



“Biomass to Energy, Chemicals and Functional Materials”

Date: 3 - 4 July 2017

“Thailand's Bioeconomy & Biorefinery Development and Roles of Mitr Phol R&D”

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Thailand: Facts and Figures

**The world 16th largest food exporter
with value of food exports
30,847,701,710.00 US dollars**

GDP: 180,000 Bath/head (2015)

Surface Area: 513,120 sq km

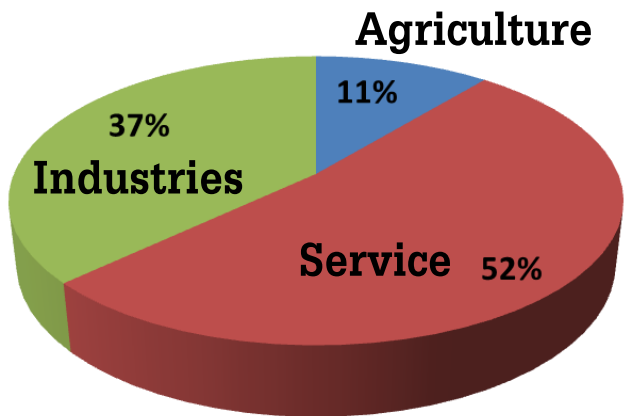
Agricultural area: 47% (2013)

Population: 67.2 million (2014)

Total Labor Force: 38.3 million (2013)

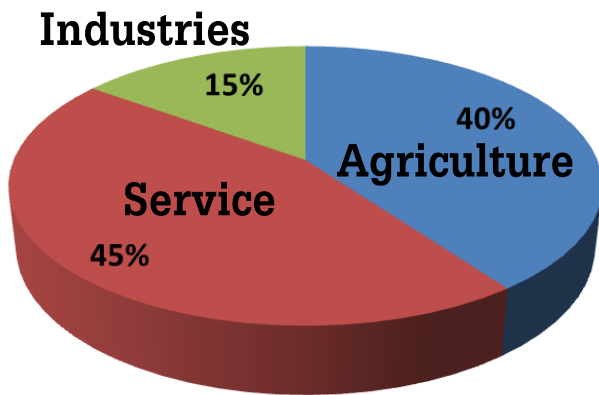


GDP Composition by Sector



Source: The World Bank (2014)

Labor Force by Occupation

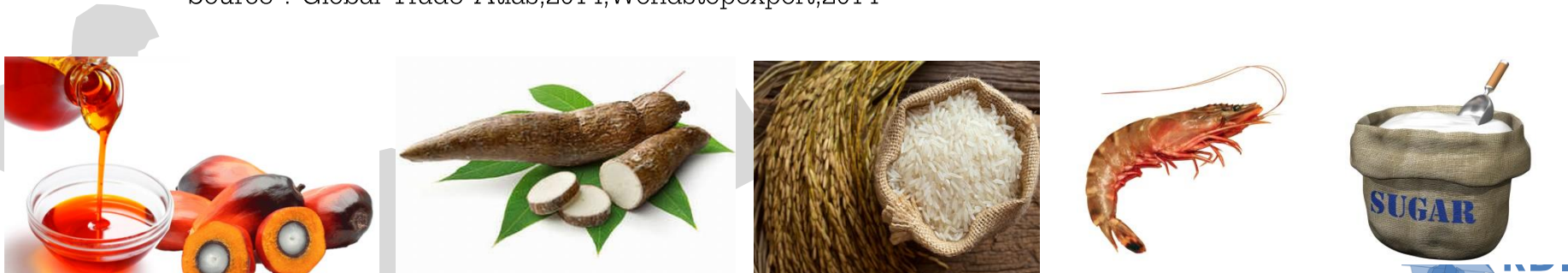


Source: The World Bank (2014)

