

Submission to the Productivity Commission's circular economy enquiry

Information request 1 – case study

Waste coffee cups into high performance roads

While avoidance and reuse are considered high order circular outcomes, recycling contributes more to the economy, supporting local jobs and new (re)manufacturing innovations. This case study centres around the Simply Cups paper cup recycling program, managed by Closed Loop Environment Solutions, and the production of a high-performance asphalt, PAK-PAVE, produced by State Asphalts.

The problem

- Australians use more than 2 billion paper cups per year.
- Paper cups are light weight but high volume items. They fill up public bins quickly causing them to overflow and requiring frequent service. They also consume landfill space.
- Coffee cups were the 9th most common item collected on Clean Up Australia day.
- The waterproof lining in cups prevents efficient processing in pulp mills.
- Coffee cups are not accepted in the comingled recycling streams.

The solution

- An effective circular economy solution where unwanted materials are turned into a resource, needs multiple criteria to be met:
 - Efficient collection that maximises quantity and minimises contamination
 - Processing systems that transform the unwanted material into a new raw material, in a cost-effective manner.
 - The development of end-markets to ensure a steady destination for the raw material.
- Closed Loop achieved efficient collection systems through the design of a tubular collection unit with a circular opening that nests used cups, thereby concentrating quantities in a space-efficient manner.
- Potential contaminants such as lids are diverted by an adjacent tube with a 'coin-slot' opening for the disposal of lids.
- This system produces an end material that is 95% purity.
- Over a 7-year period, Simply Cups has grown to more than 1500 collection sites that generate approximately 10t of material per month.
- These sites are serviced by a national logistics partner who aggregates the cups in each state and undertakes preliminary processing.
- Preliminary processing involves shredding the cups as a whole, together with polyethylene tube liners that match the polyethylene waterproofing agent that lines cups.
- (Note: compostable cups with alternative liners can also be accepted).
- Preliminary processing is undertaken a statewide level which further densifies material (CLESmix) before shipping to secondary processing destination.

- Secondary processing involves pelletising the CLESmix so that it is suitable for adding to an asphalt mix – PAK-PAVE.
- PAK-PAVE is a specialised stone-mastic asphalt (SMA) that has high bitumen content.
- The cellulose fibres have a meshing effect that creates a stronger bond between the bitumen and stone components.
- This stronger bond in the asphalt means that SMA roads are more durable and less prone to pot-holing.
- SMA roads are also quieter and safer, demonstrating a shorter skidding distance.
- The increased strength of SMA asphalt means they can be laid with a 40% reduction in depth profile, generating significant savings in the other asphalt components.
- SMA asphalt is more expensive ton-for-ton, but the reduced profile means that metre-for-metre it is comparable to traditional asphalt.
- SMA asphalts are commonly used in Western Australia, but the market is still immature on the eastern seaboard.
- Prior to the Simply Cups program cellulose pellets were sourced from non-recycled fibres manufactured in Germany.
- PAK-PAVE was developed via a 4-year CRC project involving UNSW, State Asphalts and Closed Loop.
- PAK-PAVE was approved for use by the NSW EPA and Department of Transport in 2021.
- The first pilot involving PAK-PAVE was undertaken in early 2022 by Penrith City Council where it has outperformed other trial mixes used.
- As this pilot nears the two year mark, the engineering and construction sector is becoming increasingly confident in specifying PAK-PAVE with several new projects being undertaken.
- Work to continue promoting PAK-PAVE to public and private procurement departments continues.

Additional notes

- While the solution above involves one product (paper cups) being made into another (asphalt), the new asphalt product can easily be recycled at the end of its life into new asphalt, elevating it up the circular economy hierarchy.
- The dominant component of CLESmix is fibre (approx. 90%) with 5% polyethylene and 5% other materials. The polyethylene from cup liners and collection bags is a very similar polymer to bitumen so is effectively incorporated into PAK-PAVE.
- Closed Loop has explored 18 different options for remanufacturing of paper cups. PAK-PAVE is the best performer, although several other options are in existence.
- Thanks to the Simply Cups program, coffee cups can now be printed with the Australian Recycling Label, for brands and manufacturers that make a product stewardship contribution to support the recycling process.
- PAK-PAVE has featured in mainstream media including Channel 9 television news, the Sydney Morning Herald, the Guardian, ABC radio and dozens of industry publications.

Information request 2

Priority opportunities to progress the circular economy

Our response here is quite general, but we consider making product stewardship programs compulsory is the most effective method to progress the circular economy.

This is because downstream systems for collecting, processing and developing end markets is resource intensive in terms of time and money. Generating income for these components is challenging.

Conversely, generating income from product sales is a given. Adding a product stewardship component to sales is a simple but effective tool...and it can be passed on to consumers. To facilitate a shift from a linear to a circular economy the cost of disposal or recycling needs to be shifted from an external to an internal cost, that is, this cost must be included in the sale price of an item.

Information request 3

Hurdles and barriers to a circular economy

Consistent with the above comment, cost is the biggest barrier to transitioning to a circular economy. If the opportunity to externalise costs for manufacturers, retailers and consumers remains, then that pathway will be followed. Internalising end-of-life costs into a product's sale price is critical.

Information request 4

Governments' role in the circular economy

Regulating product stewardship is a critical role of government. Making product stewardship mandatory is most effective, followed by incentivising it.