THE SOLUTION FOR SUSTAINABILITY OF PLASTIC INDUSTRY

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Part ONE

1 Part

INTRODUCTION

Plastics are Used to Create Many Products.

- Plastic is an important and ubiquitous material in our economy and daily lives.
- It has multiple functions that help tackle a number of the challenges facing our society.
- Plastics are in our packaging, clothing, furniture, cars and more.

1 Part

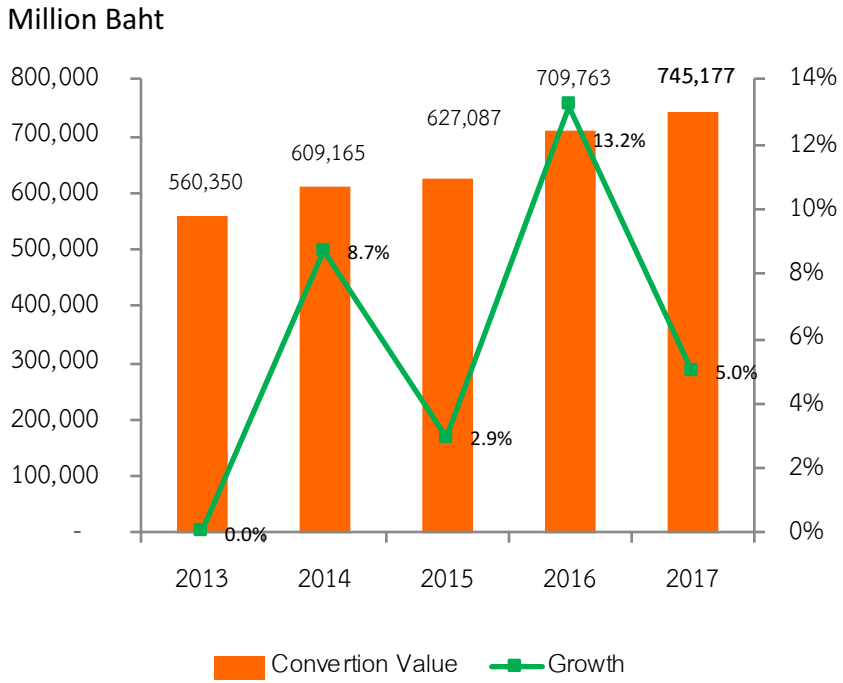
INTRODUCTION

An Important Source of Growth ang Jobs

- Thailand's plastic production industry has grown rapidly in recent years and currently boasts over **3,000** operating companies.
- The plastics sector employs **300,000** people and generated a turnover of THB **745,000** million baht in 2017.

. . . and every job created in the plastics sector leads to the creation of almost 3 additional jobs in the wider economy.

Thailand Plastic Conversion Value in 2017



Source: Plastics Institute of Thailand

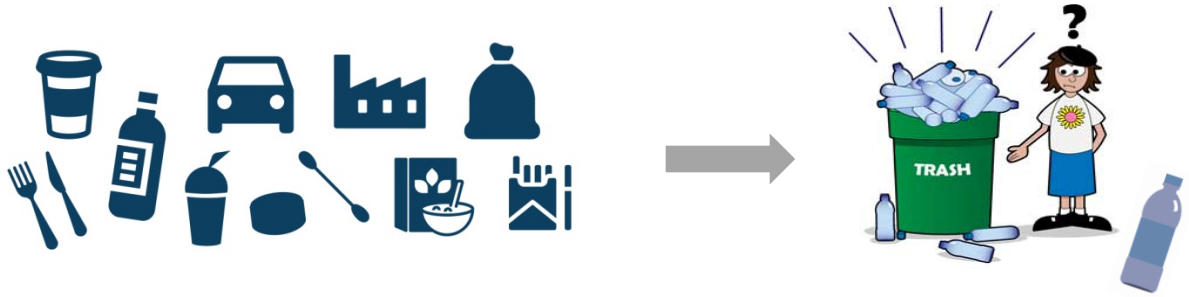
1 Part

INTRODUCTION

Facing Plastics Pollution

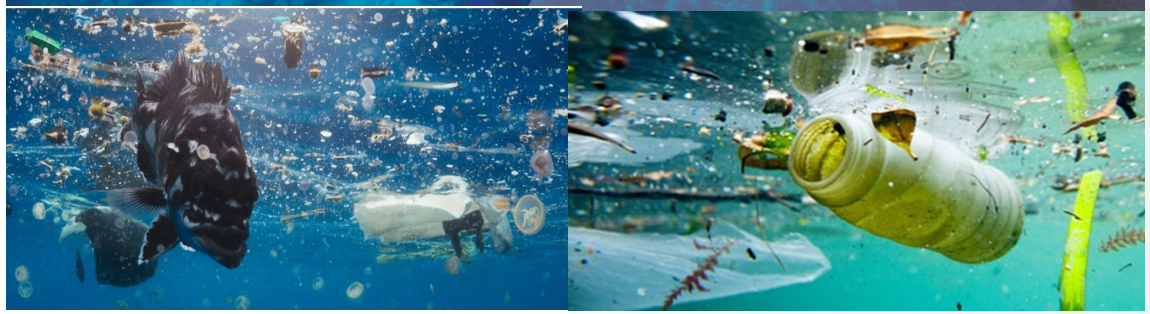
There is a lot of plastic being produced every year

and a lot of it ends up in the oceans.



