silva et al. (2021)	1	2	2	1	1	1	8	Moderate
[70]	Deraman (2021)	1	2	2	1	1	1	8	Moderate
[71]	Bamigboye et al. (2019)	2	2	2	1	1	1	9	Moderate
[72]	Alighiri et al. (2019)	1	2	2	1	1	1	8	Moderate
[73]	Muyen et al. (2016)	1	2	2	1	1	1	8	Moderate
[74]	Ikechukwu et al. (2021)	1	2	2	1	1	1	8	Moderate
[75]	Aneke et al. (2021)	1	2	2	1	1	1	8	Moderate

[76]	Yousaf et al. (2025)	1	2	2	1	1	1	8	Moderate
[77]	Ashraf et al. (2024)	1	2	2	1	1	1	8	Moderate
[78]	Nnorom et al. (2023)	1	2	2	1	1	1	8	Moderate
[79]	Intini et al. (2011)	2	1	1	0	1	2	7	Moderate
[80]	Ingrao et al. (2014)	2	1	1	0	1	2	7	Moderate
[81]	Koh et al. (2018)	2	2	2	1	1	1	9	Moderate
[82]	Marof et al. (2025)	1	2	2	1	1	1	8	Moderate
[83]	Mousakhani et al. (2022)	2	1	1	0	1	2	7	Moderate
[84]	Gawłowski et al. (2017)	1	2	2	1	1	1	8	Moderate
[85]	Xanthos et al. (2001)	1	2	2	1	1	1	8	Moderate
[86]	Jiang et al. (2020)	1	2	2	1	1	1	8	Moderate
[87]	Mazzuca (2024)	1	2	2	1	2	1	9	Moderate
[88]	Kassab et al. (2023)	1	2	2	1	1	1	8	Moderate
[89]	Bethke et al. (2020)	1	2	2	1	1	1	8	Moderate
[90]	Oliveira et al. (2020)	1	2	2	1	1	1	8	Moderate
[91]	Filho et al. (2022)	1	2	2	1	1	1	8	Moderate
[92]	Mandegarian et al. (2024)	1	2	2	1	2	1	9	Moderate

Result. Of the 69 included studies, 12 were appraised as low risk of bias (total: 10−12) and 57 were appraised as moderate risk (total: 7−9). No included study fell in the high-risk band (6 or below), so no study was excluded from the synthesis on quality grounds. The appraisal records what each source reports as used in this review; a score of 0 does not imply that the study was poorly conducted.

Table S3. Per-source data behind Table 1 and Figures 3 to 7.

One row is completed per source and per plotted value. Midpoints are the arithmetic mean of the reported lower and upper bounds. Unit conversions and the functional unit of each source are recorded so that the normalisation can be reproduced. Values that are not normalised to a common functional unit must not be compared directly.

Figure / Table	Panel	Source (ref.)	Reported value (with units)	Lower bound	Upper bound	Midpoint as plotted	Original functional unit	Conversion or normalisation applied
Table 1; Figure 3a	Cost - mechanical recycling	[16,17,21]	300−600 USD per tonne of recycled PET	300	600	450	USD per tonne of recycled PET	None; ranges quoted as published; the midpoint is the arithmetic mean of the bounds.
Table 1; Figure 3a	Cost - chemical recycling	[19,20,21]	800−2000 USD per tonne of recycled PET	800	2000	1400	USD per tonne of recycled PET	None; ranges quoted as published; the midpoint is the arithmetic mean of the bounds.
Table 1; Figure 3a	Cost - enzymatic recycling	[22,23]	500−1500 USD per tonne of recycled PET	500	1500	1000	USD per tonne of recycled PET	None; ranges quoted as published; the midpoint is the arithmetic mean of the bounds
Table 1; Figure 3b	Energy demand - mechanical recycling	[16,17]	0.5−1.5 kWh per kg of PET processed	0.5	1.5	1.0	kWh per kg of PET processed	None; ranges quoted as published; the midpoint is the arithmetic mean of the bounds.
Table 1; Figure 3b	Energy demand - chemical recycling	[19,20,21]	2.5−10 kWh per kg of PET processed	2.5	10	6.25	kWh per kg of PET processed	None; ranges quoted as published; the midpoint is the arithmetic mean of the bounds.
Table 1; Figure 3b	Energy demand - enzymatic recycling	[22,23]	1−3 kWh per kg of PET processed	1	3	2.0	kWh per kg of PET processed	None; ranges quoted as published; the midpoint is the arithmetic mean of the bounds.
Table 1; Figure 3c	Technology readiness level - mechanical recycling	[16,21]	TRL 9 (fully commercial)	9	9	9	TRL scale 1-9	None.
Table 1; Figure 3c	Technology readiness level - chemical recycling	[19,21]	TRL 6−8 (demonstration to commercial)	6	8	7	TRL scale 1-9	None; the midpoint is the arithmetic mean of the bounds.
Table 1; Figure 3c	Technology readiness level - enzymatic recycling	[22,23]	TRL 4−6 (laboratory to pilot)	4	6	5	TRL scale 1-9	None; the midpoint is the arithmetic mean of the bounds.
Figure 4	Envelope at 5% PET replacement	[24,25,28,29,30,36,42,43]	Relative compressive strength 85−95% of the PET-free control	85	95	90	% of PET-free control	None; values expressed relative to the control reported by each study.
Figure 4	Envelope at 10% PET replacement	[24,25,28,29,30,36,42,43]	Relative compressive strength 85−95% of the PET-free control	85	95	90	% of PET-free control	None; values expressed relative to the control reported by each study.
Figure 4	Envelope at 15% PET replacement	[25,27,28,30,31,37,38,48,49,50]	Relative compressive strength 40−70% of the PET-free control	40	70	55	% of PET-free control	None; values expressed relative to the control reported by each study.
Figure 4	Envelope at 30% PET replacement	[25,27,28,30,31,37,38,48,49,50]	Relative compressive strength 40−70% of the PET-free control	40	70	55	% of PET-free control	None; values expressed relative to the control reported by each study.

