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**Marine Debris Mitigation – Plastic Neutrality Through a Credit System in Southeast Asia**

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## Abstract

*Sustainable Development Goals (SDG) 12: Responsible consumption and production and 14: Life Below Water* coincide in targeting the problem of plastic marine litter, which has been garnering immense media attention in the recent years. Efforts to reduce unnecessary plastic consumption have been seen in social movements, corporate policies and most noticeably, in regulatory control in the form of bans for specific types of single-use plastic items. A paradox exists as, arguably, civilization cannot sustain its current developmental momentum without the use of plastics. This is the argument that is seen coupled with mass bans of single-use plastics, including packaging material. However, the larger-than-ever problem of marine litter, though already well in the limelight, still requires much more effective action and solutions. While recovery and collection innovations are underway for application and picking up speed, the unfathomable rate of marine litter entering waterways is still in a completely different echelon. Corporate engagement to manage the plastic value chain in ways that commit to the creation of circular economies is attaining popularity. While reduction and substitution are being considered, the status quo of the scale of the production of plastics is still expected for the next few years as life cycle assessments (LCA), test trials of consumer acceptance towards novel delivery mechanisms and other forms of innovation are emerging. Will the development rate of debris-nullifying innovation catch up with the rate of debris production? What about the existing plastic marine litter dating back from decades ago?

Responsible production has long adopted the concept of credits. Carbon credits are the most notable one, while palm oil credits are also prominently purchased by manufacturers to offset any palm oil content that is not yet sourced from certified sustainable suppliers. The concept of plastic credits has been proposed but remains much less explored than their counterparts for other commodities. “Plastic neutrality” in the form of credit purchasing by manufacturers is one of the final missing pieces of the puzzle picturing a circular economy. In theory, the credit system could serve as an inseting/offsetting mechanism to recover from nature an equivalent or higher amount of plastics to be produced by the credit-purchasing responsible manufacturer. This paper explores how plastic neutrality through Plastic Credits, similar to the existing carbon and sustainable palm oil credits, could be applied in Southeast Asia.

*Keywords: marine litter, plastics, responsible production, Southeast Asia*

## Introduction

Credit systems have long been in the field of environmental protection – they give the “operating right” for companies to produce, consume or emit certain products or by-products that are coupled with known externalities or undesirable practices that have a negative impact on the environment (van Riel, et al. 2013). The most noteworthy and well-known environmental credit system is arguably the carbon credit system. Through the purchase of credits, individuals and organizations can more sustainably procure, produce and consume certain commodities, products or by-products and address the environmental externalities in various ways, either by offsetting or a newer concept that is called insetting (Gallemore and Jespersen 2019)(Figure 1). Carbon offsetting is normally referred to as reducing an entity’s carbon footprint according with the amount of carbon-equivalent of greenhouse gases (GHG) that would be produced by the entity’s value chain by purchasing credits from an external compensation project that generates a carbon-negative effect (Cooper 2018). On the other hand, similarly, carbon insetting pursues a similar reduction of carbon footprint, but in this case, by compensating for the carbon footprint through projects within the value chain of the entity (Cooper 2018).

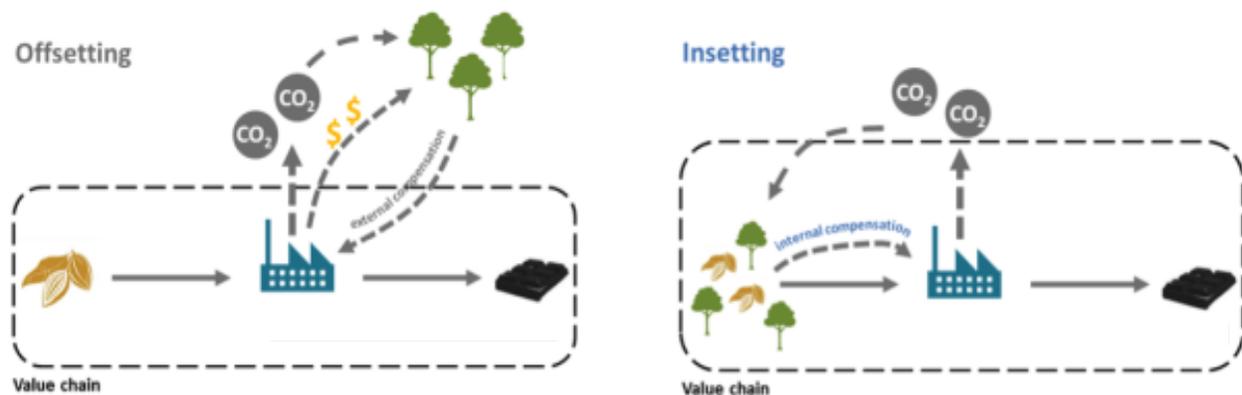


Figure 1 Carbon offsetting vs. insetting (Plantations International 2020)

