SCI
Recycling & Re-using Asphalt
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IN-SITU RECYCLING

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Recycling & Re-using Asphalt

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Construction Waste

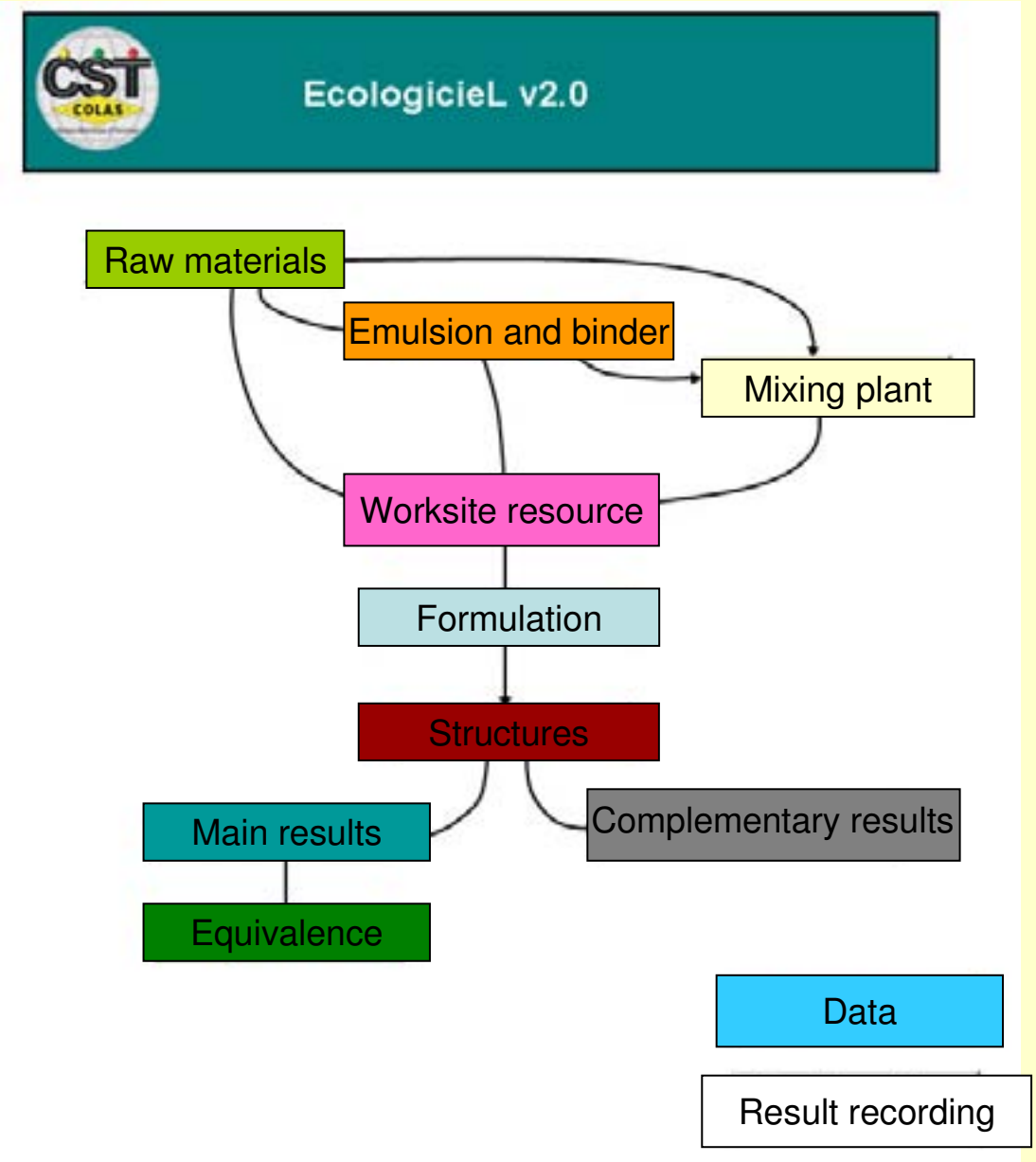
- Construction
  - estimated at 40% of all resource consumption
  - generates 120 million tonnes of waste a year, equivalent to ~ ⅓ of amount of all waste in UK
- WRAP initiative
  - to half all waste to landfill by 2012
  - Consistent with government's Strategy for Sustainable Construction
  - Landfill tax (£2.50/£48) & Aggregates levy (£2)

