



# Talk Book

## Ending Plastic Waste Symposium

6-7 August 2024





## The event

- CSIRO partnered with RMIT University and the Solving Plastic Waste CRC to deliver the Ending Plastic Waste Symposium 2024.
- The event was held on 6-7 August 2024 at the Sofitel on Collins, Melbourne.
- Over 270 guests from government, industry, NGOs and research organisations came together to discuss and showcase the latest science and technology to address plastic waste.





## Key points

- Plastic waste is estimated to double by 2040: the time to act is now
- A circular economy for plastic is achievable – however this can only be done with a significant reduction in the production and consumption of plastic
- If the material is not worth collecting and reprocessing, it won't be. There is a need to incentivise investment and to tap into the different levels of the waste hierarchy
- A change needs to occur across the entire value chain – from production to behavioural changes from the consumer
- Plastic waste should be seen as a resource, rather than going to waste and discarded after one use



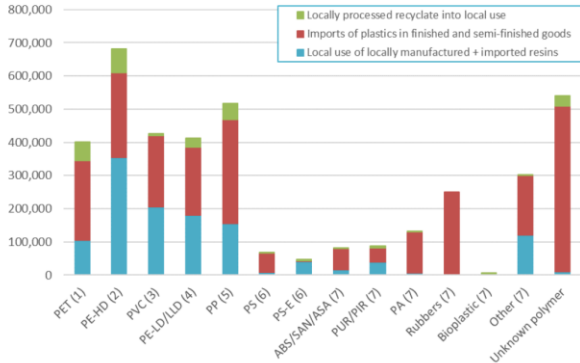
# Australia plastic flows and trends

Speaker: Kyle O'Farrell (Blue Environment)

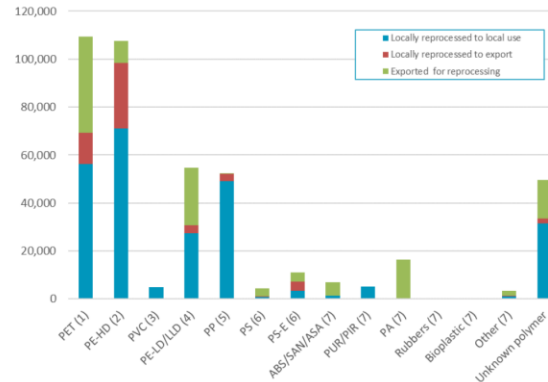
In 2022/2023:

- Australia's plastic recovery rate was 14% of the 4.0 million tonnes of consumption
- 62% of plastic consumption in Australia is imported
- Packaging constitutes over 29% of plastic consumption, followed by the built environment (18%)
- Plastic recovery in packaging used for business to consumer is around 53%, with packaging used for business-to-business movement much lower (15%)
- Highest recovery rates are for PET (30%) and HDPE (21%)

Plastics consumption by polymer type and source in 2022–23



Plastics recovery by polymer type and destination in 2022–23





# Health implications of plastics in our ecosystem

Facilitator: Professor Magdalena Plebanski (RMIT University)

Speakers: Professor Deborah Glass (Monash University), Associate Professor Mayur Garg (Northern Health Hospital), Dr Kirsty Wilson (RMIT University), Professor Magdalena Plebanski (RMIT University)

- Data shows that nanoplastic particles can be stored in human body tissue
- The lymphatic system shows some ability to remove some of the smaller microplastics from the system
- Plastics can act as a 'vehicle' for other contaminants affecting human health
- How do we stop green washing with information that some nano-particulars have some health benefits?
- One of the problems is that any voice is seen as valid. Scientists need to communicate our findings quickly, discuss the topic openly, and bring all into the conversation
- Further research is needed to understand the health implications and long-term effects of plastic to humans



