



# THAILAND'S BIOPLASTICS INDUSTRY



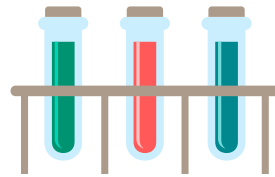
Thailand Board of Investment  
[www.boi.go.th](http://www.boi.go.th)

## INDUSTRY OVERVIEW

Worldwide consumption of bioplastics has increased more than 600% in the past decades<sup>1</sup> and expected to reach 40% market share of global plastics market in 2030.<sup>2</sup> This remarkable growth is resulted from the global trend of environmental awareness. That is why 66% of global respondents are willing to pay more for bio product.<sup>3</sup>

Governments around the world also ramp up with this trend. Bangladesh is the first country in the world to ban

the lightweight plastic bags in 2002.<sup>4</sup> European Union also plans to ban plastic bags across the EU by 2020. This is a bright future of bioplastics investment that has been increased around the world in the past few years as well as in Thailand. The country's largest energy company PTT just invested nearly 2 billion on the bioplastics and bio-based production in 2016.<sup>5</sup> These gigantic movements have tremendous effect to world in order to become bio-based community.



Source:

<sup>1</sup> Ceresana Consulting; Worldwide consumption of biodegradable plastics from 2000-2008

<sup>2</sup> Energy and Gold Ltd.

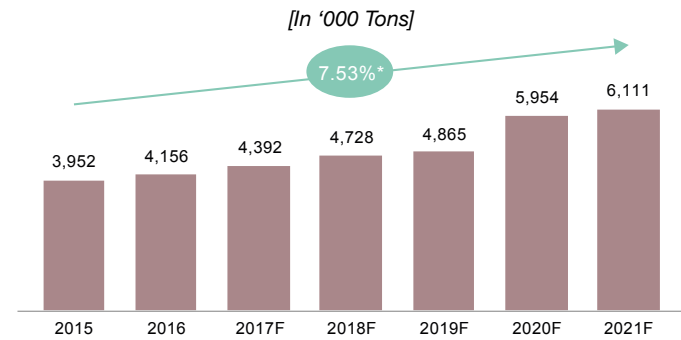
<sup>3</sup> Green Peace

<sup>4</sup> Marrickville Council

<sup>5</sup> Deal Street Asia

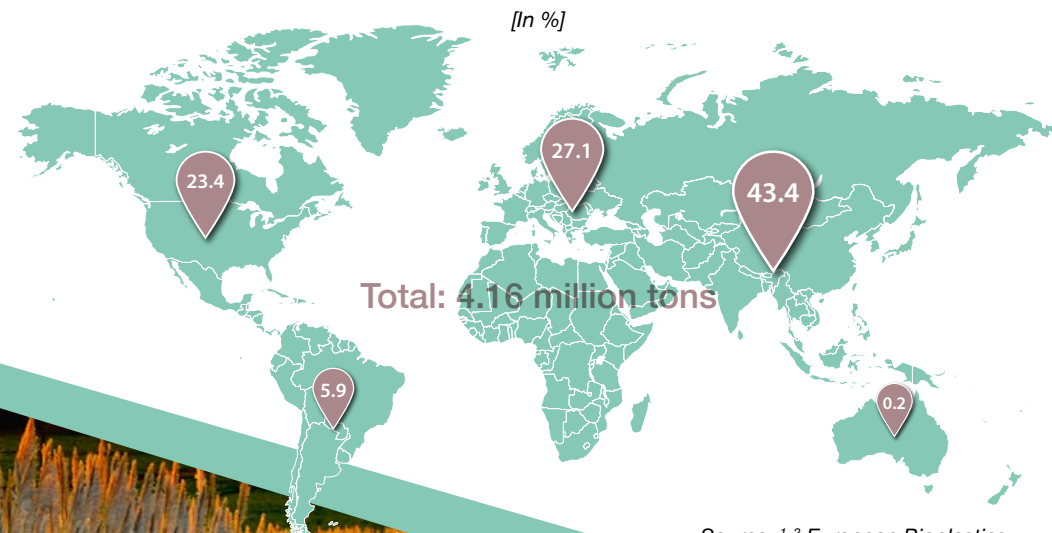
With more sophisticated materials, applications, and products emerging, the global production capacity of bioplastics is forecasted to grow by 50 percent, from 4.2 million tons in 2016 to roughly 6.1 million tons in 2021.

### Global Production Capacities of Bioplastics<sup>1</sup>



Asia will continue as a major production hub. In 2021, it is expected that more than 45 percent of bioplastics will be produced in Asia, and a quarter of the global production capacity will be based in Europe.

