Cleaning Up Our Act: Redirecting the Future of Plastic in NSW

Discussion Paper

March 2020

We (CEC) have read the attached doc and highlighted the interesting bits. Thought you would be interested.

NSW GOVERNMENT

Minister's message

Plastic has vastly improved the quality of our lives and allowed us to pursue unparalleled advances in technology, transport, communication, healthcare, safety and education.

However, plastic has also become synonymous with the global consumer economy and underpins our use and dispose mentality—so much so that plastic is piling up in our natural environment and posing a risk to human health.

The plastic that is littered today will still exist in hundreds or even thousands of years' time—possibly longer. Even when plastic does break down, it doesn't go away, it often becomes microplastics or nanoplastics, which can adsorb dangerous chemicals. The plastic itself and the chemicals attached can be breathed in, absorbed through the skin or ingested. If we don't improve how we manage plastic now, plastic pollution will only increase, causing more damage to our environment and increasing the risk to human health, now and for generations to come.

We are facing a global plastic pollution crisis that requires a comprehensive and bold response. This is not just about banning one product; this is about changing how our economy uses, reuses and disposes of plastic.

Reducing plastic waste and protecting our environment and the health and wellbeing of our communities are key priorities for the NSW Government.

We have a great track record when it comes to protecting our environment and reducing litter. *Cleaning Up our Act* will build on this strong legacy. The success of the NSW container deposit scheme, Return and Earn, which has seen more than 3 billion containers returned, demonstrates that industry and our community is ready and willing to work with government to improve resource management practices and reduce litter.

Community sentiment and preferences regarding the use of plastic is starting to change and we need to work together with households to put more pressure on industry to change the way plastic is generated and managed. We need to reduce the amount of plastic leaking into the environment and improve recycling outcomes for plastics, including building capacity for industry to develop a demand for end-products that encourage innovation and create jobs.

Cleaning Up our Act offers a comprehensive series of actions for managing plastics that can firmly place NSW alongside international jurisdictions and help to realise my vision of NSW leading the nation when it comes to tackling the challenge of plastic waste.

Once complete, *Cleaning Up our Act* will sit alongside the 20-Year Waste Strategy with a focus that is centred on:

- Sustainability—plastic is valued and managed in NSW within a circular economy, delivering improved environmental and human health outcomes.
- Reliability—plastic is manufactured, reused, recycled, and disposed with minimal disruptions in services and in accordance with community expectations. For example, there are resilient local and international markets for recovered plastics.
- Affordability—plastic usage and management improvements are undertaken with the least adverse impacts on consumers, including costs, and plastic reuse and recycling initiatives realise the economic opportunities available.

I now want to hear your views on the outcomes and priority directions we have laid out in this discussion paper.

Together, we can change the way we manage plastic in NSW to help protect our environment and the health of communities for generations to come.

Matt Kean MP

Minister for Energy and Environment

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Acknowledgement to Aboriginal people

We acknowledge the traditional owners of Country in NSW and pay our respect to their Elders past, present and emerging. We recognise that the state's waste and resource recovery facilities are built on land that has been managed by Aboriginal people for millennia.

Painting by Jordan Ardle, La Perouse Aboriginal Community, Bidgigal People.

NSW Plastics Plan – the first steps

Cleaning Up Our Act is the first step in developing a new, comprehensive approach to managing plastic waste and pollution in NSW.

The overarching objective of this approach is to protect our environment and human health from the impact of plastics, while minimising impacts on consumers and maximising the economic opportunities available.

The NSW Government wants to develop a whole-of-lifecycle plan (from production, through to disposal and management of waste) for plastics in our state, that not only looks to adopt international best-practice but lays out an ambition to lead the way on new approaches. The proposed actions will allow NSW to become a world leader in managing plastics, where we have eliminated harmful plastics, cleaned up plastic pollution and used our knowledge to get the most value out of our plastic resources.

Figure 1: Stages of the plastic lifecycle

Executive summary

This discussion paper sets out the following four key outcomes for each stage of the lifecycle of plastic, each supported by a proposed target and priority directions.

Outcome 1: Reduce plastic waste generation

Proposed target: Phase out key single-use plastics

- **Priority direction 1:** Harness people power to create a fundamental shift in the way we use plastic
- **Priority direction 2:** Set design standards for plastic consumer items
- **Priority direction 3:** Phase out key single-use plastic items

Outcome 2: Make the most of our plastic resources

Proposed target: Triple the proportion of plastic recycled in NSW across all sectors and streams by 2030

- **Priority direction 4:** Make producers of plastic items more responsible for collecting and recycling in NSW
- **Priority direction 5:** Mandate 30% minimum recycled content in plastic packaging in NSW by 2025
- **Priority direction 6:** ~~Support demand and industry capacity~~

Outcome 3: Reduce plastic waste leakage

Proposed target: Reduce plastic litter items by 25% by 2025

- **Priority direction 7:** Use extended producer responsibility schemes to fund litter collection and end-of-life plastic management
- **Priority direction 8:** Invest in infrastructure that can better manage plastic before it causes harm

We are asking for your thoughts on each of the proposed outcomes, targets and priority directions.

Outcome 4: Improve our understanding of the future of plastics

Proposed target: Make NSW a leader in national and international research on plastics

- **Priority direction 9:** Set up a NSW plastics research network by 2021
- **Priority direction 10:** Support commercialisation of research-driven plastics solutions

The NSW Government will work with key stakeholders and the community to develop and undertake actions under each priority direction. Some actions will be targeted towards specific plastics known to be of concern, while other actions will target a wider range of plastics or address system wide issues in the plastic management process. Some of these interventions mirror what is happening in other states and territories, some need new regulatory action, while others need close partnerships with communities, researchers and industry. We also recognise that certain plastic items may perform critical functions for some members of the community. These and other social considerations will be explicitly addressed in carrying out the NSW Plastics Plan.

Have your say

Government, industry and community all need to work together to clean up our state. Now is your chance to help set the direction for how NSW deals with plastic.

Let us know your thoughts through the online surveys found www.yoursay.dpie.nsw.gov.au/plastics-plan.

You can also provide a written submission by emailing plastics.plan@environment.nsw.gov.au

Your feedback from this consultation process will be used to develop the final NSW Plastics Plan and inform ongoing implementation.

We all have a part to play

Managing plastic waste is everybody's responsibility, shared between governments, industry, and the community.

Commonwealth, state, territory and local governments work together to set and enforce legislation and policy in a consistent manner that is fair and equitable. Governments also provide critical infrastructure, gather data, and have an important role in funding priority research and innovation.

Industry includes all those organisations from the producers of plastics through to the disposers of plastic waste. Many socially and environmentally conscious organisations are already carrying out, or are currently looking into, actions to better manage plastic waste. *Cleaning Up Our Act* will further support these industry-led initiatives.

The community and non-government organisations are key players in keeping our NSW environment free from plastic waste. Through *Cleaning Up Our Act*, the NSW community will be supported to become leaders in the sustainable use of plastic, particularly in reducing our over-reliance on single-use, unnecessary and problematic plastics.

