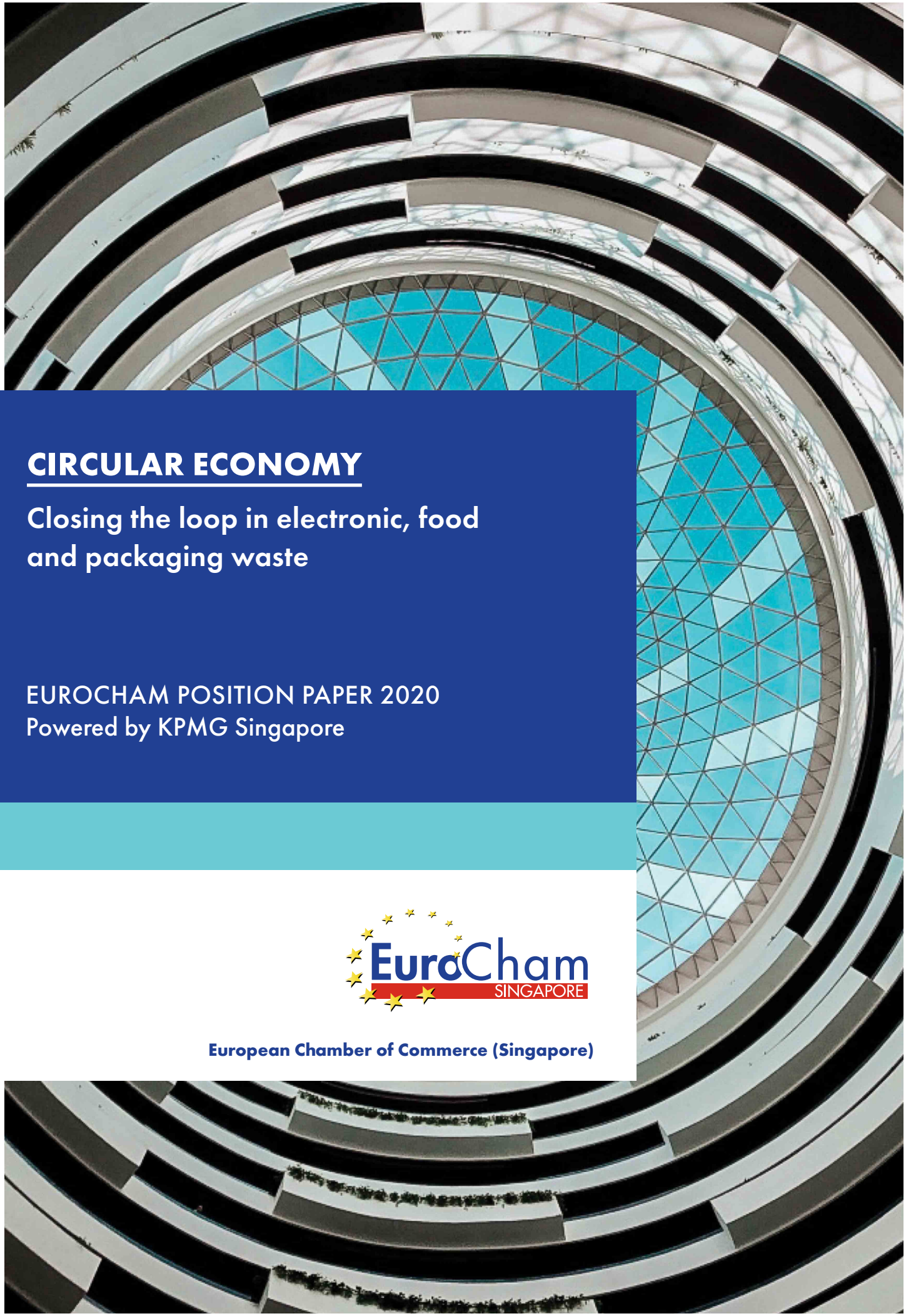

CIRCULAR ECONOMY

Closing the loop in electronic, food and packaging waste

EUROCHAM POSITION PAPER 2020
Powered by KPMG Singapore

EuroCham SINGAPORE

European Chamber of Commerce (Singapore)

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EXECUTIVE SUMMARY

In the wake of the coronavirus pandemic which offers a glimpse of what the world might look like under a climate breakdown, the dire need to delineate from current linear systems of "take, make, dispose" and embrace the transformative concept of a circular economy has never been more apparent.

The key drivers and challenges of advancing the circular economy are summarised below:

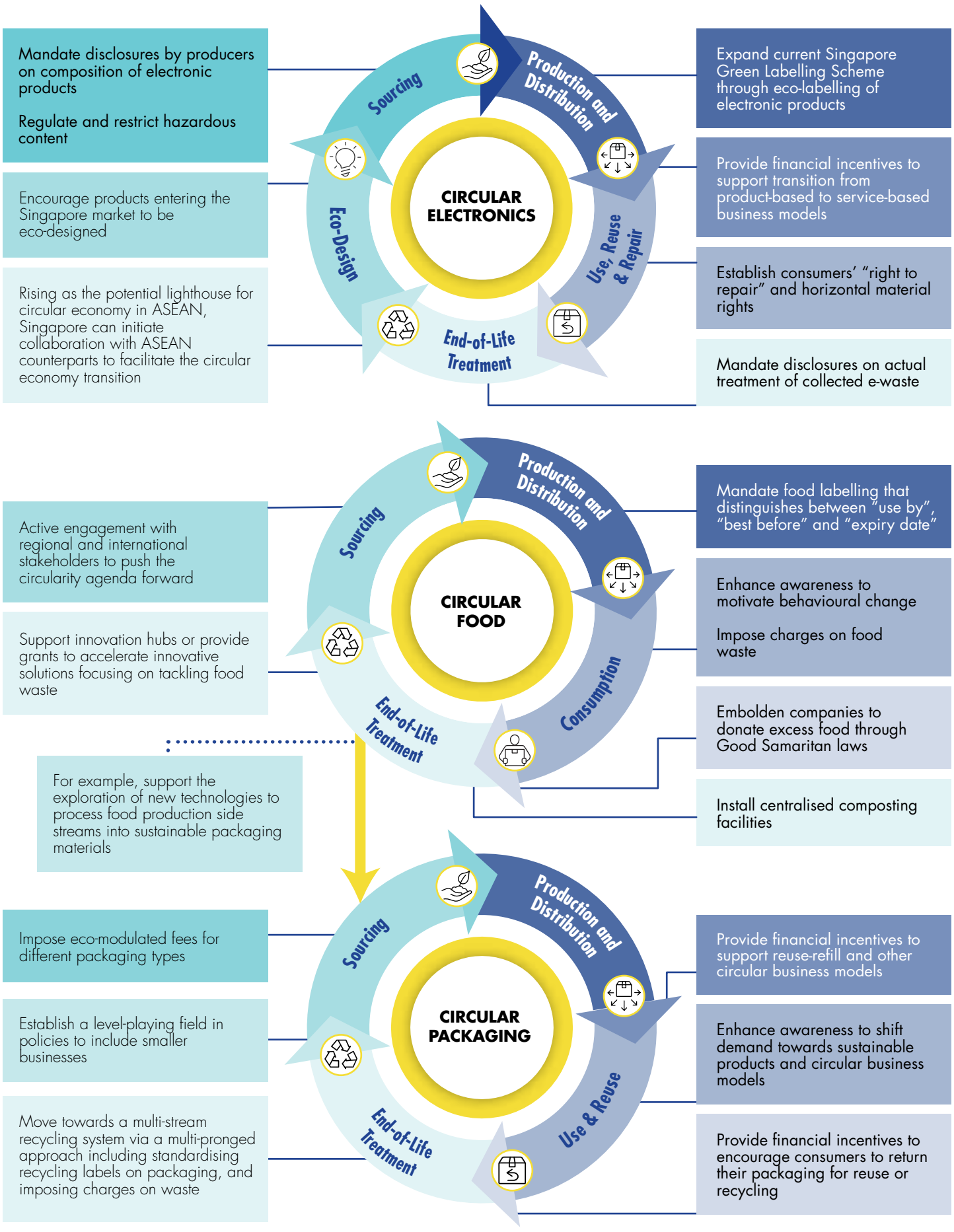
Drivers towards the circular economy	Challenges of advancing the circular economy
• Improve resource productivity • Reduce social inequalities • Build supply chain resilience • Support the economic recovery • Foster innovation • Create profit opportunities • Reduce costs • Strengthen relationships with stakeholders • Strengthen food security • Reduce significant greenhouse gas emissions	• Lack of consumer awareness • Perceived associated risks with used and refurbished equipment • Unconstructive consumption habits • Lack of a tracking system to monitor circularity progress and impacts • Inadequate support for circular business models in current purchasing policies • Current focus on short-term profits • Trade barriers • Incongruent policies, regulations and infrastructure internationally • Need for multi-stakeholder collaboration • Need for robust government support and infrastructure • Mentalities geared towards end-of-life treatment • Circular economy commonly misconceived as recycling economy

There is a growing momentum for a transition towards the circular economy in the European Union ("EU") and Singapore, supported by regulatory shifts in both regions. In this position paper, we offer a vision for advancing the circular economy with a focus on three waste streams – electronics, food and packaging waste – by analysing the regulatory shifts and policies in the EU and Singapore and featuring the circularity journeys of EuroCham member companies operating in Singapore.

The objectives of this position paper are to:

- Raise public awareness on the circularity concept and
- Recommend an approach to policy-making that considers the full life cycle of a product to advance the circular economy for electronics, food and packaging in Singapore as summarised on the next page:

Figure 1 - Recommended life cycle approach to advance the circular economy for electronics, food and packaging in Singapore



INTRODUCTION

Since the early days of industrialisation, our economies have been built on a linear model of production and consumption – one that relies precariously on finite resources. We take materials, make products, use them and dispose them, based on the assumption that they have minimal value and recoverability at the end of their "useful life". Our reliance on these finite resources and fossil fuels creates problems such as price volatility and escalating climate change. Today, the coronavirus ("COVID-19") pandemic has revealed the fragility of our linear economic systems as border restrictions and lockdowns disrupt global supply chains and unveil entrenched inequalities in the distribution of resources. In many ways, the current crisis offers a glimpse of what the world might look like under a climate breakdown, which will be the biggest global health threat of the century[1].