Thailand: Kitchen of the World

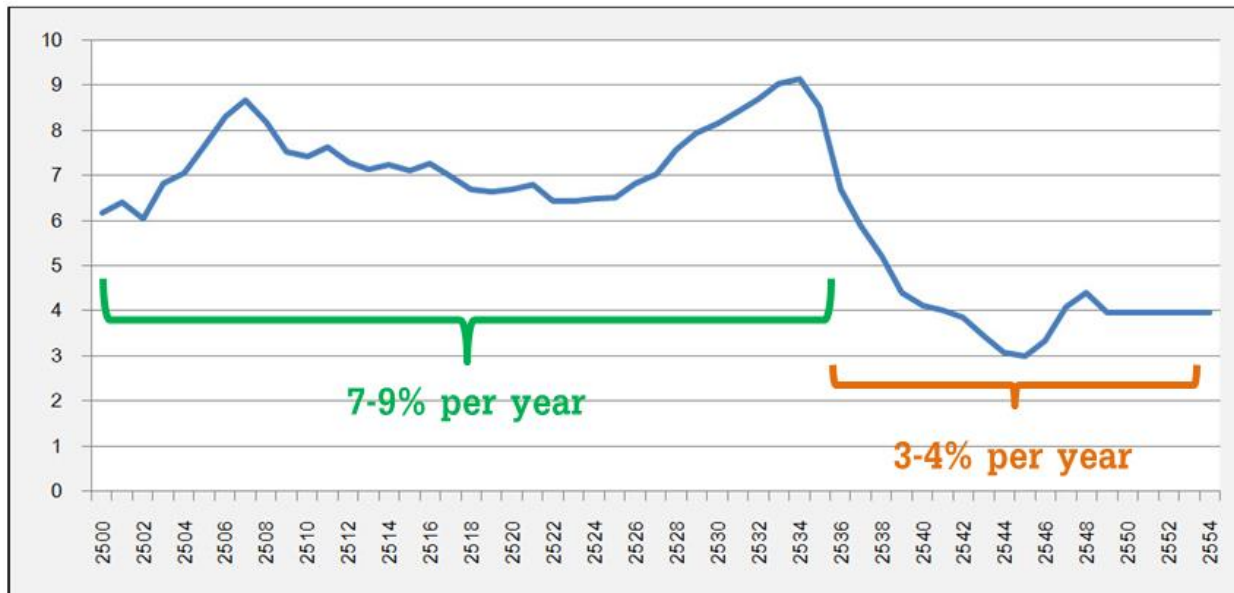
Product	Asean World Market Share (%)	Thailand World Market Share (%)
Palm Oil	86	1
Cassava Products	84	57
Rice	32	22
Shrimp	30	8
Sugar	11	11

Source : Global Trade Atlas,2014,Worldstopexport,2014



Thailand's Economy in Trouble

Thailand Gross Domestic Product (Thailand GDP)



High Income Country



Strategy?

Middle Income Country



Middle Income
Trap (MIT)

Thailand Lost decades

ที่มา: รายงานการวิจัย "การยกระดับการขยายตัวทางเศรษฐกิจระยะยาวของไทย: มุมมองและข้อเสนอแนะเชิงสถาบัน" โดย สมชัย จิตสุชน (2557)

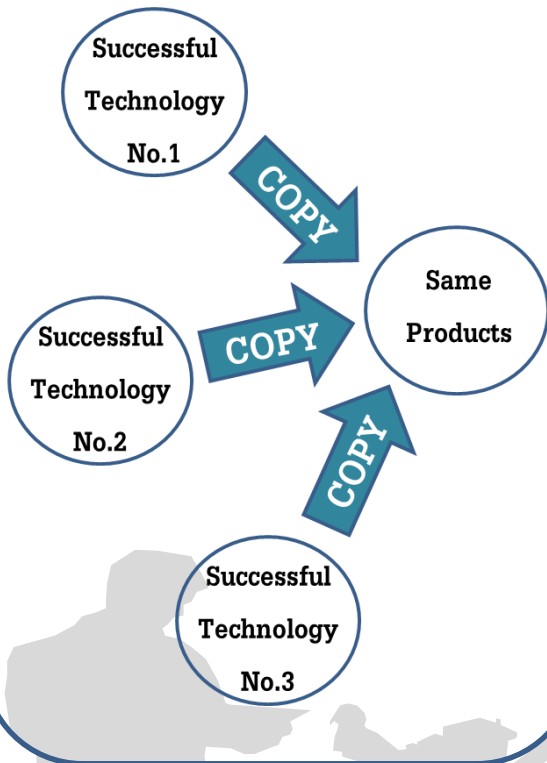
The Middle Income Trap (MIT)

- unable to compete against advanced economies with high levels of innovation and value-adding activities
- unable to compete with less developed economies that have cheaper labor.

Zero to One

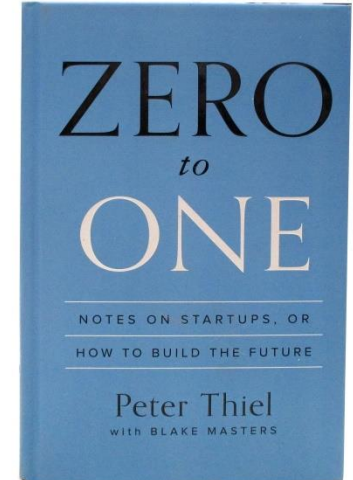
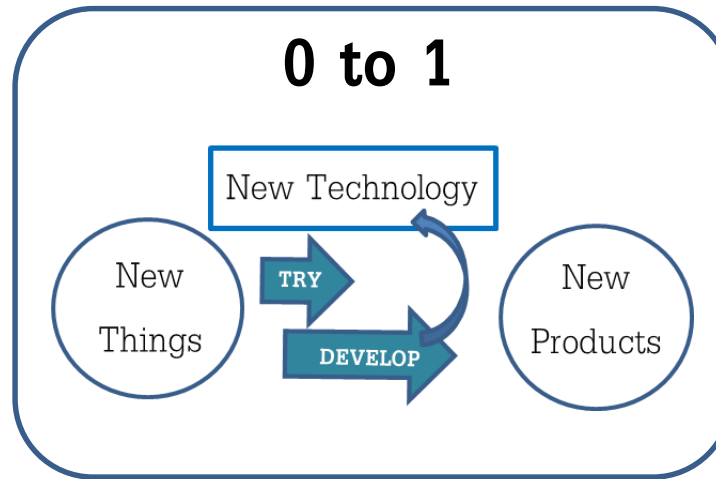


