

Tyndall°Centre
for Climate Change Research



Foreseeing Mitigation



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connecting you to the future

Including Aviation in the EU ETS versus a Global Emissions Trading Scheme for international transport

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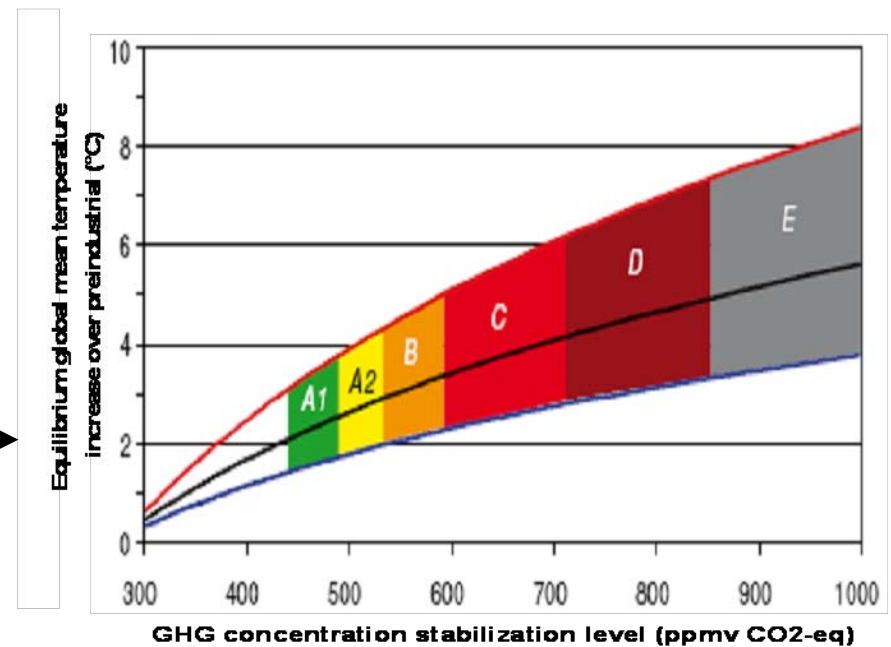
Presentation to Omega workshop,
Department for Transport, London, 11 December 2008

Outline

- **Avoiding dangerous climate change**
 - Decarbonising the global economy
 - “when and how”, not “how much”
- **Policies for transport are ripe for reform**
 - systemic: pollution, congestion, noise,
- **Aviation in EU ETS vs a GETS for international transportation**
- **Aviation and shipping together?**
 - International co-ordination and policy: +sum game
 - Perhaps the most intractable GHG “broad sector”
- **GETS**
- **Outcomes**
 - Management of GHG, NOx, SO2
 - Inducing technological change and more Investment
 - Funding flows from air passengers and importers to development
- **Risks and opportunities**
 - Regulatory capture
 - Weaker “buckaneering spirit”

The key question: can “dangerous anthropogenic climate change” be avoided?