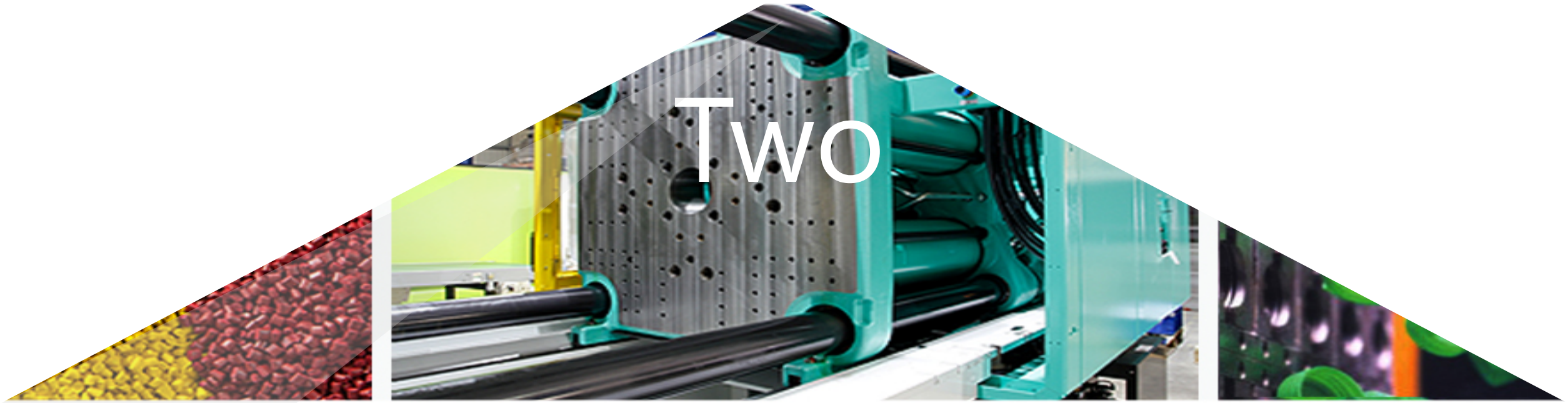
While that has brought its benefits, such as lower-cost materials or capabilities like water resistance, plastic has also produced a lot of trash.

A massive amount of plastic wastes ends up in our oceans every year.



There will be more plastic in the oceans than fish by 2050 if nothing is done.

Part Two



2 Part

Plastics Today: Key Challenges

Plastic value chains and end-of-life plastics

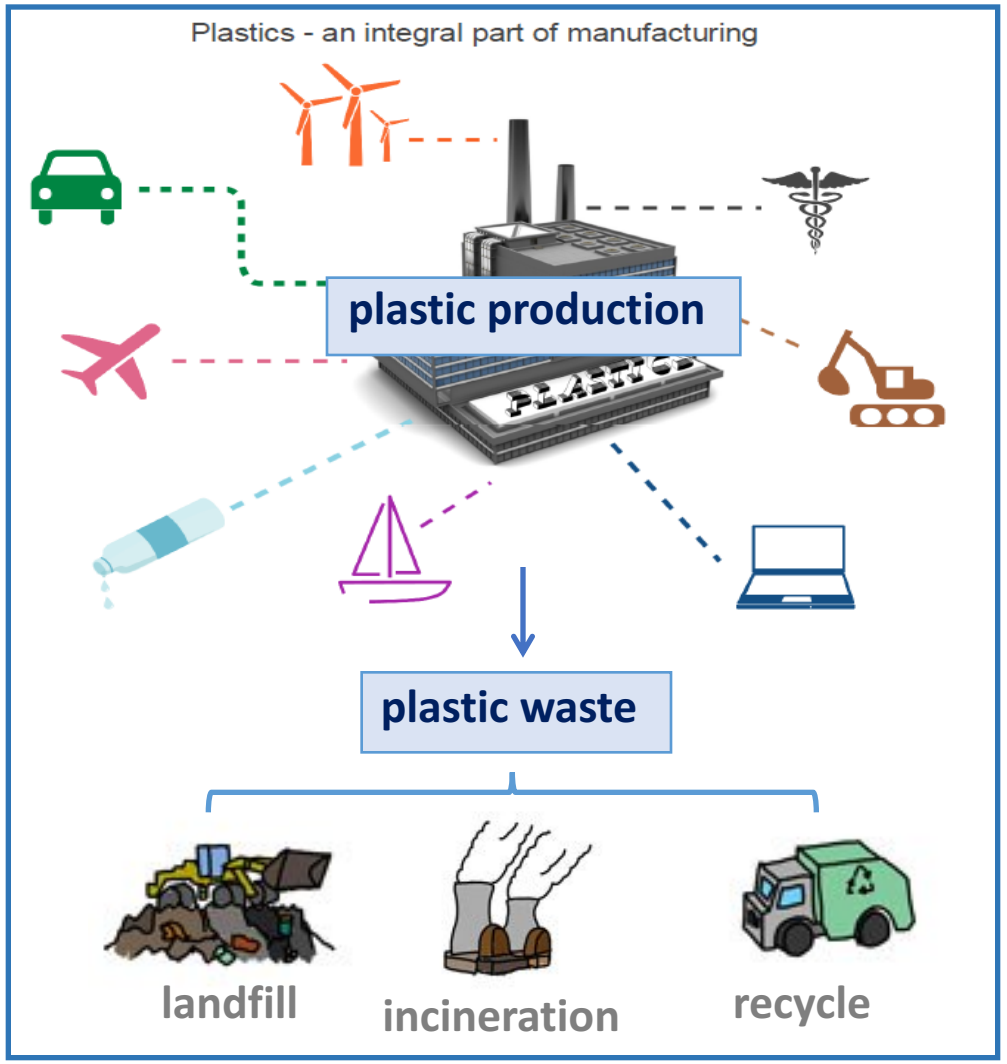
- **However, Reuse and recycling of end-of-life plastics remains very low, particularly in comparison with other materials such as *paper, glass or metals*.**
- **At the same time, landfilling and incineration rates of plastic waste remain high.**