In the wake of the COVID-19 pandemic, the dire need to delineate from current linear systems and embrace the circular economy has never been more apparent.

The dire need to delineate from current linear systems of "take, make, dispose" and embrace the transformative concept of a circular economy has never been more apparent. A circular economy entails creating a closed-loop system that boosts economic, natural and social capital by decoupling economic activity from finite resource consumption, designing out waste and pollution and regenerating natural systems[2]. One of its key principles is to reduce the extraction of raw materials by designing products and services that enhance product durability, reusability, repairability and recyclability. These principles aim to redefine growth and have the potential to improve resource productivity, reduce social inequalities and build supply chain resilience within planetary boundaries. By stimulating a pivot towards circular thinking and regeneration, surpluses can be redirected to more beneficial uses and innovative ways can be applied to optimise resource use.

As businesses are directly impacted by the COVID-19 pandemic and our global economy deeply relies on intertwined supply chains, there is a heightened urgency to build resiliency and embrace fundamental change. Yet, circularity agendas may be put on a backburner as governments and corporations prioritise the healing of a pandemic-disrupted economy. Further, the pandemic-induced oil plunge has lowered prices of virgin plastic and the demand for single-use plastic packaging has risen as a result of quarantine-related home deliveries and fears associated with reusing materials and products[3].

Retrenchments in Singapore could hit 65,000 employees in 2020 as a result of the COVID-19 pandemic and the ensuing business disruptions[4]. It is therefore crucial for governments to recognise the role that a circular economy transition can play in building a resilient post-pandemic economy[5]. The Economic Research Institute for ASEAN and East Asia ("ERIA"), a Jakarta-based think tank, found that adopting circular principles across Asia could lead to the economic growth of US$324 billion and create 1.5 million jobs by 2025[6]. Governments should leverage this window of opportunity to stimulate the economy through circular strategies and business models which foster innovation, create profit opportunities, reduce costs and strengthen relationships with stakeholders.

Apart from jobs, the security of Singapore's food systems has been severely impacted. For a country that imports over 90% of its food, global supply chain disruptions due to the pandemic have highlighted the imperative to strengthen Singapore's food security[7]. Moving into the circularity of food which includes reducing food loss and waste will enhance Singapore's food security, helping Singapore to achieve its goal of producing 30% of the population's nutritional needs by 2030[8]. Therefore, commitment to a sustainable growth trajectory by establishing a circular economy must be part of our post-pandemic reality.

1 *Reuters. (2018). Climate change 'biggest global health threat' of century, doctors warn. https://www.reuters.com/article/us-global-climatechange-health-idUSKCN1NX2ZX*
2 *Ellen MacArthur Foundation. Circular Economy Concept. https://www.ellenmacarthurfoundation.org/circular-economy/concept*
3 *Hicks, Robin. (2020). Coronavirus-induced oil price plunge is hurting the circular economy for plastic. https://www.eco-business.com/news/coronavirus-induced-oil-price-plunge-is-hurting-the-circular-economy-for-plastic/Kechichian, Etienne & Mahmoud, Nidal. (2020). The circular economy can support COVID-19 response and build resilience. World Bank Blogs.*
4 *Yong, Jun Yuan. (2020). Covid-19: Economists expect S'pore retrenchments in 2020 to hit 45,600 to 65,000. TodayOnline. https://www.todayonline.com/singapore/covid-19-economists-expect-spore-job-losses-rise-sharply-foreign-workers-be-hardest-hit*
5 *Kechichian, Etienne & Mahmoud, Nidal. (2020). The circular economy can support COVID-19 response and build resilience. https://blogs.worldbank.org/psd/circular-economy-can-support-covid-19-response-and-build-resilience*
6 *Economic Research Institute for ASEAN and East Asia. (2018). Industry 4.0 Empowering ASEAN for the Circular Economy. https://www.eria.org/uploads/media/ERIA-Books-2018-Industry4.0-Circular_Economy.pdf*
7 *Channel News Asia. (2020). COVID-19 Pandemic highlights importance of strengthening Singapore's food security, says experts. https://www.channelnewsasia.com/news/singapore/covid10-singapore-food-security-farming-innovation-12649468*
8 *Singapore Environment Council. (2019). Singapore Environment Council Launches "Advancing a Circular Economy for Food: Key Drivers and Recommendations to Reduce Food Loss and Waste in Singapore. http://sec.org.sg/wp-content/uploads/2019/08/Press-rel.-SEC-food-study.final-2-1.pdf*

While we are battling the pandemic, the bigger threat of climate change cannot be neglected. Adopting a circular economy framework in areas such as steel, plastic, aluminium and food has the potential to achieve a global reduction totalling 9.3 billion tonnes of greenhouse gases in 2050 - equivalent to eliminating current emissions from all forms of transport globally. This highlights the essential role of circular strategies in reducing greenhouse gas emissions that cannot be achieved by shifting to renewables alone[9]. Enhancing circularity and closing resource loops, while underpinned by the transition to renewable energy, can therefore help Singapore to achieve its carbon emissions reduction target of halving its emissions from its peak to 33 million metric tonnes of carbon dioxide equivalents ("MtCO2e") by 2050, and net-zero emissions as soon as viable in the second half of the century[10].

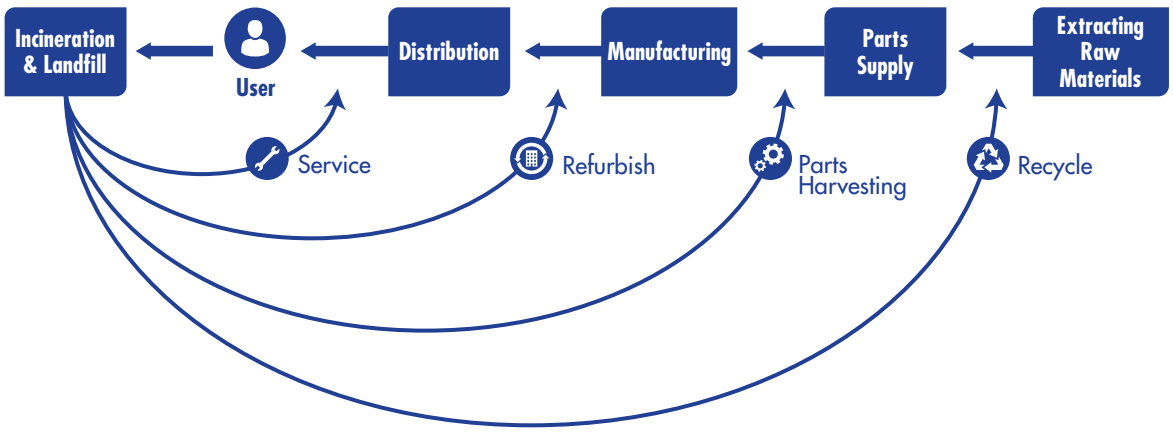
Globally, electronic waste produced per year is estimated to reach 120 million tonnes by 2050 if recycling does not improve[11], approximately one third of food produced is never eaten - at a cost of US$1 trillion[12] and plastic packaging waste represents US$80 to US$120 billion loss to the global economy every year[13]. While these waste streams present global challenges, they also stimulate global opportunities within the circular economy. Both Singapore's Zero Waste Masterplan and the European Green Deal: Circular Economy Action Plan adopt the circular economy approach to address these waste streams.

In this position paper, we offer a vision for establishing a circular economy with a focus on three waste streams – electronics, food and packaging waste. It first analyses both the Zero Waste Masterplan and the European Green Deal: Circular Economy Action Plan and breaks down the ways in which the difference in approaches can result in unintended outcomes. In addition to providing companies with a view on how their businesses need to respond to the regulatory shifts and thrive in a circular economy future, the paper sheds light on how expanding circularity solutions in Singapore will enhance trade and economic activities between Singapore and the EU.

The position paper then highlights best business practices based on circular economy principles as exemplified by EuroCham member companies operating in Singapore, with a focus on each of the three waste streams. The case studies provide valuable insights into the challenges these companies face in adopting circular economy practices in Singapore. Most importantly, through the case studies, the interviewed companies have emphasised the need for policy advancements and avenues from the Singapore government to create a business environment that aligns with their circularity ambitions.

Through the case studies, policy recommendations are put forth for Singapore to create an environment conducive for circularity.

By reassessing current foundations and incorporating further improvements, such as incentivising the move towards service-oriented business models and establishing the consumer right to repair, Singapore can shift its economic landscape towards circularity and establish a sustainable, resource-efficient and climate-resilient future.



