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## Is your waste a waste?

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## IS YOUR WASTE A WASTE?

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Historically, the intrinsic nature of living systems allows resources to return to the environment through a complex web of energy flows and nutrient cycles. With the advent of industrialisation, these systems began to shift away from this sustainable way of life. Indeed, studies have shown that at the current rate of resource consumption, human civilisation has already triggered Earth's sixth mass extinction event. This catastrophe will only worsen if nothing is done. Redesigning the way we conduct business and policy is a critical step towards bringing human activity back into alignment with the planet's ecosystem.

Businesses generally adopt a linear 'take-make-dispose' model, which results in massive amounts of waste. While this economic model has generated an unprecedented level of growth, the rising demand on resources has become unsustainable.

The circular economy is a practical solution to this resource problem. It is an economic system that is restorative by intention and design. In other words, this solution of optimising resource yields will span over the entire product life cycle—beginning from the 'take' stage to after the product's end-of-life. The goal is to take less and fully utilise all products, components and materials through their life cycle (refer to Figure 1).

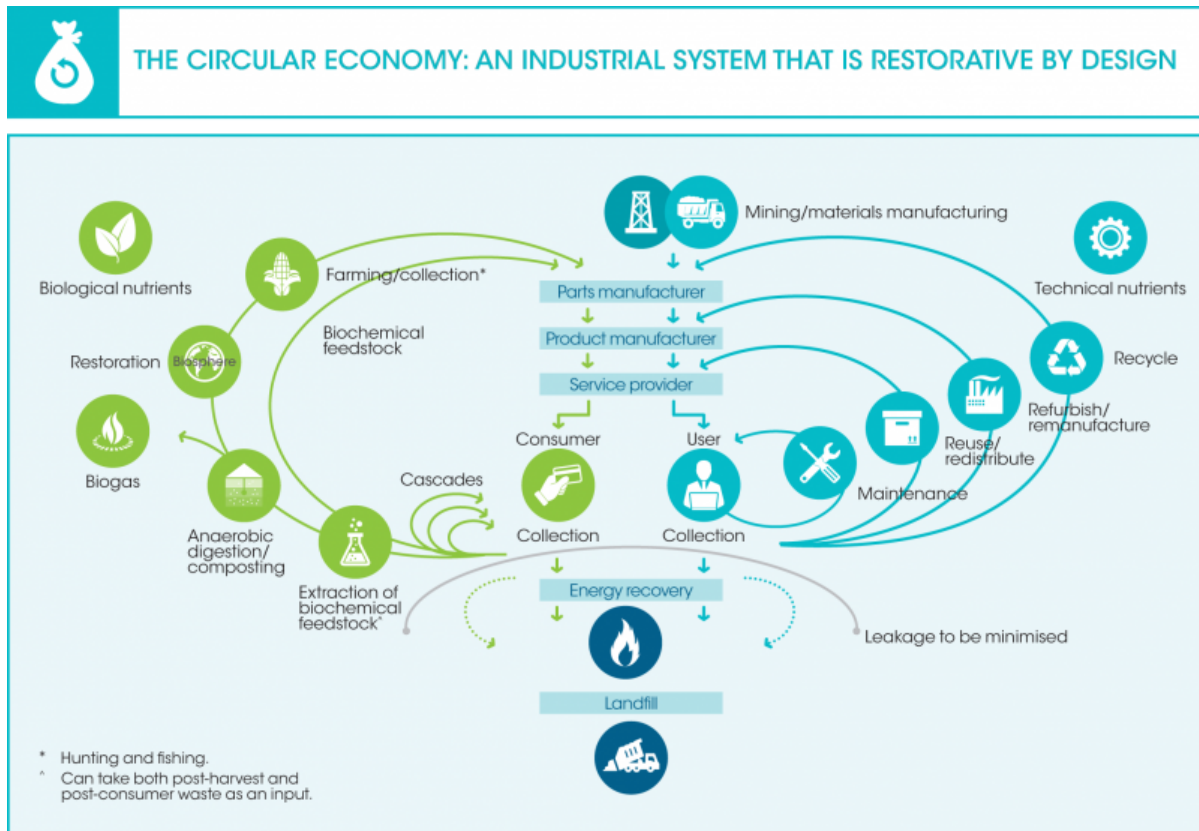


FIGURE 1

Adapted from original by the Ellen MacArthur Foundation. <https://www.ellenmacarthurfoundation.org>