## Case studies: Existing credit systems to account for environmental externalities in manufacturing

### 1. Carbon credits – mitigating climate change

At the end of the previous millennium, the concept of offsetting was made known to the world through the *Kyoto Protocol*, its objectives being to reduce GHG emissions to mitigate and alleviate global climate crises (UNFCCC 1997). Under the *Kyoto Protocol*, there are many options from which a business entity can purchase carbon credits – one such example forestry projects, which produce wood for fuel to replace fossil fuels and energy-intensive materials, as well as generate trees that absorb carbon dioxide (van der Gaast, Sikkema and Vohrer 2016). With the purchase of credits from projects that are reducing carbon emissions, businesses can compensate for their emissions of greenhouse gases necessary for their planned productions (Bumpus and Liverman 2008). In theory, the total amount of global GHG emissions could be controlled through the buying and selling of carbon credits through this trading process (Gupta

2011). It is also important to note that carbon credits act as supplementary ways to reduce one's emissions from their own controllable surroundings, be it a household, a company or a country, and not as the primary way (Bumpus and Liverman 2008). As per the *Kyoto Protocol's* First Commitment Period, primary carbon reduction is done in the form of an actual reduction of GHG emissions within the respective committed nations (UNFCCC 1997).

## 2. Certified sustainable palm oil credits – preventing biodiversity loss and conserving habitats

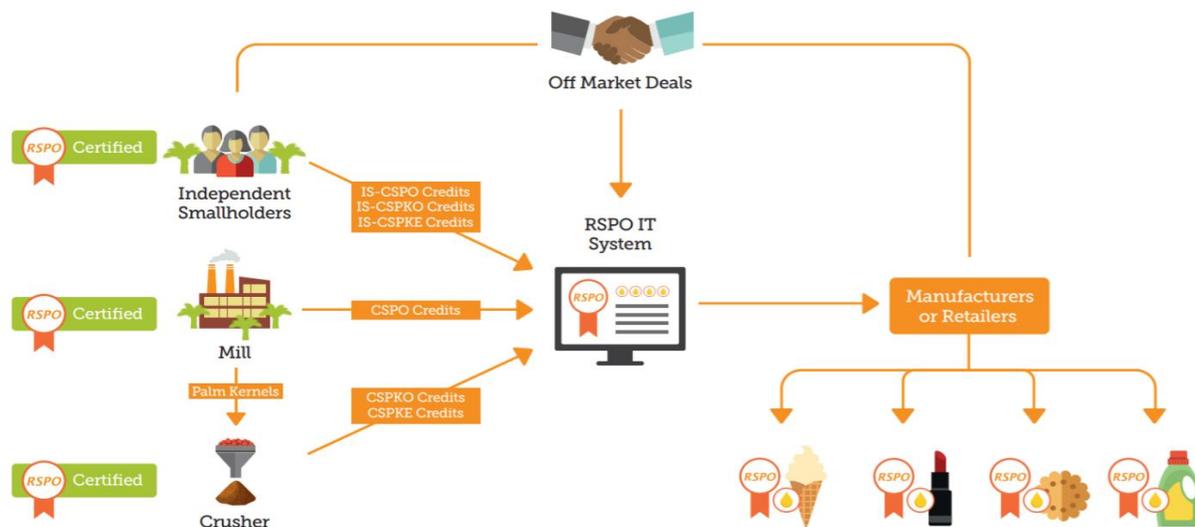


Figure 2 RSPO Certified Palm Oil Credits

Palm oil, one of the most voluminous agricultural products in the world, has been a controversial commodity with its production methods and externalities heavily criticized (Gassler and Spiller 2018). The most significant environmental issue linked to palm oil production is the deforestation of primary and secondary forests (Ivancic and Koh 2016). The negative impact of deforestation is further amplified when taking place within the borders of the two largest palm oil-producing countries of the world, Indonesia and Malaysia, home to approximately 11% of the world's remaining tropical forests and important habitats for the biodiversity-abundant area (Ivancic and Koh 2016). Other environmental detriments associated with palm oil production include the slashing and burning that produce haze and GHG emissions and irreversible conversion of peatland to plantations that lead to biodiversity decline (Lam and Lee 2011).