9 *Ellen MacArthur Foundation. (2019). Completing the Picture - New circular economy and climate change paper presented at the COP25. https://www.ellenmacarthurfoundation.org/news/completing-the-picture-new-circular-economy-and-climate-change-paper-presented-at-the-cop25*

10 *National Climate Change Secretariat Strategy Group, Prime Minister's Office. (2020). Charting Singapore's low-carbon and climate resilient future. https://www.strategygroup.gov.sg/files/media-centre/publications/nccsleds.pdf*

11 *Ryder, Guy and Zhao, Houlin. (2019). The world's e-waste is a huge problem. It's also a golden opportunity. World Economic Forum. https://www.weforum.org/agenda/2019/01/how-a-circular-approach-can-turn-e-waste-into-a-golden-opportunity/*

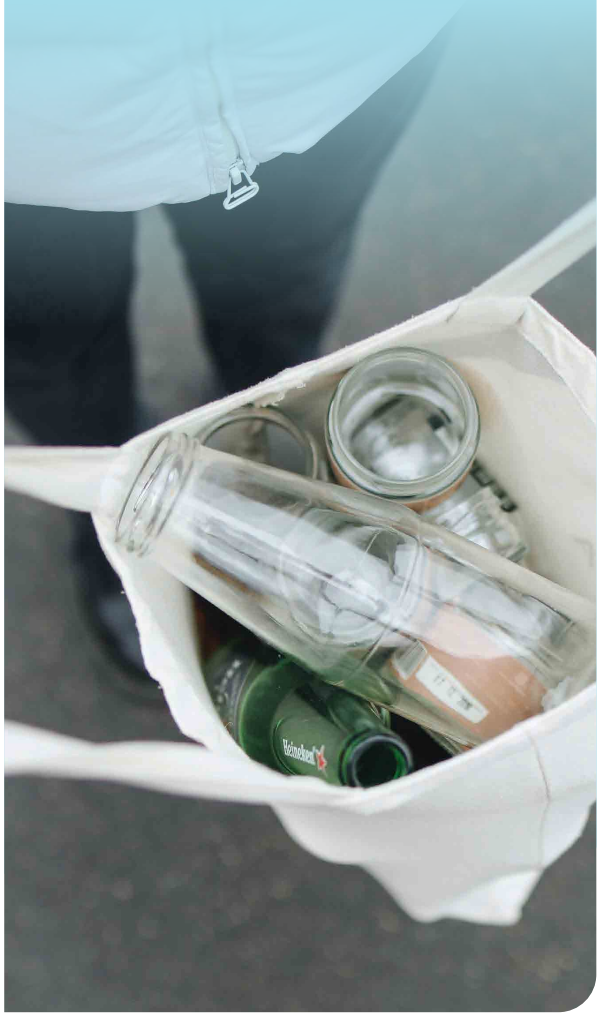
12 *Sustainability Accounting Standards Board. Wasted Food is Wasted Money. https://www.sasb.org/blog/blog-wasted-food-wasted-money/*

13 *Fon Mathuros (2016). World Economic Forum. More Plastic than Fish in the Ocean by 2050: Report Offers Blueprint for Change. https://www.weforum.org/press/2016/01/more-plastic-than-fish-in-the-ocean-by-2050-report-offers-blueprint-for-change/*

GAP ANALYSIS: SINGAPORE ZERO WASTE MASTERPLAN AND EUROPEAN GREEN DEAL CIRCULAR ECONOMY ACTION PLAN

The difference between the life cycle approach adopted by EU's Circular Economy Action Plan and the focus on end-of-life treatment by Singapore's Zero Waste Masterplan may create a divergence between EU companies' circularity ambitions and the market environment in Singapore.

By embracing circularity principles beyond waste management, Singapore's policy objectives could be aligned with that of the EU's to enhance opportunities for trade and economic development between both regions.



There is a growing momentum for a transition towards the circular economy in the EU and Singapore, supported by regulatory policies and incentives in both regions. To date, the Zero Waste Masterplan and the Circular Economy Action Plan of the European Green Deal appear to adopt different approaches to closing resource loops. As seen in Table 1, EU's Circular Economy Action Plan proposes a comprehensive approach of regulating products along various phases of their life cycle while aiming to normalise sustainable products, services and business models and transform consumption patterns. On the other hand, Singapore's Zero Waste Masterplan has a focused approach on tackling end-of-life treatment and waste management.

The difference between the EU's and Singapore's policy approaches may be explained by the distinct roles they play in international trade. Based on the interviews with the EU companies, Singapore's role in the value chain for electronics, food and packaging typically starts from the sales and distribution stage, whereby such products are usually manufactured and/or sourced overseas and imported into Singapore for consumption. Singapore's smaller participation in the earlier stages of the value chain may have influenced its inclination towards prioritising waste management measures over a broader suite of circularity solutions.

However, the different approaches to policy making may create an unintended divergence between EU companies' circularity ambitions and the market environment in Singapore, where the latter may not fully support those ambitions and circular business models. For example, with respect to electrical and electronic equipment ("EEE"), Singapore's policy focus is on e-waste management (reuse, recycling or disposal) whereas the EU's policy focus is on extending the lifetimes of products. In this case, while a product may be designed by EU companies to be reparable, consumers in Singapore may underestimate the product's life span and call for a take back of the product prematurely for recycling or disposal despite having the option to repair. These misconceptions may curtail the opportunity to earn revenue from additional repair services.

By embracing circularity principles beyond waste management considerations, Singapore's policy objectives could be aligned with that of the EU's to enhance opportunities for trade and economic development between both regions. While the Zero Waste Masterplan may create a strong foothold for the circular economy in terms of developing robust take-back and recycling systems in Singapore that accommodate EU companies' circular products or packaging, other key circular economy principles including sharing, prolonging product lifespan, reusing and refurbishing need to be prioritised in policy-making to appeal to EU companies that adhere to these principles. For instance, government incentives could be used to foster a market environment that supports and sustains EU businesses in Singapore that adopt circular economy business models such as leasing or performance-oriented models.

Table 1 – Key elements of Singapore's and the EU's circular economy plans for electronics, food and packaging

	SINGAPORE	EU
Overarching Plan	Zero Waste Masterplan[14] (A Circular Economy Approach to Closing Three Resource Loops), Legislated in Resource Sustainability Act[15]	European Green Deal – Circular Economy Action Plan[16]
Electrical and electronic equipment ("EEE")	**Built around the Extended Producer Responsibility (EPR) concept**, all manufacturers and importers of regulated EEE* will bear the physical and/or financial responsibility for the proper treatment and disposal of regulated products that have reached end-of-life from 2021	**Mandates on products to lengthen product lifetimes and reduce waste** **Electronics and Information and communications technology ("ICT"):** The 'Circular Electronics Initiative' to promote longer product lifetimes includes:
	• Producers of consumer EEE will be required to join a Producer Responsibility Scheme ("PRS"), where the operator of the PRS will be appointed by National Environment Agency ("NEA"), to collect, send e-waste for recycling and meet collection targets	• Regulatory measures for electronics and ICT under the Ecodesign Directive so that devices are designed for energy efficiency and durability, reparability, upgradability, maintenance, reuse and recycling
	• Producers of non-consumer EEE, which includes solar photovoltaic ("PV") panels and servers, will be required to provide free take-back services for all their end-of-life equipment from their clients upon request	• Implementing the 'right to repair' by 2021, including a right to update obsolete software
		• Regulatory measures on chargers for mobile phones and similar devices, including the introduction of a common charger, improving the durability of charging cables, and incentives to decouple the purchase of chargers from the purchase of new devices
		• Improving the collection and treatment of EEE waste including exploring options for an EU-wide take back scheme to return or sell back old mobile phones, tablets and chargers
		• Review of EU rules on restrictions of hazardous substances in electrical and electronic equipment
		Batteries: New regulatory framework will be proposed including:
		• Rules on recycled content and measures to improve the collection and recycling rates of all batteries, ensure the recovery of valuable materials and provide guidance to consumers
		• Progressively phasing out of non-rechargeable batteries where alternatives exists
		• Sustainability and transparency requirements for batteries (e.g. carbon footprint of battery manufacturing, ethical sourcing of raw materials and security of supply, and facilitating reuse, repurposing and recycling)
Food	**Mandate food waste segregation for treatment**	**Aim to reduce food wastage through several measures such as the Farm to Fork strategy[17]**
	Food	**Food, water and nutrients**
	• The Resource Sustainability Act (2019) stipulates timeline for segregation of food waste by large food waste generators	• The Commission plans to propose a new EU-wide target on food waste reduction as part of its Farm-to-Fork strategy

(*) Regulated EEE include solar PV panels, ICT equipment, batteries, lamps, large household appliances and electric mobility devices

14 *Towards Zero Waste. Singapore's inaugural Zero Waste Masterplan charts Singapore's path towards a zero waste nation https://www.towardszerowaste.sg/zero-waste-masterplan/*
15 *Ministry of the Environment and Water Resources. Factsheet on Resource Sustainability Act. https://www.mewr.gov.sg/news/factsheet-on-resource-sustainability-act*
16 *European Commission. (2020). Circular Economy Action Plan. https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf*
17 *European Commission. Farm to Fork Strategy – for a fair, healthy and environmentally-friendly food system. https://ec.europa.eu/food/farm2fork_en*

	• From 2021	• The Commission will determine scope of a legislative initiative on reuse to substitute single-use packaging, tableware and cutlery with reusable products in food services
	– Owners of large public sector buildings with food and beverage outlets to segregate their food waste for treatment. This could be done under the Public Sector Taking the Lead in Environmental Sustainability initiative	• The new Water Reuse Regulation implemented in 2019 will encourage circular approaches to water reuse in agriculture. The Commission will facilitate water`w reuse and efficiency, including in industrial processes. The Commission will develop an Integrated Nutrient Management Plan, with a view to ensuring more sustainable application of nutrients and stimulating the markets for recovered nutrients
	– Mandatory for developers of new commercial and industrial premises, where large amounts of food waste are expected to be generated, to allocate and set aside space for on-site food waste treatment systems in their design plans	
	• 2024	
	– Large commercial and industrial food waste generators will have to segregate their food waste, but they can choose the food waste treatment method	
	– Developers of new developments who were required to set aside space for on-site food waste treatment systems in their design plans from 2021 will be required to implement the onsite treatment of food waste	
Packaging	**Mandate packaging reporting from 2020 to lay foundation for EPR framework by 2025**	**Aim to make all packaging placed on the EU market reusable or recyclable in an economically viable way by 2030**
	Packaging	**Packaging**
	• From 2021, producers of packaging and packaged products (i.e., brand owners, manufacturers, importers, and supermarkets) with an annual turnover of more than $10 million will be required to report on the types of packaging they put on the market and their corresponding weights. And from 2022, their plans to reduce, reuse and recycle the packaging are required to be submitted	• The Commission will review the Directive to reinforce the mandatory essential requirements for packaging to be allowed on the EU market, with a focus on: – Reducing (over)packaging and packaging waste, including by setting targets and other waste prevention measures – Driving design for reuse and recyclability of packaging, including considering restrictions on the use of some packaging materials for certain applications – Considering reducing the complexity of packaging materials, including the number of materials and polymers used
	• This will lay the foundation for the introduction of an EPR framework which will be implemented by 2025. This ensures producers are responsible for the collection and recycling of the materials they use to package their products	• Assess the feasibility of EU-wide labelling that facilitates the correct separation of packaging waste at source
	• National Environment Agency will be implementing a Deposit Refund Scheme (DRS) for beverage containers by 2022 as the first phase of the EPR approach for packaging waste management. Packaging waste, including plastics, is one of Singapore's priority waste streams due to its high generation and low recycling rate	• Strictly monitor and support the implementation of the requirements of the Drinking Water Directive to make drinkable tap water accessible in public places, which will reduce dependence on bottled water and prevent packaging waste
		Plastics • Mandatory requirements on use of recycled plastics • Develop a policy framework on: – Sourcing, labelling and use of bio-based plastics – Use of biodegradable or compostable plastics

While governments are instrumental in advancing the circular economy by producing a regulatory framework for all stakeholders, corporations are also key players in the journey of achieving circularity. Our Case Studies section discusses the featured companies' circular practices, challenges and specific policy recommendations to push Singapore's circular economy landscape further.

