

PWI Technical Seminar - Sustainable Infrastructure

Turning Today's Waste into Tomorrow's Track Infrastructure

by

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&

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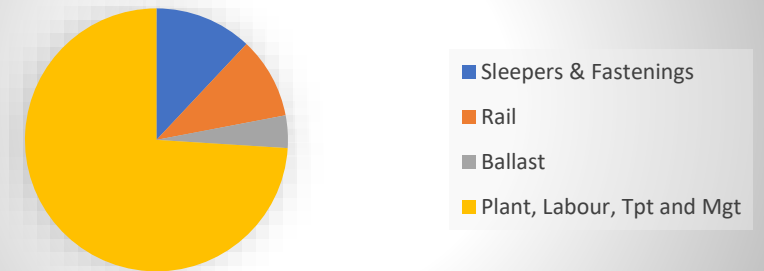
Why is Network Rail Reviewing Sleeper Strategy?

- Main component limiting longer asset life
- Major contributor to embodied carbon in track
- Relatively low cost – c12% of install cost – major impact
- Creosote ban and cessation of use of softwood
- Justification for continued use of tropical hardwood

“By 2035 we will only use materials that are made sustainably, don’t pollute, last longer and can be fully re-used or re-cycled. We will maintain natural habitats and promote bio-diversity”.



Installed cost - Track



Network Rail Sleeper Strategy – Customer Requirement



Proven Performance and Increased Asset Life



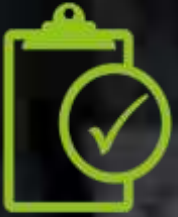
Improved Sustainability



Reduced Whole Life Cost

SERVING THE NATION WITH THE CLEANEST, GREENEST MASS TRANSPORT

PRIORITIES	A LOW-EMISSION RAILWAY	A RELIABLE RAILWAY SERVICE THAT IS RESILIENT TO CLIMATE CHANGE	IMPROVED BIODIVERSITY OF PLANTS AND WILDLIFE	MINIMAL WASTE AND THE USE OF MATERIALS
AMBITIONS	We will achieve net zero carbon emissions by 2050 (and 2045 in Scotland) and deliver continual improvements to air quality so that our passengers, neighbours, and employees breathe healthier air	We will prepare the railway infrastructure to minimise the impacts of climate change by 2050.	We will continue to look after nature and protect, maintain and enhance biodiversity across the railway.	We will reuse, repurpose or redeploy all surplus resources, minimise use of resources, design out waste and embed waste life-cycle/circular economy thinking into the rail industry by 2035.



Proven Performance and Increased Asset Life



Designed for Reliability

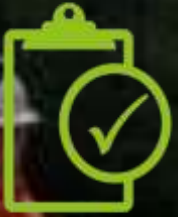
Full Network Rail DfR, CSM, HAZID and RAM Assessment processes followed as part of Sicut PA

Independently tested in accordance with ISO 12856:2020; EN 13481; EN 13146 – including approximately 50 years of simulated track testing

Granted Deutsch Bahn Full Approval following a 5-year lab and track trial in Germany and Swedish Transport Authority Approval following successful track trials with Trafikverket since 2016

The Sicut Composite Sleeper has a TSI Certificate of conformity in accordance with Directive 2008/57/EC on the interoperability within the track system





Proven Performance and Increased Asset Life

Llanbister & Llandovery Trial Sites



Llanbister

- Track Cat 5, Linespeed 30mph, EMGTPA 0.5
- 272 Sicut composite sleepers delivered week 25 – 1 in 3 by condition
- Sleepers supplied pre-chaired
- Mechanised sleeper changing method employed
- Mini digger situated in cess to handle and position sleepers
- Follow up tamp for consolidation





Proven Performance and Increased Asset Life

Llanbister & Llandovery Trial Sites

Llandovery

- Track Cat 5, Linespeed 60mph, EMGTPA 0.5
- 449 Sicut composite sleepers delivered -1 in 3 by condition
- Sleepers supplied drilled only
- New mechanised delivery method employed
- Tamping bank used daily & follow up tamp for consolidation





