



EFB



Elec &
Steam.



*Seminar on the Joint Crediting Mechanism (JCM) Implementation in Indonesia 2019
21-October-2019, in Jakarta*

“City-to-city Collaboration Programme, Rokan-Hulu Regency and Kawasaki City”.

Introducing EFB (Empty Fruit Bunch) 100% Fuel

Biomass Power Plant & Co-Generating

By PT. Fuji Furukawa E&C Indonesia

CONFIDENTIAL



A Subsidiary Company of
Fuji Furukawa Engineering
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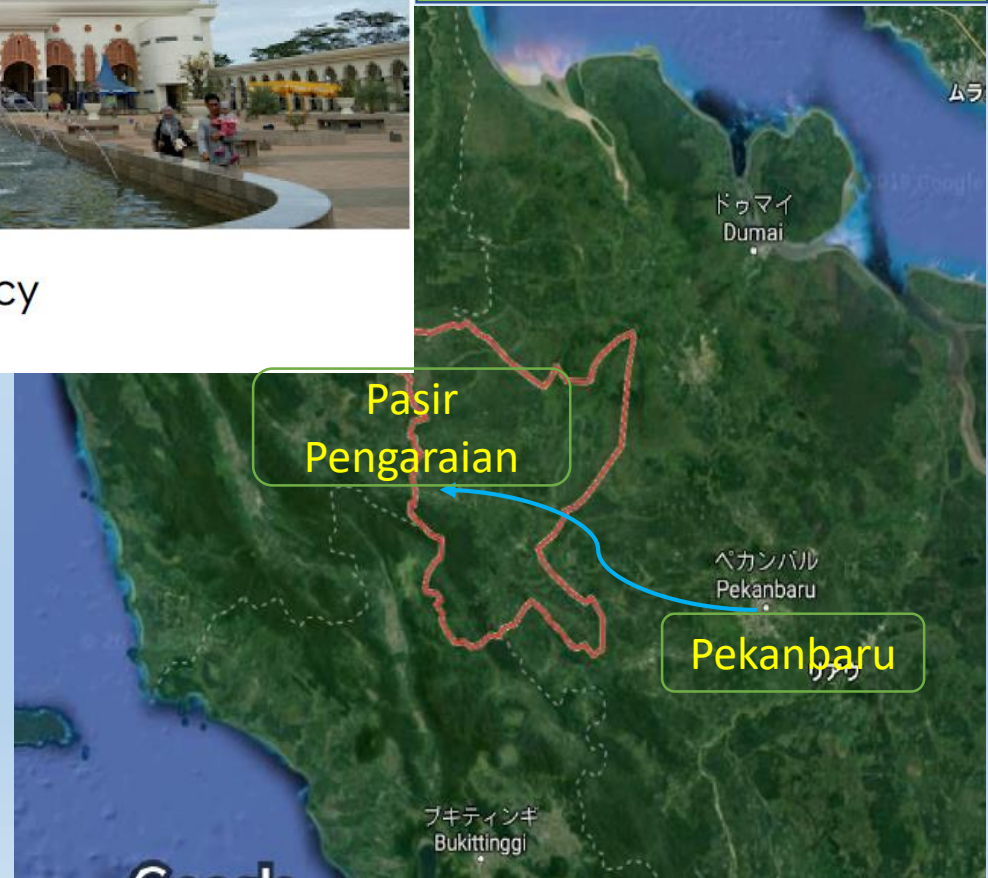
the “City-to-city Collaboration Programme, **Rokan-Hulu Regency** and Kawasaki City”.

Jakarta – Pekanbaru
1 Hr & 45 Min
by Air Flight



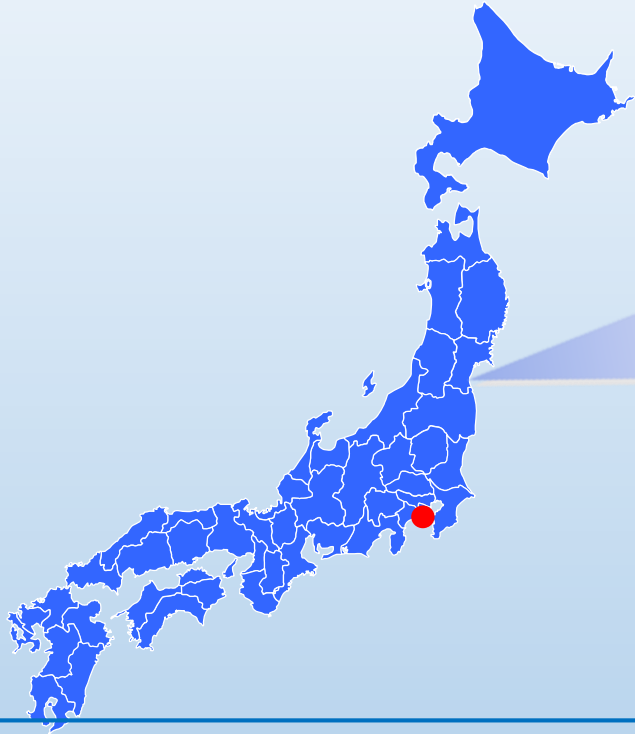
Rokan Hulu Regency
Kabupaten Rokan Hulu

Pekanbaru –
Pasar pengaraian
4 Hr by Car



“City-to-city Collaboration Programme, Rokan-Hulu Regency and Kawasaki City”.