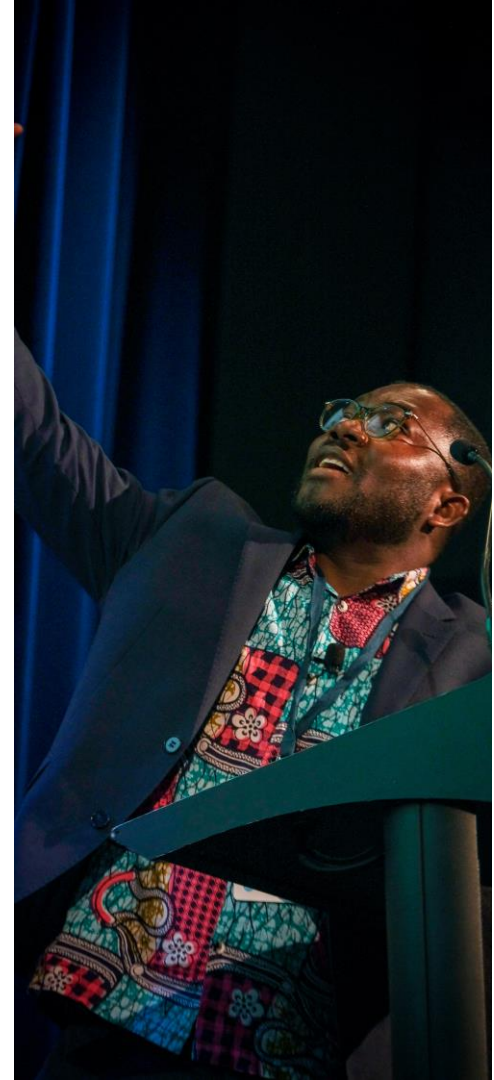


# Microplastics

Facilitator: Professor Nicky Eshtiaghi (RMIT University)

Speakers: Dr Scott Wilson (AUSMap), Dr Catherine Rees (Melbourne Water), Tanveer Adyel (RMIT University), Professor Bing-Jie Ni (UNSW), Dr Elvis Okoffo (The University of Queensland), Dr Mike Williams (CSIRO), Professor Nicky Eshtiaghi (RMIT University)

- Most microplastics studies in Australia are in the marine and coastal area, with few in freshwater and the soil.
- Determining the ecological risks associated with microplastic exposure and possible uptake is needed.
- There is a need to consider harmonisation of methods for microplastic data collection as well as understanding how they can be vectors of contamination.
- Tweaking the wastewater treatment process can allow the removal of more microplastics.
- It's estimated that around 200 gms of plastics per person per year is released through sewage in Australia.
- Two step pyrolysis is proving to be a potential technique for the remove or a diverse set of microplastics from water.





# Environmental detection and remediation

Facilitator: Professor Andrew Ball (RMIT University)

Speakers: Professor Andrew Ball (RMIT University), Dr Julia Jaeger (Eurofins ANZ), Dr Fereshteh Nayyeri (CSIRO), Dr Phoebe Lewis (EPA Victoria), Dr Mehran Rashti and Dr Xiangyu Liu (Griffith University), Professor Megh Mallavarapu (The University of Newcastle)

- Mechanical techniques to remove plastics and microplastics from the environment are available.
- Scaling up of techniques is difficult and traces of plastic may still be present.
- Regulation around contaminants at a Federal level could improve issues into the future.
- Many quality assurance gaps exist when analysing microplastics (fibres) with spectroscopy.
- Camera monitoring with Artificial Intelligence (AI) is an innovative educational tool that offers potential for collaborative work (e.g., Recycle Mate)





# Medical plastics

Facilitator: Professor Stefanie Feih (Griffith University)

Speakers: Renae McBrien (Queensland Children's Hospital), Dr Trevor Thornton (Deakin University), Helen Jarman (MedCycle), Leonie Walsh (Solving Plastic Waste CRC)



