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PERTAMINA

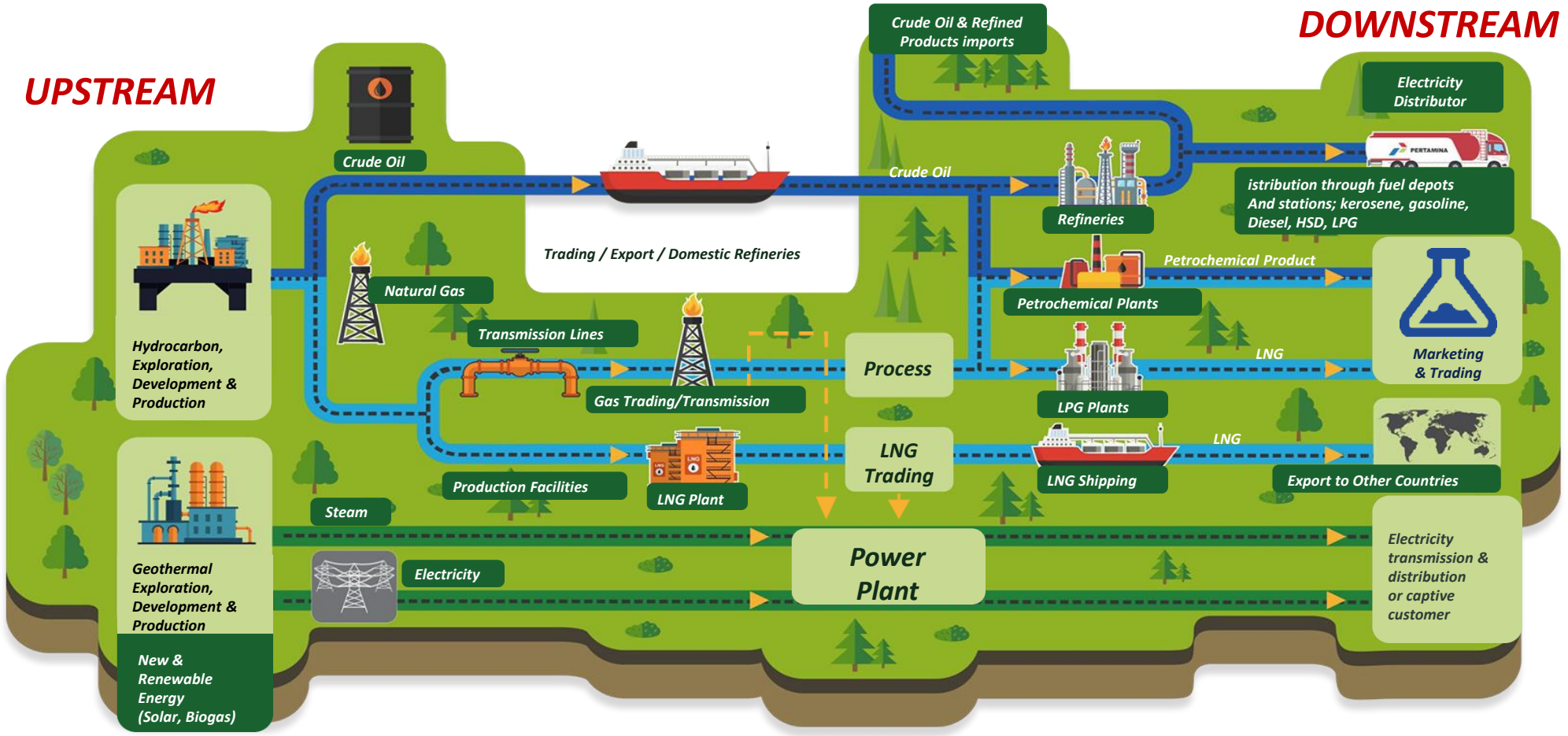
Shaping Indonesia's Sustainable Energy Future Through Technology and Innovation

Oki Muraza
Deputy President Director – PT Pertamina (Persero)

29th January 2025

PERTAMINA BUSINESS PROCESS

INTEGRATED ENERGY COMPANY



75,3 bio USD Revenue

1mio BOEPD Lifting

1mio MBSD Refinery Capacity

15000 Fuel Retail Points

33000 KM Gas Pipe

2,5 GW Clean Energy Generation

288 Ship Operated

#1 ESG Integrated Oil and Gas

Pertamina Dual Growth Strategy : Pertamina continuously ensures the resilience, affordability and sustainability of energy