Recycling rate R_1 (All plastics recycling rate) = ***61.9%***

(share of all plastic waste sent to recycling)/
(collected plastic waste in your country/region)

Recycling rate R_2 (Packaging recycling rate) = ***20.9%***

(share of plastic packaging waste sent to recycling)/
(collected plastic waste in your country/region)



2 Part

Plastics Today: Key Challenges

Compostable properties bring new opportunities

Rising environmental awareness among the general population is the major driver for the market growth.

Europe is estimated to be the largest consumer of biodegradable plastics holding more than 35% of the global market share

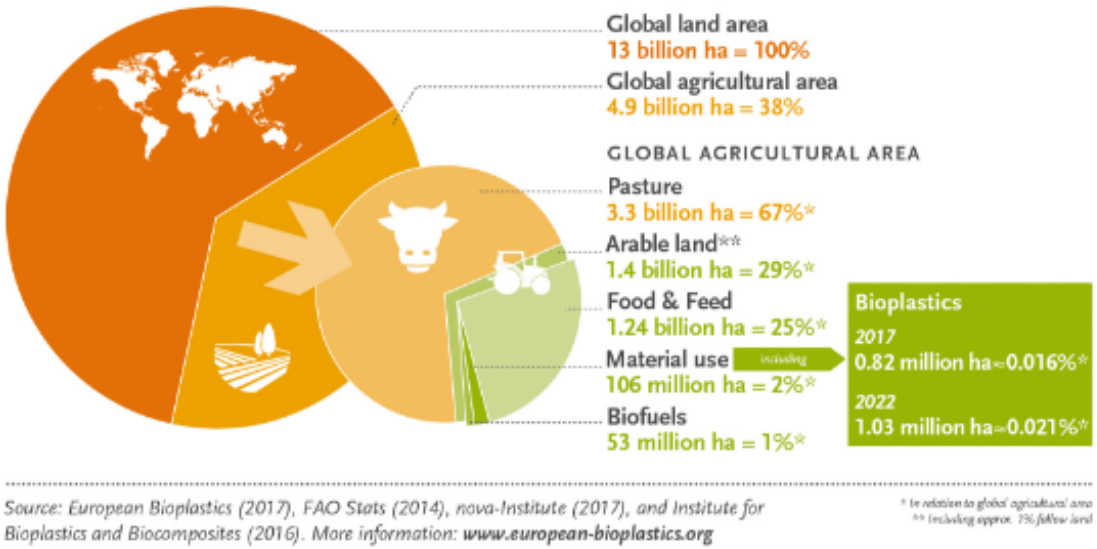
In Asia, the biodegradable polymers growth is seen due to the restricted usage of plastic bags by the government.

2 Part

Plastics Today: Key Challenges

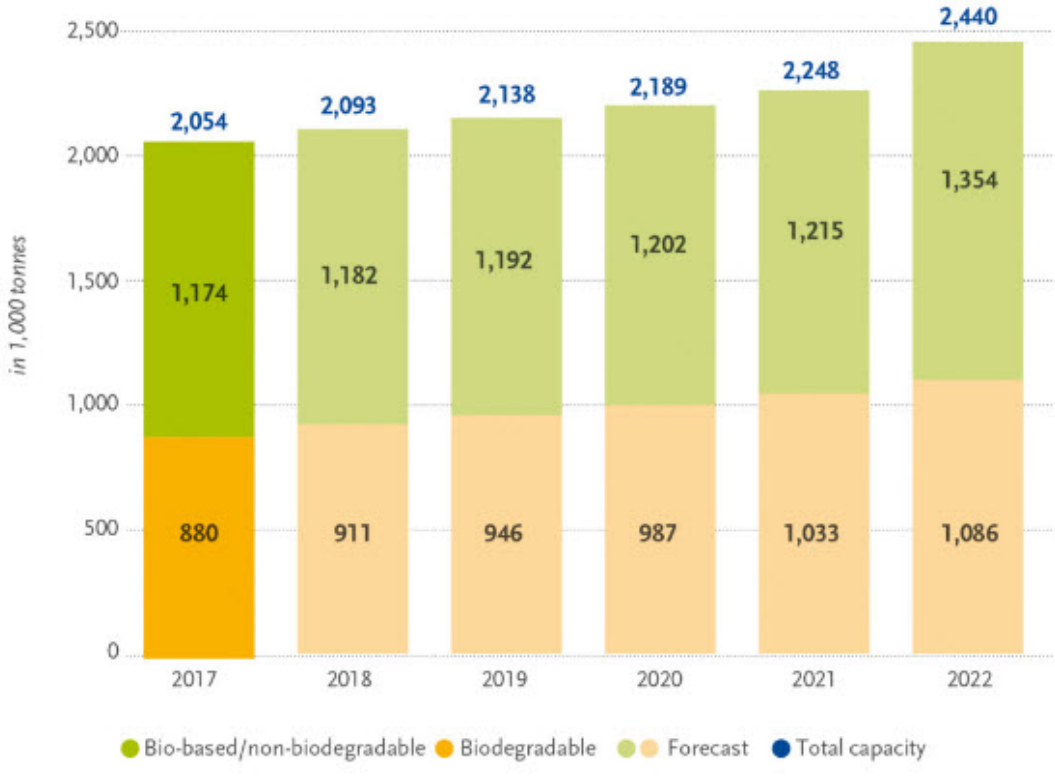
Growth of global bioplastics feedstock

Land use estimation for bioplastics 2017 and 2022



Source: European Bioplastics (2017), FAO Stats (2014), nova-Institute (2017), and Institute for Bioplastics and Biocomposites (2016). More information: ***www.european-bioplastics.org***

Global production capacities of bioplastics



Assuming continued strong growth of the bioplastics market based on the current stage of technological development, a market of 2.44 million tonnes could be achieved by the year 2022, accounting for about 1.03 million hectares in 2022, or around 0.02 percent of the global agricultural area.

