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Focus on Carbon Net Zero and Sustainability

1 km haul road carbon comparison

Traditional imported-stone construction, in-situ stabilisation and decommissioning.

Carbon Net Zero Strategy

1.0% cement headline case with 1.5% and 2.0% sensitivity

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Like-for-like: 1.0% cement + 100 mm stone

1.0% cement + 100 mm

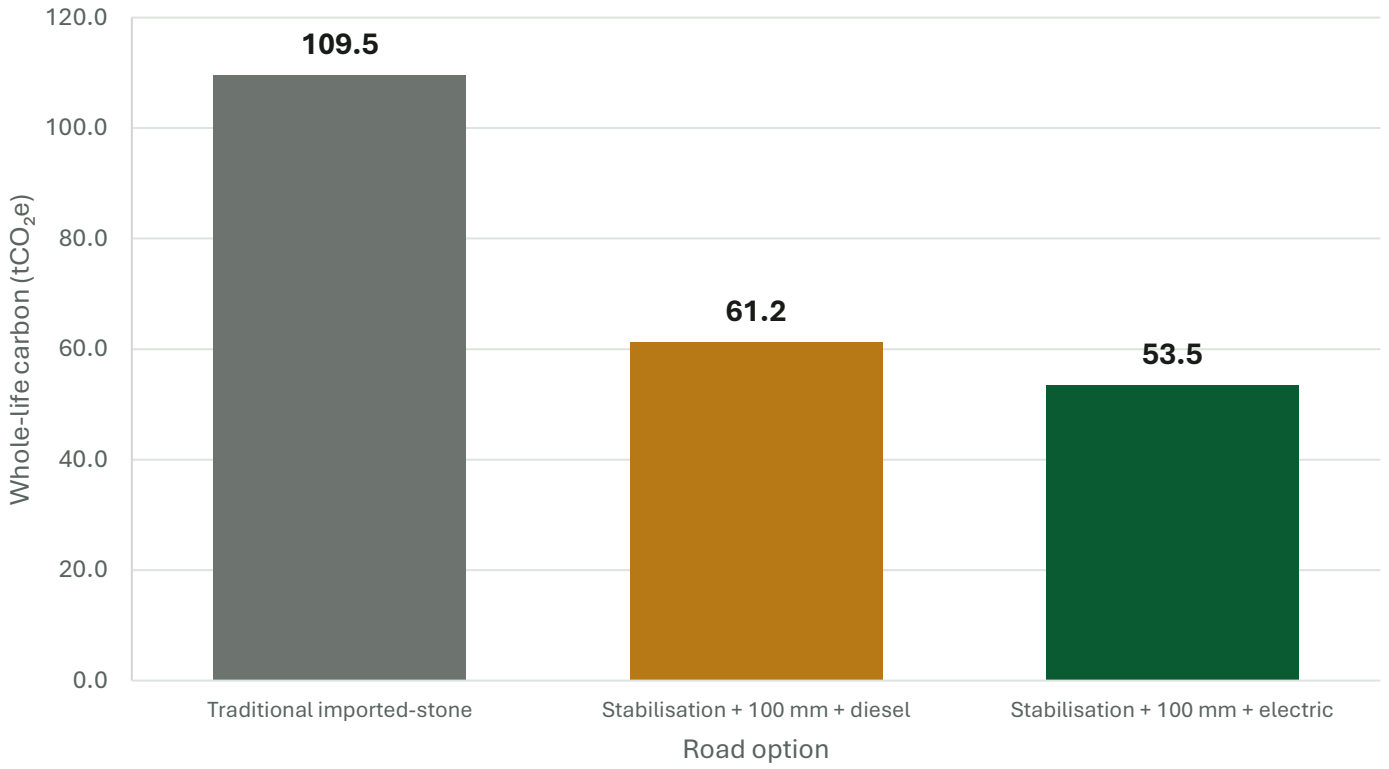
51.1%

whole-life reduction

56.0 tCO_2e saved

Traditional road
109.5 tCO_2e

Stabilisation + 100 mm + electric
53.5 tCO_2e



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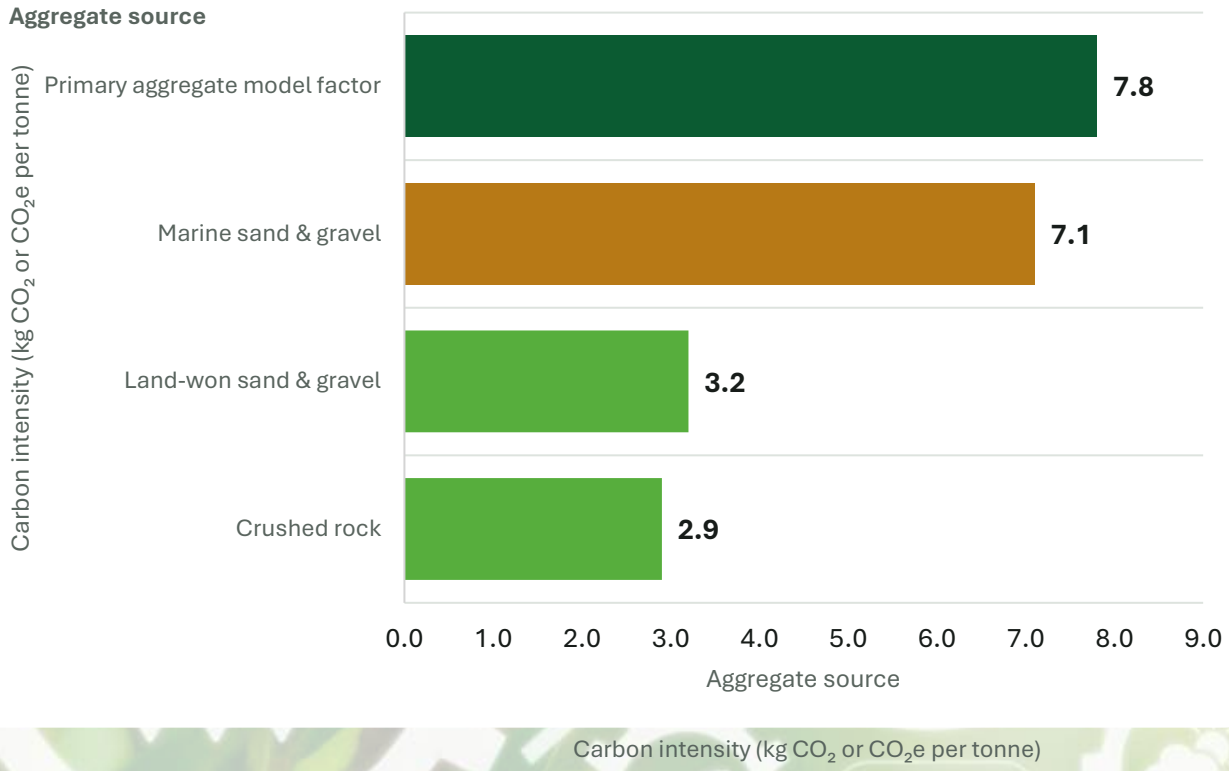
Model basis and boundaries

Model input	Base case / range	Application
Road geometry	1,000 m × 6.0 m	Comparison basis
Traditional aggregate depth	500 mm	Imported-stone road
Compacted aggregate density	2.1 t/m^3	6,300 t aggregate
Stabilised treatment depth	300 mm	In-situ treatment
Stone surface option	100 mm	1,260 t imported stone
Cement dosage	1.0%, 1.5%, 2.0%	1.0% headline base case
Dry treated-soil density	1.7 t/m^3	3,060 t treated mass
One-way quarry / tip distance	30 km	Bulk material transport
Traditional construction diesel	3,000 litres	Placement and compaction
Electric decommissioning energy	1,550 kWh	Location-based electricity

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Quarrying and imported stone



