This brochure was prepared by the project "Rethinking Plastics – Circular Economy Solutions to Marine Litter", which is funded by the European Union (EU) and the German Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH and Expertise France (EF). As regards the summary of project results, the content is the sole responsibility of GIZ and do not necessarily reflect the views of EU and BMZ.

Contact
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Rethinking Plastics – Circular Economy Solutions to Marine Litter
Tayuan Diplomatic Office 14 Liangmahe South Road, Chaoyang District
100600 Beijing

Dr. Liu Xiao
Project Manager
Phone: 8527 5589 ext.188
E-mail: xiao.liu@giz.de
Website: https://rethinkingplastics.eu/
As of June 2022, Beijing

WeChat

Website

Rethinking Plastics – Circular Economy Solutions to Marine Litter

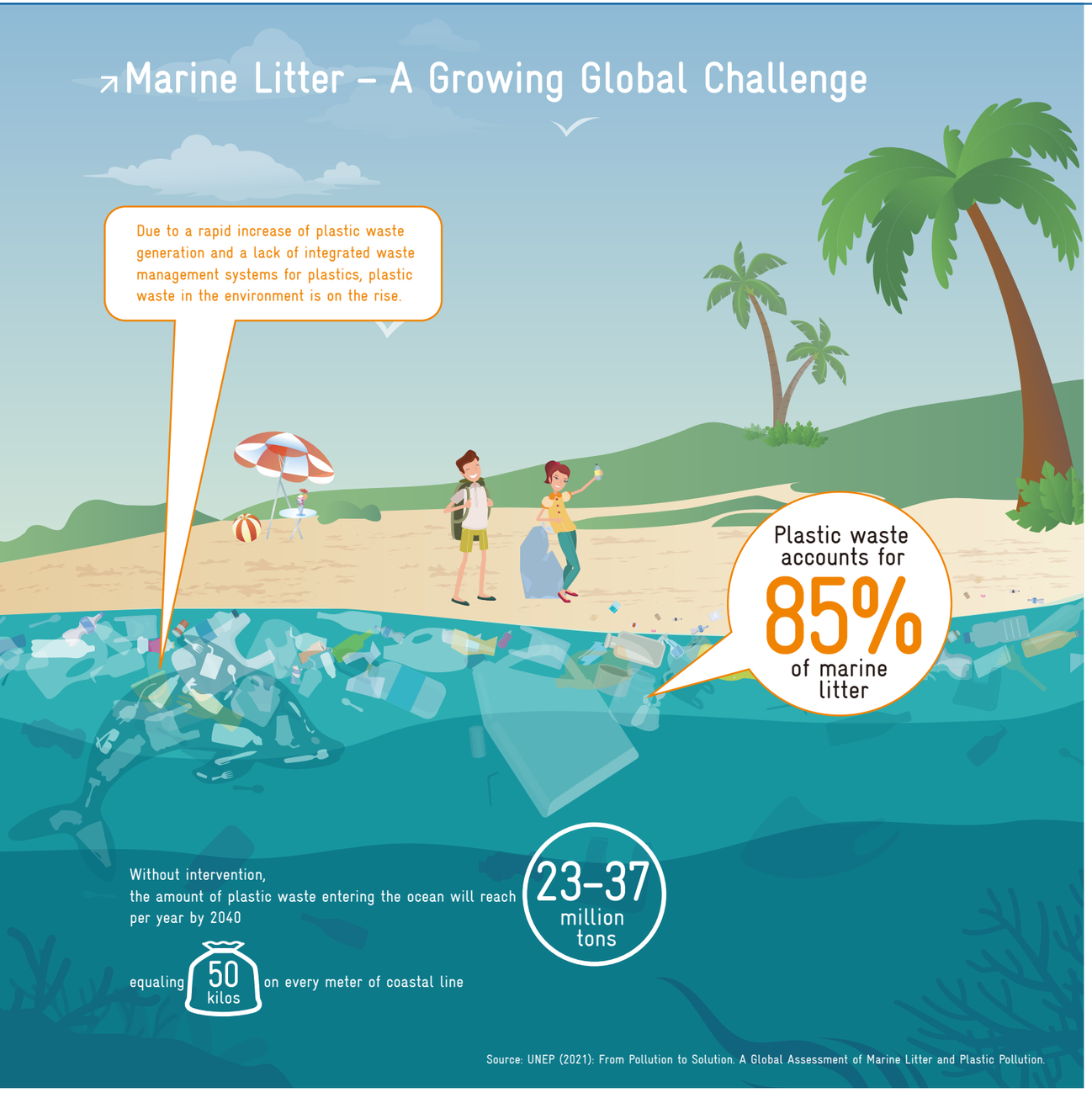
“塑料再思考”

循环经济应对海洋垃圾

Project Results in China


Reduce Plastic Waste
and Protect the Ocean!

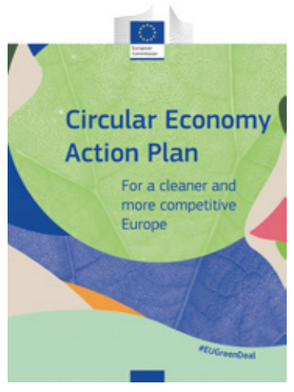
Marine Litter – A Growing Global Challenge



Source: UNEP (2021): From Pollution to Solution. A Global Assessment of Marine Litter and Plastic Pollution.

Circular Economy Solutions

To tackle the global plastic waste challenge, joint efforts are needed for a circular economy. The European Union (EU) presented the Plastic Strategy and Circular Economy Action Plan, as well as issued the Single-use Plastic Directive, aiming to reduce marine litter. In recent years, China has also released a series of policy documents to promote plastic management along the whole value chain and reduce the plastic leakage into the environment.



