



# WHERE ARE WE WITH BIOFUELS?

MONTRÉAL, OCTOBER 2011

# Just the facts

## 2% of emissions

Last year, aviation emitted 649 million tonnes of CO<sub>2</sub> from a global total of 34 billion tonnes.

## Around 10% of fuel

Total transport fuel use in 2008 was over 2 billion tonnes. Of that, commercial aviation used 215 million tonnes of Jet A-1.

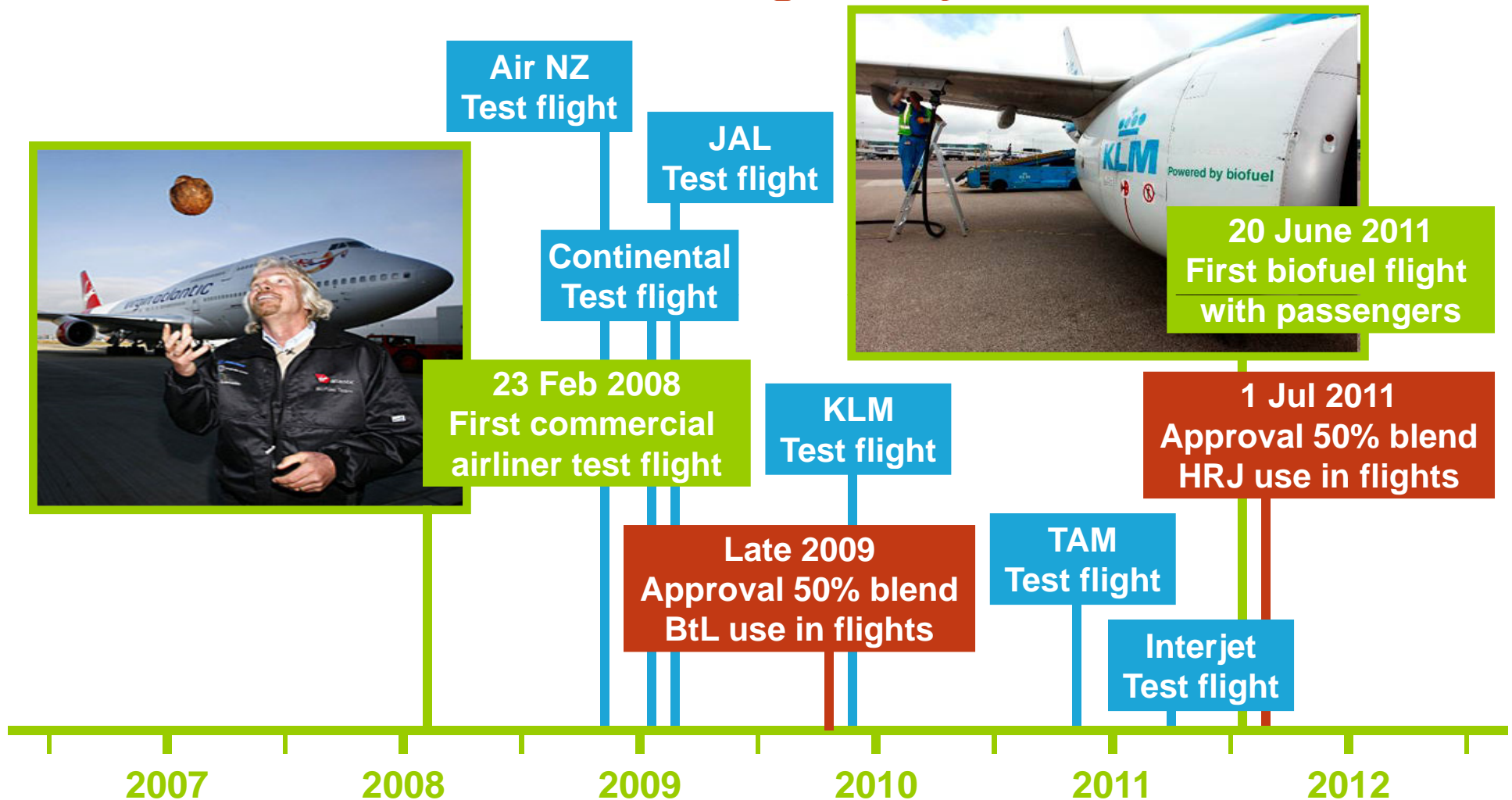
## Largest operating cost

Last year, airlines spent \$140 billion on jet fuel, or 30% of operating costs. In 2003, it was 14%.

