# Kampala City Kittage Landfill Greenhouse Gas Reduction Calculation and Plastic Credit Application Report

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# - Table of Contents -

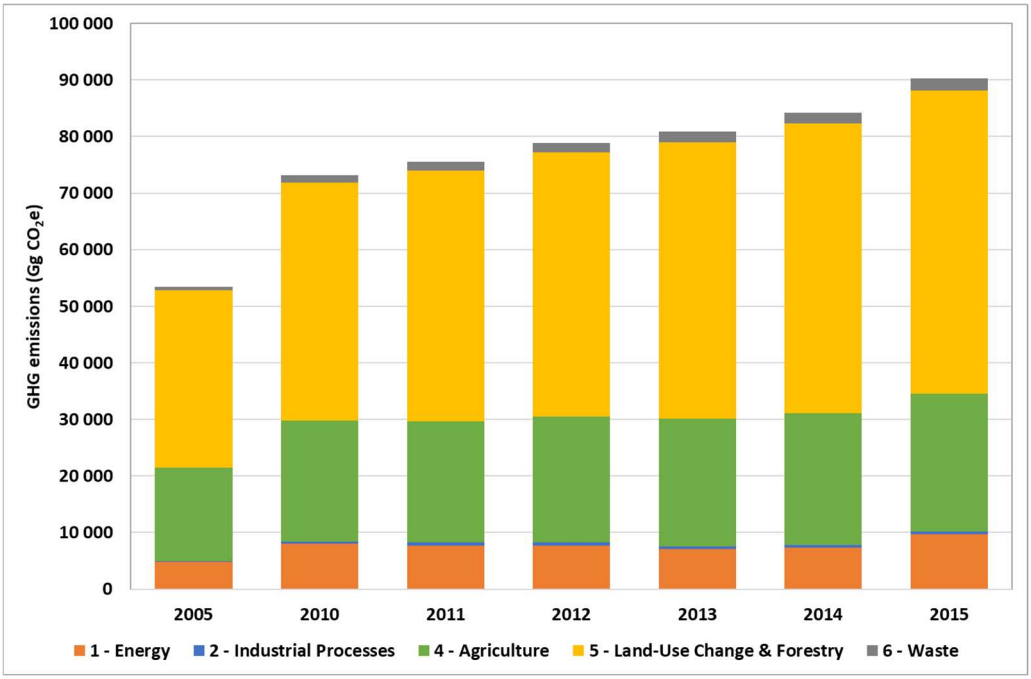
# I.. Calculation of Greenhouse Gas Reduction at Kittage Landfill

## 1. Purpose and general description of project activity

The objective of the project is to capture and flare the landfill gas (LFG) generated fr om the Kiteezi landfill site. This project is aimed at reducing atmospheric emissions of methane, a greenhouse gas (GHG) which contributes to global warming and climate ch ange. Apparently, the central business parts of the city are serviced with daily sweepin g and cleaning, but outside these areas such services are not provided. At times, the poorer parts of the city and the industrial areas show extreme littering. Littering and th e near absence of city cleaning appear to be the most important waste problem in Ka mpala City. Litter is all around, even in the wealthier areas of the city.

The amount of waste produced in Uganda is rapidly increasing, owing to a growing p opulation, rapid urbanization, the growth of the middle class, and shifting spending hab its and lifestyles. In the updated Nationally Determined Contribution (NDC), Uganda pre sents an ambitious economy-wide mitigation target in 2030 of 24.7% reduction below the Business As Usual (BAU).

However, Uganda's GHG emissions have slowly increased from 53.4 MtCO2e in 200 5 to 90.1 MtCO2e in 2015 (Figure). The emissions are projected to increase to 148.8 MtCO2e by 2030 and rise to 235.7 MtCO2e by 2050.




〈Figure〉 Sectoral trends in GHG emissions for Uganda (Updated Nationally Determined Contribution, 2022)

The Ugandan government is implementing the agenda of its overarching Uganda Vision 2040 as well as its Second National Development Plan (NDP III) intending to reduce carbon emissions, achieving low-carbon goals, and ensuring sustainable development.

According to the National Urban Solid Waste Management Policy (NUSWMP), the Greater Kampala Metropolitan Area (GKMA) produced 3,206 tons of solid waste per day as of 2015. It is expected to reach 4,739 tons by 2030. However, only one landfill site, the Kiteezi landfill site, serves the entirety of the GKMA. This facility has far exceeded its design capacity, and moreover does not treat leachate due to obsolete, broken, or otherwise inoperable treatment equipment.

Although the 35-acre Kiteezi landfill site receives around 1,200 tons of waste daily, reusable solid waste is not separated from the general waste flows, and is left to mix with the waste materials already buried on site. Nor does the landfill site have a sanitary drainage system, contributing considerably to soil and water pollution in the surrounding environment. Furthermore, the landfill site has no facilities to properly manage carbon dioxide and methane emissions, which are released into the atmosphere unprocessed.

This landfill site is managed as open dumpsites, posing a high risk to environment and public health. For instance, because the dumpsites do not make use of leachate protection barriers, the sites pose a potential risk of groundwater contamination. Moreover, the lifespan of these dumpsites is estimated to elapse in roughly 2~4 years under the existing scenario.

This project presents the key activities that are identified to stop uncontrolled dumping, open burning and improving the final treatment and disposal in the city. The project activities involve the capture of methane to produce electricity for the on-site needs. GHG emission reductions will result from the efficient combustion of otherwise flared LFG, in the power generation, leachate evaporation, and flaring equipment.

The project involves methane destruction through burning and combustion in engines, while generating energy that will be used internally in the landfill. Other activities also include a gas extraction system, equipment for gas burning, a gas pre-treatment plant and gas reception engines, as well as the engines for burning the Landfill Gas (LFG) generated in dumping zones.

The extraction system comprises a set of closed wells interconnected through a system of pipes inside the landfill, that allows to extract the LFG y carry it to a central collector that connects with the burning system. Vacuum pumps or blowers will be connected to the collection system for active gas extraction.

### Environmental Benefits

The implementation of a CDM project at the Kiteezi landfill will contribute positively to climate change, as the emission of greenhouse gases emission will be reduced. Met

hane (CH4) is the main GHG generated at the landfill, and combustion of such gas yiel ds carbon dioxide (CO2) which is less harmful (being methane 25 times as dangerous as carbon dioxide in terms of climate change); other compounds destroyed by flaring i nclude ammonia.

### Social Benefits

The burning of the LFG will not only contribute to climate change mitigation but also to the health and life quality of the surrounding communities in the project's area of in fluence. During the project's lifetime, the CDM/SDM project activity should lead to alle viation of poverty by generating additional employment and contribution to provision of basic amenities to the people and hence leading to improvement in quality of life of, a t least, the people within the community in which the project is sited.

### Sustainable Benefits of the Project Activity

Flaring of the collected LFG does not only destroy methane but will also destroy vola tile organic compounds in the LFG. The project will further result in reduced air pollutio n, reduced odour nuisances, improved health and safety conditions for nearby resident s, and reduction of the risk of fire and explosion at the landfill site.

- Contribute to establish better practices over the local natural resources, as many ope n dumps are still a common practice and waste disposal habits are incautious
- Prove the use of a new technology and demonstrate the viability of LFG capture and flare project, while increasing demand for local labour
- Encourage local supply of equipment and other components for the construction and operation of the LFG plant, increasing local know-how
- Generate local jobs both for low-skilled and skilled workers
- Improve air quality in the area and local health conditions for inhabitants
- Environmental and sanitary impacts associated with the emissions of methane and ot her organic compounds will be prevented
- The capture and flaring of landfill gas will avoid emissions of methane and other gas es such as hydrogen sulphide (H2S), mercaptans and other odorous compounds, whic h leads to a cleaner environment in the surrounding area to the landfill
- Odorous gas emissions affect public health and quality of life. Bad odours can cause local health problems
- Capture and flaring of landfill gas will reduce explosion and fire risks.

## 2. Location of project activity

2.1. Host Party

▪ The Republic of Uganda

2.2. City/Town/Community etc.

▪ Kampala Capital City

2.3. Location

▪ Kampala City, Kiteezi site

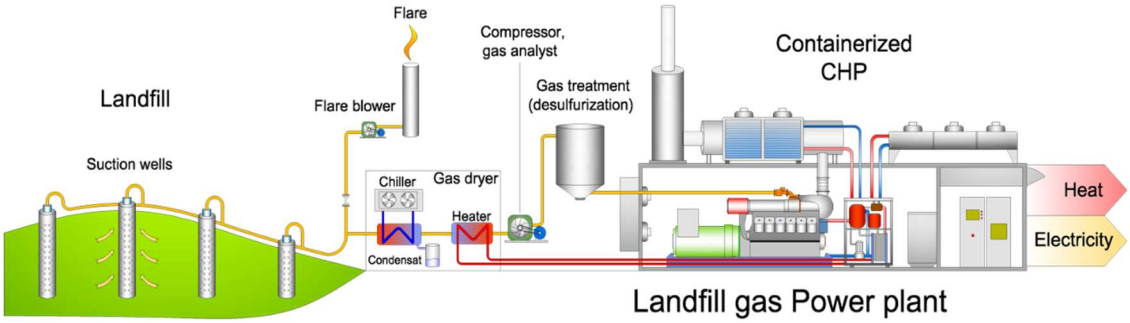
## 3. Landfill gas power generation technology

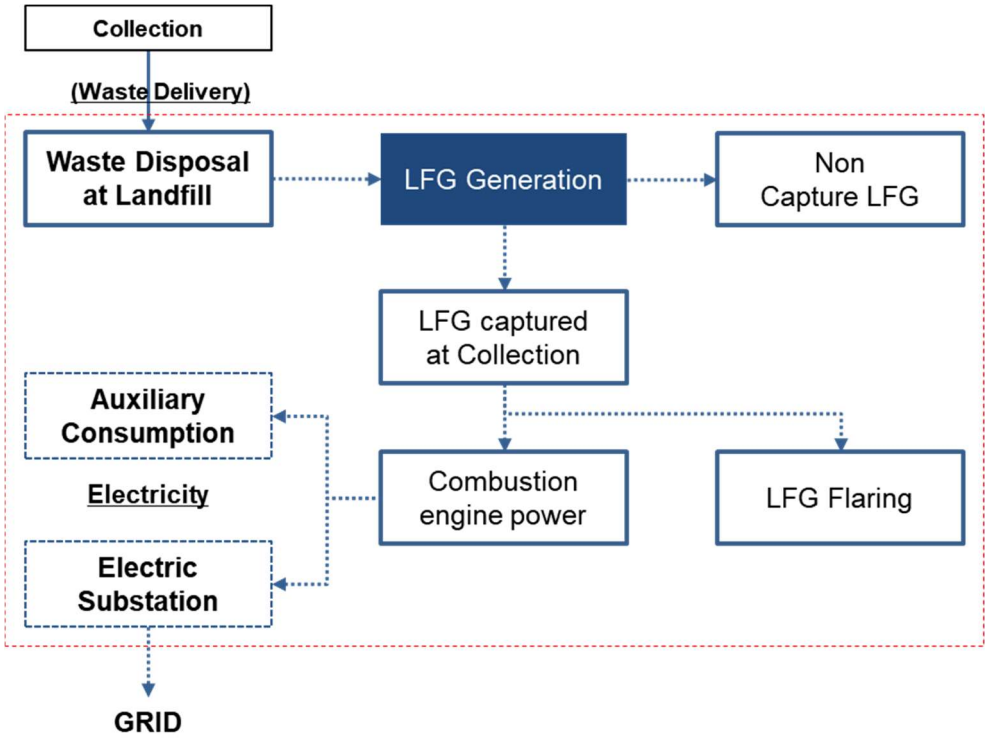
1) Securing greenhouse gas emissions rights by capturing and refining landfill gas and using it as power generation fuel

2) Facilities are divided into processes that collect landfill gas and cogeneration facilitie s that utilize purified landfill gas.