President of Republic of Indonesia's Asta Cita for Indonesia Emas 2045

2 Energy Sovereignity & Green Economy

5 Value Creation and Downstream Industry Development

Adapting Business Competitiveness to Global Dynamics

Geopolitic Tension

1 Conflicts in various parts of the world are causing price volatility and changes in supply patterns.

Climate Change

2 Decarbonization demands from businesses, as well as carbon offsets, to achieve Net Zero Emissions (NZE) targets.

Technological Disruption

3 Technological developments (AI, automation, clean technology) demand business agility and adaptation

Maximizing Legacy Businesses

1 Increasing Upstream Production

2 Building Resilience Downstream Business

3 Expanding Service and Non-Captive Business

4 Optimizing & Expanding the Infrastructure and Services

Building Low Carbon Business

Focus on this Presentation

5 Scalling Up Biofuel Ecosytem

6 Developing & Scalling Up Green Energy

7 Expanding Geothermal Capacity

8 Developing Emerging Low Carbon Technologies

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Sustainability Focus : Sustainable Focus in Pertamina Group & Methane Reduction

MSCI **BBB**

CDP **B** Water Security & Climate Change

SUSTAINALYTICS 2025

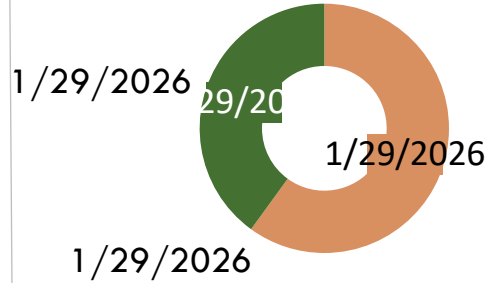
23.4 Medium Risk

#1 Sub-industry Integrated Oil & Gas

Pertamina's 10 Sustainability Focus

	Focus	SDGs
1	Addressing climate change	
2	Reducing environmental footprint	
3	Protecting biodiversity	
4	Enhancing health and safety	
5	Prevention of major accidents	
6	Respecting and empowering our people	
7	Reorienting innovation and research	
8	Expanding community engagement and impact	
9	Strengthening cyber security	
10	Leveraging corporate ethics	

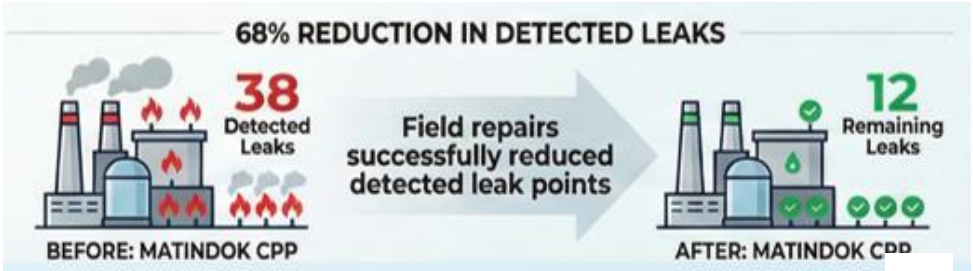
Methane Reduction Vision



Reducing Methane 40% from 2021 baseline

Advanced Field Technologies

Methane Reduction in Pertamina Group



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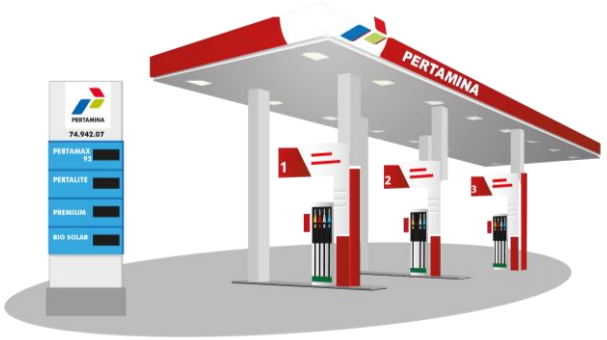
Bioethanol : Imports Substitution and Sustainability

National Roll-Out Pertamax Green

PERTAMAX GREEN 95

95 RON **<50** ppm Sulphur

(Euro IV) **E5** Bioethanol



160+ Fuel Stations

in Banten, West Java, East Java, Central Java, DIY

Bioethanol Advantages :

Energy Security	Gasoline Substitute Products where Indonesia relies on **138 million barrels per year**[1] from Imports (>50% of consumption)
Trade Balance	The substitution value of gasoline imports reached **12.4 billion USD**[2] or the equivalent of **200 trillion Rupiah.**
Emission Reduction	Transportation sector emissions in Indonesia reach **202 million tons per year**[2]
Circular Economy	Creating jobs and increasing economic growth, especially in the agricultural sector