Figure 5a	Compressive strength - PET-sand bricks	[69,70,71,72,73,74,75,76,77,78]	5−25 MPa	5	25	15	MPa	None; ranges quoted from the cited studies; the midpoint is the arithmetic mean of the bounds.
Figure 5a	Compressive strength - clay bricks (reference)	Industry and standards reference values	3.5−15 MPa	3.5	15	9.25	MPa	None; reference range for fired clay bricks; the midpoint is the arithmetic mean of the bounds.
Figure 5b	Thermal conductivity - PET-sand bricks	[69,70,72]	0.2−0.5 W/(m K)	0.2	0.5	0.35	W/(m K)	None; ranges quoted from the cited studies; the midpoint is the arithmetic mean of the bounds.
Figure 5b	Thermal conductivity - clay bricks (reference)	Industry and standards reference values	0.6−1.0 W/(m K)	0.6	1.0	0.8	W/(m K)	None; reference range for fired clay bricks; the midpoint is the arithmetic mean of the bounds.
Figure 5c	Density - PET-sand bricks	[69,72,76]	1400−1800 kg/m3	1400	1800	1600	kg/m3	None; ranges quoted from the cited studies; the midpoint is the arithmetic mean of the bounds.
Figure 5c	Density - clay bricks (reference)	Industry and standards reference values	1600−2000 kg/m3	1600	2000	1800	kg/m3	None; reference range for fired clay bricks; the midpoint is the arithmetic mean of the bounds.
Figure 5d	Processing temperature - PET-sand bricks	[70,72,74]	180−250 C (PET softening range used for casting)	180	250	215	C	None; forming temperature of the PET-sand composite; the midpoint is the arithmetic mean of the bounds.
Figure 5d	Processing temperature - clay bricks (reference)	Industry and standards reference values	900−1100 C (kiln firing)	900	1100	1000	C	None; firing temperature of conventional clay bricks; the midpoint is the arithmetic mean of the bounds.
Figure 6	Energy demand - recycled PET product	[79,80]	50% of the conventional product	50	50	50	% of conventional product	Normalised to the conventional product = 100%; no cross-study pooling.
Figure 6	Energy demand - conventional reference	[79,80]	100% (reference)	100	100	100	% of conventional product	Normalised reference value; no cross-study pooling.
Figure 6	Carbon footprint - recycled PET product	[79,80]	21% of the conventional product	21	21	21	% of conventional product	Normalised to the conventional product = 100%; no cross-study pooling.
Figure 6	Carbon footprint - conventional reference	[79,80]	100% (reference)	100	100	100	% of conventional product	Normalised reference value; no cross-study pooling.
Figure 6	Global warming potential - recycled PET insulation	[79,80]	54% of the conventional product	54	54	54	% of conventional product	Normalised to the conventional product = 100%; no cross-study pooling.
Figure 6	Global warming potential - conventional reference	[79,80]	100% (reference)	100	100	100	% of conventional product	Normalised reference value; no cross-study pooling
Figure 7a	Recycled plastics market - 2023	[100]	51.7 USD billion	51.7	51.7	51.7	USD billion	None; market value as published by the source.
Figure 7a	Recycled plastics market - 2030 projection	[100]	98 USD billion (projected)	98	98	98	USD billion	None; projected value as published by the source.
Figure 7b	Investment in recycling capacity - 2025	[101]	2.6 EUR billion	2.6	2.6	2.6	EUR billion	None; value as published by the source.
Figure 7b	Investment in recycling capacity - 2030 plan	[101]	8 EUR billion (planned)	8	8	8	EUR billion	None; planned value as published by the source.
Figure 7c	Cost reduction - recycled PET feedstock	[100,101]	27.5% cost reduction relative to virgin feedstock	27.5	27.5	27.5	% reduction	None; value as published by the source.
Figure 7c	Cost reduction - PET-modified concrete	[100,101]	2.5% cost reduction relative to the conventional mix	2.5	2.5	2.5	% reduction	None; value as published by the source.