3) Landfill gas is stored in a CSV (Condensate Separate Vessel) tank through a collecti on facility, and moisture and hydrogen sulfide are removed through a purification fa cility.

4) Refined gas is fed into a combined heat and power (CHP) plant as fuel, and the fin al byproducts are waste heat and electricity.




3.1. Ex ante calculation of emission reductions

3.1.1. Baseline Emissions

a. Landfill Methane Recovery

The following table summarizes the calculation for the variable part of the equation and the emissions from solid waste disposal site ($BECH_{4,SWDS,y}$) for every year in the crediting period, please refer to the project's spreadsheet for more details.

| Year | $BECH_4$,SWDS,y (tCO2e) | FCH4,BL,y (tCH4/yr) | Total LFG generation (Nm3/a) | Total captured LFG (Nm3/a) | Total captured LFG (Nm3/hr) |
|---|---|---|---|---|---|
| 2026 | 289,593 | 0 | 28,889,916 | 14,444,958 | 1,649 |
| 2027 | 279,632 | 0 | 27,896,259 | 13,948,129 | 1,592 |
| 2028 | 270,014 | 0 | 26,936,779 | 13,468,389 | 1,537 |
| 2029 | 260,727 | 0 | 26,010,299 | 13,005,150 | 1,485 |
| 2030 | 251,760 | 0 | 25,115,686 | 12,557,843 | 1,434 |
| 2031 | 243,100 | 0 | 24,251,842 | 12,125,921 | 1,384 |
| 2032 | 234,739 | 0 | 23,417,710 | 11,708,855 | 1,337 |
| 2033 | 226,665 | 0 | 22,612,268 | 11,306,134 | 1,291 |
| 2034 | 218,869 | 0 | 21,834,528 | 10,917,264 | 1,246 |
| 2035 | 211,341 | 0 | 21,083,539 | 10,541,769 | 1,203 |

b. Grid connected to renewable electricity generation

Baseline emissions from electricity generation are given for the following equatio n, which multiplies the effective generation of energy generated by the project for the emission factor of 0.137 tCO2e/MWh taken.

$$BEy = EGPJ,y \times EFgrid,y$$

| Year | BECH4,SWDS,y (tCO2e) | Total LFG generation (Nm3/a) | Total captured LFG (Nm3/a) | Total captured LFG (Nm3/hr) | Unit installed (kW) | Flaring LFG (Nm3/hr) | Net quantity of electricity produced (MWh) |
|---|---|---|---|---|---|---|---|
| 2026 | 289,593 | 28,889,916 | 14,444,958 | 1,649 | 1,500 | 890 | 11,169 |
| 2027 | 279,632 | 27,896,259 | 13,948,129 | 1,592 | 1,500 | 834 | 11,169 |
| 2028 | 270,014 | 26,936,779 | 13,468,389 | 1,537 | 1,500 | 779 | 11,169 |
| 2029 | 260,727 | 26,010,299 | 13,005,150 | 1,485 | 1,500 | 726 | 11,169 |
| 2030 | 251,760 | 25,115,686 | 12,557,843 | 1,434 | 1,500 | 675 | 11,169 |
| 2031 | 243,100 | 24,251,842 | 12,125,921 | 1,384 | 1,500 | 625 | 11,169 |
| 2032 | 234,739 | 23,417,710 | 11,708,855 | 1,337 | 1,500 | 578 | 11,169 |
| 2033 | 226,665 | 22,612,268 | 11,306,134 | 1,291 | 1,500 | 532 | 11,169 |
| 2034 | 218,869 | 21,834,528 | 10,917,264 | 1,246 | 1,500 | 488 | 11,169 |
| 2035 | 211,341 | 21,083,539 | 10,541,769 | 1,203 | 1,500 | 445 | 11,169 |

c. Baseline Emissions

| Year | BECH4,SWDS,y (tCO2e) | Estimation of $FCH_4$,PJ,Y (tCH4) | Estimation of $FCH_4$,BL,y (tCH4) | stimation of ECBL,y (MWh) | Estimation of BEEC,y (tCO2e) | Estimation of BECH4,y (tCO2e) | Estimation of baseline emissions (tCO2e) |
|---|---|---|---|---|---|---|---|
| 2026 | 289,593 | 5,171 | 0 | 11,169 | 1,530 | 130,317 | 130,317 |
| 2027 | 279,632 | 4,993 | 0 | 11,169 | 1,530 | 125,834 | 125,834 |
| 2028 | 270,014 | 4,822 | 0 | 11,169 | 1,530 | 121,506 | 121,506 |
| 2029 | 260,727 | 4,656 | 0 | 11,169 | 1,530 | 117,327 | 117,327 |
| 2030 | 251,760 | 4,496 | 0 | 11,169 | 1,530 | 113,292 | 113,292 |
| 2031 | 243,100 | 4,341 | 0 | 11,169 | 1,530 | 109,395 | 109,395 |
| 2032 | 234,739 | 4,192 | 0 | 11,169 | 1,530 | 105,633 | 105,633 |
| 2033 | 226,665 | 4,048 | 0 | 11,169 | 1,530 | 101,999 | 101,999 |
| 2034 | 218,869 | 3,908 | 0 | 11,169 | 1,530 | 98,491 | 98,491 |
| 2035 | 211,341 | 3,774 | 0 | 11,169 | 1,530 | 95,104 | 95,104 |

3.1.2. Project Emissions

a. Grid connected to renewable electricity generation

Project emissions from electricity consumption are determined as per the procedures described in the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption”, “AMS-I.D.: Grid connected renewable electricity generation”

$$PE_{Power,y} = PE_{EC,y} = \text{å}ECPJ,j,y \times EF_{EL,j,y} \times (1+TDLj,y)$$

| | Estimation of ECPJ,y (MWh) | EFgrid (MWh/tCO2e) | Estimation of PEEC,y ($tCO_{2e}$) |
|---|---|---|---|
| | Monthly consumed elcetricity x 12m | | PEEC,y=ECPJ,y*EFEL,grid,y |
| 2026 | 2,000 | 0.137 | 274 |
| 2027 | 2,000 | 0.137 | 274 |
| 2028 | 2,000 | 0.137 | 274 |
| 2029 | 2,000 | 0.137 | 274 |
| 2030 | 2,000 | 0.137 | 274 |
| 2031 | 2,000 | 0.137 | 274 |
| 2032 | 2,000 | 0.137 | 274 |
| 2033 | 2,000 | 0.137 | 274 |
| 2034 | 2,000 | 0.137 | 274 |
| 2035 | 2,000 | 0.137 | 274 |

b. Summary of ex ante estimates of emission reductions

| Year | Baseline emissions (tCO2e) | Project emissions (tCO2e) | Leakage (tCO2e) | Emission reductions (tCO2e) |
|---|---|---|---|---|
| Year 1 | 130,317 | 274 | 0 | 130,043 |
| Year 2 | 125,834 | 274 | 0 | 125,560 |
| Year 3 | 121,506 | 274 | 0 | 121,232 |
| Year 4 | 117,327 | 274 | 0 | 117,053 |
| Year 5 | 113,292 | 274 | 0 | 113,018 |
| Year 6 | 109,395 | 274 | 0 | 109,121 |
| Year 7 | 105,633 | 274 | 0 | 105,359 |
| Year 8 | 101,999 | 274 | 0 | 101,725 |
| Year 9 | 98,491 | 274 | 0 | 98,217 |
| Year 10 | 95,104 | 274 | 0 | 94,830 |
| Total | 1,118,899 | 2,740 | 0 | 1,116,159 |
| Total number of crediting years | | 10 years | | |
| Annual average over the crediting period | 111,890 | 274 | 0 | 111,615 |

# II.. Application of Plastic Credit

## 1. Current Status of Plastics Regulation in the International Community

### 1.1. Plastic Waste Regulatory Background

Globally, plastic production and waste generation are increasing, but the recycling rate is only 9%[1]

▪ Plastic production increased significantly from 234 million tons in 2000 to 460 million tons in 2019, while plastic waste generation more than doubled from 156 million tons to 353 million tons during the same period.

▪ Due to COVID-19 lockdowns, global plastic use decreased by 2.2% year-on-year in 2020, but the use of plastic is expected to increase again with the economic recovery, especially in the medical sector, personal care plastic products, and e-commerce.

▪ On the other hand, the recycling rate of plastic waste in the world is only 9%, and the waste plastic that is not recycled is disposed of in landfills (50%), unauthorized dumping (22%), and incineration (19%), while plastic waste is mainly generated from packaging materials (40%), consumer goods (12%), and textiles (11%).

The production of plastics using fossil fuels, the disposal of environmentally unsound waste, and the introduction of waste plastics and microplastics into the oceans can cause serious environmental and economic problems.

▪ Globally, approximately 1.8 billion tonnes of greenhouse gases were emitted throughout the production and consumption of plastics in 2019, 90% of which were generated during the production and transition from fossil fuels.

▪ In particular, plastics account for 80% of marine waste, and marine plastic waste is expected to increase from 9 million ~ 14 million tons per year in 2016 to 23 million ~ 37 million tons per year in 2040.[2]

▪ Environmental pollution caused by the influx of plastics not only threatens the ecosystem and human health, but also causes additional costs for waste disposal and pollution recovery, and also affects fisheries and tourism.

