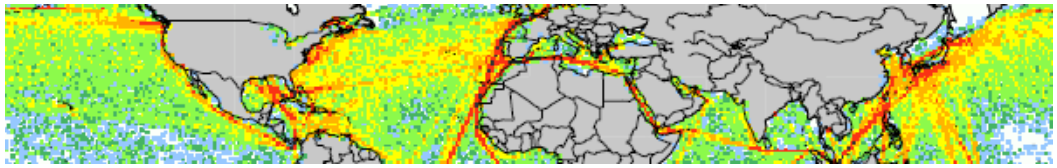
Innovative Financing and Environment

Combining mitigation with funding for adaptation to climate change



An innovative approach combining emission mitigation in international transport with funding for climate change adaptation

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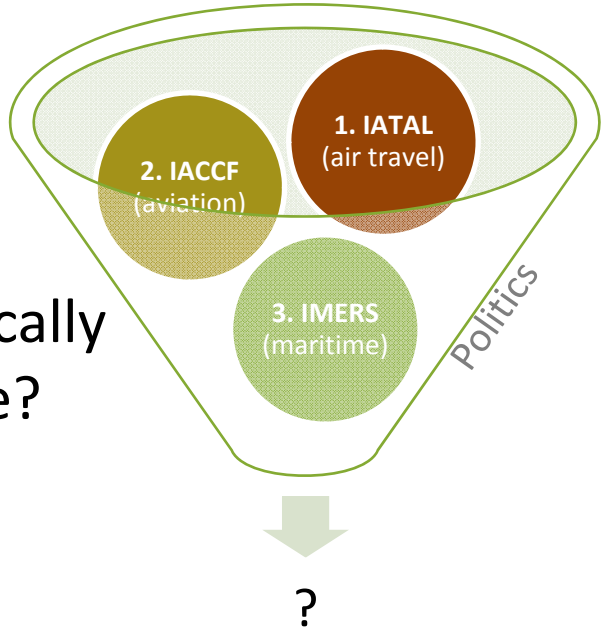
Introduction & Agenda

- Personal
  - Bringing business expertise to climate change

- Outline of selected ideas and environment issues
  1. IATAL, **Int**ernational Air Travel Adaptation Levy (**A**daptation)
  2. IACCF, Int. Aviation Climate Change Fund* (**A** + **M**itigation*2)
  3. IMERS, Int. Maritime Emission Reduction Scheme (**A** + **M***2)

- Can a levy/charge mechanism be made politically compelling to address climate change at scale?
  - When and how on example of IMERS



* Mitigation*2, means near- and long-term emission mitigation, including industry improvements.

Refresher from Oslo (2nd meeting)

IATAL*: An Issue of Responsibility & Capability

1. IATAL
(air travel)

IATAL as Mitigation Instrument

IATAL (M) ≈ Responsibility ≈ per passenger flight emissions

preferred solution

IATAL as Solidarity Contribution

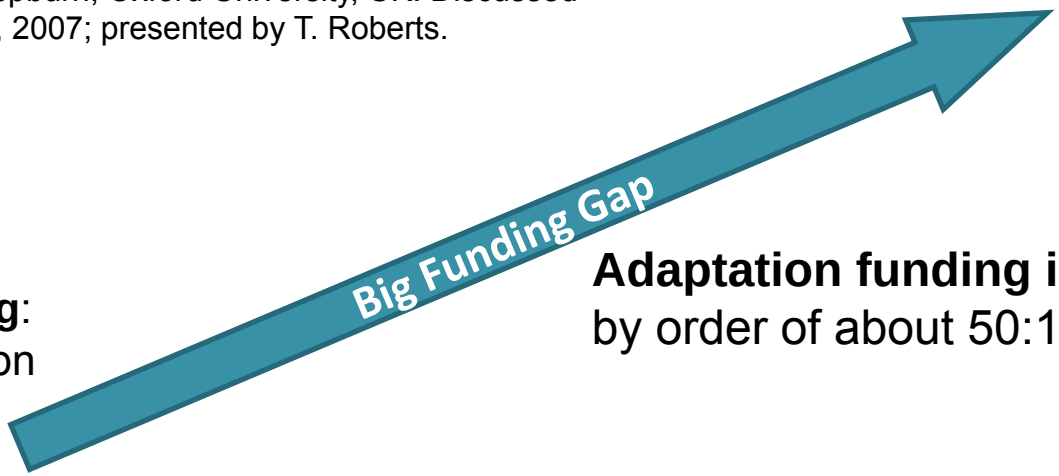
IATAL (S) ≈ Capability ≈ ticket price ✓

IATAL as both

IATAL (MS) ≈ Responsibility × Capability

* Idea by B. Müller & C. Hepburn, Oxford University, UK. Discussed at the 2nd meeting in Oslo, 2007; presented by T. Roberts.