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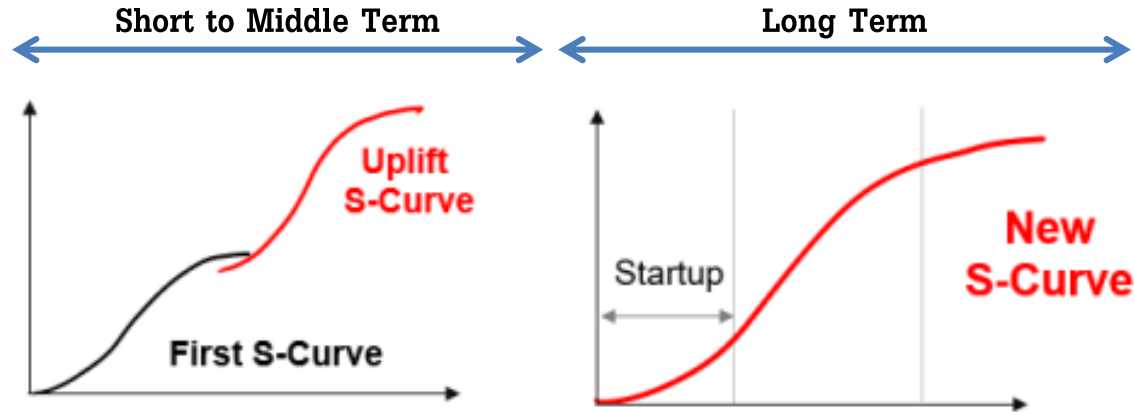
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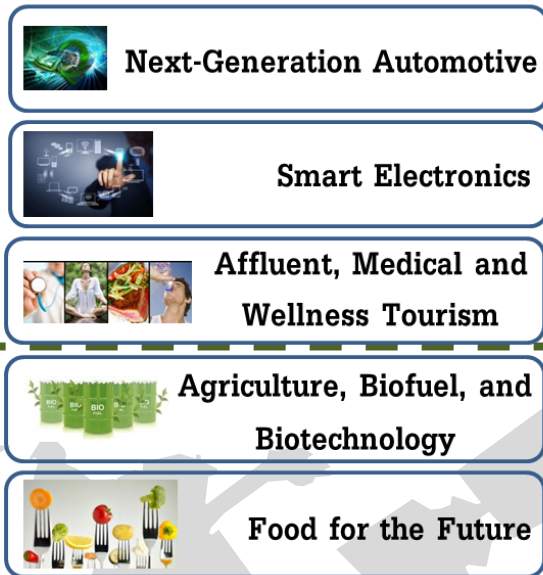
Zero to One: Notes on Start Ups, or How to Build the Future

“Technology is miraculous because it allows us to do more with less, ratcheting up our fundamental capabilities to a higher level.”

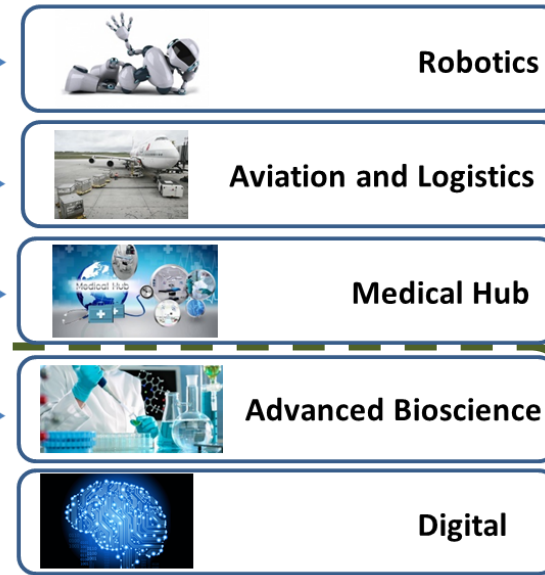
New Engines of Growth: S-Curve and New S-Curve