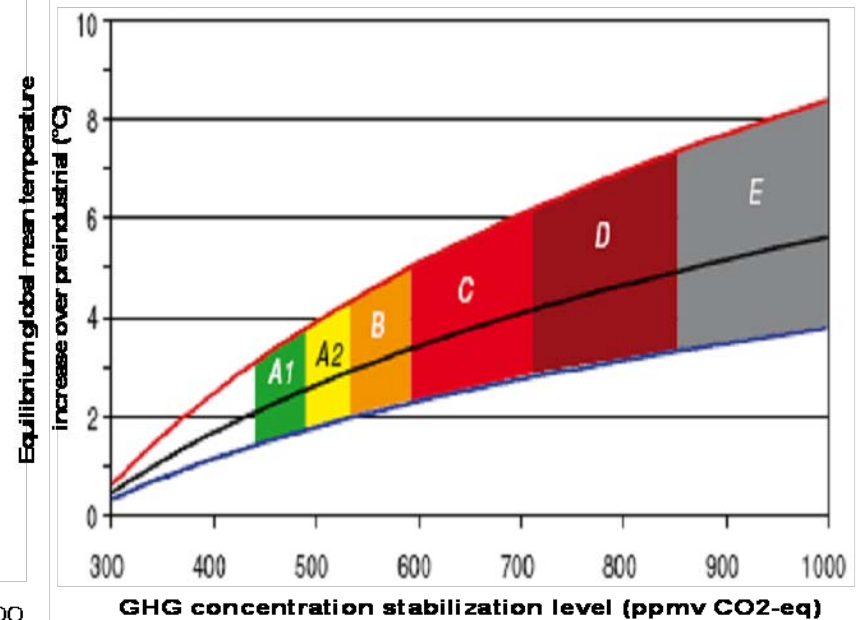
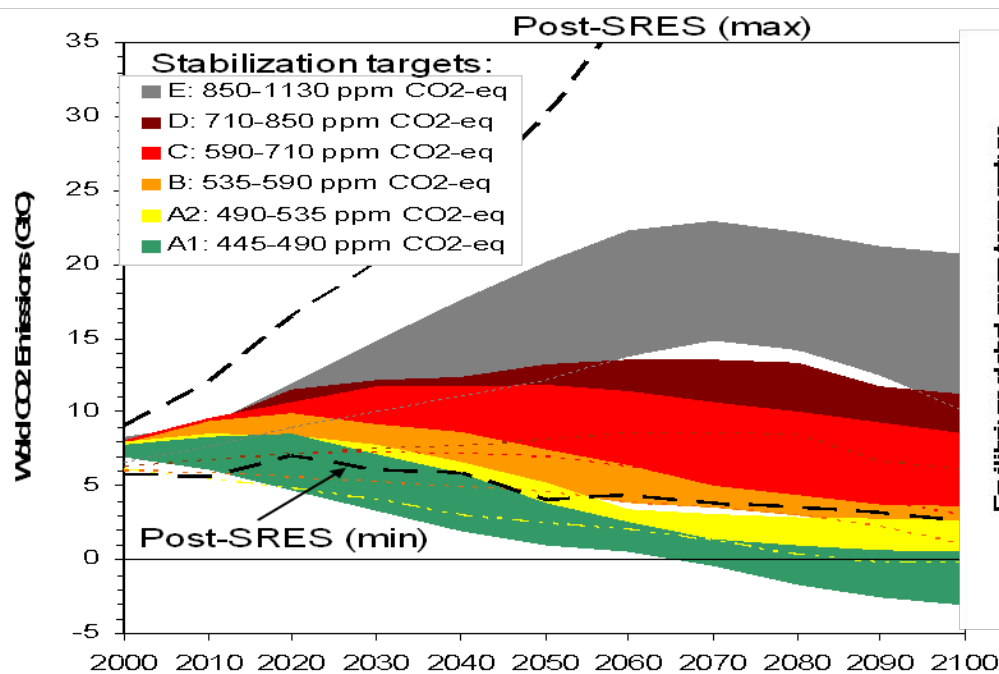
EU interpretation:
global mean
temperature increase at
less than 2°C above pre-
industrial level