- Plastic produced in medical waste – considered a ‘clean stream’ as they are not mixed with other plastics so could be more easily recycled.
- Our health care relates to financial and environmental performance – it’s what we measure – it’s a data rich environment
- There is enough data from health care services for mandating reporting to get the benchmarks and the change needed by those in procurement and at senior levels to enforce change.
- Change in this sector is difficult and slow due to the international supply of medical products; Australia's low procurement power; and long procurement contracts with suppliers. There is low opportunity for new and innovative suppliers to be considered.
- While many hospitals are individually making changes, integrated coordinated system of medical supplies in Australia is needed.
- It’s important to create value change linkages outside of the hospital setting. Sharing the adoption of these changes is required across the system to encourage change .
- A designated sustainability officer in an organisation is a great start in making change.



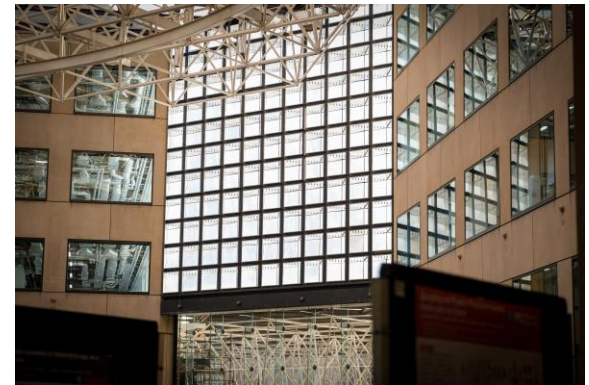


# Construction and the built environment

Facilitator: Dr Biplob Pramanik (RMIT University)

Speakers: Vani Naidoo (InfraGroup), Dr Mohammad Saberian (RMIT University), Associate Professor Dilan Robert (RMIT University), Dr Chamila Gunasekara and Dr Yuguo Yu (RMIT University), and Dr Thomas Loh (RMIT University)

- What is the end of life of those products (pipes/concrete bricks) made with plastic waste? How will these be recycled in 50+ years?
  - RMIT is developing technologies for sorting / recycling and looking at end of life of products
- Are there issues around microplastic and chemical leaching when using plastic (e.g. used PPE) in concrete or pavement?
- Are there applications where waste plastic is used in within construction in Australia?
  - A few example in Australia (Vic) where recycled materials has been incorporated in major road and rail projects
  - Needs harmonisation across local, state and federal government
  - Requires strong supply chain for all projects





# Agricultural plastics

Facilitator: Dr Anne-Maree Boland (RMCG)

Speakers: Isabel Axiö (RMCG), Dr Stuart Gordon (CSIRO),  
Gavin Crawford (Bundaberg Regional Council), Stefanie Thoo (Pro-Pac Group)



- Agri-plastics are complex, contaminated, with a lack of alternatives and recycling infrastructure usually buried or burnt – there is a need for a national roadmap / stewardship.
- Example 1: Plastic mulch film ~45% of all agricultural plastic and are not biodegradable - replace with a sprayable biodegradable mulch, such as TranspiratiONal-SBM, a biodegradable mulch
- Example 2: Trickle Tape and recycling in QLD – product stewardship scheme
- Product stewardship options are long term options, but it is important to look at the short-term alternatives available.
- The current use of plastics in agriculture can help to ensure food security through improved yields, input efficiencies and reduce food loss and waste.
- Requires strong supply chain for all projects



# Plastics in food packaging

Facilitator: Professor Benu Adhikari and Associate Professor Fugen Daver (RMIT University)

Speakers: Dr Pete Cass (Enzide Technologies), Dr Mehran Ghasemlou (Deakin University), Associate Professor Steven Pratt (The University of Queensland), Dr Leonie van 't Hag (Monash University), Dr Rajkamal Balu (RMIT University)