In response to a pressing global call for sustainably produced palm oil and to promote sustainable palm oil and oil palm products through a reviewed set of standards, the Roundtable on Sustainable Palm Oil (RSPO) was founded in 2004 by the World Wide Fund for Nature (WWF) and producers and buyers of palm oil (Roundtable for Sustainable Palm Oil 2020). Within the multilayered system of RSPO-certified sustainable palm oil classification, RSPO offers a credit system as an entry point to sustainable palm oil sourcing of which buyers of palm oil could choose to buy in lieu of physical certified sustainable palm oil (RSPO 2020). According to RSPO, by buying credits, buyers of palm oil would contribute to the creation of a higher demand for sustainable palm oil products in the global market.

Palm oil credits were marketed under the GreenPalm system until 2017 (Roundtable for Sustainable Palm Oil 2020). Since then, RSPO Credits, also known as Book & Claim, have been sold to buyers of palm oil (RSPO 2020) (Figure 2). In the context of crude palm oil, one RSPO Credit represents one metric tonne of certified sustainable palm oil distinctively produced by independent smallholders. Every credit that is purchased would provide a premium to a producer that has produced one metric tonne of palm oil in accordance to the RSPO Principles and Criteria (Roundtable for Sustainable Palm Oil 2020). Benefits of the palm oil credit system for the buyer include having no sourcing changes from the supply chain point-of-view – the organization could offset up to the entirety of their palm oil supply through purchasing the full volume of their palm oil consumption in RSPO Credits, in the meantime, the supply chain does not need to adopt any actual changes and replace all of their raw materials composed of oil palm to RSPO certified sustainable palm oil alternatives. The downsides for the sustainability of palm oil production in having the credits is that while buyers of RSPO Credits have offset their palm oil supply with the credits, the actual demand for physical certified sustainable palm oil would not change until the buyer commits to a sourcing change to physically adopt RSPO certified sustainable palm oil.

## Background: Plastic marine litter crisis and solutions thus far

Plastic marine litter has been reported as an environmental problem as early as the 1970s (Bergmann, Gutow and Klages 2015). Using current growth figures for future projections, the flow of plastic into the ocean per year will almost triple by the year 2040 to 29,000,000 metric tons, which equals to having 50 kg of plastic litter per metre of coastline across the world (Pew Charitable Trusts, SYSTEMIQ 2020). East Asia and the Pacific, inclusive of Southeast Asia, is the source of an astounding 60.6% of global mismanaged plastic waste (Ritchie 2018). Five of the top ten countries with the highest mass of mismanaged plastic waste are in Southeast Asia (Jambeck, et al. 2015). There are arguments that plastic marine litter is a problem of waste management, as studies show that land-based marine litter has increased over the last few decades (Bergmann, Gutow and Klages 2015). Yet leakage is not the only cause of the problem, the continued growth of plastic consumption, despite the issue of marine litter coming into public knowledge in recent years, is said to be the contested top cause of increased plastic marine litter. According to WWF, plastic leakage in oceans will continue to be over 9,000,000 metric tons per year until 2030 due to the discrepancy between the growth in waste management capacity with the even faster growth in plastic consumption (WWF 2019).

After the Fifth International Marine Debris Conference held in Honolulu in 2011, a framework for comprehensive and global effort to reduce ecological, human health, and economic impacts of marine litter was created – the *Honolulu Strategy* (UNEP and NOAA 2011). In the *Honolulu Strategy* document, the first of 3 goals that were identified as the components of the strategic framework is Goal A: Reduced amount and impact of land-based sources of marine debris introduced into the sea (UNEP and NOAA 2011). Contributing to Goal A are 7 sub-strategies, none of which include any ideas for the reduction of the production of plastics, while the reduction of solid waste was mentioned aplenty as a recommended way to prevent marine litter (UNEP and NOAA 2011). From around 2015, the discussion of marine litter solutions has significantly shifted from education and the collection or recovery of marine debris to circular economy and accountability of producers of plastics (WWF 2019, Williams and Rangel-Buitrago 2019).