Adaptation **needs**:
in order of **$10bn pa**



Adaptation **funding**:
Total donors: ~0.2bn
CDM: $0.2 – $1bn
(till 2012; %2 levy)

Adaptation funding is inadequate
by order of about 50:1

G8: “We Need to Act”

G8 Gipfel 2007 Heiligendamm

- “We are therefore committed to taking strong and early action to tackle climate change in order to stabilise greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system.
- Taking into account the scientific knowledge as represented in the recent IPCC reports, global greenhouse gas emissions must stop rising, followed by substantial global emission reductions.
- It is vital that major economies [...] agree on a detailed contribution for a new global framework by the end of 2008 which would contribute to a global agreement under the UNFCCC by 2009.”

G8 Leaders

Science is clear – **action is necessary ...**
But **priorities vary**:
• Developed countries: mitigation of climate change
• Developing countries: sustainable development, adaptation to climate change

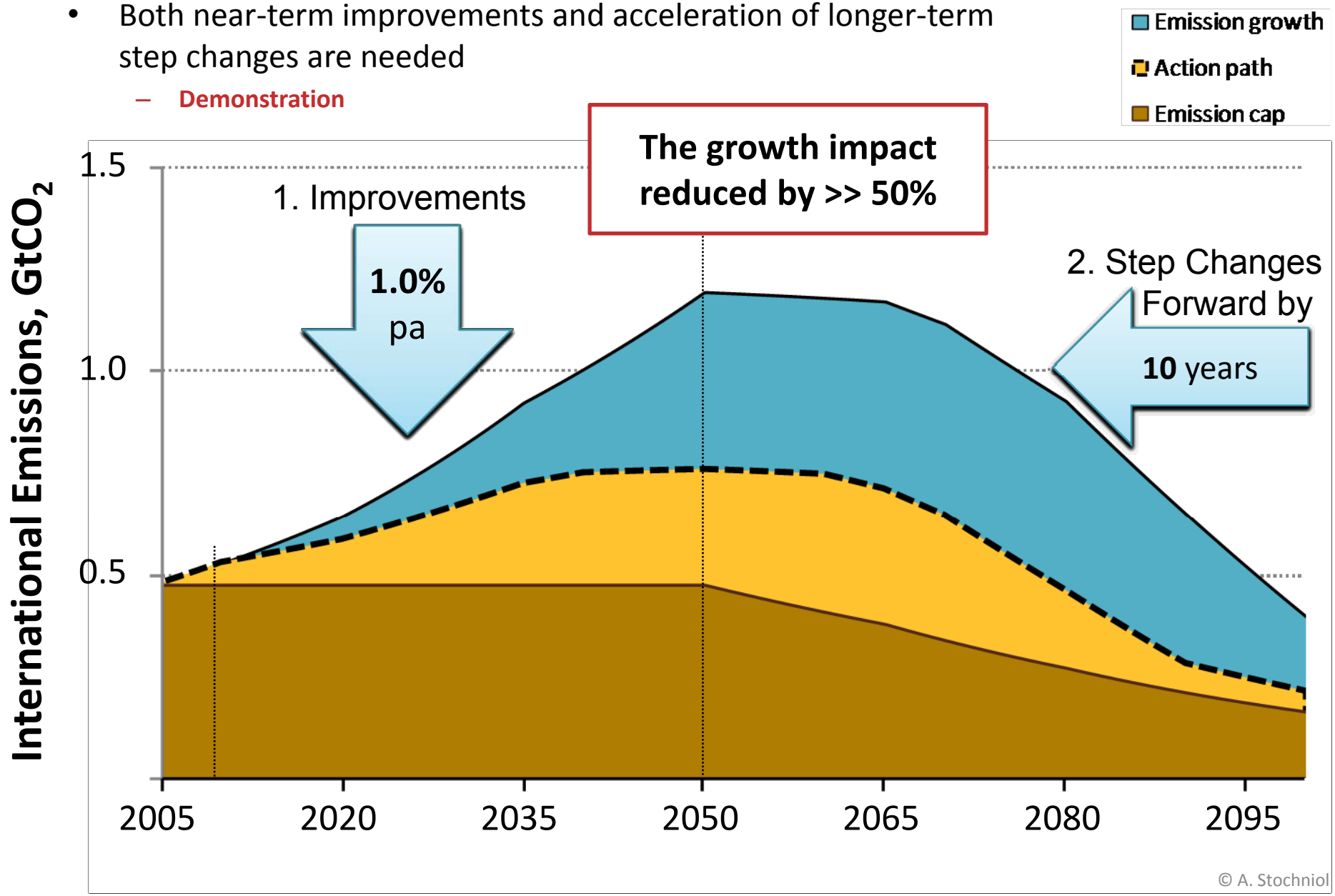
Key Financing Points

- Future mitigation is as important as reducing emissions today
  - Especially for transport sector where emissions grow rapidly *(mitigation*2 needed)*
- Adaptation to climate change is crucial to developing countries
  - The poorest countries are most vulnerable and will be hit hardest by CC
    - Rising water stress; Falling agricultural yields/incomes; Malnutrition and disease; Migration and conflict
- Mitigation cannot be substitute for adaptation, and vice versa
  - Cost of delay is measured in $billions
- Current financial mechanisms are inadequate in both design and scale
  - New innovative means are urgently needed to generate additional funding at scale, before and after 2012

Importance of Future Mitigation for Transport – shipping example

Financing Innovation to Bring Forward Step Changes …

- Both near-term improvements and acceleration of longer-term step changes are needed
  - **Demonstration**



GHG Reduction Policy Options

Numerous policy options have been proposed to reduce greenhouse gas (GHG) emissions with a clear conclusion that **market-based policies are far superior** at the lowest cost than non-market regulations and standards.

Greenhouse Gas Emission Reduction Policy Options

Lowest Cost

Highest

1. Economy-wide GHG tax
2. Hybrid cap-and-trade scheme
3. Cap-and-trade with banking, borrowing, and allocation auctioning
