



# CASE STUDIES

## Heng Hiap's PLASHAUS Closing The Loop & Advancing Plastic Recycling In Malaysia

August 2020

Case Studies Authors :  
Jacqueline Chang  
Tze Ni Yeoh  
Melissa Tan



CIRCULAR ECONOMY  
CLUB  
Johor Bahru



## Heng Hiap's PLASHAUS Closing the Loop & Advancing Plastic Recycling in Malaysia Pasir Gudang, Johor (Malaysia)

### ***Key lessons on Smart Plastic Management covered in the case study:***

- **Integration for Efficiency:** HHI addressed their existing weaknesses by integrating their traditionally fragmented 10-step recycling process into a single value chain process which was able to increase productivity, efficiency and quality.
- **Implementing the 'ABC' pillars of action to motivate staff:** HHI's strategic approach to implement circular economy within their value chain was to inculcate *Agile Activism*, *Business Breakthroughs* and *Create Change* as part of the organisation's culture.
- **Customizing 'Smart Plastic':** HHI's *5Cs framework - Collect, Convert, Co-Create, Champion & Conscientious Consumer* is an internal framework applied to drive key innovation & business breakthroughs that contributed to their key successes in closing the loop in relation to smart plastic management as a circular recycler.
- **Activating supply by informal sector empowerment:** The company has built a network of 28,000 reclaimers and collectors where reliable supply of plastic contributes to increasing recycling rates.
- **Growing conscientious consumerism and creating market opportunities:** HHI collaborates with schools & youth groups on educational programmes on the importance of being a conscientious consumer. HHI also exports about 70% of its outputs to more than 33 countries to date (main markets are Southeast Asia, India, Japan and Australia).
- **Management of intellectual property in a circular economy:** To date, HHI has filed 1 trademark and has 17 patents pending in relation to technologies applied to process post-consumer resin into upcycled materials and alternative energy.

### ***Executive Summary***

This case study describes Heng Hiap Industries (HHI), an advanced recycled plastic manufacturer in Malaysia. PLASHAUS is HHI's in-house ocean plastic brand that was created in 23<sup>rd</sup> May 2017 as a result of successful innovations and collaborations with their partners and co-creators. PLASHAUS is a key example of a circular economy innovation that converts Ocean Bound Plastic (OBP)<sup>1</sup> to upcycled finished goods; creating fully sustainable, closed loop systems, where resources are re-used, recycled as part of its circular design and solutions. As noted by World Economic Forum, "Smart resource use and business models that do not rely on natural resource extraction (extraction of oils and minerals) are a huge untapped field for innovation and for a

---

<sup>1</sup> Ocean Bound Plastic is defined as plastic that has not yet found its way into the ocean and is classified as "mismanaged waste." That is, plastic that is not being collected and not likely to be collected and is found on the ground within 50 kilometres of a waterway or coastal area [online]. Available at <https://www.nextwaveplastics.org/faq> (Accessed on 24 July 2020).

new model of growth”<sup>2</sup>. This case study illustrates how an advanced recycling company in Malaysia applies smart resource use in their ‘Smart Plastic’ management and business model to capture market opportunities to innovate and create products which are resource-friendly.

## ***Introduction***

HHI’s Founder and Managing Director, Mr. Seah Kian Hoe, grew up in a family of recyclers and helped with the family business since he was a child. Coming from humble beginnings, he was motivated to expand and modernize the family’s 35 year old business of recycling in Malaysia. When he was given the opportunity to pursue his studies abroad, he decided to study engineering and specialized in re-engineering of plastic at graduate school. After completing his MBA under a Fulbright scholarship, Mr. Seah returned to Johor, Malaysia and established HHI in 2002. HHI is now one of Malaysia’s top recycling companies with a large export market. One of the company’s ground-breaking innovations is transforming plastic scrap into ‘Smart Plastic’ products, which can be used in highly specialized niche applications by customising recycled plastic such as rPP and rHDPE pellets to ‘on spec material’<sup>3</sup>, upcycling of Ocean Plastic and rPET products. Some of the unique features of HHI’s PLASHAUS ‘Smart Plastic’, are colour and properties customization, including fire retardant plastic, fast cycling, antibacterial properties and many more<sup>4</sup>. The PLASHAUS brand currently services 8 different industries<sup>5</sup>. PLASHAUS’ journey has grown and now it also services the manufacturing and commercialising of *Louvre Chairs*<sup>6</sup> and *120 chairs*<sup>7</sup> made from 100% OBP with co-creator KIAN. This innovation & collaboration with KIAN provides a critical case study on how circular recyclers enable and successfully roll out circular innovations. **Figure 1 below** depicts the manufacturing process of the Ocean Plastic chairs.