Circular Economy Action Plan

Single-use Plastic Directive

Source: European Commission

Sébastien PAQUOT | Counsellor for Climate Actions and Environment
Delegation of the European Union to China

Circular Economy is what we want to achieve. We are working on concrete approaches in China through our Rethinking Plastics project. Several pilot activities in different regions contribute to finding new solutions to reduce plastic waste and marine litter.

Project Information

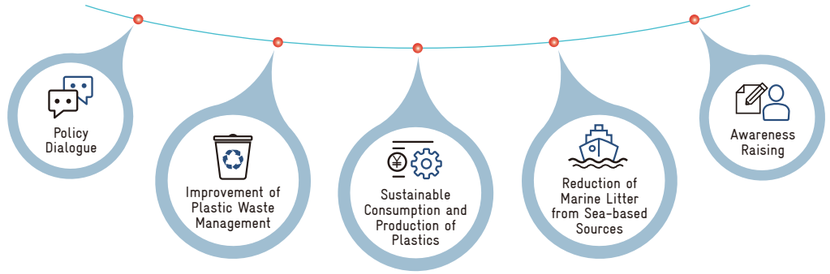
Rethinking Plastics – Circular Economy Solutions to Marine Litter

Contracting Authority	European Union (EU), German Federal Ministry for Economic Cooperation and Development (BMZ)
Implementation Organization	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Expertise France (EF)
Partner Countries	China, Indonesia, Philippines, Thailand, Vietnam, Singapore and Japan
Implementation Period	May 2019 to October 2022

Objectives

The project supports the transition towards a circular economy for plastics in East and Southeast Asia to reduce plastic waste leakage into the sea and thus marine litter.

Action Areas



Rethinking Plastics in China:

Through dialogue and training activities, recommendations and one-year long pilot projects including agricultural mulch film management, packaging waste reduction, ship waste management and fishing-for-litter initiative in China, the project aims to improve the plastic management along the whole value chain, promote sustainable consumption and production of plastics, and reduce marine litter from sea-based sources.

Pilots

Pilot Study on Establishing a Waste Collection System Favouring Single-Use Plastic Drinking Bottles

Reusable Packaging in the Online Express Delivery Industry

Ship Waste Management at Commercial Ports

Innovative Plastic Mulch Film Collection

Application and Promotion of Reusable Standardized Containers

Reducing Marine Litter through Fishing-for-Litter

For more information: https://rethinkingplastics.eu/

Key Concepts

01 Waste Hierarchy

The hierarchy provides a generalised priority order for waste reduction and management: Prevention, as well as the 3R principle (Reduce, Reuse and Recycle) are on top and should be promoted. The focus for the remaining waste is to phase out uncontrolled disposal (e.g. open dumping and burning).

Source: UNEP (2015), Global Waste Management Outlook.

02 Circular Economy

In a circular economy, resources are used and managed in a more efficient and sustainable way through the principles of "Reduce, Reuse, Recycle".

03 Extended Producer Responsibility (EPR)

EPR is an environmental policy approach in which a producer's responsibility for a product is extended to the waste stage of that product's life cycle, including collection, sorting, recycling or final disposal.

Source: Basel Convention (2019): Practical Manual on EPR.

04 Deposit-Refund System (DRS)

In a Deposit-Refund System, the packaging is given an economic value by requiring consumers to pay a deposit at the point of sale. When the empty packaging is returned, the deposit is refunded. The DRS has proven to be an effective way to collect plastic bottles for high-quality recycling.

05 Sustainable Consumption and Production

Sustainable consumption and production encourages circular economy development, in which the reduction of single-use plastic products, reuse and recycling are promoted. Products can for example be designed in a way, that they use less packaging or that they can be reused and recycled. Consumers can choose more sustainable or reusable alternatives, refuse over-packaging, or bring their own bag, cup or cutlery.

06 Awareness Raising

Awareness raising is an important approach on environmental topics that aims to inform and engage people regarding more environment-friendly and sustainable attitudes and behaviors. The target groups cover decision makers on policy level and in businesses, youth and consumers etc.

Xiamen

Pilot Study on Establishing a Waste Collection System Favouring Single-Use Plastic Drinking Bottles

Partner

China Association of Circular Economy (CACE)

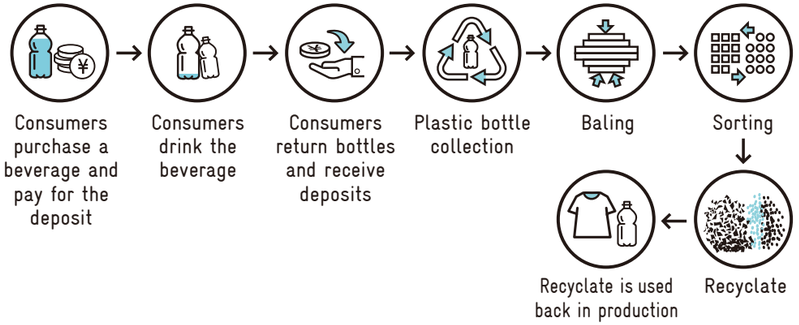
Problem

Are the consumed drinking bottles collected and recycled? How can this process be improved to be more efficient and value-added?