The lower the stabilisation level, the earlier global emissions have to go down

Range comes from different models

Range comes from alternative estimates of climate sensitivity

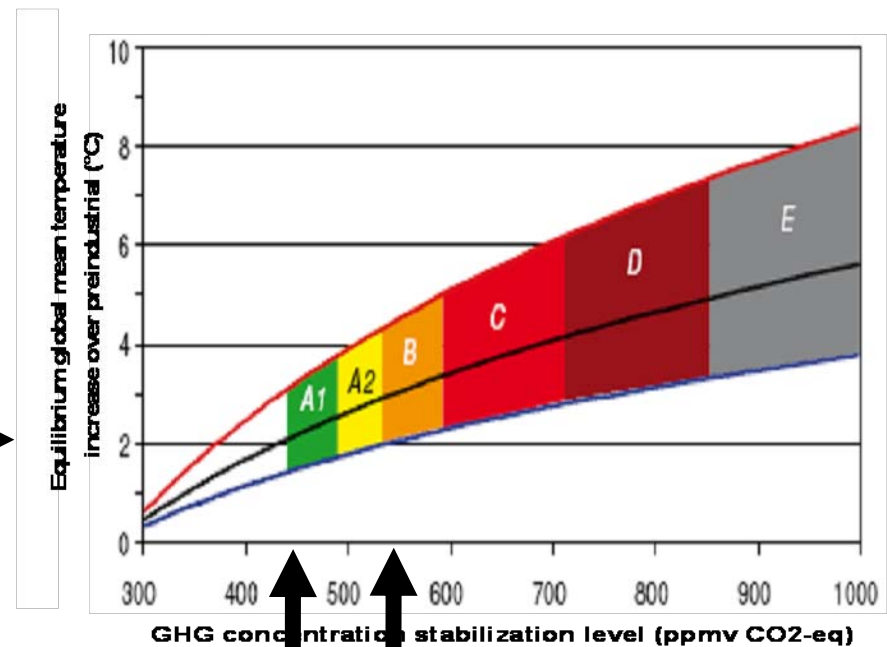


Multigas and CO₂ only studies combined

Note lack of studies below 450ppmv-CO₂-eq

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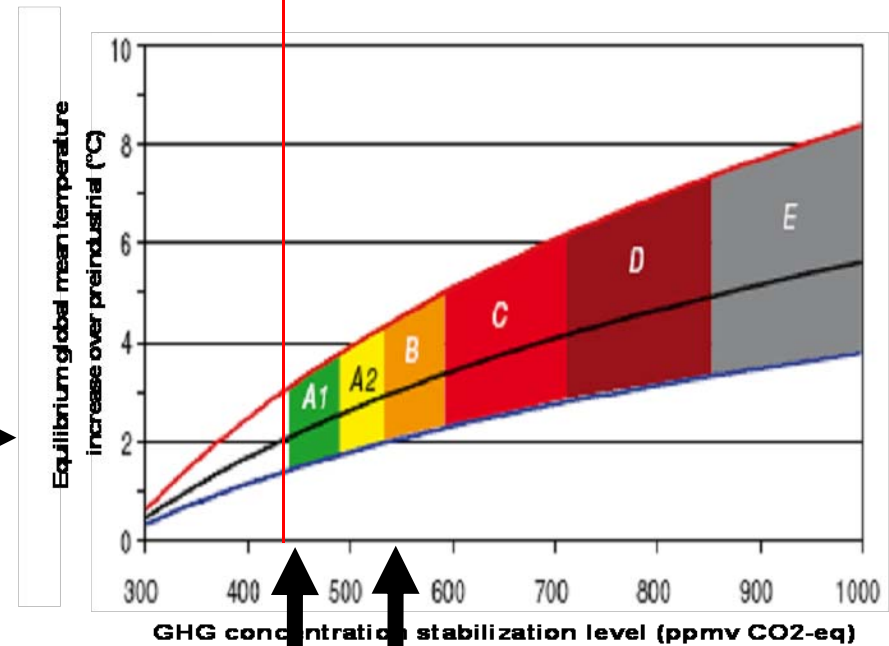


Stern 450-550

The key question: can “dangerous anthropogenic climate change” be avoided?

where we are now

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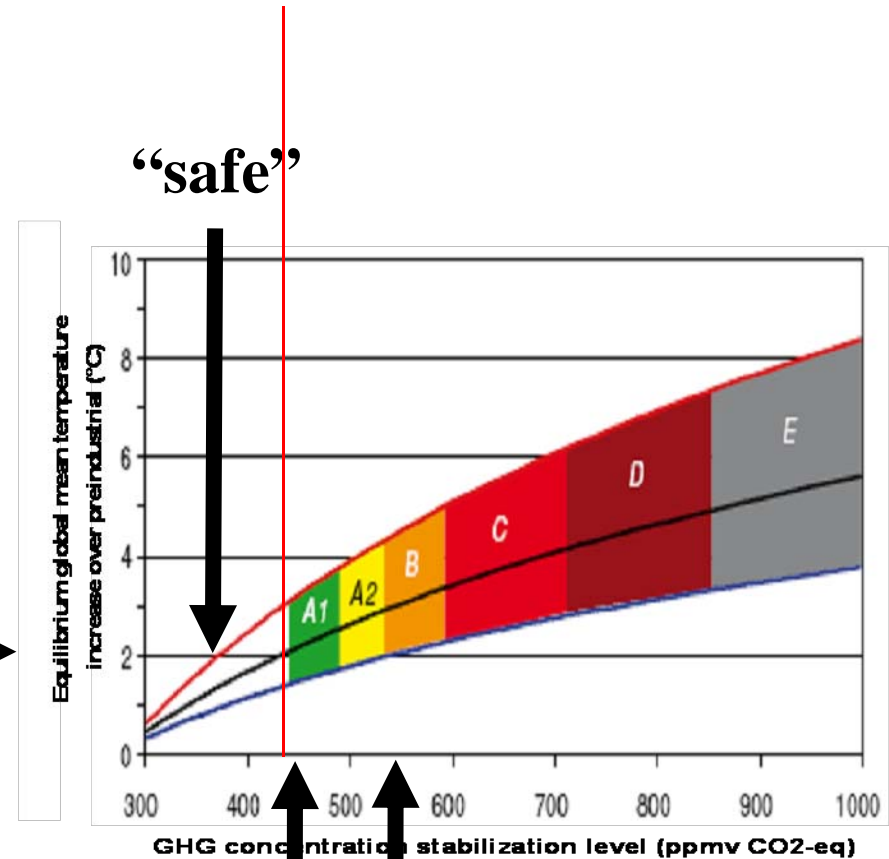