About Kawasaki-city: Location



Population : 1,501,697 per.
(As of Jun. 1, 2017)

Area : 144.35 km²

Gross production: 5.3 trillion JPY
(50 billion USD)



Introducing Fuji Furukawa Engineering and Construction Co, Ltd. (FFEC)

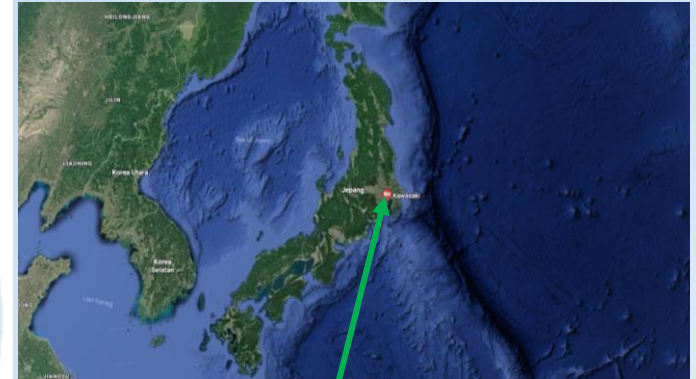
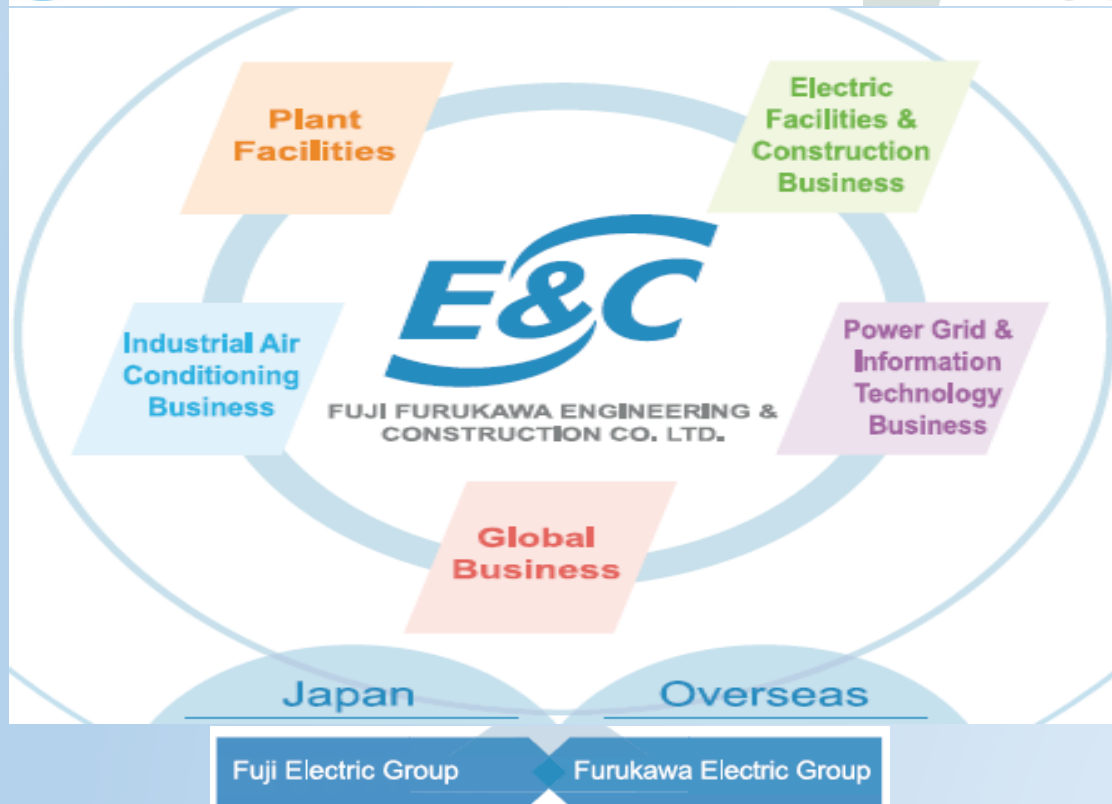
Website: <https://www.ffec.co.jp/en/>



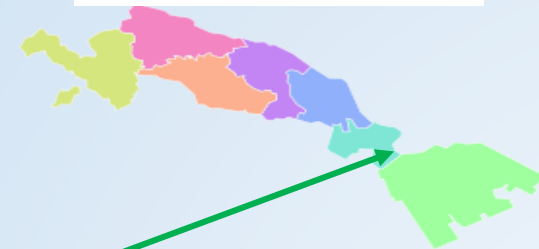
Fuji Furukawa Engineering & Construction Co.Ltd.

More Optimal, More Comfortable

“Connecting” people, society and the Earth to the future



— English —
 **Kawasaki City**



Representative	Takashi Kusaka, President	Head office	Solid Square West Tower, 580 Horikawa-cho, Saiwai-ku, Kawasaki, 212-0013 Japan TEL +81-44-548-4322 FAX +81-44-548-4545
Capital stock	1,970 million yen (As of March 31, 2018)		
Number of Employees	1,473 (consolidated) (As of March 31, 2018)	Establishment	October 1, 1923

Introducing FFEC Global Network

Project EPC by FFEC and PT. Fuji Furukawa E&C Indonesia



THAI YOKOREI CO.,LTD.

Solar power generation equipment work

(Thailand)



PT. FURUKAWA INDOMOBIL
BATTERY MANUFACTURING

Lead storage battery manufacturing
plants Electrical equipment work

(Indonesia)



JFE Engineering
Corporation

Electrical equipment work

(Myanmar)

