

CarbonBind®

Conversations

“CarbonBind® is the bitumen of tomorrow - available today.”

Erik Denneman

GLOBAL TECHNICAL MANAGER, PUMA BITUMEN



Innovation. Sustainability. Performance.



Trafigura

CarbonBind[®]
Conversations

Meeting Australia's
sustainability targets
one road at a time

Going further
— for better performing roads

Key messages

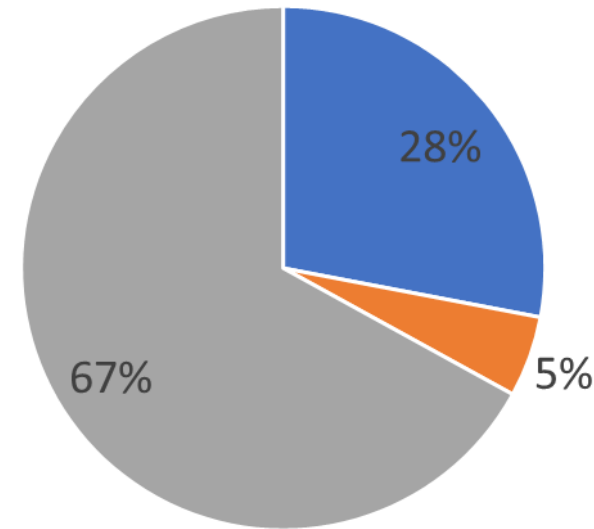
- Biogenic Binders - Meeting Emission Reduction Goals
- Biogenic Binder Technology
- Verified Sustainability and Carbon Reduction Claims
- Available in a range of PMB and Paving Grades

How Substantial are Road Construction Emissions?

The Challenge for Road Owners

- Construction accounts for 10% of Australia's carbon emissions
- Net-Zero Commitments Local/State/Federal
- Growing Community Expectations
- Short Time Line & Slow Change