Types of Environmental Impact

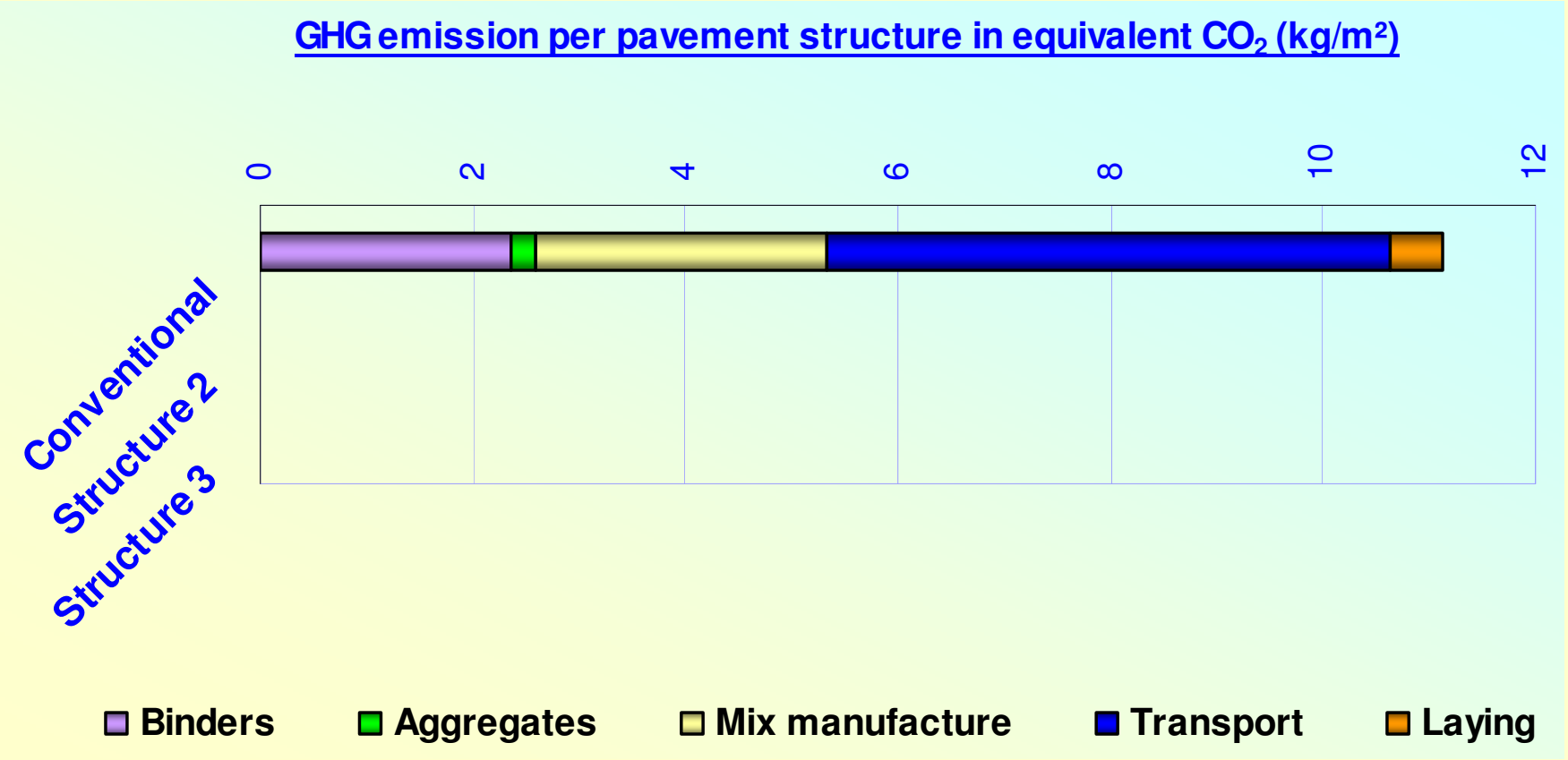
Impact	Unit
Energy consumption	MJ
Greenhouse gases	kg equivalent CO_2
Atmosphere acidification	kg equivalent SO_2
Photochemical zone	kg equivalent ethylene

