

Role of biofuels in aviation climate change mitigation

ICAO Biofuels Side Event Bonn 03 June 2009

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Bill Hemmings
Transport and Environment
ICSA observer to CAEP

Sustainability is the Issue

- ICSA participates in the project
- Key issue for NGOs: a sustainable biofuel
- With much lower emissions than jet fuel
- European Joint Research Centre (2008)
 - Almost every other technology to reduce GHG emissions is cheaper than producing biofuels
- Most critical factor for GHG impacts is how direct & indirect land use changes affect carbon stocks

Rush to develop biofuels has played a 'significant' role in the dramatic rise in global food prices leaving 100 million more people without enough to eat

Gallagher Report, UK, June 2008

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'The much acclaimed GHG reduction benefits of biofuels are in most cases either marginal or non-existent'



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Warning Biofuels – handle with great care!

A joint NGO briefing by five Brussels-based NGOs on the implementation of the new EU Renewable Energy Directive

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Based on Analysis by the European Environmental Bureau and Transport & Environment

Published by BirdLife International, the European Environmental Bureau (EEB), Forests and the European Union Resource Network (FERN), Friends of the Earth Europe (FoEE), and the European Federation for Transport and Environment (T&E)

May 2009

EU Renewable Energy Directive 2008

- After 2017 min biofuel GHG savings 50-60%
- ‘No go’ areas: include bio-diversity rich lands
- High carbon stock areas: forests, peatlands
- ‘socially sound’ production standards
- EU - global aviation sustainability standards
- In 2010, indirect land use change addressed



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Indirect Land use Change - ILUC

- Food crops/land displaced for biofuels
- EU will decide how to factor in by 2010
- California has calculated ILUC for
 - Ethanol at 30g CO₂/MJ
 - Corn sugar cane 46gCO₂/MJ
 - Base: scientific assessment & public scrutiny
- No free carbon lunch



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If crops for biofuels weren't grown, don't assume there wouldn't have been alternative vegetation cover that would *also* sequester carbon

Annex II: Understanding the role of land use in GHG emissions from biofuels (Searchinger 2008)

UNDERSTANDING THE ROLE OF LAND IN COMPARING GREENHOUSE GAS EMISSIONS FROM BIOFUELS AND CONVENTIONAL FUELS

Why calculating land use change just means accounting for the costs of using land as well as the benefits