Transport Infrastructure 12,000kt CO₂-eq

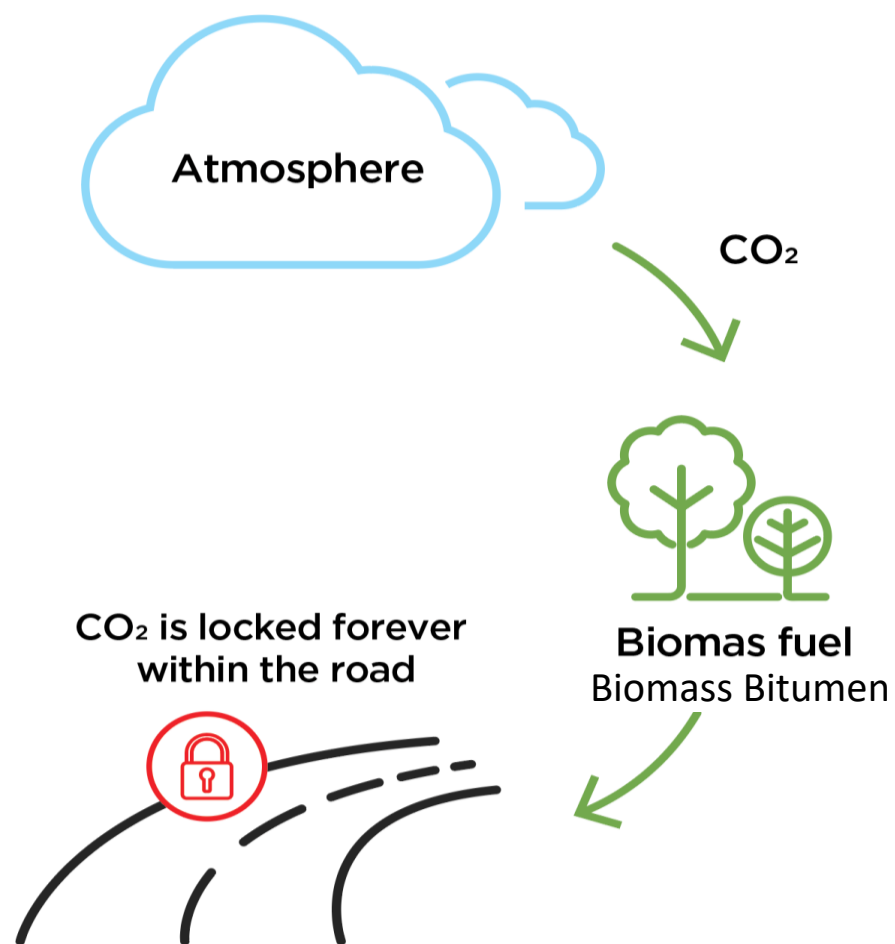


Source: Infrastructure Australia (2024)

■ Construction process ■ Transport ■ Product Manufacture

The Potential of Bio Material for Our Industry

Biogenic Carbon flow



The Advantages of **CARBONBIND®**

- **Proprietary Process to Modify Biogenic Material**
- **Carefully Selected Feedstock**
 - Cost-effective
 - Certified sustainability
 - Robust LCA
 - Available at volume
- **Externally Verified Carbon Reduction**
- **Meets Existing PMB and Bitumen Specifications**



How Does it Work?

