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Post-2012 Climate Policies for International Aviation

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The Cambridge Centre for Climate Change Mitigation Research (4CMR)

Tyndall Centre for Climate Change Research

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Outline

- International aviation and Climate Change
- Theory of emissions trading
- EU ETS
- Aviation in the EU ETS
- Aviation in the EU ETS – impact assessment
- UK climate change policies and aviation
- Post-Kyoto policies for international aviation

Picture: Virgin Airlines

Aviation and Climate Change

Aircraft emit:

- **CO_2**
- NO_X
- Water vapour - contrails
- SO_2
- Soot

Current aircraft emissions :

- 2.5% of global CO_2 emissions (~50% from international aviation)
- 3% of CO_2 emissions in the EU (2004)

But:

- CO_2 emissions from international aviation in the EU increased by 85% from 1990 to 2004 i.e. about 4.5% per year
- And might roughly to double from 2005 to 2020

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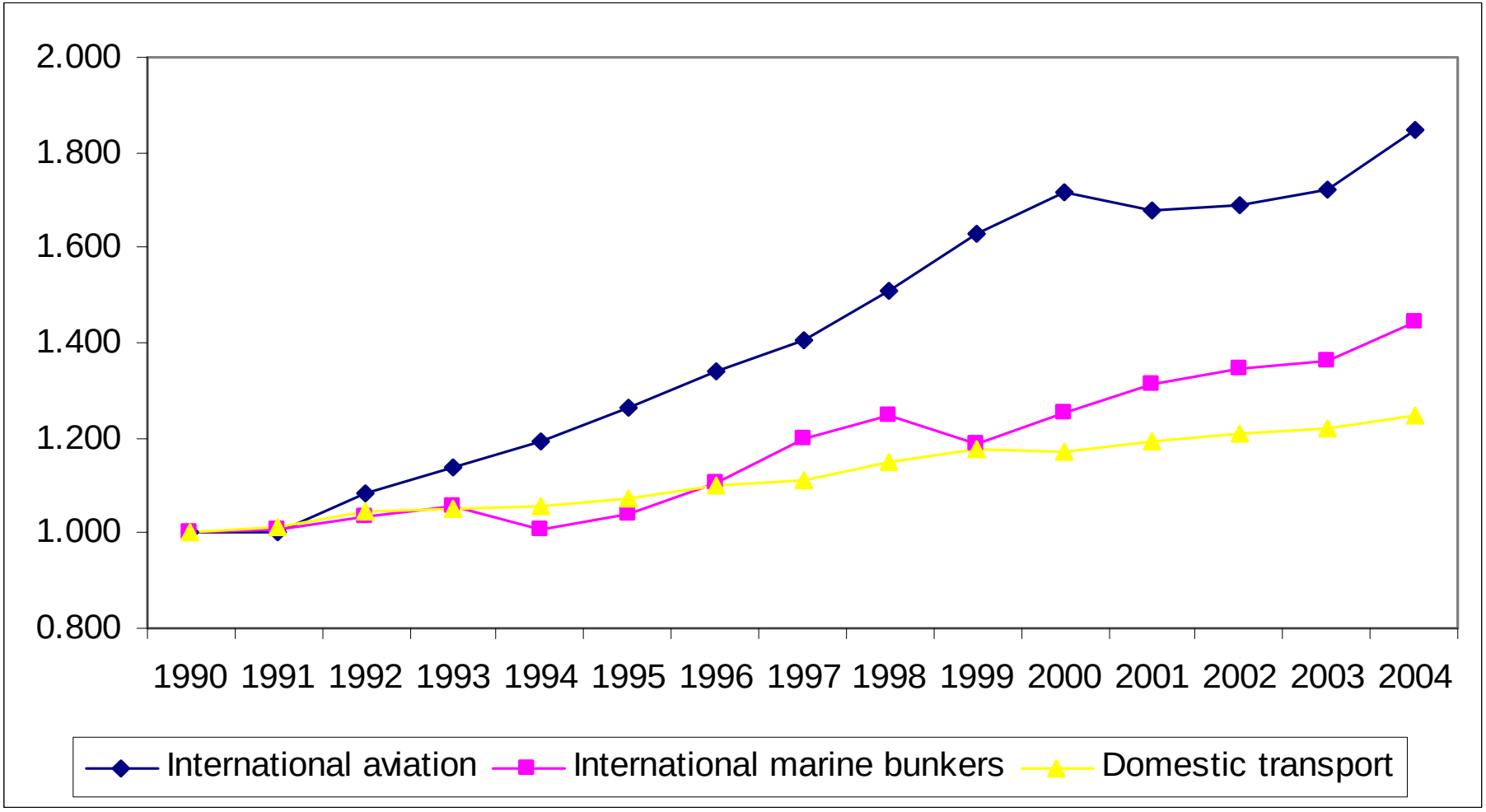
Aviation and Climate Change



