



7 May 2020

Joint submission to the NSW Department of Planning, Industry and Environment, in response to its issues paper, Cleaning Up Our Act: Redirecting The Future Of Plastic In NSW

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Dear Sir/Madam

The Sustainable Materials Research and Technology (SMaRT) Centre at the University of New South Wales Sydney (UNSW) and the NSW Circular Economy Innovation Network (NSW Circular) are pleased to provide this joint submission to the issues paper 'Cleaning Up Our Act: Redirecting The Future Of Plastic in NSW' to help shape the development of the NSW Government's 20-Year Waste Strategy.

Professor Veena Sahajwalla is Director of both the SMaRT Centre and NSW Circular, and her respective teams have particular expertise in materials science and engineering, reducing waste through recycling science and the SMaRT's Microfactorie™ technology, as well as a track record in collaborating with industry sectors and businesses to research and develop innovative, 'circular' solutions that reuse and reform waste into value-added materials and products, with much of that work focussing on plastic. This has led to the development of multiple prototype products and opportunities that are involved in various pilot projects and industry partnerships.

The NSW Government and its agencies are to be applauded for their ongoing work to address waste and recycling challenges. It is essential we strive to develop plastic waste solutions as part of a circular economy in which we keep materials in use for as long as possible and establish new business supply chains, to better manage waste streams such as plastic as a resource and create new jobs, along with other economic, social and environmental benefits.

Various technologies and capability are now already available right here in NSW to reform much of this unwanted plastics material into new products and manufacturing feedstock to help reduce the need for landfill, as well as reduce the need to create 'virgin' materials. But currently there is little commercial incentive to adopt this capability because much of this plastic waste material is seen as having no or little value and supply chains are often based on the principles of lowest cost and maximum convenience.

Overall, this submission supports the outcome areas and each of the priority directions to help achieve them and comments below only on select directions.

Outcome 1: Reduce plastic waste generation

Mixed waste plastic and an inability to separate out certain plastics results in much of it not being recycled or reformed for new uses. We must realign the way we think about plastic materials to see them as valuable and not as waste to be discarded.

Priority Direction 1: Harness people power to create a fundamental shift in the way we use plastic (behaviour change)

A shift is needed in our thinking, to move away from classifying unwanted plastic items as waste that can't be recycled or reformed for new uses. Australians need to shift their view on waste so that plastic packaging and other no longer wanted or needed products made of plastic or have plastic included are valued, given that the material can be recycled or reformed into value-added materials. In this way plastic becomes a 'renewable material' and can greatly eliminate the need for waste to be burned or buried, by being brought back into supply chains.

NSW Circular has a pilot project with The Bower (see <https://www.nswcircular.org/e-waste-plastics-transformed-into-value-added-products/>), an environmental not-for-profit community organisation committed to reducing landfill through the reuse and repair of unwanted household goods, by finding innovative new ways to use discarded plastics (and other materials) to create greater community awareness about circular economy benefits. Another pilot project is with Hunters Hills Council (see <https://www.nswcircular.org/pop-up-library-to-showcase-circular-economy-solutions/>) to showcase innovative use of waste plastics reformed into valuable filament for 3D printing, along with other reformed common waste materials in a new pop up library and to provide a demonstration and community awareness space to highlight circular economy in action and inspire the community.

At present, there is a focus on waste management at one end of the supply chain, with an emerging recycling and manufacturing industry at the other. New supply chains need to link the two together to achieve the desired solution of recycling the elements of waste products so that they can be reformed in our manufacturing industries.

UNSW SMaRT's own [survey on community attitudes to waste and recycling](#) found that:

- 65.4% of people believe recyclables put into council bins goes to landfill (69.5% female, 51.4% aged 18-34, 75.1% aged 65-plus);
- 49% of people believe green and ecofriendly efforts will not have an effect in their lifetime, and 63.8% of those aged 65-plus see no benefits being realised;
- 72.4% of people would recycle more if the material was reliably recycled;
- 91.7% of people say it is very or somewhat important for Australia to invest in technology to 'reform' most common waste into re-usable 'high-value' materials;
- 80.4% support government investment in this technology to reduce landfill and create jobs.

Both NSW Circular, as a network promoting circular solutions, and the SMaRT Centre, as a world leading materials research centre on recycling science, would each be willing to be part of a coordinated awareness and behavioural change campaign.