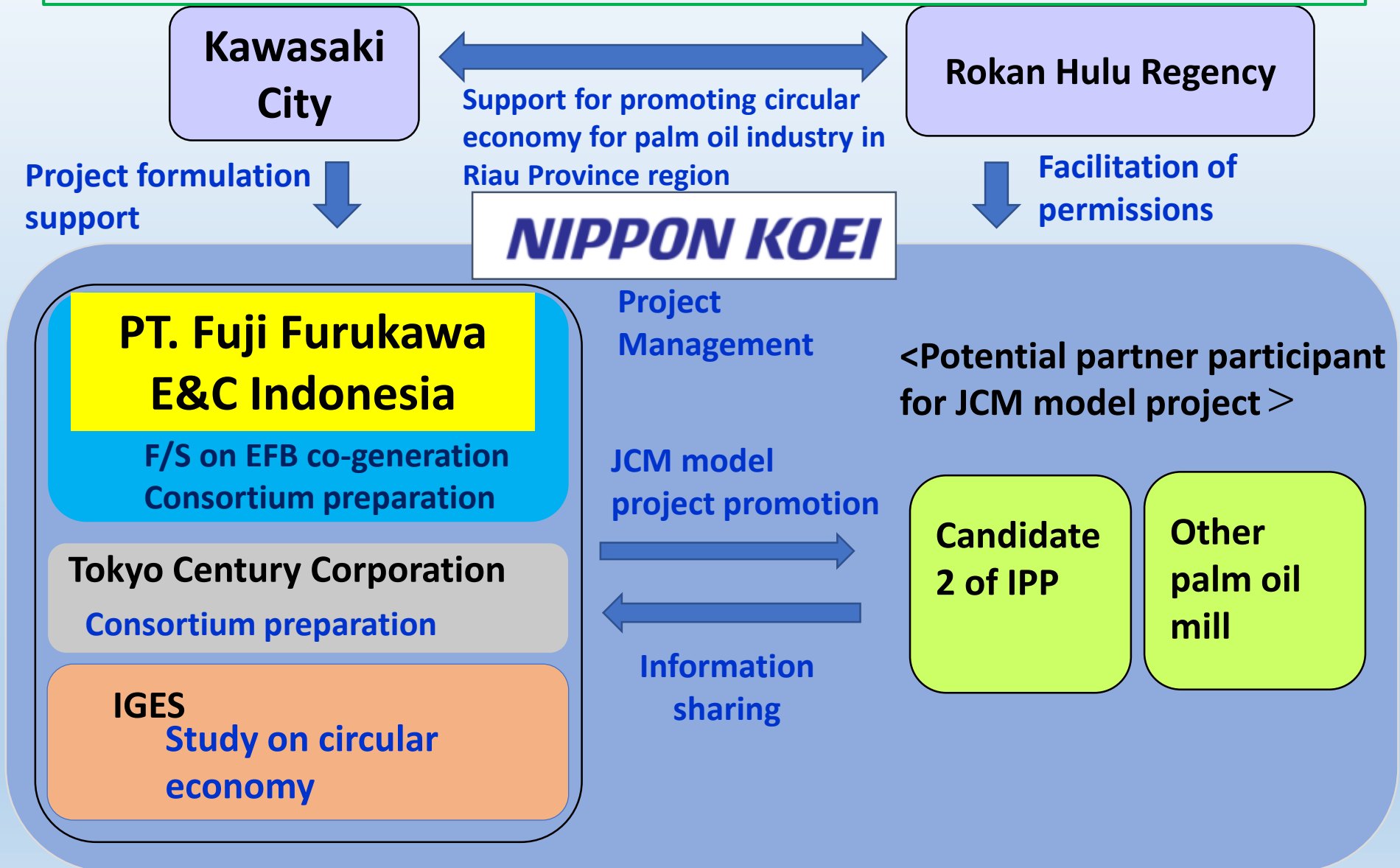
PT. FUJI FURUKAWA E&C INDONESIA

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Structure of the “City-to-city Collaboration Programme, Rokan-Hulu Regency and Kawasaki City”.



Overview of the “City-to-city Collaboration Programme, Rokan-Hulu Regency and Kawasaki City”.