Stern 450-550

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where we are now!

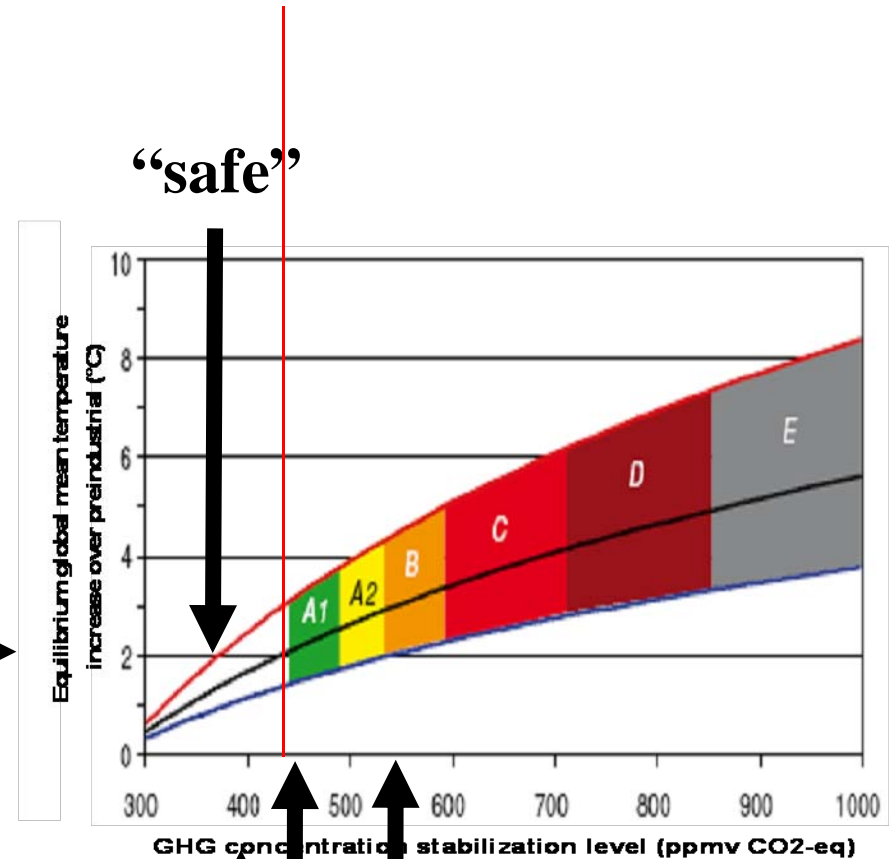
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↑ Stern 450-550

“feasible”

Implications for avoiding dangerous climate change

- **To have a good probability of achieving $<2^{\circ}\text{C}$ rise**
 - CO_2 -eq concentrations have to be $<450\text{ppm CO}_2$ eq (c/f c430 now)
 - global GHG emissions have to fall by $>70\%$ below baseline by 2050
 - technologies have to be developed to capture CO_2
- **Fossil-fuel GHG stocks cause damages and industrialized countries are responsible for most of current stocks**
 - hence reduction in OECD of c90% below BAU/1990 by 2050
- **Risks are asymmetric**
 - so precaution suggests a zero-carbon economy as soon as possible (without excessive costs)
- **Eventually all countries & sectors have to decarbonize**
 - not “How much?” but “When?” for each business and government
 - With a policy portfolio that is effective, efficient, equitable and flexible