CASE STUDIES

By instituting practices within their businesses, corporations not only exemplify the applicability of circular strategies aligned with regulatory shifts, but also demonstrate their preparedness for a changing marketplace where consumer demand and multi-stakeholder pressure render such practices mainstream and essential.

In the following case studies, we analyse the practices of EuroCham member companies operating in Singapore which are targeting to close the loops in electronic, food and packaging waste. Apart from regulatory compliance and a commitment towards sustainability, we observed that one of the biggest pushes towards circularity is the increasing recognition of circularity by corporations as a strategy for business differentiation and competitive advantage. Companies are beginning to appreciate the value of circularity as closed-loop supply chains enable them to minimise dependence on natural resources and transform waste into sources of revenue, whilst establishing long-term relationships with stakeholders - especially consumers. This analysis includes an examination of the companies' circular economy practices, business results and challenges. Of great importance is their insights and recommendations for policy advancements and avenues needed to drive circularity in Singapore.

CASE STUDY 1
CLOSING THE LOOP IN ELECTRONIC WASTE

Company interviewed: Philips Singapore (Philips)

CIRCULAR ECONOMY PRACTICES

Philips, a leading health technology company from the Netherlands, is transforming its business model to enable value-based healthcare, moving from selling equipment alone to a long-term solutions model serving hospitals and other care providers. This new model enables care providers to reduce costs, share risks and access state-of-the-art solutions and services at a more predictable cost. At the heart of this value-based healthcare model is a transition from a product-oriented to an access-based business model, allowing consumers to purchase access to the equipment without having the responsibility of owning the products. With this transition, Philips aims to build longer term relationship with customers by including maintenance, repair, latest technology upgrades and software releases in their purchase agreements. Such elements will also have to be considered in the equipment's design stage and as such, Philips has developed a modular platform approach whereby parts of the equipment can be easily removed to facilitate repair, upgrade and recycling.

Philips's initiatives, such as the Philips Diamond Select programme, offer pre-owned first-rate medical equipment and systems that have been thoroughly refurbished, upgraded and quality-tested with a full Philips warranty. This allows customers to benefit from state-of-the art technology at a more affordable price.

As a result of a shortened supply chain attributed to a healthcare imaging systems refurbishment facility in the Netherlands, Philips has been able to refurbish computed tomography ("CT") scanners in only two weeks[18] during the COVID-19 pandemic to meet the swelling demand for diagnostic equipment[19].

Philips has pledged that by 2020, it will take back all large medical systems equipment that its customers return, such as magnetic resonance imaging ("MRI"), CT and cardiovascular systems, and ensure that all traded-in materials are repurposed in a responsible way[20].

BUSINESS RESULTS FROM GOING CIRCULAR

By moving away from a transactional approach whereby interaction with customers typically end upon completion of sales, the extended communication with consumers allows Philips to gain better insights of consumers' usage of the equipment, which can be routed back to the design stage and enhance customer satisfaction in the long run.

Depending on the product, Philips predominantly achieves 50 - 90% material reuse through its refurbishing activities, including its reuse of 940 tonnes of refurbished medical imaging equipment in 2016. Improving material productivity is critical especially since manufacturing firms in the EU spend on average about 40% of their costs on materials[21]. Companies

18 *Le Moigne, Remy. (2020). Circular economy principles could help businesses face the worst recession ever. Greenbiz. https://www.greenbiz.com/article/circular-economy-principles-could-help-businesses-face-worst-recession-ever*
19 *Slavin, Terry (2020). How COVID-19 has brought circularity into sharp focus for Philips. Reuters Events: Ethical Corporation Magazine. https://events.ethicalcorp.com/reports/docs/548965/EC-Magazine-June-2020.pdf*
20 *Royal Philips. (2020). Philips marks new milestones to improve people's health across the globe at WEF 2020. GlobeNewswire. https://www.globenewswire.com/news-release/2020/01/20/1972302/0/en/Philips-marks-new-milestones-to-improve-people-s-health-across-the-globe-at-WEF-2020.html*
21 *European Commission. (2020). A new Circular Economy Action Plan.*

stand to gain competitive advantage from closed-loop models that could increase their profitability while sheltering them from resource price fluctuations.

Business results:

- Enhance customer relationships
- Increase profitability whilst being sheltered from resource price fluctuations

CHALLENGES IN ADVANCING CIRCULARITY

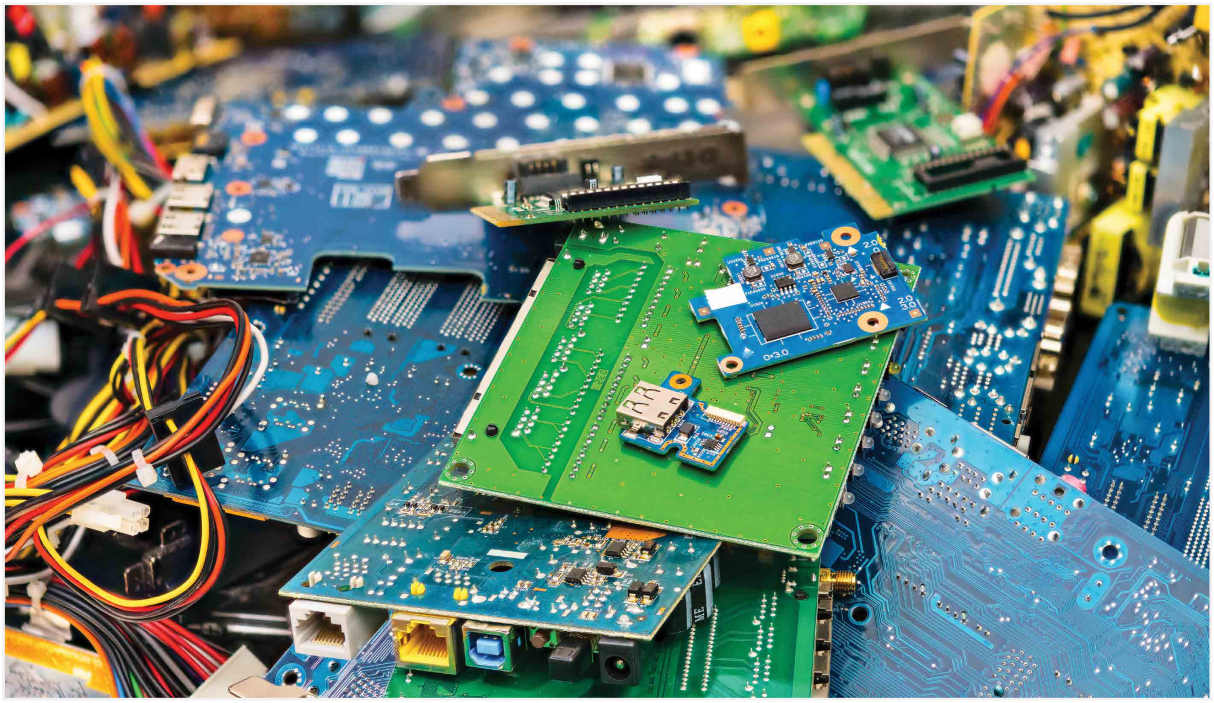
There are often perceived risks such as the risk of malfunction associated with used and refurbished equipment, especially for medical equipment, which is a difficult barrier to overcome. Additionally, a key challenge in moving towards an access-based business model lies in hospitals' conventional capital expenditure budgets for medical systems, which often entails the purchase of equipment. Therefore, hospitals' purchasing policies and budgeting need to be reviewed to enable agreements for access-based service models, such as rental of pre-owned, refurbished MRI machines maintained by the manufacturer, to be preferred over the acquisition of equipment.

Hence, more awareness is needed around the value driven through these circular business models. By showing customers the cost savings and the assurance of quality combined with the guarantee of premium maintenance, repair and upgrades, both barriers can be overcome. The success of sharing economy models suggests consumers' increasing comfort with the concept of reduced responsibility as opposed to full ownership.

Another challenge faced by companies is the trade barriers imposed by some countries such as restrictions on the import of refurbished or second-hand products[22]. In addition, the import restrictions on waste and scrap materials to avoid excessive waste dumping hinder the flow of recyclables and product components for refurbishing, resulting in difficulty matching supply and demand of electronic parts[23]. Although Singapore does not impose such trade restrictions, a global circular economy relies on international trade to channel waste and materials to countries with comparative advantage in sorting and processing these materials. Therefore, these logistical barriers impede the transition towards circular models of rebuilding products.