This discussion paper sets out priority directions for how we can bring about change and work in partnership with all stakeholders to take action.

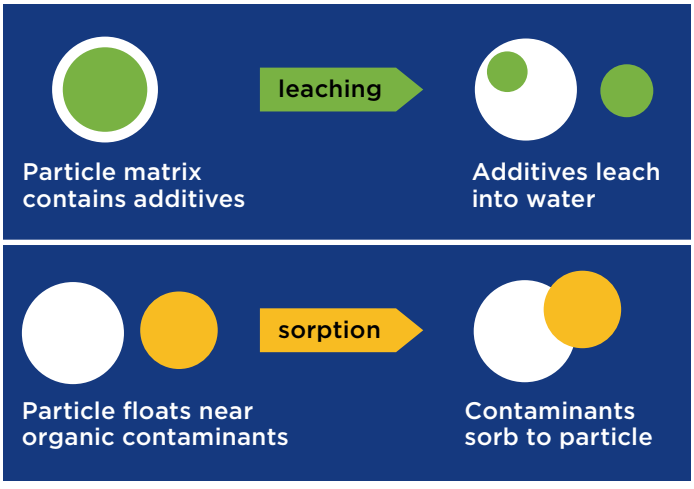
Managing plastic waste is everybody's responsibility, we can bring about change by working together.

Why we need to act now

Without fast and effective action to improve our use and management of plastics, their negative impacts will rapidly increase.

Plastic is an intergenerational problem. Plastic lasts hundreds or even thousands of years. Even when it does break down, it becomes microplastics (small plastic fragments, fibres or beads less than 5 mm) or nanoplastics (tiny pieces of plastic that can move across cell membranes). These plastics can contaminate our soil, air, water, our ecosystems and the human food chain. Microplastics have been found in Arctic sea ice (Obbard et al. 2014), in remote lakes (Koelmans et al. 2019), at the bottom of the ocean (Chiba et al. 2018) and in our drinking water (Koelmans et al. 2019). While we still don't understand the full impact of plastic on human health, we know that plastic particles can adsorb and transport toxic chemicals (Food and Agriculture Organisation of the United Nations 2019). We also know that toxic chemical additives can leach out of plastic particles into the surrounding environment. These processes are shown in Figure 2.

Figure 2: Chemical interactions with plastic in the environment



Plastic, more than any other material type, ends up in our environment (through leakage or littering) or in our landfills. On average, only 10% of the plastic we consume in NSW each year is recycled. Of the amount recycled, approximately 70% is sent offshore for recycling, with only 30% actually recycled in Australia.

On Friday 9 August 2019, the Council of Australian Governments tasked Environment ministers to develop a timetable for setting up a ban on the export of waste plastic, paper, glass and tyres. On 8 December 2019, Environment Ministers agreed to a draft timetable for the ban of mixed plastic exports from 1 July 2021, and other types of waste plastics no later than 30 June 2022. Ministers agreed to further test the draft timetable with industry and local government, while also developing response strategies and undertaking independent market analysis. The NSW Government must act quickly in co-ordination with other Australian governments to build the capacity of the local waste management and recycling sector to collect, recycle, reuse, convert and recover plastic waste to deliver against the plastic export ban and improve local recycling rates.

In NSW, there are an estimated 27 plastic items littered per 1,000 square metres. This impacts on the visual amenity of local communities and drives significant clean-up costs that fall on local governments, community groups and private land managers. A 2015 survey estimated that litter management costs the NSW economy more than $167 million each year (MRA Consulting Group 2015). Despite clean-up efforts, a lot of litter is not captured and spreads into the environment, where it finds its way into our soils, waterways, estuaries, the ocean and other pristine environments. Globally, a garbage truck a minute worth of plastic waste is flowing into our oceans (World Economic Forum 2016) and humans are estimated to be ingesting a credit card's weight in plastic a week (Dalberg Advisor et al. 2019).

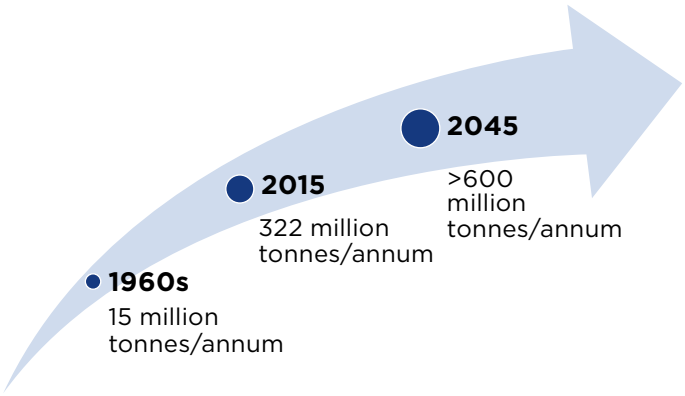
The harm to our environment and the risks to human health mean that we need to act now.

Plastic is everywhere

Today nearly everyone, everywhere, every day comes into contact with plastic. Plastic has been the backbone of our modern global economy. Plastic is low cost and highly functional—mouldable, flexible, lightweight, durable and waterproof.

We use plastic in many tasks in our everyday lives. For example, our clothing and shoes often contain plastic, as do the tyres on our cars, the sponges we use to clean the dishes, the lounge we sit on in the evenings to watch television, the television itself and many other everyday items. Look around you right now; it's likely you'll see something made from plastic. Over the last 50 years, plastic production has increased exponentially and, without a dramatic change, is set to continue that course.

Figure 3: Global Plastic Consumption



PLASTIC FACTS: Consumption in Australia and NSW

- Australia consumes 3.4 million tonnes of plastic every year (1.2 million tonnes of that is produced locally)
- Plastic manufacturing employs about 85,000 people in Australia and is 10% of all manufacturing activity
- NSW consumed 1.1 million tonnes of plastic in 2017–18 (mainly packaging and household items)

The problem with plastic

Plastic can harm our environment

We often use a piece of plastic for mere minutes, but it can remain in our environment for decades, hundreds or even thousands of years. Plastic persists in our environment in a way that paper, metal, glass or wood does not. Plastic waste is now so common in the natural environment that by 2050, it is predicted there will be more plastic by weight in the ocean than fish (World Economic Forum 2016).

Plastic can cause injury or death to marine animals through suffocation, entanglement and ingestion. Plastic can also concentrate and transport harmful chemicals. For example, plastics adsorb and concentrate chemicals like pesticides and persistent organic pollutants. Scientists have found plastic pellets with up to one million times more concentrated levels of persistent organic pollutants than surrounding seawater. These chemicals can interfere with organisms' immune systems, hormone function, ability to reproduce, impair organs or cause cellular and tissue-level disruption.

Microplastics are also a problem on land. A recent ground-breaking NSW study showed that microplastics can also block soil pores, preventing or limiting plant growth because air and water can't move properly through the soil. Once in soil, microplastics are impossible to remove, so it is important to protect our soils from microplastic pollution (Cattle et al. 2020).