Source: European Bioplastics

2 Part

Plastics Today: Key Challenges

Rethinking and improving

“Greater cooperation by all its key players”

Plastics producers

Retailers Consumers

Recyclers

Innovation

The plastics of the future

The plastics industry is very important to economy, and increasing its sustainability can bring new opportunities for *innovation*, *competitiveness* and *job creation*, in line with the objectives pursued by the Thailand Industrial Policy Strategy.

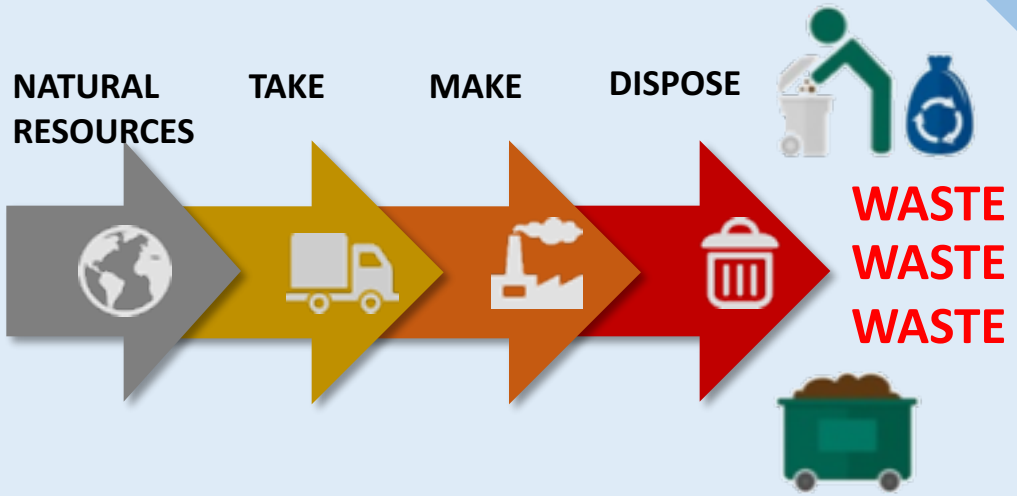
Part THREE

3 Part

Turning Challenges into Opportunities:

A Vision for Circular Plastics Economy

LINEAR ECONOMY



vs.

CIRCULAR ECONOMY

From One-way Consumption to Circular Economy

Value of products, materials and resources is maintained in the economy for as long as possible, moreover, waste generation is minimized.

Source: UNIDO, 2015

Source: Plastics Institute of Thailand

3 Part

Turning Challenges into Opportunities:

A Vision for Circular Plastics Economy

3 main principle of circular economy

I. PRINCIPLE

Preserve and enhance natural capital
By controlling finite stocks and balancing
Renewable resource flows.