Context: aviation and shipping

- **International transportation**
 - **Small GHG footprint, but global and growing**
 - **Size and effects uncertain and risks asymmetric**
 - **Aviation is very different from shipping**
 - **Place of emissions: high low**
 - **Light versus heavy loads**
 - **Regulation and safety: risk to life/oil pollution**
 - **Passengers versus freight**

Approach for aviation	In EU ETS	In GETS
coverage	EU with electricity and other ETS sectors	World (international aviation with international shipping)
comprehensive-ness	Very partial	100% in theory
institutions	Provokes conflict, esp with USA	Requires global agreement and reform of IMO and ICOA
externalities	Very partial – leaves aviation to last?	100% decarbonisation and reduction in pollution by two unmanaged (?) sectors by 2050

Aviation and shipping

- **Why together in GETS?**
 - Both are intrinsic to globalisation & trade-based growth
 - Both face local congestion and pollution
 - Both pollute outside border controls, in what would otherwise be pristine environments
 - Most intractable of broad sectors (data, law, behaviour)
 - **CRITICAL:**
 - **likely substantial reductions in costs if together: “flexibility” (time, multi-gas, and technological-option)**

International policy coordination

- **Current policies are ripe for reform**
 - systemic: pollution, congestion, noise
 - damaging emissions outside national jurisdictions
 - with national caps on GHG, SO₂, NO_x, international emissions will come to dominate flows
 - consensus and action difficult to achieve
 - classic example of externalities, but taxation illegal
- **GETS**
 - cap-and-trade can limit emissions equitably across operators and countries
 - auctions yield revenues (otherwise huge profits)
 - carbon prices can be managed
- **Post-2012 Copenhagen**
 - need to start with a global scheme, GETS is the logical next step
 - not in Kyoto
 - will reveal market carbon price for decarbonisation
 - NOT a zero-sum game: opportunities for “horse trading”

A Global Emissions Trading Scheme (GETS) for international transport

- **Each phase will run for 8 years – 5 consequent phases from 2013 to 2052**
- **Cap at the average level of 2004-2006 emissions in 2013, phasing out by 2052 i.e. no allocation in 2052**
- **100% auctioning & 100% revenue recycling**
- **Usage of credits from CDM projects: 10% of allocation in 2013 decreasing linearly to 5% in 2052**
- **CDM credits are supplementary to the allocation**

Outcomes

- **Management of GHG, NO_x, SO₂**
- **Inducing technological change and more investment**
 - Higher prices will not necessarily stop growth of the sector
 - Substitution of GHG-fuel by information
 - New planes and ships likely to be more generally productive and better quality
 - Growth less polluting
- **Funding flows from air passengers and importers to development**

Risks and opportunities

- **Regulatory capture**
 - High risk in a complex, technical, international context
- **Provides opportunities for collusion and monopolistic pricing**
- **May weaken “buccaneering spirit”**
 - E.g. emergence of new business models
- **Technologies may not emerge**
 - But wind, heat-pump, new PV materials – a technological revolution appears to be starting

Sketch of a GETS for International Transport - DATA

Data used for **preliminary spreadsheet analysis**:

Enerdata (2008)

Fuel consumption world aggregates (and countries) for:

- Inland Navigation
- International Maritime Bunkers
- Air transport - combined domestic and international (50% for domestic)

Full data for 2004 fuel use converted to CO₂ emissions

Sketch of a GETS for International Transport: assumed CO₂ Emissions

In 2004 - about 0.8 Gt CO₂ emissions from international bunker fuels - half from air transport, half from maritime (underestimated?) transport
This makes about 2.5% of global anthropogenic CO₂ emissions in 2004.