### Global Production of Bioplastics in 2016 (By region)<sup>2</sup>

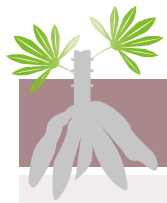


Source: <sup>1,2</sup> European Bioplastics, Nova Institute (2016)

## THAILAND: THE HUB OF BIOPLASTICS

As a land of agriculture, Thailand enjoys competitive advantages in the bioplastics industry. The richness of biomass, materials supply, research driven resources, strong downstream industry demand, and supporting government

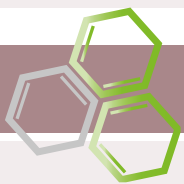
policy have created significant bioplastic business opportunities in the country. Thailand is also ASEAN's second largest exporter of plastic products after Singapore, and ranked 14<sup>th</sup> in the world in 2016.<sup>1</sup>



### Thailand's Bioplastics Value Chain

#### Agricultural Feedstock

Thailand is the world's largest cassava exporter (60% market share), the world's second largest sugar exporter (51+ sugar factories).<sup>1</sup>



#### Biopolymers

Thailand has the first PBS\* plant in the world with capacity of 20,000 tons/year.<sup>3</sup> In 2018, the second largest PLA\* plant will start operations in Thailand.



#### Biomonomers

Thailand is the world's major lactic acid producer with capacity of 330,000 tons/year.<sup>2</sup>



#### Bioplastics Converters

Thailand has more than 3,000 local plastics converters which are ready to develop their machines or adjust their production processes to serve the bioplastics market.

#### Source:

<sup>1</sup> SCB Economic Intelligence Center

<sup>2</sup> Petroleum Institute of Thailand

<sup>3</sup> Plastics Institute of Thailand

#### Note:

\* BDO = Bio-base 1,4-Butanediol; BSA = Bio Succinic Acid; PBS = Polybutylene Succinate; PLA = Polylactic Acid;

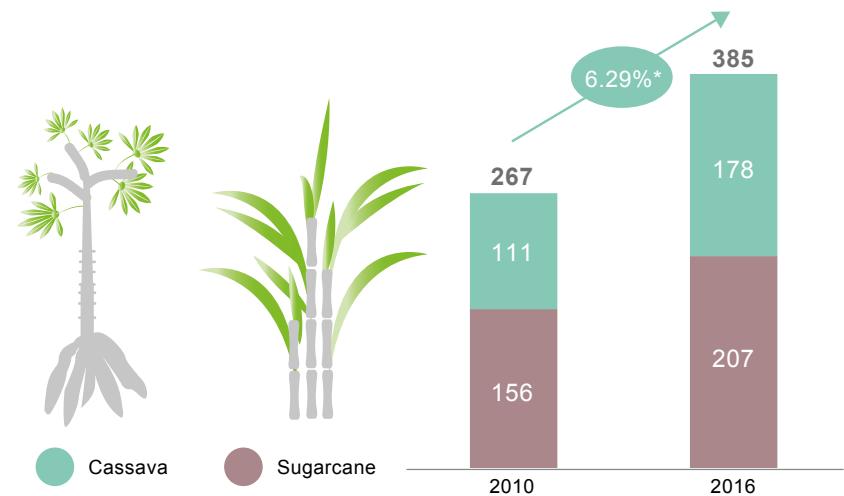
## Agricultural Feedstock

Thailand is one of the top agricultural countries in the world with main crops such as rice, rubber, sugar cane, cassava, palm oil etc. The export value of the agricultural raw material is approximately USD 20 billion.<sup>1</sup>

Moreover, Thailand has the necessary workforce and supporting organizations to encourage a vibrant agricultural products. Currently, Thailand has 1,440 plant breeders and seed technologist, and over 143 industry experts and researchers in agriculture industry.<sup>2</sup>

## Sugarcane & Cassava Domestic Production<sup>3</sup>

[In Million Tons]



#### Source:

<sup>1</sup> Ministry of Commerce

<sup>2</sup> The National Center for Genetic Engineering and Biotechnology (BIOTEC)

<sup>3</sup> Office of Agricultural Economics

#### Note:

Exchange rate (BOT, May 1, 2017):

USD 1 = THB 34.70

Thailand is a top exporter of raw materials used to produce bioplastic goods. Therefore, producing bioplastic products in Thailand will provide strong

advantages in reducing the conversion cost and ensure supply continuity.



**CASSAVA**

**Export<sup>1</sup>**

Quantity = 10 Million tons/Year  
Value = \$ 2.3 Million<sup>1</sup>  
According to National Innovation Agency (NIA) research, using cassava starch as a feedstock for bioplastic products is 30% cheaper than using corn starch.