49.2 tCO_2e

traditional-road quarry supply for 6,300 t

9.8 tCO_2e

quarry supply for the 1,260 t / 100 mm surface

+3.6 tCO_2e

30 km inbound quarry-to-site haul

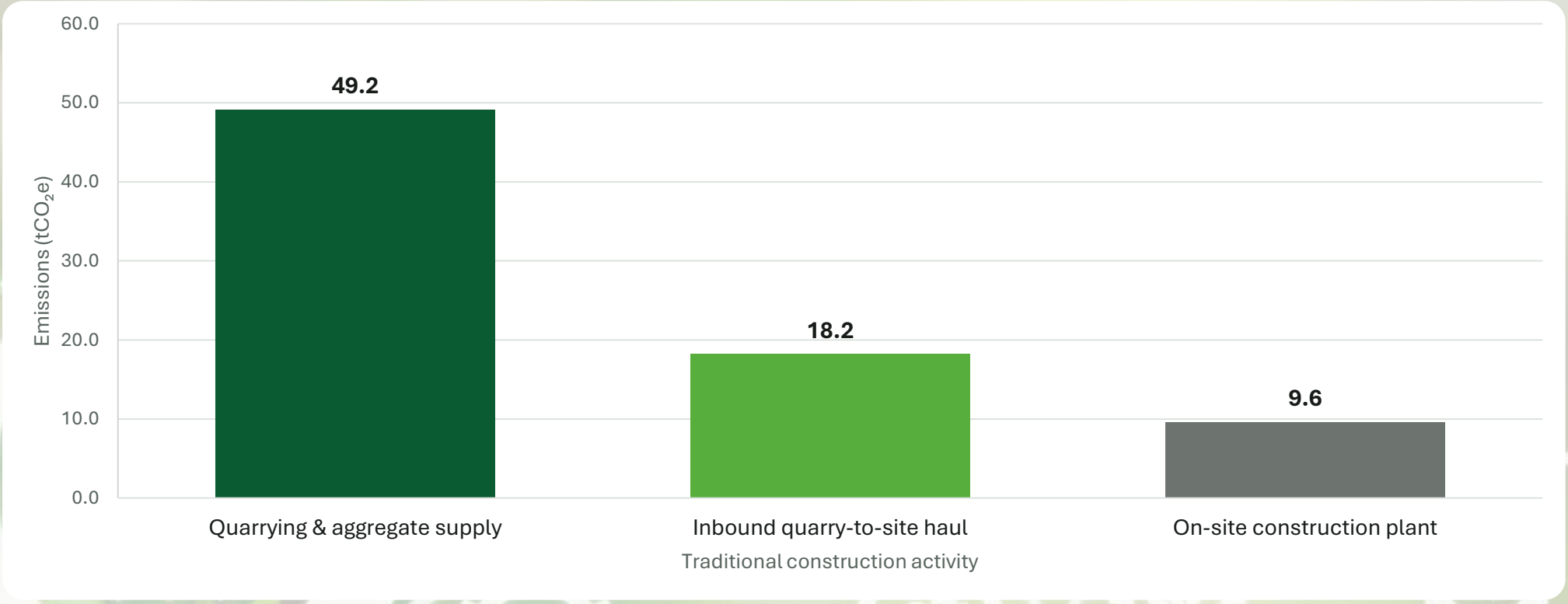
The supply factor already includes quarry extraction and primary processing; delivery is added separately.

Sources: MPA 2025 and UK Government 2026. Marine aggregate includes transport to the first point of delivery.

