



ICAO INTERNATIONAL AVIATION AND ENVIRONMENT SEMINAR

Kuala Lumpur, Malaysia

29th October 2014

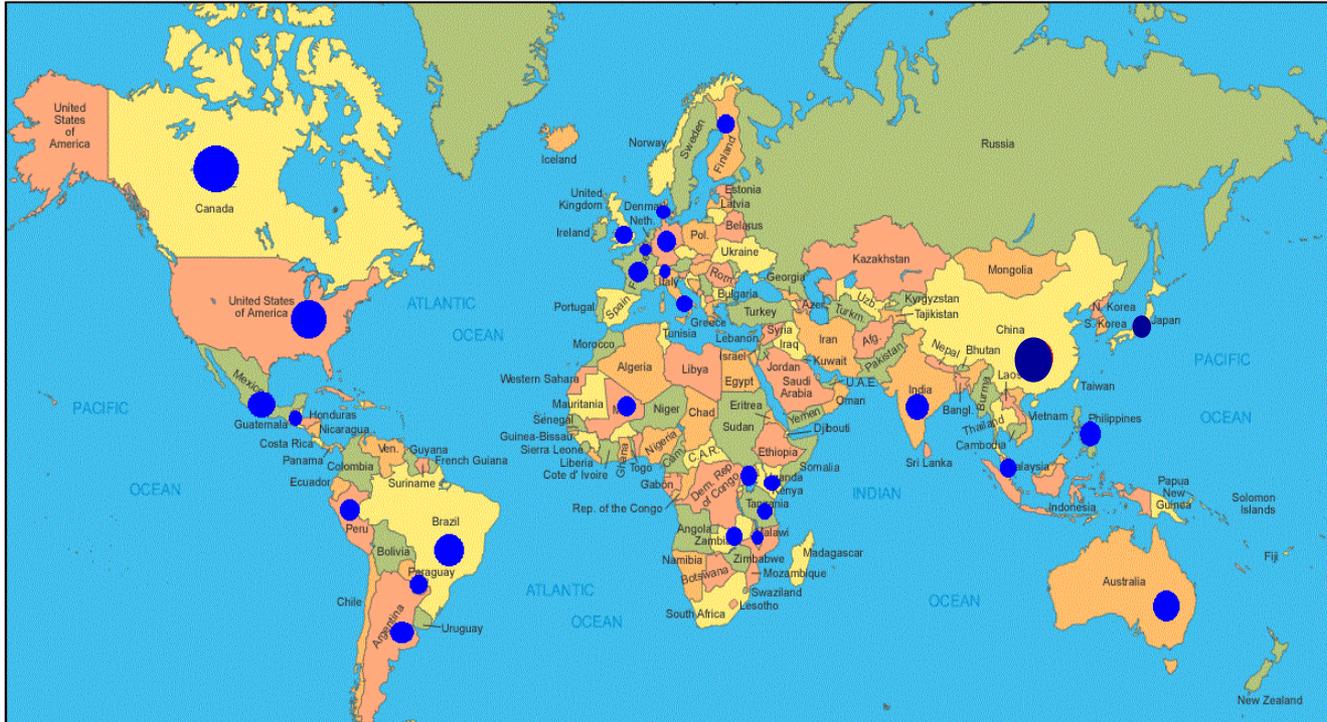
Sustainable Aviation Biofuels And the RSB



Khoo Hock Aun
Vice-Chair of the RSB Board of Directors
Managing Director, Cosmo Biofuels Group