The recently held 5th United Nations Environment Assembly (UNEA-5) agreed to enact the first binding international agreement to prevent plastic pollution by 2024, and multilateral organizations and individual countries are also working on measures to improve circularity throughout the entire life cycle of pla

1 OECD(2022), Global Plastic Outlook, https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en

2 UNEP(2011), From pollution to solution, ttps://wedocs.unep.org/bitstream/handle/20.500.11822/36963/POLSOL.pdf(

stics, including production, distribution, consumption, recycling, and waste disposal.

1.2. Current Status of Plastics Regulation Multilateral Cooperation

At the 5th United Nations Environment Assembly (UNEA-5) held in Nairobi, Kenya on February 28~March 2, 2022, 175 member states adopted a resolution to establish the first binding international agreement to tackle plastic pollution by the end of 2024. Member States agreed to build on the draft resolution submitted by Rwanda and Peru in September 2021 (an international agreement on the entire life cycle of plastics) and the draft resolution submitted by Japan in December 2021 (an international convention on marine plastic waste) to establish an international agreement to comprehensively address the plastic issue.

Prior to UNEA-5, WWF and the Ellen MacArthur Foundation released a report highlighting the need for an international plastics convention from an environmental and economic perspective, and more than 100 plastic materials, products, and distribution companies, waste treatment companies, and financial institutions issued a joint statement in support of the establishment of an international plastics convention.

According to the resolution adopted, the upcoming international agreement on plastics will include an integrated approach to the entire plastics lifecycle, country-specific reporting, and financing mechanisms including multilateral funding, as well as capacity building, technical and financial support for developing countries.

Currently, international governance on plastics is partially covered in several conventions related to pollution prevention, biodiversity, chemicals, waste trade, etc., and integrated governance is needed to prevent pollution throughout the entire plastic cycle. UNEP Secretary-General Inger Andersen called the international agreement on plastics "the most important multilateral environmental negotiations since the Paris Agreement" and plans to form an intergovernmental negotiating committee to begin work on it in the second half of 2022.

The G7 and G20 are promoting various international cooperation initiatives to improve the resource efficiency of plastics and solve the problem of marine pollution caused by waste plastics. Through the Alliance on Resource Efficiency, the G7 has been exploring ways to promote resource-efficient supply chain management and the 3Rs (Reduce, Reuse, Recycle), and adopted the Ocean Plastic Charter in 2018 and the 2030 Nature Compact in 2021 to address the issue of ocean plastics as one of the key pillars for biodiversity protection.

The 'Ocean Plastic Charter' aims to use more than 50% of recycled raw materials in plastic products by 2030, to achieve a recycling and reuse rate of plastic packaging materials of 55% or more by 2030, to support technological in

novation, and to reduce marine waste.

Meanwhile, the G20 has adopted the Osaka Blue Ocean Vision (2019),9 which effectively prohibits further generation of marine plastic waste by 2050 through a comprehensive life-cycle approach, and is sharing national schemes and best practices to implement it, and seeking integrated data collection and monitoring methods.

### 1.2.1. International Governance on Plastics Regulation

Legally binding international conventions aimed at preventing marine pollution and protecting biodiversity include direct and indirect regulations on the disposal of various wastes, including plastics, but there is no binding international treaty that deals with plastics in its entirety.

Other non-binding voluntary pledges and initiatives include FAO's Code for Responsible Fisheries, Global Partnership on Marine Waste (GPML), and UNEP Clean Oceans Campaign.

| subject | Agreement Name | content | Participating Countries |
|---|---|---|---|
| contamination | United Nations Convention on the Law of the Sea (UNCLOS) | Establishment of a legal framework for marine activities (including the obligation to take all measures to prevent, reduce and control (plastic) pollution), entered into force in 1994 | 167 countries+EU |
| | London Convention (Convention on the Prevention of Marine Pollution by Dumping of Waste and Other Substances (1972) and London Protocol (1996) | Prohibition of direct dumping or disposal of marine plastic waste | 87 countries |
| | Annex V of the MARPOL Convention (Convention for the Prevention of Marine Pollution) | MARPOL is the only international convention dealing with the problem of marine debris, and Annex V prohibits the dumping of plastic waste from ships (this Annex came into force in 1988) | 156 countries |
| creature diversity | Convention on Biological Diversity (CBD) | Aim to reduce (plastic) pollution to a level that is not harmful to ecosystem functioning by 2020 (Aichi Biodiversity Target 8), adopted | 195 countries+EU, |

| | | | |
|---|---|---|---|
| | | in 2010<br>Inclusion of plastic waste emissions within the Post-2020 Global Biodiversity Framework (Goal 7) | Us<br>Not ratified |
| | United Nations High Seas Fisheries Agreement | Minimizing damage caused by (plastic) pollution, waste, disposal, and discarded fishing gear | 59 countries |
| chemistry substance | Stockholm Convention (Stockholm Convention on Persistent Air Pollutants) | Regulates the production, use, and disposal of additives used in plastics classified as persistent pollutants, and came into effect in 2004 | 184 countries |
| Waste trade | Basel Convention (Basel Convention on the Control of Cross-border Movement of Hazardous Wastes and Their Disposal) | Prohibiting trade in hazardous waste and other (plastic) wastes or establishing terms of trade, entered into force in 1992, amended in 2020 (including trade in plastic waste in controlled areas) | 188 countries |

The WTO is opening a discussion on environmentally sustainable plastics trade from a trade and environmental perspective. In fact, 2/3 of the 130 trade measures to address plastic pollution reported to the WTO in 2009~19 have been implemented in the last four years.

In November 2020, the Informal Dialogue on the Prevention of Plastic Pollution (IDP)[11] was launched to explore the role of trade in combating plastic pollution, and in December 2021, the 67 countries that participated in the IDP Ministerial Joint Statement emphasized the need to better understand the flow of plastics trade and to expand international cooperation for resource-efficient and sustainable plastics trade.

In particular, it is necessary to provide technical support and capacity-building measures to improve plastic circularity and waste management in the poorest countries and small island countries, promote trade in products and services that can reduce plastic pollution, and build data on plastic supply chains and trade flows in cooperation with international organizations.

In March 2022, the IDP initiated discussions on cross-disciplinary issues (transparency, data, international cooperation), trade promotion to address plastic pollution, and reduction of unnecessary plastic use (single-use, packaging, etc.) in order to implement the Joint Ministerial Statement.

On the other hand, since 2021, the amendment to the Basel Convention13 has been in effect, and plastic waste has been included in the import and export controls, restricting the illegal export of waste plastics from developed countries to developing countries. When China, the largest importer of plastic waste, announced a ban on waste imports in 2017, it led to a massive influx of plastic waste to other developing countries with looser regulations, which also adopted temporary or permanent ban on waste imports, causing major disruption in the global waste plastic trade. Accordingly, the 14th Conference of the Parties to the Basel Convention in 2019 adopted an amendment that designates all waste plastics as controlled waste and requires the prior consent of the importing country, and the amendment came into effect in January 2021.

However, plastic waste consisting of a single material (17 types) and waste plastic consisting of only 3 types of PET, PE, and PP are excluded from the export restrictions, and the wastes subject to control can be moved between countries only with prior written consent from the importing country.

1.3. Response to major countries with plastic regulations

1.3.1. EU

Under the vision of carbon neutrality and the establishment of a circular economy, the EU is implementing strategies to increase resource efficiency throughout the entire plastic cycle, and is leading international discussions on addressing plastic pollution, including the establishment of international agreements. In 2019, packaging waste in the EU increased by 2.8% year-on-year, mainly due to an increase in packaging waste from glass (+5.0%) and plastic (+4.1%). The recycling rate of plastic packaging in the EU has been steadily improving from 35% in 2012 to 41.8% in 2018, but it is still lower than the overall recycling rate of packaging (65.9%).

Based on the Circular Economy Action Plan (2015 and 2020) and the Plastics Strategy (2018), the EU is implementing detailed measures on the development of biodegradable plastics, the restriction of single-use products, research on microplastics, and the regulation of packaging materials.

〈 〉 the EU's efforts to reduce plastics

| category | Highlights |
|---|---|
| Bio-based, biodegradable, compostable plastics | Promoting the development and use of bio-based biodegradable plastics to replace fossil fuel-based plastics. A policy framework on bio-based biodegradable plastics is being developed (planned for adoption in the second quarter of 2022) |

| | |
|---|---|
| Plastic Plastic Bags | Amendment of the Packaging and Packaging Waste Directive (94/62/EC) to create a directive on plastic plastic bags (Directive (EU) 2015/720): From 2020, Member States will report annual consumption data on lightweight plastic plastic bags, including setting reduction targets at the national level, restricting their use or introducing economic measures. |
| Single-use plastics | Directive (EU) 2019/904) bans the sale of 10 items (enforced in July 2021), introduces design requirements (e.g. design with lid and container), introduces labelling of plastic raw materials used in products or waste and recycling information, and introduces EPR<br>(1) Separate collection rate of plastic bottles is targeted at 77% by 2025 and 90% by 2029<br>(2) From 2025, 25% recycled plastic will be used in PET beverage bottles.<br>(3) Aim to use 30% recycled plastic in all plastic beverage bottles from 2030 |
| Microplastics | Work is underway to establish standards, certifications, regulations, etc., → the absence of comprehensive guidelines for microplastics. Listening to opinions on microplastics generated from synthetic fibers and tire wear (2022.2~5) |
| Plastic Packaging | Revision of relevant directives (such as the addition of measures to reduce the consumption of plastic bags in 2015 and the mandatory setting of EPR for packaging materials in 2018), and the introduction of a producer responsibility system for all packaging materials by the end of 2024 in all member states. Recycling rate of plastic packaging is targeted at 50% by 2025 and 55% by 2030 |
| Plastic Tax | From January 2021, a plastic tax of 0.8 euros per kilogram of unrecycled plastic packaging waste will be imposed in each member state. |

Meanwhile, since 2019, the EU has been actively participating in discussions on the establishment of an international convention on plastics[18] and is carrying out various international cooperation activities to build a circular economy. The EU's 'Plastics Strategy (2018)' includes tasks such as △supporting marine waste response in East Asia and other countries, △supporting multilateral cooperation, and △promoting bilateral cooperation to improve the circularity of plastics, and through the 'New Circular Economy Action Plan (2020)', △efforts to establish international cooperation on plastics, △proposal for the establishment of a global circular economy cooperation (19), and △FTA reflecting circular economy goals.

1.3.2. United States

In recent years, the U.S. has been planning to increase infrastructure investment to reduce its reliance on exports and landfills for waste disposal, including plastics, and to increase domestic recycling rates, and more and more state governments are restricting the use of single-use products and adopting Producer Responsibility Recycling (EPR) systems.