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### Push factors for change

A report by the Ellen MacArthur Foundation estimates that the value of circular opportunities for fast-moving consumer goods globally could be as much as US\$700 billion per annum in material savings, which is inclusive of materials used in the reverse-cycle processes.<sup>1</sup> Circular economic principles spur innovations, resulting in improved resource productivity, decreased ecological impact, and greater job creation. These benefits will become increasingly essential as the world’s population grows.

A recent population projection report from the United Nations states that, based on current growth trends, the world’s population will likely reach 9.7 billion by 2050.<sup>2</sup> Given the current rate of resource depletion, it will be impossible to meet the demand for resources. This will inevitably exacerbate social issues such as poverty, inequality and conflict. Thankfully, these problems can be prevented through better resource management in the circular economy.

If circular economy principles can help industry realise greater value, why have most firms not reassessed and changed their business models?

## **Adopting circular economies: Challenges to overcome**

### **COST**

Businesses struggle to reconcile economic and environmental concerns because of competition that forces companies to externalise costs in order to demonstrate short-term profit. The accounting systems are woefully misaligned. The rules of the game need to change if businesses are to adopt circular economic principles as a viable means to create economic value, and not just token activities of doing something good.

However, an all-encompassing and farsighted business strategy must, by definition, be financially sustainable. The hurdle for adopting greener business practices and other circular economic principles has always been the high upfront costs coupled with long payback periods, which often make for an unattractive investment. The circular economy must be built on a strong investment thesis. One such example can be found in the Pacific Gas and Electric Company in the U.S., where, according to CEO Richard A. Clarke, the company was able to improve the efficiency of its operations by recycling certain components, such as electrical conductors, transformers and plastic gas pipes, which brought in savings of several million dollars a year.<sup>3</sup>

### **LEGISLATION**

Government interventions have a huge part to play in a circular economy, but they can also be counterproductive if not implemented properly. Companies are generally influenced by strict legislative frameworks when it comes to integrating green solutions into their operations. With the absence of strong government support or an effective legislative framework, sustainability efforts are mainly dependent on the company's commitment to environmental improvements. In the U.S., the North Carolina General Assembly passed a bill banning the disposal of beverage containers. At the same time, the Senate granted support through grants and technical assistance for recycling, once the bill was passed. This positive involvement led to an estimated increase of 35,000 tonnes of glass recycled per year in the state.<sup>4</sup>

### **LOGISTICS**

A robust logistics solution is critical to any circular economy strategy. When closing the loop, reverse logistics plays an important role in the recovery of waste, enabling the circular flow of goods. This process has to be seamless and cost effective in order to maximise the value generated for the company.

When the Australian government introduced a policy on Extended Producer Responsibility (EPR), which requires manufacturers to manage their product's end-of-life segment by recycling a certain tonnage of electronic waste, take-back logistics for the end-of-life products proved to

be a daunting challenge. DHL rose to this challenge by leveraging their logistics expertise to provide companies with efficient e-waste recycling solutions that met the EPR regulatory requirements.

Logistics service providers will no doubt play a key role in facilitating the transition towards a circular economy. However, this solution could prove difficult to implement in developing countries where a lack of technical skills or infrastructure may hinder such a logistics-based solution. That said, developing countries also have the most to gain from the circular economy, particularly in the realm of food security, where they are often most vulnerable. Improving the logistics infrastructure in these countries is vital.