$$kg\ (CO_2 + 21.\ CH_4 + 310.\ N_2O)$$

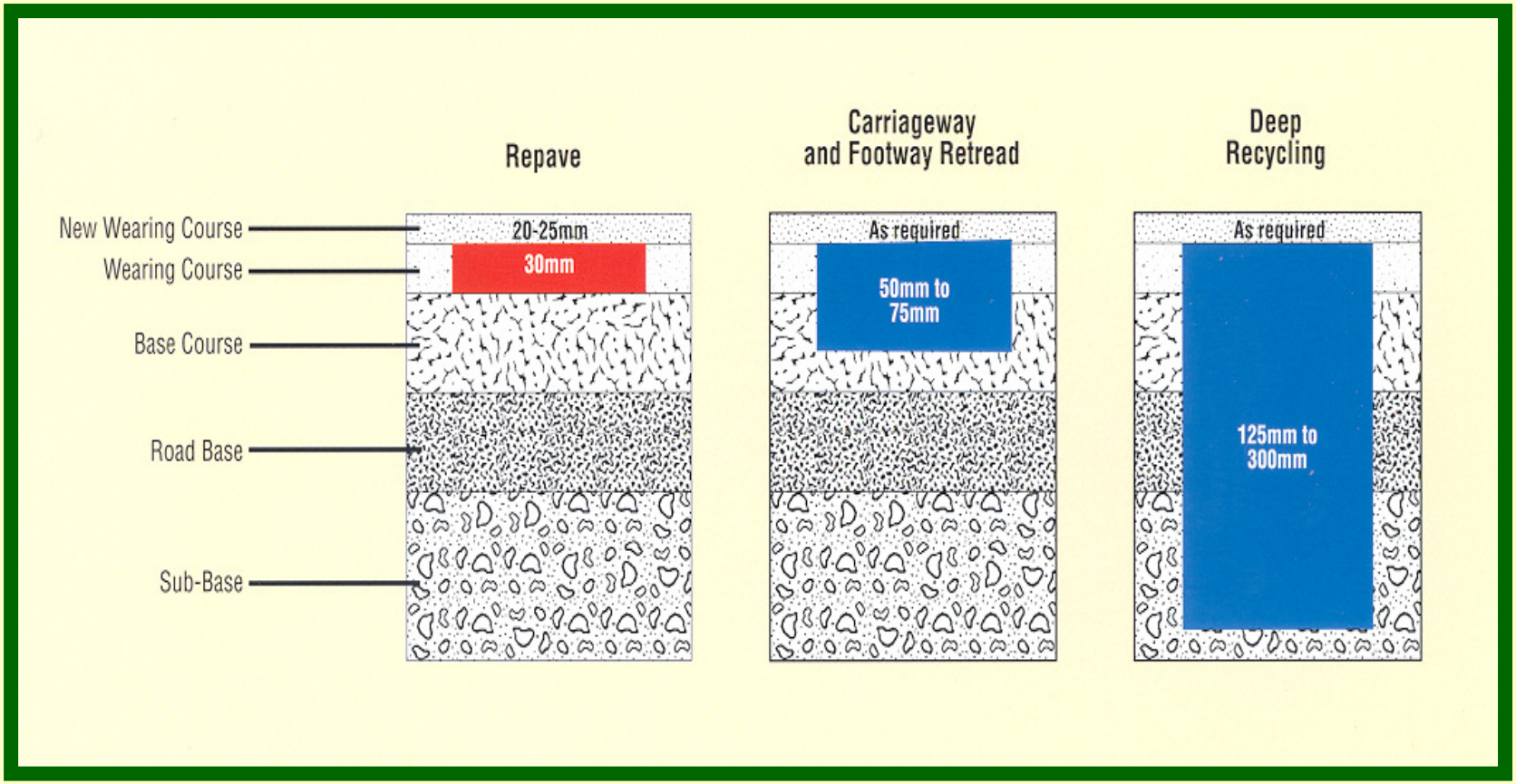
Calculator for Energy & GHG Emission



GHG Emissions



In-situ Pavement Recycling Processes



REPAVE

Surface heated, scarified, re-profiled, new thin overlay superimposed in one pass