The U.S. is the top exporter of waste plastics along with Japan and Germany, and the proportion of plastic waste disposal in Korea is overwhelmingly higher in landfills than in recycling. According to the statistics of municipal solid waste (MSW) in the United States as of 2018, 75.6% of the approximately 35 million tons of plastic waste was landfilled and only 8.7% was recycled. In 2017, China's ban on waste imports restricted exports, exposing the limits of waste disposal capacity in the U.S., prompting calls to ways to curb waste generation and promote recycling.

The $1.2 trillion Infrastructure Investment and Jobs Act (H.R. 3684), enacted in November 2021, included $350 million to improve waste recycling and management infrastructure, while the Environmental Protection Agency (EPA) released the first U.S. National Recycling Strategy, which outlines a strategy to achieve a 50% recycling rate by 2030. The Infrastructure Investment and Jobs Act includes $275 million for the Recycling Infrastructure Grant Program and $75 million to promote consumer recycling education and participation.

Although the 'National Recycling Strategy' lacks some specifics, it is meaningful in that it proposes tasks such as △improving the recycling market, improving waste collection and material management infrastructure, reducing pollution in the recycling process, strengthening resource circulation policies, and expanding data collection for the first time at the federal level. In addition, more and more states are banning or restricting the use of single-use plastics or introducing measures such as Producer Responsibility Recycling (EPR).

California, Hawaii, New York, Connecticut, and Maine have introduced regulations on single-use plastics, and in 2021, Maine and Oregon became the first states in the U.S. to pass EPR legislation on plastics and packaging materials.

1.3.3. People's Republic of China

China, the world's largest producer and consumer of plastics, is tightening regulations such as banning the import of waste plastics, introducing separate collection, and restricting the production and use of disposable products. China accounts for about 30% of the world's plastic production, but recycling of plastic waste in China is still minimal. In 2018, 52% of all waste collected and transported in China was landfilled and 45% was incinerated, but official data on the recycling rate of waste including plastics is n

ot available.

China has been the world's largest importer of waste plastics, but in order to solve the problem of environmental pollution and revitalize the domesti c recycling market, China has stopped importing 24 types of waste such as waste plastics and waste metals since the end of 2017, and has comp letely banned the import of all solid wastes from January 2021 through th e revision of the Solid Waste Law.

Starting with Shanghai in 2019, the company introduced a separate garbag e collection system, and plans to establish a separate collection and treat ment system not only in 46 pilot cities in 2020 but also in cities above th e municipal level by 2025.

In addition, since January 2021, the use of single-use plastic straws and pl astic bags has been banned in restaurants and shops in major cities, as wel l as the production of cosmetics containing microplastics, which the Chines e government plans to gradually extend to the entire country by 2025.

The '14.5 Action Plan for Plastic Pollution Control (announced in 2021)' incl udes detailed plans to reduce the source of plastic production and use, pr omote standardized recycling and waste disposal, and clean up waste in k ey areas in order to establish a more effective plastic pollution manageme nt mechanism and value chain by 2025.

〈 Highlights of China's "14.5 Action Plan for Controlling Plastic Pollution (Rele ased in 2021)" 〉

| objective | Target |
|---|---|
| Reduction of plastic production and use | Green design of plastic products: standardization, restriction of pro duction of environmentally harmful products, regulation of overpack aging<br>Reducing the use of single-use plastic products: prohibiting and re stricting sales, reducing use in sectors such as e-commerce/delive ry, and reducing the use of single-use plastics in the public sector<br>Promoting the spread of plastic alternatives: research and introduct ion of standards for bamboo, wood, degradable plastics, etc. |

| | |
|---|---|
| Promote standardized recycling and waste disposal | Strengthening standardized waste plastic recycling and disposal<br>Establishment and improvement of the separate collection, transpo rtation, and disposal system of plastic waste in rural areas Improve ment of plastic waste recycling (fostering the recycling industry, st rengthening the supervision of recycling enterprises, and introducin g advanced technology and equipment)<br>Improving the hazards of waste disposal (improving incineration facilities and treatment capabilities, preventing waste leakage into the ecosystem) |
| Waste cleanup in key areas | Plastic waste cleanup in rivers, lakes and oceans: standardized puri fication mechanisms, investigation of marine waste and microplasti cs, crackdown on illegal discharge of ship waste<br>Plastic waste cleanup in tourist destinations: Expansion of collectio n facilities, standardized purification mechanisms<br>Intensive cleanup of plastic waste in rural areas |

The ASEAN region, which has seen a sharp increase in imports of plastics and other wastes since China's ban on waste imports, is actively respond ing to the problem of marine waste, and has recently paid attention to th e restriction of single-use products, the development of alternative materi als, and the introduction of Producer Responsibility Recycling (EPR).

As of 2016, China was the largest importer of waste plastics, accounting for 56.2% of total imports, and only 2.6% of waste plastics flowing into th e 10 ASEAN countries, but in 2018 and 2020, ASEAN's share increased to 16.0% and 18.5%, respectively.

Southeast Asia is located between the Pacific and Indian Oceans, and in particular, the problem of waste plastics entering the ocean is not only de stroying the ecosystem in the region, but also affecting the fishing industr y and tourism. Accordingly, at the 34th ASEAN Summit in 2019, the 'Bang kok Declaration on Response to Marine Waste in the Region' and the 'Fra mework on Marine Waste' were adopted, and in 2021, the 'Action Plan for ASEAN Marine Waste Response (2021~2025)' was announced to promote a joint response in the region.

The ASEAN Action Plan for Marine Waste Response (2021~2025) includes 1 4 detailed tasks, including the elimination of single-use products, green pub lic procurement, microplastics research, waste infrastructure investment, an d EPR implementation support.

ASEAN member states' plastics policies are primarily focused on improvin g waste disposal capacity to prevent their inflow into the ocean, but in re cent years they have expanded their scope to include restricting the use

of single-use products and developing alternative materials.

1.3.4. Southeast Asia

Since 2019, ASEAN and the EU have been working together on issues such as building a circular economy, reducing plastic waste, and closing the gap in waste management capacity among member states through the High-Level Dialogue on Environment and Climate Change. In 2018, ASEAN+3 adopted a collaborative initiative to support ASEAN's capacity building for waste treatment and recycling, and the World Bank conducted research on plastic circularity and the potential of recycling markets in Thailand, Malaysia and the Philippines.

(Thailand) Bioplastic-related investments are increasing based on abundant raw materials and policy support, and according to the Plastic Waste Management Roadmap (2018~2030), the company plans to gradually restrict or ban beverage bottle cap seals, plastic bags, and plastic straws with the goal of recycling 100% of plastic waste by 2027.

(Vietnam) The amendment to the Environmental Protection Law (which came into effect in January 2022) will impose EPR obligations on manufacturers and importers of certain products or packaging materials, while the use of single-use plastic bags in stores will be banned from 2026. It is also working with various offshore partners to solve the problem of marine waste in the region.

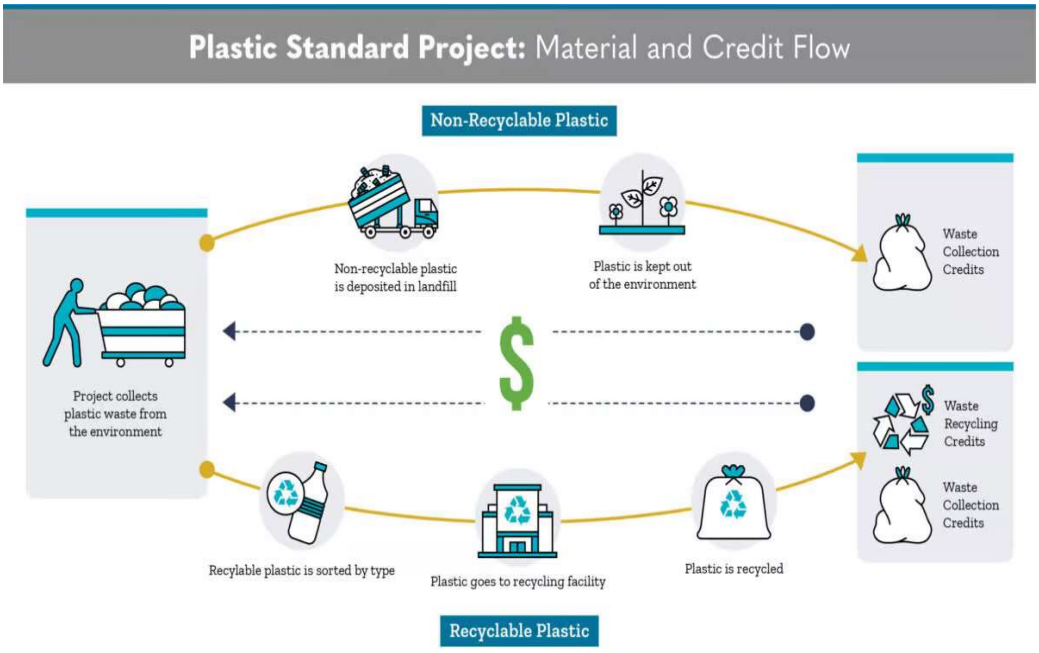
2. Plastics Program

2.1. Plastics Program Overview

The Plastic Waste Reduction Program (Plastics Program) enables impact asse ssments for new waste collection and recycling projects. Projects enrolled in VERRA's plastics program may be eligible to issue plastic credits for plastic waste collection and/or recycling activities.

Projects that collect and/or recycle plastics (or composites) are eligible to iss ue plastic credits for their activities, which can be sold to finance their projec ts. However, a project can be a single project of activities operated in a spec ific location or a program that combines several businesses operated in a spe cific area.

All plastics program projects are required to complete a rigorous development and evaluation process before enrolling in the plastics program and issuing p lastic credits.




〈 Plastic Credit Issuance Process 〉

Plastics programs can drive investment in projects that increase the collectio n and/or recycling of plastic waste by using them to provide consistent acco unting and credit for a variety of plastic collection and recycling activities.

The plastics program will be able to verify how much plastic waste has been reduced through an independent verification process for the project, which wi ll result in the issuance of credits based on the amount of plastic collected a nd/or recycled in excess of the baseline (i.e., waste that would have been g enerated without the project activity).

Thus, a "plastic credit mechanism" can provide an efficient and robust means of financing activities that verifiably reduce plastic in the environment, anywh

ere in the world.

## 2.2. The Role of Plastic Credits

### 2.2.1. Components of a Waste Reduction Strategy

The plastic credits generated through the Verra certification program complement the company's plastics stewardship goals while contributing to the expansion of plastic waste collection and recycling infrastructure around the world. In addition, investing in plastic waste management through Plastic Credits will help companies achieve their plastic stewardship goals by expanding their downstream collection systems and recycling infrastructure, which will enable them to generate the recycled plastic they need to meet their recycling content targets, address evolving regulatory pressures, and move plastics to a circular economy.