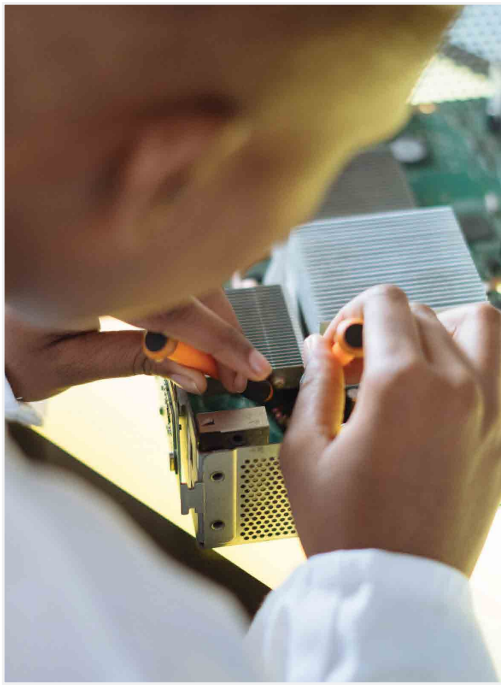
Key challenges:

- Perceived risks associated with used and refurbished equipment
- Traditional purchasing policies which do not support service-based models
- Trade barriers



22 *Organisation for Economic Co-operation and Development (OECD). (2018). International Trade and the Transition to a Circular Economy. https://www.oecd.org/environment/waste/policy-highlights-international-trade-and-the-transition-to-a-circular-economy.pdf*
23 *European Commission. (2020). A new Circular Economy Action Plan.*

RECOMMENDATIONS FOR POLICY IMPROVEMENTS



Under Singapore's EPR framework, all producers[24] of regulated EEE will be responsible for the collection of e-waste for proper disposal or recycling by licensed companies. To ensure this, other than providing records of weight and number of the regulated electronics[25], it could be made mandatory for producers to disclose information on the chemical and material composition of their electronic products as well as the actual treatment of the e-waste collected for recycling and other purposes.

To facilitate measures such as recycling, refurbishing and repairing, policies could also be placed to regulate and restrict hazardous content in electronics. Eco-labelling of electronic products that enter the Singapore market can also be considered, further expanding the Singapore Green Labelling Scheme[26] which currently apply to specific product categories.

While most of the electronic products are not locally manufactured in Singapore, the government can encourage products entering the local market to be designed for durability, reusability, reparability, upgradability and recyclability through pricing externalities. This will allow environmental costs of production and consumption to be better reflected in market prices. For example, this could be done via eco-modulation[27] whereby taxes could be levied on products entering the Singapore market which are deemed to be environmentally unfriendly, whereas tax rebates could be granted to products which adhere to eco-design requirements. Taking inspiration from the European Commission that is establishing a 'right to repair'[28] and horizontal material rights for customers such as the availability of spare parts, access to repair and upgrading services[29], Singapore can consider such measures to lengthen the lifespan of products. For example, the French Consumption Law requires customers to be informed about the availability of a product's spare parts and if necessary, calls for manufacturers to provide spare parts to the customers[30].

Moreover, the government can support the move from product-based to service-based and circular business models such as through enhanced tax deductions or capital allowances for leasing conventionally purchased equipment or acquisition of refurbished products and recycled materials. This will help to create the demand for such products and services, allowing producers to recognise the business potential of shifting towards circular business models. In the case of Philips, this could incentivise hospitals to review their purchasing and budgeting policies to consider such circular product and service models.

In addition, international collaboration is needed to overcome trade barriers and boost the demand and supply of refurbished products and recycled materials across various sectors, whilst ensuring problems such as dumping of waste do not arise. Singapore can take the lead in collaborative efforts to set standards and minimise such trade barriers especially within the ASEAN region where waste and scrap materials are often sent for processing and recycling. Rising as the potential lighthouse for circular economy in ASEAN, Singapore can initiate collaboration with its ASEAN counterparts to facilitate the circular economy transition on a broader level.

Recommendations

- Mandate disclosures by producers on composition of electronic products
- Mandate disclosures by producers and e-waste collectors on the treatment of e-waste
- Regulate and restrict hazardous content
- Eco-label electronic products that enter the Singapore market
- Encourage products entering the local market to be designed for durability, reusability, reparability, upgradability and recyclability
- Establish 'Right to repair' and horizontal material rights
- Support move towards circular business models
- Initiate collaboration with ASEAN counterparts to facilitate the circular economy transition

24 *Under the EPR framework, a company is a Producer of regulated electrical and electronic product if it carries on the business of supplying the regulated product in Singapore and in the furtherance of the business imports the regulated product into Singapore, manufactures the product in Singapore or engages another person to manufacture the regulated product in Singapore, or otherwise causes such manufacture. Source: https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/e-waste-management/extended-producer-responsibility-(epr)-system-for-e-waste-management-system*

25 *National Environmental Agency, Singapore. (2020). Extended Producer Responsibility (EPR) System for E-waste Management System. https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/e-waste-management/extended-producer-responsibility-(epr)-system-for-e-waste-management-system*

26 *Administered by the Singapore Environment Council (SEC) since 1999, the Singapore Green Labelling Scheme (SGLS) is Singapore's leading environmental standard and certification mark with over 3800 unique products certified across 43 countries. The scheme aims to help the public identify environmentally preferred products that meet certain eco-standards. https://sgls.sec.org.sg/cms.php?cms_id=3*

27 *Under a modulated fee approach, the fees paid by the producer will vary according to specific criteria relating to aspects of their products' environmental performance.*

28 *The term "right to repair" refers to the legal concept that allows consumers to repair the products they buy or choose with their own service providers instead of going through the manufacturer.*

29 *European Commission. (2020). A new Circular Economy Action Plan.*

30 *European Environment Agency. (2017). Circular by design – Products in the circular economy. https://circulareconomy.europa.eu/platform/sites/default/files/circular_by_design_-_products_in_the_circular_economy.pdf*

CASE STUDY 2
CLOSING THE LOOP IN FOOD WASTE

Companies interviewed: Sodexo, Asia Pacific Brewery ("APB") Singapore, Pernod Ricard

CIRCULAR ECONOMY PRACTICES AMONGST THE COMPANIES INTERVIEWED

Preventing and reducing food waste at source is a priority for Sodexo, a French food services and facilities management company. Sodexo launched its WasteWatch Programme[31] in Singapore which leverages analytics to identify and tackle the root causes of food waste. The programme is powered by Leanpath, a global leader in food waste prevention technology. Food producers often lack visibility of how much food is consumed and wasted, making it hard for them to take meaningful action to reduce their food waste[32]. WasteWatch utilises a tracker tool and generates real time reports along with pre-configured weekly reports to indicate the specific food item and the day or time that creates the most waste. With this programme, Sodexo subsequently sets targeted goals to optimise the amount of food produced and provides recommendations to limit waste, such as controlling food portions and batch cooking. Moreover, Sodexo has developed numerous recipes that use edible food parts which are usually overlooked such as pumpkin skin and watermelon rinds. These food parts have nutritional value but would otherwise go to waste[33]. The WasteWatch programme has resulted in a 45% reduction in food waste, illustrating how monitoring and tracking metrics can assist in waste management and control.

For unavoidable food waste, Sodexo actively works to divert them from the landfill and maximise resource recovery, such as utilising co-digesters or on-site composters to treat food waste. A composter is installed at the clients' site if there is available land mass, allowing clients to leverage the opportunity to educate others about composting through first-hand experience. The resulting compost can be used on the clients' on-site garden or farm to provide food such as herbs back into the kitchen, essentially closing the loop by turning waste into food. Similarly, APB Singapore, Heineken's brewing and operating company in Singapore, uses its brewing by-products e.g. spent grains as animal feed in Singapore. The company is currently exploring ways to upcycle its spent grains, either by looping them back into beer production as a valuable product that can grow beer yeast or as a packaging material. Pernod Ricard, a French company that produces and distributes wines and spirits, deploys innovative practices at their Absolut distillery in Sweden. Out of Pernod Ricard's organic by-products, 99% are recycled to manufacture products including animal feed, biogas and farm compost. Nearly 300,000 pigs and cows are nourished by their animal feed daily.

A pivotal circular economy practice is the dynamic engagement with stakeholders on reducing food waste. This is particularly stressed by Sodexo, which educates its stakeholders including employees, suppliers and clients within its extensive operations. The WasteWatch program includes online training through an e-learning module, followed by subsequent training programmes. In addition, Sodexo engages its clients through effective communication of the economic benefits, such as reduced costs of waste disposal and food loss, and long-lasting climate and social impacts of food waste reduction. Peer benchmarking, development of measurable goals and calculations of carbon emissions savings are also performed to build up the business case of food waste reduction for clients through the WasteWatch programme. By going beyond the mere provision of a product or service and embedding their stakeholders' needs into their service offerings, companies can build stronger stakeholder relationships as well as brand reputation.

Overall, circular economy practices for food waste vary depending on the business operations and supply chains involved. Ultimately, a circular business strategy requires close oversight of a company's entire value chain. It starts with the prevention of food waste through accurate tracking and monitoring and is accompanied by various solutions including food distribution and transformation of food waste into alternative uses.

31 *Sodexo. WasteWatch powered by Leanpath. https://www.sodexo.com/en/positive-impact/food-conscience/food-waste/wastewatch.html*
32 *Leanpath. (2016). 5 Factors Driving Food Waste in Foodservice. https://blog.leanpath.com/5-factors-driving-food-waste-in-foodservice*
33 *Lam, Fiona. (2019). A taste for sustainability. The Business Times. https://www.businesstimes.com.sg/life-culture/company-of-good/a-taste-for-sustainability*

BUSINESS RESULTS FROM GOING CIRCULAR

The financial benefits of food circularity are tangible. WRAP UK's research finds that for every US$1 invested in food loss and waste reduction, there is a US$14 return[34]. By 2050, a circular economy for food could deliver up to US$2.7 trillion per annum of benefits, including US$700 billion which could result from reducing food waste and recovering the value of by-products for new uses[35]. At APB Singapore, such benefits manifest in the cost savings of at least S$1.5 million per year in waste disposal fees as a result of its upcycling efforts for about 20,000 tonnes of spent grains.

Moreover, the interviewed companies have built stronger relationships with their customers and other stakeholders through engaging them in conversations about circular food waste solutions. Sodexo frequently receives positive feedback on their pioneer sustainability innovations and strategies that align with its clients' business strategies. By sharing its holistic perspectives on sustainability, the company's clients appreciate the insights and value-added economic, social and environmental benefits realised through circular business models and strategies. As such, the business results of integrating circularity in business operations and strategies extend beyond financial benefits and culminate in the longer-term and inherent reputational gains, while enabling such businesses to be a part of the solution to the climate crisis.