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Aggregate supply is 64% of traditional build carbon



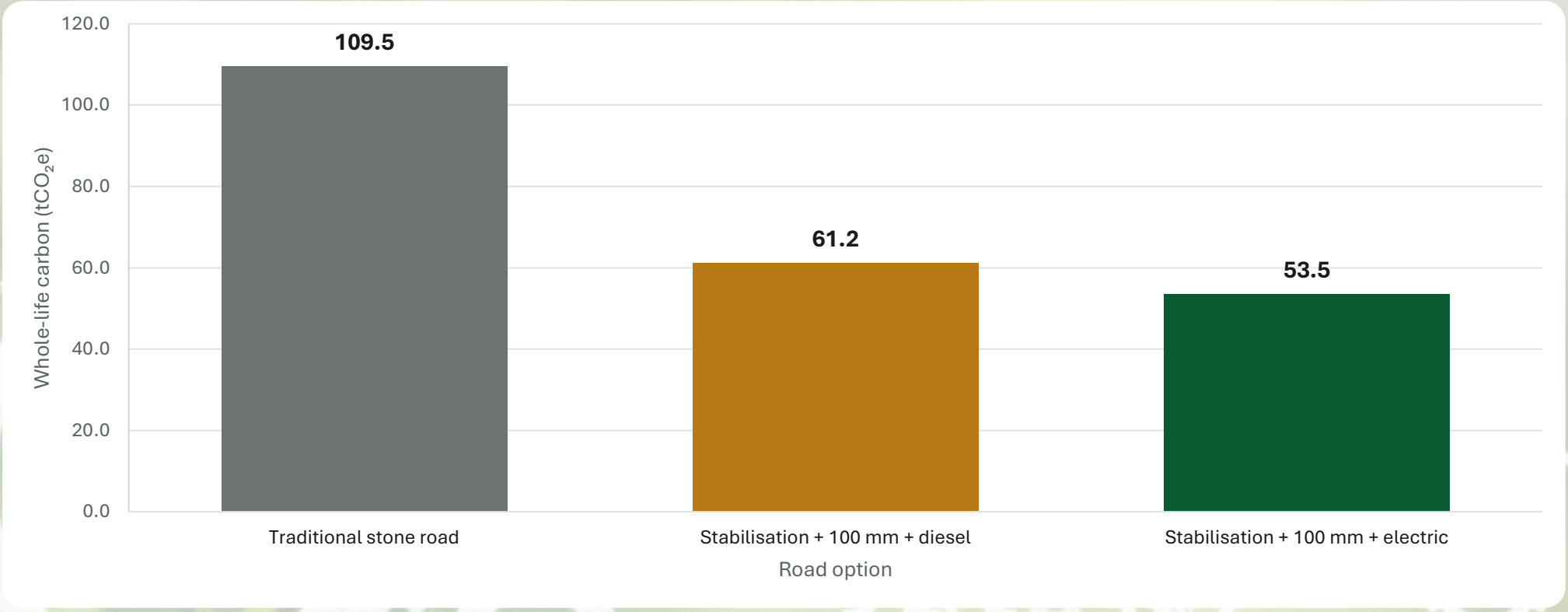
49.2 + 18.2 + 9.6 = 77.0 tCO_2e

Aggregate supply includes quarry extraction and processing through point of sale. Project delivery remains separate.

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100 mm surface included in both stabilised options