Table S3b. Conditions behind the Marshall-stability range reported in Section 4.2.2.

One row is given per study. The range quoted in Section 4.2.2 is an envelope over these conditions and must not be read as a single transferable result. “Not stated in this review” indicates that the corresponding information is not reported in the cited source as used here.

Study (ref.)	**PET form**	**Dosage and basis**	**Aggregate gradation**	**Binder grade**	**Marshall test standard**	**Reported change in stability**
Hassani et al. (2005) [55]	PET granules, dry route (coarse aggregate replacement)	Up to 20% by volume of coarse aggregate	Not stated in this review	60/70 penetration bitumen; optimum binder content 6.6%	Marshall method; standard not stated	Marshall stability and Marshall quotient almost the same as the control; 2.8% lower compacted density at 20% replacement.

Ahmadinia et al. (2011) [56]	PET additive, wet route (2−4 mm particles)	PET added to the stone mastic asphalt mixture at several contents	Not stated in this review	Not stated in this review	Not stated in this review	Stiffness and permanent deformation resistance improved at high service temperature; low-temperature flexibility reduced at high PET content.
Baghaee Moghaddam et al. (2014) [57]	PET particles in asphalt	PET content varied against the unmodified mixture	Not stated in this review	Not stated in this review	Dynamic creep test; standard not stated	Increased resistance to permanent deformation; stiffness increased with PET content.
Rahman et al. (2013) [58]	PET partial fine aggregate replacement (1.18−2.36 mm)	5−25% by weight of the asphalt mixture	Not stated in this review	Not stated in this review	Not stated in this review	Maximum permanent deformation resistance at 20% PET replacement.
Sreeram et al. (2018) [59]	PET-based binder additive, wet route	2% PET additive, with reclaimed asphalt pavement	Not stated in this review	Not stated in this review	Marshall stability and indirect tensile stiffness tests	Improved stability and Marshall quotient, indicating better resistance to permanent deformation.
Alzuhairi et al. (2018) [61]	Degraded PET additive to bitumen, wet route	2%, 4%, 6%, 8%, 10% and 12% by weight of bitumen	Not stated in this review	Not stated in this review	Marshall method of mix design	Improved stability, with lower flow value, air voids and water absorption than the unmodified mixture.
Ameli et al. (2020) [64]	Waste PET with ground tyre rubber in stone matrix asphalt	PET content varied in the binder and mixture	Not stated in this review	Not stated in this review	Not stated in this review	Improved stiffness; moisture damage resistance improved when anti-stripping agents were added.
Mashaan et al. (2021) [65]	Waste PET plastic modifier, wet route	PET content varied by mass of binder	Not stated in this review	Not stated in this review	Not stated in this review	Improved stiffness and permanent deformation resistance at lower cost than commercial polymers.
Mashaan et al. (2022) [66]	PET and nano-silica hybrid additive	Blend of waste PET and nano-silica in C320 bitumen	Stone mastic asphalt gradation	C320 bitumen	Not stated in this review	Improved rutting and fatigue performance of the modified stone mastic asphalt.

Note on Figure 4. The envelopes in Figure 4 are illustrative trend envelopes drawn by hand through the midpoints of the values reported by the included studies; they are not regression fits and no statistical model was estimated. The envelopes are plotted at PET replacement ratios of 5%, 10%, 15% and 30% by volume so that the two dosage windows discussed in Section 4.1 (up to about 10%, and 15% and above) are both represented. The horizontal axis of Figure 4 is labelled accordingly in this revision.

Table S4. Reference verification log.

Every reference in the revised manuscript was checked against Crossref using the DOI where one was supplied, and by bibliographic search where no DOI was given or where the supplied DOI did not resolve. The table records the basis of verification and the action taken. Where a record could not be verified it was replaced by a verified publication; no unverifiable record has been retained.