Rokan Hulu as the Best Model of Circular Economy in Palm Industry



Waste converts to Money

CPO / PKO Refinery Plant Production and Waste

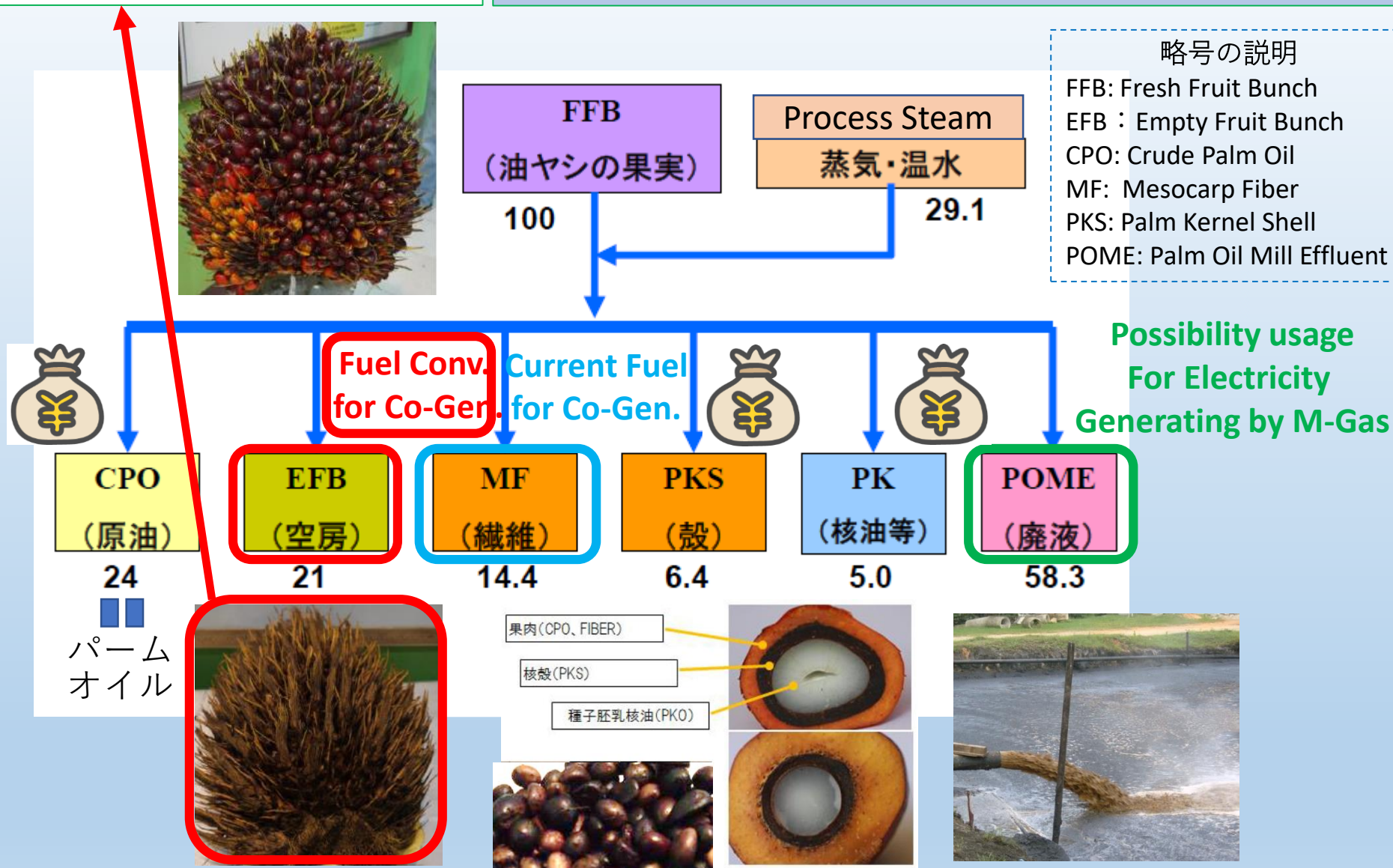





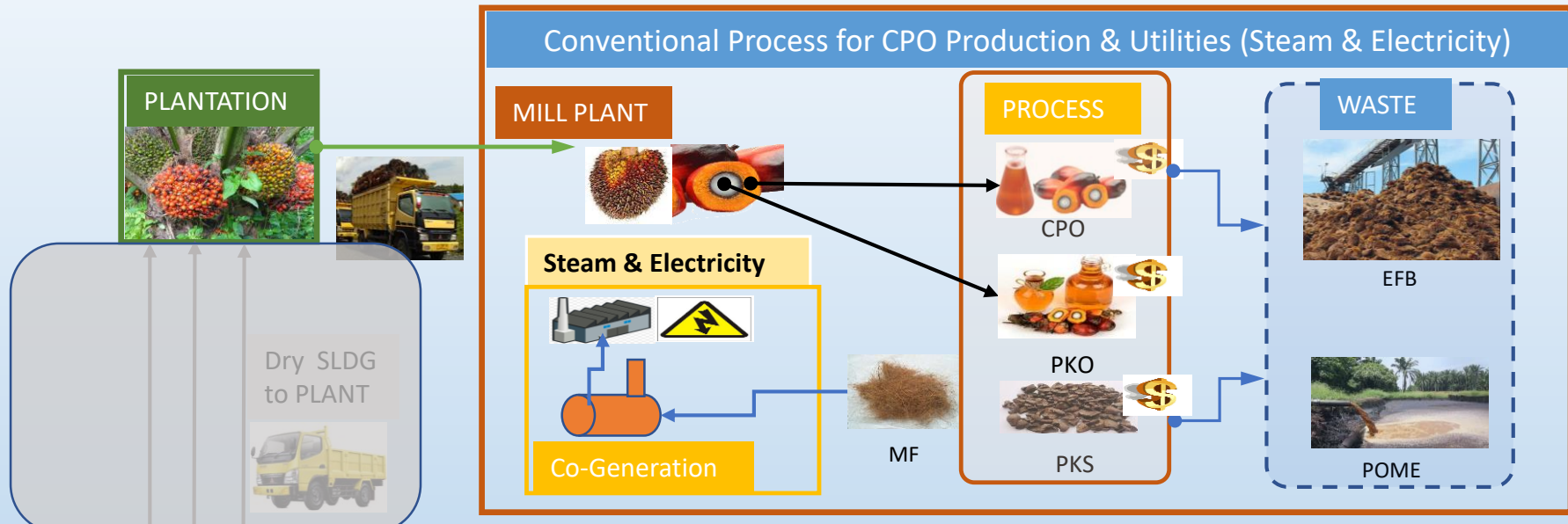
図2-5 パームオイルと副産物 (備考: 数値はFFBを100とした場合の割合)