COSMO BIOFUELS GROUP

120+ organizations from 30 countries
including 30 NGOs

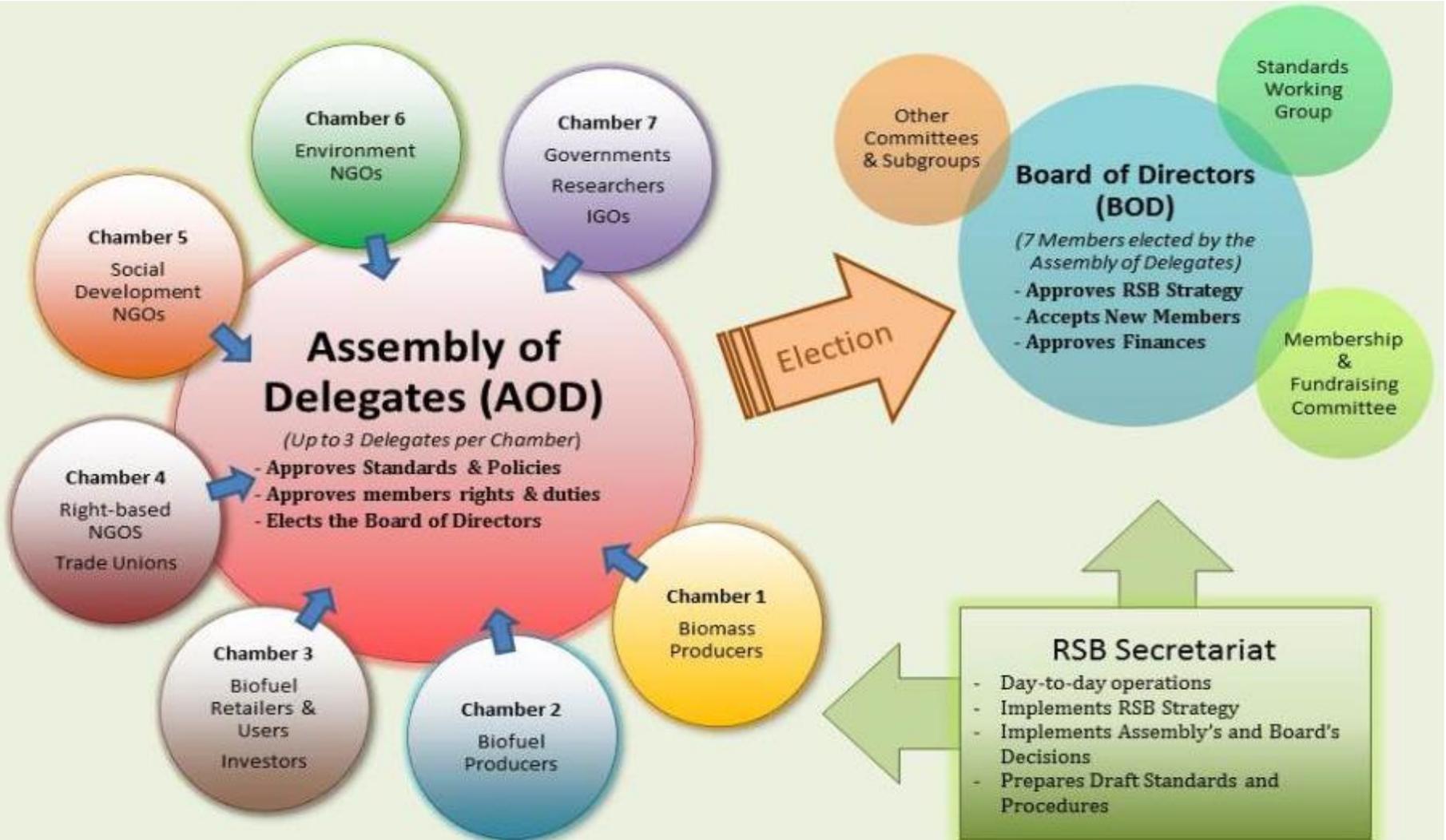


RSB Vision and Mission

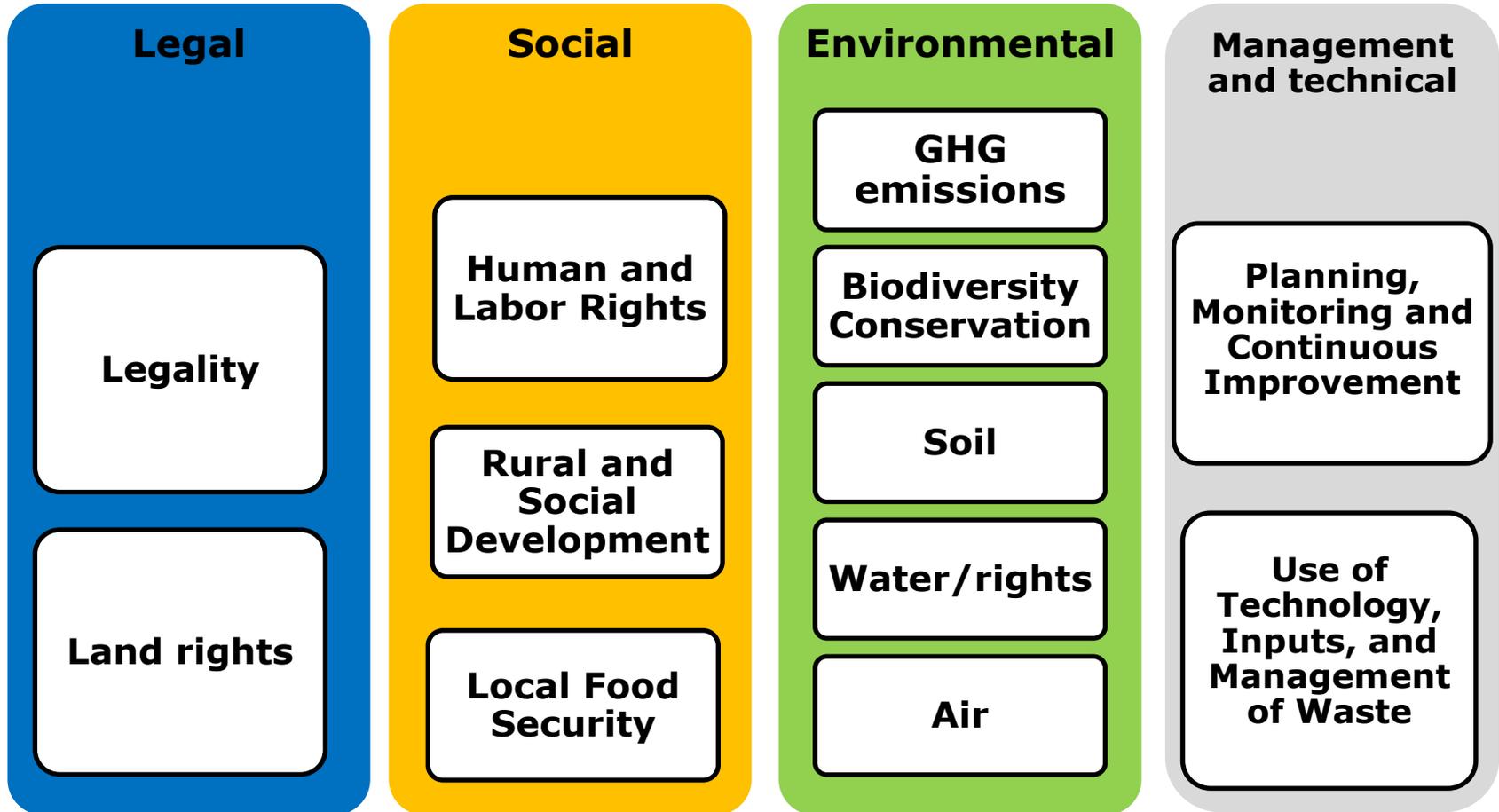
Our vision is the global sustainable production, conversion, and use of biomass.

Our mission is to:

1. Provide and promote the global standard.
2. Provide a global platform for multi-stakeholder dialogue.
3. Ensure that users and producers have access to credible, practical and affordable certification.
4. Support continuous improvement through application of the standard.



RSB Principles & Criteria



Standard for Agricultural and other Residues

Specific standard on residues and byproducts

- Including bagasse, stalks/leaves, stover, used cooking oil
- Municipal solid waste, forestry operations

Upstream verification for agricultural residues

- Ensure enough residues to maintain soil organic matter
- GHG emissions limited to transport and conversion to fuel
- Direct land-use change

Roundtable on Sustainable Biomaterials

- Standard Development
- Promotion
- Policy
- Projects



Accreditation Body

Accreditation Services International



Certification Body



Certification Body



Participating
Operators

Chain of custody



New Scope – Bioenergy & Biomaterials

- **Bio-chemicals**
- **Bioenergy**
- **Bio-plastics & Biopackaging**
- **Fiber & Lubricants**
- **Food additives**
- ...