### **Hungry for change**

Organic waste is the largest component of total waste, with food wastage being a major contributor. The Food and Agriculture Organization (FAO) estimates that roughly one third of the annual amount of food produced in the world for human consumption (approximately 1.3 billion tonnes), gets lost or wasted.<sup>5</sup> Not only does this food waste account for major economic losses, it also has adverse effects on the environment due to the greenhouse gases produced when it breaks down anaerobically.

The severity of wastage differs across industrialised and developing economies, with the latter typically wasting less. Singapore, an advanced country lauded for its devotion to efficiency, generated a total of 785,500 tonnes of food waste in 2015. Of this, only 13 percent of the food waste was recycled, which equates to a loss of some 127 kg per person per year.<sup>6</sup> Based on statistics published by the FAO in 2011, the annual food loss per capita in South and Southeast Asia, a developing region for the most part, is approximately 120-170 kg per person per year, while that of Europe and North America is approximately 280-300 kg per person per year.<sup>7</sup> Although Southeast Asia's per capita food loss is generally lower than that of other industrialised parts of the world, there is further need for improvement in order to avoid increasing levels of waste as the region develops (refer to Figure 2).



FIGURE 2

Moreover, the profile of waste differs across industrialised and developing countries. For example, there are various stages in the food supply chain, from food production to disposal, and food wastage occurs at each of these stages. According to the World Resources Institute, Southeast Asia generates 17 percent of global food waste, 37 percent of which occurs at the handling and storage stage of the supply chain, which is in stark contrast to only 6 percent in North America.<sup>8</sup> This is one area where Asia can re-evaluate current measures, and make conscious efforts to improve the situation.

In the battle to overcome food wastage, there are many successful case studies that demonstrate how it is possible to overcome the challenges of adopting circular economic principles. Many start-ups have shown that going green can be profitable if the business is built upon a sound strategy. One positive example is EcoScraps in the United States. Founded by Daniel Blake and Craig Martineau, the company recycles food waste into useful gardening

products. These entrepreneurs believe that the key to their success is streamlining the production process, producing high quality compost, and collaborating with large retailers like Costco and Home Depot to carry their product line. Within two years of inception, the company managed to raise US\$1.5 million and has plans to further expand its operations.<sup>9</sup>

Government intervention to reallocate responsibilities amongst different stakeholders is another means of reducing food waste. For example, in 2016, France became the first country to ban supermarkets from throwing away food, forcing them to donate it to food banks or charities. Under the legislation, supermarkets with a footprint of 400 square metres or more have to sign donation contracts with charities or face a penalty of up to US\$4,200. This newly passed law is welcomed by the food banks, which have since seen a 15 percent increase in food donations coming from supermarkets.<sup>10</sup> Although these food banks and charity organisations now enjoy greater diversity and quality of food, they are also responsible for ensuring that this influx of products is stocked in proper hygienic conditions. Without proper logistics, such a command and control approach may prove to be equally inefficient as the original food waste problem.

In Singapore, 'Food from the Heart', a non-profit voluntary food distribution programme, receives unwanted food from supermarkets and redistributes them to the less fortunate. Their model addresses the food waste issue by matching supply to demand in the sharing economy. To ease the logistics challenges of food distribution, 'Wheels4Food', a hybrid web and mobile shared-value platform was developed at Singapore Management University's (SMU's) School of Information Systems to facilitate the matching process, and crowdsource volunteers to deliver food items to those in need.<sup>11</sup>



## Tired of tyre waste

Like the food waste problem, scrap tyres represent another low-hanging fruit. It is estimated that about one billion scrap tyres are generated every year, and another four billion are stockpiled across the world.<sup>12</sup> Tyre landfills are undesirable because they are breeding grounds for mosquitoes and other disease-carrying pests. It is also common for these landfills to catch fire (that is notoriously difficult to extinguish) and release thick toxic smoke. To make matters worse, the global tyre industry is expected to increase 4.3 percent annually through 2017, with Asia Pacific being responsible for two-thirds of the growth in demand.<sup>13</sup> In some developed economies, the end-of-life recovery rate for tyres is generally high. For example, in 2010, the EU's recovery rate for end-of-life tyres stood at approximately 96 percent.<sup>14</sup> However, this is not the case for developing countries in Asia due to the lack of infrastructure and minimal government regulations. In Asia, end-of-life tyres are routinely disposed of in landfills, or by other methods such as burning, which have a harsh impact on the environment. The low recovery rate, coupled with a likely increase in the production of tyres, will undoubtedly accelerate environmental degradation. This problem needs to be addressed before the situation worsens.