4. Traditional cap-and-trade scheme
5. Non-market regulations and standards

The cap-and-trade schemes, options 2-4:

- have many disadvantages and might be costly*,
- but are politically very compelling due to a quantity target, an emission cap.

If only we could create a price-based scheme delivering a quantity target!

* Benefits of a GHG tax could be 1/3 higher than those of cap-and-trade, on national level. Source: US CBO, 2007.

Tackling International Transport CO_2 Emissions is Hard*

Similar Issues for Aviation and Shipping

- Global and complex character
  - Nearly impossible to allocate emissions to countries, routes; and flags in shipping
  - Lack and difficulty of establishing a reliable emission baseline
- Long lifetime of planes, ships and engines
  - Dramatic step emission reductions are decades away, especially in aviation
- Scale and complexity of business relationships, especially in shipping
  - To avoid competitive distortions more than 30,000 ships need to be included
- Differentiated needs
  - Differentiated approach is demanded by developing countries
  - Benefits to industry must be clear, costs kept down
- The emissions are NOT small, and grow rapidly

* International maritime CO_2 emission accounts "only" for ~1.8% of total emissions from fossil fuels. However, it is **#9 if compared with the largest emitting nations and its share can triple by 2050**. International aviation emission at 1.2% is #16, and its share can increase 5 times by 2050. Exempt from taxes, and unaffected by the Kyoto Protocol.

Source: wri.org + bunker estimates for 2003

Reducing International Transport CO_2 Emissions

Aviation: Impasse at ICAO

International Civil Aviation Organization

- > 10 years of negotiations
- No agreement on a way forward
- Controversial proposal to include flights departing and landing in Europe in the EU Emission Trading Scheme (EU ETS)
  - Threat of legal action by the US etc.
- Entrenched positions by parties

Shipping: pressure on IMO ↗

International Maritime Organization

- Trials in CO_2 indexing scheme
- Emissions became highly visible in 2007 (articles claiming CO2 emissions being double of the previous estimates)
- Threat to include shipping in the EU ETS
- Priority to review/reduce local pollution
- Slow process; new GHG study by 2011

UNFCCC – impasse on methodological issues of emissions from international bunkers

