

23rd September 2019

Hon Matt Kean MP
Assistant Minister for Waste Reduction and Environmental Management
GPO Box 5341
SYDNEY NSW 2001

Re: Invitation to provide your views on the NSW waste system

Dear Honourable Mr. Kean,

I would like to thank you for the opportunity to provide our views on the waste sector, improvements, priorities and the development of a circular economy. I recognise and appreciate your request for support to bring community groups, NGO's, local councils and industry along the transformational changes that your 20-year Waste and Resource Recovery Strategy (20YWS) for NSW is embarking on. Bioelektra Australia is keen to collaborate and work together on any strategy that aims to reduce waste and drives a sustainable recycling market.

The recent changes in the international market present an opportunity for industry and government to work together towards creating a circular economy, developing onshore markets and local manufacturing, advocating investment in infrastructure and new technologies.

Despite the gloomier prospect of the industry, I am pleased to say that there is a sustainable solution to the recycling crisis, through innovative technologies that can turn landfill waste as well as the non-recyclables back into valuable resources. The ultimate goal is to shift people's attention from deciding what goes into which bin to making decisions on what to purchase. To drive this change, ministerial direction is needed, urging brand owners to increase the recycled content of their packaging as well as prioritise the use of recycled content and other materials into innovative new products, thereby advancing circular economy ambitions.

I trust that we as a country, through scientifically proven technologies and not ideology can make a significant reduction in our waste footprint and revitalise the recycling industry.

Our views on the current state of the industry

Globally, we generate about 1.3 billion tons of waste per year. In Australia alone, this amounts to a whopping 2.5 million tons of plastic packaging waste. According to official statistics released by the Federal Government in November 2018, only 12% percent of that plastic waste was recycled in Australia. However, the 2017-18 Australian Plastics Recycling Survey commissioned by the Australian, Victorian, New South Wales and West Australian governments published in January 2019, arrived at a lower 9.4% recycling rate.

Although other global leaders such as Germany and Norway lead the way by achieving 48% and 95%. These figures like Australia's are deceptive according to Philipp Sommer, a circular economy expert with the German environmental and consumer protection association Deutsche (DUH). "The numbers are based on the amount of plastic waste collected rather than the amount of plastics finally recycled"

Firstly, a lot of the waste that ends up in sorting facilities has been wrongly collected. In many Australian cities, up to 50 percent of general rubbish ends up in the yellow bins designated for plastic and other recyclables, including packaging waste that needs to be separated from the valuable plastics.

Secondly, plastic packaging is often made from a variety of polymer types. For example, meat packaging includes several protective layers to avoid discolouration of the contents, although only single-variety plastics can be recycled. Automated facilities are unable to sort food containers made from different types of plastic, resulting in much mixed plastic packaging ending up being discarded, and this a problem across most developing nations such Germany in accordance to Franziska Krüger, an expert for plastics recycling at Germany's environmental protection agency.

Our current system focuses almost exclusively on putting a range of recyclables in the one bin (a practice that dates back to early 1990). This approach has failed us, as we lose 15% - 20% on average according to the data based on collection. However, it has been discovered that the data collected is inaccurate, SKM in Victoria is a case in point, where for years all the recyclables from 30 councils were reported by government authorities as being recycled when in actual fact it was stockpiled in warehouses.

Additionally, we lose a third of the glass we present through excessive breakages. We also seriously contaminate the paper and cardboard with glass fragments, undermining paper recycling and damaging the paper-making equipment.

Now some will argue that for this system to improve we must collect food and organics, glass and plastic, paper and cardboard and other recyclables separately and remain using mix General waste bin, effectively increasing the number of bins to 3 & 4 and perhaps 5 as EU is trying to do now. This in turn will increase the volume of waste generated to an average of over 500L per household and thereby promoting higher waste output rather than decrease waste output. All this is based on ideology rather than science and really accurate data.

More than 20 councils in Australia are already doing this and have not been able to achieve any substantial improvements despite the large sum of money invested into setting this up as well as education. These councils are now contemplating introducing warnings and perhaps fines in order to change habits.

These councils introduced food and garden organics (FOGO) bins, glass bins, other recycling bins, and residual mix general bins. The four bins – organics, glass, other recycling and residual waste in most cases were collected fortnightly. Although, this provided a lower frequency of collection but did not increase the value of recyclables to offset the cost of additional bins as well as transport. Also this type of collection has its limitations as it would not be suitable in multi-unit residential developments.

At the moment when recyclables are delivered to Material Recycling Facilities (MRF), the majority of these facilities export a high percentage of these recyclables since it's cheaper and avoids them from paying landfill levy, so in fact we provide no incentive for these facilities to invest into or sell their products locally to other industries as they need to prove its being diverted therefore adding a further burden and cost in their structure.