5 Existing S-Curve Industries



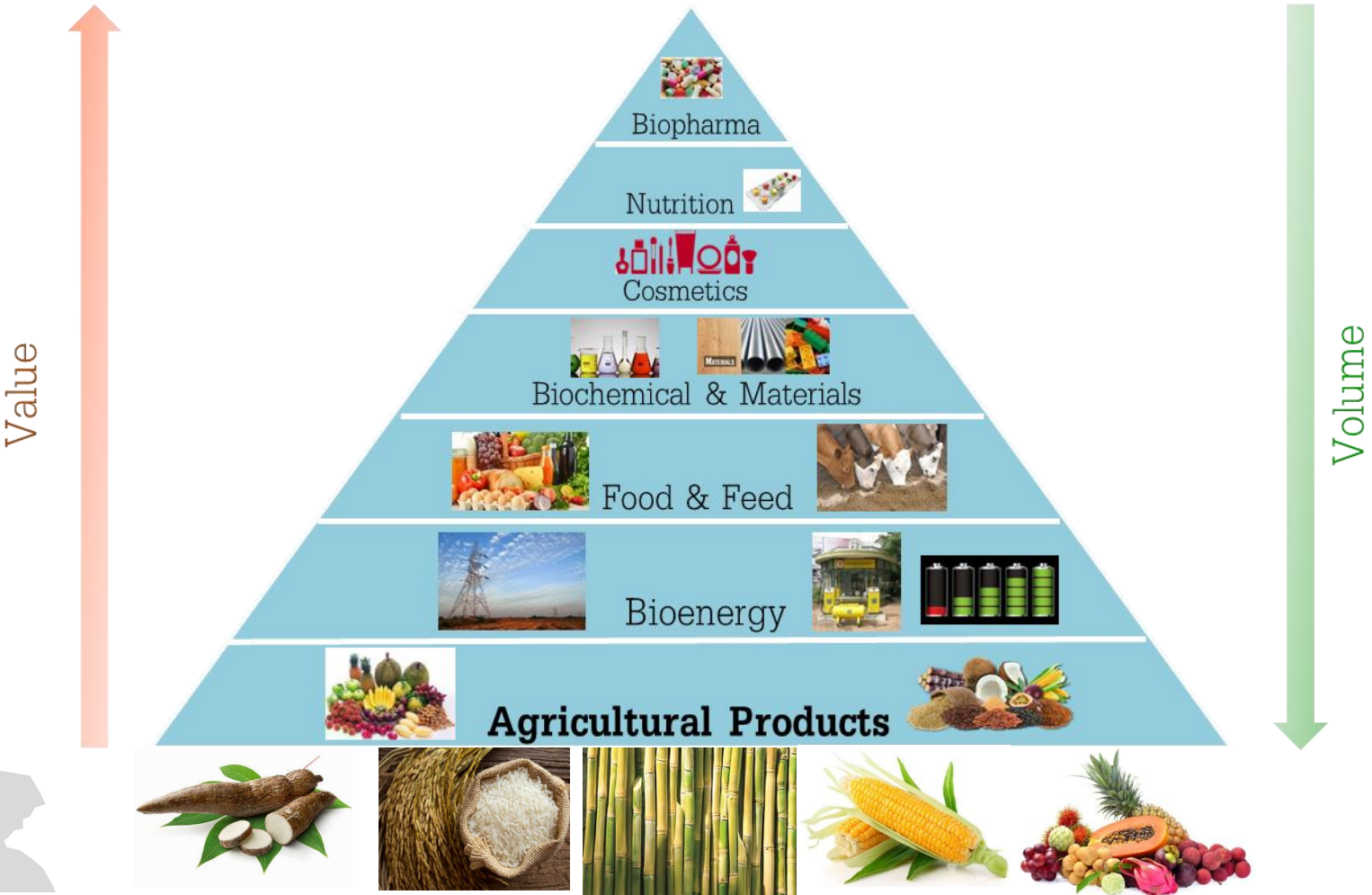
5 New S-Curve Industries



Bioeconomy



Bioeconomy Value Chain



Agricultural Products are tap (or primary) root in Bioeconomic development for supporting National policy.