Investing in plastic waste collection and recycling infrastructure can help collect plastic waste that remains in a company's value chain, protect it from the environment, and recycle it in the areas where it operates, and this investment can increase the availability of recycled materials needed to meet a company's recycling content goals.

### 2.2.2. The Role of Finance in the International Plastics Treaty

In 2022, UN member states formed the Intergovernmental Negotiating Committee (INC) to begin drafting the terms of the Global Plastics Treaty, an international and legally binding document aimed at ending plastic pollution. Achieving the goals of the Global Plastics Treaty will require a multi-faceted approach across the plastics lifecycle to address plastic pollution. Therefore, plastic credits issued by Vera's Plastic Waste Reduction Program (Plastics Program) complement other solutions to meet the priorities of the Treaty and are on the way to be included as part of the Treaty discourse.

Because investing in plastic waste collection and recycling infrastructure can recover plastic waste downstream to be recycled, reused, or properly managed, Vera's plastics program can fund activities to build and expand this waste management infrastructure by issuing plastic credits to certified plastic waste collection and recycling projects. The INC currently plans to complete negot

iations on the Global Plastics Treaty by 2024, and Vera is attending INC sessi ons and participating in the INC process as a certified observer.

2.2.3. Sustainable support for plastic waste management infrastructure

The Company's investment in the Plastic Credit project, as opposed to a one -off clean-up activity, supports a long-term investment in the development o f the infrastructure and capacity needed to build a sustainable and sustainabl e waste management system. The project enrolls in Verra's plastics program, which allows it to secure credits for 7~21 years, depending on the validity o f the project, which can be expected to provide long-term funding. Funds fro m the sale of plastic credits could enable the development of a waste mana gement infrastructure that would not be viable without revenue from the cre dit mechanism. These verifiable investments will facilitate the company's tran sition to a circular economy and accelerate the achievement of its plastics st ewardship goals.

2.2.4. The Value of Plastic Credits for EPR Schemes

Plastic credits can support the implementation and effectiveness of expanded producer responsibility (EPR) schemes, rather than hinder their development. Voluntary mechanisms, such as Plastic Credits, can help encourage investm ent in collection and recycling infrastructure, especially in areas that suffer fr om large amounts of plastic pollution and lack the resources to effectively m anage the associated environmental and health risks. Thus, Plastic Credit fina ncing can fill the gap in the amount of capital required by the government to manage plastic waste until the EPR scheme is developed and fully functiona l.

Plastic credits are a tool that can improve the integrity of new EPR regimes when characteristic principles such as traceability, verifiability, social and envir onmental protection, and stakeholder engagement are incorporated into EPR policies. Because local governments can leverage voluntary plastic credit prog rams and third-party audit systems to reduce the administrative burden of ve rifying EPR compliance, Vera is developing a framework for integrating plastic credits and EPR schemes to efficiently achieve local plastic waste collection and recycling priorities.

2.3. Plastic Credits

Plastic credits are issued based on the amount of plastic collected and recycl ed above the baseline rate (i.e., waste that would have been generated with out project activity). Each plastic credit has a unique serial number, and the plastic credit may additionally display a different certification.

Plastic credits can be labeled as additional certifications if they meet the req uirements of the participating standards or programs. Currently, the Sustainab le Development Verification Impact Standard (SD VISta) is the only participati

ng standard, and SD VISta projects can also be certified through the same verification process, including business plans, monitoring reports, verification reports, and verification reports.

However, in order for the Additional Certifications to be properly displayed in Plastic Credits, Project Proponents must submit all documentation required by the Participation Standards before requesting the issuance of Plastic Credits, and the verification period covered by the certification must be longer than or equal to the Plastic Program Verification Period.

2.3.1. Owning and Trading Plastic Credits

Plastic Credits are issued to companies or organizations that have an account with the Verra Registry and are interested in transacting while holding Plastic Credits

Registry account holders must pass a rigorous "customer verification" background check before opening an account, and individuals are not allowed to open a registry account.

Because registry account holders are not authorized to hold Plastic Credits on behalf of individuals, Plastic Credits can only be redeemed on behalf of individuals by entities that have an active registry account.

Ownership of plastic credits can only be transferred between Verra Registry accounts, and plastic credits cannot be transferred to other databases or traded as paper certificates. In order to hedge trading risk, registry account holders who wish to trade plastic credits should conduct their own due diligence to assess the risks associated with a given trade.

2.3.2. Waste Collection Credits (WCC)

Vera issues Waste Collection Credits (WCCs) for collecting and properly managing a larger amount of plastic waste than would have occurred without the Plastics Program project, and organizations that purchase WCCs can directly contribute to the creation of a system to collect plastic waste from nature and prevent further pollution.

2.3.3. Waste Recycling Credits (WRC)

Vera issues Waste Recycling Credits (WRCs) based on the amount of plastic waste recycled that would otherwise have been generated without the Plastics Program project, and the purchase of WRCs can help organizations expand their recycling infrastructure and produce recycled plastic raw materials to replace new plastics.

2.4. How plastic credits work

Projects developed under the Plastics Program undergo a rigorous evaluation process to be certified, recognizing a wide range of activities, including waste collection from the environment, development of new urban infrastructure, collection and sorting of recyclable plastic waste, development of new recyclin

g technologies, and/or expansion of existing ones.

▪ Plastics Standards: The Plastic Waste Reduction Standard specifies the rule s and requirements that all projects must follow in order to be certified.

▪ Independent Audit: All plastics program projects must be subject to office a nd on-site audits by qualified third-party independent auditors and Verra pers onnel to ensure they meet the criteria and apply the methodology appropriate ly

▪ methodology

The plastics program methodology sets out detailed procedures for quantifyin g the plastic waste collected and/or recycled as a result of project activities and provides guidance to help project developers determine project boundarie s, establish baselines, and evaluate additions

Two approved methodologies for use in the Plastics Program project are now available

- PWRM0001 Plastic Waste Collection Methodology
- PWRM0002 Plastic Waste Recycling Methodology

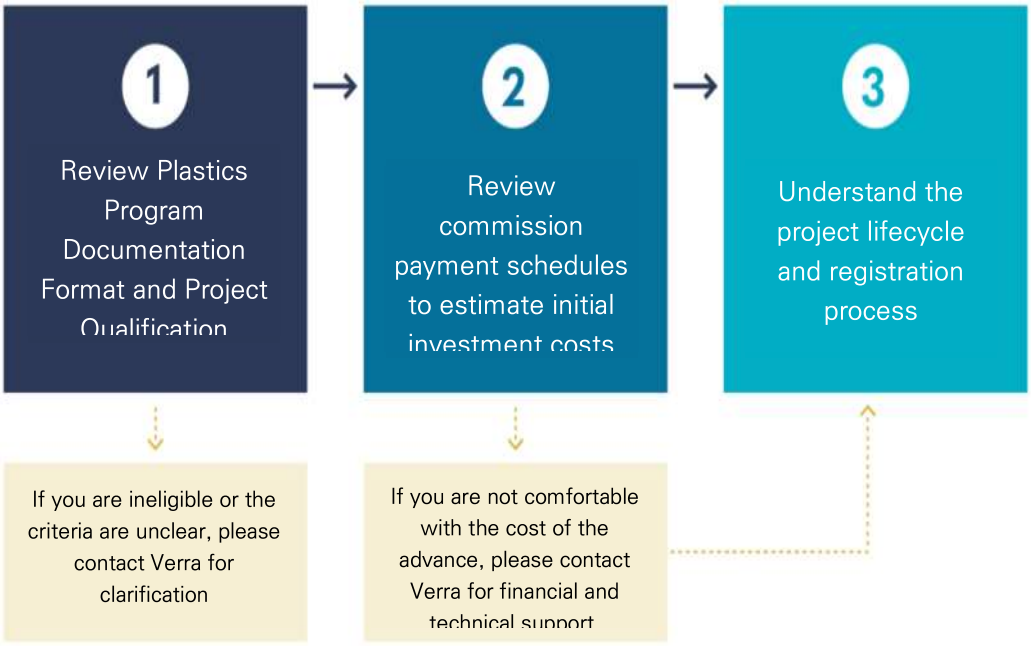
Project proponents should prepare a business plan by reviewing the requirem ents of each methodology along with plastics standards to determine if collec tion or recycling activities are eligible.

▪ Registration System

The Verra Registry is the central data repository for all registered projects an d tracks the creation, decommissioning, and cancellation of all Plastic Credits.


〈 VERRA Plastics Program Registry 〉 https://registry.verra.org/app/search/PWRP/All%20Projects

3. Plastics Projects




3.1. Plastics Program Required Documents

3.1.1. Business Plan

Written by the project proponent before and after the implementation of the project, including a description of the project design and activities, ownership, eligibility criteria, and the expected amount of plastic waste collected and/or recycled.

In addition, the document will be uploaded to the Plastics Program Registry pr ior to the feasibility assessment and published for stakeholder or public comm ent.

3.1.2. Feasibility Assessment Report

Prepared by a third-party verification body (VVB) after evaluating the feasibilit y of the project based on the business plan and supporting documents prepa red by the project proposer.

3.1.3. Monitoring Reports

The project proponent obtains data on collection or recycling activities in the monitoring period and then prepares a report for that period, which includes t he quantification of the monitored data and the collection and/or recycled pla stic waste. Monitoring reports are also uploaded to the registry and published publicly for stakeholder or public input prior to verification by the verifiers.

3.1.4. Inspection Certification Evaluation Report

A third-party verifier (VVB) evaluates and prepares the issuance of plastic cre dits based on the monitoring report and supporting documents prepared by t he project proposer.

3.1.5. Representative/Proxy Confirmation

Legal documents that must be submitted with the project documents at each stage of the project registration process (e.g., registration, registration, and issuance of plastic credits)

3.1.6. Plastics Program Type – Grouped Project

Grouped projects are a type of business that allows the plastics program to provide flexibility to project proponents and streamline the process, and Section 3.3 of the Plastic Standard summarizes the configuration options and provides examples of each option. Group projects are characterized by the ability to include multiple project activities in different regions.


〈 Plastics Program Grouped project 〉

Grouped project configurations allow new project activity instances to be included after project validation, and grouped projects can expand over time to add new project activity instances to a given region with similar characteristics to the original project. This allows project developers to continuously expand their activities without having to enroll new projects in the plastics program.

3.2. Plastics Program Administrative Costs

3.2.1. Membership fee and registration and issuance fee

The registration fee to be approved for a plastics program business is limited to a maximum of $7,500 and will be deducted as a fee for future plastic credit issuance.