Business results

- Benefit financially from food waste reduction and recovery
- Strengthen relationships with customers

CHALLENGES IN ADVANCING CIRCULARITY

Facing challenges such as limited consumer awareness and demand for sustainability is a part of many companies' circularity journey in Singapore, including that of APB Singapore, Sodexo and Pernod Ricard. APB Singapore noted that this is common among their beer consumers, who tend not to make purchase decisions based on the company's sustainability practices. Nonetheless, circular economy practices clearly confer benefits across other parts of the value chain as evident in the continuance of such practices in the companies. This highlights that circular economy principles need not be popular amongst consumers to work.

Moreover, the prevailing mindsets about food pose a threat to the goal of eliminating food waste. Instead of reducing or eliminating food waste at source and along the value chain, mentalities are often geared toward the end-of-life treatment of food waste. While waste management is important, the primary goal should be the reduction or elimination of food waste. The option to donate surplus food may cause more food waste to be generated as a charitable act or with the assumption that the food surpluses will get a second lease of life. Additionally, there are habits concerning food handling, improper storage and purchasing patterns, such as buying aesthetically appealing products and rejecting edible but cosmetically unappealing food, that contribute largely to food waste in Singapore[36]. These habits originate from consumers' detachment from food sources and misconceptions about food which can be duly addressed through education and awareness-raising to ensure that food as a resource is valued. Another challenge the companies face is in expanding circular practices beyond their operational control as key decisions may lie in the hands of external stakeholders. For example, as Sodexo's clients ultimately decide whether to invest in composting or co-digestor facilities, the company's strategy is to engage with them and provide compelling reasons for them to adopt circular strategies. As such, implementing circular economy practices calls for effective multi-stakeholder collaboration and incentives to close the loop within the entire value chain.

Challenges

- Lack of consumer awareness
- Mentalities geared toward end-of-life treatment
- Unconstructive consumption habits
- Need for multi-stakeholder collaboration

RECOMMENDATIONS FOR POLICY IMPROVEMENTS

In view of the above challenges raised, the companies interviewed urge for stronger governmental regulations and incentives in Singapore to encourage key stakeholders, including industry players and consumers, to operate to a minimum standard. Currently, there is no penalty for disposal and incineration of food waste in Singapore[37]. Negative externalities could be priced by imposing a charge on food waste by weight to deter wastage and incentivise the reduction of food waste

34 *World Business Council for Sustainable Development. (2017). New Research Finds Companies Saved $14 for Every $1 Invested in Reducing Food Waste. https://www.wbcsd.org/Programs/Food-and-Nature/Food-Land-Use/FReSH/News/Companies-Save-by-Investing-in-Reducing-Food-Waste*

35 *Ellen MacArthur Foundation. (2019). Cities and circular economy for food. https://www.ellenmacarthurfoundation.org/assets/downloads/Cities-and-Circular-Economy-for-Food_280119.pdf*

36 *Low, Youjin. (2019). Every Singaporean household throws away an average S$258 worth of food a year: Study. Today online. https://www.todayonline.com/singapore/every-singporean-household-throws-away-average-s258-worth-food-year-study?cid=h3_referral_inarticlelinks_03092019_todayonline*

37 *Singapore Environment Council (2019). Advancing a Circular Economy for Food: Key Drivers and Recommendations to Reduce Food Loss and Waste in Singapore.*

at source. In South Korea, the implementation of pay-as-you-recycle machines[38] have reduced food waste in the city by 47,000 tonnes in six years[39]. To complement such policies tackling food waste at source, Good Samaritan laws which provide legal protection for criminal or civil liabilities for people who render assistance to others can be implemented. This way, companies will be more emboldened to donate food instead of fearing legal complications[40].

Presently, the Ministry of Sustainability and the Environment ("MSE", previously known as Ministry of the Environment and Water Resources) and National Environment Agency ("NEA") mandated that from 2024, all food generated by owners and operators of commercial and industrial premises that generate large amounts of food waste, such as large malls and hotels, will be segregated for treatment. From 2021, MSE and NEA will also work with large public sector building owners with food and beverage outlets to implement food waste segregation for treatment[41]. While these address large food waste generators, there could be a concerted effort to assist smaller stakeholders. Due to numerous logistical issues of installing individual onsite composting facilities, some companies interviewed recommended that the government could provide a centralised composting facility in each district. In addition to enabling the participation of smaller food and beverage merchants or producers and helping them to save upfront costs of installation, centralised facilities can create larger efficiencies and economies of scale.

The government can also support innovation hubs or provide grants to accelerate innovative solutions focusing on tackling food waste. For example, the current Food Waste Valorisation programme under the FoodInnovate[42] initiative could be further expanded to support the exploration of new technologies that process food production side streams into sustainable packaging material, thereby tackling two waste streams concurrently. This would support APB's research endeavour in upcycling its spent grains into packaging materials.

While the steps taken towards food recycling are laudable, the linchpin of tackling food waste is at its inception. The companies emphasise the need for policies and regulations to focus on the reduction of food waste at source to play down our dependence on end-of-life waste management. Currently, the Singapore Food Agency does not distinguish between "use by", "best before" or "expiry date" labels, resulting in huge food wastage because products are not allowed to be sold or distributed beyond these dates and/or because consumers are not aware of the differences of such labels. Studies have shown that consumers are more willing to purchase food beyond its use-by/best-before dates when they are educated on the environmental impact of food waste and there is clear labelling to indicate that "use by" and "best before" mean lower food quality without compromising food safety[43]. Coupled with Good Samaritan laws, a clear policy and mandate on food labels will help to prevent food wastage at the onset and propel producers to donate their excess food when necessary. This is paralleled in France, which became the first country to ban supermarkets from throwing away unsold food approaching its "best-before" date and require them to donate surplus food to charities and food banks instead[44].

Holistic solutions beyond end-of-life management are required to consider the entirety of the food value chain and address food waste using the Food Recovery Hierarchy of prioritising waste elimination over composting and incineration[45]. As Singapore currently imports over 90% of its food supply[46], active engagement with regional and international stakeholders can push the circular agenda forward such as through regional and international dialogues, agreements and roadmaps. Strengthening food security through food waste reduction and circularity would be a vital anchor point in international dialogues amidst the COVID-19 pandemic which has shattered supply chains and severely threatened food security. With the ASEAN Integrated Food Security ("AIFS") Framework[47] lasting from 2015 to 2020, and the ASEAN Summit

38 *Automated bins equipped with scales and Radio Frequency Identification (RFID) which weigh food waste as it is deposited and charge residents using an ID card in Seoul, South Korea. https://www.weforum.org/agenda/2019/04/south-korea-recycling-food-waste/*

39 *Broom, Douglas (2019). South Korea once recycled 2% of its food waste. Now it recycles 95%. World Economic Forum. https://www.weforum.org/agenda/2019/04/south-korea-recycling-food-waste/*

40 *Kwan, Jacklin and Tan, Audrey. (2019). Good Samaritan laws may help reduce food waste. The Straits Times. https://www.straitstimes.com/singapore/environment/good-samaritan-laws-may-help-reduce-food-waste*

41 *National Environment Agency. (2019). Food Waste Segregation For Treatment By Large Commercial & Industrial Food Waste Generators To Be Mandatory From 2024. https://www.nea.gov.sg/media/news/news/index/food-waste-segregation-for-treatment-by-large-commercial-industrial-food-waste-generators-to-be-mandatory-from-2024#:~:text=From%202024%20onwards%2C%20the%20Ministry,their%20food%20waste%20for%20treatment.*

42 *FoodInnovate is a multi-agency initiative to grow Singapore's food manufacturing industry through innovation. FoodWaste Valorisation is one of the programmes under FoodInnovate which specifically targets food waste through developing solutions to convert food manufacturing by-products into new usable products and gain cost savings. Source: https://www.enterprisesg.gov.sg/industries/type/food-manufacturing/foodinnovate*

43 *Ong, Anthea. (2019). Reduce waste by redistributing food surplus to those in need. Channel News Asia. https://www.channelnewsasia.com/news/commentary/reduce-waste-redistribute-food-surplus-to-lower-income-11902132*

44 *Lemos, Liv. (2019). How governments around the world are encouraging food waste initiatives. Winnow Solutions. https://blog.winnowsolutions.com/how-governments-around-the-world-are-encouraging-food-waste-initiatives*

45 *KPMG Australia. (2020). Fighting food waste through the circular economy. https://assets.kpmg/content/dam/kpmg/au/pdf/2019/fighting-food-waste-using-the-circular-economy-report.pdf*

46 *Singapore Food Agency. (2020). The Food We Eat. https://www.sfa.gov.sg/food-farming/singapore-food-supply/the-food-we-eat#:~:text=Supporting%20Local%20Produce-,The%20Food%20We%20Eat,markets%20mainly%20comes%20from%20overseas.*

47 *ASEAN Integrated Food Security ("AIFS") Framework and Strategic Plan of Action on Food Security in the ASEAN Region (SPA-FS). 2015-2020. https://www.asean-agrifood.org/?wpfb_dl=58*

2020 focused on pandemic recovery plans, Singapore could take the lead in establishing dialogues and agreements on food waste reduction and circularity in this region. For example, the Singapore government can work with the ASEAN CSR Network[48] and Food Industry Asia[49] to engage the food and beverage sector in the region and develop joint agreements with other ASEAN governmental agencies to reduce food waste and adopt circular economy practices. After all, environmental challenges cannot be tackled in silos and effective circular economy transitions require collaborative efforts locally and globally.

Like most other environmental problems, education is key to addressing the food waste challenge. Enhancing public awareness on the impact of food waste from farm to fork to landfill could motivate behavioural changes such as buying consciously and optimising food use to prevent food wastage at the onset.