Proven Performance and Increased Asset Life
Improved Mechanised Delivery Method





Proven Performance and Increased Asset Life

Sherrington Viaduct



- Track Cat 3
- 640 Sicut composite sleepers
- Pre-plated PAN 11 and PAN VN (guardrail)
- Delivered panelled
- Weight restriction over viaduct





Proven Performance and Increased Asset Life

Chepstow Viaduct



Wales and
Western





Proven Performance and Increased Asset Life

Kings Cross Redevelopment (Gassworks Tunnel)

- 750 Sicut composite sleepers
- Pre-plated PAN 11, short-ended and chamfered
- Delivered panelled
- Improved fire performance vs hardwood





Proven Performance and Increased Asset Life



NR trials and evaluation identified several advantages of the Sicut Composite Sleeper

- Increased durability – Ability to withstand poorer track bed/wetter/dirtier ballast conditions
- Long service life leading to a reduction in disruptive possession due to increased time between renewals – increasing capacity – improving safety
- No material degradation expected over time leading to minimum maintenance through life - reduced maintenance interventions
- Reduced manual handling risks – no creosote & light weight
- Suitable for spot replacement with softwood and hardwood sleepers for track refurbishment
- No risks associated with electrical conductivity – third rail, signaling and E&P





Proven Performance and Increased Asset Life



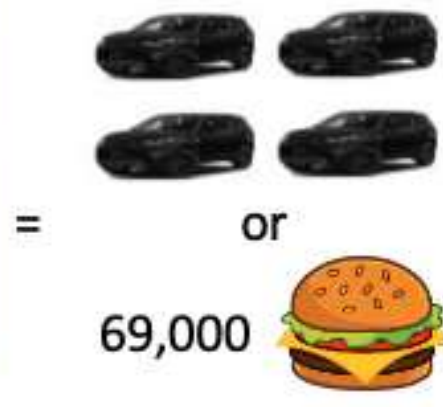
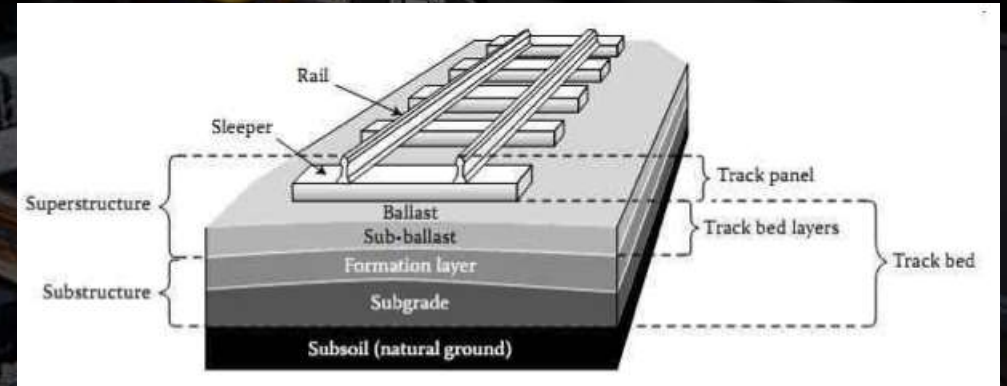
Advantages continued:

- Standard sleeper can be used for all baseplate designs, including guard/check rail baseplates (fastclip option too)
- Can be short ended and chamfered - on or off site
- Better fire performance in tunnels vs hardwood
- Pre-fabrication options simplified for faster, lower risk installation
- Reduced risk of sleeper damage during handling, transport and installation
- Resistant to tamper damage during install and maintenance