However, the situation is not all doom and gloom. A tyre recycling survey conducted by the Green Transformation Lab, a DHL-SMU industry-academic research collaboration entity, showed positive and reassuring results: 95 percent of the respondents to the survey that involved Asia's tyre industry stakeholders and environmental agencies, feel that recycling of scrap tyres is relevant, while 76 percent see logistics as a potential solution.<sup>15</sup>

Currently, there are over a hundred products that use recycled tyre rubber. This goes to show that a huge market for end-of-life tyre rubber already exists. One of the biggest uses of scrap tyres is in cement production. Other examples include boat bumpers, artificial turf, playground tiles and shoe soles. Asia can look to the U.S. scrap tyre industry as an example and turn its scrap tyres into useful materials for reuse. In 1990, about one billion scrap tyres were in stockpiles in the United States. At the end of 2015, 93 percent of those tyres had been cleaned up, with only 67 million remaining.<sup>16</sup> Described as the greatest success story in the history of recycling, studying how the U.S. handled its scrap tyres can equip Asia with the knowledge to confidently venture into appropriate and effective sustainability efforts (refer to Figure 3).



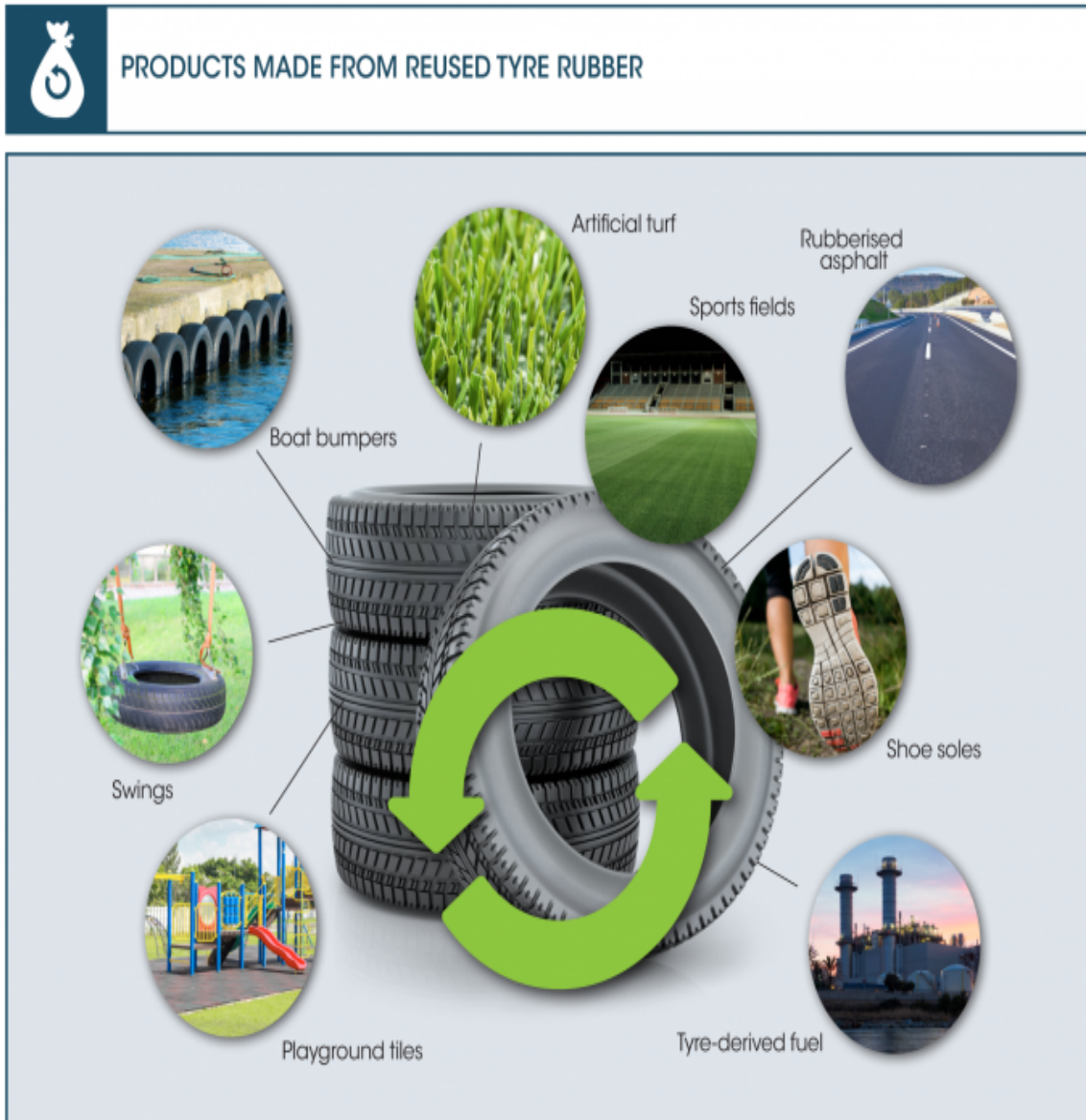


FIGURE 3

The government can also play a huge role in the mitigation of tyre waste. In the EU, a legal framework has been established to shift all scrap tyre management responsibilities to manufacturers. A reporting obligation with the authorities also allows clear traceability through the supply chain. By forcing the tyre producers to take back the unwanted tyres, the dispersion of scrap tyres can be reduced to several consolidated areas. Some tyre producers also set up self-funded companies to aid in collection. On top of that, the manufacturing companies are encouraged to innovate and find more cost-effective ways to recycle scrap tyres.