Recommendations

- Impose charges on food waste
- Embolden companies to donate excess food through Good Samaritan laws
- Install centralised food composters
- Support innovation hubs or provide grants to accelerate innovative solutions focusing on tackling food waste
- Mandate food labelling that distinguishes between "use by", "best before" and "expiry date"
- Engage actively with regional and international stakeholders
- Enhance public awareness to motivate behavioural change

CASE STUDY 3
CLOSING THE LOOP IN PACKAGING WASTE

Companies interviewed: Asia Pacific Brewery (APB) Singapore, Pernod Ricard, Lego and Wipak

CIRCULAR ECONOMY PRACTICES AMONGST THE COMPANIES INTERVIEWED

While the interviewed companies adopt approaches that cover the full life cycle of their products and services, their circular practices are implemented most effectively within their operations where they have direct control. Therefore, most of the circular practices that minimise packaging waste begin at the inception of the product's life cycle - its design. This involves designing packaging with recycled content or other renewable and sustainable materials, reducing its thickness or physical components to maximise delivery and storage, or ensuring all the packaging can be fully recycled. The companies resolutely ensure that while the products incorporate circularity principles in the design or materials used, they do not compromise the integrity and quality of their materials and the health and safety of their consumers.

In a bid to understand and respond to consumers' needs, technology comes into play in the companies' strategies. Lego, a Danish toy manufacturing company, uses data analytics to gain a deeper insight into consumers' attitudes towards plastics and accordingly drives the development of new, sustainable materials for their packaging and products in collaboration with key suppliers. Similarly, Wipak, a global supplier of sustainable packaging solutions for food products and medical devices, identifies the move towards sustainable packaging as a clear business imperative arising from market needs. To strengthen customer experience and transparency, Wipak provides life cycle analyses of its products through a mobile application which enables customers to compare the carbon dioxide emissions of various packaging offerings.

Some companies go further to close the loop. For example, all glass bottles provided by APB Singapore to its partner establishments such as pubs and bars will be collected, cleaned and reused. If the bottles are found to have defects, they will be sent back to the manufacturer to be remade into bottles.

BUSINESS RESULTS FROM GOING CIRCULAR

Minimising packaging and the materials used has a direct impact on reducing production costs for companies[50]. Apart from the costs saved from purchasing new bottles, the reuse of returned bottles by APB Singapore enhances its supply chain resiliency as it is less reliant on its bottle manufacturer – a priority highlighted by the COVID-19 pandemic.

Although the use of more sustainable materials in packaging may be more costly depending on the materials, it is a long-term investment that opens doors to new business opportunities while staying relevant to market demands. Worldwide, 6% f

48 *ASEAN CSR Network. https://www.asean-csr-network.org/c/*
49 *Food Industry Asia. https://foodindustry.asia/home*
50 *McKinsey & Company. By rethinking packaging, a company reduces production costs while enhancing brand. https://www.mckinsey.com/business-functions/operations/how-we-help-clients/reduce-packaging-costs#*

consumers are willing to pay more for sustainable products and brands[51] and more than half of consumers said they would pay more for sustainable products designed to be reused or recycled[52]. While the immediate business returns of circular practices for each company may vary, the market for sustainable and circular products and their packaging is projected to expand and flourish in the long-term.

Business results

- Reduce costs
- Build supply chain resilience

CHALLENGES IN ADVANCING CIRCULARITY

Despite a growing demand for sustainable products globally, the companies noted that a key barrier to bringing sustainable packaging to the Asian market is their observable lack of consumer demand. This could be attributable to the nascence of the sustainability in Asia, especially if sustainable packaging translates to relatively higher prices. Furthermore, consumers are often inclined to be sceptical of the recycling process in Singapore, which might be attributable to the lack of robust recycling infrastructure, facilities and approach to education[53]. The companies have launched publicity events in a bid to raise public awareness on sustainability, such as APB Singapore's Sustainable Pop-up Bar. This event featured a reverse vending machine which received recyclable bottles or cans from visitors who were rewarded with free beer. The success of the event is evident from the reverse vending machine's subsequent breakdown due to receiving an overabundance of recyclable packaging. This suggests that a financial incentive or penalty could be a key driver in encouraging sustainable behaviour, therefore serving as a successful pilot test for Singapore's upcoming Deposit Refund Scheme. Although such events have seen efficacious results, whether this translates to long-term sustainable habits is yet to be determined.

Besides the difficulty in gaining traction among consumers, these companies also observe hesitation from other industry players in acquiring circular practices in their packaging. To many industry players, circularity and sustainability are not key focus areas despite the risks posed by linear business models and shifting consumer behaviour. In order to motivate supply chain stakeholders to play their part, it is crucial for them to recognise the business need for circularity and its positive business results. Without industry players' commitment and collaboration to push for a change in the packaging ecosystem, incorporating a closed-loop system would be difficult.

A closed-loop logistics system such as that established by APB Singapore involving the collection and reuse of packaging may be more challenging to implement for companies like Pernod Ricard that do not have production sites in Singapore. In addition, Pernod Ricard has expressed that a factor impeding the implementation of such take-back programmes is the fear of counterfeit alcohol being sold using the brand's returned bottles if they get lost in the supply chain.

One of the key challenges faced by the companies in developing appropriate circular strategies is the absence of adequate waste management systems in some countries. For example, Wipak will only attain the intended outcomes of its inventive recyclable flexible packaging if there are necessary collection and recycling facilities to handle such materials. In addition, regulatory discrepancies in different countries render it difficult for companies to implement homogeneous solutions. For instance, Pernod Ricard's glass bottles are unable to be recycled in South Korea based on its standards of classification for glass recyclability.

Amidst the COVID-19 pandemic, single-use plastics and packaging have been dubbed as heroes of the fight against the virus, as they are viewed as the more sanitary choices. In addition, the recent oil price plunge has caused the price of recycled plastic to be much higher than virgin plastic. Hence, companies focusing on short-term profits find it more difficult to justify their switch to sustainable options as opposed to the cheaper option of single-use virgin plastic packaging.

Challenges

- Lack of consumer demand
- Scepticism of the recycling system in Singapore
- Need for multi-stakeholder collaboration
- Closed-loop logistics systems challenging for companies without local production sites
- Incongruent policies, regulations and infrastructure internationally
- Current focus on short-term profits

51 *McCaskill, Andrew. (2015). Consumer-Goods' brands that demonstrate commitment to sustainability outperform those that don't. https://www.nielsen.com/eu/en/press-releases/2015/consumer-goods-brands-that-demonstrate-commitment-to-sustainability-outperform/#:~:text=Sixty%2Dsix%20percent%20of%20global,and%2050%25%20in%202013).&text=Consumers%20across%20regions%2C%20income%20levels,remain%20loyal%20to%20their%20values.*

52 *Cantwell, Guy, Nolan, Maggie and Corser, Matt. (2019). More than Half of Consumers Would Pay More for Sustainable Products Designed to Be Reused or Recycled, Accenture Survey Finds. Accenture. https://newsroom.accenture.com/news/more-than-half-of-consumers-would-pay-more-for-sustainable-products-designed-to-be-reused-or-recycled-accenture-survey-finds.htm*

53 *Mohan, Matthew and Ang, Hwee Min. (2020). Contamination of recyclables, incorrect recycling among possible factors for Singapore's low domestic recycling rate: Experts. Channel News Asia. https://wworous w.channelnewsasia.com/news/singapore/contamination-of-recyclables-incorrect-recycling-among-possible-12648240*

RECOMMENDATIONS FOR POLICY IMPROVEMENTS

The companies interviewed have recommended for Singapore's upcoming EPR framework to introduce eco-modulation of fees[54] for packaging to incentivise the use of packaging with a smaller environmental impact. Rather than levying a fee on companies based on the overall weight of packaging put into the market, the EPR framework can consider the characteristics of different packaging materials such as the ability of the material to be reused or recycled. This is to avoid penalising companies for using materials, such as reusable glass or metal, that fulfil their sustainability criteria but are invariably heavier than less easily recyclable materials such as plastic.

The EPR schemes in the EU could serve as a guide in this respect. In the EU, all packaging EPR schemes include a fee modulation to producers for each packaging material placed on the market. These schemes also consider the end-of-life waste management in different EU countries. For instance, fees for plastic and composite materials tend to be significantly higher than other materials such as paper, card, glass and metals, and in the Czech Republic, they do not apply fees for reusable packaging[55]. In Singapore, one third of the 1.6 million tonnes of domestic waste disposed in 2018 is packaging waste and more than half of this packaging waste is made of plastic, of which only 4% is recycled[56]. Therefore, a targeted approach to pricing each packaging material, especially plastic, would be needed to reduce packaging waste and encourage eco-design.

In Singapore, commingled recycling bins are used to collect recyclables. However, about 40% of the items deposited in these bins do not get recycled because they are either non-recyclable or are contaminated[57]. The relatively ineffective recycling system would be challenging for companies, such as Wipak, to achieve the intended outcomes of their inventive recyclable packaging. A robust recycling system and a multi-pronged approach is vital to improve Singapore's domestic recycling from the meagre rate of 17% in 2019[58].

Other than standardised recycling labels on packaging and installation of separate recycling bins for different materials to move Singapore towards a multi-stream recycling system, education coupled with monetary incentives and/or penalties are key to inducing consumers to reduce and properly sort out their waste. Given the high population density in Singapore, an incentive system to sort and bring back waste to respective producers or collection facilities is recommended as it may offer higher efficiencies for recycling. For example, Singapore's upcoming Deposit Refund Scheme targeted to be implemented by 2022 that incentivises consumers with rewards to return used beverage containers can be extended to include other forms of packaging. In addition, many EU Member States have pay-as-you-throw schemes in place, whereby households are charged based on the amount of waste they generate[59]. This pressurises households to reduce waste and sort their waste for recycling, thereby facilitating separate waste collection. While these solutions could be difficult to implement in current housing estates where infrastructure such as individual rubbish chutes in each flat have been established, they could be more easily integrated into newer estates or retrofits, such as under the Housing Development Board ("HDB") Green Town Programme, which plans to implement sustainable living with green features for residents[60].