Legislative interventions, including bans and levies on the consumption of day-to-day, free to obtain disposable plastic items, became a popular approach for countries around the globe. Recent studies have argued that the curbing of vast amounts of plastic waste produced is a much-needed measure to address the growing marine litter problem (Walker and Xanthos 2018, Gallo, et al. 2018). The impetus to legally limit the amount of single-use plastics produced is driven by the growing voice from the international academic community, calling for governments to intervene by imposing sophisticated policy frameworks from the points of design and production (ten Brink, et al. 2018, Gallo, et al. 2018). As of July 2018, 127 countries out of 192 countries studied have adopted some form of regulation or measure for plastic bags (UNEP 2019). To name a few examples in Asia, India has imposed bans on plastic bags in 2002 and 2005, while Hong Kong has adopted a plastic bag levy as early as 2009 (Xanthos and Walker 2017). Nevertheless, no significant legislative change has been seen in the area of consumer product packaging so far. Despite the recent effort to escalate legislative intervention to prevent marine litter, studies have identified potential gaps, which include the limits of existing policy instruments, deficiencies in the legislation and poor enforcement of regulations, sporadic international or regional cooperation and the lack of science-based data on marine litter (Bergmann, Gutow and Klages 2015). In Southeast Asia, namely the Association of Southeast Asian Nations (ASEAN), the legislative framework for packaging material sustainability is non-existent, while rapid population growth and economic development leading to increased consumption in the region is leading to severe deficiencies of standards in prevention of plastic marine litter (UNEP SEA circular 2019).

A region of numerous success stories in achieving very high recycling rates, the European Union (EU) has strategies to address the planned targets throughout the plastic supply chains from an end-to-end point of view – beginning with product design to covering post-consumer and end-of-life, by means of stimulating regional capacity of recycling and warranting demand for recycled plastics, as well as implementing legislature (Filho, et al. 2019). Extended producer responsibility (EPR) schemes, first introduced by Thomas Lindhqvist in 2000, have had positive effects on recycling rates in countries that have refined implementation to mandate the collection and ensure technical recyclability (Lindhqvist 2000, Filho, et al. 2019).

## Circular economy development in Southeast Asia

Grass-root movement in the developed world has been even more demanding than recommendations by academia – there are now challenges for a zero-waste lifestyle, mass criticism directed towards manufacturers and retailers on the amount of plastics in their products, and even businesses that have committed to drastic reductions in plastics (Jennings 2019). Moreover, in the search for alternatives to replace plastics, studies have shown that properties of plastic polymers that protect food products outweigh known environmental costs of alternatives, such as water and energy consumption, in LCAs (Abejon, et al. 2020, Humbert, et al. 2009). Reusability became a topic of discussion among consumers who are conscious of their plastic footprint. Non-packaging single-use plastic items, most notably, cups for made-to-order beverages and plastic bags for groceries, have been widely suggested to be replaced by “bring-your-own” reusables since the early 2010s (Wabnitz and Nichols 2010). As for on-product packaging, Accorsi et al. have conducted LCAs on reusable containers for food catering and compared results with conventional single-use material such as plastics. Results indicate that the environmental impact of reusables is highly dependent on disposal policies and

transportation (Accorsi, et al. 2014). As for perishables, pharmaceutical and medical products, and other products that rely on individual or pressure-resistant packaging, no peer-reviewed LCA research has been found on reusable packaging, possibly due to lack of practical alternatives. To strike a balance between impactful reductions in plastic packaging use and other environmental costs such as carbon footprint in logistics and food waste, businesses are stuck between a rock and a hard place, as few researchers can proclaim that the plastic marine litter crisis should be prioritized over global climate crises. In addition to all environmental concerns, economic feasibility is an impenetrable wall that new solutions, no matter how environmentally friendly, cannot traverse unless they offer pricing that is remotely competitive compared with plastics.

In one study conducted in five countries in Southeast Asia, 91% of consumers consider themselves concerned about plastic waste issues, while only 38% are interested to recycle or convert their waste into useful products (UNEP SEA circular 2020). Consumer action to recycle alone would not be sufficient to create a circular economy for plastics in Southeast Asia. It is necessary to have a system in which businesses are incentivized to adopt recycled material, and therefore create demand for recycling. Southeast Asian private-sector concern about plastic waste issues is reassuring – 82% of surveyed businesses feel extremely concerned, while fewer than half feel their current efforts are enough to mitigate the problem (UNEP SEA circular 2020).