Contribution by Rethinking Plastics

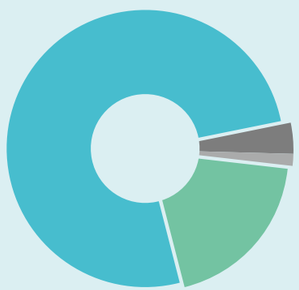
Baseline study of plastic bottle collection in Xiamen + Public awareness towards a Deposit Refund System (DRS) + Cost analysis to establish DRS

Solution



Findings

Waste generation of beverage packaging in Xiamen



2439 tons/day
In 2020, the household waste generation in Xiamen Island amounted to 2439.1 tons per day.

121 tons/day
Beverage packaging were 120.9 tons (paper, plastic, metal and glass packaging). The recycling rate of general beverage packaging is 83%.

34 tons/day
The amount of waste consisting of plastic bottles was 34 tons per day, with a recycling rate of 89%.

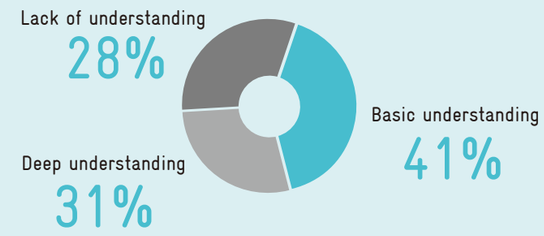
467 tons/day
The other low-value non-beverage packaging waste were generated in 467 tons per day, with a relatively low recycling rate of 11%.

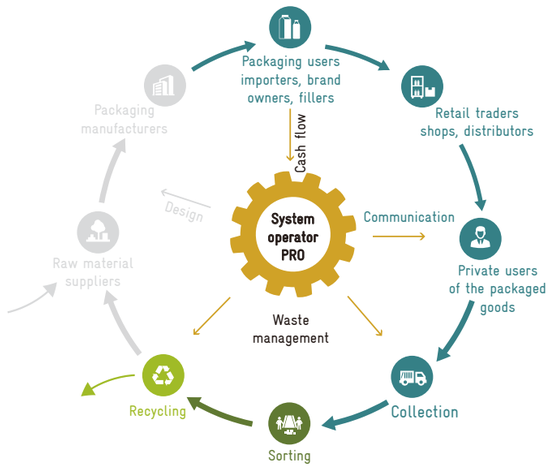
*The statistics are calculated based on investigation in 13 residential communities, 130 households in Xiamen Island.

Public awareness towards DRS

The pilot conducted an online survey on knowledge and readiness of consumers with 243 replies. Most respondents stated that they have an interest in joining DRS but need more information about the new system. They voted for a deposit amount of up to 1 RMB and 78 per cent of participants hope to get refund through WeChat and Alipay.

Public understanding of DRS





Source: PREVENT Waste Alliance (2020): EPR Toolbox.

Cost analysis to establish DRS

	Collection of plastic bottles	Collection of all packaging types (paper, plastic, metal and glass)
Recycling rate target	90%	90%
Daily collection amount (ton)	34.3	120.9
Deposit (RMB/bottle)	0.3	0.3
Collection station	154	154
Construction cost (million RMB)	16.72	21.56
Operation cost (million RMB/year)	26.37	73.45
Cost (RMB/ton)	2340	1849
Cost (RMB/packaging)	0.06	0.05

Suggestions

- According to the research result of Xiamen pilot, it is feasible to establish DRS through market operation.
- Relying on the existing internet-based collection mode, the financial calculation suggests that better economic benefits can be achieved by integrating collection of all kinds of beverage packaging, and establishing an intelligent management platform of the whole value chain.
- There is much room for improvement regarding the collection and recycling of low-value packaging waste in Xiamen. The next step can focus on low-value packaging collection and its performance evaluation.

ZHAO Kai | Executive Vice President
China Association of Circular Economy

Through the pilot experience of DRS research in Xiamen, we hope to explore a new mechanism for plastic bottle collection based on the local situation in China, which will contribute to the improvement of the overall recycling rate, plastic pollution control and the achievement of the national carbon neutrality strategy.

Kailu County
Inner Mongolia Autonomous Region

Innovate Plastic Mulch Film Collection

Partner

Research Center for Rural Economy (RCRE), Ministry of Agriculture and Rural Affairs (MoARA)

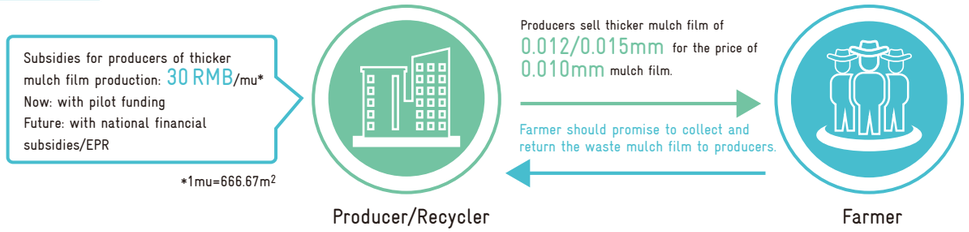
Problem

China is the largest consumer of agricultural mulch film, with an annual consumption amount of 2.4 million tons. The collection rate of waste mulch film is around 80%. How to minimise the mulch film residue in the soil and promote recycling in a more effective and efficient way?