Surface crazing,
weathering,
ageing

Fretting of joints,
ravelling of chippings

Tines scarify 35mm

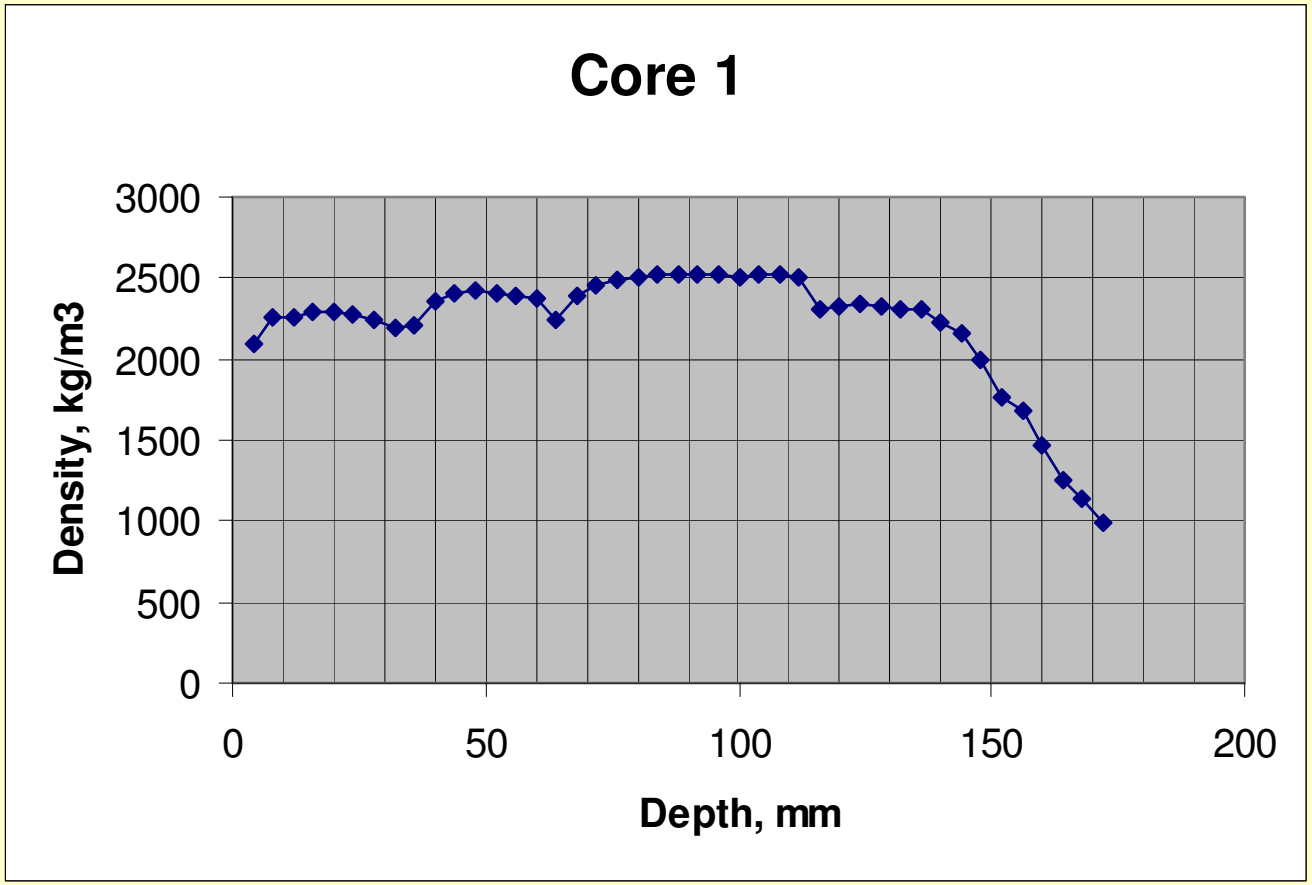
Crazed areas, open joints heat-welded

Floating screed improves levels

New 20-25mm overlay bonded to hot surface