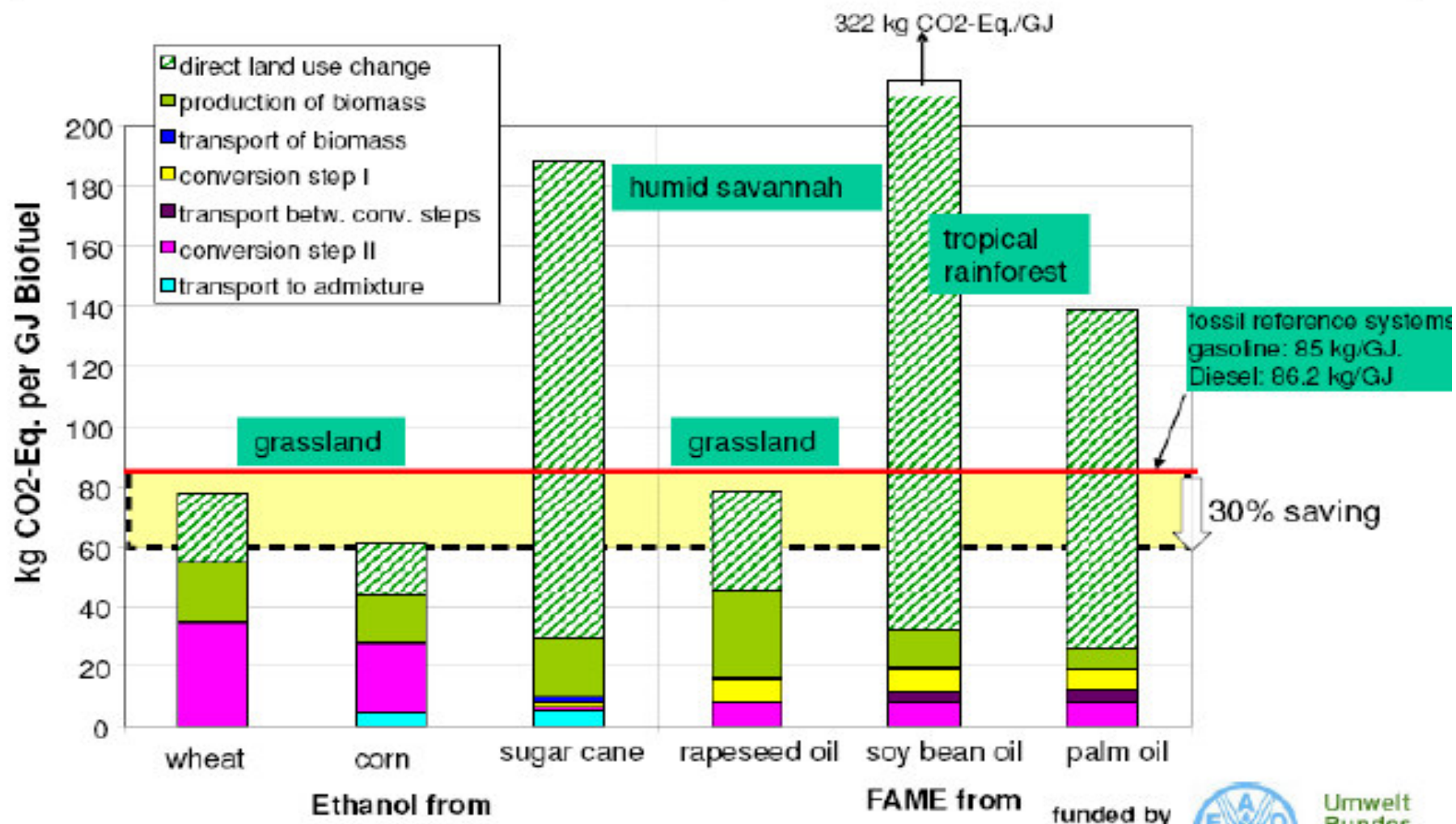
GREET and UK Default Values CO2 Emissions for Various fuels, grams (CO2 equivalent) per mega joule of energy in fuel								
	1	2	3	4	5	6	7	8
	Production Emissions	Refining and Retail Transport	Combustion	<i>Land Use Benefit</i> carbon removed from air by plants used for biofuels	<i>Land Use Cost</i> emissions from cropland expansion to replace crops on land diverted to biofuels (as estimated by Searchinger/Heimlich)	Total without any land use effects (rows 1+2+3)	Total counting land use benefit only (rows 1+2+3+4)	Total counting land use benefit and cost (rows 1+2+3+4+5)
GREET								
Gasoline	4	15	72	0	0	91	91	91
Corn Ethanol	24	40	71	-62	104	135 (+48%)	73 (-20%)	177 (+93%)
Biomass Ethanol	10	9	71	-62	111	90 (-1%)	28 (-70%)	138 (+51%)
Diesel	5	11	68	0	0	84	84	84
Soy Biodiesel	23	23	69	-76	110-180	115 (+37%)	39 (-57%)	+149 to +219
UK Default Values –Diesel*	3	14	69			86	86	86
UK Default Palm to Biodiesel	8-9	35-36	69	-69	?	112-114 (+30% to +33%)	43-45 (-50% to -48%)	?
UK Default Rape biodiesel for UK	52	0	69	-69	?	121 (+41%)	52 (-40%)	?

Percentages are for biofuel compared to gasoline or diesel.

Annex IV: Emissions due to direct land use change

Fritsche, 2008

GHG Balance incl. direct LUC



Umwelt
Bundes
Amt
for more on this

The Bunker Emission Problem

- Aviation 2005 non-cirrus RF 3.5% total RF
- Total aviation 2005 RF 4.9% total RF
- Aviation Total 2005 CO₂ 733 tonnes

International Shipping CO₂ emissions

If left unmitigated;

- 2007 870m tonnes = 2.7% of global
- 2020 1250m tonnes = 6% of global
- 2050 12-18% of 2°C carbon budget

Where will aviation emissions be in 2050?