PLASTIC FACTS: Plastic harms our oceans and marine wildlife

- 8 million tonnes of plastic leak into our oceans every year (Jambeck et al. 2015)—equal to a dump truck a minute (World Economic Forum 2016)
- The Great Pacific Garbage Patch (a hotspot of plastic waste in the ocean) is twice the size of NSW (1.6m square kilometres)
- There are up to 236,000 tonnes of microplastics in the oceans
- By 2050 there will be more plastic by weight in the ocean than fish
- 80% of global marine debris is plastic
- 75% of litter along the Australian coastline is plastic (Hardesty et al. 2017)
- Plastic kills or injures thousands of animals from more than 600 marine species every year
- 33% of turtles (Schuyler et al. 2014) and 43% of seabirds have eaten plastic (Hardesty et al. 2014). By 2050, 99% of seabirds will have eaten plastic (Wilcox et al. 2015)
- Coral can ingest microplastic and may then starve to death as their digestive tracks fill up with plastic
- The CSIRO estimated that a small proportion of the discarded or lost fishing nets floating in the ocean killed up to 14,600 turtles in one year
- An estimated 6.4 million tonnes of fishing gear are lost or discarded in the oceans every year
- The United Nations has estimated that the damage to the marine environment caused by plastic costs US$8 billion every year

PLASTIC FACTS: Impacts on climate change

- 99% of plastic is made from fossil fuels
- Global production and incineration of plastic releases 400 million tonnes of CO_2 a year

Plastic can pose a risk to human health

Plastic can pose risks to human health in various ways. People can be exposed to microplastics and nanoplastics and the chemicals they contain by breathing them in, eating or drinking them, or absorbing them through their skin. Microplastics have been found in table salt, honey, tap and bottled water, in the air we breathe and in seafood. Researchers have found evidence that suggests billions of microplastic particles can be shed from a single tea bag. Researchers also recently found microplastics in human waste (Schwabl et al. 2019).

Researchers do not yet fully understand the human health impacts of microplastics. However, research to date has shown inhaled or ingested microplastics can pass into the blood stream and remain there for a long time. In animals, microplastics in the blood stream have been shown to cause inflammation, fibrosis, breaks in DNA, cellular and tissue-level disruptions (which can cause cancer).

Chemical additives in microplastics (such as phthalates, perfluorooctanoic and perfluorooctanesulfonic acids and bisphenol A—also known as BPA) or chemicals adsorbed by microplastics in the environment (such as pesticides or persistent organic pollutants) can have significant negative impacts on human health. These chemicals can impair reproductive health and thyroid function, impact neurodevelopment, disrupt the endocrine system and may be carcinogenic or impair health in other ways. Researchers are still trying to figure out the level of exposure risk to humans.

Research on the human health impacts of nanoplastics is still in its early stages. We currently don't know the quantity of nanoplastics in our environment or how they interact with the environment or people. However, nanoplastics are considered a risk to human health because they can move across cell membranes, with as yet unknown consequences.

PLASTIC FACTS: Risks to human health

- A University of Newcastle study estimated we ingest 250 grams of microplastics a year—equivalent to a credit card's weight in plastic every week (Dalberg Advisor et al. 2019)
- Up to 90% of microplastic particles can persist in treated bio-solid sludge, which is often applied as fertilizer on soils
- Recent research estimates microplastic concentration in soils and in freshwater ecosystems is between four and 23 times higher than in the oceans

This discussion paper is the first step towards developing comprehensive policies to make NSW a leader in the way we manage plastic waste.

We must fundamentally change the way we manage plastic at every stage of its lifecycle to make sure we protect the environment and community from any potential harm. This discussion paper sets out broad outcomes we want to achieve—at the point of generation of plastic, collection, reprocessing and end-of-life. It also sets out broad outcomes for how we want to influence the future state of plastic, including managing new technologies and new innovations that might also bring with them new risks to the environment and human health.

This discussion paper also highlights potential priority directions for the NSW Government to follow to achieve these outcomes. Some of these involve us aligning with international best-practice, while some would see NSW taking bold new steps and leading the way.

For each outcome, the discussion paper proposes setting targets to help us measure our progress.

Outcome 1: Reduce plastic waste generation

Proposed target: Phase out key single-use plastics in NSW

What is the problem?

The low cost and versatility of plastic means we often use it as a disposable or single-use material, particularly in packaging and convenience items like plastic plates and cutlery. These types of plastic are problematic because they have little or no leftover value, are difficult and costly to recycle and often end up in landfill or as litter in the environment. Single-use or disposable plastic items may also be thought of as 'unnecessary' because they can often be replaced with viable alternatives.

We must fundamentally change the way we manage plastic at every stage of its lifecycle.

What can we do?

The best way to reduce plastic waste is to eliminate it at the point of generation.

We currently produce many plastics that could be considered unnecessary; plastics that are not essential, but merely convenient and easy to use. These plastics can be reduced, substituted with non-plastic fit-for-purpose alternatives or eliminated entirely without significantly compromising utility, access to products or services, or causing undesirable environmental outcomes.

Any plastic that is produced creates manufacturing costs, as well as further downstream costs once it becomes waste (during collection, recycling or disposal to landfill) or is leaked into the environment (generating clean-up costs).

By avoiding plastics that we don't need or that are problematic to manage, we can save finite resources, minimise risks to the environment and human health and prevent the need for management of waste further downstream.

Who is responsible?

Government	Community	Industry
Use regulation where appropriate to limit the types of harmful and unnecessary plastics produced Work in partnership with community and industry to improve understanding about how to avoid plastic waste	Be proactive about avoiding products that end up as plastic waste	Work in partnership with government and the community to design out plastic waste

Priority direction 1: Harness people power to create a fundamental shift in the way we use plastic

People are driving a massive change in the way our society thinks about plastic and waste more generally. Plastic is at the forefront of our convenience culture, but the community is now increasingly aware of the environmental and health risks of plastic and is demanding change from government and business.

Consumers have pushed businesses to shift from disposable packaging to reusable items. In NSW, people power pushed the major supermarkets and other retailers to move away from lightweight plastic bags to alternatives like paper or recyclable plastic bags. One major supermarket has announced a trial in 2021 of dispensing products in branded, reusable packaging that can be returned to the store where it is washed and refilled.

We have an opportunity to continue to educate the community and push for behaviour change. By giving people the information and tools they need, we can help consumers make informed choices so they use less plastic. There are opportunities for government to support local, community-driven initiatives. The South Australian government, as part of its single-use plastics strategy, is setting up 'plastic-free precincts'. The first precincts are in three major retail areas and the state's 21 surf lifesaving organisations. These precincts are provided with targeted support to help them and their users transition away from single-use plastics towards reusable and recyclable alternatives.

Other governments are investing in urban infrastructure that can help people reduce their reliance on single-use plastics. In 2018, the German government announced that as part of its five-point plan to reduce plastic waste it would set up drinking fountains in cities and towns to encourage consumers to use refillable bottles instead of disposable plastic water bottles.

By engaging with the community, we can design new systems that change the way we interact with plastic. Some of these may involve new rules and standards, or even some extra costs. But by working with the community we can have an open discussion about the need for action and the ways we can best drive behaviour change.