Contribution by Rethinking Plastics

Baseline investigation of the use of mulch film + Pilot of thicker / biodegradable mulch film + Monitoring and analysis of waste mulch film collection effects

Solution



Fushenghao Village, Kailu County, Inner Mongolia

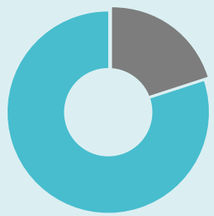
280 farming households

Pilot of thicker mulch film 0.012mm on 3500 mu farmlands

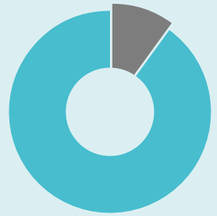
Pilot of biodegradable film on 200 mu farmlands

Pilot of thicker mulch film 0.015mm on 300 mu farmlands

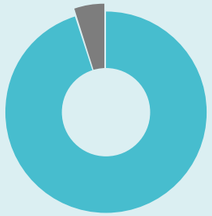
Findings



Mulch film of national standard (0.010mm)
Mechanical Collection rate 80%



(0.012mm)
Mechanical Collection rate 90%



(0.015mm)
Mechanical Collection rate 95%

Degrading rate of biodegradable mulch film (within the one-year pilot period) 50%

*The collection of waste mulch film is completed by local common collection machines.

Thicker high-quality mulch films contribute to a high collection rate and bring a revenue of 500–1000 RMB/t for the recyclables.

In 2022, the national subsidy will support the use of 0.015 mm mulch film on 50 million mu farmlands, and additional 5 million mu farmlands for biodegradable mulch film. The Kailu County will continue the pilot on 0.1 million mu farmlands of 0.015mm mulch film with the national subsidy.

Unified scientific monitoring methods and long-term monitoring mechanism should be established for monitoring mulch film residue in the soil, which can help to better summarize the mulch film pollution problem and implement solutions.

Suggestions

- Using high-quality mulch film can reduce mulch film residue in the soil. The pilot shows it is effective to reduce mulch film pollution through the cooperation with producers. With this regard, EPR will be an effective instrument.
- Considering the vulnerable position of farmers in the society, and under the agricultural subsidy background in China, it is effective to adjust the subsidy policy and guide the promotion of using high-quality mulch films.
- It is suggested to further monitor and evaluate the effectiveness of the 0.1 million mu pilot in Kailu County, which can help promote the mulch film management policy.

JIN Shuqin | Director/Researcher
Research Center for Rural Economy, Ministry of Agriculture and Rural Affairs

Dedicated to the research of agriculture and rural affairs, I feel the deep affection for farmlands, just like farmers. I hope our earth can be revitalized with bluer sky, cleaner waters and soil through joint efforts.

Haikou

Reusable Packaging in the Online Express Delivery Industry

Partner

China Federation of Logistics and Purchasing (CFLP), Shenzhen University

Problem

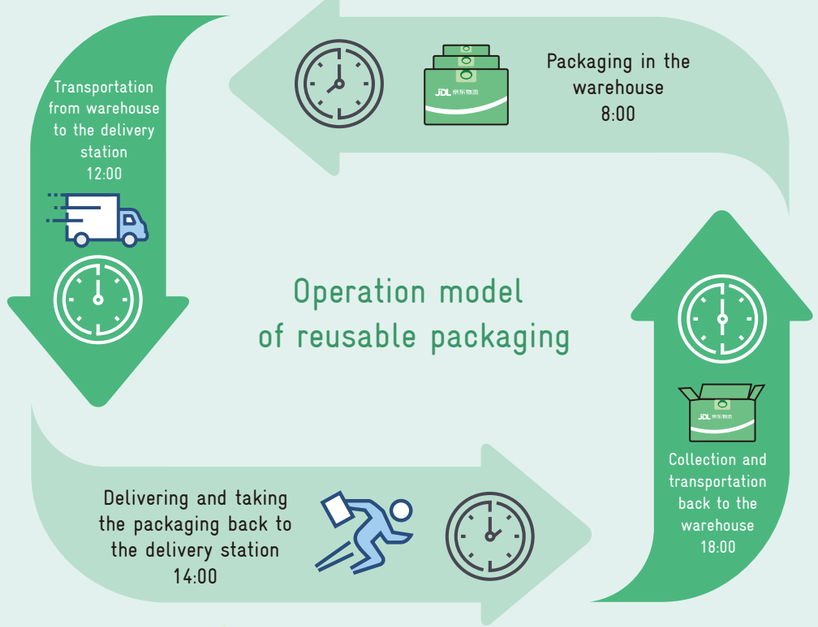
In 2021, the total volume of express delivery was over 100 billion pieces. How to better reduce resource consumption and waste in the express delivery industry?

Contribution by Rethinking Plastics

Green Stream Box

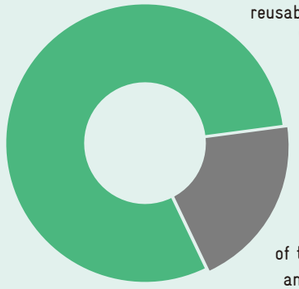
Operation model + Environmental benefits + Technical guideline + Public survey

Solution



*The analysis is based on the existing model of reusable delivery packaging of JD Logistics in Haikou, which is one of the leading express delivery companies in China.

Findings



There are more than 10000 reusable boxes in total in Haikou Warehouse of JD Logistics.

Reusable delivery boxes account for 20% of the daily intra-city delivery amount of Haikou Warehouse

Using Green Stream Box, 0.9 million single-use plastic packaging have been saved in one year

including over 0.3 million corrugated boxes

0.5 million plastic bags

saves around 1.78 million meters of tape

The scenario of using reusable boxes is the intra-city express delivery package sent by JD Haikou Warehouse, covering a population of more than 200000. The reusable box is circulated every 3 days. Based on the survey, more than 90% of the customers provided positive feedbacks and acceptance of the reusable box.