How a Circular Economy can be achieved

In a tremendously complex recycling industry our thinking requires a systematic approach. Materials, products and packaging cannot be considered in isolation, consumption will always have some impact, whether it is our decision making at the supermarket or in front of our bins. We believe that reducing our waste footprint is achievable and much sooner than expected by simply embracing the following changes.

To begin with, all MRF need to be structured to sort materials to local recycling specifications (e.g. newsprint separate from cardboard, PET plastic separate from polyethylene). They need to be regularly audited to

ensure they are achieving set diversion targets and not stockpiling. The destination of recyclables should be relayed back to councils and residents to motivate residents to drive down waste.

We should recycle as much as possible, into new products at a local level. This will mean major expansion of all recycling capacity. We don't believe any export of material is required, but this needs to be monitored to prevent us sending hazardous material to developing countries.

Having detailed the above, government and industry organisations need to enforce the purchase of recycled materials in the form of new products. Brand owners need to increase the recycled content of their packaging to the technical limits. Government agencies need to receive ministerial direction to prioritise the use of recycled content and other materials in all procurement activities.

Funds collected from landfill levies need to help fund this transition to a robust, world-leading approach, including support for establishing resource recovery plants at council level. Continuous promotion of container deposit scheme that must cover all beverages. The deposits need to be redeemed for material flowing through our kerbside system to increase its economic value, and not be confined to a limited number of reverse vending machines.

To support circularity and close the loop in products life cycle, the integration of innovative recycling technologies must play a more essential role in any strategy. Investment, integration and facilitating the implementation of these technologies from government agencies is a must. It is no secret that the reason for kerbside recycling not achieving the desired results is mainly attributed to the large percentage of product contamination and MRF's not having the capability to process all recyclables contained in the bin. Therefore, having a technology that can address these challenges will help set the industry back on its track.

The need to adopt New Innovative Technologies

The changes in the market are forcing us to innovate and implement new technologies. Australia can no longer sustain resource recovery technologies that only provide single stream recycling as they have demonstrated their inefficiency due to their 100% dependency on household's behaviour, attitude and knowledge towards recycling. To illustrate this, if a MRF receives dirty material it will produce dirty material also needing to landfill between 20%-30% of its input. If an MBT facility receives dirty material it will produce a dirty output and if an Incinerator receives dirty material it will be less efficient and contaminate.

Innovative technologies like ours have been designed to target this problem, the idea behind the technology is to be able to have a multi input with multi output technology that is able to recover resources from different waste streams, turning them into process ready materials in one single process.

Bioelektra developed a waste treatment technology that unveils resource potential in waste. It allows for simple methods of waste collection and does not require further segregation-at-source. The process is based on a separation method known as mechanical heat treatment, which involves sterilising waste streams with steam. This is the key to the process as by having the materials sterilised prior to sorting enables us to process dirty multi-stream inputs and turn them into clean multi stream outputs. The recovered individual fractions (Biomass, Refuse Derived Fuel RDF, glass, plastics and metals) are then process ready and sent to recyclers.

Please refer to the below Bioelektra process flow and links to technology videos that illustrate the complete process.



1. Out of Respect for nature
<https://vimeo.com/206132220>
2. Bioelektra Australia Shoalhaven Council Project - animation video
<https://vimeo.com/356355304/27ea81e23f>

The most significant point of difference of our technology is the commercial grade of recovered materials. The quality of the material creates an ample appetite from existing and emerging markets which in turn stimulates local economic activity through the creation of jobs, new products, retains valuable resources within the local economy, reduces reliance on virgin materials and stops the need of stockpiling driven by downturns in international market demand.

Our ongoing collaborative R&D with Melbourne University, RMIT and local businesses have provided the emergence of innovative alternative use and applications for recycled materials, mainly coming from the building and construction industry. This reinforces our efforts of developing reliable end markets where they currently do not exist.

The most affluent market for the recovered glass, plastic and biomass is in the form of aggregate for the manufacturing of bricks, road base and cement render. This is all supported by the trials conducted by the University of Melbourne and RMIT who have indicated the possibility of using MSW as a main ingredient in construction material for non-load bearing elements, temporary works and road construction.

Established local manufacturers are also a reliable local end market for recycled plastic and metals, as we can supply businesses with commercial grade materials that are almost ready to use. This is how Bioelektra supports a circular economy approach for manufacturing.