CO_2 emissions from transport in the EU 1990- 2004 (1990 = 1) Source: EEA, 2007

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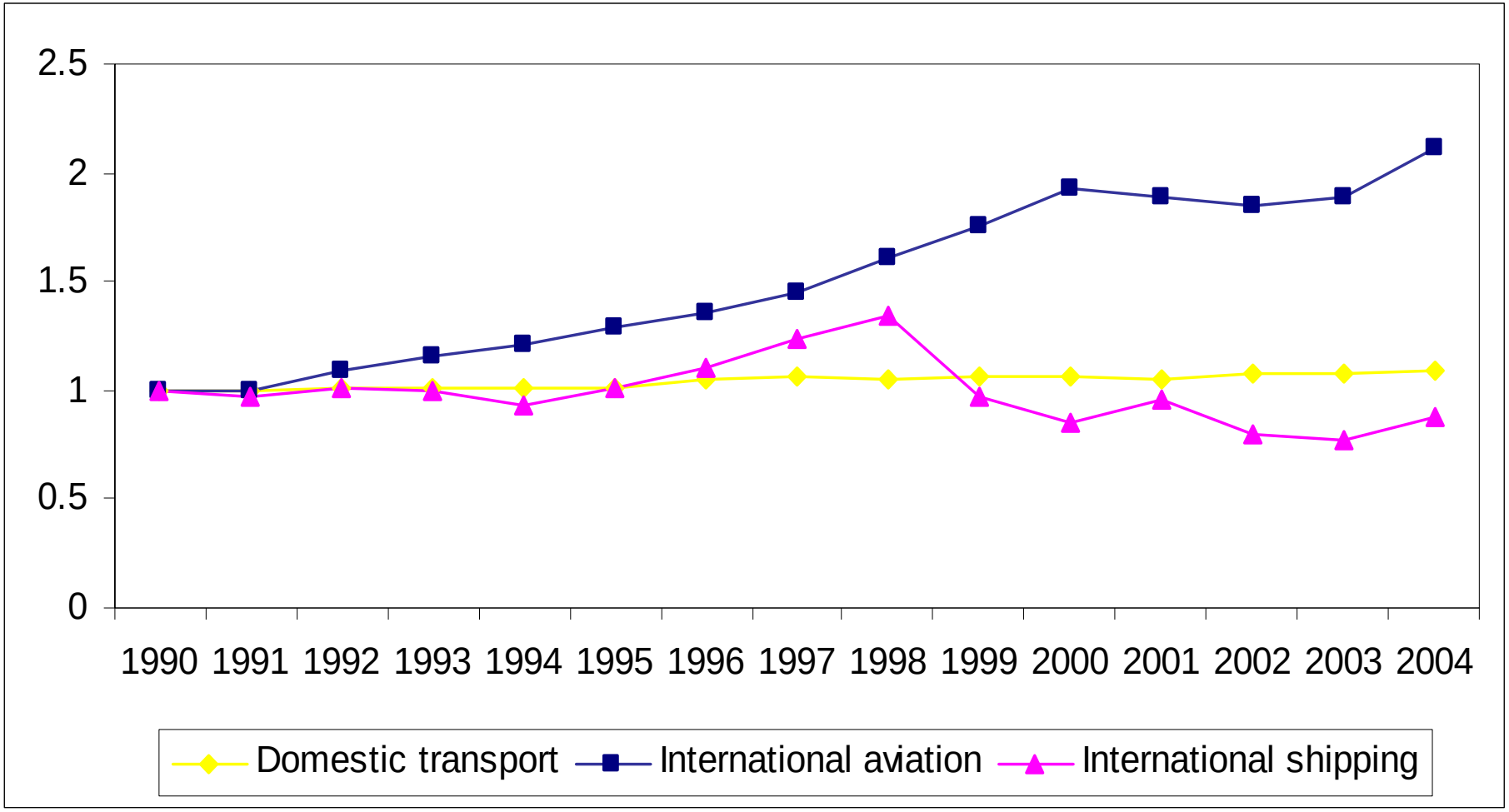
Aviation and Climate Change



