Presented by

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Airbus Alternative Fuels

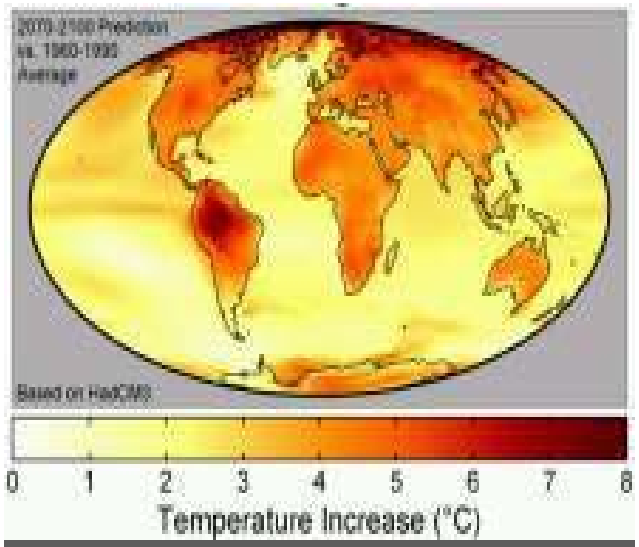
European Bio-fuels Technology Platform

3rd Stakeholder Plenary Meeting

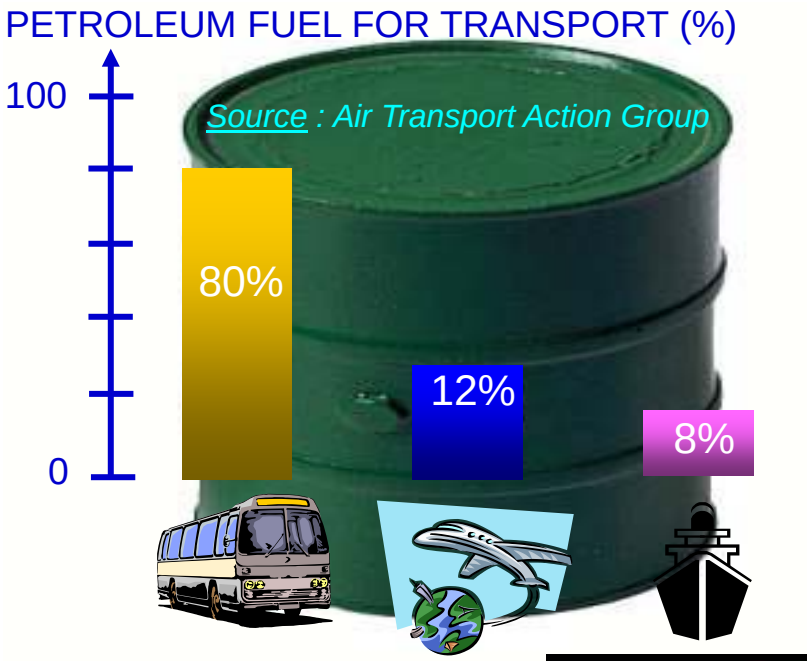
April 14th, 2010

AIRBUS

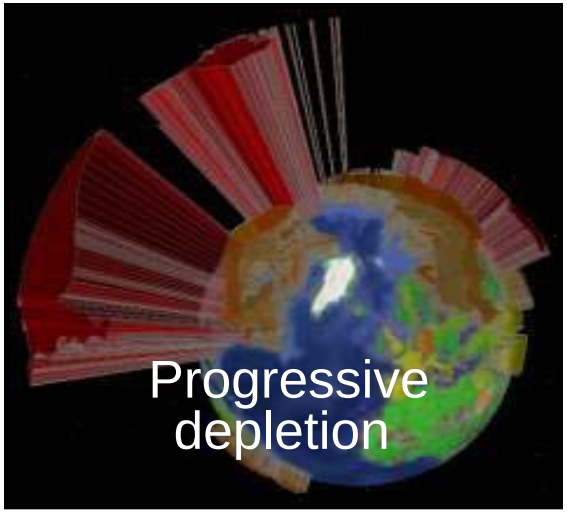
Background
Aviation and fossile fuels



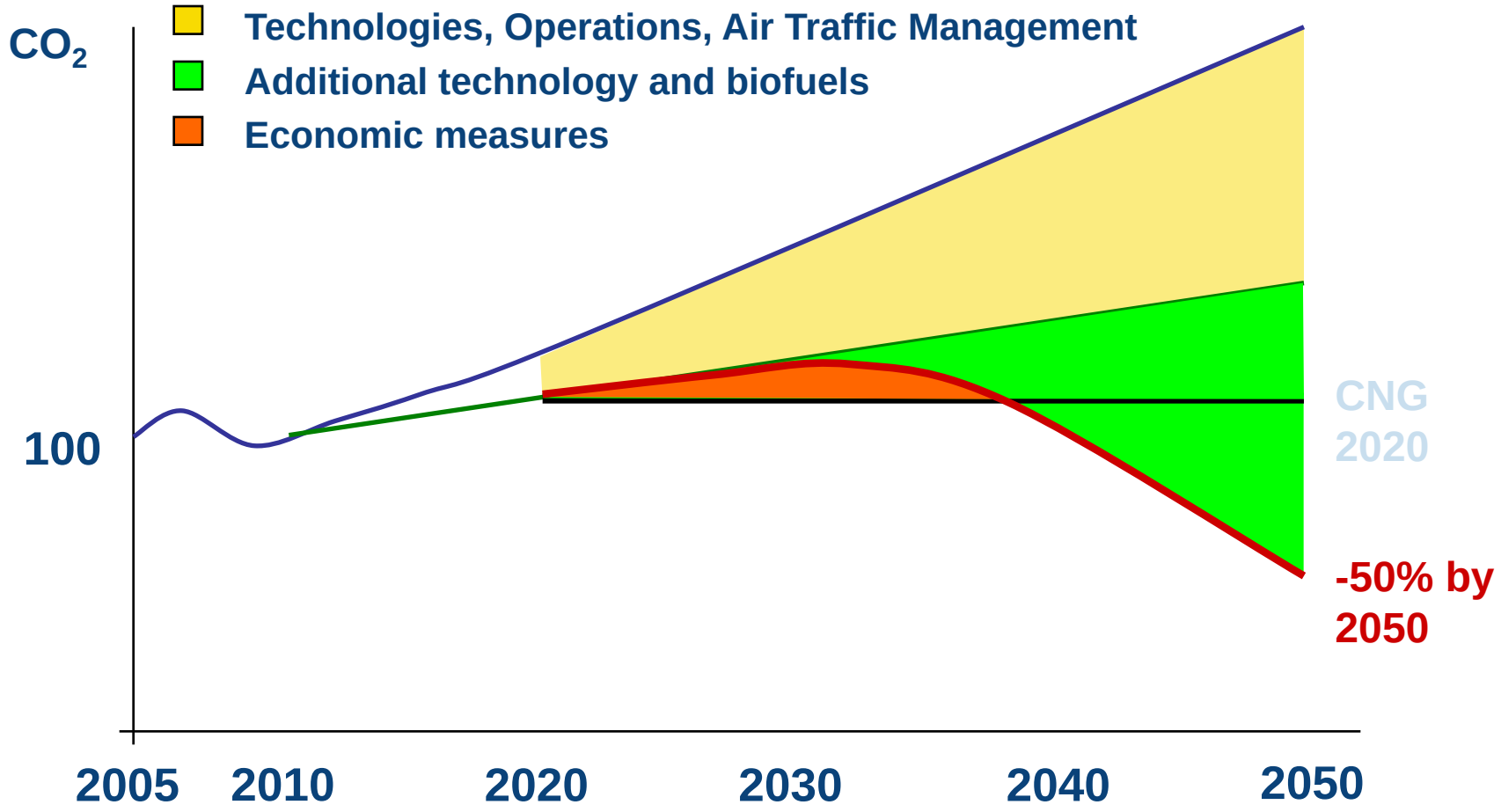
Impact on climate change



* ~40% airlines operating costs in 2008



Background
What aviation is proposing



Background
*Targets for 2020 ACARE**

* Advisory Council for Aeronautics Research in Europe

The ACARE targets represent a doubling of the historical rate of improvement…

-80%
NOX Emission

-50%
CO2 Emission

-50%
Perceived Noise

"We want to make our aircraft even more efficient,cleaner and quieter." **Thomas Enders** President and CEO Airbus