Ref : 1. Data Argus Year 2024 , 2. Data BPS Year 2024, 3. Data ISMO Year 2024

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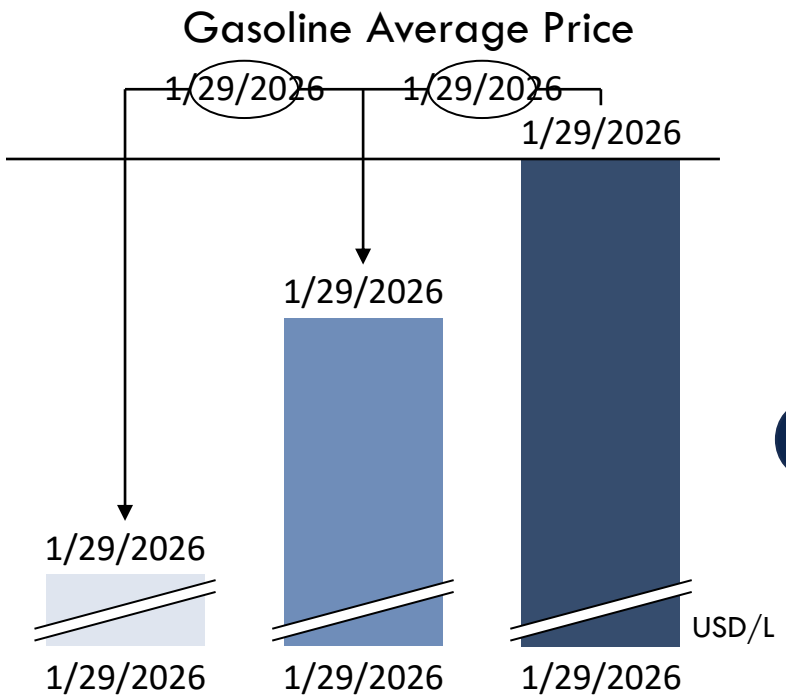
Bioethanol Development : Affordable, Non-Edible, Low Carbon

Bioethanol Price Comparisson



With the price sensitive Indonesian market, there needs to be innovation in the development of bioethanol so that it can substitute existing gasoline products.

Bioethanol Feedstocks

MOLASSE

DESCRIPTION

Sugar by-products containing high-level of sugars.

OPPORTUNITY

Mostly used 1st G Feedstock that still in-line with food security.

CHALLENGE

Securing Feedstock in highly- competitive market

SORGHUM

DESCRIPTION

Plant that can produce grain as starch source and stem containing sugar juice.

OPPORTUNITY

Could co-generate food and energy balancing national demand gap.

CHALLENGE

Grain Market Penetration

ARENGA PINNATA

DESCRIPTION

Palm-Type Tree that could produce sap containing sugar.

OPPORTUNITY

High Sugar Productivity per Tree

CHALLENGE

Mechanization, Feedstock Preservation, Land Availability

EFB

DESCRIPTION

Waste of Palm Oil Production Value Chain containing Lignocellulose Biomass.

OPPORTUNITY

abundant availability of biomass.

CHALLENGE

Feedstock Supply chain & Expensive Processing Technology

1st Generation – Sugar & Starch Based

2nd Generation

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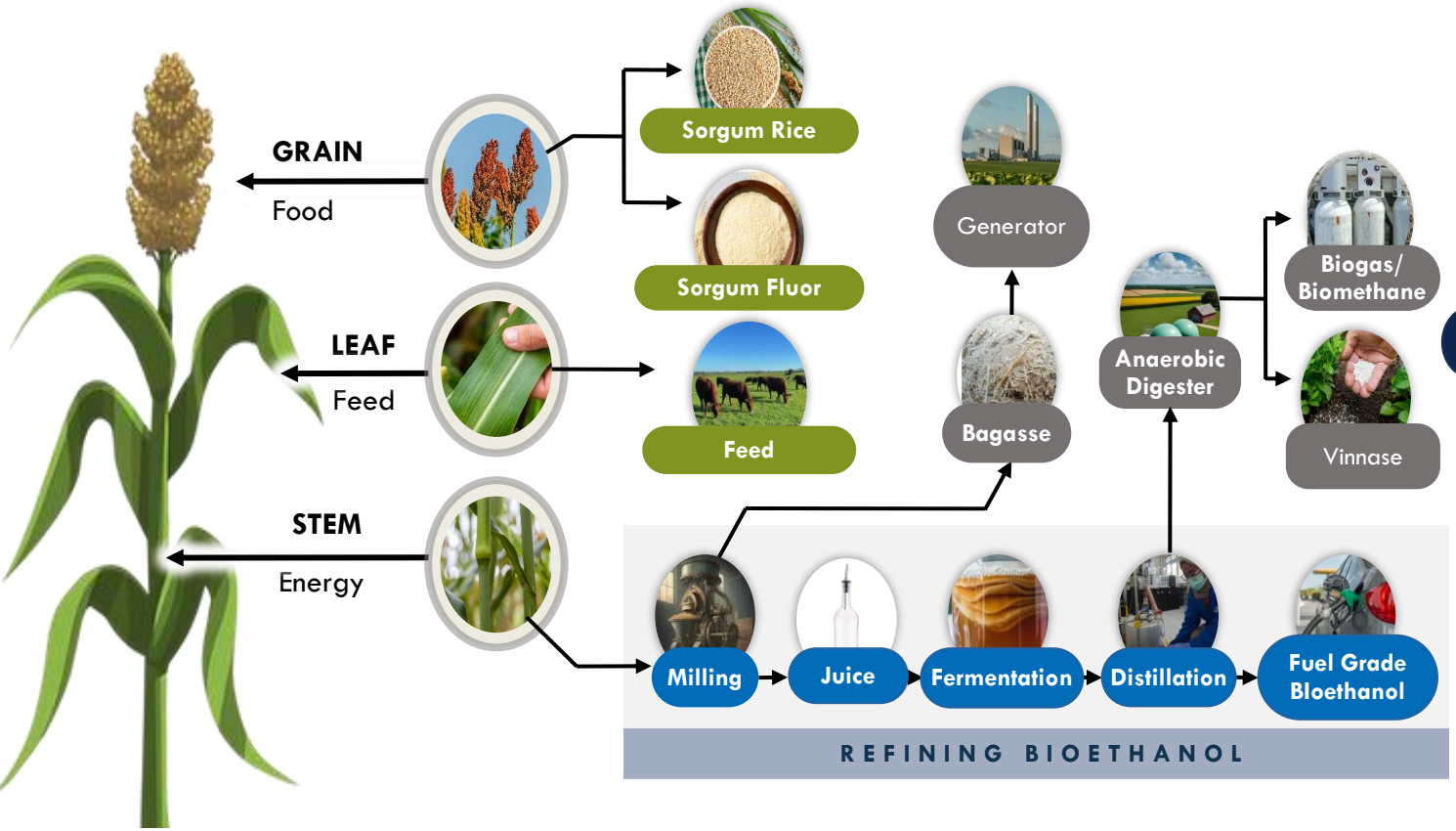
Sorghum Bioethanol : Bioethanol 100% (E100) has been tested in Toyota Flexy Fuel Vehicle (FFV)