## Distribution points

There are 161,768 gas stations in the USA alone, but only 1,679 airports control 95% of the world's passengers.

# We've come a long way...



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Passenger flights are taking place



**Lufthansa**

***FINNAIR***

**\* interjet**



**AEROMEXICO®**



**Thomson**  
Airways

***IBERIA***

**AIRFRANCE**

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# Next steps

- Continued technology development
  - Feedstocks (*crop-based, waste-based and algae*)
  - Processes (*e.g. alcohol-to-jet and pyrolysis*)
- Commercialisation
  - Bringing biojet closer to price parity with conventional Jet A-1
- Sustainability
  - Ensuring our supply of biofuel is truly sustainable



# Global efforts

Solena project / SAS

SeaGreen @ Cranfield University

Solena project / British Airways

Flightpath for biofuels

Aireg / German PureSky

Spanish Camelina value chain

Algae production trial @ MAD

Romania camelina value chain

Policy projects / Research  
projects / Biofuels production /  
Value chain and production



# Global efforts

Detroit Airport biofuel production

Sustainable Aviation Fuels  
Northwest

Solena project with 10 US airlines

Farm to Fly

Plan de Vuelo in Mexico

Jatropha value chain project

ABRABA in Brazil

# Global efforts

LanzaTech and Virgin Atlantic

Sustainable bioenergy research  
centre

Qatar Advanced Biofuel Platform

Chinese sustainable aviation  
study with PetroChina

Joint Laboratory for Sustainable  
Aviation Biofuels



# Global efforts

Virgin Blue initiative to develop  
biofuel from native eucalyptus

Sustainable Aviation Fuels  
Roadmap (Aust. and NZ)