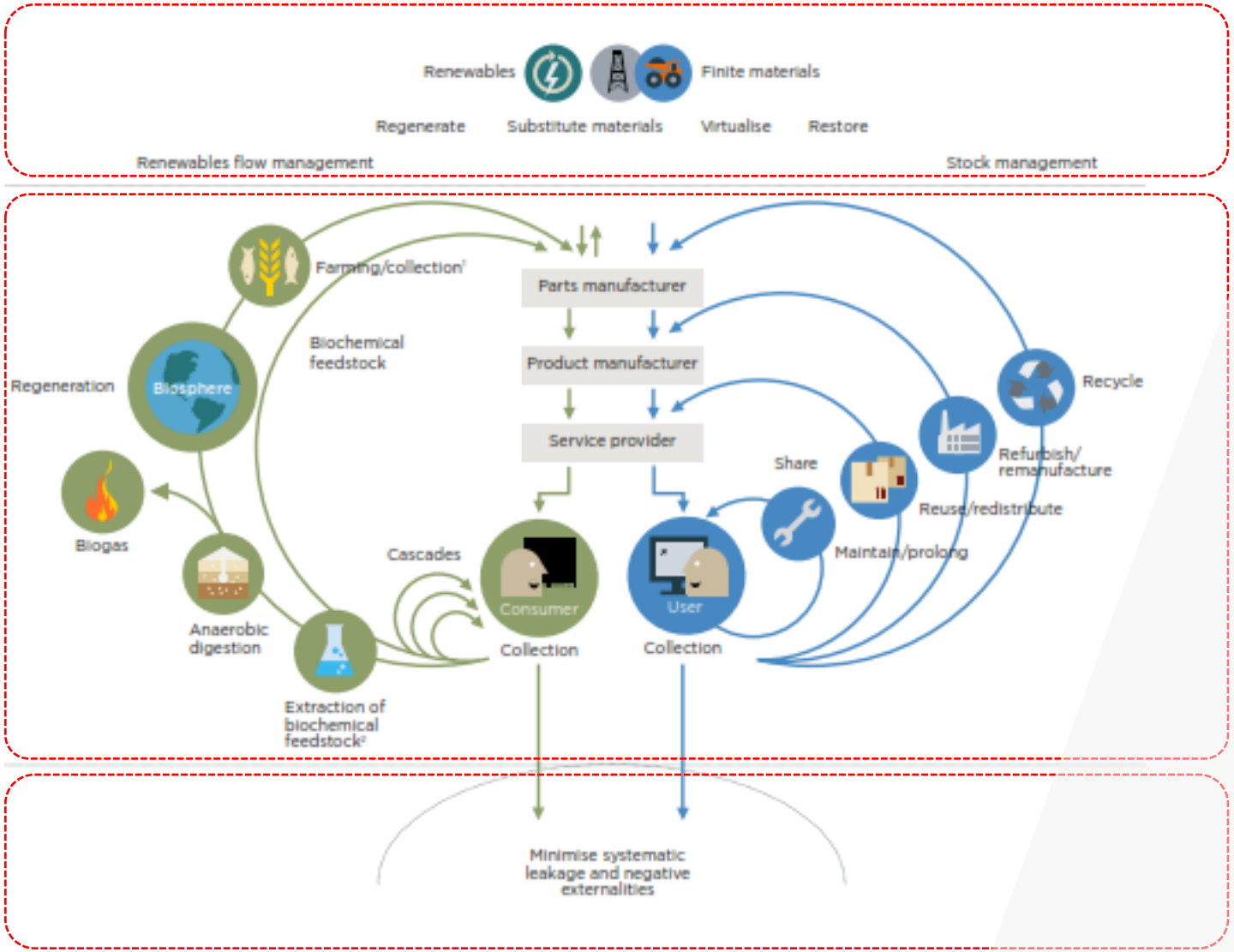
II. PRINCIPLE

Optimize resource yields by circulating product, component and materials in use at the highest utility at all time in both technical and biological cycles.

III. PRINCIPLE

Forster system effectiveness by revealing
And designing out negative externalities

Outline of a Circular Economy

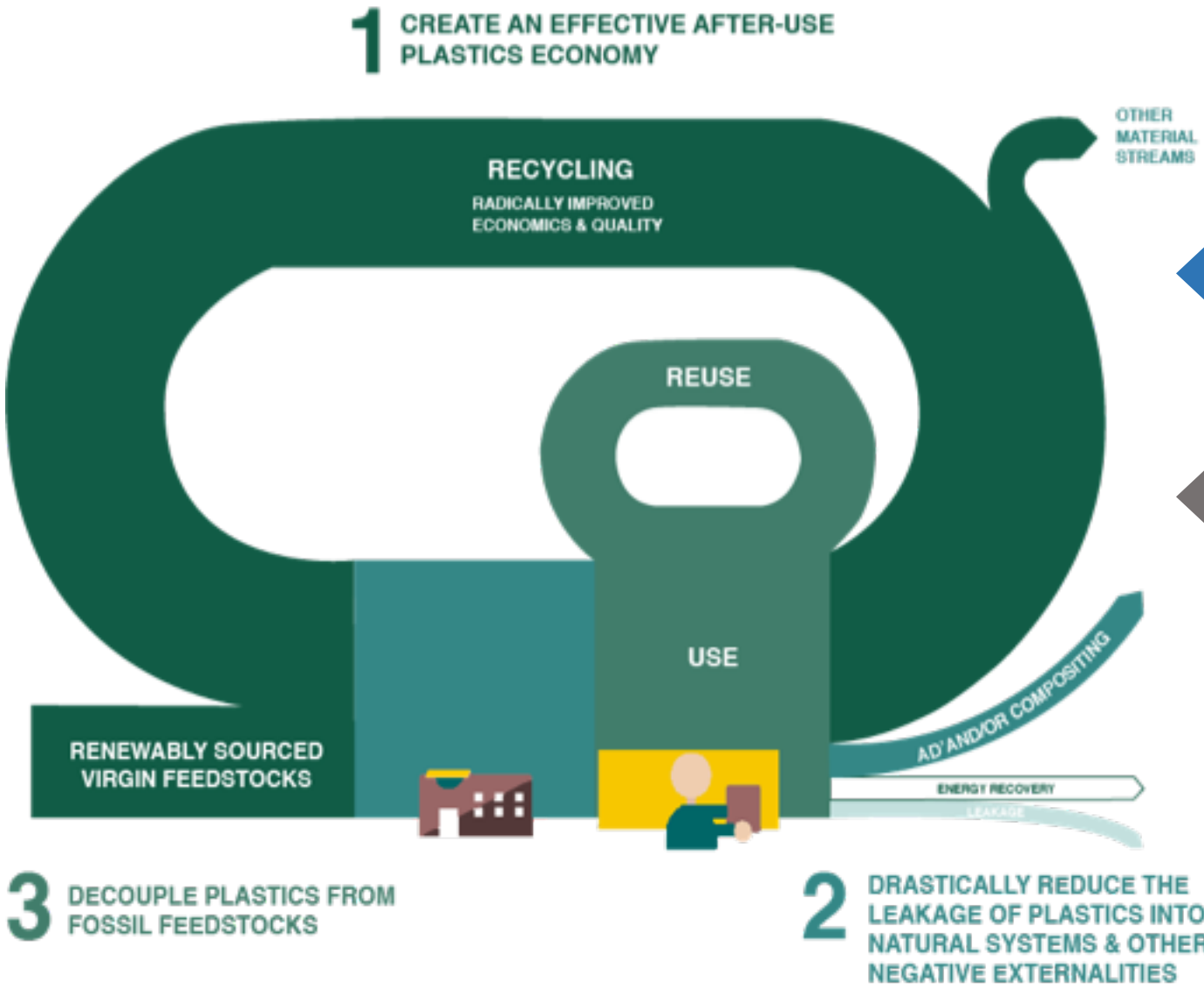


Source: Plastics Institute of Thailand

3 Part

Turning Challenges into Opportunities:

A Vision for Circular Plastics Economy



Ambition of Plastics Economy

Scale up the adoption of reusable packaging within business-to-business applications as a priority

This will be achieved through reusing materials more productively and creating a reliable supply chain from waste.