Priority Direction 2: Set design standards for plastic consumer items

There are many opportunities for NSW to support industry to design products and materials involving plastic which are complex to recycle, including multi-material plastics for which there are examples in industries where this is already occurring. As mentioned above, NSW Circular and the UNSW SMaRT Centre have been involved in numerous pilot projects in this

area and, for example, one involved construction and development firm Mirvac (see <https://www.nswcircular.org/marrick-co-by-mirvac/>) where designer quality furniture and furnishings were made using waste plastics and other common waste materials.

Ensuring sectors are required to design for when a product is no longer wanted or useful removes from the consumer or end user the sole responsibility around disposal, but this must be supported by the right infrastructure and processes. The 'design' phase involves actively working with companies and organisations to account for when their own products are determined 'end of life' and no longer wanted.

Plastics are found in so many products and items, not just packaging. Often plastics are seen as valueless unlike, say, metals, when old products like cars and e-waste such as printers and computers, are considered for recycling. While the metals are valuable, so are the plastics, given the new uses already described. It's time to rethink attitudes towards all of the materials we design, produce, use and discard, to see them as renewable resources if we want to reduce our reliance on finite resources and create important positive environmental and economic impacts.

Plastics that are in food packaging, for instance, are not readily subject to recycling by consumers through their household bins. Food grade plastics therefore could be separated at the consumer source so they are collated as a single category, thereby allowing uniformity of the processing of food grade plastics. Strict quality controls around plastics to check on contamination is needed to ensure a greater level of plastic recycling and reformation. Reforming is the fourth "R" to join Reduce, Reuse and Recycling.

Outcome 2: Make the most of our plastic resources

This outcome and its directions are closely related to outcome 3's direction 8 that looks at infrastructure. It is crucial to help avoid waste at source so it doesn't become waste but can be diverted for meaningful assessment around the reuse of the materials it contains. If people know about more meaningful collection and recycling of discarded materials, such as through the few community recycling centres (CRCs), then they would be more willing to use and embrace these methods (see community attitudes data below). Mandated or enforced requirements around this may be required.

Priority Direction 6: Support demand and industry capacity

Private sector waste management providers need incentives (whether economic or regulatory) to recover, re-use and recycle plastic waste. Without incentives, they can be expected to pursue the cheapest and easiest option for waste management, which will not necessarily align with State (or Commonwealth/COAG) public policy goals or the broader public good. Aligning these requirements to those who produce the plastic materials will ensure a more holistic and circular approach to address demand needs and build industry capability.

We must reconsider how we conceptualise and define waste. For example, in accordance with the definition of waste under New South Wales' Protection of the Environment Operations Act 1997 anything made from waste (including plastic melted and remodelled to make a new product) remains waste. This definition is out-of-step with the technology which allows waste to be reformed and become part of a new value-chain. It will be difficult to fully realise the concept of a circular economy, which values resources by keeping products and materials in use for as long as possible, if the concept of waste is not redefined to recognise the value of products made from recycled or repurposed materials.

The best options for reducing waste are those options that don't conceive of an item as waste following the end of a product's life, but rather as a resource or component in the manufacture of a future product. Therefore, the optimal solutions to waste management will be those that re-use or recycle products rather than burying them in landfill, or incinerating waste (including waste to energy proposals) which only destroys the resource for ever.

But innovative supply chains are ultimately needed to achieve this. Businesses and organisations generally rely on traditional supply chains where reformed materials are usually not part of the chain. Solutions are available such as those identified by UNSW researchers at SMaRT which are peer reviewed, piloted and now recognised as world leading, and supported by the Australian Research Council (ARC) which funded the Green Manufacturing Hub in 2015, and again in 2019 when the ARC approved SMaRT's Consumer Waste Industrial Transformation Research Hub, set to commence in the latter part of 2020.

Outcome 3: Reduce plastic waste leakage

Priority Direction 8: Invest in infrastructure that can better manage plastic before it causes harm

Mapping and planning of critical waste infrastructure is central to managing the immediate challenges facing the sector in light of the impending COAG-agreed waste export bans, which will see a ban on export of unprocessed glass by July 2020 and mixed plastics by July 2021. Government and industry have a role to play in planning and implementing adaptive and sustainable waste infrastructure which can facilitate the transition towards circular economy goals highlighted by the NSW EPA foresight analysis.

