

Biofuels as a near-term solution for decarbonizing the Singapore Shipping Sector

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wilmar
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Wilmar – Asia's leading Agribusiness group

Global leader in cultivation, processing and merchandising of vegetable oils, oilseeds, sugar, cereals

One of the largest Oleochemical and Biofuel producers globally



Founded in 1991, HQ Singapore



SGX (F34) | STI | MSCI
Market Cap S\$28.05B



2020 FY Revenue US\$50.5B



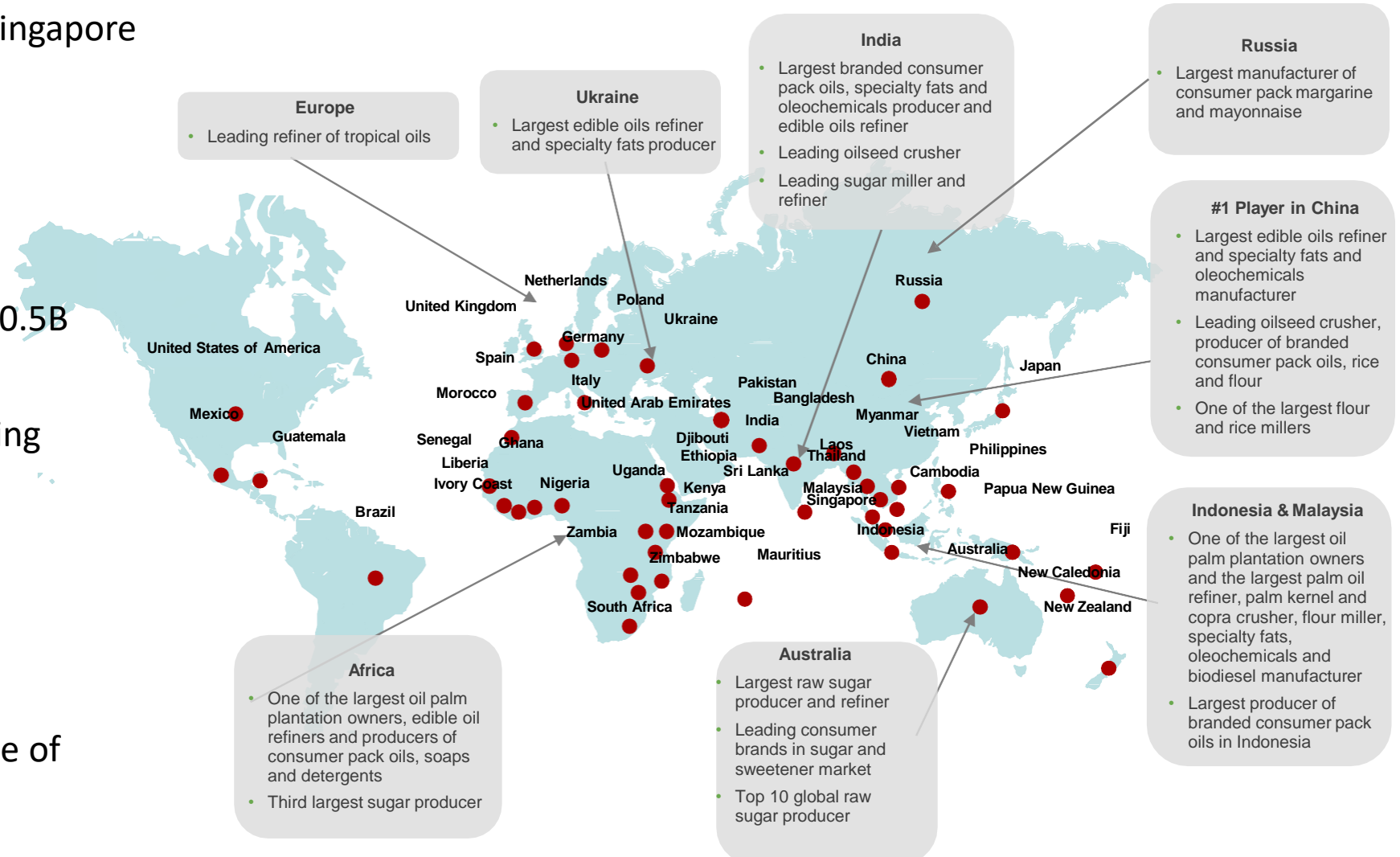
Over 1000 manufacturing plants in 33 countries*



Extensive Distribution Network in over 50 countries



Multinational workforce of 100,000 globally



* Including subsidiaries, joint ventures and associates

Wilmar's Sustainability Pledge



Supporting the United Nations Sustainable Development Goals



Responsible Business Commitments



Committed to Sectoral Roadmap for 1.5°C Pathway



Transparency & Accountability



Transforming our Supply Chain

Wilmar's Recent Sustainability Accolades



Global Biomass-based Diesel Landscape

Major Oils
& Fats

240mil MT
Production

68%

Top 3 Veg oils combined

19%

Share of Biofuels use

BBD
production
(MT)