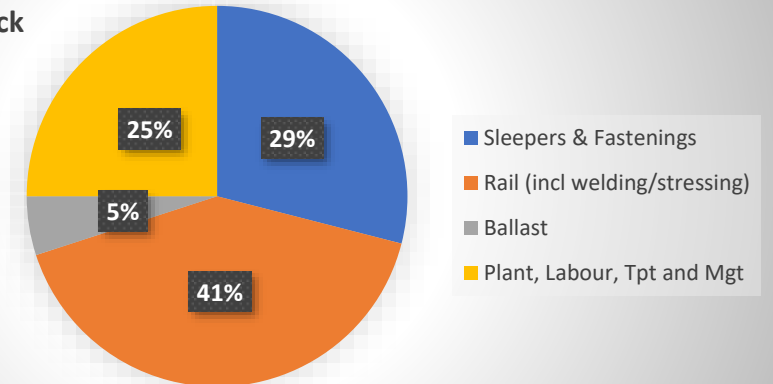




Improved Sustainability



Embodied CO₂e in Track





Improved Sustainability – Reducing Embodied CO₂e

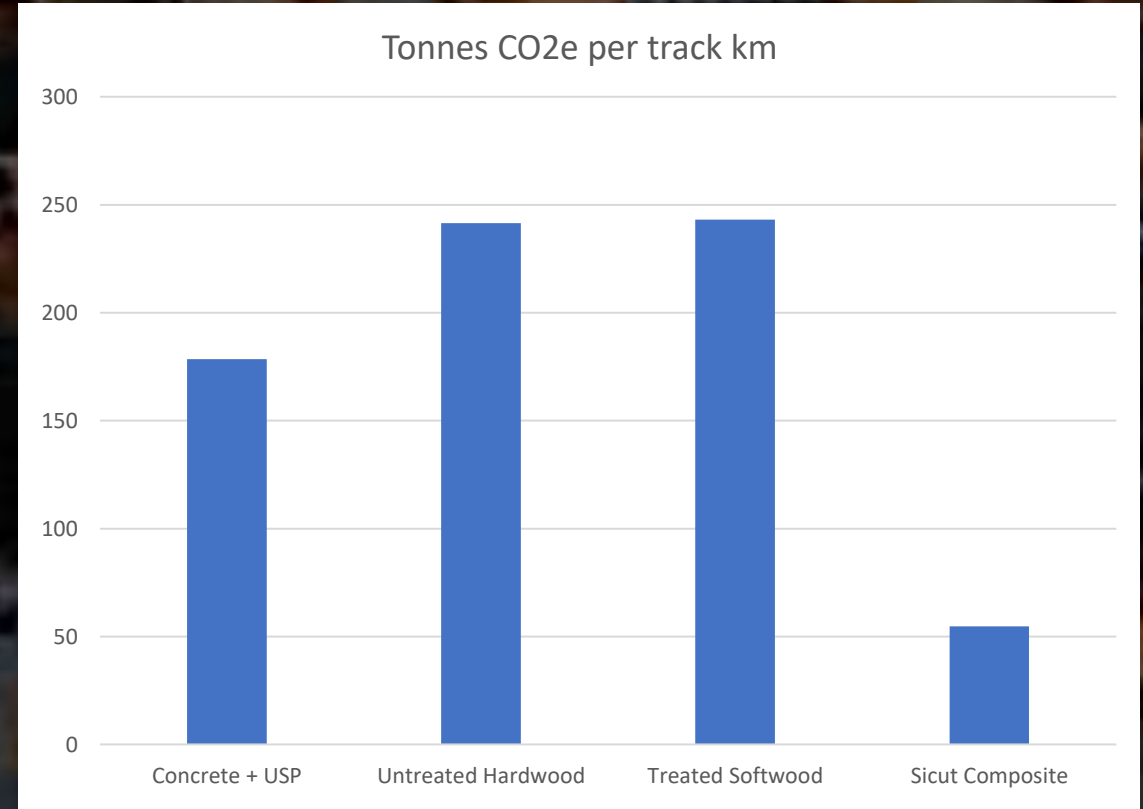


Using the Sicut Composite Sleepers in place of hardwood or concrete delivers a substantial reduction in embedded carbon of up to 200,000 kgCO₂e per km