Companies RSB Works With (RSB Members or Certified Companies)

Feedstock companies developing novel biomass sources

Carinata & Camelina



Jatropha



Algae



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Novel industrial biotech companies targeting biochemicals



Farnesene



Ethanol & 2,3-butanediol



Butanol



Tailored Oils

RSB is a B2B certification program that works with all steps in the supply chain to ensure sustainable feedstocks for the developing biochemical industry.

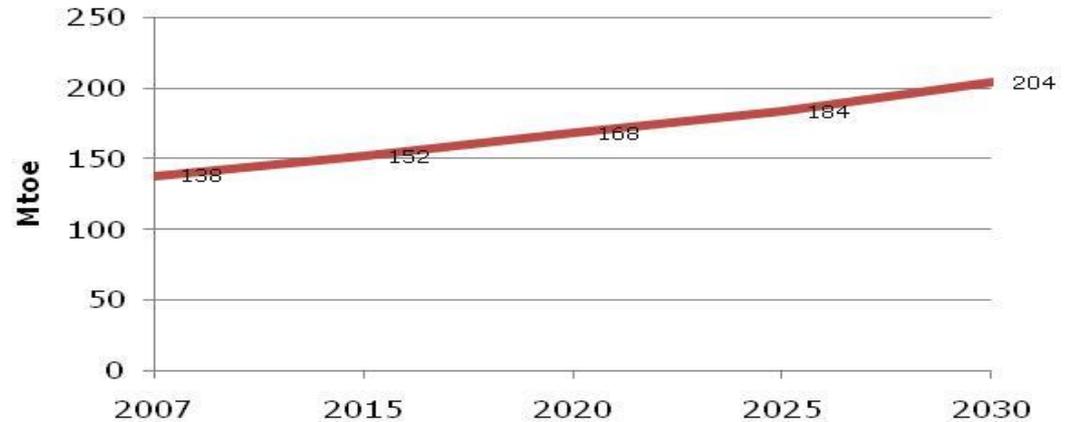
Diversity of feedstocks

- Algae in the US and Asia
- Sugar cane in Peru, Sierra Leone, Brazil
- Wheat residues in Australia
- Jatropha oil in Mexico and Asia
- Used cooking oil and animal fats in the US, Europe, Canada, China, South Korea
- Camelina in Spain
- Coppice trees – Poplar, US; Gliricidia, Sri Lanka
- Macaúba oil, tobacco, Moringa tree – suited for smallholders



- **Aviation industry seeks early adoption biofuel**
- **10% replacement by 2030 requires 20.4 Mtoe biofuels.**

Aviation bunker projections IEA



- **Aviation industry requires truly sustainable biofuels;**
- **Regulations are fierce;**
- **Prefer 2nd generation sources such as jatropha, algae and camelina**
- **Second generation processes biomass conversion into biofuel**

Commitment to RSB certification

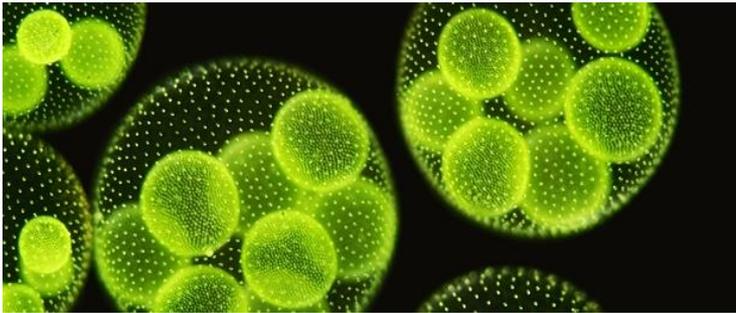


Sustainable Aviation Fuel
Users Group

Members: GOL, TAM, Avianca, United, Air France, KLM, Lufthansa, British Airways, Air China, AeroMexico, Air New Zealand, Cathay Pacific, Gulf Air, JAL, Qatar, SAS, Singapore Airlines, etc – **32 % of jet fuel demand**