Bioelektra technology can provide the following benefits:

1. **Divert over 90% of the waste from landfill.**
2. **Recycling over 65%** of the mixed waste without manual handling or further source separation. The only technology in the world that can achieve this high result.
3. Make recyclers more efficient as they don't have to worry about levels of material contamination that could affect their process and bottom line. This will also revitalise the recycling industry by providing clean products of commercial grade
4. We can provide uncontaminated materials to EfW technologies
5. 100% of workforce required for each facility is sourced locally, providing 200 short-term and over 34 long-term employment opportunities per 100,000 tonnes of MSW processed.
6. Provide environmental benefits through the diversion of organic waste from landfill.
7. Provide a sustainable waste management solution for commercial waste generators as an alternative to landfilling.
8. Produce low cost alternative energy, generating 8mw for every 100,000 tons of waste processed.
9. **Save the environment, 400kg of Co2** emissions per tonne of waste processed at the facility rather than landfilled.
10. Drive investment to regions, increased visitation, and business opportunities.
11. Embracing innovation and new generation technologies stimulating creativity, collaboration and encouraging business partnerships.
12. Developing markets for innovative products from output materials:
 - I. Biomass with potential application as a fuel to produce green energy
 - II. Recovery of plastics isolated into PET, PP and PE + PS and provision of washed and fragmented plastic flakes
 - III. Separation of glass for production
 - IV. Separation of pre-solid refuse fuel (SRF) fraction for alternative fuel production and recovery in form the of energy

The need to generate Energy from Waste

Energy from Waste (EfW) has also been branded as the other solution to the waste problem. Citing EU as an example, but forgetting to highlight that all EU countries until recently considered incineration as recycling and that EU countries must now recycle 65% of their waste by 2030, making such facilities financially and environmentally unviable. Also these sites are mainly used to generate heat rather than power due to the expensive cost of LNG. Australia does not need heat to the amount required by EU countries, nor do we have the infrastructure to disperse heat directly to homes like Europe does. Some of these sites sit idle during summer season or work only at 40% efficiency.

Having said that, we do agree that generating energy from waste is a must, as long as it's done in a sustainable manner using methods other than incineration. There are a number of Australian innovations that can produce Heat and Electricity with Zero emissions. Bioelektra is working closely with these organisations and have partnered up with them for the addition of their EfW technology to our process. The EfW system uses the non-recyclable organic fractions biomass & RDF derived from the Bioelektra process to generate heat and electricity through an innovative thermolysis process. This technology generates reliable continuous electrical power from renewables with almost zero residual. From every 100,000 tons of waste processed we will generate 8MW of electricity able to power 6,500 homes.

The system uses a controlled process involving heat without combustion to produce the following:

1. High quality, high energy value tar free syngas: Can be used in gas powered electric generating motors or as a replacement or blender for natural gas or refining into bio fuels (primarily used in the aviation industry).
2. Hydrogen: Is currently used in a multitude of industrial and manufacturing applications and holds great potential in automotive hydrogen fuel cell technology.
3. Electricity: Creates electricity via proprietary syngas firing gas motors.
4. Bio Char: Is a replacement for coal, can be used as fertiliser and as a soil amendment, as well as its environmental value as a sequestered carbon.

Final thought

Throughout this brief, Bioelektra Australia has detailed our views on the reasons behind the national recycling crisis and evokes government to push for the introduction of multi stream input and multi stream output technologies moving away from the current single stream recycling which has not worked.

Technologies like ours can provide a real solution on a global scale, predominately for Australia and our Asia Pacific neighbours. Delivering a cost effective solution for governments, local councils and communities as the return on investment can easily be substantiated through:

1. Immediate reduction of plastic ending up on our beaches, lakes, creeks and landfills.
2. Immediate substantial increase life cycle of landfills by over 40 years at a minimum.
3. Immediate reduction in CO2 by 400 kilos per tonne of waste processed. Considering the amount MSW that ends up in landfills in Australia that is a potential total of 1 billion tonnes of CO2 saved.
4. Immediate 60% increase in employment, in comparison to landfill. 36 permanent full time employment per 100,000 tonnes of waste processed and 200 jobs during construction.
5. Immediate boost to recycling product manufacturing industry.
6. Becoming a global example on how to reduce our waste footprint and environmental impact by simply relying on science rather than ideology.
7. Finally, waste generation should not only be focused on households. There is a need for government to introduce an environmental tax on plastic producers - one that is flexible allowing to be reduced as results improve. For example, if recycling is above 95% nationwide, then every producer, no matter what, is exempt from the tax, and while this may sound like a difficult target to meet, it has been reached in Norway every year for the past seven years. Let's also not forget the amount of energy we could save as a result.

I look forward to be part of any further target engagement to assist with the development of the 20-year Waste and Resource Recovery Strategy for NSW and welcome any opportunities to contribute in this process.

Yours sincerely,



Fred Itaoui
Managing Director
Bioelektra Australia
fred@bioelektra.com.au