Suggestions

- The reverse logistics cost is the key part for reusing delivery packages. The successful case of JD Haikou relies on the self-run warehouse and delivery system. It is suggested that the current operation model can be promoted. It is still challenging to promote reusable packaging in intercity delivery or between different delivery systems.
- The delivery industry currently focuses mainly on the optimization of cost and benefit. The sustainable transition in this industry needs support and guidance from the national policy level.

DUAN Yanjian | Director of Green Stream Initiative, JD Logistics

It is important to achieve the standardization of delivery packaging and build the infrastructure for packaging collection and reuse. In addition, the green consumption needs to be encouraged, so that the reusable packaging in delivery can be promoted.

WAN Ying | Secretary General of E-commerce and Express Service Committee, China Federation of Logistics and Purchasing

I think it is promising to promote the business model of reusable packaging in the express delivery industry.
I hope that we can choose reusable packaging, when using express services in our daily life. Together we can build an ecological society.

Qingdao

Application and Promotion of Reusable Standardized Containers

Partner

Qingdao Junshengmingshi Logistics Packaging Institute

Problem

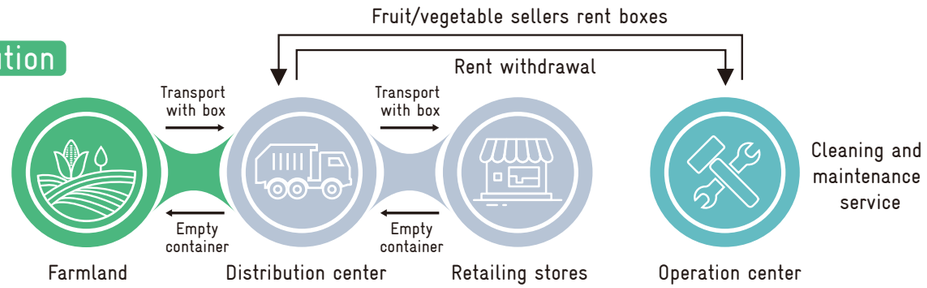
The annual consumption of single-use containers amounts to 17 million pieces in Qingdao West Coast New District (QWCND). Is there any better solution?

Contribution by Rethinking Plastics

Based on the existing pilot in QWCND

Business model analysis + Environmental benefit analysis + Policy recommendations

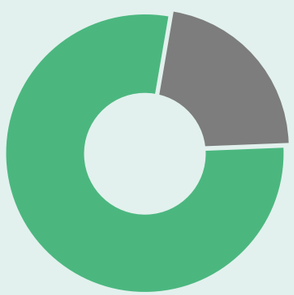
Solution



Findings

The pilot organization provided 60000 reusable containers for Qingdao West Coast Supply and Marketing Group.

The containers are reused every three days in average and more than 120 times annually.



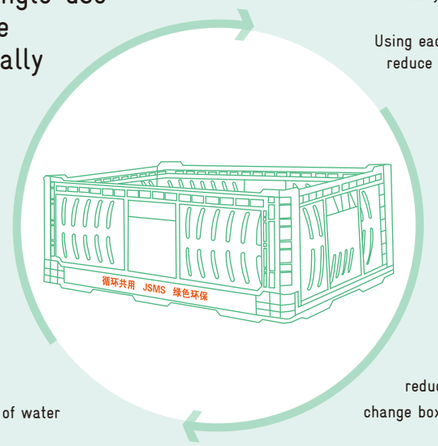
13000 are used for egg transportation

47000 containers are used for fruit

Compared to the single-use ones, each reusable container can annually

reduce the GHG emissions of 936kg CO_2eq

save 516L of water



The daily cost of each container is 1RMB

Using each reusable logistic container helps reduce single-use material consumption in 120kg and save the cost of buying new single-use containers for an amount of 600RMB

If the food loss during transportation through single-use packaging is 20% according to research data, using a reusable container can contribute to food loss reduction in 300kg/year as there is no need to change boxes during transportation and arrangement in retailers.

The reusable boxes are managed through chips and digital system, which can effectively achieve the tracking functions and improve the efficiency.

In comparison to single-use containers, the reusable containers have higher construction investment and operation cost. The Qingdao pilot received a green financial loan from China Construction Bank (Qingdao), which supports the establishment of a sustainable business model.

Suggestions

- The reusable containers have remarkable environmental and economic benefits, and it can be promoted as a sustainable business model.
- The reusable frequency in the Qingdao pilot is stable and not affected by seasons. However, based on the experience in some European cases, the cost related to seasonal changes needs to be carefully considered.
- The deposit and property management are important for reusable containers. The digital system can improve the management effectiveness and efficiency.

WANG Guixin | Director, Qingdao Junshengmingshi Logistics Packaging Institute

There is a great demand for packaging in the fruit and vegetable industry in China. If this packaging can be replaced by reusable options, the amount of single-use plastic can be significantly reduced at source.

Tianjin Port Shanghai Port

Ship Waste Management at Chinese Commercial Ports

Partner

National Marine Data and Information Service (NMDIS)
Transport Planning and Research Institute (TPRI), Ministry of Transport (MoT)

Problem

There are 20 million ships in total at Chinese ports every year. How can we encourage more ship waste to be delivered to ports?