- Bioplastics are not just base polymer but incorporate a number of other components.
- Additional components' footprint should be considered to the overall environmental footprint of the materials
- It is possible to modify the structure of the polymer to enhance properties and avoid the use of additives
- Globally, what has gone into biodegradable materials hasn't been thought about and could have been replaceable
- Good quality science is needed to inform how we use additives
- Commercial viability and recycling need to ensure there are discussions between all parties involved
- For commercial compost, we need a way to distinguish materials allowed into commercial composters
- Additives would need to be structurally bonded onto the polymer to avoid leaching
- 100% biobased vs partly petrochemical – always some give and take with the biodegradable world.
- Need strong collaboration between researchers and policymakers
- Commercially available plasticizer that are compostable compete with food production
- Paper and cardboard also have CO<sub>2</sub> / environmental footprint





# Plastic waste management and recycling

Facilitator: Suzanne Toumbourou (ACOR)

Speakers: Helen Millicer (One Planet Consulting), Jim Coulston (Vinyl Council of Australia), Dr Melissa Skidmore (CSIRO), Dr Ylias Sabri (RMIT University), Dr Ahmad Kandjani (CSIRO), Dennis Fay (Salty Monkeys)

- Plastics should be considered as a resource rather than a waste product and given a value
- We have not reached plastic circularity yet – the problem of not reaching it is largely structural, and economic rather than chemical
- Industry needs to make money, and recycling needs to generate its own revenue. This is not happening yet
- We are lacking the manufacturing ‘muscle’ for recycling – we need companies to uptake and make
- Collaboration of all parts of the system, connecting government and industry is needed
- The problem cannot be solved within Australia. There is a large economic block. We must be able to re-export the plastic that comes into the country in order for circularity as we don’t have capacity to reprocess the 50% of goods that come into Australia.
- Economics are limiting our ability to reach circularity - how we collect the materials – is difficult due to economics
- Remote communities in Torres Strait – most debris is foreign and largely plastic bottles and fishing gear – how remote communities deal with waste and their ability to recycle is a large cost impediment





# Bioplastics and renewable plastic production

Facilitator: Dr Albert Ardevol Grau (CSIRO) and Professor Namita Choudhury (RMIT University)

Speakers: Dr Colin Scott (Bioplastics Innovation Hub, CSIRO-Murdoch University), Professor Bronwyn Laycock (The University of Queensland), Shaman Gaspar (Infors HT), Dr Valentina Hurtado McCormick (CSIRO), Professor Naba Dutta (RMIT University), Rowan Williams (BASF/Australasian Bioplastics Association)

- Currently, most research is being done in the production phase of bioplastics and reducing the cost of production
- Every state and jurisdiction defines bioplastics differently – we need a uniform standard across Australia
- We need more incentives in the bioplastics field
- We should account for the end-of-life damage with mention of black carbon release when burning plastics
- In the absence of any Australian standard or any pending Australian standard for soil biodegradable application, ISO ISO23517 is adopted





# Understanding the life cycle of plastics: data and metrics

Facilitator: Gavin Walker (CSIRO)

Speakers: Tu Xayachak (RMIT University), Dr Narges Emami (CSIRO), Dr Jeroen Wassenaar (Cleanaway), Peter Bury (Chemistry Australia)

- No single plastic meets all the United Nations Sustainable Development Goals (SDG) – we need to have specialisation in each of the SDGs to drive incremental improvements and make a contribution; to ‘zero in’ on one is not doing our job
- There needs to be complex system thinking
- Life cycle analysis of plastics – accuracy of data into models is critical
- How do we ensure the approach of reuse and avoid in the waste hierarchy is still appearing when we are focusing on circular economy?
- Container deposit schemes are coming online but there is still a lack of participation
- The role of education is still needed in the space of recycling to improve rates





# Unifying efforts: setting standards and best practice

Facilitator: Helen Millicer (One Planet Consulting)

Speakers: Dr Naomi Boxall (CSIRO), Ben Russell (Standards Australia) and Dr Maja Arsic (CSIRO), Tim Kaliyanda (Licella)