---

<sup>2</sup> Thirlway, C. (2020), “Sustainability and the Circular Economy” WIPO Magazine, Issue 1/2020 March [online]. Available at [https://www.wipo.int/wipo\\_magazine/en/2020/01/article\\_0002.html](https://www.wipo.int/wipo_magazine/en/2020/01/article_0002.html). (Accessed on 31 July 2020).

<sup>3</sup> This means it is tailored according to product specifications by the client to HHI.

<sup>4</sup> Please refer to Heng Hiap’s website available at [http://henghiap.com/?page\\_id=31](http://henghiap.com/?page_id=31)

<sup>5</sup> These 8 industries are gardening, household, paint bucket, industrial handling, automotive, home appliances, construction and HDPE pipes.

<sup>6</sup> The Louvre Chair made from 100% Ocean Plastic (OP) is inspired by the American Midwest style and Shaker craftsmanship and is stackable & lightweight with an open backrest. It reinterprets the design of traditional wooden chairs and utilizes the quality of modern plastic injection moulding technology. It can be used indoors and outdoors.

<sup>7</sup> The 120 chair is also made from 100% OP inspired by a triangle’s inherent strength. Look for the chair’s unique feature of three 120° angles, adjacent to each other, forming the joint between the front leg and the chair seat. For more information please visit <https://www.home.kian.com/> and <http://henghiap.com/>

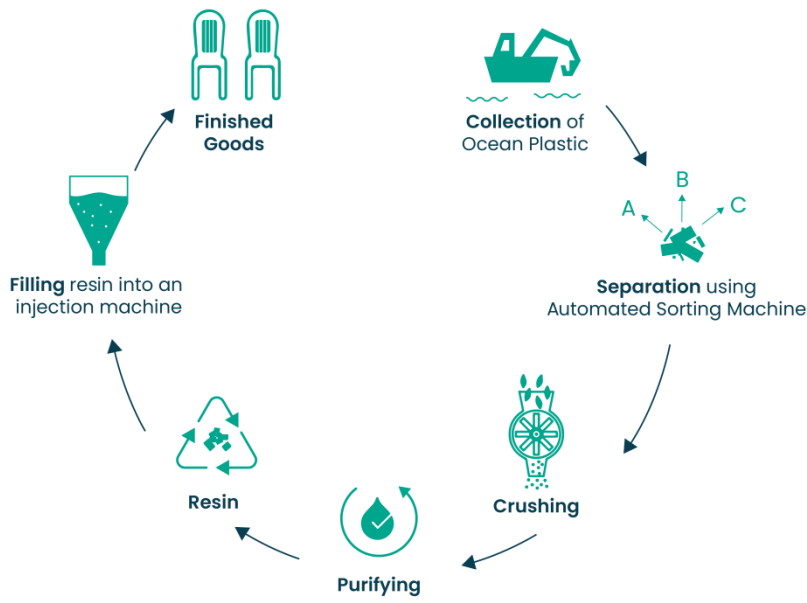


Figure 1: Closing the Loop – The Ocean Bound Plastic Journey at PLASHAUS

### ***Marine Litter and Ocean Bound Plastic***

The plastic industry is one of the fastest growing industries globally. Annual production of plastic increased by nearly 200-fold between 1950 and 2015<sup>8</sup>, due to wide adoption of plastic as a material in packaging, construction, textile, among other industries. In recent years, however, the plastic as well as the petrochemical industry have experienced significant backlash in light of climate change and severe ocean plastic pollution.

Relative to virgin plastic, recycled plastic is less carbon intensive. Life cycle analysis of using recycling plastic in substitution of virgin plastic exhibit a reduction of greenhouse gas emissions by 20-50%<sup>9</sup>. Nevertheless, in developing countries, plastic recycling is often carried out by the informal sector (e.g. in Vietnam, Indonesia) which results in low-quality pellets which may not meet safety standards. A lack of waste treatment infrastructure also results in low efficiency and high risk of polluting following the recycling process. 2020 saw further challenges to the plastic recycling industry driven by low commodity prices (which drove down the price of virgin plastic) and disruptions of scrap collection due to COVID-19 restrictions.