According to the World Business Council for Sustainable Development, the U.S. and the EU dump 14 percent and 16 percent of their scrap tyres into landfills respectively, whereas 85 percent of tyres in New Zealand go into landfills.<sup>17</sup> However, even when proper regulations are in place, costs must still be managed. For example, end-of-life logistics costs for tyres can be brought down by shredding the tyres, thereby reducing the volume by 75 percent and making transportation about 30-60 percent cheaper.<sup>18</sup> Once again, the combination of efficient logistics in conjunction with government regulations is essential.

## Closing the loop

Adopting the circular economy can only be sustainable if the business is able to reconcile economic and environmental concerns. This implies that any effort of circularity has to be built on top of a positive business case. While going green opens up new market opportunities that have the potential for wealth creation, businesses need to be able to identify these opportunities and seize them with a well-planned strategy and a focus on innovating new technologies and business processes.

Collaboration and outsourcing certain business functions often yields increased productivity and efficiency. This will become even more important in the circular economy as logistics processes become more complex. In a competitive environment, it may be wiser to work with a logistics service provider. At the same time, business and government should work together on crafting feasible regulations that align with competitive forces and socio-environmental sustainability, in short, the circular economy.

The concept of circular economies drives optimal resource efficiency. This means that resources should be fully utilised throughout the product's lifecycle. To achieve this, businesses have to plan through the entire product life cycle, beginning from design to end-of-life. Designing products for a circular economy is not as simple as it sounds. The move will require take-back schemes and products designed for easy upgrade or reuse. Businesses typically focus on the manufacturing, packaging, marketing and point of sale of a product. Now they must rethink how to ensure their products will not eventually end up in a landfill or an incinerator. This will require innovative business models as well as new policies and regulations to change the rules of the game (refer to Figure 4).