Background

Alternative fuels: short/Medium term requirement

Any alternative should be fungible ("drop-in")

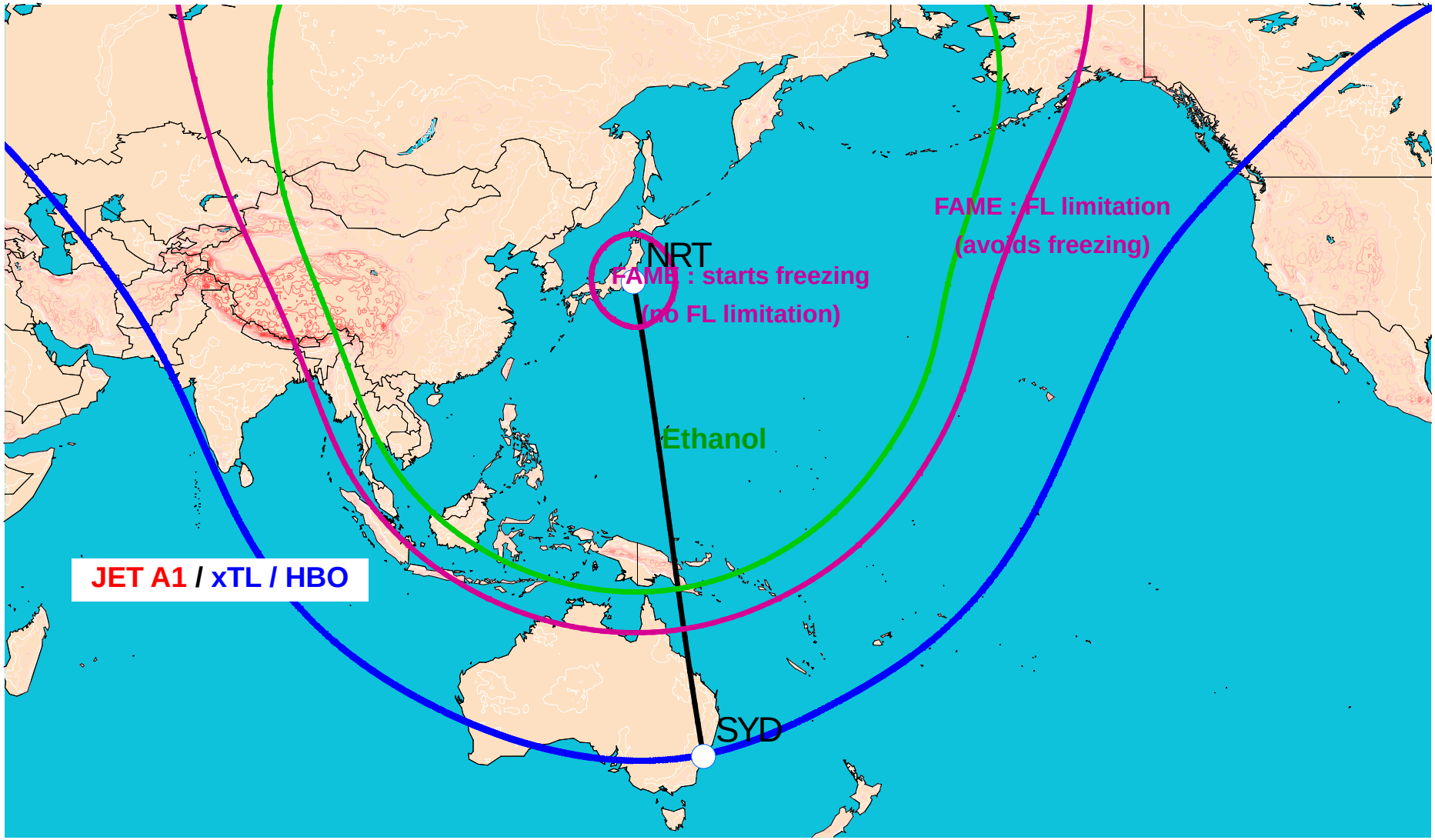
Where we are
What are the options?