Mitr Phol Group

Sugarcane Plantation & Sugar Business

- Phukiao
- Danchang
- Phuviang
- Singburi
- Kalasin
- Phuluang

Energy Business

- Ethanol
- Bio-Power
- Alternative Power



Wood Substitute Material & New Business

- Panel Plus
- Fertilizer



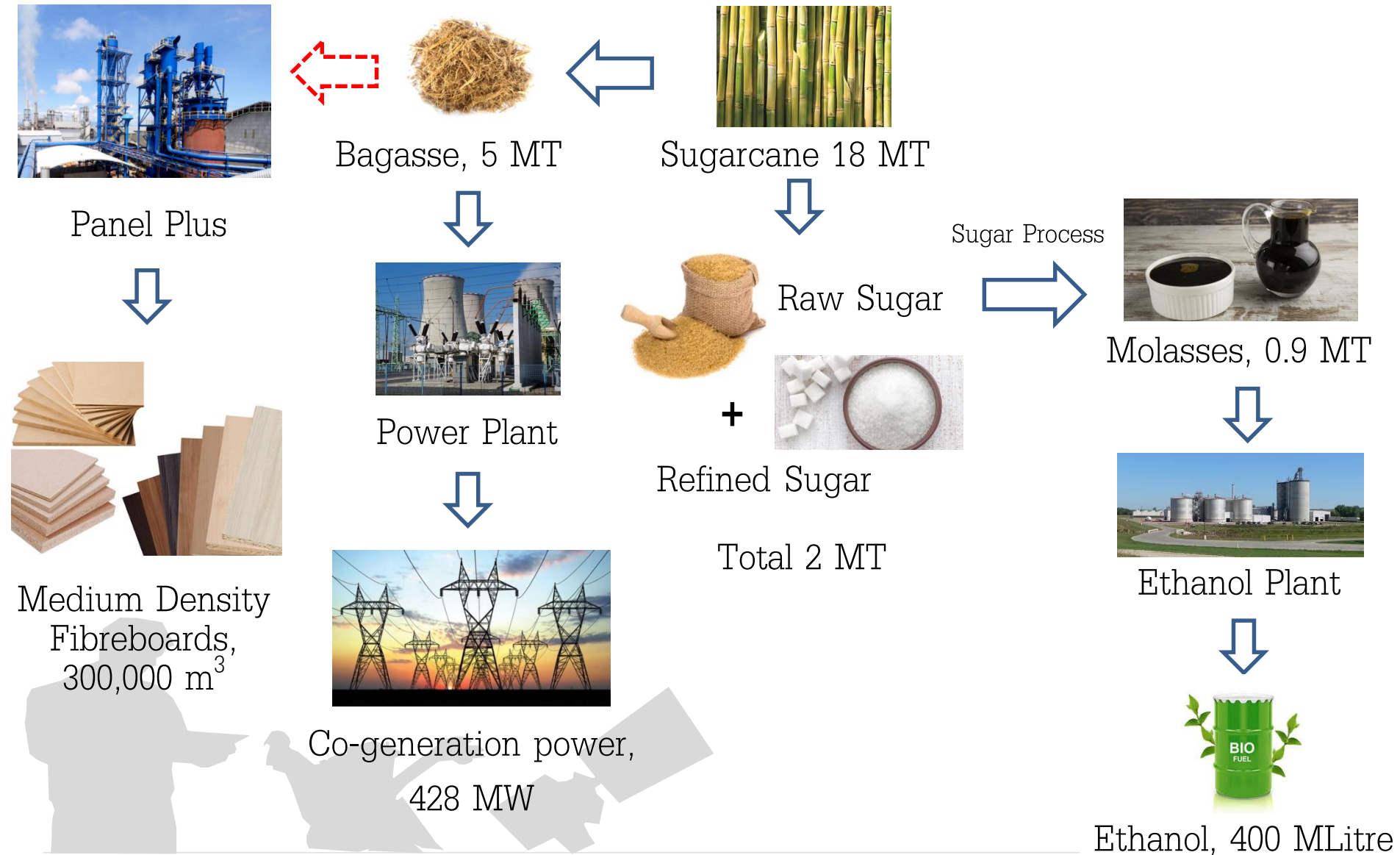
Offshore Business

- China
- Lao
- Australia

Innovation and Research Center



Typical Products from Sugarcane Industries



The Threats to Sugarcane Industries

1. Climate Change, Insect Pest, and Diseases



2. Saccharophobia



3. Disruptive Technology

- Solar Energy vs Co-generation Power



bagasse-based
co-generation power

- Electric Vehicles (EV) vs Flexible-Fuel Vehicles (FEV)



molasses-based ethanol

Climate Change, Insect Pest, and Diseases

Insect Pest and Diseases



Sugarcane white leaf disease



Climate Change on Drought

Brazil approves world's first commercial GM sugarcane: developer CTC



By Ana Mano | SAO PAULO

Brazil has approved commercial use of a genetically modified sugarcane, setting a milestone for the country's highly competitive sugar industry as this is the first time such permission has been granted anywhere in the world.

Authorization was obtained by CTC Centro de Tecnologia Canavieira SA, which developed the technology and made the application seeking approval in December 2015, Chief Executive Officer Gustavo Leite told Reuters in an interview.

CTNBio was not immediately available to comment on the approval.

Leite said it would take at least three years for the first shipments of sugar produced from GM crops to reach export markets because of the pace of propagation of new cane varieties.

Brazil has about 10 million hectares of sugarcane fields and potential to plant GM cane in up to 15 percent of this area, Leite said.



Saccharophobia

Campaign Encourages Sugar Reduction

กระทรวงสาธารณสุข ร่วมกับ
สสส. และภาคีเครือข่าย เร่ง
รณรงค์สร้างค่านิยม คนไทย
อ่อนหวาน ใช้น้ำตาลซอง 4 กรัม



Saccharophobia

← Back to: List of phobias

Saccharophobia (from Latin *saccharum*, "sugar") is the fear of sugar and sugary foods and drinks. Common causes of saccharophobia include negative health effects of sugar, including type II diabetes, and dislike of sweetness. Many saccharophobes are diabetic and worry that sugar would make it worse, yet sufferers who are not diabetic are less likely to get type II diabetes. Sufferers would avoid eating candies, cakes, cookies, soft drinks, and others that contain considerable amounts of sugar. Because saccharophobes don't take much sugars at all, they're more susceptible to getting **hypoglycemia**, a disease resulted from low sugar levels. Because saccharophobes are more susceptible to getting that low-sugar disease, saccharophobia should be treated as soon as possible, often using **self-help** by an individual, **energy therapy**, and medications.



Reduce Sugar Consumption by Increasing Sugar tax



The Finance Ministry is set to trim the excise tax for reduced sugar drinks in an attempt to encourage people to consume healthier products and prompt makers to reduce sugar content, says a source at the Finance Ministry.

Drinks that contain less sugar than the Finance Ministry's threshold will be levied a lower excise tax than that for drinks with higher sugar content, the source said.

The tax on sweet drinks is part of the amended excise tax act set to come into force from Sept 16.

Under the amended tax, the levy on drinks with sugar content that has been reduced to the level required by the Finance Ministry will be cut to four baht per bottle from five.