Whole life carbon saving for the track infrastructure might be 5 or 6 times this and GWP calculations do not capture other environmental savings such as land and water use

These saving can be delivered today without any further R&D

Sicut EPD available to support PAS 2080





Improved Sustainability – Reducing Transport

Reduced weight (100kg vs 300kg for concrete) will result in reduced transport and logistics burden

- Concrete sleepers - 24 deliveries @ 65 per delivery
- Composite sleepers - 8 deliveries @ 200 per delivery
- 16 fewer lorry deliveries per km





Improved Sustainability – Reducing Ballast

Reduced ballast due to reduced construction depth

- Reduced sleeper height requiring 33% less crib ballast
- c400 tonnes less ballast per km





Improved Sustainability – Addressing Deforestation

Of the 18 million railway sleepers in the UK railway, Network Rail replaces 500 - 700,000 per year, most in concrete but 10-15% in tropical hardwood or creosote treated softwood

Creosote, classified as a carcinogen and toxic substance, was banned by Network Rail in July 2021

Historically Network Rail has required the felling of c120 acres of tropical hardwood forests each year

The continued use of tropical hardwood is not sustainable – sleeper life of less than 20 years vs 200 - 300 years for the hardwood tree to grow to maturity

Composite sleepers offer an opportunity to help reverse deforestation now in line with global COP26 commitments





Improved Sustainability – Addressing Plastic Waste



The UK is targeting 70% recycling by 2025 (currently 31%) and 30% recycled content in new plastic products

Sicut composite railway sleepers contain nearly 100% recycled content and are 100% recyclable

Using Sicut recycled plastic to make the 60,000 hardwood sleeper replacement sleepers each year would make effective use of over 5,000 metric tons of UK plastic waste every year (250m bottles), keeping it out of landfill and the oceans

A consistent demand for such volumes of waste material would incentivize investment in long term sustainable capacity growth for recycled plastic processing in the UK and improve recycling rates