Not everyone in industry nor across local government have necessary infrastructure or funding for it to solve these challenges on their own. So, rather than it being known as waste infrastructure, it really is process infrastructure related to materials supply chains. State funded initiatives such as CRCs could be a model to pursue to advance a decentralised and laterally integrated infrastructure model for the benefit of all size businesses, regardless of location. New infrastructure needs to be decentralised and to laterally integrate sectors that are not normally connected, as indicated by the examples and reports below.

Special activation precincts are a good model for the infrastructure needed. The NSW Government is to be applauded for its Special Activation Precinct (SAP) policy, and leading the development of the Parkes SAP which will connect global freight markets to local businesses and agricultural producers. The SAP model could be specifically applied to plastic waste and recycling, to create new and localised supply chains, plastic materials and products, offering economic and environmental benefits.

The Senate Environment and Communications References Committee Inquiry into Waste and Recycling Report 2018 found the importance of investment in infrastructure for the collection and processing of recycled material and diverting waste from landfill. It said "this infrastructure is needed both to enable regions to participate in recycling programs and to reduce contamination rates, and the report noted evidence that "to reduce the contamination rate of recyclable materials, investment in material recovery facilities (MRFs) is required". That report also highlighted the benefit of the Microfactorie™ concept.

Furthermore, the COAG Waste Ban Response Strategy released March 2020 added weight (p16) to the argument of centralised support for new and innovative processes and infrastructure, saying "significant challenge raised in industry consultation is the ability for businesses to secure investment for facilities and equipment upgrades, and to develop and test new technologies for creating value-added products from waste". It went on:

“Governments have a role to play in ensuring that viable proposals from start-ups and small and medium enterprises receive the support they need to scale up, achieve commercialisation, and compete in the open market. Support offered could involve access to test facilities, expert knowledge, and seed funding for cross-sectoral approaches to solving waste challenges. All governments opportunity: Investigate opportunities for regional microfactories, to enable regional and remote areas to process locally generated waste resources into useful value-added products for community benefit.”

Commercialisation of such technology / infrastructure will be slower than needed if left to market forces alone. If waste infrastructure was seen more as an “essential service” for not just waste collection but where the waste is used as a resource for remanufacturing and other uses, this would lead to the creation of value added products and a whole new and local supply chains.

Outcome 4: Improve our understanding of the future of plastics

This outcome somewhat relates to Outcome 1 and we will not repeat those points here but will comment on PDs 9 and 10 generally.

Priority Direction 9: Set up a NSW plastics research network by 2021; and Priority Direction 10: Support commercialisation of research-driven plastics solutions

We see a role for NSW Circular in helping achieve a NSW plastics research network by 2021. Now that we are in our second year, we cannot just share learnings but important network opportunities and stakeholders. Packaging is just one part of the waste plastics world.

The SMaRT Centre has extensive experience in the commercialisation of research-driven plastics solutions, engaging industry, doing and collaborating on research, and undertaking the necessary steps along the commercialisation journey.

A number of different initiatives are underway in NSW and other states and at national levels, to bring stakeholders together to address market gaps and ‘close loops’ around materials supply. This is disparate and across jurisdictions. There is also little incentive to industry participants unless there is a demonstrable revenue benefit.

Microfactories can enable the lateral integration of different industrial sectors to achieve the stated goals of COAG and the NSW issues paper, by recovering and reforming so-called waste materials to create new and localised supply chains, materials and products, offering economic and environmental benefits.

In conclusion

Given the severe impacts on global supply chains from COVID-19, the future of global manufacturing lies in small-scale, decentralised technology that will enable communities to produce many of the products, materials and resources they need locally by using resources largely derived from local materials that are unwanted or thought of as waste.

The science and technology we already have available can now make it possible for a complicated waste stream like plastics to produce value-added materials which can then feed into different industrial supply chains for manufacturing products.

This emerging model will profoundly disrupt today’s centralised, vertically integrated model of production, where, for instance, a single material or part available only from an overseas supplier can disrupt the manufacturing process.

Ideally, waste disposal would be run as a distributed solution across the State with decentralised manufacturing close to the point of disposal working to recycle waste material into feedstock in conjunction with local manufacturers, supplier and businesses. This also represents an economic opportunity, especially in rural areas, where jobs could be generated through manufacturing new supplies and products, to help create, in the current COVID-19 world, what is called 'sovereign capability'.

Yours sincerely

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