CARBONBIND[®] Technology

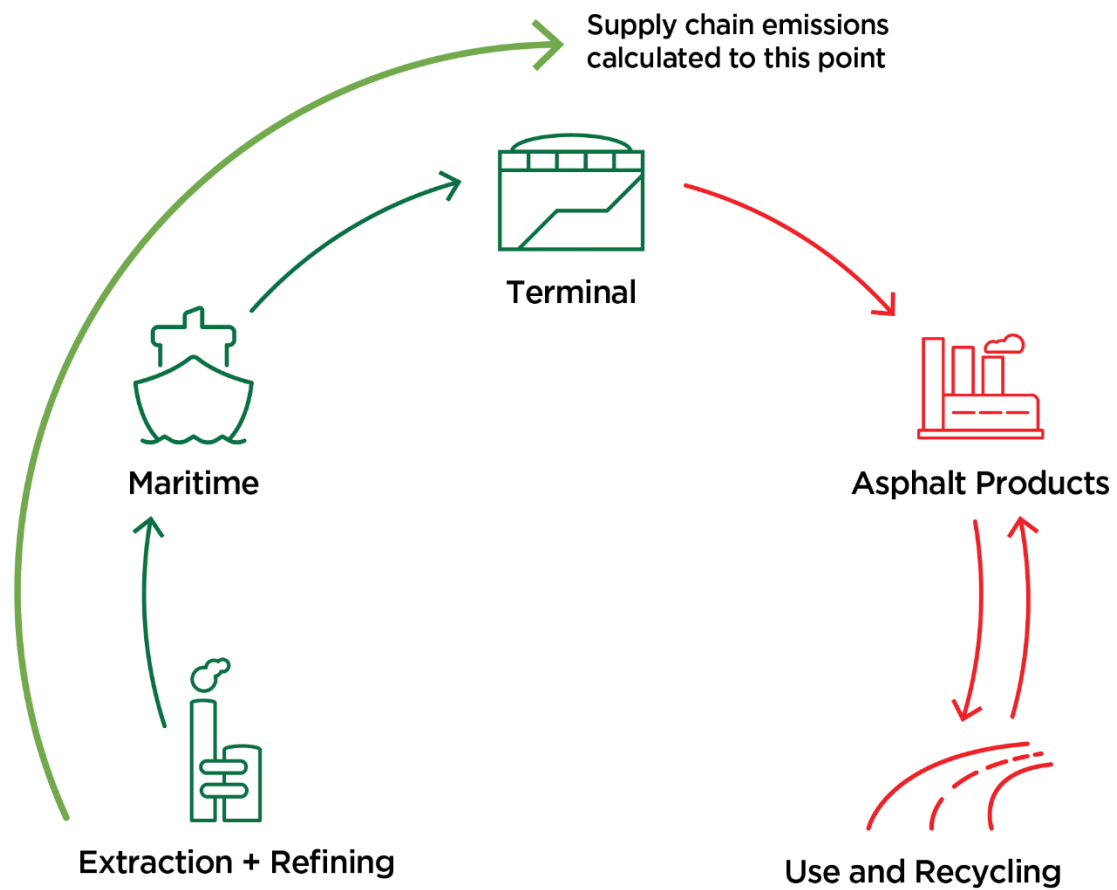
Bio feedstock



Modified biomaterial

- Learn more:
 - CarbonBind Technology Webinar
 - 5 August 12:00pm AEST
 - Presenter: Dr Mark Cannatelli

Traditional Bitumen



425

kg Co_{2e}/t of bitumen
stored in Australia

Source: AfPA LCA Calculator

Life Cycle Assessment

CarbonBind® Biogenic Material



Environmental Product Declaration

In accordance with ISO14025:2006 and EN15804:2012+A2:2019

Puma CarbonBind biogenic bitumen component





The Norwegian EPD Foundation

Owner of the declaration:
Puma Energy Europe B.V.

Product name:
CarbonBind biogenic bitumen component

Declared unit:
1 metric ton

Product category /PCR:
NPCR Part A for Construction products and services ver2 260421 + NPCR 025 2022 Part B for Asphalt ver2-2022

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-6658-5905-EN

Registration number:
NEPD-6658-5905-EN

Issue date: 31.05.2024

Valid to: 31.05.2024

Core environmental impact indicators

Indicator	Unit	A1-A3	A4	C3
GWP - total	kg CO ₂ eq	-2.93E+03	9.96E+01	3.00E+02 / 3.00E+01*
GWP - fossil	kg CO ₂ eq	6.91E+01	9.95E+01	0.00E+00
GWP - biogenic	kg CO ₂ eq	-3.00E+03	-1.62E-02	3.00E+02 / 3.00E+01*
GWP - luluc	kg CO ₂ eq	2.40E-01	8.46E-02	
ODP	kg CFC11 eq	2.25E-06	1.47E-06	
AP	molc H+ eq	5.71E-01	2.64E+00	

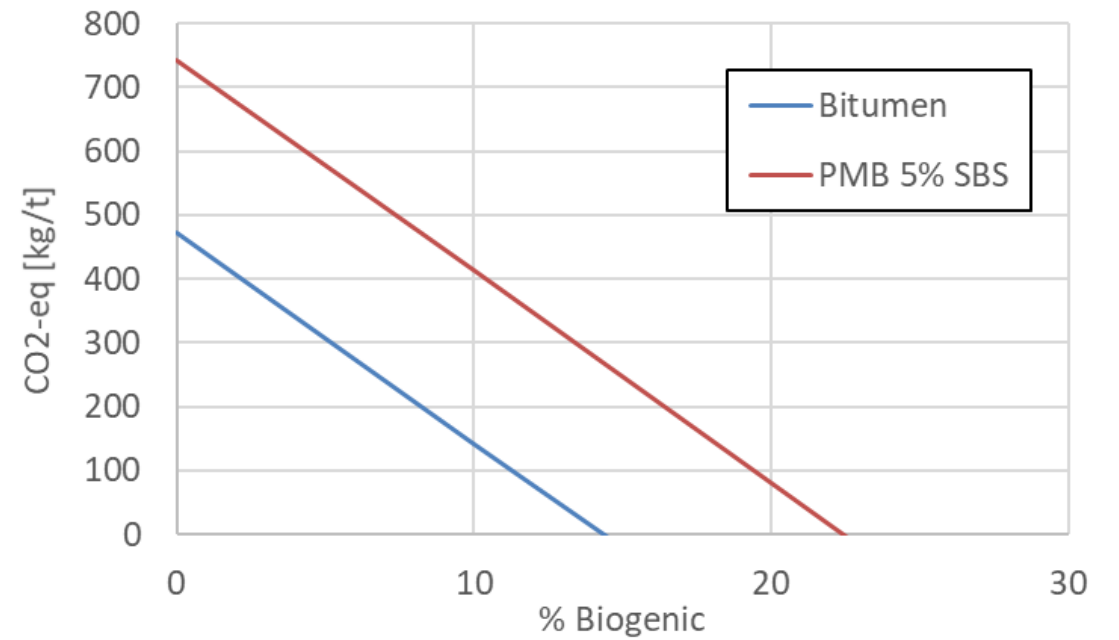
-2930

kg Co_{2e} /t of BioMaterial

Refer to Environmental Product Declaration for more information.