The source said drinks for which 10% of the content is fruit or vegetable juice with sugar content lower than the Finance Ministry's threshold will be exempted from the tax.

But the ministry will impose an excise tax if the drink's sugar volume exceeds the set mark.

Slim tax for healthy drinks on tap

Sugar tax for public health: Soft drinks 20-25% price rise from 16th September 2017



Disruptive Technology:

Solar Energy vs Co-generation Power

Solar Energy

26
Jun 2017

Seven opportunities: Thailand Solar Energy Update 2017

By *praktikantin* in *breaking news, china, gallery, solar, top10*

Comments Off on *Seven opportunities: Thailand Solar Energy Update 2017* 6314

Walking on sunshine: Thailand's solar energy blueprint

Thailand is continuing its integrated energy blueprint, consisting of a gas plan, oil plan, the Energy Efficiency Plan (EEP), the Alternative Energy Development Plan (AEDP) and the Power Development Plan (PDP) with the Smart Grid Plan (SGP). The targeted percentage of renewable energy production seems to be increased in the future.

The political risk of a (retrospective) cancellation of renewable energy incentives is small, but not non-existing. Section 44 of the Interim Constitution ("S44IC") will be still in place in 2017 and gives the army manned NCPO (National Committee for Peace and Order) full and uncontrolled authority to reshape the energy legislation and regulatory framework without grandfathering, loss compensation, legal or court protection.

Technical enhancements and cost reductions might bring governmental incentives to an end, should the production of photovoltaic and the solar energy production reach competitiveness with traditional power production. The legal impacts of such technological improvement have to be awaited with excitement.



Thailand's solar energy markets are fragmented and confusing. Send us details of your solar venture plans for a swift legal review of market prospects and the best possible course of action.
lawyers@pugnatorius.com

Co-generation Power



Bagasse



bagasse-based co-generation power
428 MW/ year

Disruptive Technology:

Electric Vehicles (EV) vs Flexible-Fuel Vehicles (FEV)

Electric Vehicles (EV)

Thailand preparing incentives for electric vehicles



Thailand is getting serious about green automobiles with the government preparing to launch a roadmap for development of the electric vehicle industry complete with incentives for investments by the private sector and cooperation from the Federation of Thai Industries (FTI), local and regional media reported last week.

"Having been successful as a global destination for pick-up truck and small car production, Thailand has been looking to jump start the development of a green car industry churning out hybrid, electric and hydrogen vehicles. Things are progressing, and now a roadmap for the electric vehicle industry is expected to surface this month," a report on paultan.org, a Malaysia-based auto industry website, said last week.

"Instead of resting on its car production laurels, the 'Detroit of the East' is laying the groundwork for the future. Malaysia also has incentives for car companies to produce hybrids, but the privileges depend on direct negotiation with the government. In contrast, Thailand's automotive blueprints and requirements are clearly defined," the website wrote.

Flexible-Fuel Vehicles (FEV)