注) 数値には複数の異なるデータ有り。

EFB treatment current situation of some Mill Plant at Rokan-Hulu Regency

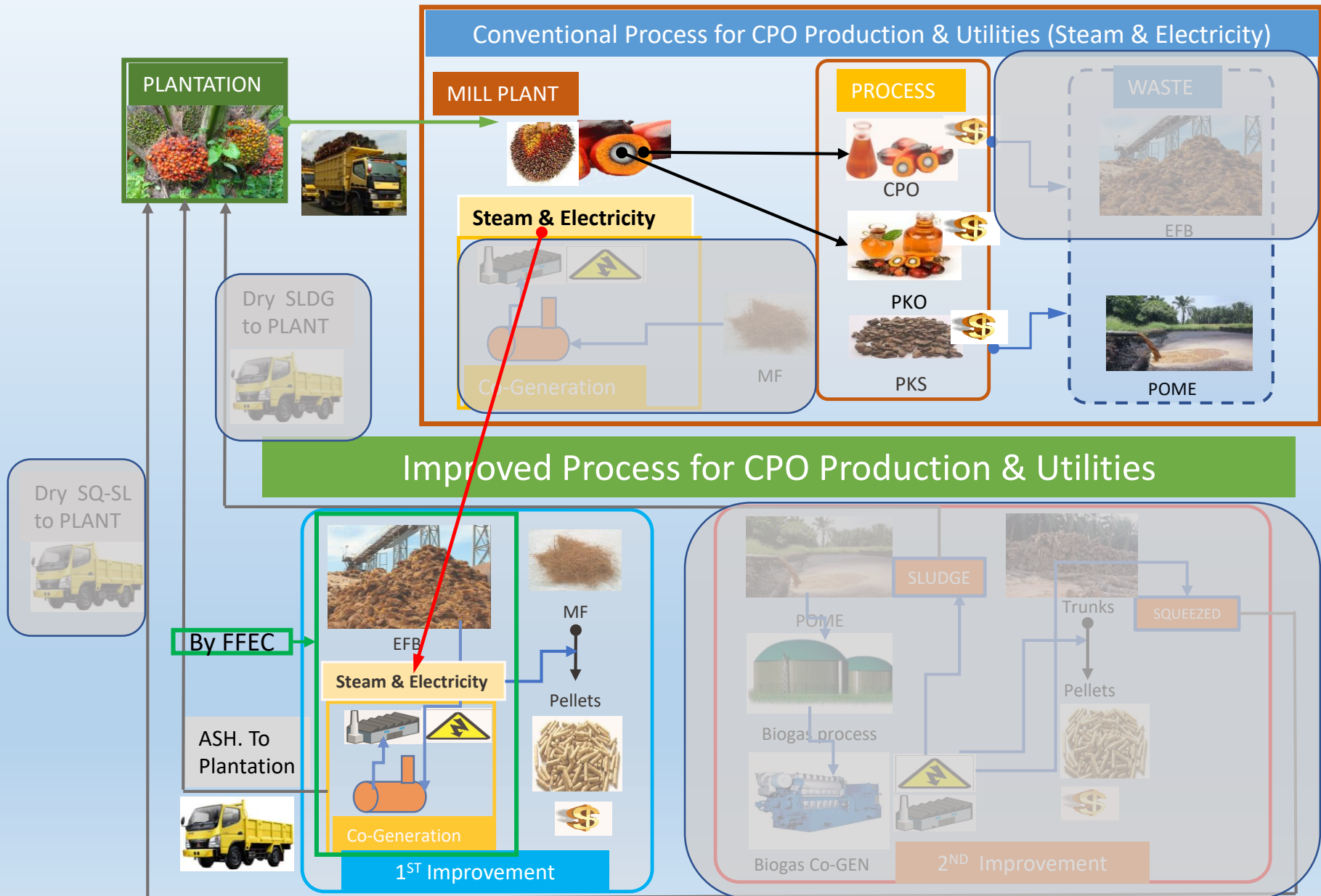
No.	ITEM	DESCRIPTION
I	Regional regulation for EFB disposal.	EFB should be treated inside of Mill Plant, prohibited dispose to outside.
II	Solution A	 <p>EFB feeds back to Palm Plantation or anyway bring EFB to out of factory. (against regional regulation.)</p>
III	Solution B	  <p>EFB feeds to incineration, convert to ash for decreasing volume of waste.</p>

Palm oil production utility (Steam & Electricity) Fuel source switch from MF to EFB (Previous by MF)



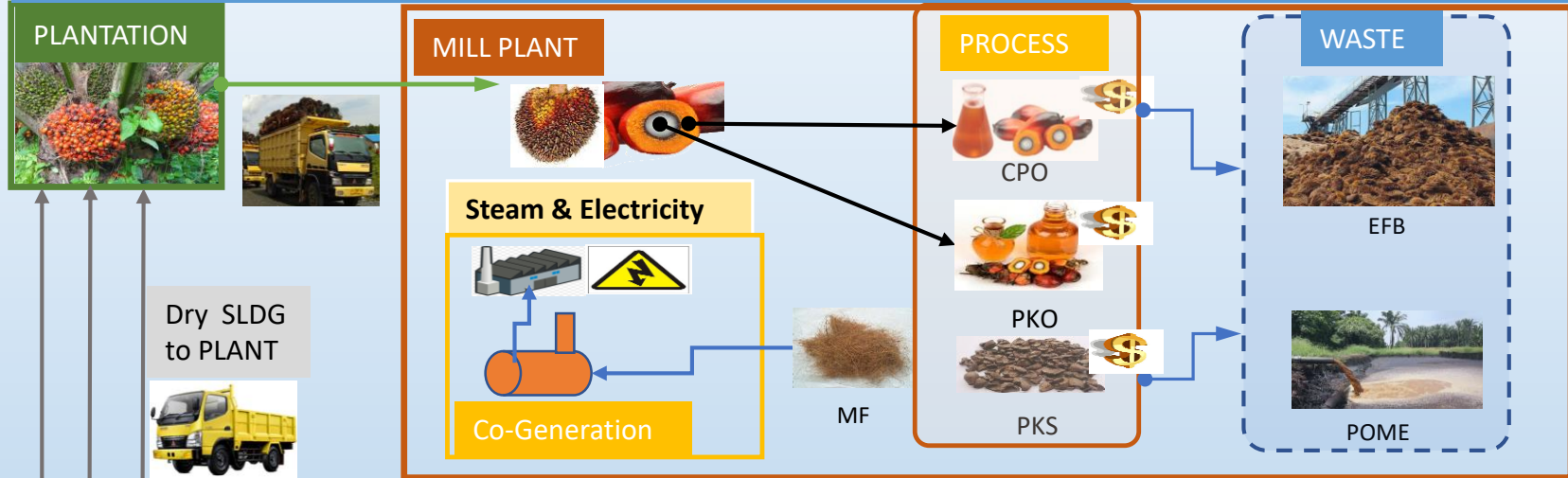
No.	Characteristics	EFB (Empty Fruit Bunch)	MF (Mesocarp Fiber)
1	a) Fuel advantage; b) Initial investment;	a) Poor than MF, high moisture & potassium (clinker problem). -> See 3 b) High cost than MF	a) Higher than EFB, low moisture & potassium (clinker less). -> See 3 b) Low cost than EFB
2	Material / Fuel long distance distribution ability;	No ability. (local consumption only.)	Ability of domestic & export value (Fuel source).
3	Sustainability (fertilizer recycle to Plantation);	High fertilizer components, ash feedback to Plantation.	Poor fertilizer components, ash to be waste.