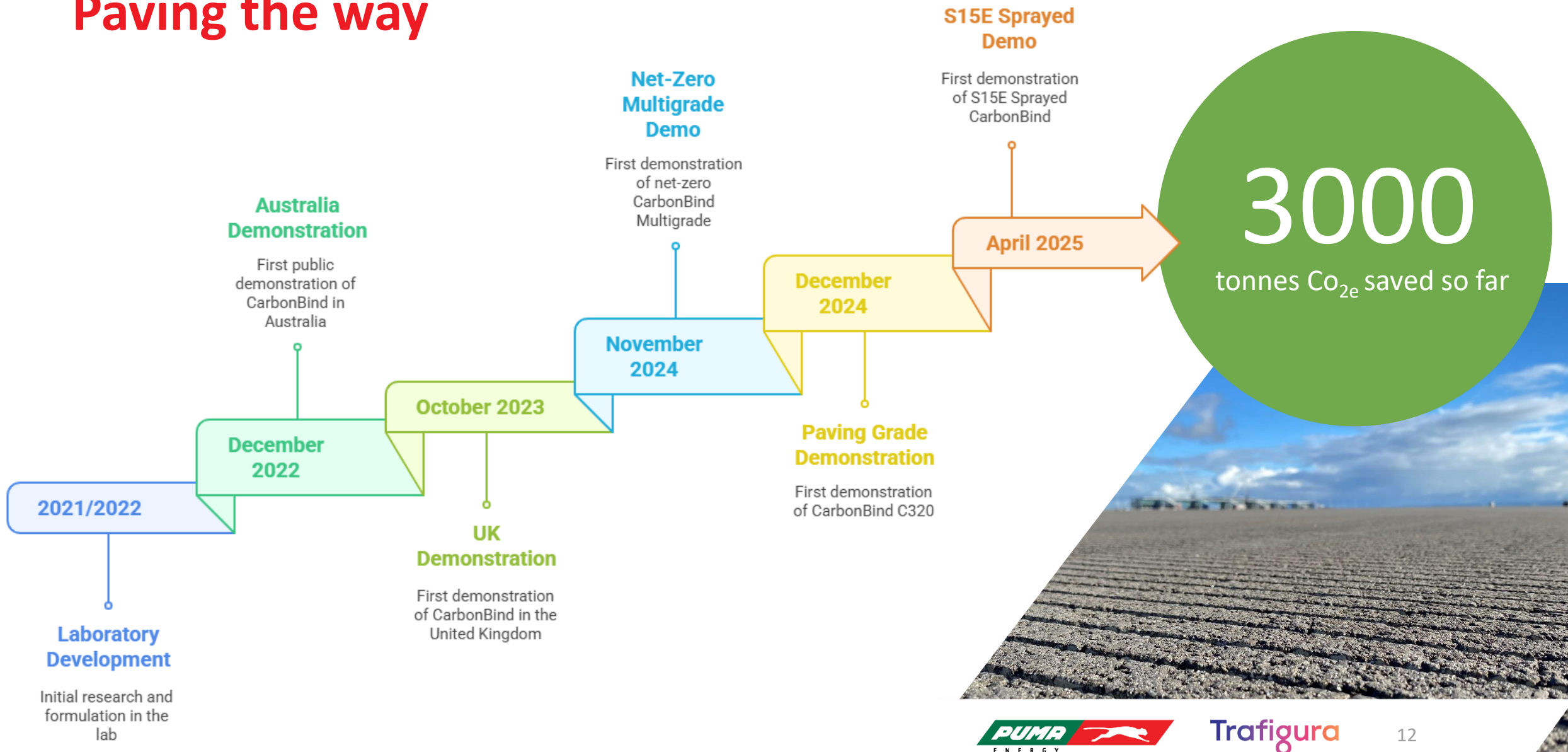
CARBONBIND® Impact

1t of Puma Biogenic Material offsets **over 6t** of Bitumen



CARBONBIND®

Paving the way



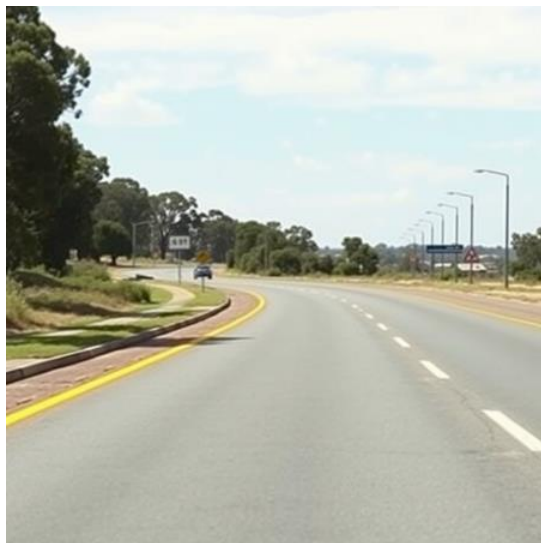
Humps in the road to net-zero

Implementation Challenges

- Lack of green procurement processes
- Legacy Specification Language, e.g.
 - *Must be refined from crude petroleum*
 - *Must be 99% soluble in Toluene*
- Need for performance specifications