Food Ecosystem and Bioethanol from Sorghum



Showcase E100 from Sorghum in Flexy Fuel Vehicle

July 2024 – Pertamina continues to sharpen its competencies and expand collaboration to encourage the development and utilization of bioenergy in various sectors. At the GAIKINDO Indonesia International Auto Show (GIIAS) 2024, **Pertamina** collaborated with **Toyota** to carry out initial filling and test drives using **Bioethanol from the Sorghum stem.**

Special Flight Sustainable Aviation Fuel : SAF from Used Cooking Oil using Proprietary Catalyst

Pelita Air's Flight on August 20, 2025, Jakarta-Bali Route

1. **End-to-End ISCC Certified SAF** Production is capable of reducing aviation fuel emissions by up to 84%
2. **Regional Champion** as the only SAF Co-Processing Producer in the ASEAN region
3. **Technology Leadership** created by the domestic minds that exceeds the capabilities of international licensors
4. **Starting Up E2E Ecosystem** in Internal Pertamina Group from collecting used cooking oil to airlines consumption

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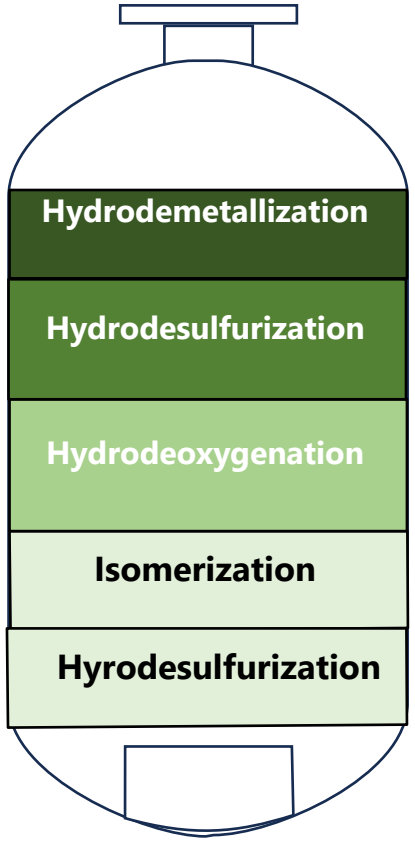
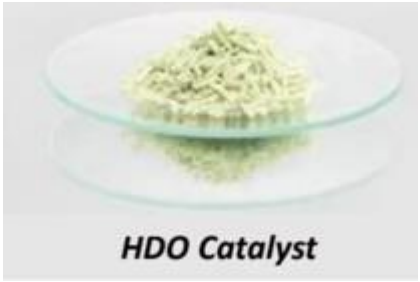
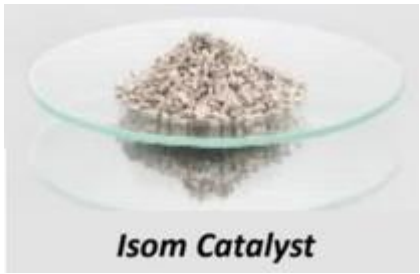
SAF Production Process Technology : Process Innovation in the Development of Sustainable Aviation Fuel

Invention

New TDHT Catalyst Configuration







Impact

Before	After
2 Operation Mode : 1. Avtur 2. Diesel	4 Operation Mode : 1. **SAF max 3% UCO** 2. **HVO from RBDPO** 3. Avtur 4. Diesel
Import Catalyst from International Suppliers	Utilizing Pertamina group resources using Pertamina Formulated Catalysts and Pertamina Group affiliated Manufacturing
Fossil Feedstock	Co-processing UCO (3%)