Solena and Qantas BtL plant

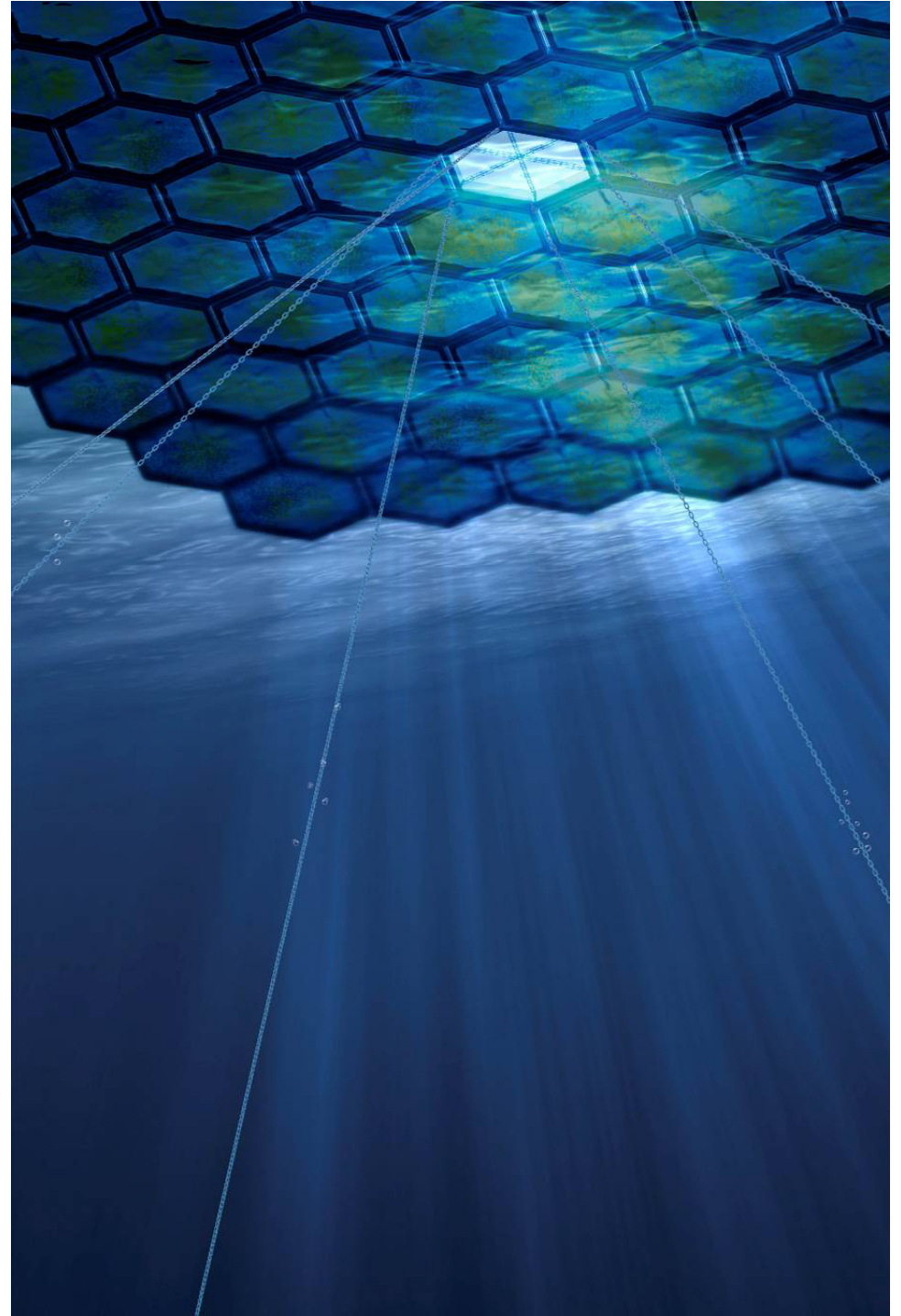
# Camelina

- High-yield oil plant
- Can be grown in rotation with wheat / corn crops
- Replaces nutrients and increases yields for food crops
- Sustainable Aviation Fuels Northwest project working on camelina among other feedstocks



# SeaGreen

- Cranfield University research programme to produce algae using sea water
- Supported by British Airways, Rolls-Royce and Airbus
- Algae potentially very important part of biofuel mix, requires more research





# Solena

- Solena process = municipal waste converted to jet fuel
- British Airways, SAS, Qantas, Alitalia and 10 US Airlines
- 500,000 tonnes of waste into 16 million gallons of jet fuel in each plant
- First plant ready in 2014



# LanzaTech

- Turns CO emissions from industrial processes into jet fuel via alcohol-to-jet process
- Signed first agreement with Virgin Atlantic, assisted by Boeing
- Certification and first flights in the next 2-3 years







# Initiatives Alternative-fuels

## Key contributors:

IATA 2010 Report on Alternative Fuels  
Effective December 2010



5<sup>th</sup> Edition

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## IATA Guidance Material for Aviation Biofuel Management