Case study: Water stations

Sydney Water and the Sydney Cricket and Sports Ground Trust have installed 12 new permanent water stations at the Sydney Cricket Ground (SCG), providing free water for cricket fans in an effort to encourage better health and a better environment.

The water stations proved a hit at the January 2018 Sydney Ashes Test, where spectators consumed almost 13,000L of water from the refill stations across the five days of the Test—the equivalent of over 20,000 bottles of water (600mL). Notably, the fourth day of the match saw temperatures reach over 43°C—the highest temperature ever recorded during a Test match in Australia.

By using the water station and avoiding those 20,000 bottles of water, fans saved over 15,000kWh of electricity, over 32,000L of water and 3,000L of oil from the plastic bottle manufacturing process. In addition, a significant amount of fuel and carbon emissions have been saved by not having to transport the plastic bottles.

www.sustainabilitymatters.net.au/content/water/news/scg-water-stations-are-a-hit-with-cricket-fans-1398514955

Giving the community better information about the harmful impacts of plastic litter and pollution can also encourage people to make better choices about how they manage their plastic waste. In NSW, we have run a successful, long-running campaign targeting littering, highlighting the impacts on the environment and encouraging behaviour change (see *Don't be a Tosser!* Campaign case study).

Case study: *Don't be a Tosser!* Campaign

The campaign has had a huge impact on the community's self-awareness of littering behaviour. Importantly, since the beginning of the current campaign in March 2018, there has been a 17% increase in people's own awareness of their littering behaviour, with the biggest shift being the number of people admitting to littering less than once a month. This is critical to creating long-lasting behaviour change, as once someone is aware of their own actions, it is easier to positively influence their behaviour.

The future of the Tosser Campaign

Building on the success of the *Don't be a Tosser!* Campaign, the NSW Government is running a marine litter campaign in 2020 to raise community awareness of the impact of litter on the marine environment. The approach will be to create meaningful conversations with the community about the consequences of marine litter.

Through the ongoing development of the *Don't be a Tosser!* Campaign, the NSW Government is showcasing the consequences, both individual and environmental, of littering that will capture the attention of the community and educate them on why their litter matters.

By designing out plastic waste, we can reduce the amount of plastic that is littered or landfilled.

Tell us your thoughts:

- Do you support using less plastic in NSW?
- Is it hard to use less plastic? If so, why?
- How can the NSW Government make it easier to use less plastic?
- How can businesses make it easier to use less plastic?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Priority direction 2: Set standards for consumer items to design out plastic waste

Consistent, mandated product design standards for certain plastic items would help reduce problematic and unnecessary plastics that can harm the environment and increase the use of recyclable materials. By designing out plastic waste, we can reduce the amount of plastic that is littered or landfilled. This can create a shift towards durable and reusable materials and increase the proportion of plastic that is recycled and remanufactured.

Many large Australian companies have already signed up to the Australian Packaging Covenant Organisation (APCO) industry target to shift to 100% of all packaging being recyclable, reusable or compostable by 2025. NSW will support and monitor the progress of APCO's members to achieve this target, as further NSW actions may be needed if the target is not achieved. NSW could also work with packaging industry companies that are not APCO members to make sure there are comprehensive actions to improve the sustainability of all plastic packaging generated in NSW.

Building on these targets, NSW could consider mandating product standards for plastic items, including packaging, to make sure items can be cheaply and easily recycled and used as inputs into the remanufacturing process.

Standards could apply not only to the types of polymers used but also to the way items are assembled—to make sure that recyclable parts are easily separated, for example. This could apply to packaging, which often has many parts of

varying recyclability, or even to certain composite construction materials which can use polymers like expanded polystyrene. The European Union (EU) has introduced standards for beverage containers that have single-use parts, like bottle caps.

State-based product standards can face challenges with setting-up and running but can also stimulate national action. Any standards would be carefully considered and developed in close consultation with industry and the community.

Tell us your thoughts:

- Do you support the NSW Government introducing mandatory design standards for certain plastic products?
- What products or materials should have mandatory design standards?
- What mandatory design standards would significantly reduce plastic waste generation?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Priority direction 3: Phase out key single-use plastic items

Some aspects of plastic waste can be tackled through regulatory action. This includes phasing out specific single-use items that typically end up in landfill or as litter.

Mandated phase outs of certain single-use plastic items have been happening in every other Australian state and territory and many places overseas.

Victoria's plastic bag ban came into force in 2019. South Australia banned lightweight shopping bags more than a decade ago and has recently released a list of other single-use plastic items it will target for phasing out, including heavier, boutique plastic bags. Likewise, bans on bags and other single-use items like disposable plates and cutlery, straws and food and beverage containers are in place across the EU, Canada, many US states, Bangladesh, New Zealand and Taiwan.

In NSW, the major supermarkets and other retailers have voluntarily phased out lightweight shopping bags, replacing them with heavier plastic bags or paper alternatives and encouraging their customers to bring their own reusable bags. Some supermarkets provide their customers with scrap cardboard boxes, which can later be recycled. These moves have reduced the number of plastic bags in the community but not all retailers have made the shift. Additionally, the heavier plastic bags now being offered, usually at a cost to the consumer, also pose similar risks to the environment when they are only used for a limited time and then disposed of. Some work has started between industry and governments to move businesses away from heavier plastic bags, however these items should also be considered as part of any phase out.

Beyond plastic shopping bags, there are a range of other single-use items that pose potential risks to our environment through the litter stream, are not easily recoverable and recyclable and could be replaced with other materials. These include:

- disposable plastic plates/bowls, cutlery, cups, stirrers and some other single-use food service items
- expanded polystyrene food and beverage containers
- plastic straws
- heavier/boutique plastic bags
- oxo-degradable plastics.

We intend to phase out lightweight plastic shopping bags (less than 35 microns thick, including those made from 'degradable' and 'compostable' plastic) and are considering doing so within 6 months from passage of legislation (while avoiding the Christmas and New Year period). This phase out will complement the other aspects of this strategy designed to support plastic recycling and reduce plastic litter entering the environment. The NSW Government will also consider phasing out the other plastic items and materials listed above.

Any phase out will include consideration of specialist uses for some single-use plastic, like in hospitals where it is used to keep items sterile and for people with a disability who may rely on these items. Where there are no viable alternatives for these uses, exemptions will be considered.

Developing a comprehensive plan to address plastics

To begin the discussion we are seeking your feedback now on the list of plastic items and materials for phase out, the timeframes and any implementation challenges. Lightweight plastic bags have a suggested phase out timeframe because alternatives are readily available, and the community and industry have indicated they are eager to make the switch. However, we want to make sure consumers are given an alternative to lightweight plastic bags that minimises or avoids any costs to them.

Beyond these items, we propose to develop a sound framework to assess other plastic items as new evidence comes to light.

Importantly, we have to make sure sustainable options are offered as alternatives, that deliver better environmental and human health outcomes. We also do not want to create an opportunity for retailers to profiteer by selling alternatives that do not have a genuinely better environmental outcome. Some alternatives, like 'compostable' or 'biodegradable' plastics, can break down into microplastics, leach toxic chemicals and harm the environment, so care must be taken.