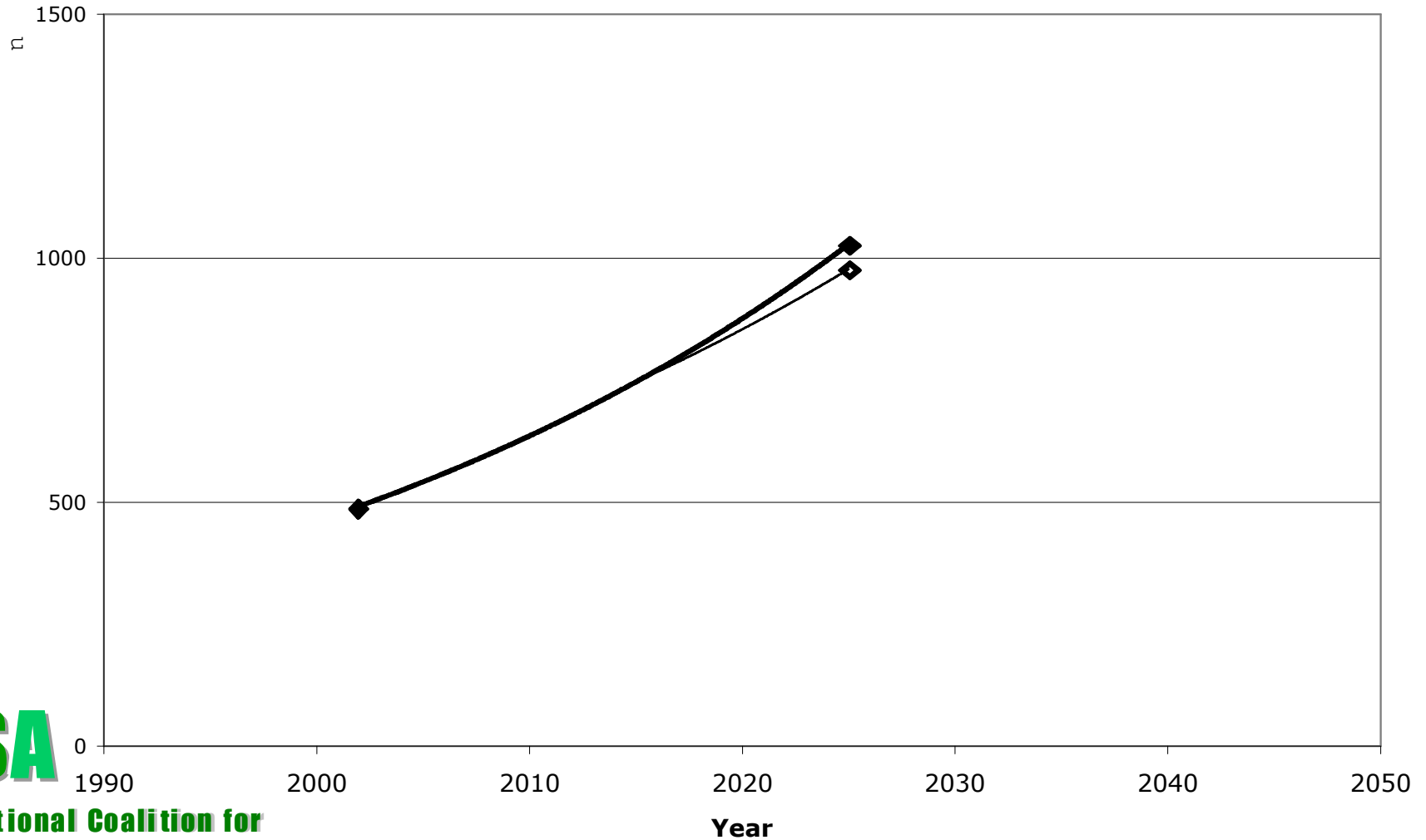
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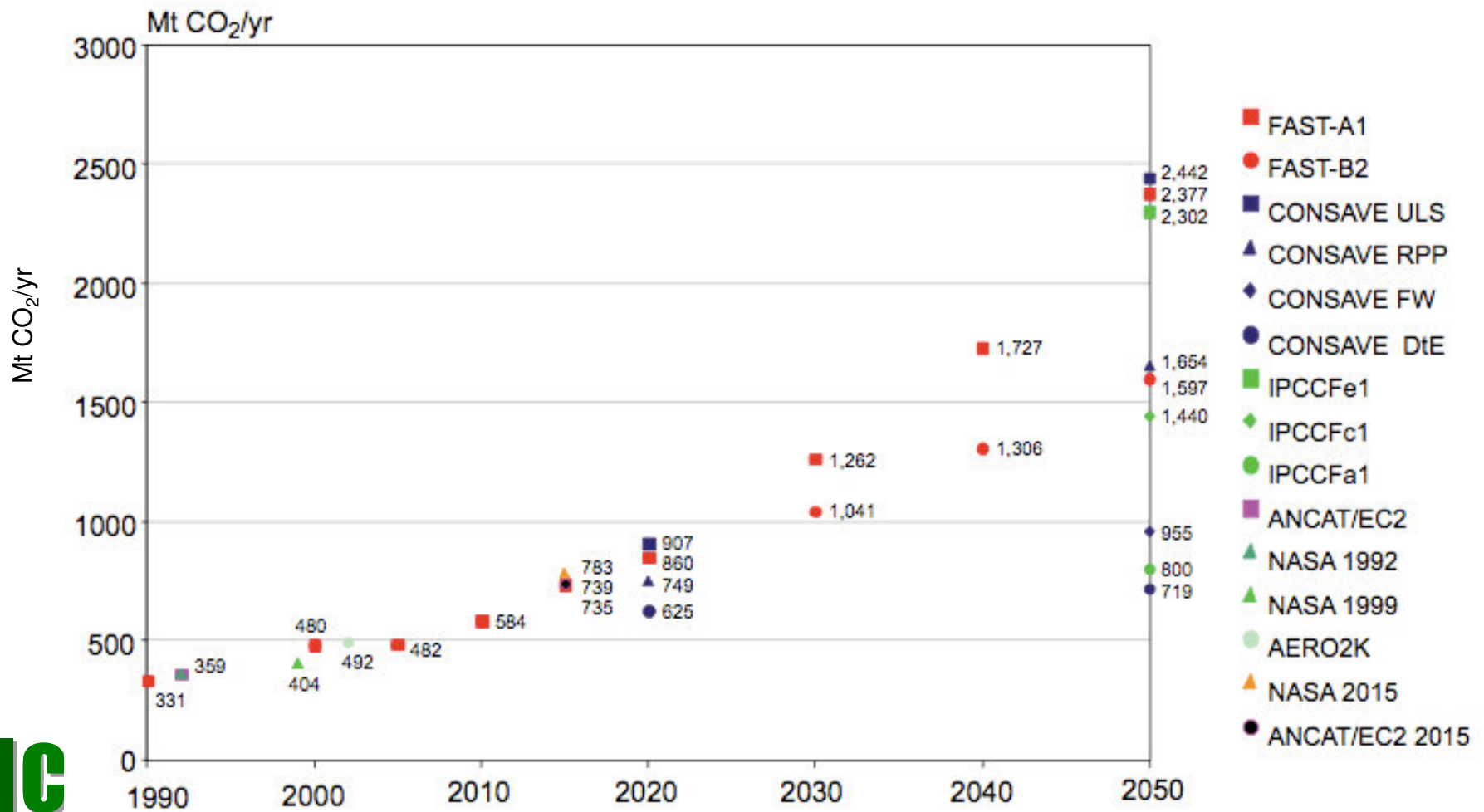
Mitigation solutions are urgent for aviation