Ref.	Type	DOI	Basis of verification	Outcome and action taken
[1]	Background and context source	10.1126/sciadv.1700782	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[2]	Background and context source	No DOI	Publisher source (no DOI issued)	Verified as cited; grey literature, no DOI.
[3]	Background and context source	10.1098/rstb.2008.0205	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[4]	Background and context source	10.1057/s41599-018-0212-7	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[5]	Background and context source	10.1016/j.scitotenv.2016.05.041	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[6]	Background and context source	10.1098/rstb.2008.0311	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[7]	Background and context source	10.1787/9789264300248-en	Crossref bibliographic search	Details corrected: title, year and DOI updated to the 2018 IEA cement roadmap.
[8]	Background and context source	10.1007/s11356-021-16980-y	Crossref bibliographic search	Replaced: the submitted record could not be verified and was replaced by Lamba et al. (2022).
[9]	Background and context source	10.1016/j.resconrec.2017.09.005	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[10]	Background and context source	10.1016/j.jobe.2019.100742	Crossref bibliographic search	Details corrected: title matched to the source of record.
[11]	Background and context source	10.1016/j.jclepro.2015.08.042	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[12]	Background and context source	10.1016/j.wasman.2007.09.011	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[13]	Background and context source	10.1016/j.conbuildmat.2020.119146	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[14]	Background and context source	10.1016/j.envint.2021.106622	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[15]	Background and context source	10.1136/bmj.n71	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[16]	Background and context source	10.1016/j.wasman.2017.07.044	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[17]	Background and context source	10.1016/j.polymdegradstab.2011.12.019	Crossref DOI lookup	DOI corrected to 10.1016/j.polymdegradstab.2011.12.019.
[18]	Background and context source	10.1016/j.wasman.2009.06.004	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.

[19]	Background and context source	10.1021/ie501995m	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[20]	Background and context source	10.1016/j.enconman.2016.02.037	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[21]	Background and context source	No DOI	Publisher source (no DOI issued)	Verified as cited; industry source, no DOI.
[22]	Background and context source	10.1038/s41586-020-2149-4	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[23]	Background and context source	10.1016/j.joule.2021.06.015	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record
[24]	Included study	10.1016/j.conbuildmat.2009.02.036	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[25]	Included study	10.1016/j.wasman.2010.01.030	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[26]	Included study	10.1016/j.conbuildmat.2010.11.044	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[27]	Included study	10.1016/j.wasman.2009.05.007	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[28]	Included study	10.1016/j.conbuildmat.2012.02.098	Crossref DOI lookup	Details corrected: volume and page range matched to the source of record.
[29]	Included study	10.1590/s1516-14392013005000017	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[30]	Included study	10.1016/j.conbuildmat.2013.11.049	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[31]	Included study	10.1016/j.wasman.2018.05.035	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[32]	Included study	10.1016/j.conbuildmat.2008.09.014	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[33]	Included study	10.1016/j.wasman.2010.03.028	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[34]	Included study	10.1016/j.conbuildmat.2009.06.027	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[35]	Included study	10.1590/s1516-14392012005000088	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[36]	Included study	10.1016/j.jmrt.2020.02.090	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[37]	Included study	10.1016/j.conbuildmat.2016.01.029	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[38]	Included study	10.1016/j.conbuildmat.2014.12.037	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[39]	Included study	10.1016/j.jclepro.2015.09.107	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[40]	Included study	10.1016/j.conbuildmat.2014.10.005	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[41]	Included study	10.3390/ma14020240	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[42]	Included study	10.3390/ma15072566	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[43]	Included study	10.3390/ma15010273	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[44]	Included study	10.3390/su152416692	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[45]	Included study	10.3390/ma16083155	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[46]	Included study	10.1155/2022/4928065	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[47]	Included study	10.28991/cej-2020-03091626	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[48]	Included study	10.1016/j.clet.2023.100600	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[49]	Included study	10.1016/j.cscm.2022.e00934	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[50]	Included study	10.3389/fmats.2023.1101146	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[51]	Included study	10.1016/j.conbuildmat.2022.127084	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[52]	Included study	10.1155/2020/8424936	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[53]	Included study	10.1016/j.conbuildmat.2019.03.088	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[54]	Included study	10.3390/su14095725	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[55]	Included study	10.1177/0734242x05056739	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[56]	Included study	10.1016/j.matdes.2011.06.016	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[57]	Included study	10.1016/j.matdes.2013.07.015	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[58]	Included study	10.1016/j.proeng.2013.02.018	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[59]	Included study	10.1080/1023697x.2018.1534617	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[60]	Included study	10.1016/j.jclepro.2018.01.171	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[61]	Included study	10.1051/matecconf/201816201042	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[62]	Included study	10.1016/j.eng.2020.08.020	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[63]	Included study	10.1016/j.jclepro.2020.124286	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[64]	Included study	10.1016/j.conbuildmat.2020.118932	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[65]	Included study	10.3390/recycling6030049	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[66]	Included study	10.1016/j.cscm.2022.e01044	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[67]	Included study	10.3390/ma16186258	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[68]	Included study	10.1016/j.resconrec.2024.107979	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[69]	Included study	10.3390/ma14175035	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[70]	Included study	10.37934/arfmts.88.3.117136	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[71]	Included study	10.1088/1742-6596/1378/4/042105	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[72]	Included study	10.1088/1742-6596/1321/2/022023	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[73]	Included study	10.3329/pa.v27i3.30833	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[74]	Included study	10.1016/j.cscm.2021.e00542	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[75]	Included study	10.1016/j.cscm.2021.e00515	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[76]	Included study	10.1016/j.conbuildmat.2025.142612	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[77]	Included study	10.3390/su16198567	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[78]	Included study	10.1177/08927057231171525	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[79]	Included study	10.1007/s11367-011-0267-9	Crossref DOI lookup	Details corrected: year 2011, volume 16, pages 306-315.
[80]	Included study	10.1016/j.scitotenv.2014.06.022	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[81]	Included study	10.3390/gels4020043	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[82]	Included study	10.1016/j.conbuildmat.2025.140320	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[83]	Included study	10.1088/1757-899x/1218/1/012051	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[84]	Included study	10.12912/23920629/68519	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[85]	Included study	10.1106/38pa-r6gr-ylk5-jh3m	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[86]	Included study	10.3390/jcs5010002	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[87]	Included study	10.1016/j.istruc.2023.105815	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[88]	Included study	10.1016/j.istruc.2023.05.119	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[89]	Included study	10.1002/pc.25786	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.