<sup>8</sup> Ritche H., and Roser M. (2018). Plastic Pollution, Our World in Data [online]. Available at <https://ourworldindata.org/plastic-pollution> (Accessed on 28 July 2020).

<sup>9</sup> d’Ambrières W. (2019). Plastics Recycling Worldwide: Current Overview and Desirable Changes, Field Actions Science Reports, The Journal of Field Actions, no. Special Issue 19.

In 2015, it was reported that waste estimates were carried out by a group of scientists during 2010 where top 20 countries were ranked by mass of mismanaged plastic waste. Malaysia was part of that study and was ranked 8<sup>th</sup> at that time<sup>10</sup>. The Malaysian government has since recognized marine litter as a global, transboundary issue and multidisciplinary challenge, which requires both integrated national and regional cooperation. Experts estimate that 80 percent of marine debris comes from land-based sources with the majority coming from a relatively small number of coastal and riverine urban areas where rapid growth and economic development is outpacing waste management systems. According to Circular Economy Club Malaysian chapters<sup>11</sup>, plastic waste and packaging is ranked second after food waste at 13.2 percent in the municipal solid waste composition in Malaysia and is generated mostly from households and ICI (industrial, commercial and institutions) sectors.

OBP is a major source of ocean plastic pollution and making sure it is collected and not abandoned in the environment is the most efficient and economical solution to this major environmental issue. Studies by the Ocean Conservancy and the Trash Free Seas Alliance identified that improving waste collection and management systems as the fastest way to prevent and reduce marine litter in the near term, but that it is highly unlikely that government funding alone will be sufficient to build the necessary systems. There is a pressing need for a collective and coordinated vision and long-term strategy for the country to ensure that robust national actions are taken to address marine debris strategies for strong collaboration. Without immediate action, marine debris pollution may negatively impact marine biodiversity, environment, health, society and economy.

## ***Growth Strategy***

Considering the challenges above, HHI sought to differentiate itself from its competitors through three main growth strategies.

- I. Innovation and technology:*** Since its establishment, the company sought to create and adopt more efficient technologies to enhance the recycling process. Early innovations aimed at designing and acquiring technology to create a fully integrated recycling process. Integration of the 10-step process of recycling (automatic sorting, crushing, automated pre-treatment line, drying, granulating, fill station, blending silo, extrusion, silo and metal separator) allowed the company to achieve higher economies of scale and ensure a consistent quality throughout their processed batches. Physical integration of the industrial process led to a decline in logistical cost of about 60% and 40% in labour cost.

The team at HHI is cognizant of the limits of mechanical recycling. The company is currently investing resources in R&D and infrastructure towards two new processes: pyrolysis and

---

<sup>10</sup> Jambeck, J.R. et al. (2015). Plastic waste inputs from land into the ocean [online]. Available at <https://science.sciencemag.org/content/347/6223/768> (Accessed on 31 July 2020)

<sup>11</sup> Circular Economy Club Malaysian chapters conducted two stakeholder consultations with key stakeholders on 29 June and 2 July this year for a stock take on Malaysian cities' top 5 challenges.

the making of 'new coal'. While these processes are yet to be commercialized, the company is able to generate its own energy from diesel and coal from pyrolysis to power its factories.

- II. Targeted products:** HHI observes that there are two product markets in plastic: The *Survival Market* vs. the *Sustainability Market*. In the Survival market, products compete on the basis of pricing. The cheaper, the higher the demand. This market favours low-cost producers i.e. virgin plastic producers given the current low commodity prices. In the Sustainability market, products can sell at a premium due to higher quality on-spec materials and in accordance with the sustainability criteria.