15mil 
Fit-for-55

13% GHG reduction by 2030, sub-targets for Maritime and Aviation

9mil 
RFS

5-10% Biofuel (Ethanol & BBD) blending

 **8**mil **B30**  **6**mil **B13**

Volumetric blending for transport and industrial applications

Transport
footprint

16.2%

Contribution of Transport (2016) to Global GHG Emissions, WRI

64%

Share of Biofuels (2030) in Global Transport Sector's RE consumption, IEA

Drivers | Trends

- **Mandated vs. Discretionary blending**
- **Biofuels** largely adopted in the **Land Transport** and **Industrial Sectors** over the last decade
- **New demand sectors emerging** for Biofuels, increasing **NZE commitments**
- **EU + US mandates focused** on local veg oils. Will W&R live up to the hype? trade global or local?
- **ICAO CORSIA** focused on W&R
- **Sustainable supply of W&R key** to commercialisation of new technologies
- **Crop-based biofuels** likely to continue playing a **bridging role** over the coming decade and beyond
- **Regulatory frameworks pivotal** to aid with the Energy Transition
- **Transitional period for Bio-feedstocks** as electrification and new technologies get underway

The regional opportunity for Singapore's Maritime Industry

Maritime emissions

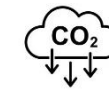
18% of air pollutants

2.5% of global GHG



IMO 2020

Sulphur content 0.5%



40% reduction by 2030



Active role in the region's energy transition dialogue & strategy



Lead the industry transformation as a global bunkering hub



Abundant bio-feedstocks (crop-based & W/R) in the region for near-to-long term decarbonization



BBD supply available in the region | "drop-in" characteristics | GHG savings potential

Some facts about the bio-feedstock in our neighbourhood..

Oil Palm a **highly efficient & versatile** crop

33% of global veg oils share

88% of Palm Production in SEA

23% of global Palm use in BBD

Untapped Biomass and Waste Oils

Sustainability Achievements

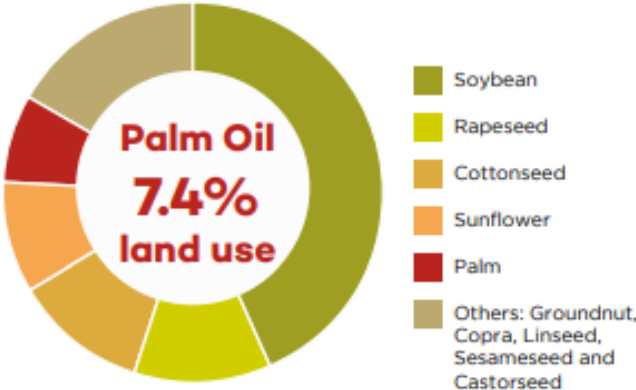
Deforestation rates decreased considerably and levelled off

Active supply chain monitoring & traceability

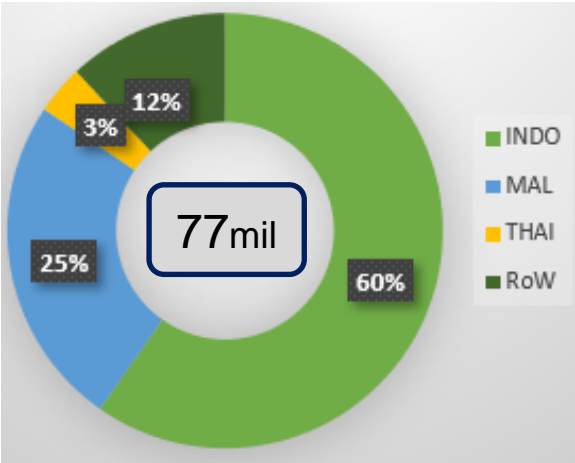
-50% of global palm certified sustainable

-74% Indo/Mal refineries committed to NDPE

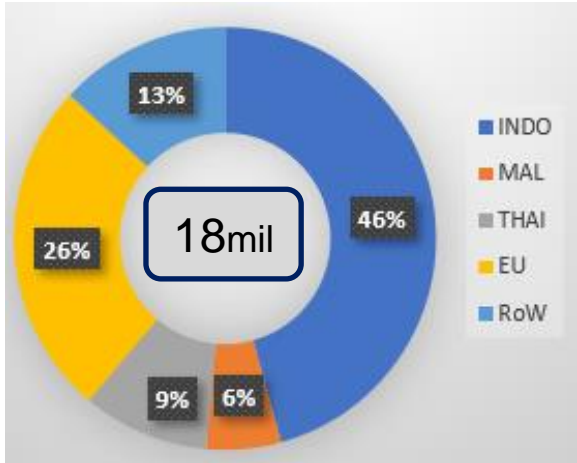
Major oilseeds: Area in 2018
(Total is 288.7 million hectares) (Oil World 2019)



Global Palm Production (MT)



Palm use in BBD Production (MT)



Learnings from B30 implementation by the Shipping Sector in Indonesia

- B10 -> B20 -> B30 successfully implemented over 2017-2021. Biofuel = FAME (Palm)
- Infrastructure for re-fuelling of B30, by and large, similar to B0
- Characteristics of FAME to be factored in the handling and blending operations
- Solvency, Hygroscopic, Density, CFPP, Energy Content and Biodegradability
- Elastomers like Teflon, Polyurethane and metals like CS, SS, Al recommended to handle B30
- Storage recommendation up to 2 months on-board with regular runs, up to 3 months on-shore with N2 blanketing
- Handling book published by EBTKE compiling inputs from all relevant stakeholder

Key Takeaways

- 1** **IMO commitment** to emission reductions **ambitious**. Stakeholders need to **take the first step**
- 2** Traditional Biofuels offer a **cost-effective solution** here and now
- 3** Yes, decarbonization solutions are more **costly** today. What about the cost of carbon emissions?
- 4** Expect **competition** for Biofuels over this decade, embrace the transition challenge
- 5** Singapore's opportunity to collaborate on a **suite of decarbonization solutions**
- 6** Electrification, Bio-A, Bio-M² & Bio-H – all **exciting prospects** for long-term decarbonization



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