In addition, the companies consider it important for policies and regulations to create a level playing field in Singapore. Under Singapore's Mandatory Packaging Reporting Framework, reporting requirements will apply to brand owners, manufacturers, importers of packaged goods, as well as supermarkets with an annual turnover of more than $10 million[61]. While this is intended to minimise the impact on micro and small enterprises, it might create unintended consequences such as confusion among consumers. For example, if the Deposit Refund Scheme only applies to packaging produced by large

54 *Under a modulated fee approach, the fees paid by the producer will vary according to specific criteria relating to aspects of their products' environmental performance.*
55 *E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink. (2017). EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging. Institute for European Environmental Policy. https://ieep.eu/uploads/articles/attachments/95369718-a733-473b-aa6b-153c1341f581/EPR%20and%20plastics%20report%20IEEP%209%20Nov%202017%20final.pdf?v=63677462324*
56 *Towards Zero Waste. Packaging Waste. https://www.towardszerowaste.sg/waste-streams/packaging-waste/*
57 *Tan, Audrey. (2019). Education campaigns and spot checks on recycling bins among ideas to improve household recycling. The Straits Times. https://www.straitstimes.com/singapore/education-campaigns-and-spot-checks-on-recycling-bins-among-ideas-to-improve-household*
58 *National Environment Agency. (2019). Waste Statistics and Overall Recycling. https://www.nea.gov.sg/our-services/waste-management/waste-statistics-and-overall-recycling*
59 *E. Watkins, S. Gionfra, J-P. Schweitzer, M. Pantzar, C. Janssens and P. ten Brink. (2017). EPR in the EU Plastics Strategy and the Circular Economy: A focus on plastic packaging. Institute for European Environmental Policy.*
60 *The Straits Times. (2020). Singapore Budget 2020: New programmes to ensure sustainable living in HDB estates. https://www.straitstimes.com/singapore/singapore-budget-2020-new-programme-to-ensure-sustainable-living-in-hdb-estates#:~:text=Singapore%20Budget%202020%3A%20New%20programme%20to%20ensure%20sustainable%20living%20in%20HDB%20estates,-The%20new%20HDB&text=Called%20the%20HDB%20Green%20Towns,rainwater%20and%20cooling%20HDB%20towns.*
61 *Ministry of the Environment and Water Resources. Factsheet on Resource Sustainability Act.*

business establishments, consumers may be confused about which packaging brands are eligible for a deposit refund or may be discouraged to participate due to the limited scope and convenience. For comprehensive and effective policies targeted at catalysing both consumer behaviour and corporate action, the government can establish plans to include smaller businesses and assist them through incentives or subsidies for the packaging reporting framework and subsequent EPR schemes. The key to establishing effective systems or policies is to enable a uniform application that are understandable by producers and consumers.

Furthermore, the packaging reporting and EPR schemes should not exist in isolation; there are other policy levers that can augment the waste management policies. For one, governments can offer both financial and non-financial support to foster innovation and new markets[62]. For instance, the government can encourage businesses to adopt circular practices to minimise packaging waste such as transiting to reuse-refill models through policies and incentives. The value of such models is corroborated by an Ellen MacArthur Foundation report, whereby 20% of plastic packaging (by weight) is shown to be profitably re-used and hence reduced, for example through product refill models[63].

Awareness-raising is a crucial policy lever to support the transition towards a circular economy. One can observe how consumers in Singapore readily accept excessive packaging for their purchases[64]. Existing educational and information programs can be improved to provide individuals with a better understanding of the unintended consequences of their consumption choices. This could then increase demand for sustainable products or business models, thereby supporting businesses in their adoption of circular strategies.

Recommendations

- Impose eco-modulation of fees for different packaging
- Move towards a multi-stream recycling system
- Establish a level-playing field in the EPR framework and policies
- Encourage transitions towards circular business models
- Enhance public awareness to shift demand towards sustainable products and circular business models

CONCLUSION

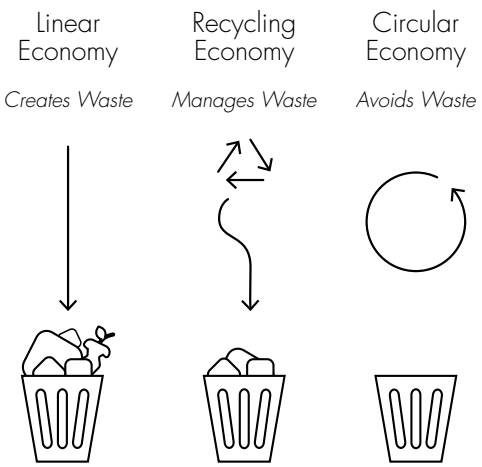
This position paper offers guidance to drive the imperative transition to a circular economy through our policy gap analysis and insights gleaned from companies which are actively putting circular economy principles into practice. As exemplified in our case studies, companies that embed circularity in their business DNA can build strong stakeholder relationships, limit environmental impacts and experience transformative benefits. Technology, such as Sodexo's Leanpath tool and Lego's use of data analytics, has also demonstrated its capacity as an enabler for the circular economy.

A key observation from our case studies is that the interviewed companies lack tracking systems to monitor the progress and impacts of their circularity strategies. This might be challenging to prove a business case for the circular economy when upfront investments are required, and tangible benefits are not yet realised. Tools such as the KPMG True Value[65] methodology can help companies comprehensively understand the impact of circularity and make more informed business decisions by combining economic, social and environmental impacts from circularity in a single financial metric. Similarly, the Circular Transition Indicators ("CTI")[66] framework developed by World Business Council for Sustainable Development ("WBCSD") provides a common metric to measure and monitor circular progress. This provides a basis to identify circular opportunities and collaboration and to better communicate the impacts and progress of circularity. Singapore can necessitate the use of this framework to have a common measurement tool across industries and facilitate progress tracking, targets setting and policy-making. CTI is critical to creating a circular economy ecosystem and to strengthen policy-making. Without such measurement indicators, policies would remain high level and at best visionary.

The interviewed companies also identify common challenges when pursuing circularity which can be addressed through a range of measures. For example, they encounter minimal consumer awareness, lack of industry cooperation and the need for ambitious governmental support to advance circular economy. While raising public awareness on the circularity concept is essential in this ecosystem, not all respond to social responsibility appeals. Therefore, it is just as crucial to have other incentives and policies to encourage sustainable behaviour. For instance, Singapore's Carbon Pricing Act, which imposes a carbon tax on industrial facilities that emit more than 25,000 tonnes of greenhouse gases[67] may induce electric power consumers to seek energy efficiency measures as a way to save costs if the carbon pricing is passed on to them by power-

62 *Ellen MacArthur Foundation. (2019). City governments and their role in enabling a circular economy transition. https://www.ellenmacarthurfoundation.org/assets/downloads/CE-in-Cities_Policy-Levers_Mar19.pdf*
63 *Ellen MacArthur Foundation. (2017). Industry endorses plan to recycle 70% of plastic packaging globally. https://www.ellenmacarthurfoundation.org/news/new-plastics-economy-report-2-launch*
64 *Wong, Kai Yi. (2018). Gone to waste: a hard look at our recycling effort. The Business Times. https://www.businesstimes.com.sg/brunch/gone-to-waste-a-hard-look-at-our-recycling-effort*
65 *KPMG. KPMG True Value Services. https://home.kpmg/xx/en/home/services/advisory/risk-consulting/internal-audit-risk/sustainability-services/kpmg-true-value-services.html*
66 *World Business Council for Sustainable Development. Circular Transition Indicators (CTI). https://www.wbcsd.org/Programs/Circular-Economy/Factor-10/Metrics-Measurement/Circular-transition-indicators*
67 *National Environment Agency. Carbon Tax. https://www.nea.gov.sg/our-services/climate-change-energy-efficiency/climate-change/carbon-tax#:~:text=Under%20the%20Carbon%20Pricing%20Act,submit%20an%20Emissions%20Report%20annually.*

generating taxpayers. The decarbonisation of supply chains through closing resource loops could be one such measure. To fully utilise carbon pricing and incentivise organisations throughout the supply chain to decarbonise and become circular, an expansion of the current scope of targeted facilities and/or a substantial increase in the carbon price could be considered.



An approach to policy-making that considers the full life cycle of a product can advance the circular economy of electronics, food and packaging in Singapore.

The common challenges faced by the interviewed companies are also underpinned by the overemphasis of the circular economy as an advanced recycling process, in which recycling is the first and often only approach. While effective recycling systems are important for waste management, it is only a single facet of the multi-dimensional aspects of the circular economy. Paying oversaturated attention on waste management at the end-of-life stage often results in a never-ending rabbit hole of continuously generated waste and renders it difficult to pull away from the linear model.

While it is important to build a robust recycling system, the main objectives should be to advance genuine circular innovations, optimise product use and repair, and move away from a waste-based model. Based on the insights gained from our policy gap analysis and case studies, Singapore can adopt a life cycle approach to policy-making in order to advance the circular economy of electronics, food and packaging.

As seen from the above, diverse steps need to be taken to lay the foundation and brace for the desired policy changes in Singapore to align with that of the EU and establish a supportive ecosystem that enables the adoption circular business models. Only with policies that complement each other across national boundaries, can our world and businesses thrive in the new economic trajectory.

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CONTENT SUPPORT

Lloyd Lowe, BASF
Prateek Jain, Unilever
Isabelle de Lovinfosse
EuroCham's Packaging, Sustainability and Supply Chain Committees

CASE STUDIES SUPPORT

Asia Pacific Breweries (S) Pte Ltd
Lego Singapore Pte Ltd
Pernod Ricard Singapore Pte Ltd
Philips Electronics Singapore Pte Ltd
Sodexo Singapore Pte Ltd
Wipak Singapore Branch Office

LIST OF ACRONYMS

AIFS	ASEAN Integrated Food Security
CT	Computed tomography
CTI	Circular Transition Indicator
CTI	Circular Transition Indicators
DRS	Deposit Refund Scheme
EEE	Electrical and electronic equipment
ERP	Extended Producer Responsibility
ICT	Electronics and Information and communications technology
MRI	Magnetic resonance imaging
MSE	Ministry of Sustainability and the Environment
NEA	National Environment Agency
PRS	Producer Responsibility Scheme
PV	Photovoltaic
WBCSD	World Business Council for Sustainable Development