Tell us your thoughts:

- Do you support the phase out of the listed plastic items and materials?
- Over what timeframes should these items and materials be phased out?
- Are there barriers to phasing out these items?
- Are there other plastics that should be phased out?
- What should the NSW Government consider when implementing these phase outs?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Outcome 2: Make the most of our plastic resources

Proposed target: Triple the proportion of plastic we recycle in NSW across all sectors and streams by 2030

What is the problem?

Plastic has a poor record for recycling. Globally only 18% of all plastic waste generated is recycled (Geyer et al. 2017), but that figure is only 10% in NSW and 12% Australia-wide.

In NSW, the capacity to recycle plastic waste is currently underdeveloped. We can create new industries and jobs by improving plastic recycling capacity and returning plastic to productive use. In Australia, an estimated 9.2 full time employees are directly employed in recycling for every 10,000 tonnes of material processed, compared to only 2.8 full time employees for the same amount sent to landfill (Access Economics 2009).

PLASTIC FACTS: Plastic recycling rates are low

- NSW generates 800,000 tonnes of plastic waste each year but only recycles 10%
- NSW has 17 plastic recyclers and remanufacturers
- Only 30% of plastic waste recycled in NSW is remanufactured here, with the rest sent interstate or overseas for reprocessing

Plastic waste in NSW is usually collected either with other general waste (like household or commercial red bins) or mixed in (co-mingled) with other recyclable materials such as glass, metal, paper and cardboard (like household yellow bins).

Confusion about what can be recycled often means non-recyclable plastic waste contaminates the yellow bin, leading to lower-value commodities. International export markets, like China, Malaysia and Indonesia, are no longer willing to take low-value, poorly-sorted recyclable materials. Mixed plastic from kerbside yellow bins has been steadily declining in value—in 2018–19, 147,000 tonnes of mixed plastics were exported from Australia at an average value of AU$4/tonne.

Plastic waste (typically PET, HDPE and LDPE) is also collected through Return and Earn, where people deliver their eligible beverage containers to return points for a 10-cent refund. This material is valuable as it produces a clean stream of high-quality plastic material free from contamination by other waste products.

There are alternative collection systems for other plastics, such as returning soft plastics to supermarket collection bins, mailing back plastic cosmetic packaging to brand owners, or donating synthetic clothing to charities, however these systems aren't used as much as they could be. They are often not as convenient as kerbside bin collections, and many people do not know about them.

There is also a lack of local and global markets for the waste plastic that we generate, collect and sort. In other words, there are not enough plastic remanufacturers, either in NSW, Australia or overseas that want to buy our sorted plastic waste to reprocess.

Another challenge is that many plastics cannot be repeatedly recycled. Thermoset plastics (such as fiberglass and foams), which are made of polymers that become irreversibly rigid when they are heated, cannot be remelted or reshaped. This makes thermoset plastics difficult to recycle; often they can only be recycled into lower value products, which usually cannot be recycled themselves.

Some items made up of composite materials that contain plastics are usually not recycled because it is expensive, difficult and time-consuming to separate plastic from the other parts of the material. An example of a composite material is liquid

paperboard, which is used in items like takeaway coffee cups. Liquid paperboard can be made of very thin layers of paper, aluminium and plastic that are glued together, and it can be difficult to cheaply separate these materials for recycling.

What can we do?

We need a wholescale shift in the way we collect and process plastic waste.

Historically, councils, consumers and the waste industry have tried to manage the ever-growing tide of plastic waste. We can change that by giving more of that responsibility to producers for not only collecting and processing plastic but also re-using it in their manufacturing processes. The EU is leading the way in this regard, with bold product stewardship schemes in member states like the Netherlands, Germany and France for plastic and other packaging.

We can also identify ways to stimulate demand for recycled plastic content through government procurement and invest in building the capacity of industry to meet future demand.

Who is responsible?

Government	Community	Industry
Take the lead on setting a fair regulatory environment that drives better producer management of plastic	Engage in new ways to collect and process plastic waste	Work in partnership with government and the community on new ways to manage plastic

Priority direction 4: Make producers of plastic items more responsible for collecting and recycling in NSW

Currently in NSW, when a plastic item is produced and sold on the market, there is often no obligation on the producer to take responsibility for what happens to that item when it reaches the end of its useful life. When it becomes a waste product, responsibility for managing it often falls to the consumer, local governments and businesses, and the waste management sector.

Under producer responsibility schemes, the cost and responsibility for the end-of-life management of an item can be borne by the producer. Increasing producer responsibility for the items they make and sell can encourage more efficient collection and processing, better design of products and the re-use or remanufacturing of recycled content.

NSW already has legislation allowing it to introduce extended producer responsibility and product stewardship schemes. The Commonwealth Government manages product stewardship at a national level under the *Product Stewardship Act 2011*. The Act sets the framework to effectively manage the environmental, health and safety impacts of products across Australia. It allows products to be regulated or voluntary product stewardship arrangements to be accredited by the Australian Government.

Extended producer responsibility involves producers taking more responsibility (including physical or financial) for managing the environmental impact of their products at the end-of life stages of the product's life cycle. Product stewardship goes even further, involving a shared responsibility across all life-cycle stages, from the extraction of virgin materials, to manufacturing, consumption and through to and including ultimate disposal and what happens afterwards. There are currently two accredited voluntary national product stewardship schemes in operation:

- **MobileMuster** provides a free collection and recycling service to consumers to help keep mobile phone products out of the general waste stream and to ensure they are recycled in a safe, secure and ethical way. Members of the scheme include all of the major mobile handset manufacturers and network providers and their funds support recycling and various marketing and education activities to promote awareness and uptake of the program.
- **FluoroCycle** is a voluntary product stewardship arrangement that seeks to increase the national recycling rate of waste mercury-containing lamps. The scheme's operation is fully funded by a recycling levy which is paid by members of Lighting Council Australia, though businesses, government agencies and other organisations can also join as signatories. The arrangement targets the commercial and public space sectors where the bulk of waste lamps are generated.

While there are currently no mandatory extended producer responsibility or product stewardship schemes specific to plastic in NSW, certain industries are subject to similar types of legislation that apply more broadly to both plastic and non-plastic products, such as beverage containers eligible for Return and Earn and consumer packaging. These schemes are outlined in further detail in the case studies.

Case study: NSW Container Deposit Scheme—Return and Earn

The Container Deposit Scheme legislation recognises the responsibility that the beverage industry shares with the community for reducing and dealing with waste generated by beverage product packaging and sets up a cost-effective state-wide container deposit scheme to help the beverage industry pass that responsibility on and to promote the recovery, reuse and recycling of empty beverage containers.

The scheme operates by offering consumers a 10 cent refund for each eligible container redeemed at a return point (reverse vending machines, over the counter and automated depots). The refund provides a reason for consumers to hold on to their empty container and return it for the refund. The refund also gives people a financial reason to pick up littered containers. Funding for the 10 cent refunds is collected from first suppliers (manufacturers, importers, wholesalers or retailers) bringing eligible drink containers into NSW.