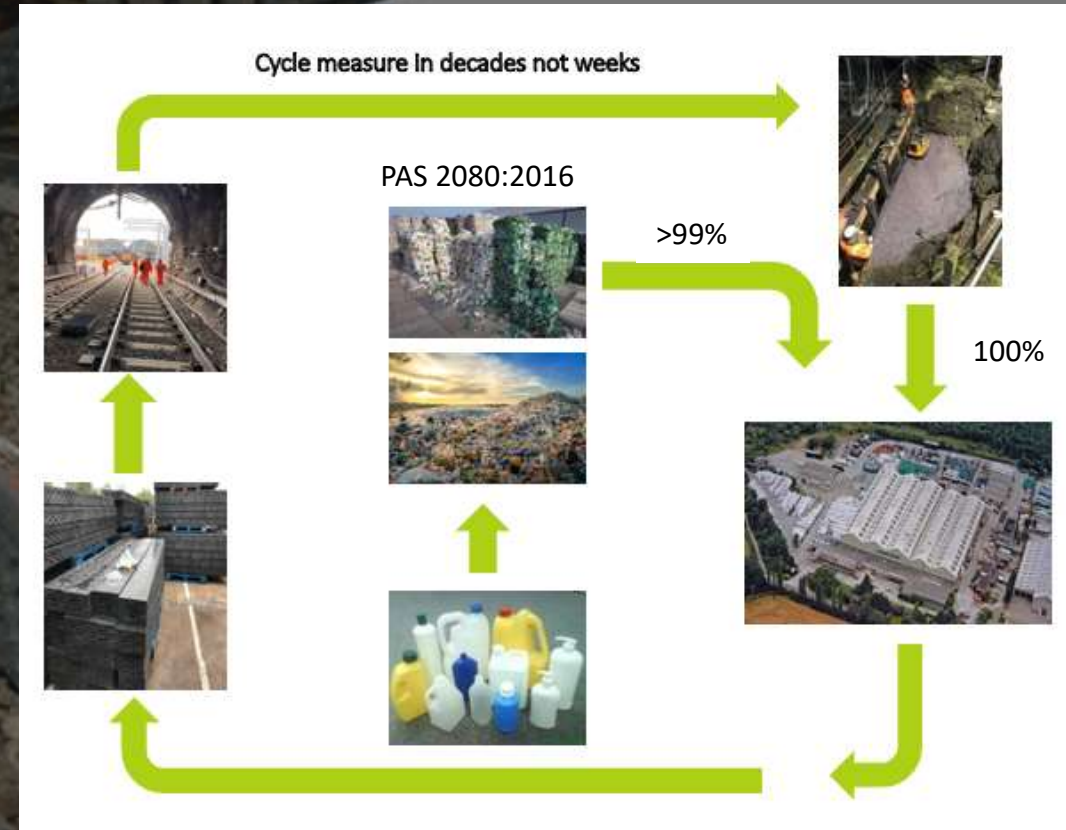




Improved Sustainability - “Sicut” Circular Economy



Measured in weeks





Reduced Whole Life Cost – Better Value



CP7



- **Safety:** the rail network must be maintained in a safe condition for all of its users, workers and the public;
- **Performance:** the railway must be customer-focused, making effective use of its capacity to deliver passenger and freight services that are punctual and reliable;
- **Asset sustainability:** assets must be planned and managed to deliver their greatest value over the course of their operational lives; and
- **Efficiency:** Network Rail (or Great British Railways as its successor body) must be subject to stretching but realistic efficiency targets.





Reducing Whole Life Cost – Better Value



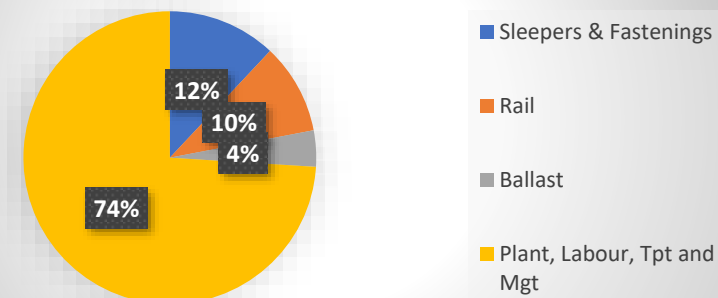
Network Rail's Technical Authority compared the Sicut Composite with hardwood and calculated an annual saving of £40 to £57 per sleeper installed over a 50-year asset life (£2,000 - £2,850 per sleeper or up to £4.4m per km) – using 2019 (not 2022) unit rates

Due to higher unit installation rates a similar study by TfL in 2016 identified a saving of >£3,500 per sleeper

Even against concrete the NR 50-year asset life saving was still >£1,000 per sleeper or £1.5m per km

There remains a challenge with delivering all of these savings due to Control Period and annual budgets constraints

Installed cost - Track



Conclusion:



Proven recycled plastic sleepers, such as the Sicut Composite, can deliver:



Significantly better performance and longer asset life than hardwood (but also concrete and steel)



Improved project H&S - reduced weight and opportunities for prefabrication (and no use of creosote)



Substantial reduction in whole life carbon associated maintenance and renewal in line with carbon reduction targets and PAS 2080:2016



Huge reduction in whole life costs (>10x unit cost vs hardwood)

They also:

- Make effective use of up to 6 million waste plastic bottles per km in a decades long circular economy
- Offer a new, simple to understand and enduring demand for recycled plastic, driving investment in collection and recycling infrastructure; treating plastic waste as a resource not a problem
- support targets to eliminate plastic waste to landfill and export and the reversal of deforestation





THANK YOU

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