Note: The image is for illustration purposes only

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Potential Replication in Other Refineries : Pertamina's refinery has the capability to produce co-processed SAF

SAF Capacity will be Up to **1 million kL/year** in 2030++*

Hydrocracking Dumai
Year of '26

Green Refinery Sumatera
Year of '30

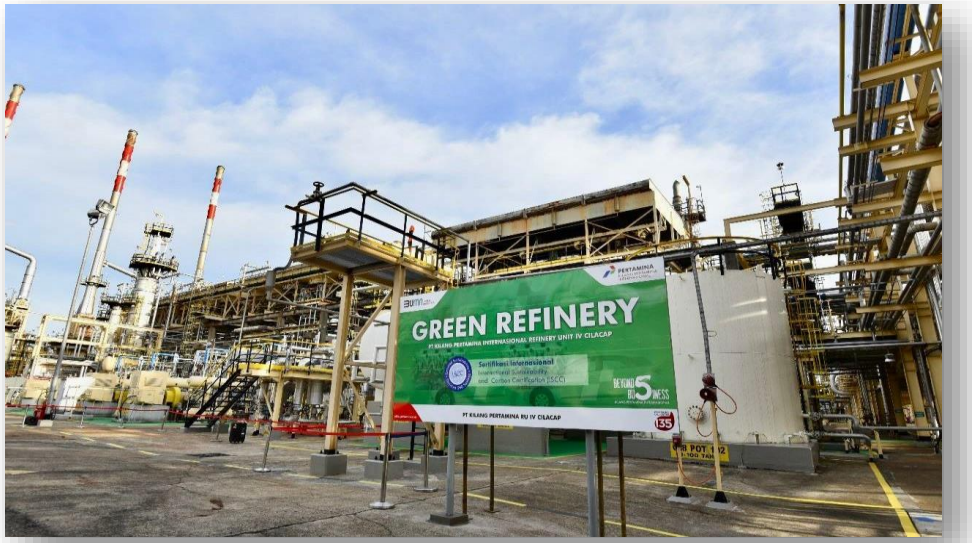
Hyrogenation Balongan
Year of '27

Green Refinery Cilacap
Phase 1 August '25, Phase 2 Year of '29

**Non-Exhaustive*

Groundbreaking Green Downstream Projects : Green Refinery Cilacap dan Bioethanol Plant

1 Green Refinery Cilacap phase 2



Green Refinery Facility Based on Used Cooking Oil (UCO) Feedstock for Sustainable Aviation Fuel (SAF) and Green Diesel Production.

Capacity :

***300 kton**/y UCO,*
***270 thousand kL**/y SAF J100,*
***280 thousand kL**/y Green Diesel*

2 Bioethanol Plant Glenmore

Fuel-Grade Bioethanol Plant using Sugarcane Molasses as Feedstock

Capacity :

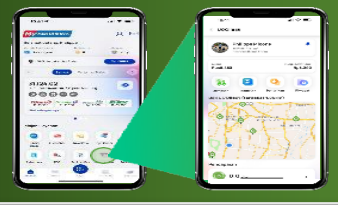
***120 kton**/y Molasse,*
***30 thousand kL**/y Etanol Fuel Grade.*

Feedstock for SAF : UCOllect

Pertamina UCOllect Boxes

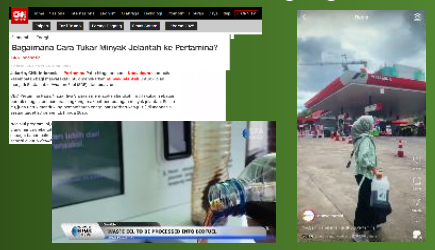
35 + 65
receiving points
in 2025

MyPertamina App



Users & Partners
> 1.000.000 App Users
> 6.000 Monthly Users

Joint Multichannel Engagement



Collection Volume
> 1,1 ton/Box/months
> 10 Deposits/Box/day

Pertamina Patra Niaga and Noovoleum initiated a collaboration to conduct used cooking oil (UCO) collection since December 2024.