### 3.3. Plastics Program Implementation Procedure

#### 3.3.1. Develop a business plan

The project proposer uses the latest version of the template to prepare a bu siness plan according to the plastics standard and related methodology. In pa rticular, the plastics program eligibility criteria should be checked to determin e the feasibility of the project.

| | Eligibility Criteria | Things to look for |
|---|---|---|
| 1 | Types of plastic waste managed by the project | (1) Polyethylene terephthalate (PETE or PET)<br>(2) High-density polyethylene (HDPE)<br>(3) Polyvinyl chloride (PVC)<br>(4) Low-density polyethylene (LDPE)<br>(5) Polypropylene (PP)<br>(6) Polystyrene (PS)<br>(7) Expanded polystyrene (EPS)<br>(8) Other plastics - Other plastics include acrylic or polymethyl methacrylate, acrylonitrile butadiene styrene (ABS), polyamide (nylon), polycarbonate and polylactic acid, etc.<br>(9) Composite materials, composite packaging, unpackaged composite materials (including visible light plastics), composite packaging |

| | | |
|---|---|---|
| 2 | Collection or Recycling Projects | Affirming that this project is an activity to collect and recycle plastic waste through official and informal channels. |
| 3 | Project Type | Collection: Plastic waste collection activities include sub-activities such as sorting, shredding, decontamination or melting before moving the waste to the next relevant entity in the value chain<br><br>Recycling: Recycling activities include the collection, sorting, and/or recycling of plastic waste that would otherwise have been managed in a manner that does not allow for a second life of the material (i.e., the production of recycled materials), and project activities include mechanical and/or chemical recycling. |
| 4 | Demonstrate that the project has not generated any plastic waste, primarily for the purpose of subsequent collection and/or recycling: | Including plastic waste collection and recycling activities, including informal waste collection activities, community waste collection from the environment (including open-pit cleanup), development of municipal or private waste collection infrastructure, waste sorting, mechanical recycling, and chemical recycling |
| 5 | Demonstration of additionality | ① Automatic verification of additional validity for activities in LDCs countries<br>② Less than 20% collection or recycling rate<br>③ If it exceeds 20%, proceed to general additionity analysis such as investment analysis and commercial analysis. |
| 6 | Business Start Date | Feasibility evaluation within 2 years after the project start date, i.e., registration application must be completed |

3.3.2. Project listing

The project proposer opens a Verra registry account and uploads the busines s plan (draft or final) and other documents to the Verra registry for 30 days t o be published for stakeholder or public comment.

3.3.3. Project validation (ex-ante)

The project proposer prepares for the validation/verification body (VVB) for val idation/verification bodies, and the VVB issues a feasibility assessment report.

During the verification and verification process, VVB rigorously evaluates the project in accordance with the requirements of the plastics programme rules and the methodology applied. VVBs may be qualified to provide verification a

nd verification services under the Plastic Program if they are certified by me mbers of the International Accreditation Forum, are approved by Verra, and h ave entered into the necessary agreements with Verra. As of October 2024, there are seven approved VVBs that can perform verification and evaluation u nder the Plastic Program.

① Colombian Institute for Technical Standards and Certification (ICONTEC) : Colombia

② Control Union Certifications B.V.: Netherlands

③ Carbon Check Private Ltd. : India

④ SCS Global Services: United States

⑤ TÜV Nord Cert GmbH : Germany

⑥ TÜV SÜD SOUTH ASIA PRIVATE LIMITED : India

⑦ VKU Certification Pvt. Ltd. : India

3.3.4. Project registration

The project proponent uploads the business plan, feasibility assessment repor t and other documents to the Verra registry and pays an application fee for t he registration review, i.e. the registration fee. Verra reserves 30 business da ys to review the business plan and feasibility assessment document and, if n ecessary, provide some review comments prior to approval. If the application project is approved based on the review, the applicant will be enrolled in the plastics program.

3.3.5. Monitoring

The project proposer monitors the project activities, quantifies the collected a nd/or recycled plastic waste, creates a monitoring report with the required da ta, and uploads the monitoring report to the Verra registry. Monitoring reports uploaded to the Verra registry are published for 30 days for stakeholder or p ublic comment.

3.3.6. Project verification (ex-post)

The project proponent must be reviewed by a verifying agency for monitoring activities at least once every three years through an approved VVB, provided that section 4.1.21 of the Plastics Standard sets out the verification require ments of the VVB, which prohibits the VVB from verifying the collection and/ or recycling of plastic waste in the project for more than three consecutive y ears.

3.3.7. Plastic credit issuance

The project proponent uploads monitoring and verification documents to the Verra registry and pays the application fee for certification review, i.e., the cr edit issuance fee. Verra reserves 30 business days to review the monitoring report and certification assessment documents and, if necessary, provide so

me review comments prior to approval. If the project is approved based on t he review, you can request a plastic credit.

The project proposer pays the plastic credit issuance fee, and the plastic cre dit is issued and deposited into the project proposer's Verra registry account.

# 4. References

## 4.1. Global Plastics Treaty

### 4.1.1. Global Plastics Treaty Overview

Plastic is an essential part of our everyday lives. Every year, the world produces over 462 million tons of plastic. While plastic can be a useful material, 90% of it pollutes our planet. This is particularly true of single-use items such as plastic cutlery, packaging, and microplastics, which break off of larger pieces of plastic like textiles. Currently, an estimated 9 million to 14 million tons of plastic waste ends up in our oceans each year. Plastic waste has been found in all areas of the globe, from the deepest seas to the most remote mountains. It causes major harm to wildlife and ecosystems, disrupts the livelihood of millions of people, and poses significant risks to human health and the world economy.

From people and wildlife to the communities and habitats they call home, solving the plastic pollution crisis is a challenge we all share. We need this for ourselves and for our world.

At the current rate, global plastic pollution could triple by 2040 unless we take immediate action. Voluntary measures and country-driven efforts have proven ineffective in stopping plastic from polluting and poisoning our planet, and it's only getting worse. Over the past five years, the number of national and voluntary actions to tackle the problem has increased by 60%. Despite this, plastic pollution has continued to increase by 50%.

### 4.1.2. Global Plastics Treaty Solution

The solution is a new set of legally binding and equitable global agreements that define the tangible steps and timelines necessary to change how we produce and consume high-risk plastic.

This must include: Phasing out all unnecessary plastic products that pose a high pollution risk, including single-use items and excessive packaging.

Establishing binding and specific design requirements for plastic products that lead to a decrease in plastic consumption.

Matching strong binding measures with ambitious mechanisms to enable effective implementation and a just transition, including robust technical and financial assistance.

In March 2022, the UN Environmental Assembly convened in Nairobi, Kenya, to debate the global plastic crisis. In a historic move, 175 nations voted to adopt a global treaty for plastic pollution—agreeing on an accelerated timeline so that the treaty could be implemented as soon as 2025.

The unique potential of a global, United Nations-led treaty is to hold all countries to a high common standard on plastic consumption and create a clear path to

ward a future free from plastic pollution. This will create a level playing field tha t incentivizes and supports national actions.

The power of moving beyond fragmented national plans is demonstrated by othe r successful environmental agreements. For example, through unified global ban s, the Montreal Protocol has phased out more than 99% of ozone-depleting sub stances since its establishment, setting the ozone layer on a gradual path to rec overy.

We must move quickly: During the two-year negotiation period of the plastics tr eaty, total plastic pollution in the ocean is expected to increase by 15%. Ending plastic pollution is in our grasp, and the treaty negotiations are a once-in-a-gen eration opportunity to do so.

4.1.3. History of Global Treaty to End Plastic Pollution

2017

December: The United Nationas Environment Assembly establishes an expert gr oup to explore potential global actions to support the long-term elimi nation of marine litter and plastic pollution. WWF, together with othe r environmental groups, puts forward (for the first time) the idea of a global and binding agreement against plastic pollution.

2018

The expert group meets twice in 2018 (in Nairobi, Kenya and Geneva, Switzerlan d) resulting in a majority of government experts recommending the exploration o f a potential global binding agreement.

2019

August: The leaders of the Pacific countries commit to work toward a global agr eement to stop plastic in the ocean.

July: 15 Caribbean countries adopt a declaration on plastic litter, calling for a glo bal agreement against plastic in the ocean.

April: The Nordic countries (Norway, Denmark, Sweden, Finland, and Iceland) ad opt a Nordic plastic declaration, in which they advocate a new global agre ement against plastic in the ocean.

March: At the UN Environment Assembly's meeting in Nairobi, a majority of stat es agreed to further work to establish a global agreement against plastic in the ocean.

2020

October: A group of 29 global companies launch a business manifesto calling for a new treaty on plastic pollution. [This comes after the Boston Consul ting Group, Ellen MacArthur Foundation, and WWF published a report o

n the business case for a new plastic pollution treaty, which highlighte d the potential gains of a harmonized global set of rules on plastic poll ution. EU member states commit at the ministerial level to work for a new global agreement against plastic litter.

July: 55 countries set up a group at the UN headquarters in New York to put a new global agreement in place. Norway, Maldives, Antigua, and Barbuda ta ke on the responsibility of leading the group.

2021

December: Over 700 civil society groups and nongovernmental organizations fro m 113 countries sign a Civil Society Manifesto, urging UN Member States to negotiate a legally binding plastic treaty.

November: During COP22 in Barcelona, Spain, the Mediterranean countries decla red their support for a global plastics treaty. With this, 156 countries (more than two-thirds of the UN's member states) have since expr essed their official support for a global agreement to stop plastic litt er.

June: The UN Ocean Day Declaration on Plastic Pollution is launched in New Yo rk, after the Alliance of Small Island States (74 states) requested that neg otiations begin on a new legally binding global plastics agreement.

2022

November: The first intergovernmental negotiating meeting (INC-1) took place in Punta del Este, Uruguay. During the meeting, more than 145 count ries publicly supported establishing strong global rules to stop plastic pollution.

August: Norway and Rwanda (joined by 18 other countries) initiate and launch th e "High Ambition Coalition" to end plastic pollution by 2040.

March: More than 2.2 million individuals sign WWF's plastics petition. The petitio n is presented to The United Nations Environment Assembly (UNEA)'s pr esident and Norwegian Minister of Climate and Environment, Espen Bart h Eide, during conference in Nairobi. A historic moment—UN Member St ates adopt Resolution 5/14, titled "End Plastic Pollution: Towards an inter national legally binding instrument".

January: More than 70 leading businesses and financial institutions call on gover nments to develop and adopt a comprehensive and robust legally bindi ng treaty on plastic pollution.

2023

November: The third intergovernmental negotiation meeting, INC-3, took place i n Nairobi, Kenya. The majority of INC-3 was spent in procedural del ays with delegates spending the negotiations drafting additional text

to be added to the previously published 'zero draft.'

September: The much anticipated 'zero draft' was published. This comprehensive first draft of the global plastic pollution treaty would set the stage for the upcoming negotiations at INC-3 in November.