Medium term biofuel emissions reductions?

Emissions reduction due to fleetwide 10% use of alternative fuels with half the lifecycle CO₂ emissions of petroleum jet fuel in 2025



Projected two to fivefold increase in aviation CO₂ emissions by 2050



Five questions for ICAO in 2009

1. How to reconcile aviation's climate impact with need for 80% GHG emissions cuts by 2050?
2. Role of biofuels in reducing emissions? When? Accelerate R&D, testing
3. **BUT** sustainability criterion paramount
4. **AND**, in meantime, aviation emissions must be included in the global carbon budget **now**
5. Its **not** a question of efficiency gains
6. Either aviation cuts its emissions or funds cuts

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ICAO Action to Date

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Instrument	Action	Year
Fuel taxes	Reaffirms opposition	2001
GHG emission standard	Rules out	2001
Closed emissions trading	Opposes	2001
Global ETS	Dismisses in favor of existing schemes	2004
GHG emissions charges	Three year moratorium	2004
EU ETS	Attempts to block inclusion of foreign carriers	2007
GIACC	unambitious	2009



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Source: Transport & Environment, 2007.

ICAO needs to take action immediately

- GHG emission/efficiency standards:
 - Light/heavy duty vehicle efficiency widely regulated
 - IMO: EEDI and EEOI under consideration in July
 - ICAO: ????
 - speed
- Market-based measures within sectoral emissions cap
 - Global ETS or levy
 - International kerosene tax?
 - En-route charges
- Flanking measures for NOx, contrails/cirrus
 - Cruise NOx emission standards
 - Emission-based landing/en route charges
 - Aircraft rerouting to reduce contrail formation?



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12 Years of bunkers under Kyoto...

- Not even one binding ICAO GHG measure
- ICAO has excelled at ruling things out!
- GIACC 4/ICAO now stymied by CBDR
- Ultimately its not ICAO but Parties
- UNFCCC: specify targets, timelines, measures
- Developing countries must stop blocking
- CBDR through revenues not applicability
- Review at COP 16



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UNFCCC must include international aviation and shipping emissions in measures on climate change



Left unmitigated, greenhouse gas emissions from aviation and shipping will double or triple by 2050

Greenhouse gas emissions from international aviation and maritime fuels, known as 'bunkers', account for nearly 10% of the climate problem and are growing rapidly.

International shipping emits 870 million tonnes of CO₂ each year – more than the UK or Canada. Emissions have grown by more than 85% since 1990 the base year of the Kyoto Protocol.

CO₂ emissions from aviation exceed 730 million tonnes annually - up well over 45% since 1990. Additional climate impacts from other exhaust gases and cloud effects are around double those of CO₂. Overall, aviation is responsible for 4.9% of global warming today. International aviation emits more CO₂ than France or Australia.

In 1997, the Kyoto Protocol (Article 2.2) gave responsibility for these emissions to developed ('Annex I') countries working through the International Maritime (IMO) and Civil Aviation Organisations (ICAO).



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Bunker Fuels and the Kyoto Protocol – Or How ICAO and IMO failed the Climate Change Test

More info

www.transportenvironment.org/pages/bunkers