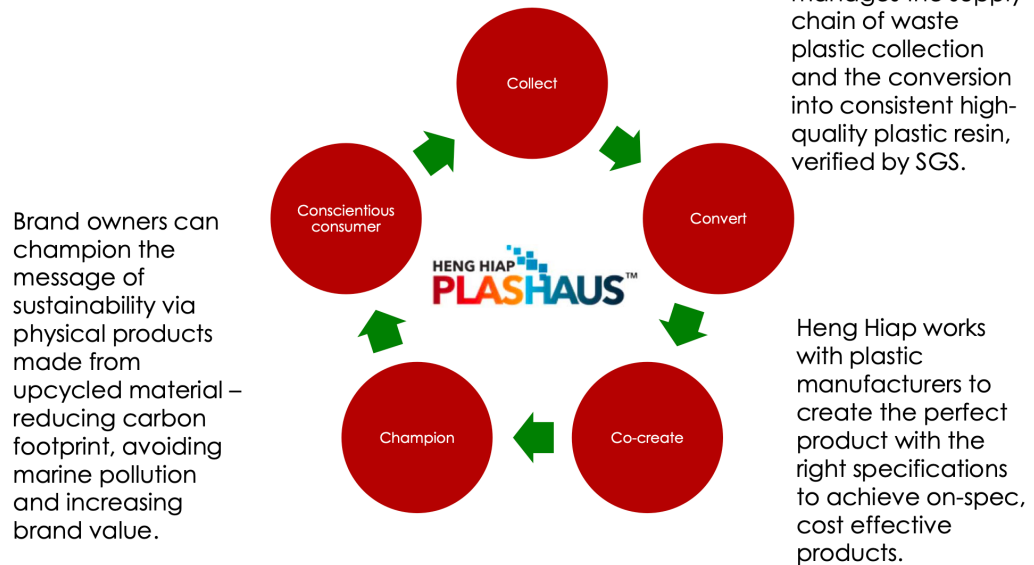
HHI mainly chooses to create market opportunities in the Sustainability Market, where they see better long term prospects due to increasing stringency in environmental regulations and the rise of ethical and sustainable consumerism. The Sustainability Market rewards innovations and focuses on the provision of more circular, ethical and high-quality products made from 100% Ocean Plastic or PLASHAUS' customized resins.

- III. Activating the circular value chain through 5Cs- Collect, Convert, Co-Create, Champion and the Conscientious Consumers:** The guiding principle of HHI projects and collaborations are guided by PLASHAUS' internal Circular Economy 5Cs *framework* as depicted in **Figure 2 below**. The company, being a specialist in the collection and conversion of plastic scrap, is able to contribute expertise and quality inputs to a collaborative arrangement to mitigate plastic pollution and to close the plastic loop. Collaborations with industry players, such as multinational corporations, that can contribute to the 5Cs *framework* involves:

**Collect** or receive supply of reclaimed Ocean Plastic (OP) through HHI's extensive network  
**Convert** OP into consistently high-quality raw materials for manufacturing  
**Co-create** by collaborating with other plastic manufacturers to create new products  
**Champion** by championing the use of OP to bridge the gap and complete the PLASHAUS circular economy. An example is PLASHAUS and KIAN fulfilling the 4Cs and growing the conscientious consumers opting for OP and to encourage others to do so.  
**Conscientious Consumerism** where brand owners champion efforts to ensure their physical products made from upcycled materials are readily available in the markets and properly labelled to educate consumers on circular plastic.

In summary, customized recycled plastic products succeed when there are synergistic needs and constructive dialogues. The ultimate goal is to "Co Create" products which are both commercially viable and have strong environmental co-benefits in diverting plastic waste from landfill and grown the pool of conscientious consumers to shift towards supporting the Sustainability Market.

### The PLASHAUS Circular Economy



© Heng Hiap Industries Sdn Bhd, 2020

Figure 2: PLASHAUS in-house 5Cs framework

### ***Growing market opportunities: Conscientious Consumerism***

The trend of rejection of plastic by consumers stems from a narrative of plastic being a flawed material in a broken recycling system, leading to environmental pollution and contribution to carbon emissions. Consumers’ appetite for plastic has gradually weakened with disposables vilified, and plastic-free alternatives vying for consumers’ attention.

The COVID-19 pandemic however has reintroduced and normalised the public sentiment that plastic is disposable, instead of a resource to be recovered back into the production cycle. Across the region, countries such as Thailand, which banned single-use plastic bags in major stores in January, is now seeing increases in the proportion of plastic waste in almost all cities<sup>12</sup>. In Singapore, estimates suggest that the eight-week lockdown generated an additional 1,334 tonnes of plastic waste.<sup>13</sup> The response to this pandemic has increased plastic waste, driven by increased ‘throwaway’ habits, i.e. consumers discarding items without attempts at recovery, citing sanitary reasons to secure public health - a situation further aggravated with temporary suspensions of recycling collection, temporary discontinuation of reusable and refill programs