## Discussion: Plastic neutrality – a marine litter prevention proposition for plastic-generating businesses in Southeast Asia

Multinational corporations (MNCs) such as German consumer goods giant Henkel and Swiss pharmaceutical mogul Novartis have published global “zero-waste” or “plastic neutral” sustainability goals on packaging, namely becoming zero-waste by 2025 through closed-loop recycling and plastic neutral by 2030, respectively (Henkel 2020, Novartis 2020). However, with prices of crude oil, the petrochemical raw material for plastics, reaching an all-time low at negative price points (Apergis and Apergis 2020), the relatively infinitesimal cost to manufacture virgin plastics is driving recycled plastic out of competition, rendering recycling an irrelevant and

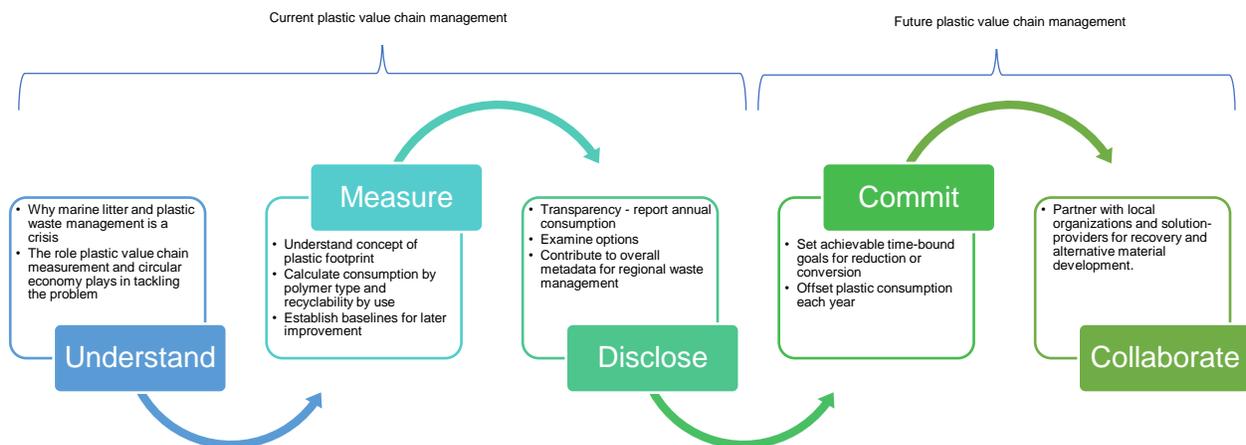


Figure 3 Proposed step-by-step strategy for Southeast Asian businesses to become plastic neutral

undesirable process. Heightened difficulty to source quality recycled plastic could hinder businesses to commit further towards plastic neutrality.

A series of steps inclusive of understanding, measuring, and disclosing current plastic footprint, and committing and collaborating to reduction and neutrality is proposed to form an overall strategy to facilitate Southeast Asian business commitment towards a circular economy and plastic neutrality (Figure 3 Proposed step-by-step strategy for Southeast Asian businesses to become plastic neutral). While the first two steps are widely adopted by multinational MNCs, the necessity of managing a business' plastic value chain is still a nascent concept in Southeast Asia. The final step in current plastic value chain management is adopting transparency in the form of publicizing plastic footprint, for instance, in sustainability and/or annual reports. After businesses take up management of their current plastic value chains, time-bound commitments towards plastic neutrality would be the most important subsequent step.

Plastic neutrality can be defined as:

- 1) adopting 100% post-consumer, recycled material, and/or;
- 2) recovery and recycling of legacy plastic debris in nature or landfills, to the extent of the entire plastic footprint (by offsetting or insetting)(Figure 4)