[90]	Included study	10.1016/j.jcomc.2020.100069	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[91]	Included study	10.1016/j.istruc.2022.07.071	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[92]	Included study	10.1177/08927057241291021	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[93]	Background and context source	No DOI	Agency source (no DOI issued)	Verified as cited; agency report, no DOI.
[94]	Background and context source	10.1021/acs.est.7b00423	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[95]	Background and context source	10.1021/es401169n	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[96]	Background and context source	10.1039/b517844b	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[97]	Background and context source	10.1016/j.polymdegradstab.2011.05.006	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[98]	Background and context source	10.1016/S0079-6700(02)00018-7	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[99]	Background and context source	10.3390/recycling7020011	Crossref bibliographic search	Replaced: the submitted record could not be verified and was replaced by Lubongo and Alexandridis (2022).
[100]	Background and context source	No DOI	Publisher source (no DOI issued)	Verified as cited; market report, no DOI.
[101]	Background and context source	10.1787/aa1edf33-en	Crossref DOI lookup	Verified as cited.
[102]	Background and context source	No DOI	Agency source (no DOI issued)	Verified as cited; JRC report, no DOI.
[103]	Background and context source	10.1061/9780784485255.012	Crossref DOI lookup	Verified as cited; conference paper, DOI resolves.
[104]	Background and context source	10.1016/B978-0-323-85789-5.00007-1	Crossref DOI lookup	Verified as cited; book chapter, DOI resolves.
[105]	Background and context source	10.1016/j.wasman.2018.09.003	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.
[106]	Background and context source	10.1016/S0921-3449(03)00035-1	Crossref DOI lookup	Details corrected: journal, volume and pages matched to the source of record.
[107]	Background and context source	10.1016/j.susmat.2015.05.002	Crossref DOI lookup	Verified as cited; DOI resolves to the cited record.

Table S4b. Records from the submitted version that could not be verified and were removed.

Each record below was checked by DOI lookup where a DOI was supplied and by title, journal, volume and page range search in Crossref. None of them could be matched to an existing publication. They have been removed from the reference list and the evidence they carried has been replaced by the verified studies shown.

Record as previously cited	**Outcome of verification**	**Action taken in this revision**
Woidasky, J.; Schmidt, J.; Vietze, S. Recycled PET in construction: environmental assessment. Resour. Conserv. Recycl. 2021, 170, 105577.	No record of this article could be located in Crossref or in the publisher's index; the volume and article number belong to an unrelated paper.	Replaced by Lamba, P.; Kaur, D.P.; Raj, S.; Sorout, J. (2022) [8]
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