CATEGORY \ TYPE	Conventional ("Kerosene")	Alcohols	Bio Esters	Synthetic Fuels xTL	Hydrogenated Biomass HBO	Cryogenic Fuels
Non-Renewable (Fossil)	✓ Jet Fuel	BIO-JET FUELS		CTL, GTL — Exist		Liquefied Natural Gas ✗
Renewable		Ethanol … 35% lower energy content ✗	Fame 10% lower energy content, -5°C Freeze point… ✗	Approved: BTL ✓	Future: Hydrogenated Vegetable Oils ✓	Liquid Hydrogen ✗ Low energy content per unit volume, Availability, Infrastructure

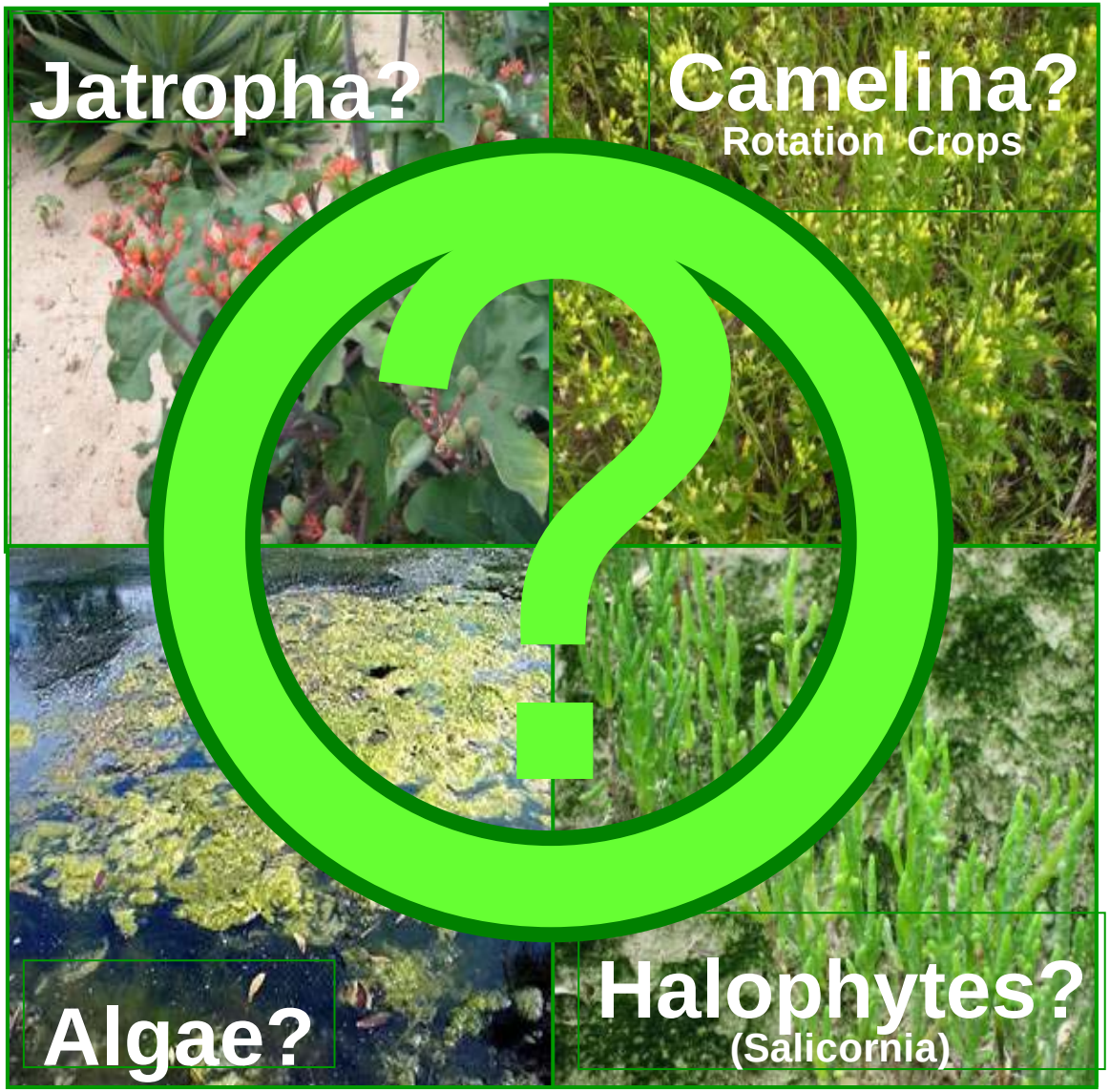
* *FAME =Fatty Acid Methyl Esters*

CTL, GTL & BTL = Coal, Gas or Biomass to Liquid

Where we are
Fuel type impact



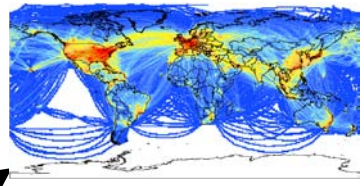
Where we are
Feedstocks



Not all Bio-fuels are Green!

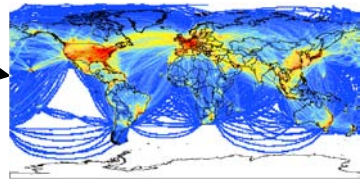
Where we are
Fuel Readiness Levels (Best Practice ICAO 2009)

FRL	Description	Exit Criteria
1	Basic Principles	Feedstock / Process Observed / Reported
2	Concept Formulated	Feedstock / *Complete* Process identified.
3	Proof of Concept	Basic Fuel Properties Validated at Lab Scale
4.1 4.2	Preliminary Technical Evaluation	System Perf. & Integration Studies Entry Criteria/Specification Properties
5	Process Validation	Scaling from Laboratory to Pilot plant
6	Full-Scale Technical Evaluation	Fuel Properties, Rig and Engine Testing
7	Fuel Approval	Fuel Class/Type Listed in Int'l Fuel Standards
8	Commercialization	Commercial Purchase Agreements
9	Production Capability Established	Full Scale Plant Operational



Energy Balance

Particulates Measurements



Facility Specific Green House Gas Assessment*

Legend:	R & D	Certification Qualification	Business & Economics

Where we are

Messages, Issues ... and Expectations

Alternative Fuels work!

Commercialisation 7 – 10 years away too slow