Molasses



molasses-based ethanol

400 Mlitre/ year



Smart Farming



Smart Sensing



Smart monitoring



BIG DATA



Smart Control

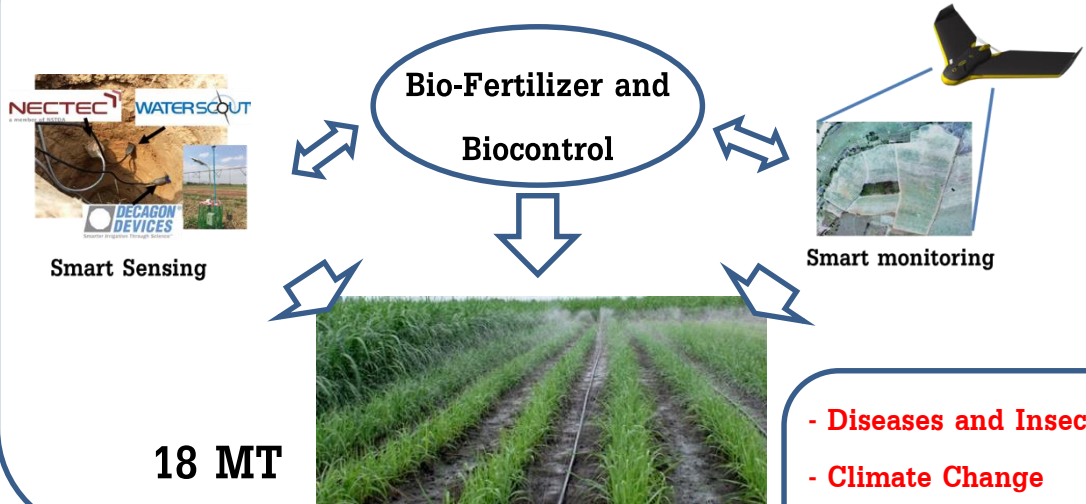


Information



Backup Plan

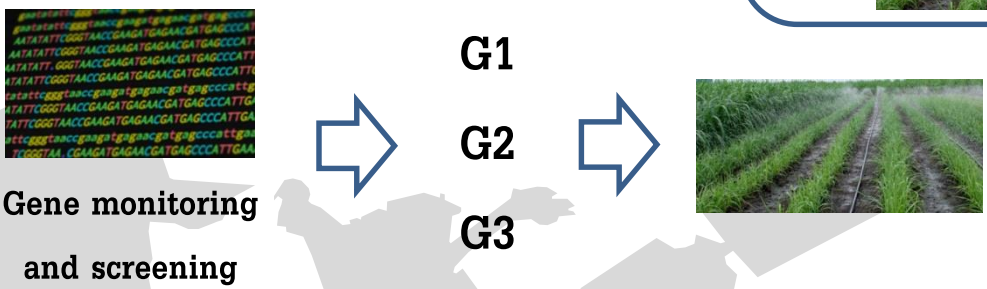
Preservative/ Surveillance



- Diseases and Insect Pest
- Climate Change

7 MT

Genetics



Mitr Phol Group



- Co-generation power, 428 MW
- Value-Added Products
 - Phenolic Compounds
 - Alternative Sweeteners
 - Xylooligosaccharides (X-O-S)

Supporting Plan

ต้นตะกั่วชัย
(Giant Bur-flower Tree)
ต้นไม้โตเร็ว
ปลูกง่าย โตไว



Low Glycemic Index (GI) Sweetener

The Glycemic Index (GI) is an indication of how quickly a specified amount of food will cause a rise in blood sugar level.

6 Types of sweeteners:

Type	Name	Glycemic Index (GI)	Example
1	Sugars	high	Sucrose, Glucose
2	Sugar Alcohols	very low	Xylitol, Erythritol
3	Natural Caloric Sweeteners	lower than sugar	Honey, Maple Syrup
4	Natural Zero Calorie Sweeteners	0	Luo Han Guo
5	Modified Sugars	high	Corn Syrup, Caramel
6	Artificial Sweeteners	0	Aspartame, Saccharin

to be announced



Healthy and Sustainable Sweetener

DFI uses an innovative electrochemical process to transform common sugars into healthy and sustainable products found in nature, but that are otherwise difficult to manufacture. Specifically, DFI has discovered a breakthrough process for the production of erythritol, methionine and formic acid.



Healthy Sugar Alcohol: Erythritol

Erythritol, the Functional Food

Erythritol is a unique sweetener that is classified as a sugar alcohol. Structured much like sugar, it is naturally produced in the human body. It is also found in many other natural products including raspberries, watermelon, grapes, pears, and mushrooms. Erythritol differs from other sugar alcohols, as it is virtually calorie free (0.2 per gram on label in the US & is non-caloric in the EU and Japan). It also has no adverse effects on digestion and has several positive health effects.

With only 5% of the calories of sugar, Erythritol still has 70% of the sweetness!

Name	Calories per Gram
Table Sugar	4.00
Xylitol	2.40
Erythritol	0.20

Erythritol Does Not Spike Insulin or Blood Sugar
Erythritol has no insulin response, making it safe for people with diabetes, and therefore desirable in low glycemic load food products. Studies have shown that there is no spike in insulin or blood sugar, and there is also no effect on cholesterol, triglycerides or other biomarkers. (2)

Erythritol Fights Cavities
Erythritol actually prevents cavities. Erythritol cannot be broken down by the harmful bacteria and actually prevents them from attacking your teeth.

Erythritol Does Not Have a Negative Effect on the Digestive System
Many sugar replacers can cause digestive problems. However, Erythritol is the most tolerated polyol in nature.

Erythritol and Endothelial Benefits
In recent studies, Erythritol has shown endothelial benefits, where it appears to reduce the "hardening of the arteries."

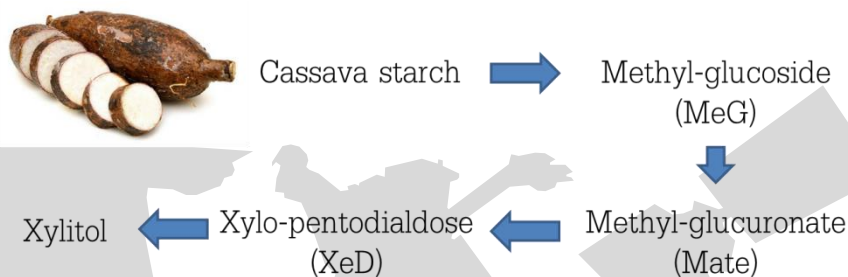
Erythritol in your Daily Life
It even has benefits for home cooking! Unlike artificial sweeteners, Erythritol can be used in applications that require high temperature, such as baking and boiling. So you can make all your same meals, with less calories and the same great taste!