CARBONBIND® Range



Standard Binders

C170
C320
others

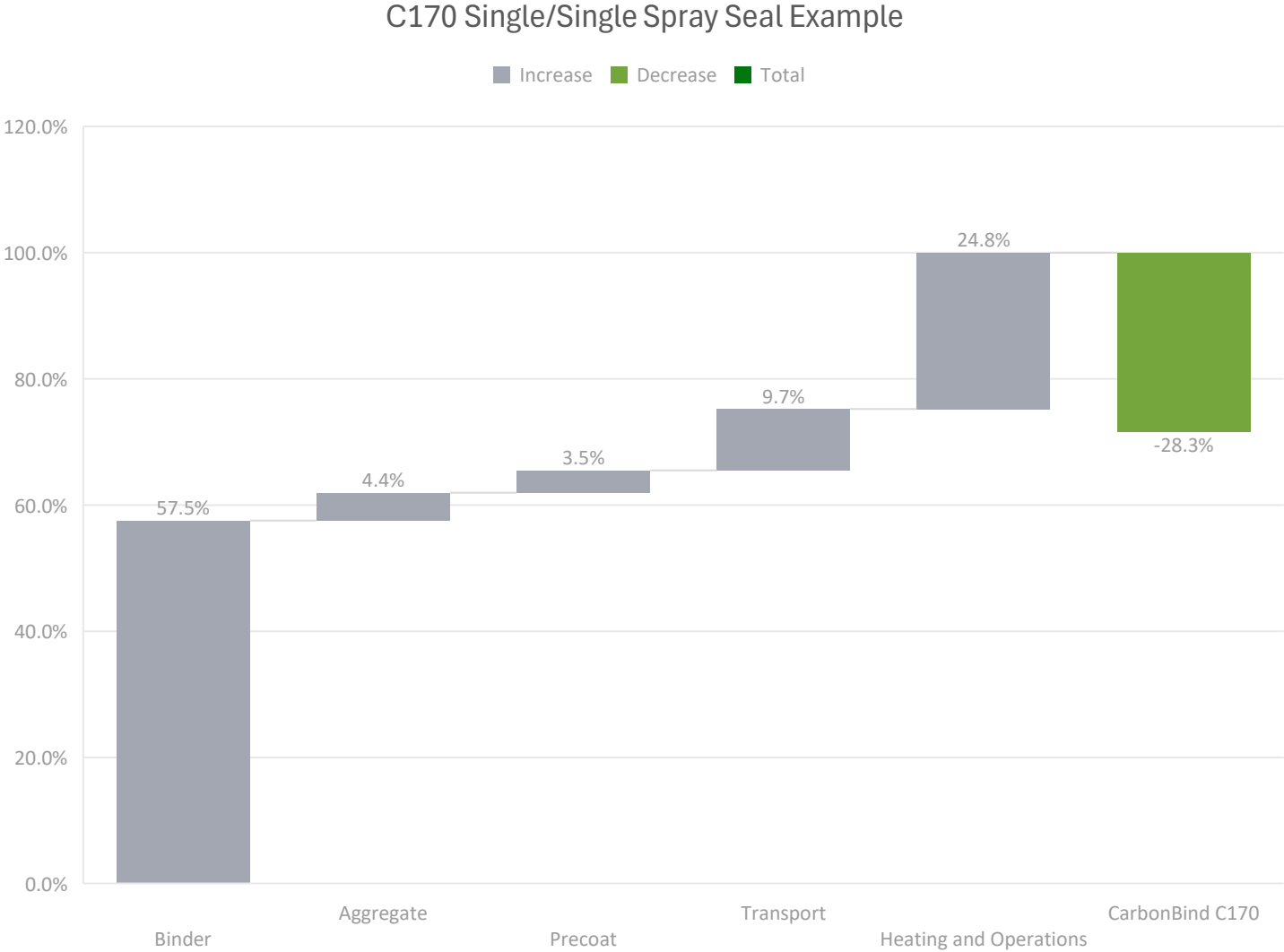


Polymer Modified Binders

A15E
S15E
others

Product	GWP (kg CO ₂ eq/t)		Emissions reduction
	Standard	CarbonBind	
PG 64-22	637	415.9	35%
50/70	530	316.4	40%
70/100	530	163.9	69%
C170	425	218.8	49%
M1000	444	316.8	29%
A10E	752.7	614.4	18%
A15E	791	627	21%
A20E	667.6	554.8	17%
A18R	416.2	221.1	47%
S10E	554.4	508.7	8%
S15E	586.7	529.7	10%
S20E	667.6	582	13%
S25E	748.4	634.3	15%
S35E	505.9	477.3	6%
S5R	424.2	228.1	46%
S10R	421.7	235.9	44%
S15R	419.3	215.9	49%