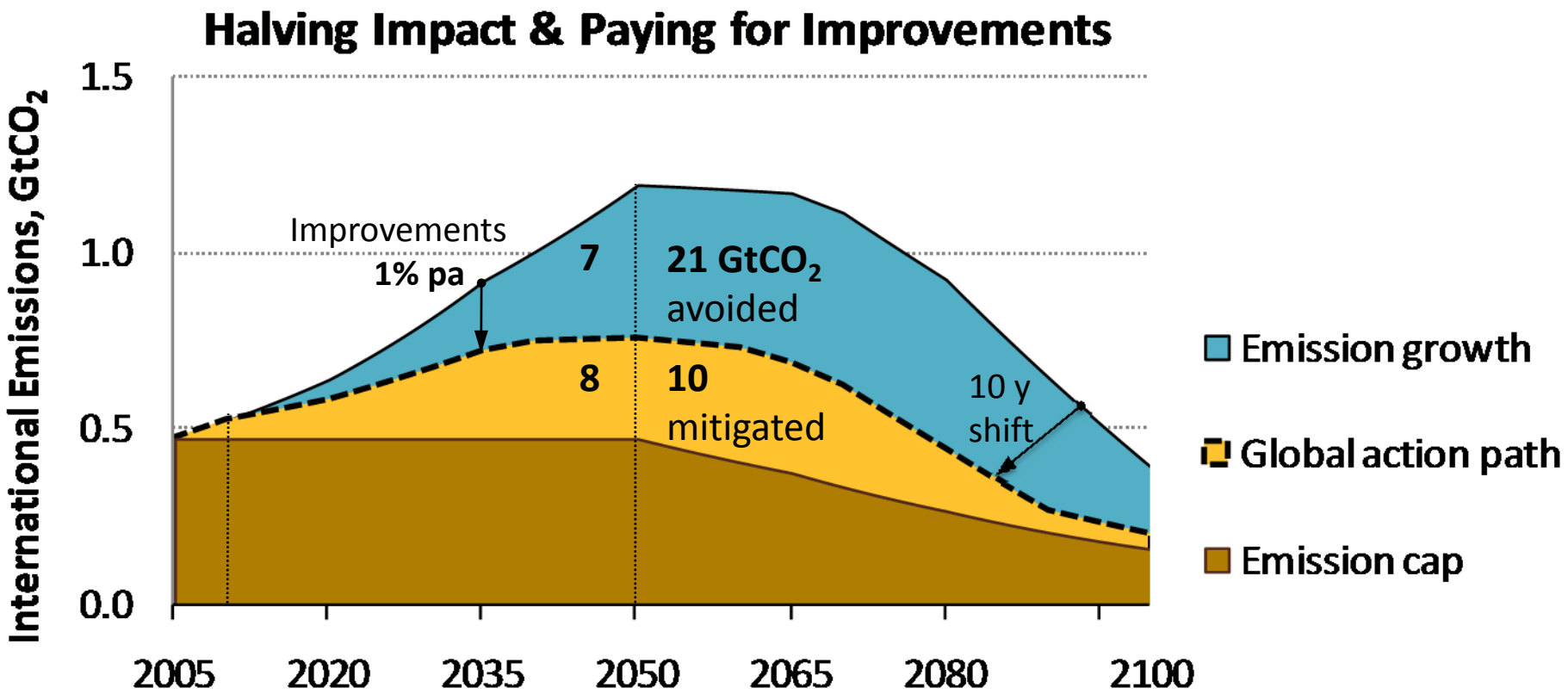
2. IACCF (aviation)

- Two track attempt
  - Business, through 12 largest airlines
  - ICAO
- Practically no traction
  - ICAO triennial council in 2007 to discuss emissions, no new ideas possible

3. IMERS (maritime)

- Lessons learned; Multilateral approach
- Brought idea to couple of parties
- Norway found it compelling and submitted a proposal to the IMO
  - We will focus on IMERS here, IACC Fund – a similar concept

Maritime Case for Action



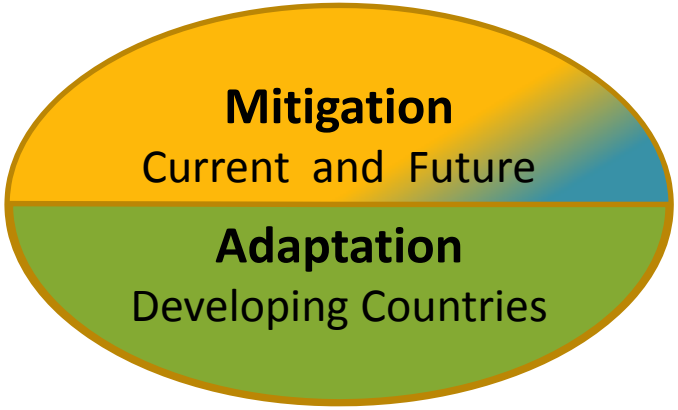
- Achieving 1% annual industry improvements and bringing forward the step changes by 10 years will more than halve the total shipping emission above the "cap"/aspirational goal
  - Results by 2050*: avoided emission: 7GtCO$_2$, mitigated (offset): 8GtCO$_2$, total: **15 GtCO$_2$**
- **Cost of 3 year delay: 0.8GtCO$_2$** by 2050 alone (**$20bn**, or > 1 year of emissions; not shown)

*Note: there is no trade-off with SO_2 emissions; they will also be reduced through the increased fuel efficiency.