June: The second intergovernmental negotiation meeting, INC-2, took place in Paris, France. 134 governments called for common, global rules for plastics across its entire lifecycle, and a mandate for developing a 'zero draft' of the treaty was secured.

2024

November: The fifth and final intergovernmental negotiation meeting, INC-5, will take place in Busan, South Korea.

April: The fourth intergovernmental negotiation meeting, INC-4, for the treaty took place in Ottawa, Canada. The meeting saw further development of rules to prohibit problematic and avoidable plastic products, but left open whether the treaty will include measures to reduce production and consumption of plastics. To ensure the stage is set for INC-5 and to secure a successful treaty by the end of 2024, there is a mandate for the chair to produce a new, updated zero draft and an agreement by all countries to conduct formal intercessional work (between INC-4 and INC-5) to advance negotiations and make progress on key decisions.

## 4.2. VERRA Plastics Program

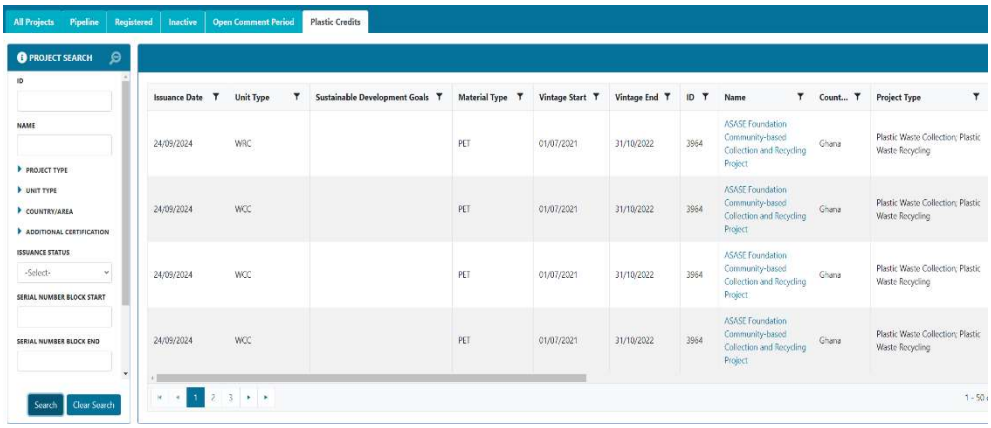
- https://verra.org/programs/plastic-waste-reduction-standard
- https://verra.org/programs/plastic-waste-reduction-standard/plastic-program-details/

## 4.3. VERRA Plastics Program Methodology

- https://verra.org/methodologies/pwrm0001-plastic-waste-collection-methodology-v1-1/
- https://verra.org/methodologies/pwrm0002-plastic-waste-recycling-methodology-v1-1/

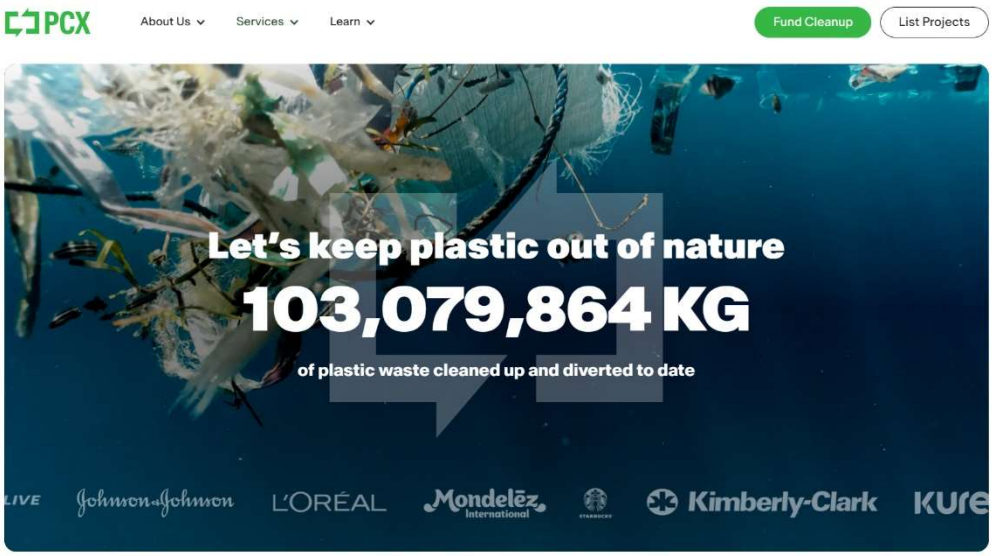

### 4.4. VERRA Plastics Program Registry

▪ https://registry.verra.org/app/search/PWRP




### 4.5. Plastic Credit Trading Platform

▪ https://www.pcxmarkets.com/



PCX

Sort by: Alphabetically, A-Z 37 products

Filter:

Country

- Philippines (14)
- Indonesia (3)
- Thailand (4)
- Vietnam (1)
- Malaysia (1)
- Argentina (1)
- India (8)
- Nigeria (1)
- Ivory Coast (1)
- Cambodia (1)

+ Show more

Plastic Type

Processing Type

Accreditation Standard

Project Tags

Collection and Co-processing of Mixed Plastics in Batangas, Philippines (PPRS)

$115.00

Collection and Co-processing of Mixed Plastics in Rizal, Philippines (PPRS)

$115.00

Collection of High-Risk Mixed Plastics from Tidal Zone in Pattaya and Chon Buri, Thailand (PWRS)

$1,560.00

Collection of Polyethylene Farm Plastics in Far North Queensland, Australia (PWRS)

$960.00

Community and Farmer Collection and Recycling of Rigid Plastics in Navdapanth, Madhya Pradesh, India (PPRS)

$660.00

Community Collection and Co-processing of Mixed Plastics in Antipolo, Philippines (PPRS)

$106.00

Community Collection and Co-processing of Mixed Plastics in Calicut, India (PPRS)

$240.00

Community Collection and Co-processing of Mixed Plastics in Mumbai, India (PPRS)

$300.00

4.6. Business registration and issuance status (as of 2024.10.)

4.6.1. Feasibility / Certification Evaluation in Progress Projects: 29

| ID | Name | Project Type | Status | Country | Average Amount of Plastic Credit | Material Type |
|---|---|---|---|---|---|---|
| 5204 | Zhangyru Plast Plastic Recycling Project | Plastic Waste Recycling | Under Validation (public comment period closed) | Kazakhstan | 8,061 | PET; PET bottle |
| 5103 | Plastic Waste Recycling Project by Emmbi Industries Ltd | Plastic Waste Recycling | Under Validation (public comment period closed) | India | 5,860 | HDPE; LDPE; PP; PVC |
| 5081 | Tiê Tiê: recycling vulnerabilities into opportunities | Plastic Waste Recycling | Under Validation (public comment period closed) | Brazil | 3,917 | HDPE; LDPE |
| 4988 | Plastic Waste Recycling Project by Kundana Techno Tex Private Limited | Plastic Waste Recycling | Under Validation (public comment period closed) | India | 36,302 | PET; PET bottle; PET other rigid |
| 4965 | costa rica makes me happy CRMMH | Plastic Waste Collection; Plastic Waste Recycling | Under Validation (public comment period closed) | Costa Rica | 123 | All types |
| 4959 | PLASTIC WASTE RECYCLING PROJECT IN INDIA BY RECYCLE PLASTICS | Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | India | 11,768 | HDPE; LDPE; Other Plastics; PET; PP; PS; PVC |
| 4960 | Biotrend Turkey Waste Plastic Reduction Project | Plastic Waste Collection | Under Validation (public comment period closed) | Turkey | 37,578 | All types |
| 4954 | Plastic Waste Reduction Project in Burundi | Plastic Waste Collection | Under Validation and Verification (public comment period closed) | Burundi | 5,200 | HDPE; Other Plastics; PP |
| 4955 | Lavergne Haiti Plastic Waste Collection Project | Plastic Waste Collection | Under Validation (public comment period closed) | Haiti | 5,751 | HDPE; PET; PP |

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|---|---|---|---|---|---|---|
| 4933 | Plastic Waste Reduction Project in Bangladesh Phase 2 | Plastic Waste Collection; Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | Bangladesh | 82,642 | HDPE; LDPE; Other Plastics; Other Plastics, Acrylonitrile butadiene styrene (ABS); PET; PET bottle; PP; PVC |
| 4864 | Plastic Waste Reduction Project in Bangladesh - Phase 1 | Plastic Waste Collection; Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | Bangladesh | 108,817 | HDPE; LDPE; Other Plastics; PET; PET bottle; PP |
| 4762 | MAYCO SOLUCIONA BananaPlastRevive Colombia: Sustaining Lives, Preserving Nature; | Plastic Waste Recycling | Under Validation (public comment period closed) | Colombia | 2,949 | HDPE; LDPE; PP |
| 4738 | Plastic Waste Recycling Project by Alliance Fibres Limited | Plastic Waste Recycling | Under Validation (public comment period closed) | India | 12,103 | PET; PET bottle |
| 4700 | Plastic Waste Recycling Project by Ganesha Ecosphere Limited | Plastic Waste Recycling | Under Validation (public comment period closed) | India | 28,686 | PET; PET bottle |
| 4678 | Plastic Waste Recycling Project by Dodhia Synthetics Ltd | Plastic Waste Recycling | Under Validation (public comment period closed) | India | 31,665 | PET; PET bottle |
| 4594 | UCC Recycling Plastic Waste Reduction | Plastic Waste Recycling | Under Validation (public comment period closed) | Mexico | 7,198 | All types |
| 4521 | PET Waste Collection and Recycling Project by Ganesha Overseas Pvt. Ltd. | Plastic Waste Collection; Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | Nepal | 13,339 | PET; PET bottle |
| 4257 | PLASTIC WASTE RECYCLING PROJECT | Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | India | 2,400 | PET; PET bottle |
| 4199 | Batam Ocean Impact Project | Plastic Waste Collection | Under Verification (public comment period closed) | Indonesia | 2,786 | Composite material |