Source: www.ellenmacarthurfoundation.org

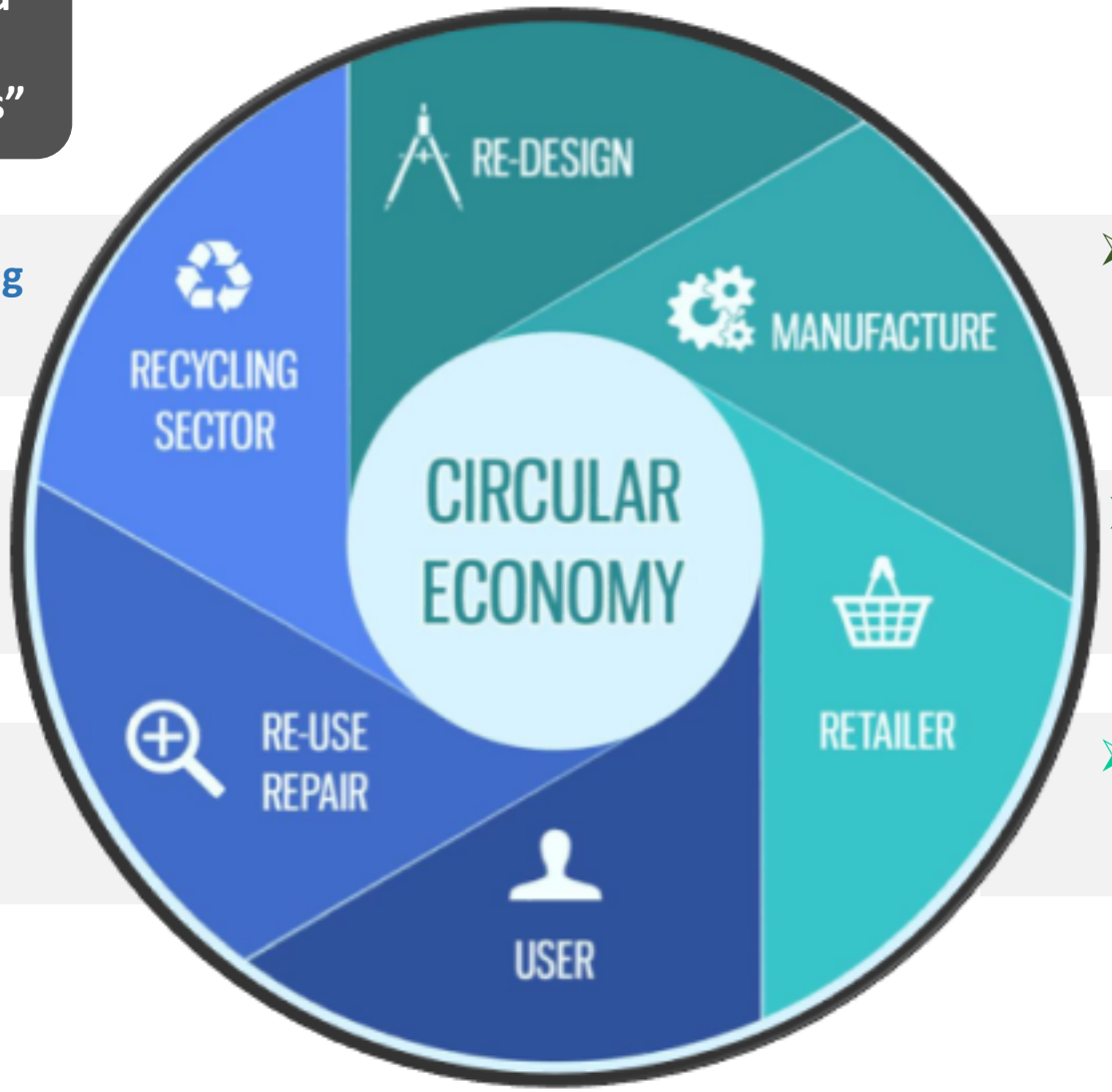
3 Part

Turning Challenges into Opportunities:

A Vision for Circular Plastics Economy

"support more sustainable and safer consumption and production patterns for plastics"

- leadership in sorting and recycling equipment and technologies.
- improved separate collection and investment in innovation, skills and capacity.
- Citizens are aware of the need to avoid waste, and make choices accordingly



- Plastics are designed to allow for greater durability, reuse and high-quality recycling.
- Innovative materials and alternative feedstocks for plastic production are developed and used.
- The market for recycled and innovative plastics is successfully established

3 Part

Turning Challenges into Opportunities:

A Vision for Circular Plastics Economy

PRODUCTION

- Improve the production process which can use disposable raw material.
- Promote the design that align with the concept " Design for reduce a purchase" (Focus on maintenance).
- Longer use.
- Easy return non-use product to be a production material.
- Apply technology innovation R&D result with an efficiency resource management and eco-friendly.