<sup>12</sup> Dr. Simachaya, W. (2020). Solid Waste During COVID-19, Thailand Environment Institute [online]. Available at [http://www.tei.or.th/en/blog\\_detail.php?blog\\_id=49](http://www.tei.or.th/en/blog_detail.php?blog_id=49) (Accessed on 31 July 2020)

<sup>13</sup> Elangovan, N. (2020). Singapore households generated additional 1,334 tonnes of plastic waste during circuit breaker:Study [online]. Available at <https://www.todayonline.com/singapore/singapore-households-generated-additional-1334-tonnes-plastic-waste-during-circuit-breaker> (Accessed on 31 July 2020)

and no available facilities to handle widespread public use of plastic protective equipment (“PPE”) and other types of plastic not commonly accepted for recycling.

Despite the setback, conscientious consumers are a growing segment that supports the transition towards circular products. A recent survey by ING records that more than 60% of consumers are deterred from purchases by companies that are not aligned with environmental sustainability goals. Almost 50% of consumers are willing to pay higher prices for products that are assured to be made in environmentally-friendly ways.<sup>14</sup> Conscientious consumers and HHI share similar objectives to remove plastic from the waste stream and environment, and when aligned creates positive growth in the demand for recycled plastic.

Stakeholders in this segment may benefit from proactively encouraging conscientious consumerism by directly engaging consumers and communities, to:

**I. Create higher quality supply of plastic scrap**

A majority of consumers are not aware of the different types of plastic and their recyclability. Hence, active guidance is needed to train consumers to consume plastic and other materials with end-of-life in mind. For example, consumers should be made aware of the types of plastic that are more difficult to recycle, such as mixed materials, compared to plastic that are readily accepted by local recycling facilities. Higher consumer awareness which translates into better purchasing and recycling practices will increase and create higher quality supply of plastic scrap.

**II. Increase recycling rates by connecting directly to consumers**

Although a Mandatory Waste Separation programme is applied in 8 states in Malaysia since 2015, its implementation has limited take-up rates partly due to access to collection, low consumer awareness and incentives. Collaborations between brand owners with grassroots movements and communities can establish consistent communication, creates a social motivation to participate, connects consumers to existing infrastructure and identifies underserved areas.

**III. Increase market share of recycled plastic**

Recycled plastic offers an appealing middle ground for conscientious consumers to consume plastic with minimal guilt especially when framed as a solution to reduce plastic pollution, such as with salvaged marine litter and OBP. HHI currently collaborates with consumer goods companies in pilot programmes to find recycling solutions for difficult-to-

---

<sup>14</sup> All survey work undertaken by Longitude, a Financial Times company together with ING. (2020). Learning from consumers: How shifting demands are shaping companies’ circular economy transition, A Circular Economy Survey [online]. Available at <https://www.ingwb.com/media/3076131/ing-circular-economy-survey-2020-learning-from-consumers.pdf> (Accessed on 31 July 2020).



recycle products, thus diverting plastic waste from landfill and increasing access to recycled plastic products for consumers

HHI and Ace Edventure,<sup>15</sup> a Malaysian-based education centre focused on developing critical, analytical and independent thinking with real world learning are currently discussing on how to collaborate in a pilot programme. The Rotary Club Johor is also interested to work together with HHI to conduct talks with youths on how to create a sustainability business. Environmental education is key to internalising environmental values into a generation, ideally by leveraging on the structure of a school system. If scaled to a national level and integrated into public and private school systems, it will create a new generation of conscientious consumers by the millions that are empowered to demand action and change as they mature.

### ***Production of Ethical Ocean Bound Plastic: A Viable Circular Solution***

#### ***Key Milestones in Implementing Environmental, Health, Safety & Security Policy***

*2010 IEC (UKAS) Certification in ISO 9001:2015*

*2016 IEC (UKAS) Certification in ISO 14001:2015*

*2020 Adopted Sedex Members Ethical Trade Audit (SMETA) Best Practice Guide*

*2020 NIOSH Certification in ISO 45001:2018*

*2020 Awarded the Global Recycled Standard (GRS)*

*2020 Ocean Bound Plastic Certified by Zero Plastic Oceans (Audited by Control Union, observed by WWF)*

Both HHI and its Ocean Plastic brand, PLASHAUS adhere to the labour, health and safety, universal rights, business ethics and environmental protection standards outlined by the SMETA (Sedex Members Ethical Trade Audit) Best Practice Guide<sup>16</sup>.