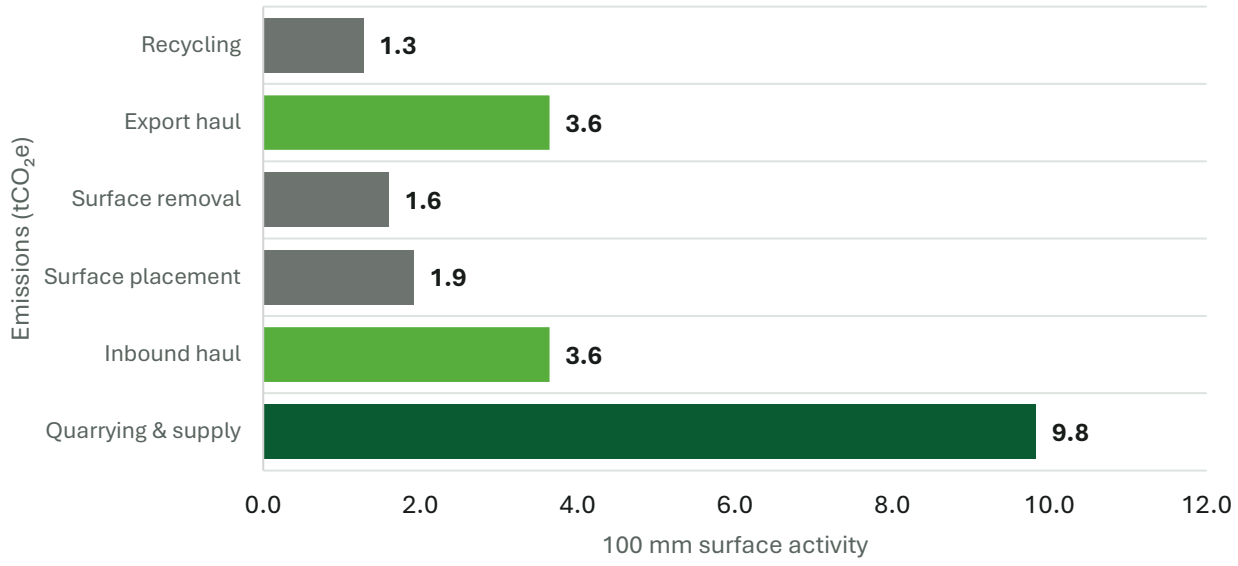


Saving vs traditional: 48.3 tCO_2e with diesel decommissioning | 56.0 tCO_2e with electric decommissioning

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Stabilisation + 100 mm imported-stone surface



53.5 tCO_2e

hybrid whole-life total

56.0 tCO_2e saved

51.1% reduction

1,260 t stone | 600 m^3 | 21.9 tCO_2e surface uplift

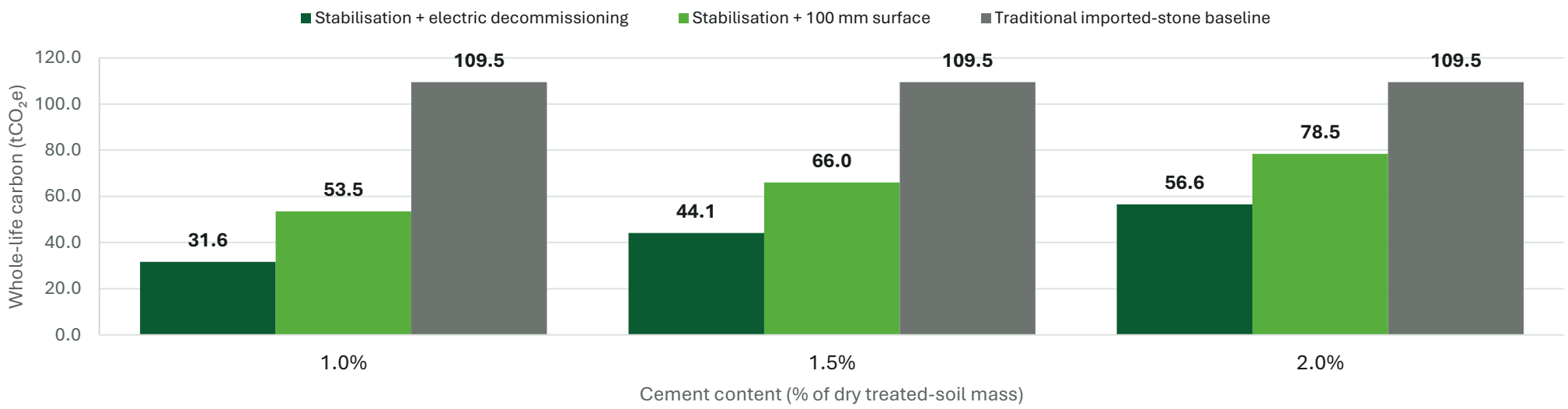
Scenario	Construction	Decommissioning	Whole-life	Reduction
100 mm + diesel	46.7 tCO_2e	14.5 tCO_2e	61.2 tCO_2e	44.1%
100 mm + electric	46.7 tCO_2e	6.8 tCO_2e	53.5 tCO_2e	51.1%
Traditional road	77.0 tCO_2e	32.6 tCO_2e	109.5 tCO_2e	—

The surface uplift includes quarrying, 30 km delivery, placement, removal, export haul and closed-loop recycling.