Impact on sprayed seal GWP

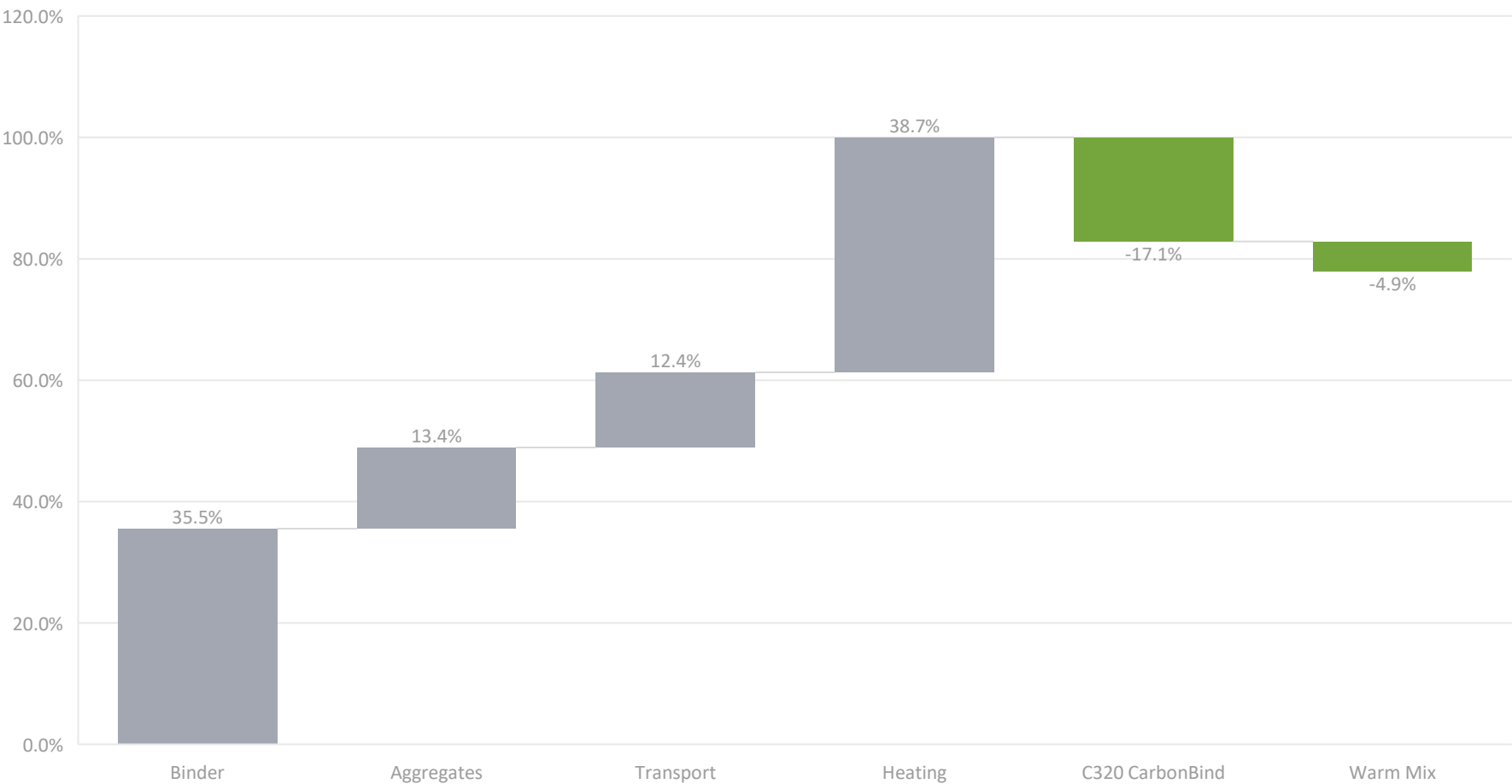


Source: Estimated figures for a Single/Single Spray Seal in Rural Australia using AfPA Sustainability Calculator Data

Impact on asphalt GWP

Low Carbon Asphalt - Bitumen

■ Increase ■ Decrease ■ Total



Source: Estimated figures for an AC14 mix using standard C320 Bitumen with AfPA Calculator figures

CARBONBIND® - S15E



53,500

kg CO₂ Saved

- 540,000 kilos of S15E Sprayed throughout April 2025
- Supplied to Darling Downs District
- Sprayed by RPQ
- No operational issues
- High Performance
- Storage Stable

CARBONBIND® - C320



3,570

kg CO₂ Saved

- 400 tonnes of asphalt laid in December 2024
- Supplied to Moreton Bay
- Laid by Boral
- First use of Biogenic Paving Grade in Australia
- No operational issues
- High Performance
- Storage Stable

CARBONBIND® - M1000



- 860 amount of asphalt laid in November 2024
- Supplied to Sunshine Coast
- Laid by Austek
- No operational issues
- First net zero bitumen used in Australia
- High Performance
- Storage Stable

The Opportunity for your project

Support

Case studies and technical data to demonstrate performance. Global R&D lab with Asphalt and Binder testing capabilities.



Collaboration Model

Puma Bitumen provides material and technical support. Relationships with Contractors to provide work.



Flexibility

Puma Bitumen can tailor products and carbon savings for each project's needs. Available Now across Australia.



Michael He

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Next Conversation



Technical performance of CarbonBind®

With Dr Mark Cannatelli

An in-depth discussion on the technical properties of CarbonBind®.

Tuesday 5th August

12:00 – 13:00 AEST



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WWW.PUMABITUMEN.COM

Thank you

WE LOOK FORWARD TO GOING FURTHER WITH YOU.

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