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|---|---|---|---|---|---|---|
| 4181 | PLASTIC WASTE RECYCLING PROJECT BY RI BOTL SOLUTIONS PRIVATE LIMITED | Plastic Waste Recycling | Under Validation and Verification | India | 10,436 | PET; PET bottle |
| 4054 | PLASTIC WASTE REDUCTION PROJECT BY B LS ECOTECH LTD | Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | India | 102,394 | PET; PET bottle |
| 4024 | PET recycling activity by Badri Cotsyn Priva te Limited | Plastic Waste Recycling | Under Verification (public comment period closed) | India | 23,818 | PET |
| 3964 | ASASE Foundation Community-based Collectio n and Recycling Project | Plastic Waste Collection; Plastic Waste Recycling | Under Verification | Ghana | 7,863 | PET |
| 3845 | Plastic Waste Reduction Project by Sevenstar | Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | India | 14,350 | PET; PET bottle; PET durables; PET others |
| 3846 | Plastic Waste Reduction Project by Future | Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | India | 5,600 | PET; PET bottle; PET durables; PET others |
| 3796 | Plastic Waste Reduction Project | Plastic Waste Recycling | Under Validation and Verification (public comment period closed) | India | 13,125 | All types |
| 3744 | Project Hara Kal: Recovery of Ocean & Natu re Bound Plastic from villages in Kerala, In dia | Plastic Waste Collection | Under Verification | India | 49,732 | All types |
| 3704 | THE HUB FOR CIRCULAR ECONOMY OF PLA STIC RESIDUE PROJECT | Plastic Waste Recycling | Under Validation (public comment period closed) | Canada | 13,700 | LDPE; LDPE films and flexibles |
| 3647 | SMG - Plastic Waste Reduction Program | Plastic Waste Collection; Plastic Waste Recycling | Under Validation (public comment period closed) | India | 6,357 | All types |

4.6.2. Business registration application business: 4

| ID | Name | Project Type | Status | Country | Average Amount of Plastic Credit | Material Type |
|---|---|---|---|---|---|---|
| 4797 | Exxel Plastic Recycling Project | Plastic Waste Recycling | Registration Requested | Canada | 6,527 | HDPE; LDPE; Other Plastics, Acrylonitrile butadiene styrene (ABS); PET; PP; PS |
| 4737 | Plastic Waste Recycling Project by AGUA PET RECICLAGEM LDA. | Plastic Waste Collection; Plastic Waste Recycling | Registration Requested | Mozambique | 9,873 | HDPE; PET; PP |
| 4726 | JMPM – PLASTIC WASTE TO PACKAGING | Plastic Waste Collection; Plastic Waste Recycling | Registration Requested | Gabon | 540 | PET bottle |
| 3701 | Clean Kedarnath | Plastic Waste Collection | Registration Requested | India | 164 | PET bottle |

4.6.3. Business registration approval business: 14

| ID | Name | Project Type | Status | Country | Average Amount of Plastic Credit | Material Type |
|---|---|---|---|---|---|---|
| 4786 | Plastic waste recycling by Van Werven, Sweden | Plastic Waste Recycling | Registered | Sweden | 6,708 | HDPE; PP |
| 4438 | Improving waste collection and recycling services in Colombia | Plastic Waste Collection; Plastic Waste Recycling | Registered | Colombia | 1,416 | HDPE; LDPE; PP; PS |
| 4432 | UPSYDE: PRODUCING DURABLE GOODS FROM HARD-TO-RECYCLE PLASTIC WASTE | Plastic Waste Recycling | Registered | Netherlands | 2,841 | Composite material |
| 4431 | Ghana Plastic Waste Recovery and Recycling Project | Plastic Waste Collection; Plastic Waste Recycling | Registered | Ghana | 2,047 | HDPE; LDPE; PET; PP |
| 4135 | Project STOP | Plastic Waste Collection | Registered | Indonesia | 8,633 | Composite material |

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|---|---|---|---|---|---|---|
| 4133 | Pure North: Sustainable Plastic Recycling in Iceland | Plastic Waste Recycling | Registered | Iceland | 2,507 | PVC |
| 4017 | VeryNile - Nile River Cleaning Plastic Offsetting Program | Plastic Waste Collection | Registered | Egypt | 179 | Other Plastics |
| 3838 | Plastic Waste Recycling & Improving Waste Picker Livelihoods in Kenya | Plastic Waste Collection; Plastic Waste Recycling | Registered | Kenya | 32,242 | HDPE; LDPE; PP |
| 3113 | Conceptos Plásticos - The WaY Cote d'Ivoire | Plastic Waste Collection | Registered | Cote D'Ivoire | 1,473 | Flexible material |
| 3022 | IntegriCo - Production of Composite Timbers from Plastic Waste (Sarepta) | Plastic Waste Recycling | Registered | United States | 3,069 | Composite material |
| 2793 | Starboard Plastic Offset Program (POP) | Plastic Waste Collection | Registered | Thailand | 312 | Other Plastics |
| 2720 | Deekali Plastic Recovery West Africa: Recycling, Reuse and Community Action | Plastic Waste Collection; Plastic Waste Recycling | Registered | Senegal | 2,810 | PP |
| 2718 | Far North Queensland Farm Plastics Project | Plastic Waste Collection | Registered | Australia | 250 | Flexible material |
| 2513 | Second Life Thailand: Ocean-Bound & Land Plastic Recovery, Recycling and Reuse | Plastic Waste Collection; Plastic Waste Recycling | Registered | Thailand | 31,952 | Other Plastics |

4.6.4. Business registration application & issuance application business: 9

| ID | Name | Project Type | Status | Country | Average Amount of Plastic Credit | Material Type |
|---|---|---|---|---|---|---|
| 5002 | POLIBALBINO RECYCLING PROJECT IN BRAZIL | Plastic Waste Recycling | Registration and Verification Approval Requested | Brazil | 5,350 | PET; PP; PS; PVC |
| 4931 | Green Steps: Towards a Greener Future with Tanrıkulu | Plastic Waste Collection; Plastic Waste Recycling | Registration and Verification Approval Requested | Turkey | 28,923 | All types |
| 4805 | SEArcular Indonesia collection and recycling project | Plastic Waste Collection; Plastic Waste Recycling | Registration and Verification Approval Requested | Indonesia | 13,578 | HDPE; LDPE; Other Plastics; PET; PP; PS |
| 4722 | RePL Plastic Waste Reduction Program | Plastic Waste Collection; Plastic Waste Recycling | Registration and Verification Approval Requested | Indonesia | 12,094 | Composite material; EPS; HDPE; LDPE; Other Plastics; PET; PP; PS; PVC; Rigid material |
| 4688 | Together for Tomorrow: Collaborative Plastic Collection and Community Empowerment | Plastic Waste Collection; Plastic Waste Recycling | Registration and Verification Approval Requested | Turkey | 11,412 | All types |
| 4682 | A Wise transformation of plastics recycling in Brazil | Plastic Waste Recycling | Registration and Verification Approval Requested | Brazil | 14,545 | HDPE; PP |
| 4471 | Project Laut Yang Tenang: Environment-Bound Plastic Recycling and Waste Entrepreneur Empowerment in Indonesia | Plastic Waste Collection; Plastic Waste Recycling | Registration and Verification Approval Requested | Indonesia | 6,626 | HDPE; HDPE films; LDPE; LDPE films and flexibles |
| 4470 | Agents of Change: Orchestrating the Recycling Chain | Plastic Waste Collection; Plastic Waste Recycling | Registration and Verification Approval Requested | Brazil | 15,291 | HDPE; LDPE; Other Plastics; PET; PP; PS; PVC |

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|---|---|---|---|---|---|---|
| 3597 | Incentivising recycling in India through the generation of plastic credits | Plastic Waste Recycling | Registration and Verification Approval Requested | India | 8,857 | HDPE; PP |

4.6.5. Plastic credit issuance volume :13,755 ton

| ID | Name | Amount of Plastic Credit | | | Country | Material Type |
|---|---|---|---|---|---|---|
| | | WCC (Collection) | WRC (Recycling) | Total | | |
| 2513 | Second Life Thailand: Ocean-Bound & Land Plastic Recovery, Recycling and Reuse | 3,876 | 306 | 4,182 | Thailand | Other Plastics |
| 2718 | Far North Queensland Farm Plastics Project | 32 | - | 32 | Australia | Flexible material |
| 2720 | Deekali Plastic Recovery West Africa: Recycling, Reuse and Community Action | 316 | 632 | 948 | Senegal | PP |
| 2793 | Starboard Plastic Offset Program (POP) | 378 | - | 378 | Thailand | Other Plastics |
| 3022 | IntegriCo - Production of Composite Timbers from Plastic Waste (Sarepta) | - | 250 | 250 | United States | Composite material |
| 3113 | Conceptos Plásticos - The WaY Cote d'Ivoire | 227 | - | 227 | Cote D'Ivoire | Flexible material |
| 3838 | Plastic Waste Recycling & Improving Waste Picker Livelihoods in Kenya | - | 15 | 15 | Kenya | HDPE; LDPE; PP |
| 3964 | ASASE Foundation Community-based Collection and Recycling Project | 2,297 | 594 | 2,891 | Ghana | PET |
| 4017 | VeryNile - Nile River Cleaning Plastic Offsetting Program | 34 | - | 34 | Egypt | Other Plastics |
| 4133 | Pure North: Sustainable Plastic Recycling in Iceland | - | 1,566 | 1,566 | Iceland | PVC |

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|---|---|---|---|---|---|---|
| 4135 | Project STOP | 2,866 | - | 2,866 | Indonesia | Composite material |
| 4199 | Batam Ocean Impact Project | 366 | - | 366 | Indonesia | Composite material |
| **Sum total** | | 10,392 | 3,363 | 13,755 | **-** | |

4.6.6. Plastic credit incineration:1,166 ton

| ID | Name | Amount of Plastic Credit | | | Country | Material Type |
|---|---|---|---|---|---|---|
| | | WCC (Collection) | WRC (Recycling) | Total | | |
| 2513 | Second Life Thailand: Ocean-Bound & Land Plastic Recovery, Recycling and Reuse | 174 | 60 | 234 | Thailand | Other Plastics |
| Retirement Reason : ① Environmental Benefit ② Retirement for Person or Organization | | | | | | |
| 3022 | IntegriCo - Production of Composite Timbers from Plastic Waste (Sarepta) | - | 165 | 165 | United States | Composite material |
| Retirement Reason : ① Retirement for Person or Organization | | | | | | |
| 3113 | Conceptos Plásticos - The WaY Cote d'Ivoire | 4 | - | 4 | Cote D'Ivoire | Flexible material |
| Retirement Reason : - | | | | | | |
| 3838 | Plastic Waste Recycling & Improving Waste Picker Livelihoods in Kenya | - | 15 | 15 | Kenya | HDPE; LDPE; PP |
| Retirement Reason : ① Environmental Benefit | | | | | | |
| 3964 | ASASE Foundation Community-based Collection and Recycling Project | 293 | 337 | 630 | Ghana | PET |
| Retirement Reason : ① Environmental Benefit<br>(Plastic footprint mitigation) | | | | | | |
| 4199 | Batam Ocean Impact Project | 118 | - | 118 | Indonesia | Composite material |
| Retirement Reason : ① Retirement for Person or Organization | | | | | | |

| (Offset for 2024 Global Scope 1 Plastic Footprint Estimation (excluding London)) | | | | | |
|---|---|---|---|---|---|
| **Sum total** | 589 | 577 | 1,166 | **-** | |