Global CO₂ were about 35Gt in 2004 (IPCC 4AR, 2007)

From 2005 to 2052 three CO₂ growth scenarios for international bunkers (preliminary):

- Low growth 2%pa
- Medium growth 4%pa
- High growth 7%pa

Sketch of a GETS for International Transport: assumptions about carbon prices

Three price scenarios 2013 to 2052:

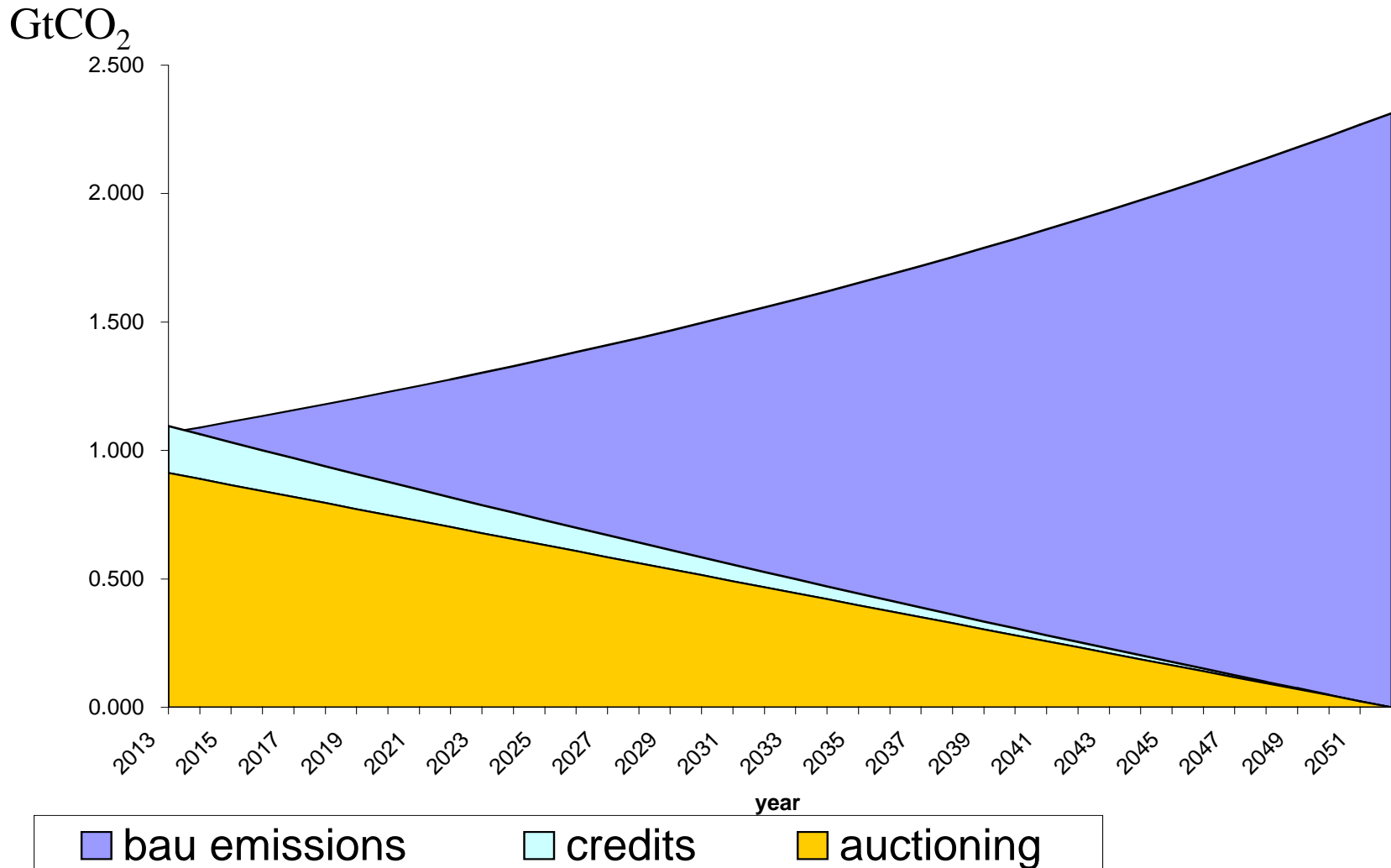
Low price scenario: 100\$(2000)/tonne CO₂

Medium price scenario: 300\$(2000)/tCO₂

High price scenario: 500\$(2000)/tCO₂

These numbers are realistic for the proposed scheme design – studies of closed scheme for aviation in the EU ETS have shown higher prices than these (more than 900€/tCO₂ by 2030), but the coverage for the scheme is smaller