Effective xxxx 2011

1<sup>st</sup> Edition

# Initiatives Alternative-fuels



SkyNRG  
Sky Energy | The Fuel Future



Air Transport Association

BRITISH AIRWAYS

TAM



Lufthansa

Delta

Virgin  
atlantic

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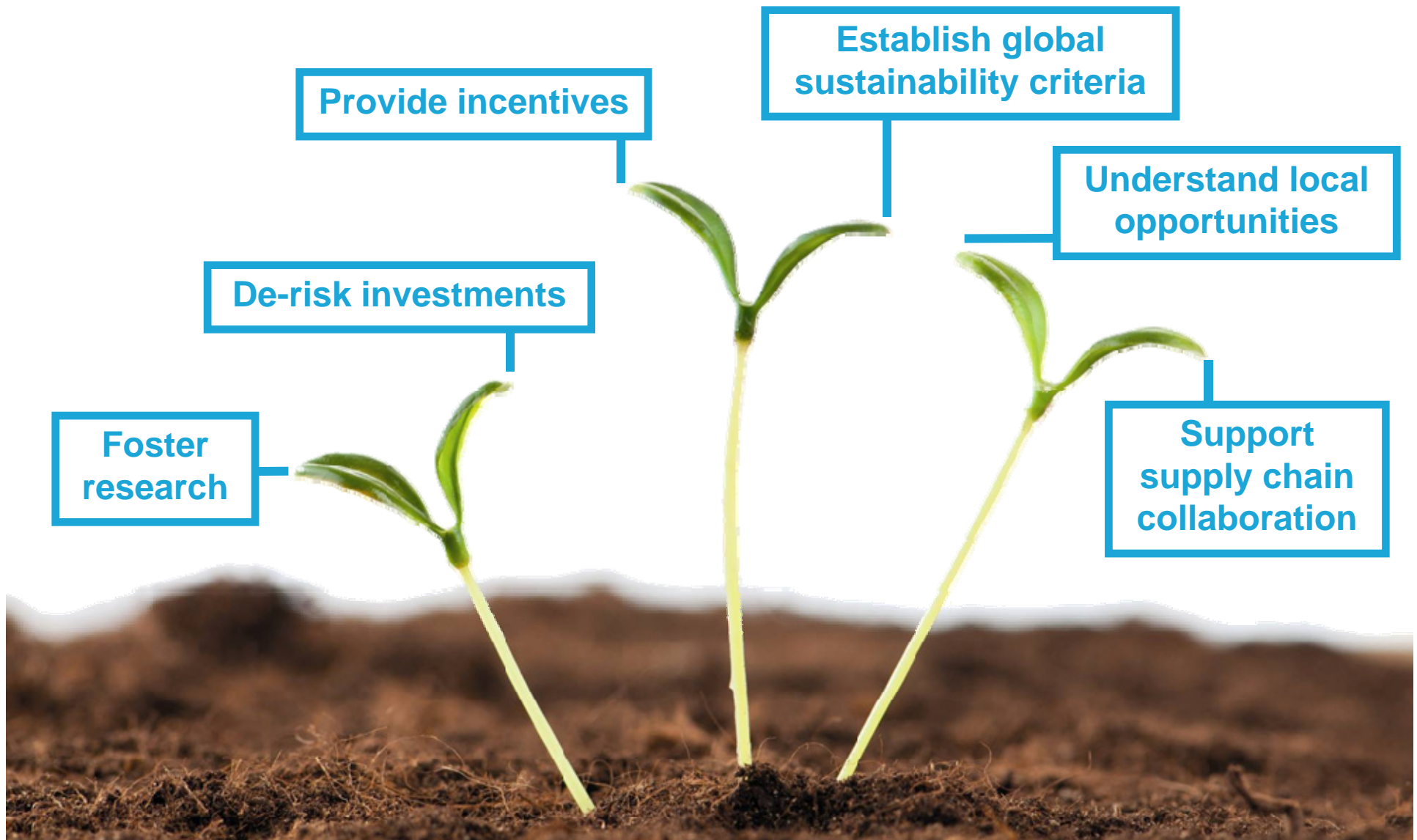
# Global efforts

## Sustainable Aviation Fuels User Group (SAFUG)



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# Governments need to help:



## Quick win

- Aviation is the perfect opportunity to partially de-carbonise a sector:
  - Fuel is already highly-controlled
  - Limited distribution system (1,700 airports = 95% of traffic)
  - Drop-in fuels mean no change in equipment
  - Strong customer demand to shift to low-carbon fuels
  - High-profile





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