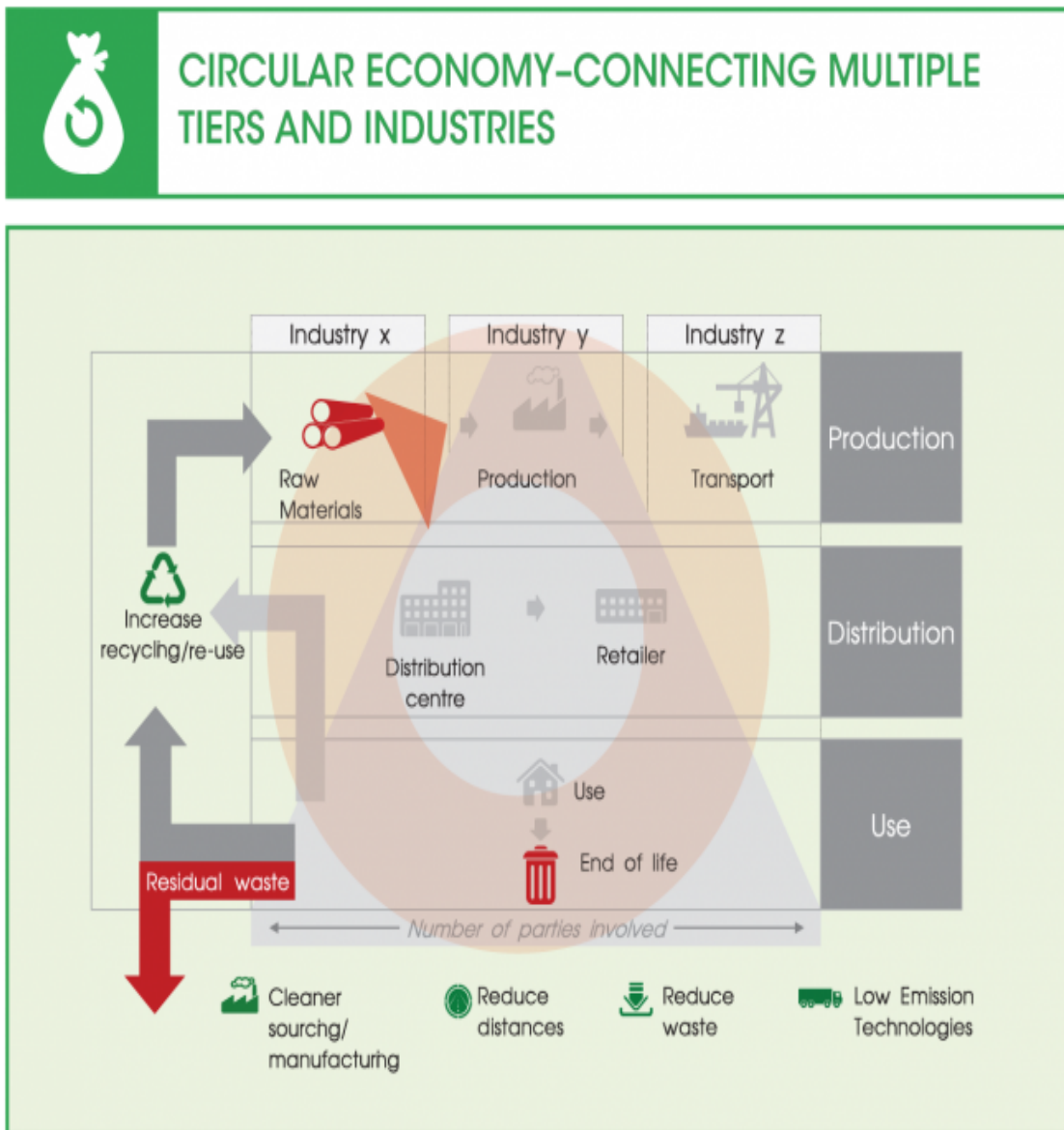


FIGURE 4

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*By Tan Kar Way, Marcus Ong Jiong Kai, Sijie Ho and Michelle Kan*

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