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Cement dosage sensitivity: 1.0% to 2.0%



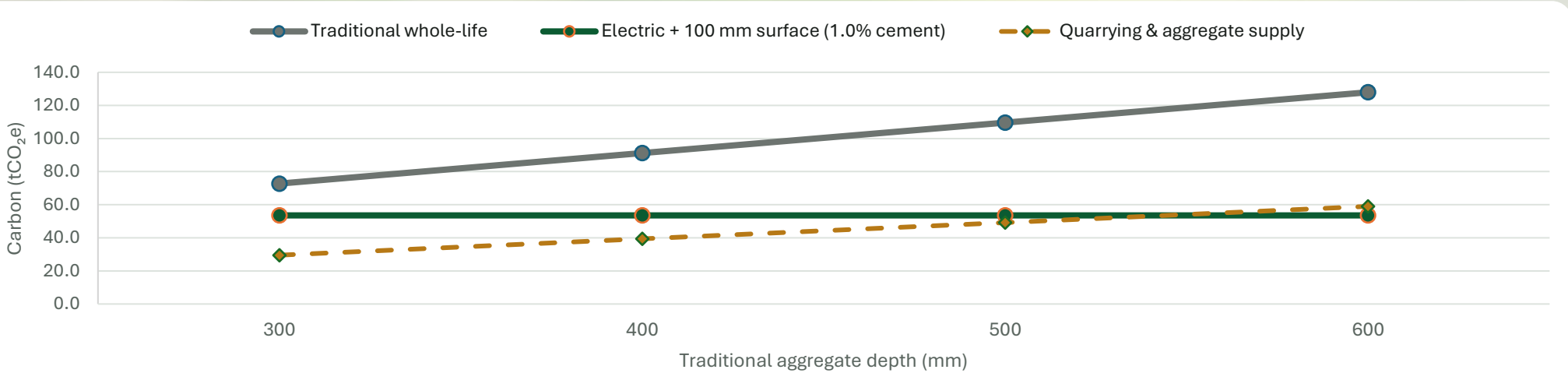
Cement	Binder	Pure stabilisation	100 mm surface	Traditional	100 mm saving	100 mm reduction
1.0%	30.6 t	31.6 tCO_2e	53.5 tCO_2e	109.5 tCO_2e	56.0 tCO_2e	51.1%
1.5%	45.9 t	44.1 tCO_2e	66.0 tCO_2e	109.5 tCO_2e	43.5 tCO_2e	39.7%
2.0%	61.2 t	56.6 tCO_2e	78.5 tCO_2e	109.5 tCO_2e	31.1 tCO_2e	28.4%

The 100 mm option adds a constant 21.9 tCO_2e surface uplift. Cement dosage still requires performance testing.

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Traditional road carbon rises with aggregate depth