CO_2 emissions from transport in the UK 1990- 2004 (1990 = 1) Source: EEA, 2007

International Transport and Climate Change

Where does this growth come from?

- Emergence of new low cost airlines
- Liberalisation of the air transport market – 'open skies' agreements
- Globalisation, rapidly developing communication technologies (?)
- Matured technology and long lifetime of vessels (30 years or more)
- **Increasing incomes**

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International Transport and Climate Change

GHG emissions from international transport are not covered by existing international climate treaties.

Kyoto Protocol (Article 2(2)) 1997:

'*The Parties included in Annex I shall pursue limitation or reduction of emissions of greenhouse gases not controlled by the Montreal Protocol from aviation and marine bunker fuels, working through the International Civil Aviation Organization and the International Maritime Organization, respectively.'*

International Civil Aviation Organisation (ICAO) and International Maritime Organisation (IMO) are in charge

ICAO and IMO do not recognise 'Annex I'

Emissions from domestic aviation and shipping are included in the Kyoto Protocol

Emissions Trading: *Economic Theory*

- Emissions trading (quantity rationing) is one of the three economic incentives to internalise environmental externalities
- The other two are: fees and liability rules
- Emissions trading in theory:
  - find socially desirable amount of yearly emissions (for a country, region, world) and fix it - set a cap
  - divide this amount between polluters (give property rights to companies)
  - let them trade - those with lower marginal abatement cost abate and sell allowances to those with higher abatement costs

CAP-AND-TRADE

ALTERNATIVE - CREDIT PROGRAM

Emissions Trading: *EU ETS*

- Came into operation 1 January 2005
- Phase 1 ran 2005-2007, Phase 2 started on 1 January 2008 and will last till 2012, Phase 3 planned 2013-2020
- Currently the world's largest emissions trading system
- The most important European climate change policy in place
- Includes CO2 emissions from energy intensive industries:
  - power sector,
  - pulp and paper,
  - cement, lime,
  - ceramics, glass
  - iron and steel
  - refineries

AVIATION

SHIPPING?

Aviation in the EU ETS

- In December 2006, the EC released a proposal on including aviation industry as a first representative of the transport sector in the EU ETS, the EP had final vote in July 2008
- All airlines operating on territory of the EU will be included (all flights departing from and arriving at the EU) from 2012
- Third parties do not need to comply if they have relevant measures in place
- CO_2 from the aviation sector will be capped at the 97% level of average emissions for 2004 – 2006 in 2012 and this will be lowered to 95% from 2013 onwards
- Harmonised allocation methodology – 85% percentage granted for free, 15% will be auctioned