Associated: Boeing, Embraer, Airbus, among others

<http://www.safug.org/safug-pledge/>



Aviation Pushing Ahead with Biojet Fuel



- ASTM Approvals – “**Drop In**”
- Fischer Tropsch (IPK) in 2009
- Hydro-processed esters and fatty acids (HEFA) July 2011 (Camelina, Jatropha, animal fat, algae oils)
- Farnesane June 2014; plans are for up to 10% blend. (Amyris plant in Brazil – capacity 50 M liters/year)
- Brazil’s ANP is close to approving Farnesane.
- Other technologies on the way.

Aviation Pushing Ahead with Biojet Fuel



- Pushing for “biofuels done right”
- Avoiding expansion of cropland
- Promoting: land restoration (cattle pastures); inter-cropping and fallow crops; use of residues & municipal wastes
- Food AND Fuel – innovations in combining fish production with fuel
- Support Smallholders
- Solve More Than One Problem at a Time

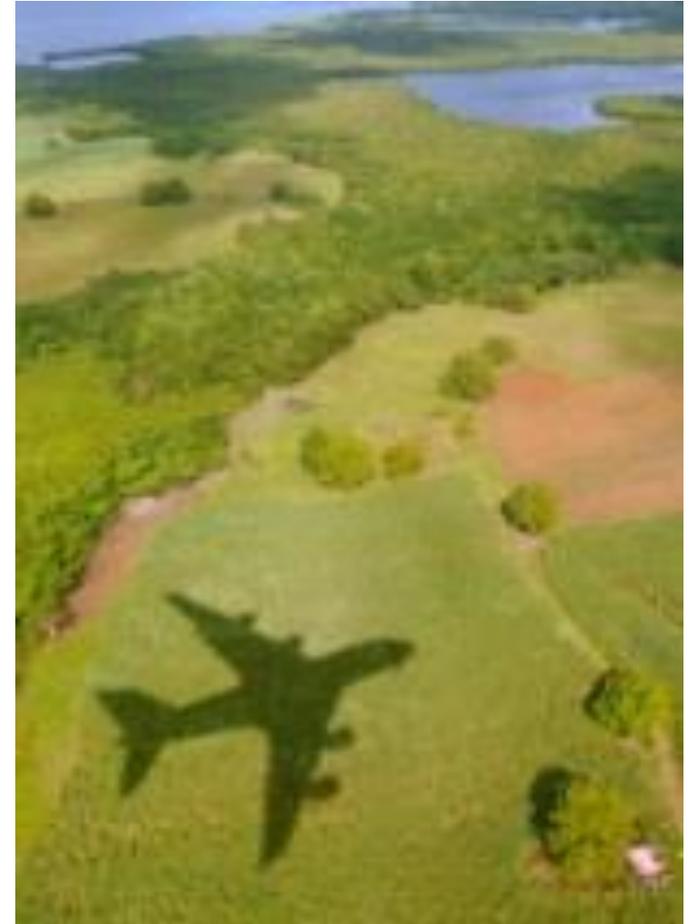
Aviation and Feedstock Production Projects

- Macaúba palm oil -
Montes Claros region, Minas Gerais
- Collaboration with Federal University of Minas Gerais
- South Africa – energy tobacco,
Limpopo Region
South African Airways, Solaris,
SunChem, SkyNRG
- Sri Lanka - Gliricidia
- Malaysia – Algae
International Berhad/Cosmo
Biofuels Group



Aviation Industry Works with RSB

- Global best practice – available around the world, for multiple feedstocks
- Independent 3rd Party Audits provide assurance of meeting standards – such as food security, biodiversity, land and water rights
- Promotion of Smallholder production
- RSB is leading a process of benchmarking with other credible standards



Thank you!

For More Information



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