New asphalt overlay

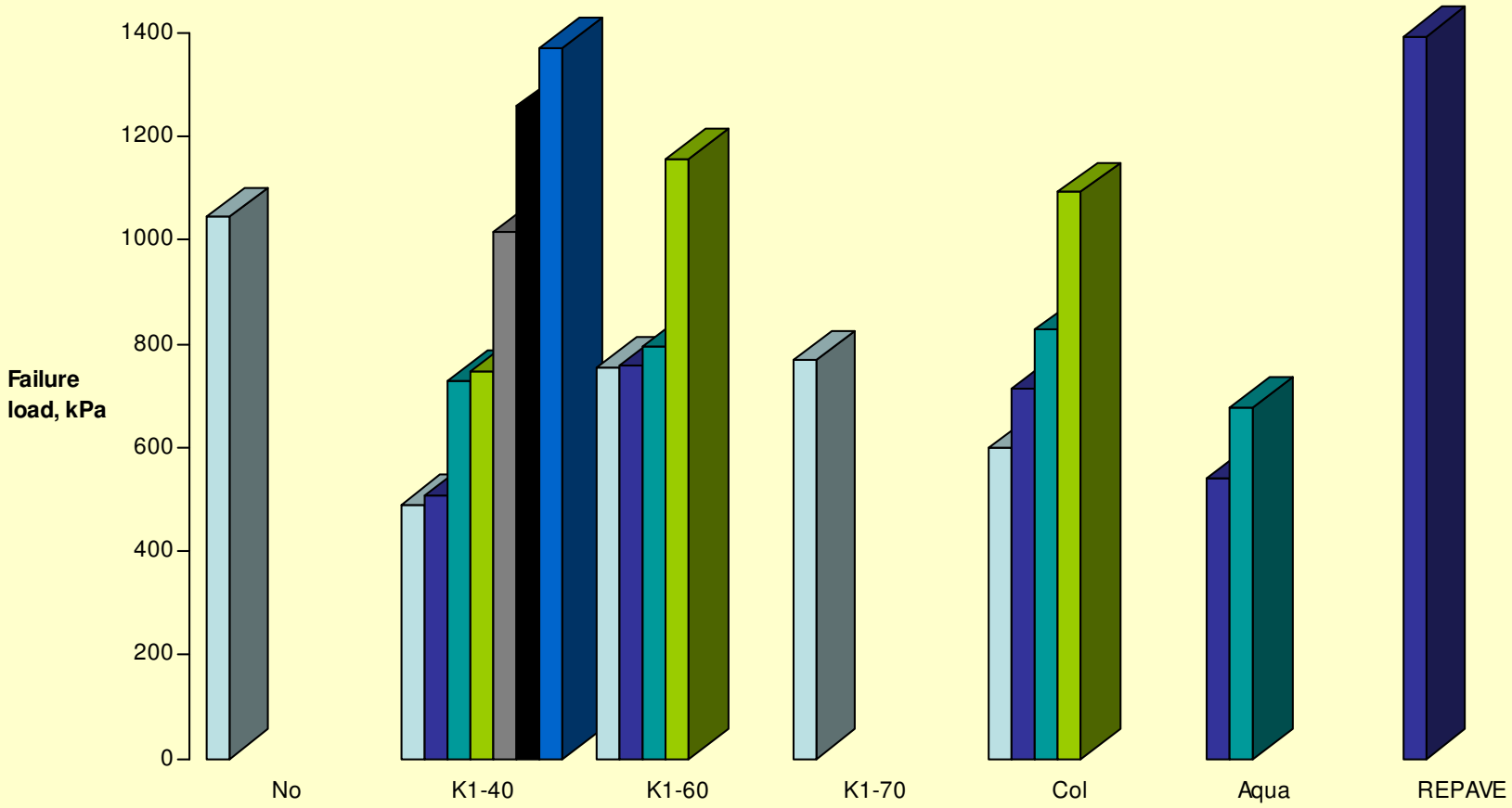
Repave – TRL Study



Core Scanner

0 - 25 mm	**14 mm nom. size**
25 - 61 mm	**14 mm nom. size**
61 - 115 mm	**28 mm nom. size**
115 – 175 mm	**28 mm nom. Size (broken at base)**