Aviation in the EU ETS

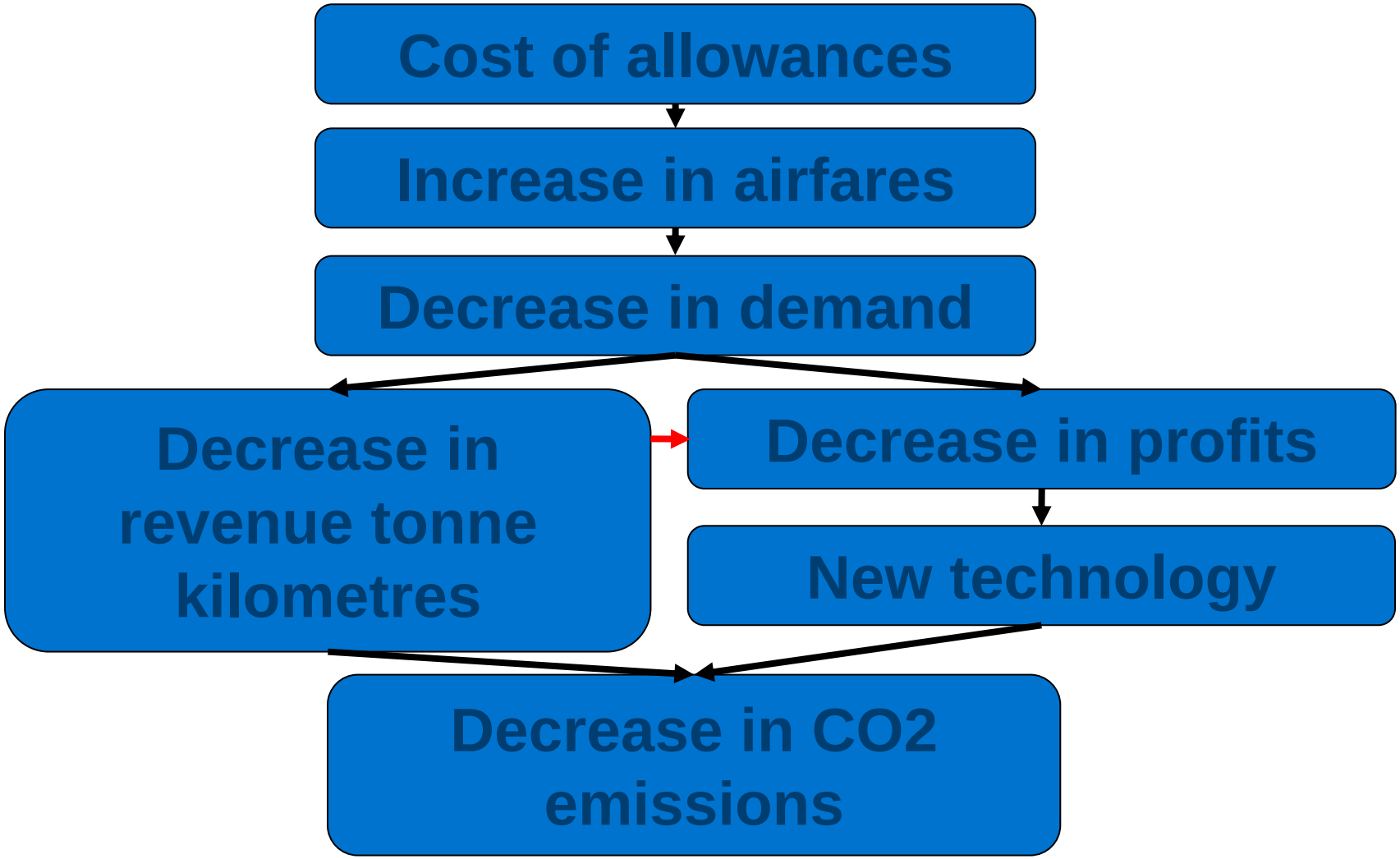
- No uplift factor to cover the climate change impacts of NO_x and contrails
- Credits from CDM projects and JI projects will be used up to a harmonised limit – 15% for 2012, ?% from 2013
- An open trading system is proposed
- New entrants and fast growing airlines will receive allowances from a ‘new entrance reserve’
- From 2013 aviation industry might have the same rules as industries (e.g. 85% free allocation, that will phase out by 2020)