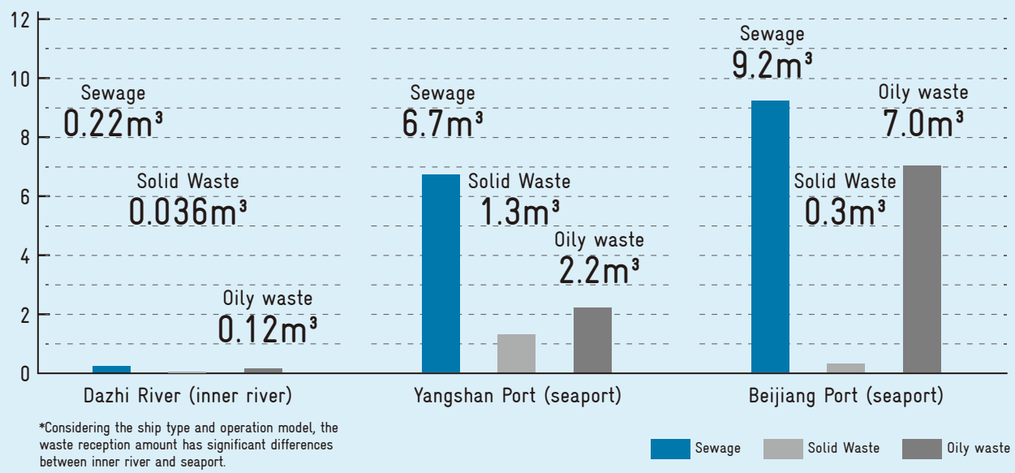
Contribution by Rethinking Plastics

Assessment of ship waste management + Ship waste management manual + Policy recommendations to improve current ship waste management

Solution

Findings

Average reception amount per ship in different ports in 2021



*Considering the ship type and operation model, the waste reception amount has significant differences between inner river and seaport.

Summary of charging systems for ship waste reception (cost-recovery)

Charging system	Operation mode
Direct fee	Ships are charged according to the waste delivered
Indirect fee	Ships are charged a certain amount no matter if waste is delivered
Free of charge	Port receives the ship waste for free
Contract	Ships are charged based on contracts with ports (e.g. annual fee)
Combined	Above modes combined

(Source: ANGEL CARPENTER, SALLY MACGILL. Charging for Port Reception Facilities in North Sea Ports: Putting Theory into Practice [J]. Marine Pollution Bulletin, 2001, 42 (4): 257-266.)

The reception capacity in Dazhi River is sufficient. The capacity of receiving sewage can be improved for Yangshan Port. At Beijiang Port, it is suggested that a treatment facility can be constructed for centralized treatment of sewage.

The key aspect is to guide the ships to deliver waste to ports, and have the proper capacity to receive the waste. International experience shows different charging schemes for ship waste reception, which can be discussed by ports based on local needs.

Suggestions

- Policy recommendations based on pilot results have been submitted to related departments.
- Improve the ship waste facility and increase the reception capacity. Require the ship to deliver all waste, unless enough storage space can be proved on the ship.
- Introduce the cost recovery system based on the situation in China. Explore the indirect fee scheme to motivate the ship to deliver waste actively to Ports.
- Raise the awareness of stakeholders and encourage their participation in ship waste managment.

LIN Ning | Professor/Director of Marine Archives
National Marine Data & Information Service

Efficient and sustainable ship waste management requires a clear division of roles and responsibilities and a close cooperation between all stakeholders involved in ship waste management, among them ships, ports and cities. Together, they can create joint efforts to reduce marine litter.

HAN Zhaoxing | Section Chief of Planning and Assessment, Department of Environment & Resources
Transport Planning and Research Institute, Ministry of Transport

It is recommended that waste generated on ships are encouraged to be delivered to ports, and then integrated to municipal waste treatment systems, so that the impacts on the marine environment can be minimized.

Changhua Sanya

Reducing Marine Litter through Fishing-for-Litter

Partner

Hainan Research Academy of Environmental Sciences (RAES)

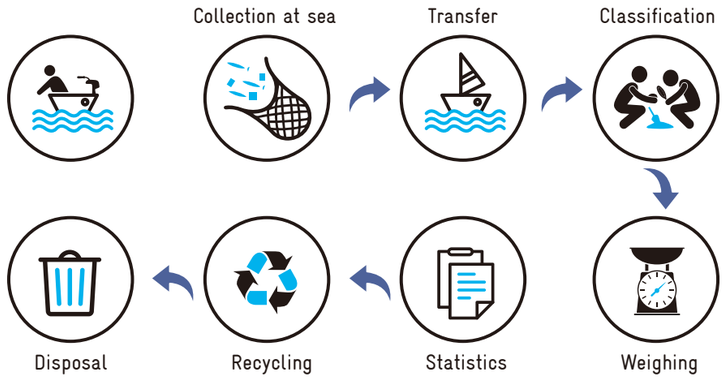
Problem

How can fishermen be encouraged to collect the waste from the ocean to reduce existing marine litter?

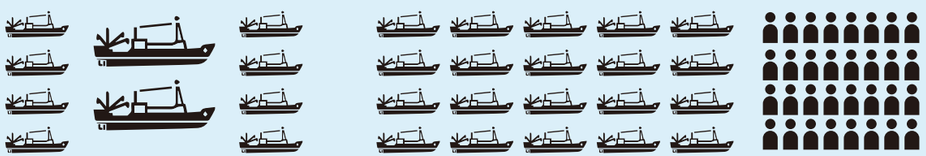
Contribution by Rethinking Plastics

Exploring the fishing-for-litter scheme + Public awareness raising

Solution



Findings



Starting from 10 boats

at the end, 62 boats participated with 400 fishermen joining

Plastic accounts for 60% of the marine litter fished out of the ocean by weight, including

Plastic debris | Plastic bottles | Fishing nets

Iron from crab trap accounts for about 30%

Under the pilot project, fishers were encouraged to bring back waste they fish on the sea for environmentally sound disposal on land. Around 30 organizations (e.g. communities, government departments and different social groups) directly joined the reduction of marine litter.