Return and Earn has been highly successful, mostly because it's convenient and well-designed. Over 3 billion containers have been collected in just over two years of operation. Before this, about 33% of containers were recovered through the kerbside system. In the first half of 2019, this had risen to an average of 69% through both return points and kerbside combined.

The NSW Government could explore how the essential design elements of Return and Earn can be reflected in new extended producer responsibility or product stewardship schemes for other types of plastics.

Product stewardship schemes promote the recovery, reuse and recycling of materials.

Recycling of consumer packaging

In NSW, large producers or brand owners of consumer products, with a gross annual income in Australia of more than $5 million, have a legal obligation to reduce the environmental degradation caused by the disposal of used packaging, conserve virgin materials through waste avoidance and promote the re-use and recycling of used packaging materials.

Liable brand owners can fulfil this responsibility by either joining APCO, a co-regulated scheme, or by choosing to be directly regulated by state and territory governments in accordance with the specific recovery targets and the other reporting needs set out by each state or territory.

Most liable brand owners currently elect to become a member of APCO rather than be directly regulated by the NSW Government. In April 2018, all Australian environment ministers agreed to work with APCO and its 1,500 members to deliver a National Packaging Target of 100% of Australian packaging being recyclable, compostable or reusable by 2025 or earlier. APCO carries out activities to promote sustainable packaging design, education and other circular economy projects to achieve the national target but does not directly collect packaging waste or fund recycling systems for packaging.

The NSW Government could explore how extended producer responsibility or product stewardship instruments can be leveraged to further support recycling of consumer packaging in NSW and make sure industry-led targets are being achieved.

Case study: Packaging Recycling Act Japan

Since 1995, Japan has had in place the Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging 1995 (the *Packaging Recycling Act*).

The legislation was designed to create a new system to promote sorted collection and storage of containers and packaging. The *Packaging Recycling Act* requires that designated producers (including importers) must recycle waste packaging that meet specific sorting criteria after being collected in a sorted state by municipalities.

There are obligatory recycling amounts, standards and targets set for each individual packaging producer. Packaging producers can either collect and recycle waste packaging or outsource the recycling to a producer responsibility organization (the Japan Containers and Packaging Recycling Association).

Only certain recycling methods are approved under the *Packaging Recycling Act* (for example, pelletising and flaking of plastic or making polyester) and recyclers are required to achieve a minimum yield for recycling through each method.

Once the national government is satisfied that a collection rate of about 90% has been achieved for a specific type of container and packaging, the container and packaging can be exempted from the obligations of the Act.

Financial obligations for waste generators

The *Protection of the Environment Operations Act 1997* (POEO Act) currently requires certain licensed waste facilities in NSW to pay a contribution for each tonne of waste received at the facility. Referred to as the 'waste levy', the contribution aims to reduce the amount of waste being landfilled and promote recycling and resource recovery.

The NSW Government could explore how financial instruments, economic incentives or other mechanisms could be used to improve plastic design to protect the environment and human health,

increase recycling of plastic, reduce landfilling of plastic, prevent plastic leakage and turn plastic back into a valuable resource. Any such action would have to be carefully designed so that it targets the right environmental outcomes and is consistent with relevant legal frameworks.

Case study: Extended producer responsibility for French packaging companies

France has had an extended producer responsibility scheme for packaging in place since 1992.

It is the largest such scheme in France, providing over 600 million euros annually for packaging waste management.

French legislation requires producers to set up a collective product responsibility organisation (PRO), or to manage their waste individually through an equivalent scheme.

Producers pay an 'eco-contribution' to the PRO to manage the waste generated by their products at end-of-life. The fee consists of a variable amount based on the weight of the packaging according to material type, plus a flat Consumer Sales Unit fee based on the number of units of packaging.

The PRO is not directly responsible for waste management, but uses the fees collected from producers to support recycling through municipal (kerbside) services.

All schemes are based on a 6-year cycle with an overarching 'terms of reference', including quantitative targets, performance objectives as well as financial and operational requirements that must be approved by government.

France has recently created additional packaging extended producer responsibility regulation, which means online retailers must make sure the collection and recycling of waste arising from products sold online is properly financed.

Supporting industry-led initiatives

The NSW Government recognises the many voluntary industry-led extended producer responsibility or product stewardship initiatives that are not currently supported by regulation in NSW, but that manage a range of unique plastic products and materials in a sustainable manner.

Additional government support for these extended producer responsibility or product stewardship initiatives may help to support those businesses already taking responsibility for their plastic waste, by setting up mandatory targets, providing additional governance and oversight, or by providing protection from 'free-riders' or other businesses that are currently not participating.

Tell us your thoughts:

- Do you support the NSW Government introducing extended producer responsibility or product stewardship schemes for certain plastics?
- What plastic items or materials could be considered for extended producer responsibility or product stewardship schemes?
- Are there challenges with carrying out these schemes? How can they be overcome?
- What are the other ways the NSW Government could make producers more responsible for the plastic they generate?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Priority direction 5: Mandate 30% minimum recycled content in all plastic packaging in NSW by 2025

When the plastics we do generate reach end-of-life it's important we recycle as many of them as we can and use that plastic to make new products or materials. This reduces the overall amount of new plastic we generate. By reducing the amount of new plastic we make we reduce greenhouse gas emissions, preserve valuable resources in our economy for longer and prevent plastic entering our environment.

We are already doing great things with recycling in NSW, through initiatives like the Return and Earn container deposit scheme. But there are more opportunities to recycle plastic and keep this valuable resource in our economy. We currently recycle just 10% of our plastic—70% of which is exported out of NSW for reprocessing. The proportion of recycled content in plastic items, like packaging, is also typically low. This represents a great economic opportunity to capture an untapped resource. To make plastic recycling economical we need to make sure there are clear uses and strong demand for the plastic once recovered. One way we can do this is by requiring manufacturers to use recycled content in their new plastic products.

Case study: Recycled content targets for the UK

Ambitious targets set by the UK Plastics Pact will see plastic packaging containing an average of 30% recycled content by 2025. The UK Plastic Pact brings together government, industry, businesses and the community to transform the way the UK makes, uses and disposes of plastic. This target will be met by improving access to quality recycled material coupled with specifying recycled content in packaging of all new, relaunched and top-selling products to meet the Pact guidelines.

Using recycled plastic in new packaging will help drive demand and create economic opportunities.

The APCO, representing over 1,500 leading companies, has established a series of voluntary industry-led targets around packaging. One of these targets is to ensure all packaging includes an average 30% recycled content by 2025.

The NSW Government may consider going a step further and mandating a minimum target for the use of recycled plastic in new plastic packaging or other plastic products or materials. If plastic packaging contained a minimum of 30% recycled content, this would equate to more than 100,000 tonnes of recycled plastic. Coupled with initiatives such as industry support and local market development (to ensure recycled content is sourced domestically) NSW could significantly increase the amount of plastics we recycle. This will help drive demand for recycled plastics, supporting our recycling industry and creating new economic opportunities to tap this underutilised resource stream. Any move to mandate recycled content would be done with consideration for appropriate legal frameworks. The NSW Government will also explore opportunities to develop nationally co-ordinated actions on recycled content requirements with the Commonwealth and other Australian states and territories. This would ensure a level playing field for industry and enhance local Australian recycling markets.