- Financial and commercial benefits are often the key drivers for compliance to standards
- More conversation and engagement needs to be done with industry to adopt standards
- Education and awareness is a critical part of the process
- Standardisation of life cycle assessments would ensure more informed decisions are made
- There is room for standards to be more regulated than what they already are – however there is a balance between a standard becoming an enforceable regulation





# Achieving change through behaviour and policy

Facilitator: Dr Andrea Walton (CSIRO)

Speakers: Pheobe Ashe (NSW EPA); Alieena Mathew (Griffith University); Dr Tori Seydel (Griffith University); Ryan Collins (Planet Ark); Edmund Tamwoy (Crystal Ailan)

- Effective communication strategies are needed to ensure change in behaviours e.g., targeting of particular groups
- There are sometimes ‘too many’ messages around sustainability
- Factors such as the cost of living are a consideration as a barrier to entry
- Incentives are needed to drive change, and the containers for change scheme is a good example
- Targeted voluntary behaviour change programs can complement regulatory efforts

*‘We are trying to convince people to do something that could be costly or time consuming. To combat this, we need to ‘dig in and understand their values’ through understanding social norms.’ – Ryan Collins (Planet Ark)*







# How can Australia increase its speed in transitioning to a circular economy?

Facilitator: Dr Simran Talwar (UTS)

Speakers: Richard Smith (AMCOR), Dr Heinz Schandl (CSIRO), Dr Ian Dagley (Solving Plastic Waste CRC), Kylie Hughes (DESI, QLD)



- Six elements for a circular economy
- Need to develop a market for recycled materials
- National harmonisation
- From the current 3.8 million tonnes of plastic used in Australia, only 12% is recycled, 84% goes to landfill and 2 % is lost to the environment
- Polypropylene (PP) can have circularity in Australia as producer locally
- It is important to regulate packaging design so that it is recovered and recycled, now and in the future
- A circular economy is about value but also about consumption and production practices.

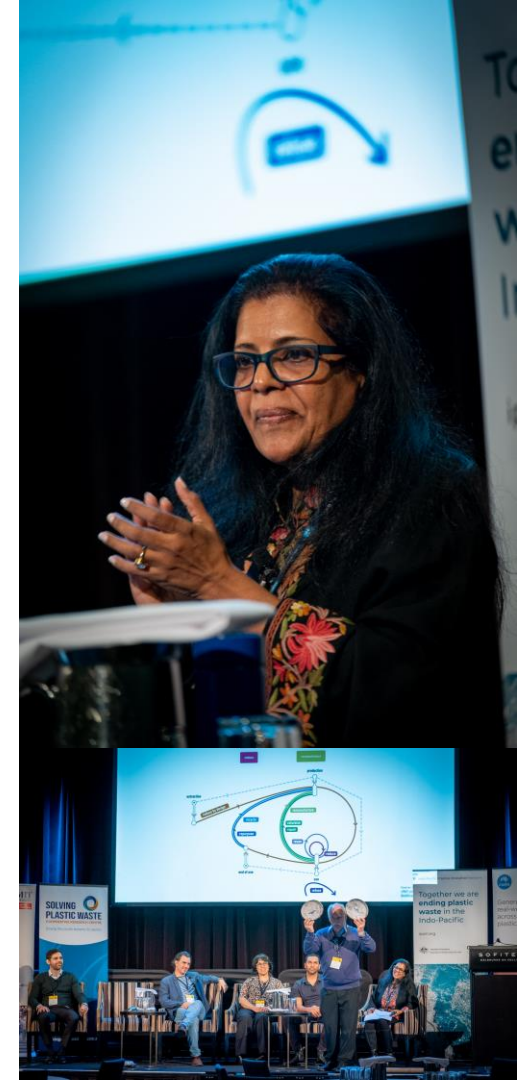


# Design for circularity

Facilitator: Professor Usha Iyer-Raniga (RMIT University)