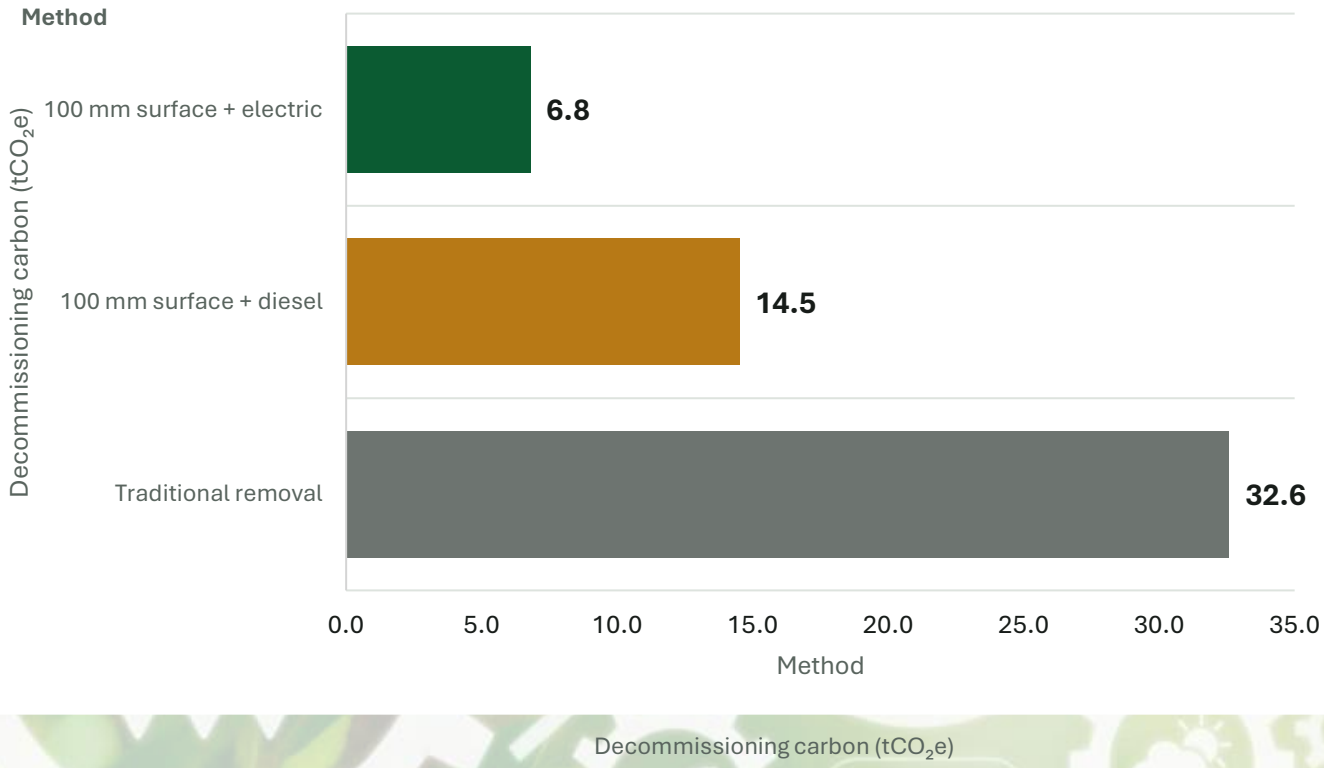


Depth	Quarry supply	Traditional whole-life	Electric + 100 mm	Reduction
300 mm	29.5 tCO_2e	72.7 tCO_2e	53.5 tCO_2e	26.4%
400 mm	39.3 tCO_2e	91.1 tCO_2e	53.5 tCO_2e	41.3%
500 mm	49.2 tCO_2e	109.5 tCO_2e	53.5 tCO_2e	51.1%
600 mm	59.0 tCO_2e	127.9 tCO_2e	53.5 tCO_2e	58.2%

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Decommissioning carbon with the 100 mm surface included



Decommissioning carbon (tCO_2e)

79.1%

reduction against traditional removal

53.1%

reduction from diesel to electric with the surface included

Electric surface option: 6.8 tCO_2e including removal, haul and recycling.

Sources: UK Government 2026 electricity factors and the JJ Mac decommissioning strategy assumptions.

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Conclusion

1.0% base case

56.0 tCO_2e

modelled whole-life saving

51.1%

reduction against the traditional road

53.5 tCO_2e whole-life

Whole-life carbon by cement dosage

1.0%: 31.6 pure | 53.5 tCO_2e with 100 mm

1.5%: 44.1 pure | 66.0 tCO_2e with 100 mm

2.0%: 56.6 pure | 78.5 tCO_2e with 100 mm

100 mm options at 1.0%

61.2 diesel | 53.5 electric | 56.0 saved with electric

Decision point

Use the lowest cement dosage that satisfies laboratory mix design, strength, durability and field performance requirements.