The pilot results are widely disseminated through different media channels. A total of 131 news releases were published so far.

The pilot established the mechanism of fishing-for-litter at sea, waste sorting on the land, transportation and treatment by environment sanitation bureau, and receives support from Department of Ecology and Environment of Hainan Province and People's Government of Changhua County. After the project, the fishing-for-litter activities in pilot areas will be supported in the long term through governmental funding.

Suggestions

- The FfL pilot is a good case of social governance from multi-stake-holders in marine litter management, and worth promoting nationwide and even worldwide.
- The environment and social value of collecting marine litter needs to be further recognized by the society. The next step is to explore an incentive system for the fishermen and promote the sustainable business model of FfL in a wider range.

LYU Shuguo | Director of Ecology and Environment Institute South China Sea / Researcher
Hainan Research Academy of Environmental Sciences

Marine litter has no national boundaries, and it is difficult to identify responsibilities, that is why it particularly needs global management and actions of everyone. Through our efforts, I hope to promote our Changhua-model to the whole country, and even to the world, so that the vision of a plastic free ocean can be realized.

ZHONG Qiangbin | Captain of Fishing Boat Qiongchangyu No. 30010
Changhua Port, Hainan Province

The power of one person to salvage marine litter is small. I want to involve more fishermen through my efforts and let's clean up the ocean together!

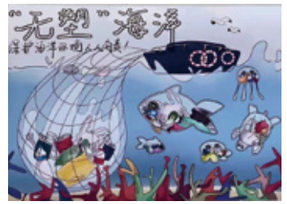
Awareness Raising and Public Education

Currently, there are a lot of information about the amounts and negative impacts of marine litter, but still: people are often not aware that they contribute to the problem and that it affects them, too. The Rethinking Plastics Project has organised various awareness raising activities targeting at different age groups. This helps to bridge the gap between the public and marine litter and motivates to change behaviour in the daily life.

“No Plastic for Future” Art Paintings of Children

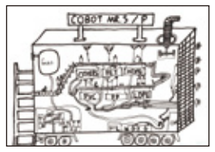

LI Xiangyu

JIA Dingyi



CHEN Xinyue


ZHANG Kaiyi

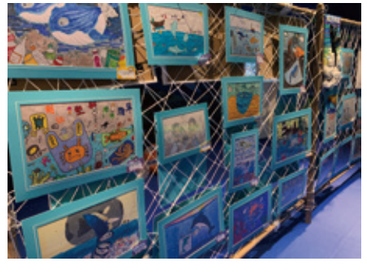

HE Zi'ang


XU Simiao


WANG Shuoqi

CHEN Xiangyi

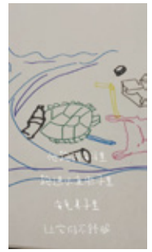
Whale Fall Exhibition of Marine Litter

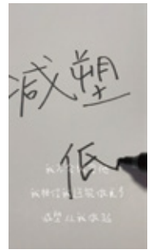


Teenager Ambassadors

Online Marine Litter Knowledge Quiz

#No Plastic for Future# TikTok Short Video Competition





FAN Wenming

YANG Liuxin

Photo Contest “Green Development & Circular Economy”

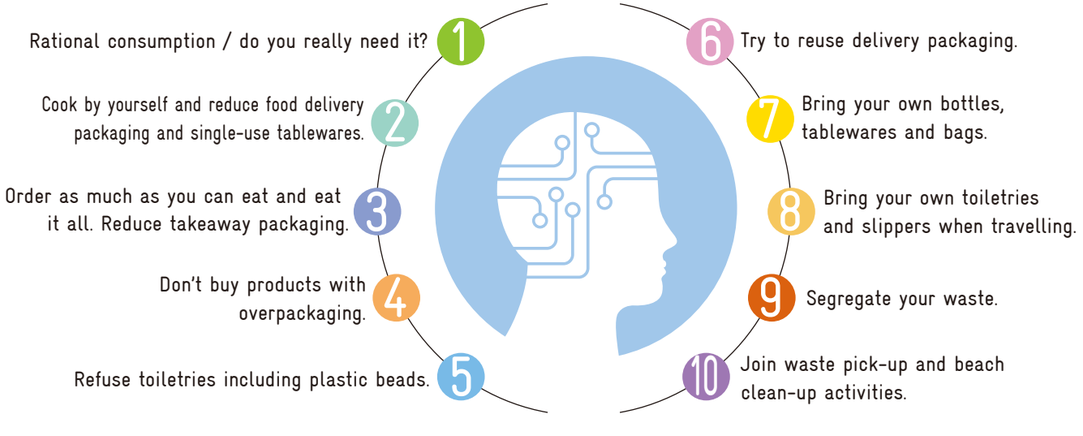

Greatwall Guardian (YING Liming)


Waste and City (ZHANG Yuping)

EU Sustainability Tour

Plastic Reduction Action List

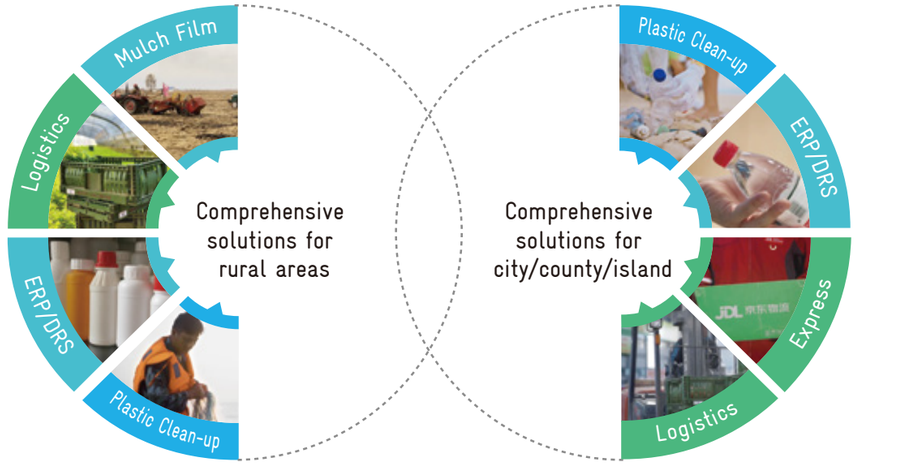
The action list was summarized from the ideas and opinions brainstormed by participants of campaign activities.