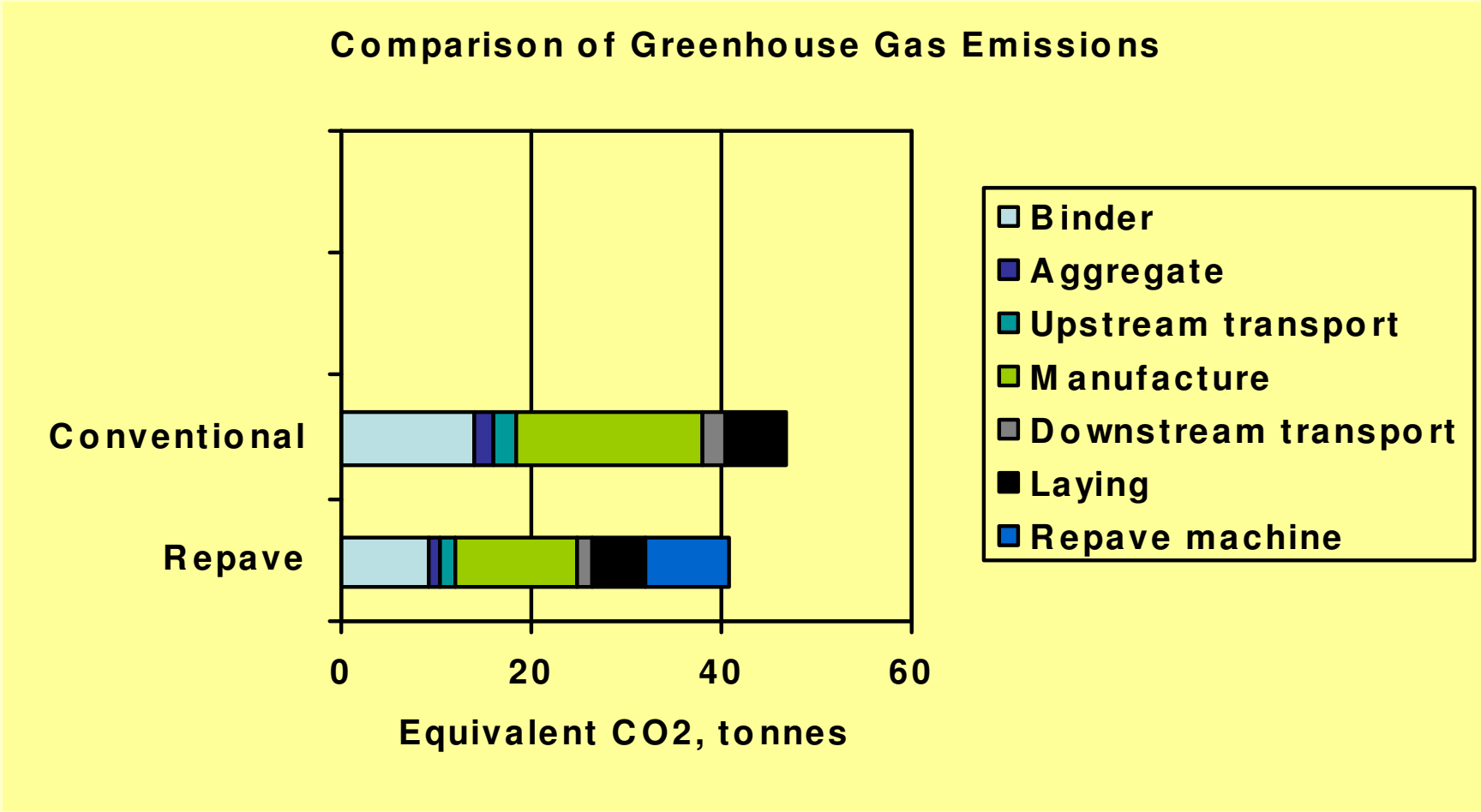
Thin Surfacing Torque Bond Strength



ECO Analysis - Repave

Colas

Chipped HRA replacement versus Repave



Repave

Case Study: A1 (M) N Yorks

The Problem

- 16,950m² lane 1 rutting

Conventional Solution

- Plane and inlay 50mm (anticipated duration 9 shifts)

Colas Solution

- Plane 25mm and Repave (actual duration 4 shifts)

Repave Case Study

A1 (M) N Yorks

Benefits:

- Less waste – 423m³ planings saved
- Less new asphalt required – 925 tonnes saved
- 55% less time required on site
- Money saved on scheme £58,000
- High Performance result, good rut resistance

Repave

- Specification for Highway Works, Clause 926
- Design Manual for Roads and Bridges
  Volume 7 Section 4