Aviation has limited solutions

Missing common sustainability analysis. Why invest?

Other industries have alternatives

30% Aviation Biofuels by 2030?

And what's next?

Time for action not talk

- (Some) R&T already delivered, let's deploy and implement
  - Clarified sustainability criteria – not only European RED
  - Lifecycle analysis
- More R&T needed on e.g. algae
  - Also building on early industrial experience
- Government support through policy and incentives
  - Prioritisation of Energy types for different transport modes
  - Tax incentives / carbon credits

And what's next?

Investors to invest…

- Cross industry approach
  - Aircraft / Engine Manufacturers to provide technical support for qualification
  - Airlines (ready ?) to commit to quantities
- Investors needed!
  - Growing local economies in various world locations
  - JVs with airlines groupings?
  - Focus on Aviation!
- Price, price, price…

Conclusion
Partnership to support (Aviation) bio-fuels

- Airbus will continue to develop both R&T and industrialization focused projects
- Airbus will continue to look for collaboration projects with (Aviation) counterparts
  - EBTP as a very helpful pillar

- Projects with:
  - ✓ New sustainable feedstocks / processes
  - ✓ Complete Bio-fuels development process from feedstock selection to test-flying
  - ✓ Fuel approval projects
  - ✓ Regular revenue flights using Bio-fuels
  - ✓ Higher proportion blends

THANK YOU!

Air transport is essential

Flying is a wonderful thing

Tremendous progress in efficiency over the years

Being eco-efficient makes good business sense

We are committed to **eco-efficient** growth…

… more value with less environmental impact

This is only the (bio-fuel) beginning!

AIRBUS

AN EADS COMPANY