SECONDARY RAW MATERIALS

- Turning production waste to be raw material.
- Determine a policy for reusable material such as plastic, organic waste, construction material, iron, glass.
- Develop secondary raw materials standard.

How to Promote the Circular Economy

CONSUMPTION

- Boots the demand/marketing promotion of the product and service that align with circular economy concept.
- Communicate an information to consumer about environmental qualification of the products.
- Easily return expired products.

WASTE MANAGEMENT

- Develop waste management/ defect product to a reproduction process (Packaging/ Automotive/ Battery/ Electronic waste).
- Determine standard for enhance a responsibility of the manufacturer regarding waste management.

Part FOUR

4 Part

The Way Forward: Turning Vision into Reality

Circular Plastics Economy

4.1 Improving the economics and quality of plastics recycling

- improve design and support innovation to make plastics and plastic products easier to recycle
- expand and improve the separate collection of plastic waste, to ensure quality inputs to the recycling industry
- expand and modernize sorting and recycling capacity
- create viable markets

In particular, any measure likely to have significant socioeconomic impact will be accompanied by an impact assessment.

4 Part

The Way Forward: Turning Vision into Reality

Circular Plastics Economy

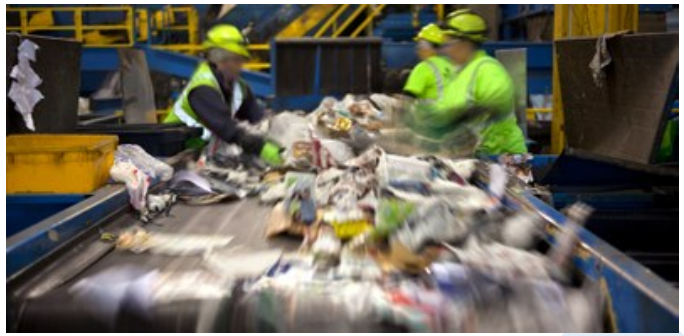
Product design is one of the keys to improve recycling levels.

Design for recyclability

✓ Better product design makes plastics recycling easier.

Boosting demand for recycled plastics

✓ recycle plastics used in a wide variety of electrical and electronic goods.



Better separate collection and sorting

✓ raising public awareness and ensure high-quality separate collection.

4 Part

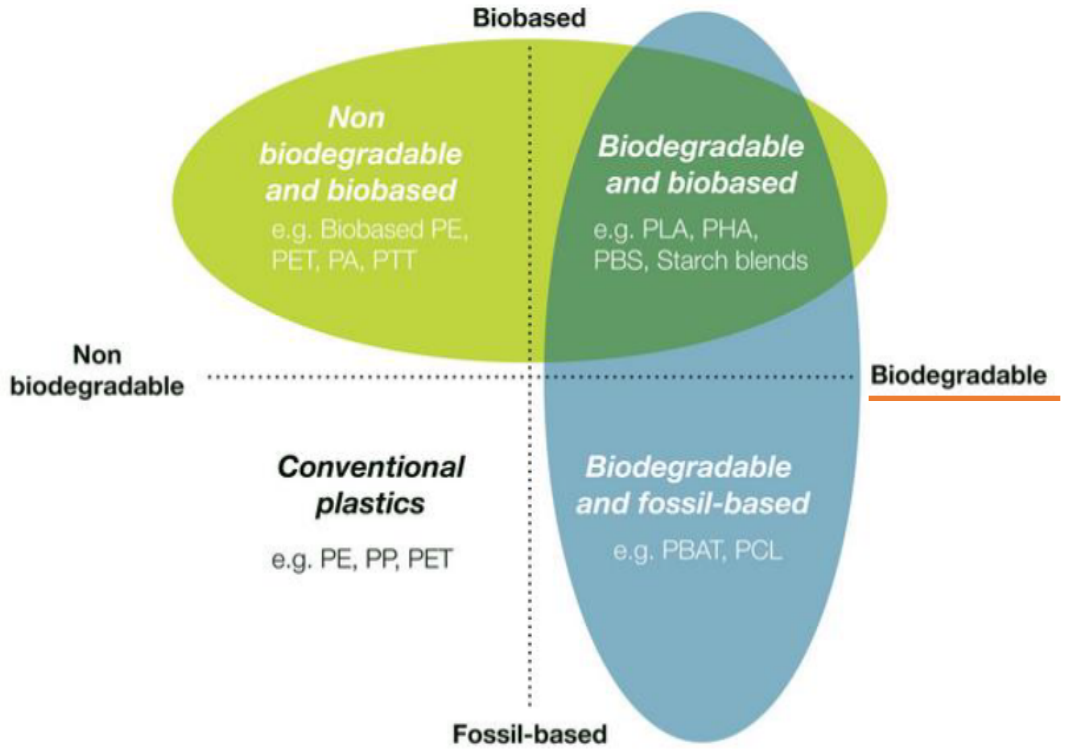
The Way Forward: Turning Vision into Reality

Circular Plastics Economy

4.2 Curbing plastic waste and littering

- ✓ Preventing *plastic waste* in our environment
- ✓ A legislative initiative on *single-use plastics*
- ✓ Establishing a clear regulatory framework for plastics with *biodegradable* properties
- ✓ The rising problem of *microplastics*

Extended Producer Responsibility schemes have proven effective in several countries.



Eliminating single use plastics from your life is a perfect place to start.

