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Question 1 - What are the key issues facing the NSW waste system?

1. Infrastructure: NSW desperately needs more waste and resource recovery facilities, particularly sorting and secondary processing facilities for recovered resources (recyclables). Given the need to recycle locally and no longer having the option to ship resources to China, consideration should be given to the fast-track approval of new facilities. Anecdotally, it takes much longer for NSW to approval new facilities compared to Victoria or Queensland. 2. Lack of support for the approval of first-of-kind technologies: An important opportunity exists for emerging 'Energy from Waste' technologies to address challenging feedstocks such as non-recyclable plastics. We believe in maintaining a pragmatic approach to the approval of first-of-kind and emerging technologies that ensures environmental and community protection whilst also understanding the impact the status quo is having e.g. ongoing environmental degradation from plastics in the environment will be key. We therefore suggest consideration should be given for fast-track approval of technologies proven at pilot scale that help address recycling of resources that would otherwise end up in landfill (many types of plastic with the exception of PET and HDPE). Policy which allows the fast-track approval of emerging technologies to deal with 'waste', such as End-of-Life Plastic, is essential to dealing with non-recyclable plastic in the most environmentally efficient way possible. 3. Lack of policy support for recycled product use and classification of resources as waste: In NSW, we already have projects that use recycled glass in civil construction, however, there is no requirement for Government to use recycled material and this stunts the growth of domestic remanufacturing in the State. It is important that the NSW Government is clear about what is defined as 'waste' or 'residues'. As an example, classifying plastic as a 'waste' poses a challenge for the approval of new facilities based on emerging technology such as Hydrothermal liquefaction (HTL), which can chemically recycle End-of-Life Plastic with an 85% recovery rate to a synthetic crude oil (and the balance as gas recycled back through the process). In keeping with the waste hierarchy, chemical recycling of End-of-Life Plastic is preferable to incineration. Policy must support the approval of these new technologies as well as consider if 'wastes' such as plastic would be better classified as 'resources', in keeping with the ethos of the Circular Economy. Another example of the impact of material classification as a waste or a resource relates to recovered glass, where sustainable solutions are desperately needed. The reason this is important is that without this, stored glass material at recycling facilities can fall under the permitted quantities. In applications such as glass sand, it is critical to be able to hold significant volumes of finished product that can be called upon and dispatched as required to construction projects. If this material is still categorised as waste (which it is not) it significantly limits the throughput capacity of the recycling facility. 4. Lack of landfill levy reinvestment: NSW's high landfill levy rate (the highest in the country) currently enters consolidated revenue and there is question as to whether it is fulfilling its dual purpose to drive landfill diversion and increase resource recovery. We believe there should be a greater number of grants for resource recovery.

Question 2 - What are the main barriers to improving the NSW waste system?

As discussed above (question 1) plus: 1. Regulatory uncertainty: There is a lack of certainty and stability due to the nature of the State's regulatory and policy frameworks. We agree that the industry wants to invest in and build processing and infrastructure capacity and it certainly does not want to export recyclables as we see the many opportunities that domestic processing and remanufacturing will bring. However, regulatory certainty is needed to underpin this investment and

all policies must be based on robust science and research, not on conjecture or opinion, which has been the case to date. NSW's regulatory landscape is also overly onerous, penalising legitimate operators while not putting the onus on waste generators. Waste and resource recovery operators do not control the materials that they. As operators are punished for situations that are often out of their control, it is becoming too taxing and costly to operate in NSW.

Question 3 - How can we best reduce waste?

1. Divert Organics from general waste: Overseas experience show that almost 100% collection of food and organic waste can provide, via anaerobic digestion plants, can have huge benefits. For example, Milan utilises around 120, 000 tonnes of biodegradable waste per year which feed into its anaerobic digestion plants and supply electricity for 24, 000 people through 12.8 MW of generation capacity. 2. Landfill bans for certain streams: Licella supports the position of Bioenergy Australia in recommending the introduction of landfill disposal bans on selected waste streams including food waste. Landfill bans for certain materials such as organics will hugely benefit anaerobic digestion, which is already widely applied in many developed & developing countries at small and large scale. Councils should also be encouraged to provide recycling services for problem wastes such as batteries, paints, gas containers and e-waste to avoid these materials being sent to recycling facilities, incineration or landfill. 3. Policy that promotes and supports the Waste Hierarchy: It is important that the highest value possible be harvested from the waste via recycling and repurposing. Policy setting that encourages this will result in higher levels of investment and generate significantly more jobs. Waste from energy in the form of incineration should be the last resort for resources not able to be recycled or recovered by other means. Keeping in mind 51% of MSW is organics able to be handled via anaerobic digestion, then 4% glass (100% recyclable as glass sand), 17% is paper & cardboard (recyclable) and 17% plastic (combining physical and chemical recycling can recover almost all of this, including End-of-Life Plastic). The balance does not justify the approval of new waste to energy incinerators. Rather policy and appropriate funding support for physical and chemical recycling will reduce waste and drive forward the Circular Economy in NSW.