Palm oil production utility (Steam & Electricity) Fuel source switch from MF to EFB (Improved by EFB)



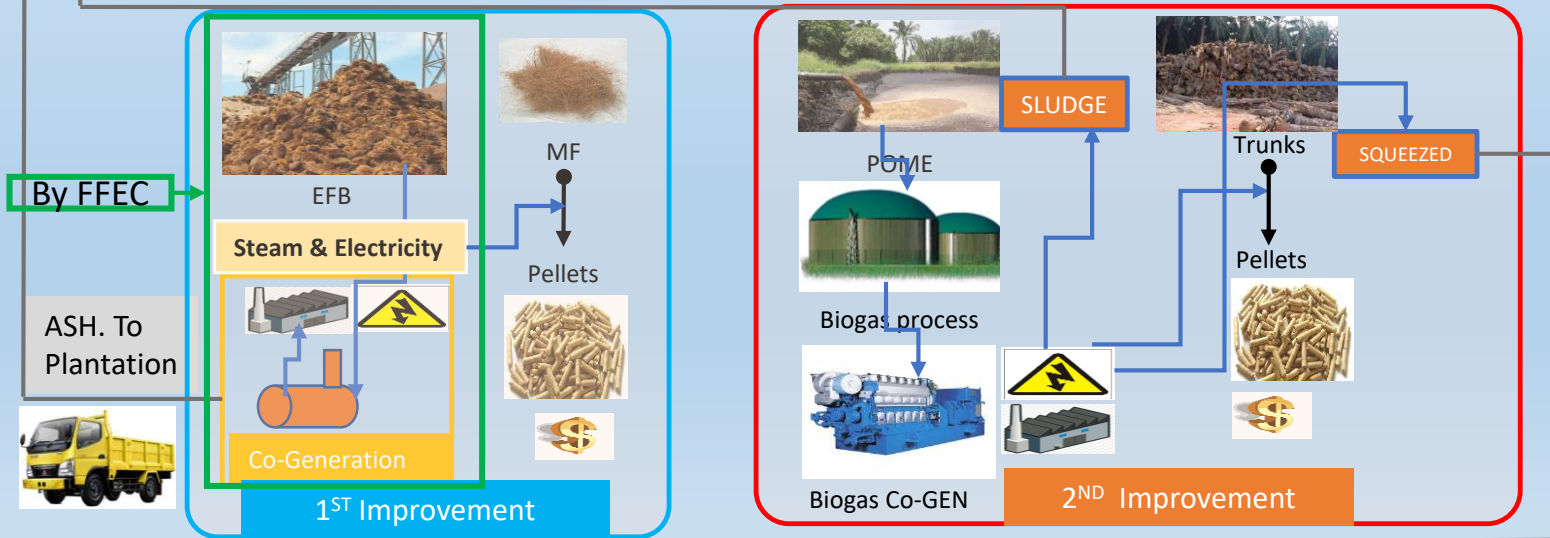
Palm oil production process improvement with EFB 100% Biomass Co-Generation (off-grid)

Conventional Process for CPO Production & Utilities (Steam & Electricity)



Improved Process for CPO Production & Utilities

Dry SQ-SL to PLANT



CONCLUSION & PROPOSAL

(Waste to Energy improvement, mainly off-grid)

No.	AGENDA	SUGGESTION
I	Palm plantation & Palm oil production sustainability (Recycle):	Fertilizer components feedback (EFB ash, POME mad & Trunk squeezed)
II	Utilities (Steam & Electricity) by local production for local consumption:	Co-generating fuel to be utilized by EFB (convert from MF) & biogas from POME
III	Tightening regulation & Incentive providing by the Government:	Regulation -> Recycle & Waste minimize Incentive -> Tax reduce

Governments of both countries cooperate with the private sector to build a model plant.

Indonesia (SEA Countries)		JAPAN
Central Government Agencies		政府期間
Local Government Agencies		地方自治体
CPO Manufacturers		建設コンサルタント
Contractors		EPC建設事業者
Power Plant Operators		輸入販売事業者
Trading Companies		電力事業者
Logistic Companies		流通事業者

Ongoing Project (On grid to PLN)

EFB 100% Fuel Biomass Power Plant Outline

Note; this project's FS is undergoing restudy, subject to change.