4 Part

The Way Forward: Turning Vision into Reality

Circular Plastics Economy

4.3 Driving innovation and investment towards circular solutions

advanced sorting

polymer design

Innovation is a key enabler for the transformation of the plastics value chain

chemical recycling

The New Plastics Economy aims to overcome the limitations of today's incremental improvements and fragmented initiatives, to create a shared sense of direction, to spark *a wave of innovation and to move the plastics value chain* into a positive spiral of value capture, stronger economics, and better environmental outcomes.

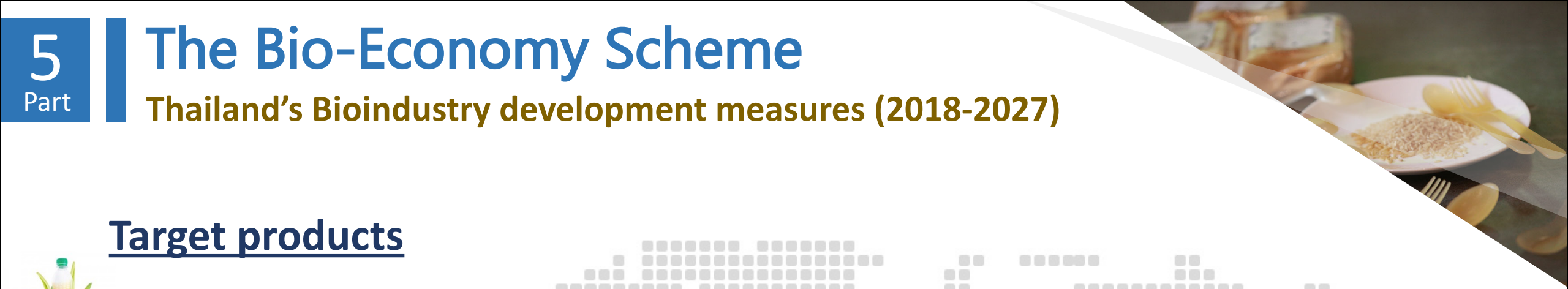
Source: http://www.plasticwastedisposal.com

Part FIVE

5 Part

The Bio-Economy Scheme

Thailand's Bioindustry development measures (2018-2027)



Target products

Bioplastic

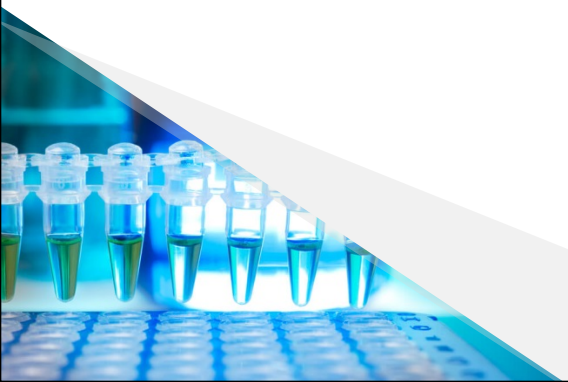
Biochemicals

Biopharmaceuticals

"Bio Hub" by 2027

THAILAND

- Domestic investment
- Farmers' revenues increase
- The quality of life
- Employment



5 Part

The Bio-Economy Scheme

Thailand's Bioindustry development measures (2018-2027)

High Value Added

Creating Value Added Products

Upstream | Midstream | Downstream | Continuous Industry

Agricultural products

Sugar-cane

Cassava

Oil palms

Bioindustry

Food Industry

Sugar

Bagasse

Molasses

Tapioca

Tapioca Chip

tapioca starch

Palm oil

Ethanol

Lactic acid

Succinic acid

Biopolymers (PLA)

Biopolymers (PBS)

dextrin

gluten-free

Ethanol

Lactic acid

Sugar Alcohol

Fatty acid

Glycerol

Fatty alcohol

Methyl Ester

Surfactant

Bio ingredients

Processed Food

Bioplastics

Yeast Extract

Furfural alcohol

Beta glucan

Sweetener

Phytase enzyme

Medicine/ Vaccine

Packaging

Plastics in Agriculture

food

beverage

feed

Skin Care

Bioplastics 100-220 baht/kg.

100-220 times

Bioplastics 100-220 baht/kg.

32-110 times

Vitamins 80-180 baht/kg.

20-45 times

No production in Thailand

Intermediate goods

Finished goods

Source: The Office of Industrial Economics (OIE)

5 Part

The Bio-Economy Scheme

Thailand's Bioindustry development measures (2018-2027)

Center of Bio Excellence: CoBE

- R&D
- Prototype/Scale up
- Human Resource
- Bio Intelligence Unit

Bio Intelligence Unit

Bioeconomy – Biorefinery Complex

The plant will increase Polybutylene succinate (PBS) productivity by five times and almost double Polylactic acid (PLA) production capacity

6 Part

Conclusion:

Sustainability of plastic industry

Plastics can make a major contribution towards *a circular economy*, helping to achieve a more sustainable and resource efficient future for all.

GLOBAL PLASTIC PROTOCOL

INNOVATION MOONSHOTS

EVIDENCE BASE

DIALOGUE MECHANISM

STAKEHOLDER ENGAGEMENT

NEW PLASTICS ECONOMY

Rethink the way we make, use and reuse plastics.

6 Part

Conclusion:

Sustainability of plastic industry

Harnessing global action

- Many initiatives have been launched at international fora (such as G7 and G20, the United Nations, and in the context of the MARPOL Convention) and regional sea conventions; actions against marine litter are also included in the International Ocean Governance Agenda for the future of our oceans.

- Going forward, there are also significant prospects for developing an innovative *circular plastics industry* in Thailand


THANKS
One pathway to a more circular economy is through “zero waste to landfill”