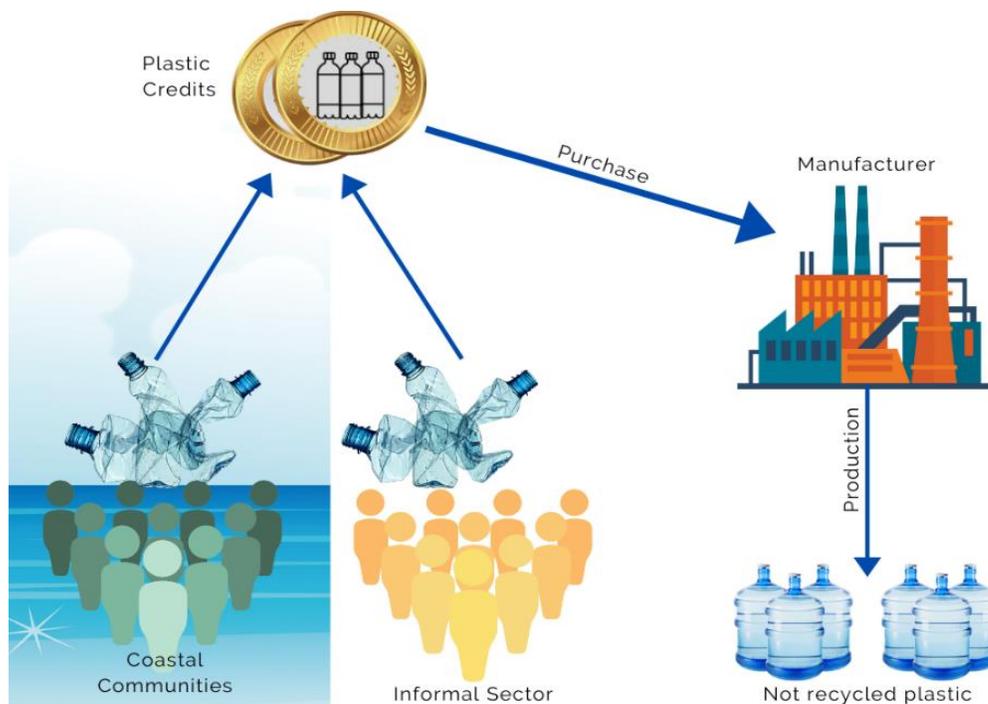


Figure 4 A simplified depiction of the proposed Plastic Credit system for Southeast Asia involving local communities

By committing to plastic neutrality, businesses would be more incentivized to reduce current plastic footprint, so as to ease the future transitioning difficulty in becoming plastic neutral. Existing plastic sustainability programs for businesses in Southeast Asia, such as WWF-Singapore's Plastic ACTION (PACT), encourage both plastic footprint reduction and plastic neutrality by 2030 (WWF-Singapore 2020).

## Plastic Credit system – standardized marine debris recovery ledger

While reductions of plastic consumption require value chains reimagined, recovery of plastics has a much lower technical hurdle. Beach cleanups have been gaining popularity in corporate social responsibility programs. Some speculate that such activities under the attention-grabbing name of combatting marine litter are desirable for the “photograph opportunities” they offer (Stafford and Jones 2019). In fact, the efficacy of beach cleanups as a solution for marine litter has been observed to be dependent on many factors, such as the input period and oceanic seasonal variations (Kataoka and Hinata 2015). Regardless of the intention of corporate-sponsored beach cleanups, it is undeniable that any removal of plastic from nature, no matter how little, is facilitative to resolving the problem and should be encouraged. Despite so, unassuming consumers may not be able to differentiate the efficacy of a quarterly beach cleanup with a plastic neutral goal.

With the primary objective of mainstreaming recovery of plastics in nature and secondary objectives of widening the supply base of recyclates so to stimulate recycling, a Plastic Credit ledger system is proposed as part of the aforementioned business strategy. The following table (Table 1) illustrates some of the projected outcomes of implementing the Plastic Credit system, as well as the consequent benefits for other parties involved in the plastic value chain.

*Table 1: Projected outcomes of Plastic Credit system and benefits for the recycling industry, manufacturing industry and local communities*

Projected outcome from Plastic Credit system	Benefits for the recycling industry	Benefits for the manufacturing industry	Benefits for local communities
Creating a standardized ledger for each recyclable polymer, aligned by recyclability	Higher recyclability of recycle stream (better quality)	Increased interest in adopting recyclable material	Higher income per kg of recovered plastics due to better quality
Employment of local/affected communities for year-round work		Corporate endorsement for environmental and social impact in offsetting/insetting partial or total plastic footprint	Human rights-based employment for fishing/coastal communities with fair wages
Increased and more systematic recovery/collection activities by the informal sector	More stable and more reliable recycle stream	Increased feasibility of sustainability goals for higher recycled material content	Stability in income for the local communities employed
Increased interest for local groups to conduct regular volunteer-based beach clean-ups			Cleaner local landscapes, seascapes, and tourism attractions

The system can help businesses quantify the extent of neutralization of their plastic footprint either by offsetting, by means of activities financially supported but separate from the corporation’s core business, or insetting, from activities like corporate family day beach cleanups. Conditions adhering to the issuance of Plastic Credit include that the recovered post-

consumer plastic must be:

- 1) recyclable and accepted by a recycler to be recycled, and
- 2) recovered from nature.

