



# Shell Polymers Monaca

**Paving the way to the future:** Shell and Partners Enable Circular Economy with Advanced Recycling Project at New Western PA Facility



**PAPA Conference – January 2023**

# Agenda

- Video
- Shell Goals
- GreenMantra Technology
- Lindy Paving View
- Roundtable Questions



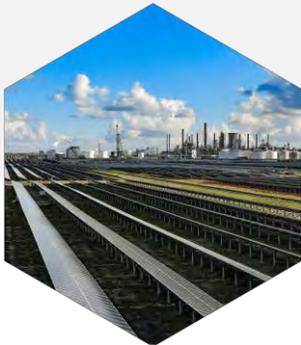
Interviews were filmed in a PPE free area.

# Based on customer feedback we are working towards two broad goals in the Chemicals value chain

The focus of Shell Chemicals for sustainability offerings has two broad goals: to reduce the carbon footprint of chemicals products and to enable the circular economy

## REDUCING CO<sub>2</sub> INTENSITY

We are moving towards our ambition of net-zero emissions from the manufacture of chemicals, by addressing emissions in our own operations and helping our customers decarbonise.



## ENABLING THE CIRCULAR ECONOMY

We are using circular principles to address the challenge of plastic waste, and developing new processes and technologies to create chemicals from alternative feedstocks.



# Shell is Recycling Plastic Waste to Make Chemicals

## DID YOU KNOW?

In 2019, we announced our ambition to use **one million tonnes** of plastic waste as feedstock at our chemicals plants by 2025

## ALTERNATIVE FEEDSTOCKS

Using a process known as pyrolysis, the **Norco, Louisiana** facility takes liquid plastic waste and transforms it to **high-end chemicals for reuse**.

We are working to extend the use of plastics waste as a feedstock in Europe and Asia. Shell's strategic partnership with **BlueAlp Holding BV** will underpin the delivery of pyrolysis oil as feedstock, initially to Shell's Moerdijk and Rhineland crackers from 2023.



[VIEW THE RECYCLING PLASTIC WASTE ANIMATION](#)



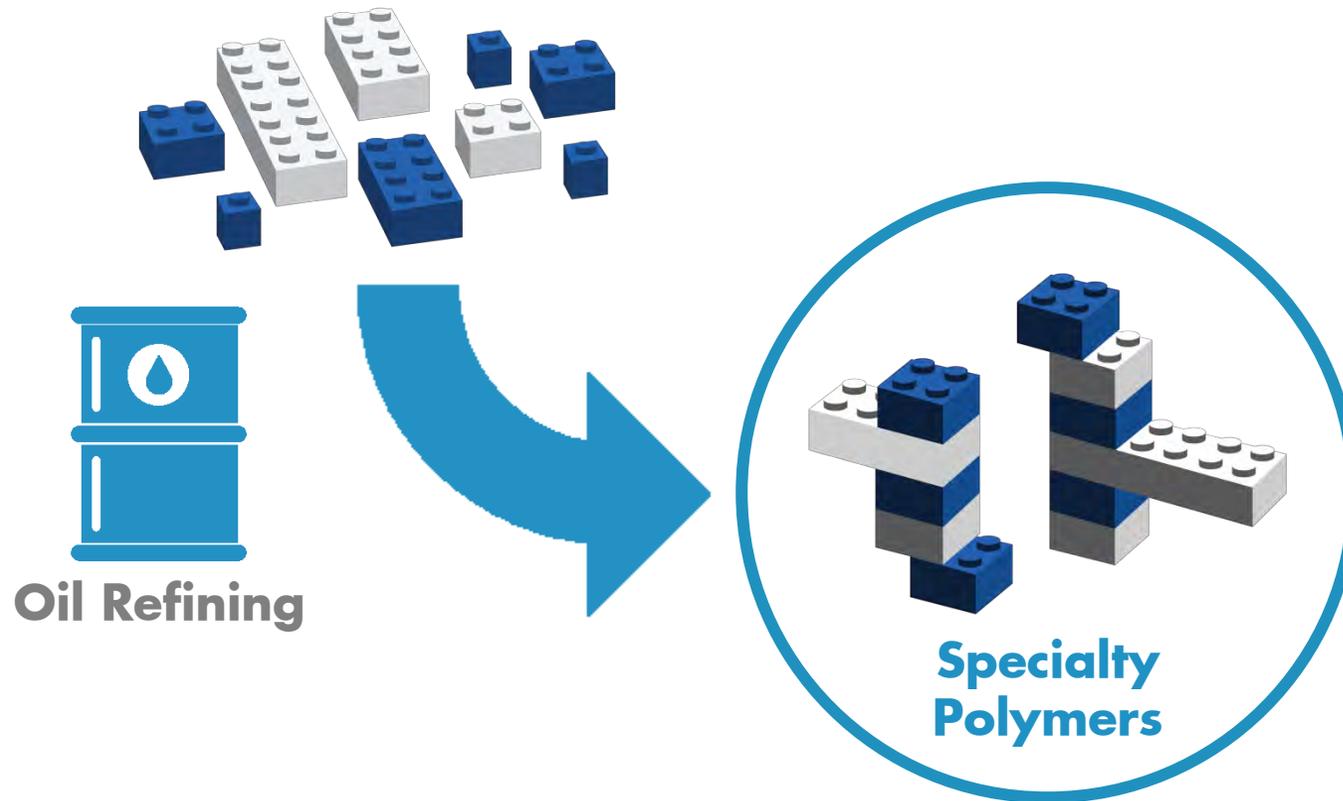
[← RETURN TO MAKE](#)



