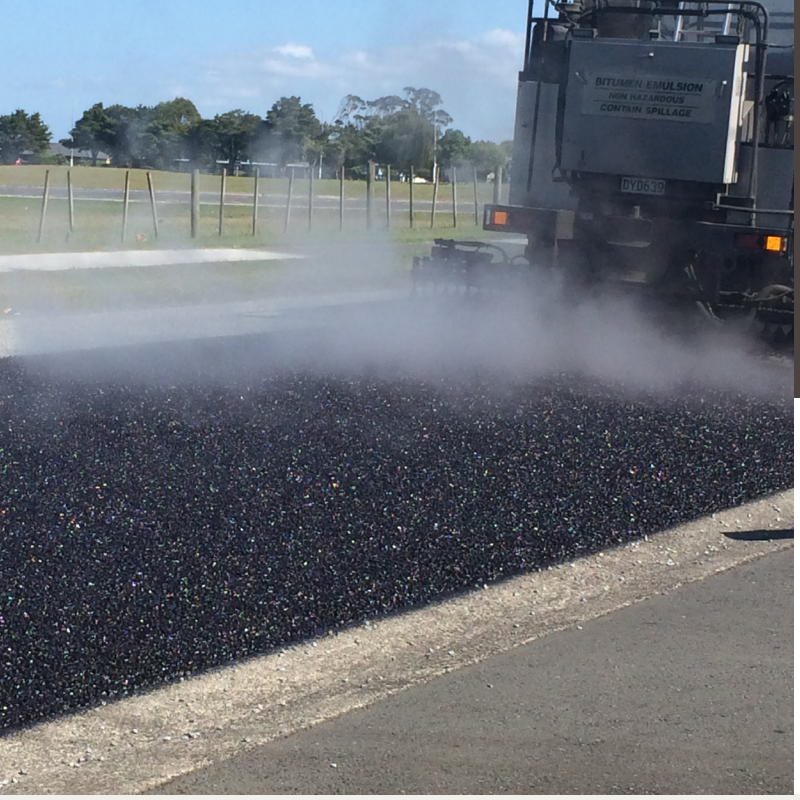

Emulsion Binders

The smart choice for safer + superior chip seal performance

Road Science

Executive Summary

Bitumen emulsions have been used successfully in New Zealand roadworks as a replacement for hot cutback for over two decades, offering a safer, more sustainable alternative to hot cutback bitumen. Their warm application reduces health and environmental risks, eliminates hazardous solvents, and significantly lowers emissions. With proven durability, better workability, and strong industry backing, including from Waka Kotahi NZ Transport Agency, the shift to emulsions is no longer just innovative — it's essential for modern, responsible road maintenance.

Road Science has been advocates for this transition for years based on robust technical evidence and industry-wide support. This document provides a snapshot overview of the benefits and resources supporting this industry shift.

- 99% less kerosene emissions
- Increased safety
- Consume less energy
- Superior adhesion
- Non-hazardous
- Carbon credits saving | NZ$64 per tonne

HIGHLIGHTS

- Waka Kotahi NZ Transport Agency have moved from hot cut-back bitumen to bitumen emulsion in its highway sealing operations due to health, safety, and environmental benefits.
  VIEW REPORT
- Emulsions offer better workability, especially in wet or humid conditions, due to its water-based nature.
- Emulsions offer better bonding and resistance to stripping, making it more durable long-term.
- Emulsions have improved adhesion resulting in reduced chip loss and reduced rework.
- Early adopters in New Zealand have used emulsion products over hot cutback since early 2000s. Notably, Downer-supplied Southland projects have utilised 100% emulsion-based solutions consistently for the past 14 years, Auckland Central for 13 years, and Hamilton for 11 years.
- Emulsions are not considered to be carcinogenic.
- Advances in technology have meant the traditional limitations associated with emulsions have been overcome - they can be sprayed on steep slopes without run off, high application rates can be achieved, storage stability issues have been solved and cure times significantly improved.
- On a typical summer day in New Zealand, over 99% of airborne emissions from chip sealing originate from cutback bitumen — releasing up to 20,000 litres of kerosene into the environment. This level of discharge would be unacceptable for any other commercial activity without strict environmental regulation. In stark contrast, emissions from emulsified bitumen are just 0.6%, making it a dramatically cleaner and safer alternative.
  VIEW IBEF REPORT
- Waka Kotahi NZ Transport Agency bitumen alternatives report highlights carbon emissions comparison of 438.5 kg CO_2e per tonne (hot cutback) to industry references around 172.5 kg CO_2e per tonne (emulsion) - 60% reduction.
  VIEW REPORT
- As of May 2025, the spot price for carbon credits (NZUs) in New Zealand under the Emissions Trading Scheme (ETS) is approximately NZ$64 per tonne. This value represents the potential revenue or offset you could claim or sell.
  CARBON CALCULATOR
- For full list of FAQs associated with Road Science emulsion for chip seals
  VIEW RESOURCE

EMULSION ADVOCATES

"Our decision to use emulsion as our binder of choice for renewals has proven to be a success. Initial chip adhesion was definitely superior to bitumen and was put to the test in several locations by the "boy racer" fraternity"

- Whanganui Alliance, 2021

"For over 11 years, Road Science bitumen emulsion has been a key component in Hamilton City Council's chip sealing programme, consistently enhancing the durability and performance of sealed surfaces. Its use has significantly reduced chip attrition, leading to fewer customer complaints, improved chip adhesion and retention, and less waste. These benefits have not only improved the quality of chip seals citywide but also enhanced safety of the road network. With less need for immediate rework and proven long-term reliability, emulsion technology continues to demonstrate its value in the Connect Hamilton contract."

Steven Uffindell, Manager
- Connect Hamilton