Question 4 - How can we recycle better?

1. Source separation: iQ Renew's experience demonstrates that source separation is not only possible but highly beneficial. Clearly if wastes are separated at the source, less work needs to be done to remove cross contamination (like from when all recyclables are put in a single bin). An excellent example of the benefits of source separation is demonstrated by the higher prices that can be achieved for paper and cardboard from councils that have separate paper bins to glass and plastics. Legislation in Germany also encourages higher degrees of separation with fees being paid by packaging producers to recyclers who sort according to the specification of the materials being recycled (See the Veolia slides below). As can be seen from these slides made 3 years ago, Chemical Recycling had not been considered. This highlights the need to keep flexibility so that feedstocks are not locked away for twenty years. This separation approach enables recycling to the highest level available. For example, focusing on HDPE and PET to start with, and then the balance of plastics going to a Cat-HTR chemical recycling plant, but still enabling physical recycling of Polypropylene if this becomes available. Maintaining the flexibility to adapt to the recycling facilities and technology available ensures the highest possible resource recovery rate. 2. Community education: Licella and iQ Renew support the position of the Waste Management and Resource Recovery Association of Australia in reinforcing that community education is central to recycling better. NSW needs consistent messaging to improve our recycling habits. An education campaign to teach the community how to correctly sort and recycle is critical to maximising the recoverability of resources the yellow bin is only for dry household material paper, cardboard, and containers. The community should also be educated on what recycling actually means - buying back products made from Australian recycled material, to truly close the loop. The government plays a key role in

improving recycling by mandating the use of recycled/recovered content in procurement policies for Local and State Government, including State Government agencies, and ensure these are applied in procurement for all building, civil, and infrastructure works.

Question 5 - What are the main opportunities for improving the NSW waste system?

Summarising from above: 1. Investment in the State's resource recovery and recycling infrastructure 2. Fast-track approval for new recycling technologies (e.g. Hydrothermal upgrading of End-of-Life Plastic) to deal with problem waste streams 3. Government policy that supports the use of recycled content and the classification of recovered materials such as glass and plastic as resources (not waste) 4. Provide regulatory certainty to the resource recovery sector to underpin the needed investment in the industry 5. Reinvest at least 50% of the landfill levy in the resource recovery and recycling industry to rapidly increase its capacity and capability and deal with waste and minimise valuable resources going to landfill 6. Introduce further source separation of recyclables by removing co-mingle bins and therefore reducing contamination of resource streams and maximising the value that can be recovered from these resources.

Question 6 - Any other information that you would like to contribute to the waste strategy initiative?

About Licella Holdings (www.licella.com) Licella are Australian technology developers with a mission to build A Bridge to a Lower Carbon Future by unlocking value from waste thereby enhancing Resource Recovery. Licella have developed a proprietary hydrothermal upgrading platform that can chemically recycle End-of-Life Plastic (otherwise sent to landfill) into valuable fuels and chemicals. The Cat-HTR? (Catalytic Hydrothermal Reactor) platform has been extensively tested at the world's first large scale continuous-flow pilot plant, converting End-of-Life Plastic, wood waste (such as that from Construction & Demolition) and other biomass residues (e.g. bagasse) into a stable biocrude or synthetic crude oil. Our oil can be used to produce more sustainable fuels, waxes and a range of chemicals (including the chemicals to make new plastics). With over AU\$75M invested already in the Cat-HTR? platform, it is now commercial-ready and we are working with our strategic partners to build the world's first commercial-scale hydrothermal upgrading plants. About iQ Renew (www.iqrenew.com) iQ Renew will be one of the first companies in the world to combine physical and chemical recycling. iQ Renew has the exclusive rights to the Cat-HTR technology for End-of-Life Plastic in Australia and New Zealand. By combining physical and chemical recycling, iQ Renew can extract more value from recovered resources and prevent valuable resources ending up in landfill and our oceans. iQ Renew is also expanding its physical recycling operations. This includes the iQ Renew Virtual Quarry - a truly circular solution for glass, as local solutions for glass collected kerbside are desperately needed. By crushing glass into a recycled sand product, iQ Renew is reducing our reliance on natural resources and helping provide a sustainable solution for recovered glass.