Moreover, the entity that is purchasing the Plastic Credits must already have a plan to reduce their plastic footprint through plastic value chain measurement and management – inclusive of but not limited to circular designs and material selection based on LCA results. This is analogous to how carbon credits are only supplementary to the overall GHG reductions necessary for any entity.

Akin to how the carbon credit aligns all GHG to a carbon-equivalent ratio, the Plastic Credit system needs to have a basic measurement unit to standardize all recyclable plastic polymers, possibly with what is commonly regarded as the most recycled, highly versatile polymer polyethylene terephthalate (PET/PETE). As seen in the RSPO credit system, the Plastic Credit system must also be governed by a centralized standards body that maintains the standard with principles and criteria reviewed regularly and LCAs performed as necessary to ensure the ledger does not fall into obsolescence due to new technologies emerging in recycling and alternative production.

### [Linking to other policies –EPR schemes, ISO standards, human rights-based approach, regional policies](#)

Incentives for post-consumer plastic collection could be driven by mandatory deposit refund schemes where waste management is developed and effective, and by Plastic Credits where there are leakage, poor collection rates and/or accumulation of plastics in nature. The two systems should be incorporated into future EPR schemes of Southeast Asia, while transactions of the credits are transparent within the EPR scheme.

Another opportunity for synergy prior to the launch of mandatory EPR schemes would be to have the Plastic Credit system merge with voluntary technical standards. The ISO TC/323 Circular Economy certification standard is under development by the International Organization for Standardization (ISO 2020) and would be an excellent example. Businesses that wish to escalate their recognition in contributing to a circular economy would need to satisfy the requirements of having a plastic neutral goal in order to be considered for the certification.

Linkage of the Plastic Credit system to a human rights-based approach is also paramount, as the collection of post-consumer use plastic in Southeast Asia is often done by informal waste pickers, while coastal communities recover plastic marine litter (UNEP SEA circular, COBSEA, SEI 2019). There are already numerous known social, economic and health-related adverse effects of marine litter on marginalized groups (UNEP SEA circular, COBSEA, SEI 2019). In the case of RSPO credits, the social aspects of sustainable palm oil production have been well-addressed. Therefore, the Plastic Credit standard authorities must safeguard collection personnel from health, gender equality and human rights issues to minimize further marginalization of the communities.

With the current development of regional policies to combat marine litter in Southeast Asia, it is also important to ascertain the alignment of similar marine plastic-related regulations across the

region, noting the differences in labour costs, recyclability of individual polymers and existing regulations on packaging and plastics.

## Conclusion

The world came together through the *Kyoto Protocol* to tackle the problem of climate crises and adopted the carbon credit system. Likewise, Southeast Asia now shows collaborative effort to solve the problem of plastic marine litter – be it in intergovernmental regional plans for marine litter or in MNC regional strategies for plastic reduction or even neutrality (UNEP SEA circular 2019). A solution that combines business incentives to take action on plastics with governmental responsibility to remove marine debris is a standardized Plastic Credit ledger system that focuses on the recovery of legacy plastics. The system can adopt the fundamental principles of carbon and sustainable palm oil credits wherever applicable and is part of a step-wise approach to encourage businesses to undergo holistic change by managing their plastic value chains. Aside from the positive environmental impact by removing marine debris from seascapes, Plastic Credits also offer social and economic benefits for the Southeast Asian nations, especially in the coastal regions where tourism and fishing once flourished. The Plastic Credit system needs to be introduced under the consideration of initiatives and policies aiming to reduce plastic production, consumption and accumulation in oceans, such as EPR schemes and voluntary standards. With that said, it is important to reiterate that the recovery of marine debris alone is not the ideal way to solve the problem. Through a composite effort comprised of the transformation of plastic value chains, legislative enforcement and best practice recognition can Southeast Asia free itself from its plastic shackles.

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