Tell us your thoughts:

- Do you support a requirement for plastic packaging to contain at least 30% recycled content by 2025?
- Do you want all new plastic items to be made with recycled plastic?
- Would a requirement to use recycled plastic drive demand for recycled content?
- Are there barriers to creating a reliable supply of locally recycled materials for reprocessing? If so, how could they be overcome?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Priority direction 6: Support demand and industry capacity

Government can play an important role in stimulating demand by identifying opportunities to increase the safe use of recycled plastic in procurement.

The NSW Government currently applies a weighting of 15% for social and environmental issues when it assesses procurement tenders, but this could be refined to have a specific weighting for recycled plastic content in particular goods.

Likewise, we can identify infrastructure construction projects, like roads, that may be able to safely use recycled polymers, and set targets for the amount of content we use. The use of recycled plastics in construction is still an emerging field, so government can work proactively with industry to develop new solutions. One way the NSW Government plans to do this is by encouraging research and development and working collaboratively on the development of national engineering specifications and standards to support the use of recycled plastics in building, construction and infrastructure development.

By taking the lead, government can use its buying power to send a signal to the market and encourage investment in processing capacity.

Case study: Soft plastic collection and up-cycling

Dungog Shire Council, in partnership with Plastic Police, has been diverting soft plastic from the waste stream for up-cycling into products which are then procured by Council in a circular economy-based process. Sparked by a community driven initiative, Boomerang Bags, Council has provided a soft plastic collection system and education program aimed at behaviour change and increasing the diversion of soft plastic from landfill. Plastic Police has provided support by sourcing a processor and markets for the collected materials. Since starting, around 13 tonnes of soft plastic have been collected, baled and forwarded to processors to up-cycle the material into items such as street furniture and asphalts for road construction.

Case study: Soft plastic asphalt plant

Civil construction company Downer opened a new facility at its asphalt plant in Lake Macquarie that can turn waste plastic into road and pavement materials.

The asphalt product, known as Reconophalt, uses soft plastic collected through RedCycle and toner cartridges through Planet Ark.

Every kilometre of two-lane road made with Reconophalt contains the equivalent of 530,000 plastic bags, 168,000 glass bottles and 12,500 toner cartridges.

The NSW Government can also help to build industry capacity through funding support. The nine-year $802 million *Waste Less, Recycle More* initiative, has supported new technology and recycling infrastructure throughout the state but expires in 2021. While the structure of future programs funded by the proceeds of the waste levy will be further explored as part of the 20-Year Waste Strategy, any future funding programs should be targeted to support game-changing initiatives for plastics recycling and remanufacturing that help to deliver the outcomes in this discussion paper. This gives us an opportunity to concentrate funding towards the projects most likely to trigger an industry-wide shift.

Tell us your thoughts:

- How can NSW Government procurement best encourage the increased use of recycled plastic?
- What type of funding (for example, direct grants, low-interest loans) would encourage investment in the plastics recycling sector?
- What type of projects could be funded to increase plastic recycling?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Outcome 3: Reduce plastic waste leakage

Proposed target: Reduce plastic litter items by 25% by 2025

What is the problem?

In 2017–18, plastic packaging was the largest single category of plastic use, making up 32% of total plastic consumption in NSW. According to National Litter Index data from 2018–19 (Table 1), plastic packaging and single-use plastic items made up over 60% of litter by item in NSW. Plastic packaging and other single-use plastic items are highly littered because they are usually used once, often outdoors, and then thrown away. Once littered, these items end up all over the place; they can end up in our soils, and due to the light weight of the plastic, they are also easily blown or washed into waterways, ending up in our oceans as one of the key sources of marine plastic pollution.

The NSW Government has already undertaken several initiatives to reduce all kinds of litter, including the Return and Earn container deposit scheme and the $50 million litter prevention program. In just over two years, Return and Earn has seen more than 3 billion containers returned and has already taken plastic litter out of our parks, streams and oceans. Building on these initiatives will be an important means of further reducing plastic litter and leakage into the environment.

Table 1 – Most littered plastic items in NSW in 2018–19

Top 12 most littered plastic items	% of total litter items	Rank
Cigarette butts	33.7%	1
Single-use takeaway items (includes packaging, cups, straws, bottle tops, spoons, cutlery)	8.1%	2
Snack bags and confectionery wrappers	3.8%	3
Drink containers	2.9%	4
Composite plastic/cardboard takeaway coffee cups	1.6%	5
Sticks (for example, lollipop or cotton bud)	1.2%	6
Bread bag tags	0.8%	7
Packing tape and straps	0.6%	8
Lightweight supermarket bags	0.6%	9
Sacks, sheeting & other bags	0.5%	10
Polystyrene foam boxes, sheets, etc	0.5%	11
Heavyweight (boutique) shopping bags	0.1%	12
% of all litter made from plastic (including miscellaneous items)	**60.4%**	

Source: National Litter Index 2018–19

Other known sources of plastic leakage

Research on sources of plastic leakage is still ongoing. We use plastic for so many things it is difficult to map all sources of plastic entering our environment. Some identified sources of plastic leakage are:

- Microplastics such as microbeads (commonly added as abrasives or exfoliants to cosmetic, personal care and cleaning products) and microfibres (generated when we wash synthetic clothing and fabrics and they shed tiny plastic fibres into our water treatment systems) leak into our environment through waste water treatment outflows in rivers and oceans, and through treated biosolids applied to soil.
- Microplastics can be generated from littered or illegally dumped plastic items that degrade in the environment over time.
- Microplastics can also wash into the environment through rainwater runoff that washes dust from car tyres (made from synthetic rubber that contains plastic) and other plastic dust, synthetic paint and other fragmenting pieces of plastic from roadways and hard surfaces.
- Sanitary items, wet wipes, cotton buds and floss flushed down toilets are sources of plastic and microplastic pollution in our oceans and our soils.
- Spillage or loss of plastic pellets (sometimes called nurdles) used for plastic production during transport or production directly leaks plastic into our environment.
- Dumping of plastic waste from ships or loss or abandonment of fishing gear.
- Burning of plastic waste can release microplastics into the air.
- Poor waste management, such as accidental loss during transport, illegal dumping, or plastic pollution from landfills due to run-off and wind can also cause plastic to leak into the environment.

What can we do?

Appropriate management of end-of-life plastic can help reduce the leakage of this material into the environment.

Improving community awareness, engaging users of specific plastic items and making producers of plastic items more responsible for the financial costs of managing litter could all help reduce leakage of plastic into the environment.

Infrastructure that can help capture plastic before it enters the environment could also be part of a broader end-of-life management strategy for plastic.

Who is responsible?