To combat the dumping of plastic into the ocean, two bodies — Control Union and Zero Plastic Oceans — came up with the world's first third party-verified label, known as the Ocean Bound Plastic (OPB) Certification to certify goods made out of plastic that was destined to be otherwise dumped into the ocean. In 2019, HHI is the first company in Asia<sup>17</sup> to receive this certification and having this certification helps companies like HHI to complete the chain i.e. collect the waste, process it into on spec material to become raw material for factories when it comes to the collection and recycling of OBP. The material must fulfil industrial standards, so manufacturers

---

<sup>15</sup> ACE is home to Malaysia's first ever entrepreneurial school, which teaches students from the age of 7 how to run profitable, sustainable businesses. For more information please visit <https://endeavor.org/entrepreneur/anne-tham/>

<sup>16</sup> Sedex Members Ethical Trade Audit Best Practice Guide (2019) [online]. Available at <https://cdn.sedex.com/wp-content/uploads/2019/05/SMETA-6.1-Best-Practice-Guidance.pdf> (Accessed on 31 July 2020)

<sup>17</sup> On 23 and 24 July 2020, HHI became the first company in Asia to be successfully audited for OBP Standard Zero Plastic Oceans. The audit took place at HHI facilities, OBP collection points and associated processes in Johor for both the collection and recycling standards of BOP certification for OBP Categories of Shoreline, Waterways and Potential OBP. This audit was carried out by Control Union Malaysia team and observed by WWF Malaysia team as well.

can use it to produce products with standard compliance in order to give ocean plastic a credible second life.

### ***Formalizing the informal sector: 18 years collaboration***

The informal sector plays a prominent role in the recycling value chain in many developing countries. From scavengers to aggregators and micro-recycling enterprises, informality serves as both a challenge and opportunity to the recycling industry. Part of HHI's competitive advantage is working with about 28,000 reclaimers and collectors across the value chain. Many of these players, ranging from individuals that collect scrap from streets to small enterprises aggregating plastic scrap, are part of the company's 'pyramid' structure. Over the years, the company built trust with these informal sector workers that became reliable suppliers of high-quality waste.

As many developing countries sought to upskill, train and increase efficiency of the informal recycling sector, a key ingredient of the equation is "trust and patience" as stressed by Mr. Tey Boon How, HHI's Deputy General Manager who has worked for 18 years building relationships with the reclaimers and collectors. He said that the informal sector workers need to know that they will not be penalized and discriminated against in their dealings with the public sector. Extra scrutiny and additional paperwork that comes with formalization may become insurmountable when trust is absent.

### ***Way Forward: Digitalising Value Chains to Enhance Traceability & Transparency***

In creating the PLASHAUS Ocean Plastic (OP) brand, HHI has created a traceability programme which essentially allows users of the PLASHAUS OP to trace the source of the plastic. This programme allows any third party to verify that PLASHAUS OP is recycled from waste plastic that is found in the vicinity of marine and riverine environments. Going forward, the company is looking to unleashing further efficiencies in their circular solutions by digitalizing their existing integrated recycling system with a smart app & a back end monitoring system which can provide traceability and transparency for all outputs manufactured by HHI. With the launch of the Extended Producer Responsibility (EPR) Scheme for Malaysia this year, digital solutions for HHI will enhance the ability to develop a robust material flow analysis (MFA) and better support the implementation of EPR Scheme for Malaysia<sup>18</sup>.

---

<sup>18</sup> Circular Economy Club Malaysian chapters are connecting HHI with various CE practitioners in the digital space to commence a pilot project with PRO Malaysia which consist of 10 CEOs from the top brand owners in Malaysia. It is important & critical to gain consumer confidence towards manufacturers, including HHI, in their efforts to transition the industry towards a circular economy, verifying their commitments and instil confidence in consumers that players like HHI are not using virgin plastic and is indeed putting words into action to reducing the amount of plastic waste entering the oceans.

**Case Study Authors:**



Jacqueline Chang  
CEC Johor Organiser  
Circular Economy Club, Malaysia  
E:cec.johor@gmail.com



Tze Ni Yeoh  
Member  
Circular Economy Club, Penang  
E: yeohtzeni@gmail.com



Melissa Tan  
Zero Waste Advocate  
Green Guerrilla  
E: melissatan8@gmail.com