



RECYCLED PLASTIC IN CONSTRUCTION

WHY? HOW? SHOULD WE?

August 2024

OUR PLASTIC ROMANCE

First synthetic polymer invented in 1869 as a substitute for ivory for billiards

Bakelite invented in 1907 – first full synthetic plastic. The material of a thousand uses

WWII increased plastic production in the US by 300%

Anxiety about the impact of plastic started growing in the 1980s – plastic industry offered recycling as a solution

353 million tonnes of plastic waste was produced worldwide in 2019. Australians accounted for almost **4 million tonnes** of that number with more than **80%** ending up in landfill

OUR PLASTIC ROMANCE

Plastic materials and products are popular in the construction industry:

- ✓ Lightweight
- ✓ Durability
- ✓ Flexibility
- ✓ Resistant to moisture
- ✓ Lower cost
- ✓ Ease of installation
- ✓ Insulation and thermal performance

The construction industry consumes **20% of all plastics and 70% of all PVC** produced globally each year. More than **8 billion tonnes** of virgin plastics is expected to be produced worldwide between now and 2050

RECYCLED PLASTIC MATERIALS AND PRODUCTS

Using recycled and reused plastics in construction:

- ✓ Decreases the demand for virgin plastic and finite resources (petroleum)
- ✓ Prevents plastic from ending up in landfill
- ✓ Reduces energy consumption and associated carbon emissions
- ✓ Saves on construction costs
- ✓ Creates new industries and jobs



INTERNATIONAL SUCCESS STORIES



RECYCLED PLASTIC APPLICATIONS – UK & EUROPE

In Europe where the transition to a circular economy for plastic is a head of us, almost 45% of post-consumer recycled plastics are used in building and construction including:

- ✓ Green concrete
- ✓ Recycled plastic pipes
- ✓ Structural plastic lumbar
- ✓ Recycled plastic bricks
- ✓ Facades
- ✓ Recycled plastic in asphalt



THE PLASTIC ROAD

Netherlands

(Wavin, KWS and Total)

Made from recycled plastic.

refabricated with hollow space for drainage pipes, cabling and flood water attenuation

Expected to last 3x longer than traditional paved roads

Half the construction cost.
Recyclable at end of life

Two pilots (bike path, parking lot, railway platform) showed 52-72% carbon savings



VOID FORMERS

Germany

Patented void former system from Cobiax that uses steel-reinforced plastic air bubbles in slabs.

Reduces the weight and thickness of slabs for certain constructions or enable larger area spans at the same weight

Used across Europe on major building sites, in-situ and precast

One truckload of preassembled Cobiax void formers replaces 7 truckloads of concrete.



RECYCLED PLASTIC APPLICATIONS – UNITED STATES



3D-printed tiny homes

Using post-industrial plastic to construct homes 70% faster and 30% cheaper than traditional construction



California Highway

Replaced bitumen with recycled plastic bottles (binder) for resurfacing. 150,000 bottles per mile

- Rail sleeper eco-pads from recycled polymers
- Recycled glass sand as bedding materials
- Recycled plastic drainage pipes

AUSTRALIAN SUCCESS STORIES



POLICY DRIVING IMPLEMENTATION

- Victoria's Recycled First Policy and NSW's Sustainable Procurement Policy are key drivers in increasing the use of recycled and reused materials on infrastructure projects.
- Most States and Territories currently use recycled materials such as RAP in pavement construction and SCMs in concrete because it makes sense to do so – cost, performance and decarbonisation
- The ecologiQ Program, as you have already heard at this conference, is driving some amazing outcomes on road, rail and social infrastructure projects in Victoria which is keeping hundreds of thousands of tonnes of waste materials out of landfill.



RECYCLED PLASTIC APPLICATIONS



- Recycled plastic drainage pipes
- Recycled plastic composite sleepers
- Recycled plastic noise walls
- Binder modifier
- Asphalt pavement
- Bollards and wheelstops
- Bike paths, decking , boardwalks
- Roadside furniture

- Recycled plastic aggregate in shared user paths
- Recycled plastic aggregate in non-structural concrete



RECYCLED PLASTICS USE IS COMPLICATED

- Supply chains
- Standards and specifications
- Awareness, Education, Training
- Scepticism over performance
- Cost
- Recycling at end of life
- Micro-plastics



SHOULD WE?