Aviation in the EU ETS

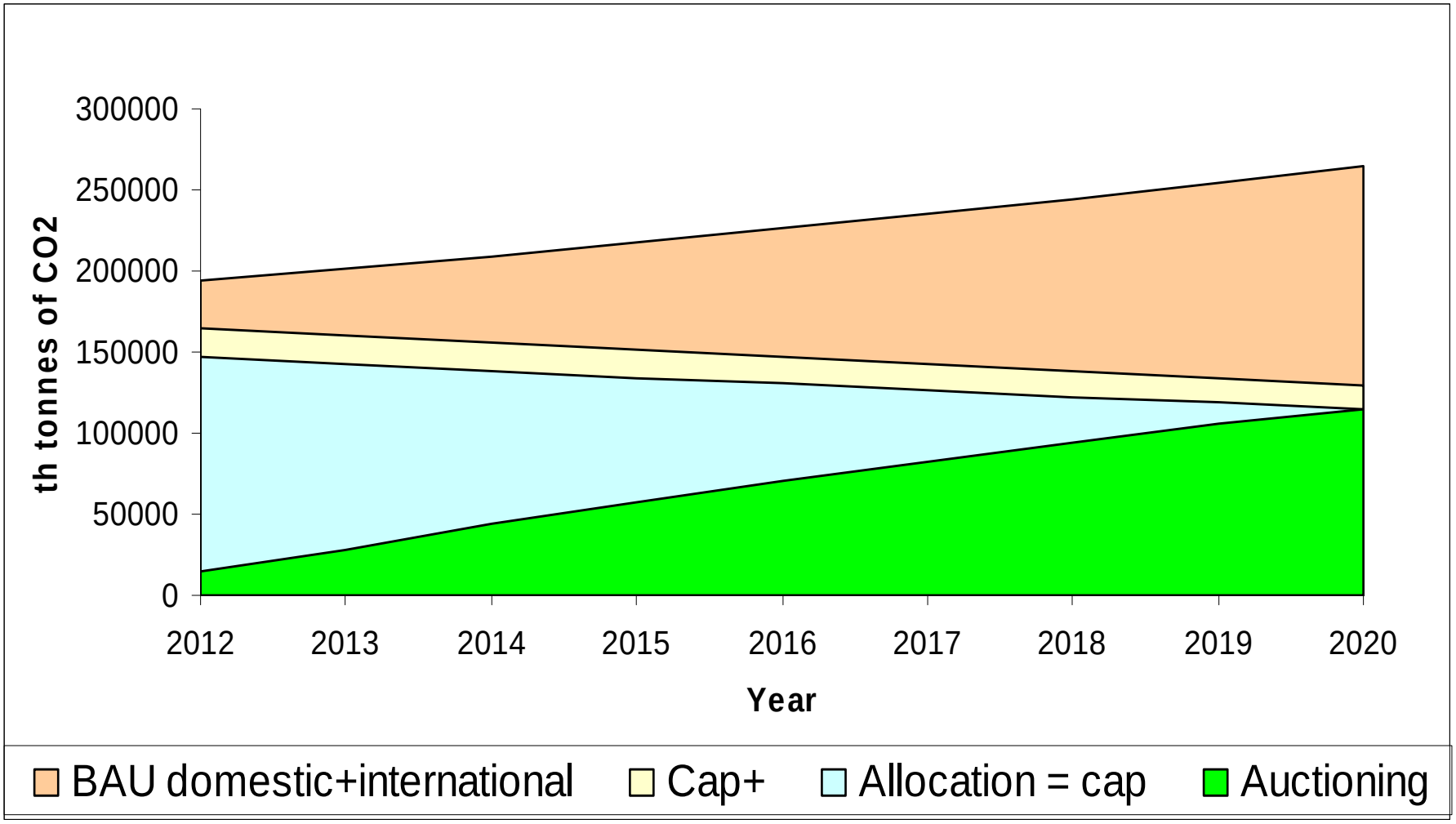
EU ETS **excludes**

- Airlines with less than 243 fights departing from or arriving in EU airports per annum or with less than 10,000 tonnes CO2 emissions per annum
- Airplanes with a maximum take-of mass of 5,700 tonnes
- Military flights, rescue flights
- Routes where the capacity offered does not exceed 30 000 seats per year
- Flights under VFR

Aviation in the EU ETS



Aviation in the EU ETS



Based on EEA 2006 and EC 2008

Aviation in the EU ETS: *impact assessment*

Objective was to explore the impacts of including airlines to the EU ETS on:

- **the industry as an economic sector - CO_2 and output**
- **the EU economy - CO_2 and GDP**

using a dynamic macroeconomic simulation model - **E3ME** (Energy-Environment-Economy Model for Europe).