Government	Community	Industry
Deliver reliable collection infrastructure and services to minimise litter and leakage Set and enforce mechanisms to prevent illegal leakage	Take ownership of the plastic waste they generate and ensure correct disposal	Ensure their products can be managed at their end-of-life to according to best practice

The NSW Government could build on the success of the Return and Earn scheme and litter prevention programs to reduce plastic litter.

Priority direction 7: Use extended producer responsibility schemes to fund litter collection and end-of-life plastic management

Some plastic items can be particularly difficult to collect because of their sheer number or the way they are used and disposed.

Cigarette butts, for example, are the most littered plastic item by number and are difficult, time-consuming and often labour-intensive to collect manually. They are small and can easily wash into waterways. They can also contain many potentially toxic chemicals that can leach into the natural environment and cause potential harm. Likewise, recreational and commercial fishing gear that is lost or littered at sea can cause significant injury or death to marine wildlife over a period of many years (because of its durability). The CSIRO found in a study that 8,000 pieces of fishing gear floating in the ocean killed up to 14,600 turtles in one year.

NSW could consider extended producer responsibility schemes for plastic items like cigarette butts and fishing gear to support their collection and management, setting performance benchmarks for participating companies. The EU has already issued a directive to its member states to introduce extended producer responsibility schemes for cigarette butts and take action on fishing gear.

Tell us your thoughts:

- Do you support extended producer responsibility for plastic items like cigarette butts and fishing gear to improve their collection and management?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

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

Plastic currently leaks into our environment from a wide variety of sources. Research is ongoing to identify all the sources of plastic leakage. However, based on the information we currently have, we know there are technical solutions we can put in place now that can help prevent plastic entering our waterways or lands.

Some of these may include:

- better waste water treatment infrastructure to reduce microplastics entering our oceans and being spread on soil in the form of bio solids
- mandating sweeping practices at plastic manufacturing facilities to prevent escaped plastic pellets (sometimes known as nurdles) from entering our environment
- improved water filtration infrastructure to make sure microplastics are removed from our drinking water
- improved stormwater and pollutant traps that can prevent plastic litter entering our waterways.

Case study: Yeddum Munni Nadyun, Ngunnawal for “good running water”, Queanbeyan

Queanbeyan worked with the NSW Environment Protection Authority to focus on the effects of littering near the Queanbeyan River. The title, Yeddum Munni Nadyun, Ngunnawal for ‘good running water,’ means good quality, clean and litter free. This project worked with, and used, local Indigenous stakeholders and local takeaway restaurants in the target area.

The number of cigarette butts counted before the program was 756 down to 114 afterwards and the number of bottle tops reduced from 101 to just 4. A 76% reduction in volume. One of the actions was to create a repurposed beautiful, and transportable caddy for the bottle tops and butts caddy (made out of an old empty paint can).

The focus on building capacity around community responsibility has provided a better understanding about litter.

Case study: Seabins cleaning up Sydney Harbour

In February 2019, Australia's first two seabins were launched at the Australian National Maritime Museum in Darling Harbour and the Parramatta River to help clean up plastic marine debris in Sydney.

The seabins suck in surface water to collect floating debris. Each seabin brings in 3.9kg of waste each day, and can catch 90,000 plastic bags, 35,700 disposable cups and 16,500 plastic bottles each year. Cigarette butts are the most common item captured, and seabins can even skim surface oil and catch microplastics 2mm in size.

Tell us your thoughts:

- Do you support the NSW Government investing in infrastructure to prevent plastic leaking into our environment?
- What infrastructure do you think would most effectively prevent plastic leakage?

Let us know your thoughts through the online surveys foundat www.yoursay.dpie.nsw.gov.au/plastics-plan.

Outcome 4: Improve our understanding of the future of plastics

Proposed target: Make NSW a leader in national and international research on plastics

What is the problem?

Despite plastic being widespread in modern society, research into the long-term effects of plastic on the natural environment and human health, and the best ways to reduce these impacts, is still emerging, or on some topics still relatively young.

These knowledge gaps are also compounded by the pace of innovation. New plastic products are constantly rolled out, and with them new pathways for plastics to enter the natural environment.

Recognising the quality work completed or underway by researchers locally and globally, there remains much to learn on the pathways of plastics into the environment and organisms, the impacts of plastics, and the best ways to manage plastic.

What can we do?

NSW has some of the world's best research institutions, innovative industry and an impassioned community.

We can bring all these elements together to build a world-leading research network that can help plug the gaps in our understanding of the impacts of plastic. A cooperative research centre or other similar model could become a focal point for the best minds in the state.

We can also leverage the work of the Circular Economy Network, led by the University of New South Wales and funded by the Office of the Chief Scientist, to target new and innovative solutions to managing plastic waste, which can be commercialised and help create new jobs.

We can leverage work already being undertaken by research institutions, innovative industry and an impassioned community.

Who is responsible?

Government	Community	Industry
Identify and communicate research and development priorities Provide funding opportunities to research institutions and industry	Support research and development in their local communities	Assist with setting and communicating research and development priorities Fund and undertake research and development

Priority direction 9: Set up a NSW plastics research network by 2021

Understanding the environmental and human health impacts of plastics and developing innovative solutions is a complex and ongoing project. There are still many gaps in our knowledge and many as yet unknown opportunities to create better solutions for our state.

Setting up a NSW Plastic Research Network will bring together key stakeholders, helping them to share knowledge and ideas to better understand the problem and come up with innovative solutions. Bringing together research institutions, government organisations and other key organisations will help make sure we get the best new information available and come up with innovative solutions that provide value and opportunities for NSW.

Case study: NSW Circular

In 2019 the NSW Government launched the Circular Economy Innovation Network (NSW Circular). Hosted by the University of New South Wales, the network consists of government, industry, research organisations and communities. NSW Circular aims to develop innovative solutions for sustainable waste management and help deliver a circular economy.

Tell us your thoughts:

- Do you support the setting up of a NSW Plastic Research Network?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Priority direction 10: Support commercialisation of research-driven plastics solutions

By backing NSW research and development into plastics, we also have an opportunity to create new industries and jobs.

Government can help support our researchers commercialising their technologies. By becoming a leader in plastics research, NSW can better understand how to tackle the plastics problem and export this knowledge. Not only does this approach make research and development more sustainable it also sets NSW up as an attractive hub for international investment.

This priority direction will build on existing research and development initiatives of the NSW Government, including:

- The Product Improvement Program—providing grants for innovative solutions to improve the efficiency of managing problem wastes.
- Circulate, NSW Industrial Ecology Program—funding innovative, commercially orientated projects to redirect materials destined for landfill towards use as feedstock in other manufacturing processes.

Tell us your thoughts:

- Do you support the NSW Government funding commercialisation of research-driven plastics solutions?
- Do you need support to commercialise a viable plastics management solution and bring it to market? If so, what support would you need?

Let us know your thoughts through the online surveys found at www.yoursay.dpie.nsw.gov.au/plastics-plan.

Review of your feedback

This discussion paper aims to encourage dialogue on a comprehensive approach to plastics for NSW. Feedback from this consultation process will be used to finalise the NSW Plastics Plan and inform ongoing implementation.

Key dates and milestones

A report summarising the key findings of the consultation will be made available.

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