**SUGARCANE**

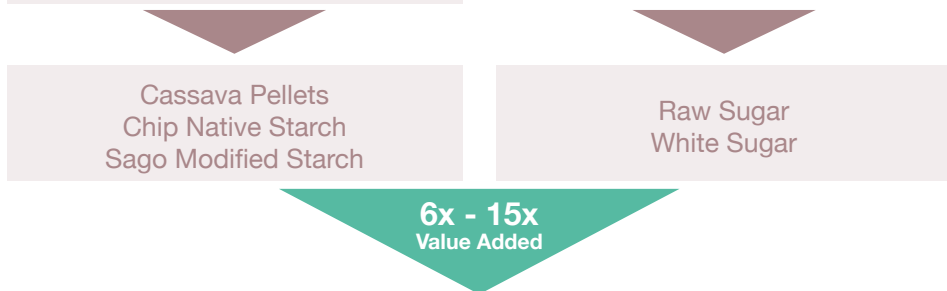
**Export<sup>2</sup>**

Quantity = 6 Million tons/Year  
Value = \$ 2.3 Million  
Bioplastic production processes consumes only 54,000 tons of sugar per year which is less than 1% of the total export. Moreover, the processing of sugarcane to produce bioplastics creates almost 10-times value added benefits.<sup>3</sup>

**Biomonomers**

The number of biomonomer production plants in Thailand increases in the past few years resulted from a strong support and attractive incentives from the government. Thailand presents a unique combination of all the attributes

necessary to be a successful site for biochemical and bioplastics production which together makes Thailand is the most attractive locations for the biomonomer hub.



Ethanol	Biogas	Biomass	Lactic Acid
1,058 million liter/years <sup>4</sup>	1,523 million liter/years <sup>4</sup>	2,321 MW <sup>4</sup>	330,000 tons/year <sup>4</sup>
Citric Acid	Sorbitol	Lysine	PBS*
15,000 tons/years <sup>4</sup>	43,000 tons/years <sup>4</sup>	47,000 tons/years <sup>4</sup>	20,000 tons/years <sup>4</sup>

**Proposed Biochemical: Production Capacity in 2016<sup>1</sup>**



**Examples of Biomonomer producers in Thailand**



Source:  
<sup>1,2</sup> Office of Agricultural Economics  
<sup>3</sup> Thailand Bioplastics Industry Association (TBIA)  
<sup>4</sup> Petroleum Institute of Thailand and BIOTEC  
Note:  
\* PBS = Polybutylene Succinate  
Exchange rate (BOT, May 1, 2017):  
USD 1 = THB 34.70

Source:  
<sup>1</sup> Petroleum Institute of Thailand  
Note: \* BDO = Bio-base 1,4-Butanediol;  
\*\*BSA = Bio Succinic Acid

## Biopolymers

### Thailand's Biopolymer Industry Ranking<sup>1</sup>

1<sup>st</sup>

The first PBS bioplastic plant in the world

2<sup>nd</sup>

PLA Producer in the world\*

### The Global Leading Biopolymer Manufacturers in Thailand



Total and Corbion are joining forces to produce and market polylactic (PLA) polymers. The two partners plan to modify the existing plant in Rayong to build a world-class PLA polymerization plant with a capacity of 75,000 tons per year. This development plant will be operating in 2018. Total-Corbion investment is approximately USD 100 million.



PTTMCC is a strategic joint venture between PTT Public Company Limited (PTT) and Mitsubishi Chemical Corporation (MCC). The joint venture produces and sells Polybutylene Succinate (PBS) with a total production capacity of 20,000 tons per year. The plant started commercial operations in 2017.

## Bioplastics Converters

With world-class standards, Thailand is ASEAN's second largest exporter of plastic products after Singapore, and ranked 14<sup>th</sup> in the world in 2016.<sup>1</sup> With over 3,000 plastics converters, Thailand is also very well-established in the downstream industries with the capability to produce a wide range of products, as those converters can adjust production processes to make

goods from bio-plastics, for example, bioplastics bag, biodegradable box, etc.

Thailand is the best production hub with world-class quality product and standard serving domestic, regional and global demands. The country's top destination of bioplastics products export are including the European Union, the United States, and Japan.