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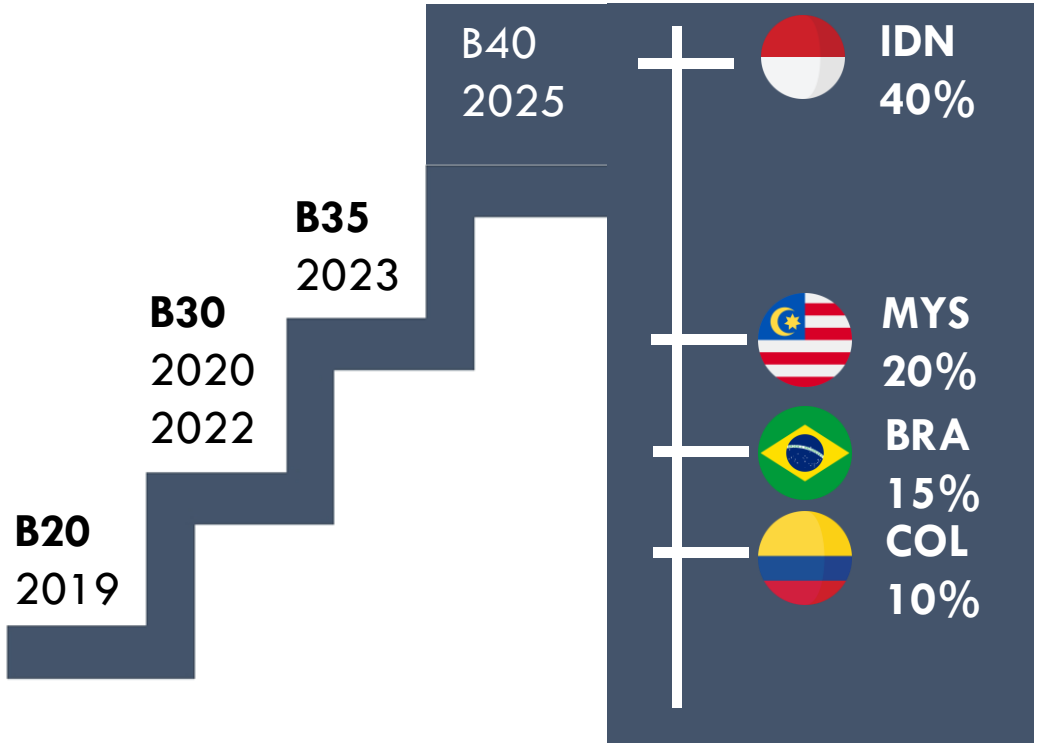
Pertamina Renewable Diesel : FAME and Pertamina Renewable Diesel as Sustainable Solution in Diesel Stream

Stepping Biodiesel

Currently, Indonesia already self-sufficient in solar products.

PERTAMINA BIOSOLAR PERFORMANCE

In Late 2025, Pertamina Launch High Performance Biosolar Product



Pertamina Renewable Diesel Initiatives

PERTAMINA RENEWABLE DIESEL

It is a hydrogenated palm oil product from the Pertamina refinery.

- Has a High Cetane Number
- Less hygroscopic
- Has higher oxidation stability
- Has high calorific value

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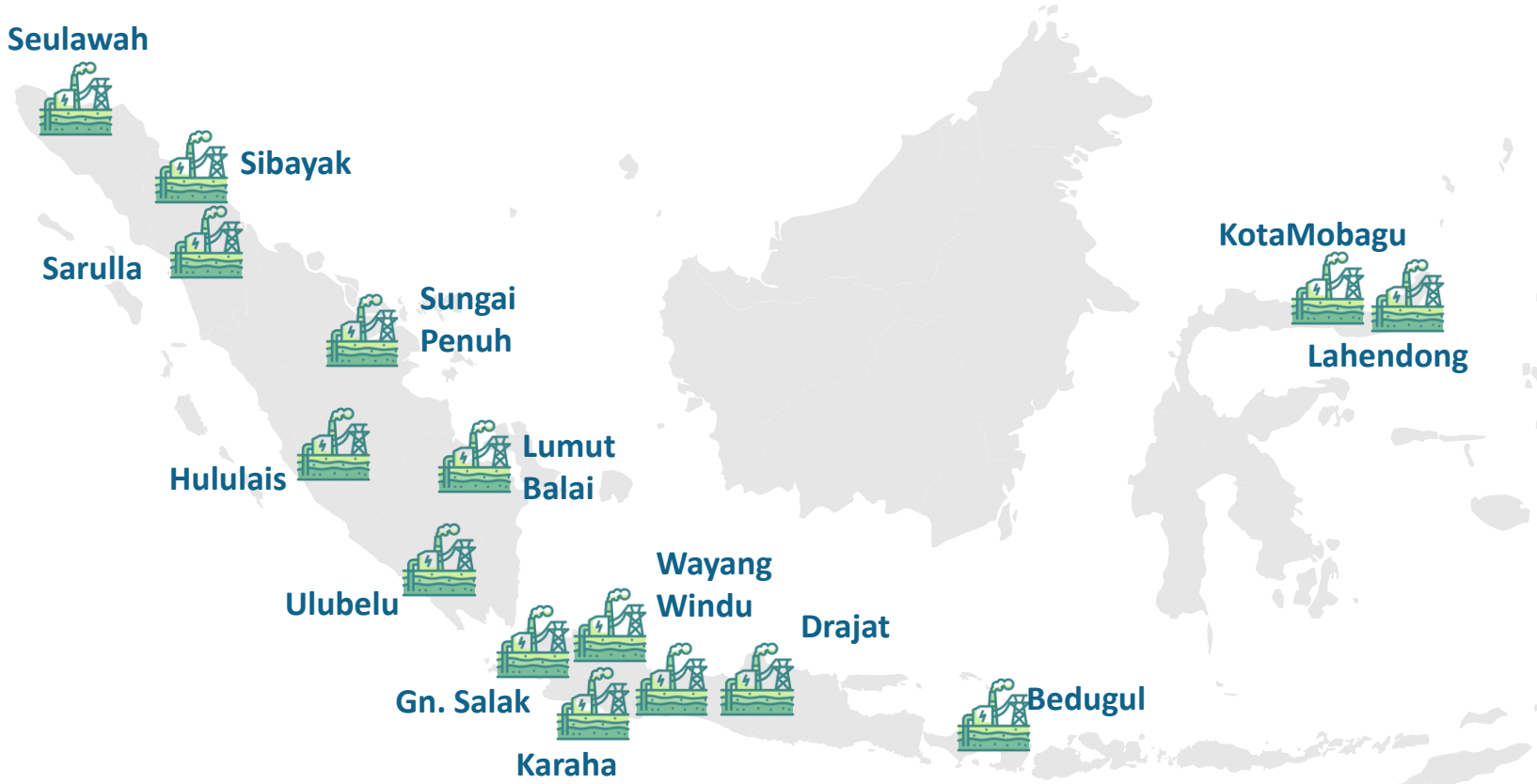
Geothermal : Geothermal for Green Electricity