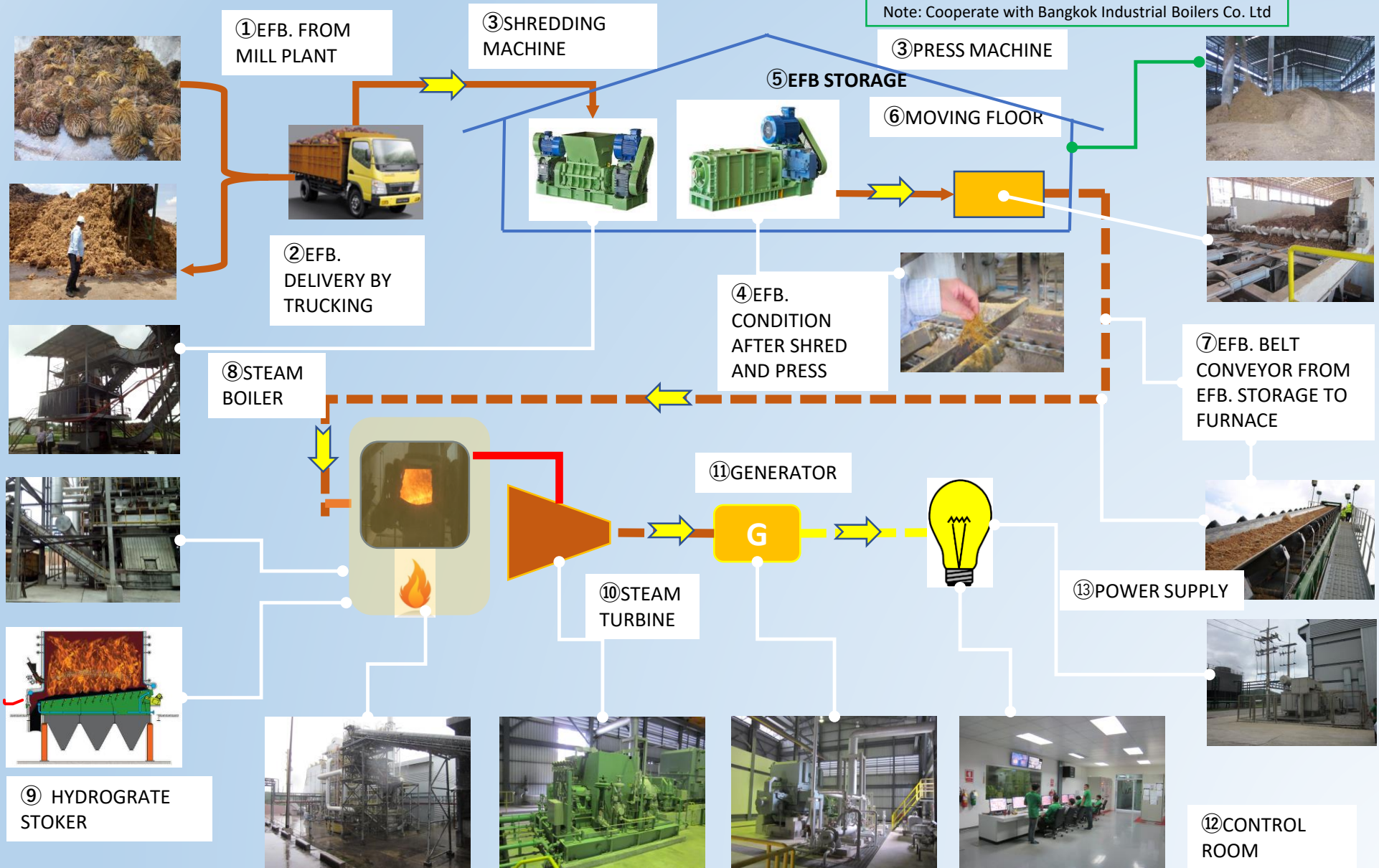
Project outline for 8.5 MWe Capacity EFB 100% Biomass Power Plant

EFB Property	High moisture and burn difficult.		Fertilizer (K) Component & CL Compound	
Counter measure	Keep Long Distance Furnace & Super Heater		Water certain wall & Vibrating Stoker	
Effect	High initial cost but waste convert to fuel		Ash to be utilized fertilize (recycle)	
Feasibility case study; B/2018		FIT = 1,294.5 IDR/KWH = BPP Y2017 (1,470) x 0.85		
Site	Rokan-Hulu Regency, Riau Province, Sumatra Island.			
Mil Plant	Capacity 90 T/H FFB base, EFB 98,322 T/Y supply to Power Plant.			
EFB	54% Moisture	LHV = 7,789 MJ/T, Plant net efficiency = 16.88 %		
CO2-e avoided	<u>17,057 T/Y</u> = 0.457 T/MWH* x 7,789 MJ/T x 98,322 T/Y x 16.88 % / 3,600			
EPC Cost	3,000 – 3,500 USD/KW (3,250)		IDR Exchange	13,872
w/o JCM Support	Payback Periods	12.1 Y	IRR	4.4 %
w/I JCM Support** (if can get it)	Payback Periods	6.5 Y	IRR	10.7 %
Note*	Carbon reduction coefficient on Y2017, cited from TEPCO website.			
Note**	Object	70% from EPC	Grants	50% of Object
Caution	Above calculation was on 2018, grants ration was down to <u>40% Object</u> .			

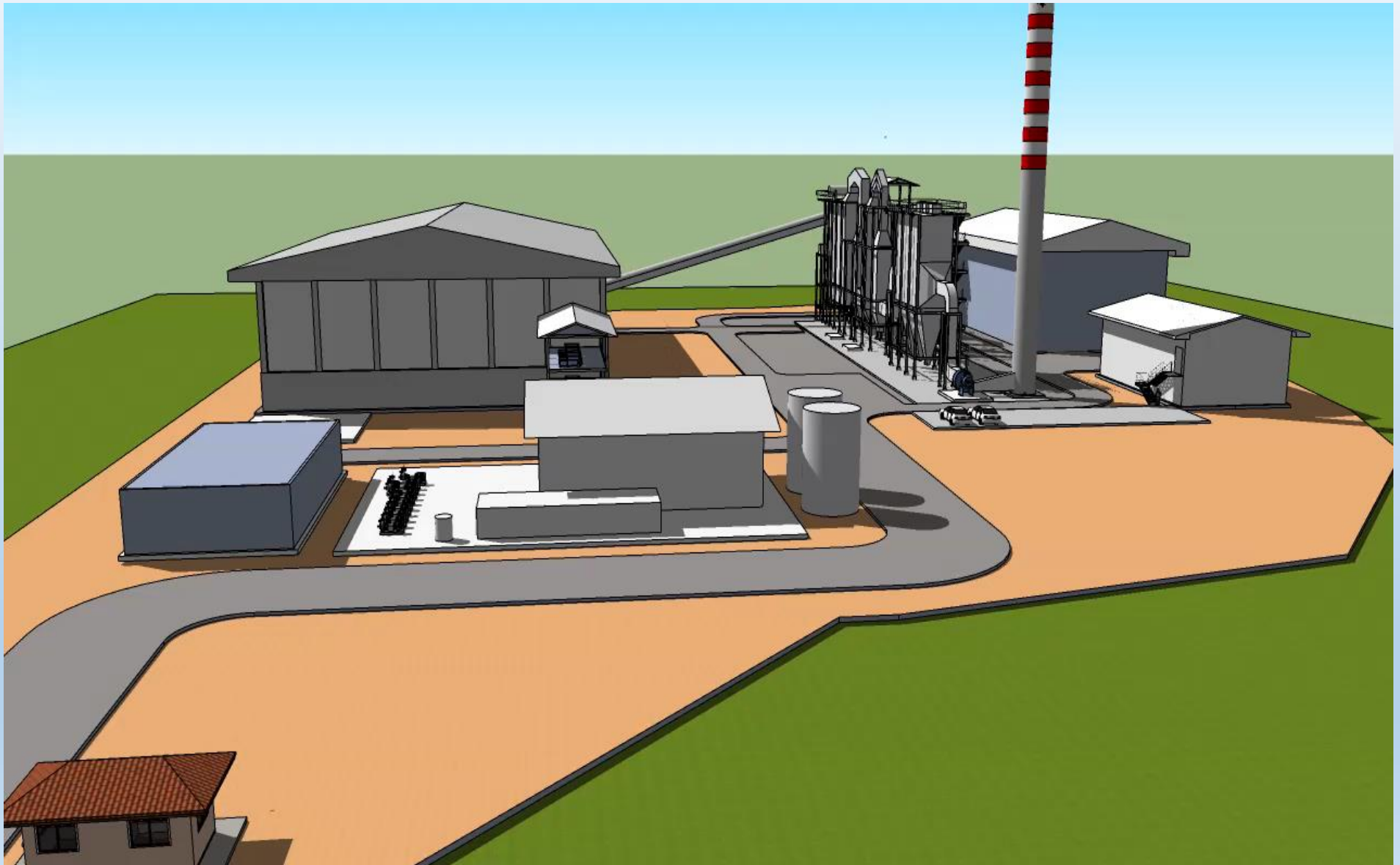
Ongoing Project (On grid to PLN)