### Examples of Bioplastics Converters in Thailand



Source:

<sup>1</sup> International Trade Center

Source:

<sup>1</sup> Plastics Institute of Thailand

Note:

\* The plant is expected to commercial operation in 2018

## WHY INVEST IN THAILAND?

### Security of Supply

Thailand's rich natural resources have solidified the country's reputation as the leading global supplier of agriculture products such as cassava, sugarcane and palm oil. These commodities, as well as

their waste byproducts, can be utilized as biomass which is a critical source for bioplastic products.

1<sup>st</sup>

Cassava Products Exporter in the world

2<sup>nd</sup>

Sugar Exporter in the world

### Strategic Location

Situated at the best location in Asia, Thailand has the perfect location connected to 3 billion people in Southeast Asia, China and India with world-class infrastructure provided. Suvarnabhumi Airport will accommodate 60 millions passengers while Laem Cha-bang deep sea port will reach 18 TEUs capacity annually when finish their third phase expansion.



Source:  
Ministry of Commerce

### Skilled and Ready Workforce

Thailand is equipped with quality researchers and experts covering every process of bioplastics production. More than 1,500 biotechnology experts and researchers work actively on the R&D

in the industrial sector.<sup>1</sup> With more than 3,000 plastic converters, Thailand has over 360,000 workers to serve the bioplastics industry.<sup>2</sup>



### Strong Government Support

Thailand is making a tremendous effort to be the "Bio Hub" of Southeast Asia. To achieve the plan The government's Action Plan for Technology Solutions for Climate Change: the Adaptation of the Agricultural Sector (2015-2024) which is the first important step to help sustain country's agricultural industry

and lift up the quality of raw material as well as farmer's life quality which will continuously impact the whole agricultural and bioplastics value chain, The first investment phase puts \$1.44 billion in Rayong area which later will expand to Khon Kaen.

Source:  
<sup>1</sup> Office of Higher Education Commission  
<sup>2</sup> Plastics Institute of Thailand  
Note:  
\* Compound Annual Growth Rate  
(2011-2015)



## SUPPORTING FACILITIES

To provide continuous support in improving the investment environment for bioplastics investors, the government, in collaboration with educational institutions, research centers, and the private sector is

offering various resources for **research and development**, **human resource training** as well as **dedicated bioplastics related faculties** in over 20 leading academic institutions.

### Research Centers



**Center of Excellence on Petrochemical and Materials Technology**  
Chulalongkorn University



**Bioplastics Research Unit**  
Prince of Songkla University



**Cassava and Starch Technology Research Laboratory**  
Kasetsart University



**Department of Biotechnology**  
Faculty of Science, Mahidol University



**Faculty of Science**  
Burapha University

### Associations and Institutions



Plastics Institute of Thailand

Promotes and enhances the **Thai plastics industry's** competencies through **R&D** and **product testing** services.



National Science and Technology Development Agency

Supports **R&D** in 5 target areas, including agriculture and food, energy and environment, health and medicine, bioresources and community, and manufacturing and service industries



National Metal and Materials Technology Center (MTEC)

Creates and enhances capabilities in **materials technology** of both governmental and private sectors through **R&D**.



Thai Bioplastics Industry Association

Assists in the development of the Thai Bioplastics industry to reach **international standards** and promotes **networking** within the Bioplastics community.



National Innovation Agency

Supports **R&D** of **innovative products** and embeds the innovative strategic direction of firms.



Biodiversity-Based Economy Development Office (Public Organization): BEDO

Supports and promotes **the bio-based economy** and enhances **value-added** bio product of the country.



National Center for Genetic Engineering and Biotechnology

Supports **R&D**, **policy research**, and **international relations** in agricultural, biomedical and environmental sciences.



Thailand Institute of Scientific and Technological Research

Promotes and enhances **innovations** in **science** and **technology** R&D capabilities for commercialization and social benefits.





## INVESTMENT INCENTIVES

### BOI Incentives

BOI recognizes the importance and value of the bioplastics industry, and offers a wide range of tax and non-tax incentives for projects that meet national development objectives.

### Non-Tax Incentives

These activities also receive the following non-tax incentives:

Permit to bring in expatriates

Permit to own land

No restriction on foreign currency

## Tax Incentives

### Bioplastics

GROUP	ELIGIBLE ACTIVITIES	INCENTIVES	
		Corporate income tax exemption	Exemption of import duty*
A2	Manufacture of eco-friendly chemicals or polymers or manufacture of products from eco-friendly chemicals or polymers that is incorporated within the same project as the manufacture of eco-friendly chemicals or polymers	8 years	✓
A3	Manufacture of products from eco-friendly polymers	5 years	✓
A4	Manufacture of paper container coated with bio-plastics	3 years	✓



Note:  
\* Exemption of import duty on machinery and raw or essential materials used in manufacturing export products





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