# What is GREENMANTRA's Technology?

A Better pathway to unique specialty polymers and waxes

## ***Traditional Process: POLYMERIZATION***



## ***GREENMANTRA Process: DEPOLYMERIZATION***



# How Does GREENMANTRA's CERANOVUS® Product Work In Roads?

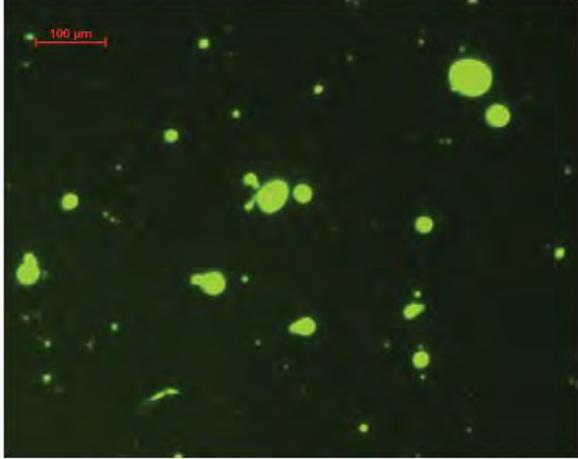
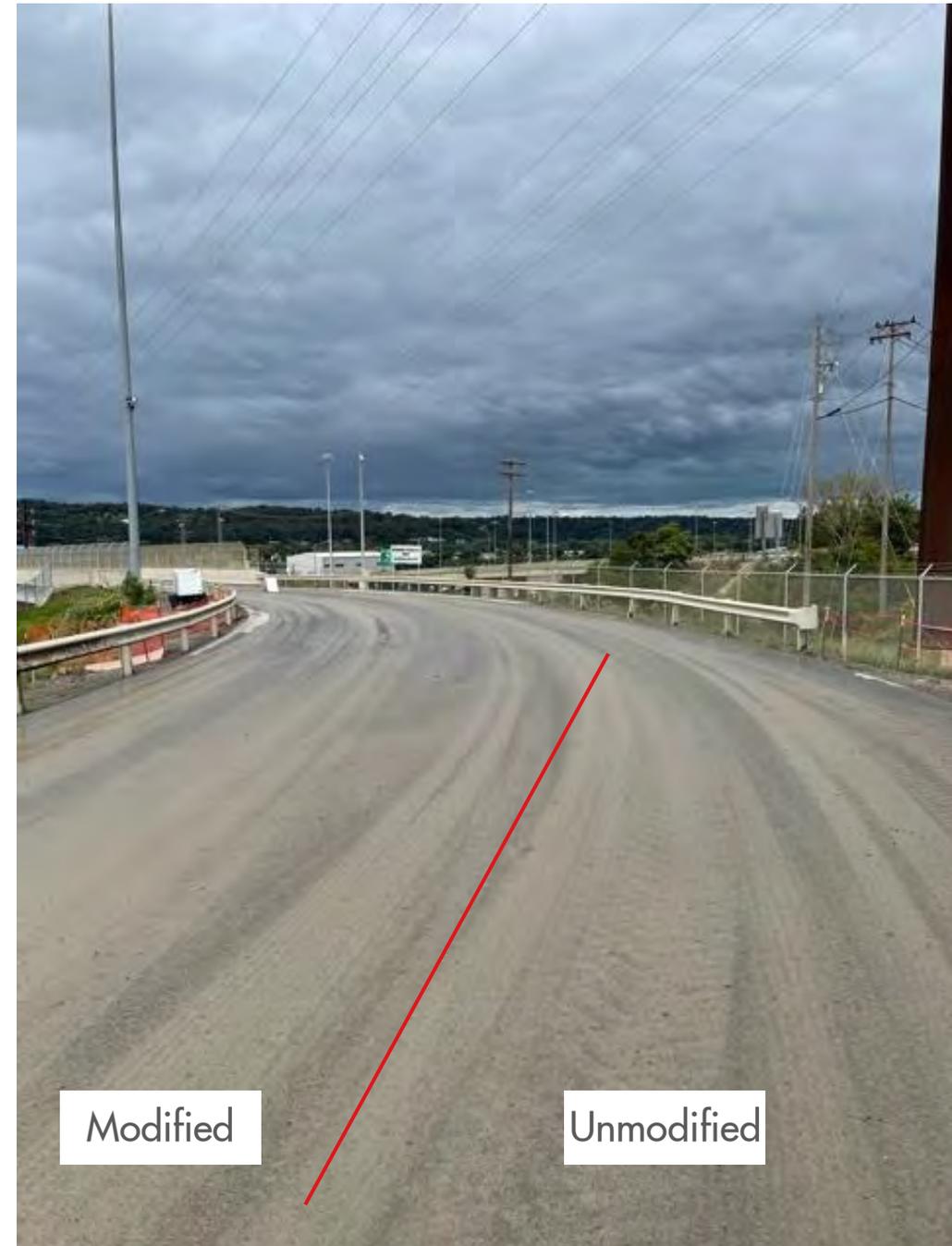