What is the Future?

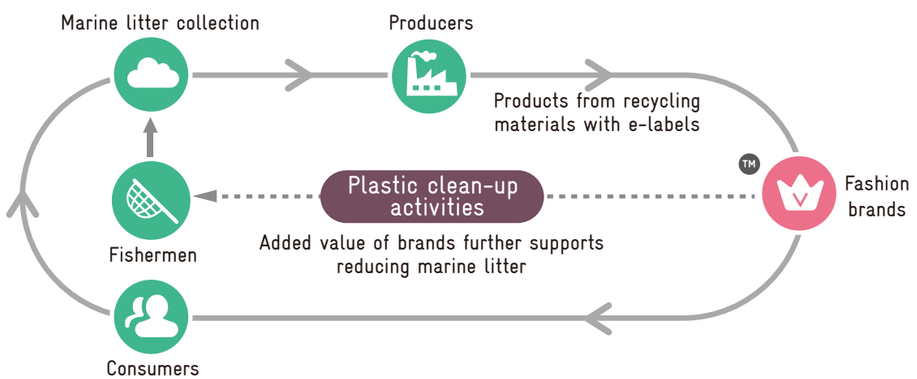
Rethinking Plastics – Comprehensive Solutions for City/County

The sustainable business models and solutions summarized from results of the Rethinking Plastics Project can be continuously promoted in other cities and regions.



Digitalization Empower Waste to Fashion

A replicable mechanism can be established to use recycled plastic material from sea-based waste for fashion production to give an added value to marine litter. This can for example be linked to Fishing for Litter activities. By using a digital system, a link can be set between fashion brands and reducing marine litter.



Add More Value to Waste

An important lesson learnt based on practical situation in China:
Added value to waste is needed to promote plastic pollution control and circular economy development. It can be realized by various instruments such as national subsidy policies, green financing or awareness raising. Especially for marine litter topics, innovative financing instruments are worth development, for example a plastic credit system as the foundation for EPR.

Policy Instruments
Policy adjustment
Supervision

Financial Instruments
Low interest loan
Insurance

Social Instruments
Awareness raising
Pay for recyling material

Alvaro ZURITA
Team Leader
Rethinking Plastics Project, GIZ

The EU Rethinking Plastics Project supports 24 pilot projects implemented in China, Indonesia, the Philippines, Thailand and Vietnam. We hope these innovative initiatives can inspire some changes and provide lessons learnt to public policy makers and other stakeholders, fostering the reduction of plastic waste and marine litter.

CHEN Xiaoting
Program Manager, Ellen MacArthur Foundation (UK) Representative Office

The Rethinking Plastics Project discusses solutions to end plastic pollution from different perspectives such as EPR, sustainable consumption and production. In order to meet this global challenge, we need to accelerate the transition towards a circular economy in the plastic industry, tackle the plastic pollution from the source, phase out unnecessary plastic products and promote circularity and innovation.

LIU Xiao
Project Manager
Rethinking Plastics Project, GIZ

We hope to encourage the public to rethink the value of plastics. Let’s enjoy the convenience of plastics on one hand, and support plastic pollution control on the other hand. Joint efforts are needed by all of us to be in harmony with nature and the ocean. Please believe in the power of small. Little drops of water make the mighty ocean.

WANG Yanhui
Director of Climate and Energy Research Center
Institute of Finance and Sustainability (IFS)

We are deeply touched by the enthusiasm of teenagers to improve the environment, and we will keep being devoted in this area and make environment friendly actions more easier for the public!

ZHOU Yanwen
Specialist
Rethinking Plastics Project, GIZ

Motivated by our pilot projects, people involved in the project, including fishermen, farmers, deliverymen and me myself, are gradually changing our behaviors. We start to use less plastics, prefer reusable options, and segregate waste. In this way we contribute to the reduction of plastic pollution and marine litter.

DING Yu
Expert of Green Finance

The participation in the EPR training organized by Rethinking Plastics Project gives me a new and detailed orientation regarding financial issues. The training also inspired inspired me in the design in the design of financial products, risk and process management.

WANG Chufan
Intern
School of Environment, Tsinghua University

Marine litter and other new environmental problems have presented serious challenges to human beings and other creatures. As a student majoring in Environment Engineering, I’m inspired by the Rethinking Plastics Project and I’m trying to explore more about the relation between theory, technology, business and actions. We do need to think more towards a better future.

CHEN Weilin
Head of Video Shooting and Production Team
Rethinking Plastics Project

The whole process of shooting and production of the project impressed me deeply and inspired our team to rethink the problem of plastic pollution from multiple perspectives. We hope that through our works, we can influence and drive more people around us to reduce the use of plastic products, actively use recyclable and degradable substitutes, and actively practice a simple, moderate, green and low-carbon lifestyle.