Sketch of a GETS for International Transport: Low growth scenario



Sketch of a GETS for International Transport: assumptions on revenue recycling

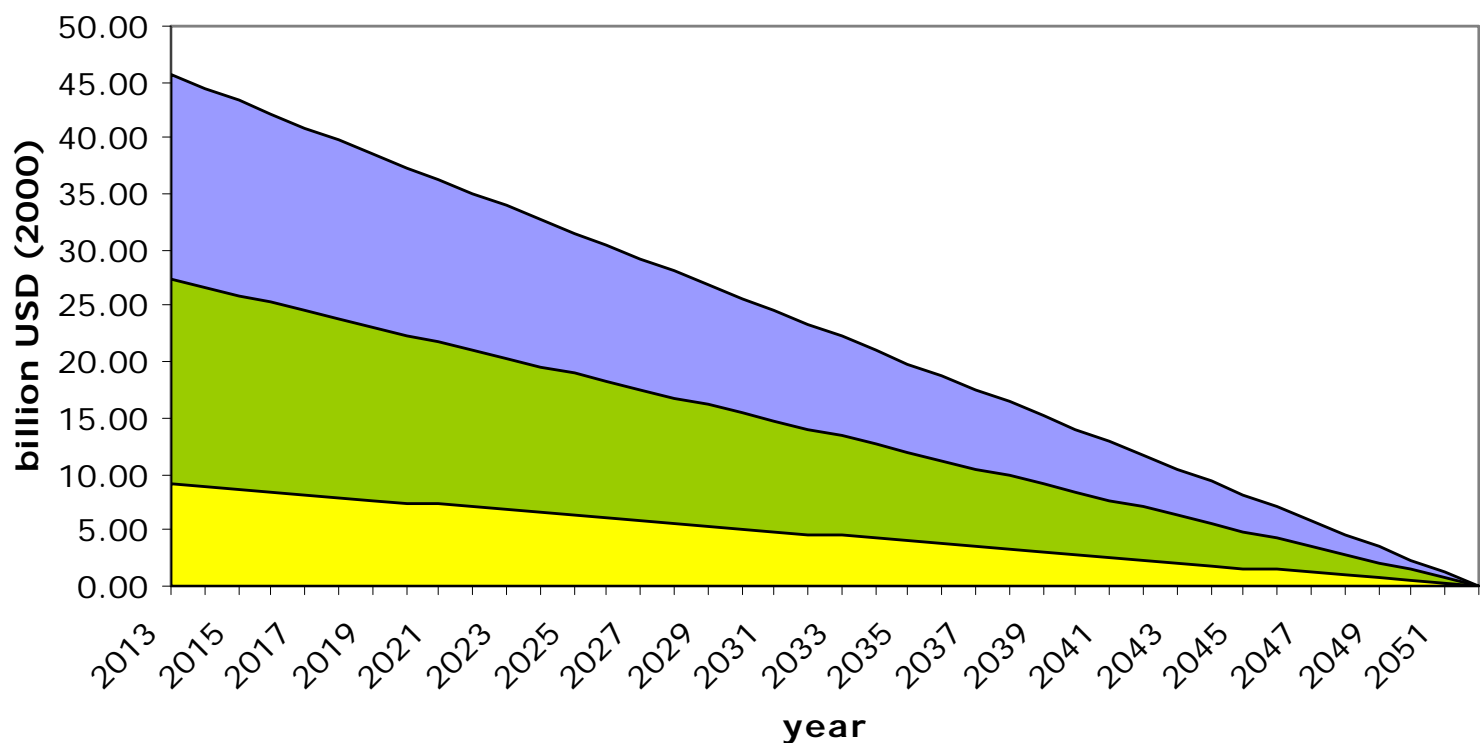
Auctioning revenues proposed to recycle:

10% for the industry to develop low-carbon technologies

90% for supporting developing economies on transition to low carbon economies

Sketch of a GETS for International Transport: Low growth scenario 10% auction revenues returned to the industry

\$bn(2000)



- Low growth revenues recycled to the industry - High price
- Low growth revenues recycled to the industry - Medium price
- Low growth revenues recycled to the industry - Low price