15 Working Area

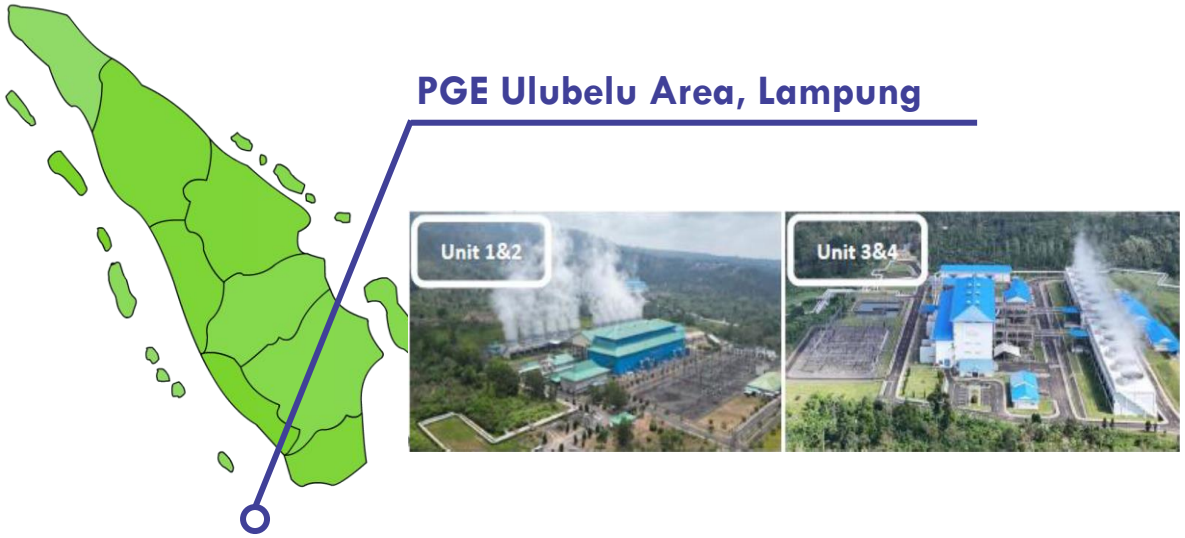
727 + 1205 MW
Installed Capacity from Owned and Joint Operation

3286 MW
Resources Upside

~19 Billion
CAPEX for Developing 3 GW

Next Quick Win Programs *(2026-onwards)*	Ulubelu	Sibayak	Hululais	Cogeneration Ulubelu
	5 MW	**5 MW**	**2 x 55 MW**	**30 MW**

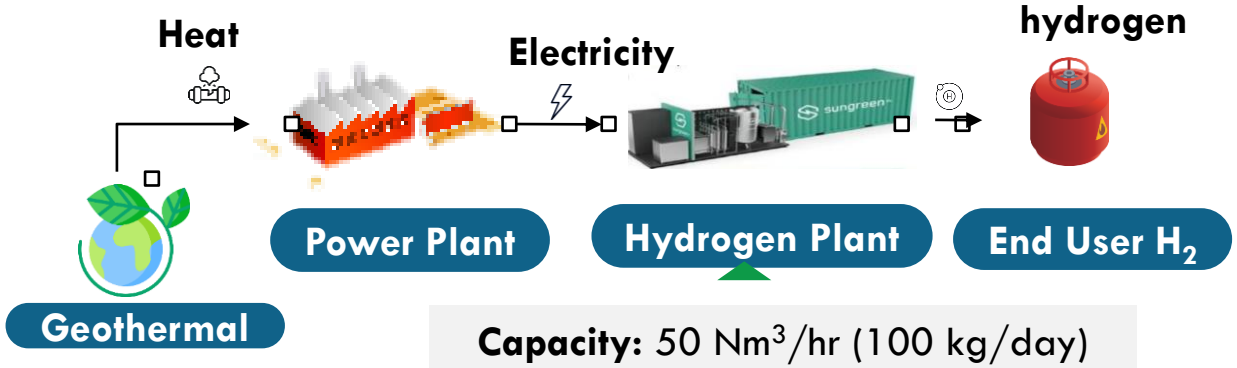
Green Hydrogen: Ecosystem for Green H2 from Geothermal