Cold Recycled Material Wandsworth 1954

Immediately after WWII, Robert Carnegie started RETREAD in Devon

Carriageway RETREAD

Urban and rural binder and surface course failures

Road pulverised and reshaped

New emulsion binder added & compacted

14mm dry stone rolled in

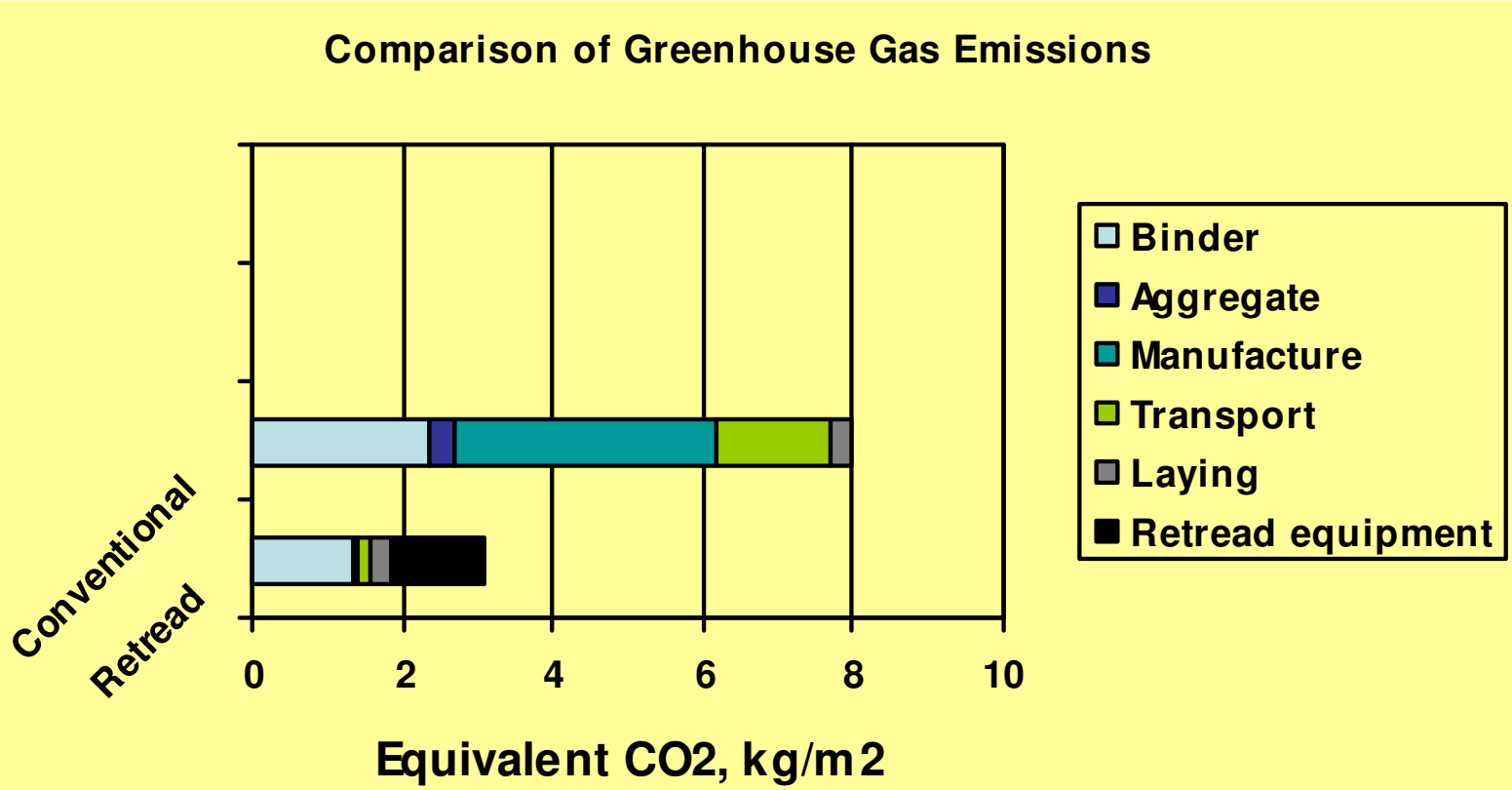
Finish, K1-70 and 6mm

New overlay if required

Footway RETREAD

Similar to carriageway, smaller plant

ECO Analysis- Retread



Retread

Benefits

- Rejuvenates and reshapes
- Conserves materials
- Twice as fast as conventional
- Half the cost of conventional
- Used on urban and rural sites

Deep Recycling

Cold in-situ recycling to 300mm for full reconstruction of carriageways

Road pulverised, compacted

(working width up to 2.5 m)

trimmed with grader, excess removed

Cement applied through metered spreader

(lime)

Mixed in-situ with:

- foam bitumen
- bitumen emulsion
- cement only
- other hydraulic binders, e.g. GBS, PFA

Haunch Recycling – Bomag 60

Recycling Case Study: A24 Surrey

- Busy feeder route in need of reconstruction
- 20 year design life - required to carry 11 msa
- Project objective: to demonstrate the energy & cost savings achievable with cold in-situ recycling
- Monitored by WS Atkins and TRL
- Energy Efficiency Office report - Final Profile 60

Recycling Case Study: A24 Surrey

- Project findings

- 4 weeks (60%) saved on contract period (conventional reconstruction12-14 weeks)
- £60,000 (26%) overall cost saving on conventional reconstruction, of which
- £18,000 (30%) of cost savings resulted from lower energy usage
- Local disruption due to haulage of new materials, etc, all reduced

Deep Recycling

- Design guide
  - Report TRL 611, 2004
- Specification for Highway Works
  - Clause 947
- Use of bitumen emulsion
  - BS 434-2:2006 Clause 11

Conclusion

- In order to:
  - Conserve materials
  - Reduce traffic congestion
  - Lower energy consumption & GHG emissions
  - Construct faster
  - Meet performance requirements
  - Cut cost
- Recycling Works


END