Coconut Husk to Green Methanol

Wily Salim
Founder & Director

Who is KVA?

Founded in 2021

Karmic Virya Abadi (KVA)

Based on Sanskirt and Indonesian translation,

'Perpetual Energy Cycle'

Our Purpose

Turn **low value** biomass waste

into **renewable fuel**

for **marine** and **aviation** industries

using **proven** technologies.

Two Key Problems

Climate Change

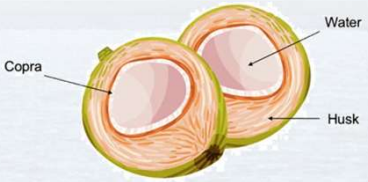
- **Air pollution** from marine activities (3% of global emission) and husks treated as waste and burned openly.
- **Scarcity of** renewable fuel to **decarbonise** shipping industry (net zero by 2050)
- **Loss of peatlands** are essential as natural carbon storage due to palm oil encroachment on coconut farms (unlike coconut which grow naturally on peatlands)

Coconut Farmers Plight

- **Inability to get away from poverty** due to low income (small scale), droughts, yield and price fluctuations
- **Economic displacement** from encroachment by larger palm oil corporations – land loss, disease/pest migration etc.

Coconut Husk is a major Agri-waste stream

- Husk mass comprise 25% - 30% of coconut mass
- Promising biomass feedstock (high lignin content at ~50% with calorific value 16MJ/kg, consistent and relatively low moisture)



Our Solution

Coconut Husk → Biomethanol

World's First Biomethanol from Coconut Husks

SUSTAINABLE ECOSYSTEM

- Improve sustainability for coconut farming (prevent open burning)
- Supply of Green Marine Fuel
- GHG reduction of ~150ktpa CO_2 e
- Protect peatlands (vs oil palm)

POSITIVE SOCIAL IMPACT

- Supplementary income to 30,000 farming families as KVA buys the husk
- $10M pa injected into local economy
- Create ~800 new jobs in rural areas

CIRCULAR ECONOMY

- Upgrade waste into green biofuel
- First in the world using coconut husks
- Placing Indonesia at the forefront of green fuel sector

Why Biomethanol & Why Now?

Urgency to Reduce

GHG Emission & Air Pollution in the Marine Industry.
IMO 2050 Net Zero Directive and MEPC83 with 2-Tiered Carbon Non-Compliance Penalties.
Shipping is the FIRST Industry to have International UN-back Carbon Mechanism.

Up to **95%**	Up to **80%**	Up to **95%**	Up to **99%**
CO_2 Reduction	NOx Reduction	PM Reduction	SOx Reduction

Demand > Supply

Clean Marine Fuel for Marine Shipping.

Greenhouse Gas Emission Reduction Potential

150,000 CO_2 equivalent from Project initial 100,000 tonnes MeOH production
Up to 600,000 CO_2 equivalent reduction with expansion!

** assumes target carbon intensity of <32.9g CO2 eq/MJ achieved. Benchmarked against fossil diesel carbon intensity of 100g CO2 eq/MJ

Market Potential (TAM)

	All Methanol	Green Methanol
	$35B to $42B All MeOH Market 2024 to 2031	**$0.2B to $0.6B** Green MeOH Market 2024 to 2031
<1% Renewable Methanol Mix	**2.9%** All MeOH CAGR 2024 to 2031	**16.4%** Green MeOH CAGR 2024 to 2031

Total Addressable Market ("TAM") from Shipping Industry

International Maritime Organisation (IMO) Net Zero 2050 Directive driving growth in methanol fuelled vessels

Source: Bloomberg, BloombergNEF, DNV. Note: Shows the fleet of vessels on the water in each year. Data as of March 1, 2024.

Bloomberg forecast 14MT annual demand by 2028, equal to TAM of $15 billion at today's prices – CAGR of 45% vs 2024

Source: Bloomberg, BloombergNEF, DNV, MAN. Note: Shows consumption from the fleet of methanol vessels in each year, assuming they only use methanol. Data as of March 1, 2024.

Alternatives

Criterium	Hydrogen	Ammonia	Methanol	LNG	Li-ion
GHG reduction potential	5	4	5	5	5
Density	2	3	4	4	1
Cost	2	1	3	1	2
Useability	4	3	4	3	4
Average	3	3	4	3	3

Source: Longspur Research based on Oko Institut eV

Marine Engine Technology

- ✓ Best Available Proven Technology for Ship New Build or Retrofit

Proven Operations

- ✓ Stena Germanica = World's First Methanol Commercial Ship since 2015
- ✓ As of Jan 2025, Maersk has 19 Operational Methanol-Powered Vessels
- ✓ Shipping Industry alone is expected to consume ~18 MMTPA by 2030
- ✓ As of Mar 2025, >300 Methanol Vessels Ordered by Major Shipping Companies

Toxicity of Alternative Fuels

Lethal dose to 50 percent (LC50) of a fish population

Ammonia
0.068 mg/l
ECHA, European Chemical Agency, registration dossier Ammonia

Gasoline
8.2 mg/l
Petrobras/Statoil ASA, Safety Date Sheet, ECHA registration dossier Gasoline

Methane
49.9 mg/l
ECHA, European Chemical Agency, registration dossier Methane

Diesel
65 mg/l
ECHA, European Chemical Agency, registration dossier Diesel

Heavy fuel oil
79 mg/l
GKG/ A/S Dansk Shell, Safety Data Sheet

Methanol
15,400 mg/l
ECHA, European Chemical Agency, registration dossier Methanol

Methanol is the <u>least toxic</u> alternative fuel

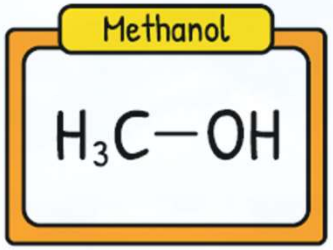
Overall Project Delivery

Husk Feedstock Supply

- Feedstock availability up to 970ktpa → possible production scale up to 450ktpa methanol
- Husk waste collected from local planters around Riau region. Incentive payments to keep the husks and avoid burning
- KVA to cover compaction and transport costs from plantations to site.

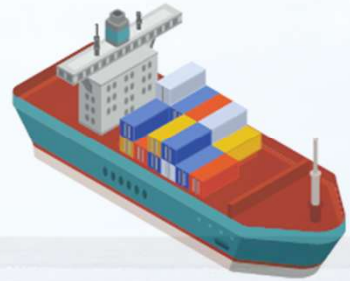
Product Sold Customers

- Start at ~100ktpa/ 300tpd biomethanol production in (and then expand in Stage 2)
- Production to be mostly sold under long term offtakes (balance for potential short term upsides)
- Focus on marine cargo sector. Discussions already held with a major shipping company in Singapore
- Later explore other potential uses - chemical input or sustainable aviation fuel (SAF)



Biomethanol Plant (the Project)

- Centrally located close to plantations and port
- (1) Gasification of husks → H2 and CO; followed by (2) synthesis → methanol
- Use proven technologies. Biomass gasification and methanol synthesis technology well established
- KVA focus is delivering commercial production from never used before coconut husks as feedstock
- Delivered under EPC turnkey or E&P + local construction contractor (lower build cost)



The Future

KVA – Coconut Husks to Biomethanol

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PT Karmic Virya Abadi

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