Main advantage of E3ME:

The ability to model two-way interactions between the economy, energy demand/supply and environmental emissions

Main disadvantage of E3ME :

Analyses the industry at an aggregate level – cannot study impacts on different business models, technologies (unless the model incorporates an industry specific submodel)

Aviation in the EU ETS: *impact assessment*

Assumptions:

- Open trading scheme
- Starting year for the air transport industry is 2012
- Credits from CDM projects will be used up 15%
- Harmonised allocation: 2012 85% granted for free, the rest will be auctioned
- In 2012 CO2 emissions from the aviation sector will be capped at the 97% level of average emissions for 2004 – 2006 in 2012 and In phase 3 aviation will be treated as all other trading industries (except power sector) in terms of a diminishing cap
- Auctioning revenues are used to increase government expenditure

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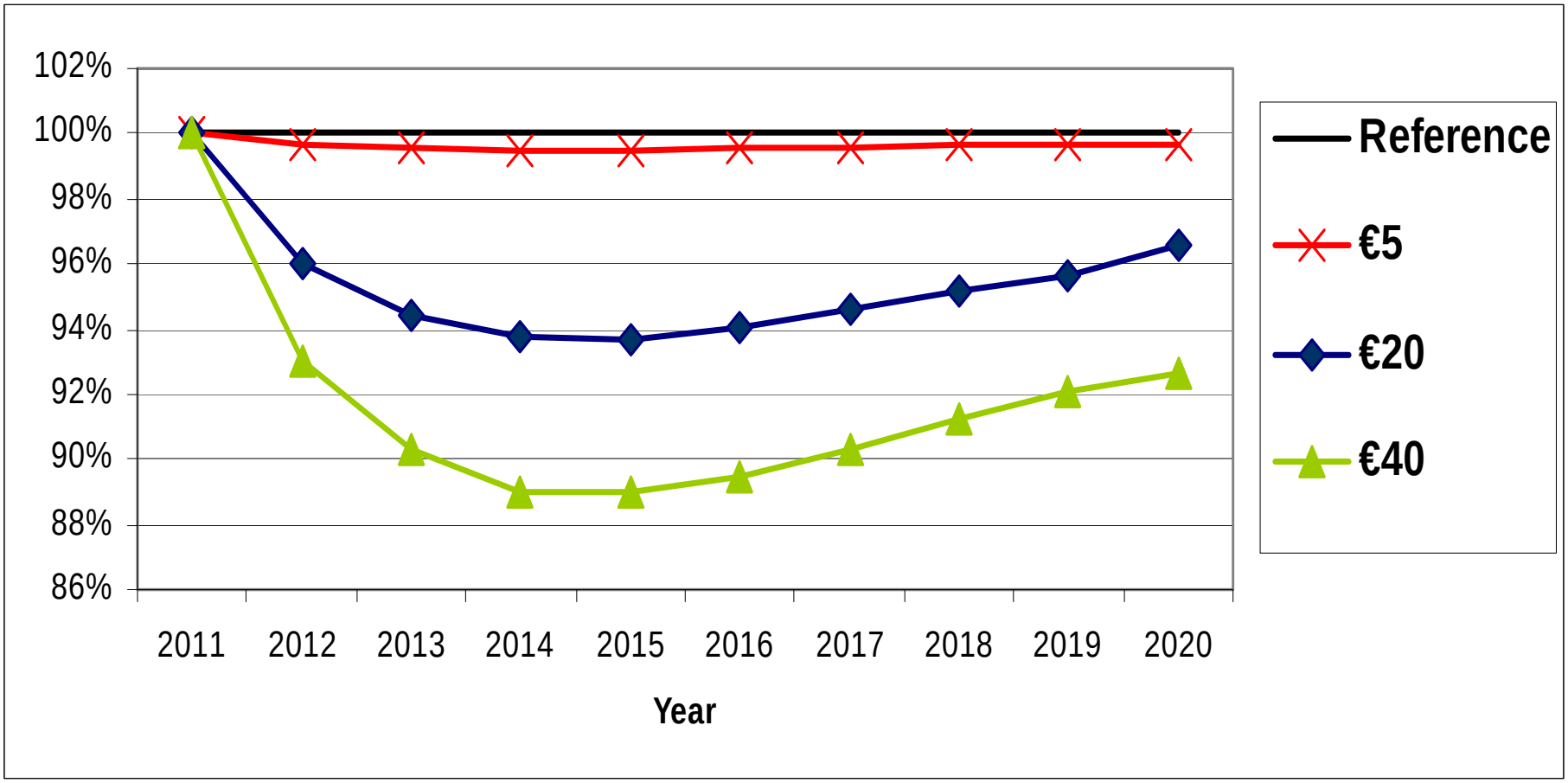
Aviation in the EU ETS: *impact assessment*