Speakers: Associate Professor Geoff Germon (Talon Technology Pty Ltd), Associate Professor Simon Lockrey (RMIT University), Aisha Poole (Penrith City Council), Dennis Fay (Salty Monkeys), Sean Trewick (Green Collective)

- Product design is key – we need to go backwards to go forwards. Its system change as well as product design change that is needed
- We need viable products given the tonnes of material that we will need to deal with. We don't want 'pretty' e.g. plastic butterflies but viable products of real use
- The options for Asia will be different for Australia – CAPEX is different
- In remote communities, there is a high cost of living . Plastic waste presents a problem due to the cost of the operations to move and recycle (e.g. biosecurity issues of moving plastics from islands to the mainland).
- Engineering for end of life could be considered a 'band aid approach', we also need to change the systems we have set up (e.g. centralised food which requires produce to be wrapped rather than decentralised food access).
- Simple behaviour changes at home and in a business setting can improve the system e.g. procurement.
- Alternatives in a cost-of-living crisis is hard to get consumers invigorated to cover the extra cost.
- Packaging labelling – spend more money to ensure its clear and to help with end of life
- Co-mingled bins can be confusing, more separation at the source? E.g. Finland – 6 separate bins increases recyclability
- Consumers need to demand more – return it if broken – activate the repair market – 'the right to repair' movement – make the market change – e.g. overpackaging – refuse.
- We need to 'scale up' in Australia rather than the research going overseas





# International approaches to integrated systems

Facilitator: Rocky Pairunan (NPAP Indonesia)

Speakers: Cameron Hutchison (DCCEEW), Dr Asira Fuongfuchat (National Metal and Materials Technology Center), Dr Nugroho Adi Sasongko (National Research and Innovation Agency, BRIN), and Dang Nguyet Anh (NPAP Vietnam)



- UN Plastic Treaty – Australia supports binding measures around the design of plastics to ensure recyclability and circularity and remove the most harmful chemicals for the products
- Transparency and traceability of what is being traded is needed across all borders – how this will work is a challenge being looked at
- Use of guidelines for reducing plastic consumption and recycling etc. needs to consider the lower literacy rates in our south-east Asia countries – easy to understand
- The role of ISO standards in achieving our goal?
- The quality of the recycled material will be important as importing across countries will still occur to ensure high quality of products
- Education of all is key e.g. farmers in rural areas



# The pivotal role of Southeast Asian countries

Facilitator: Andrea Sosa Pintos (CSIRO, Senior Program Manager, Indo-Pacific Plastics Innovation Network, IPPIN)

Panellists: Dr Wijarn Simachaya: Director, Thailand Environment Institute, Ms Amalia Adininggar Widayanti: Deputy Minister for Economic Affairs, Bappenas (Indonesia), Dr Asira Fuongfuchat: Senior Researcher, Advanced Polymer Technology Research Group, National Science and Technology Development Agency (Thailand), Mr Nguyen Thanh Lam: Senior Officer, Solid Waste Management Division, Ministry of Natural Resources and Environment (MONRE, Vietnam), Mr Rocky Pairunan: Manager, National Plastic Action Partnership (NPAP), Indonesia

- [Thailand's Roadmap on Plastic Waste Management 2018-2030](#) showcasing progress and lessons for the region.
- The need for transparency in the global plastic treaty, focusing on the implications and requirements for each country.
- Insights into the implementation of Extended Producer Responsibility (EPR) from the Vietnamese perspective, addressing challenges and successes.
- Industry readiness concerning chemicals of concern and the impact on plastic waste management.
- The critical role of standards and certification in reducing plastic leakage and enabling a circular economy.
- The ongoing challenge of imported waste
- The importance of looking beyond packaging solutions, such as addressing agricultural plastics in the waste reduction effort.
- Empowering communities to adopt and sustain new technologies as key to long-term success in tackling plastic waste.





# A circular future and call to action for all