EFB 100% Fuel Biomass Power Plant Flow Chart

Note: Cooperate with Bangkok Industrial Boilers Co. Ltd



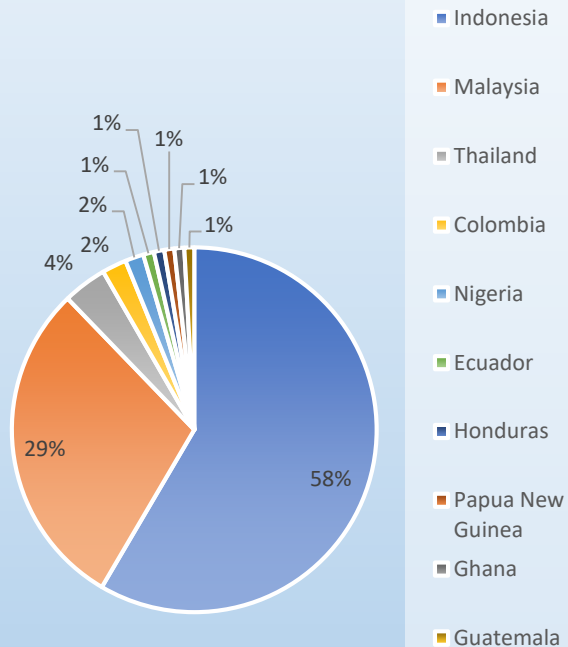
Ongoing Project (On grid to PLN)
EFB 100% Fuel Biomass Power Plant Site Plan



Crude Palm Oil Products Volume & Share in the World / Potential Bioenergy (waste to energy) in Indonesia

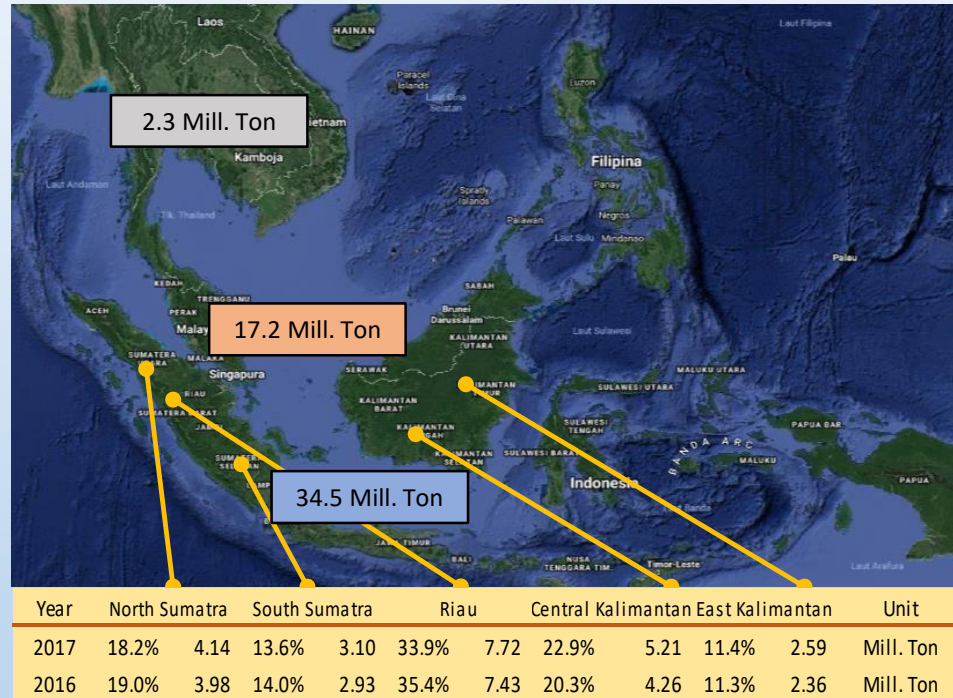
Top 10 Palm Oil Producers by Country 2016

(Data: www.palmoilanalytics.com)



5 of the Largest palm oil producing provinces in Indonesia In 2017

Data: "BADAN PUSAT STATISTIK 2017" (Central Bureau of Statistics 2017-Indonesian)



On-grid case, estimated Potential Bioenergy (waste to energy) in Indonesia _{Y2017}

Waste	Electricity Generated	Power Plant Capacity	CO2-e avoided
EFB*	9,578,150 (MWH)	1,197 (MW)	4,549,621 (Ton)
Note	EFB*: "Calculation from this presentation material page-14 "Project outline for 8.5 MWe Capacity EFB 100% Biomass Power Plant"		

THANK YOU



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