62 Wells:
- 30 Production
- 11 Monitoring
- 14 Injection
- 7 Abandoned

Power Plant	Capacity	Sales Contract	COD
Unit 1	1 X 55 MW	PJBU	2012
Unit 2	1 X 55 MW	PJBU	2012
Unit 3	1 X 55 MW	PJBL	2016
Unit 4	1 X 55 MW	PJBL	2017

Green Hydrogen Scheme

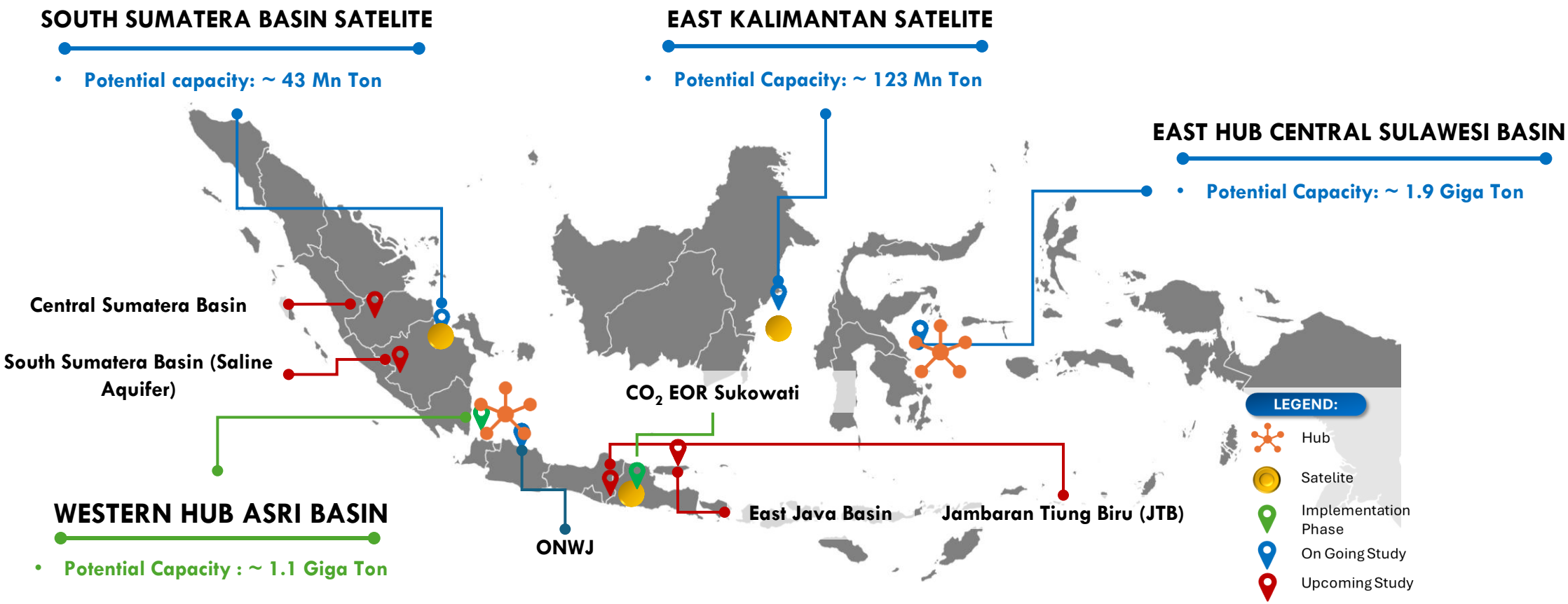


Capacity: 50 Nm^3/hr (100 kg/day)
CAPEX: 3 Mn US$

Potential User / Offtaker

1. **Hydrogen Refueling Station** Toyota in Karawang **20 kg/day**
2. **FC Generator** Pertamina Energy Terminal TLPG Tg. Sekong **50 kg/day**

Carbon Capture : CO2 Storage Development Potential



- Indonesia offers **robust CO_2 storage** with potential capacity of up to **7.3 GT** in saline aquifers and depleted reservoirs, **combined with a strategic location** near emission hard-to-abate countries with NDC targets and CO_2 storage demand
- A **world-class Hub** and **Satellite** network is being developed in **collaboration** with leading **strategic partners**

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Key Take Aways

1. The most reasonable way to do the Energy Transition while maintaining Energy Security and Energy Sustainability is by utilizing countries indigenous resources with the touch of technology.

2. In Indonesia, Biomass, UCO, Geothermal, are the most realistic ways and Pertamina is leading Indonesia energy transition.

3. Indonesia is the largest biodiesel up to 40% blending. in addition, we are planned to be Regional Hub for SAF, and we have the ambitious target to double our geothermal capacity

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THANK YOU