Reductions in CO2 emissions in the EU from air transport compared to reference scenarios. *Source: E3ME results*

Aviation in the EU ETS: *impact assessment*

Impacts on the **industry** in 2020 compared to no action scenarios:

CO_2 emissions: - 0.3% (allowance price of 5€), - 3.4% (20€) and, - 7.4% (40€)

Demand: - 0.04% (5€), - 0.54% (20€) and, - 0.98% (40€)

Impacts on the **EU economy** in 2020 compared to no action scenarios:

GDP: no change by an allowance price of 5€ and 20€, 0.02% by an allowance price of 40€

CO_2 emissions: 0.1% (5€), 0.2% (20€), - 0.2% (40€)

Aviation in the EU ETS: *impact assessment*

Auctioning:

- Higher levels of auctioning will impose more real costs on the industry
- Might not impact the industry level CO2 reduction
- How the auctioning revenues are used is **extremely** important - by allocating revenues into non-ETS sectors, slight increases in carbon emissions at the EU level might be possible.

Use of CDM credits:

- Helps aviation to reduce compliance costs
- Gives less reduction in CO2 emissions at the industry and the EU level and
- A slightly negative impact on GDP

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Aviation in the EU ETS: impact assessment

The impact is relatively low because of:

- The air transport sector is relatively small
- Airlines can purchase excess allowances from the market and use cheaper credits from other Kyoto flexible mechanisms
- Airlines can pass majority of allowance costs on to consumers: price elasticities are less important than income elasticities and behavioural lock-ins
- The cap for the whole EU ETS is too generous
- Money that will not be used on flying will be used somewhere else

Aviation in the EU ETS: impact assessment

But….

The concept of emissions trading is to use the market to implement emission reductions at the **lowest cost**.

Industries where emissions abatement is expensive **‘fund’** abatement in industries where it is cheaper. In effect, through engagement in the EU ETS, the aviation industry will **‘pay’** for emission reductions, for example in the power sector.

Aviation in the EU ETS: impact assessment

Uncertainties:

- **Pressure** on other industries – impact on poorer households
- High (volatile) **oil prices**
- **Volatile** carbon prices in the market
- Global economy is in **recession** - less income - less flying (?) - lower carbon prices
- **Existence** of future carbon markets – European?, Global?, CDM markets?
- Absence of **long-term** price signal

Anger, A (2010) Including Aviation in the EU ETS: impacts on the industry, CO2 emissions and macroeconomic activity in the EU, *Journal of Air Transport Management* No. 16, 2010, pp. 100–105

Aviation and Climate Change: UK

UK is in a process of transposition of the EU Directive on including aviation in the EU ETS into its national law

The flights from and to the UK give about 25% of the EU aviation emissions to be covered by the EU ETS and about 6.5% of the UK CO2 emissions

EU ETS might have slightly negative impact on the UK GDP

UK supports binding targets for international aviation in the UNFCCC process

Aviation and Climate Change: UK

UK Climate Change Act (2008):

34% cut in GHG by 2020 against 1990 levels
80% cut in GHG by 2050 against 1990 levels

Domestic aviation is included

International aviation is not included - should be decided by December 2012

But international aviation should be taken into account when budgets are set

The CRC Energy Efficiency Scheme – Airports – April 2010

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Post-Kyoto Policies for International Transport

UNFCCC COP15 in Copenhagen in December 2009 – no agreement

Examples

Japan – parties should agree on emissions reduction targets for international shipping and aviation (through IMO and ICAO)

Tuvalu – levy on international aviation and goods imported to developed countries by sea – to raise funds for adaptation

Costa Rica – binding targets for emissions from international bunker fuels (reached through IMO and ICAO)

EU – reduction targets for GHG emissions from aviation and marine bunker fuels shall be set as equal to 10 per cent and 20 per cent, respectively, below 2005 levels by 2020

IMO and ICAO – emphasis on technical and operational efficiency measures, do not rule out market based instruments

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Thank you for your attention! Questions?

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Picture: NASA