Figure 3: 3% Recycled PE Plastic in liquid binder



Figure 4: 3% CERANOVUS® A115 wax in liquid binder

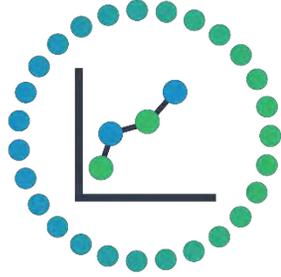
- This is a specialty engineered asphalt additive derived from 100% recycled plastics.
- This technology employs active chemistry which fully disperses the post-use plastic derived wax modifier, i.e. no discrete plastic particles contained in the asphalt matrix.
- This technology allows us to lower energy use and carbon emissions during asphalt production and installation, while simultaneously reducing plastic waste.



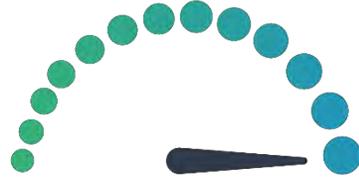
# CERANOVUS® WAX: A REVOLUTIONARY RPM ASPHALT TECHNOLOGY



Reduced  
Pavement  
Thickness



Better  
Rutting  
Resistance



Better  
Asphalt  
Coverage



Lower  
Paving  
Temperatures



Enhanced  
Sustainability and  
Waste Diversion

## EVERY MILE OF ROAD DIVERTS



The equivalent of ~ 3,000,000 plastic bags from landfill!

# What % of GREENMANTRA's CERANOVUS® A115 could we use?

## The Goal:

- To add the plastic additive without affecting the performance of the asphalt grade (64S-22)
- The plastic additive would be an additional cost and would not replace any of the virgin ingredients.

We varied the percentage of additive and used the following test procedures:

- Performed Continuous PG Grading
- Mix Design verification testing
- Hamburg Rut Testing
- Ideal CT Index

Testing showed that adding 1.5 % of the A115 was our best option

- We blended the GreenMantra additive at the terminal
- 8.13 pounds per gallon of liquid asphalt
  - Placed 17,000 tons of 9.5MM wearing course
  - Placed 49,500 tons of 25MM of base course



# The Test Strip

- Placed on one of the busiest roads on the project.
- 75 Ton of Conventional Wearing NB Lane / 90 Ton of Plastic Mix SB Lane.
- Monitored for performance for 6 months including:
  - Weather Data
  - Traffic Counts
  - Surveyed with a Total Station for movement

The results: the plastic mix performed as well as the conventional mix!!



## Field Performance of Plastic Mix:

- No real change to density when compared to its conventional counter part.
- Slight advantage to compact at lower temperatures
- “Business as Usual”

## Lead to Penn DOT – D11 First Use of Plastic Additive

- Piloted a plastic additive project on ECMS# 105201 – S.R. 51 Section 10A in Allegheny County



# Thank you!

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