DFI & Mitr Phol Partnership

DYNAMIC FOOD INGREDIENTS ANNOUNCE STRATEGIC PARTNERSHIP WITH MITR PHOL GROUP TO PRODUCE ERYTHRITOL AND XYLITOL SWEETENERS
Largest sugar producer in Asia will help to expand production of natural sweeteners and other products



Low GI Sugar Alcohol: Xylitol



Oligosaccharides from Hemi-Cellulose

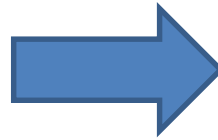


Bagasse



Hemicellulose

Xylooligosaccharides
(low and high molecular weight)



Xylose

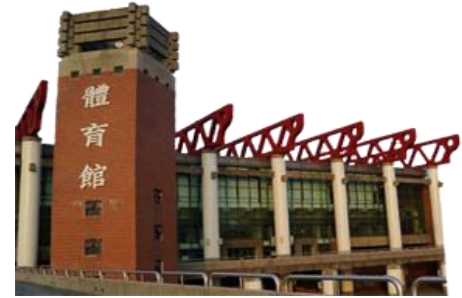
Arabinose

Acetic Acid

Furfural

Glycoaldehyde

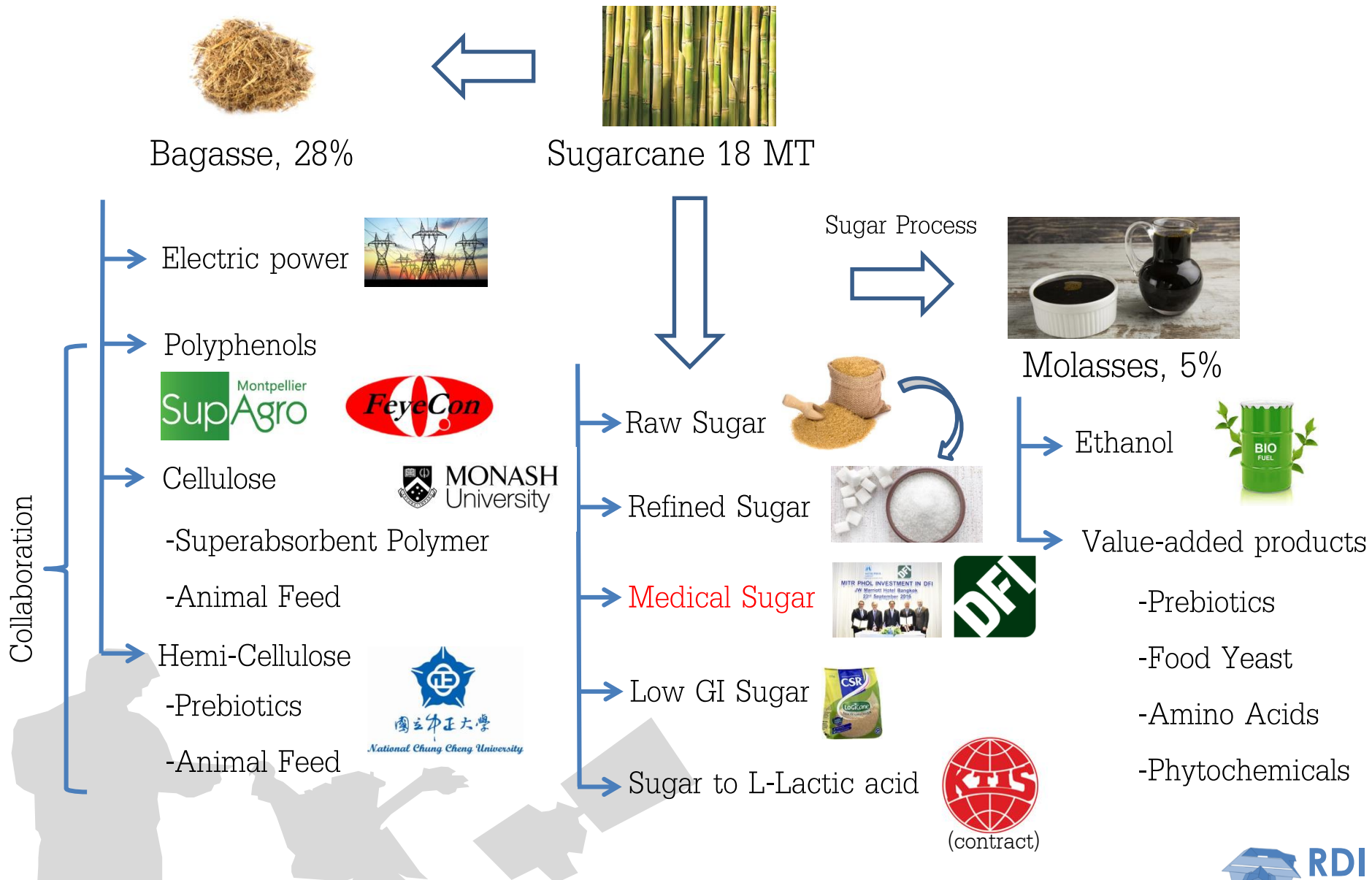
Glyceraldehyde



Value-Added Products:

- Prebiotics
- Animal Feed Additives

Value-Added Products from Sugarcane Industries



Medium Density Fibreboard (MDF)



“ Panel Plus ”

With our ongoing success, we are ready to be a part of pro-active private sector contributing to Thailand market with professional experiences and effective management system. As a leading manufacturer and distributor, we are quite confident to offer our variety of products and services to serve both domestic and international markets under our trademark - Panel Plus - the trademark of Adding Value to everything we do.



Particle Board



Medium Density Fibreboard



Melamine Faced Panels

Thank you for your attention