IMERS Innovation

An International Maritime Emission Reduction Scheme with a Fund

- Address differentiated priorities in one cohesive supra-national scheme:
  - Halve maritime GHG impact (through current and future mitigation)
  - Contribute notably to climate change adaptation in developing countries



Common but differentiated responsibility principle delivered in a new way.

Key design details:

- **No allocation** of emissions to countries, **one aggregated emission cap** or goal agreed
- **A fund** established to invest in current and future mitigation of shipping GHG emissions, and to provide contributory funding to climate change adaptation in developing countries
- **Mitigation*2:** Reduction of GHG achieved by near-term technical and operational improvements and accelerating long-term step changes
  - Mitigation outside the sector to optimize cost efficiency added
- **A hybrid economic instrument** based on harmonized charges used
  - **Using a carbon price established** by the large emitting industries
  - Delivering quantity target through a "clearing house" approach

Collection and Investment Sides

International Governance (IMO)

Portfolio split; Annual level of charges

Data and Charges Collection

1. Fuel data

2. Charge = Emissions x Unit charge

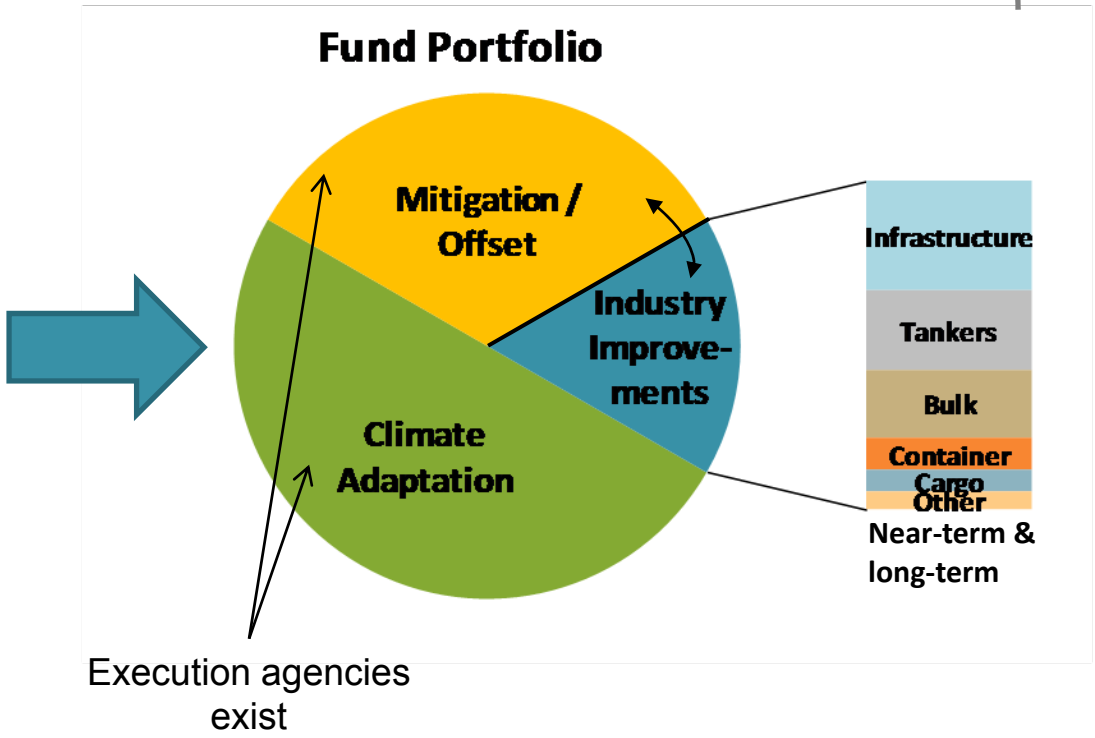
Example: Unit charge in 2010 = $10/tCO$_2$

Price impact: shipping: 3%, customer: **0.1%**

International emissions = 0.5 GtCO$_2$

80% initial coverage (30 thousand ships)

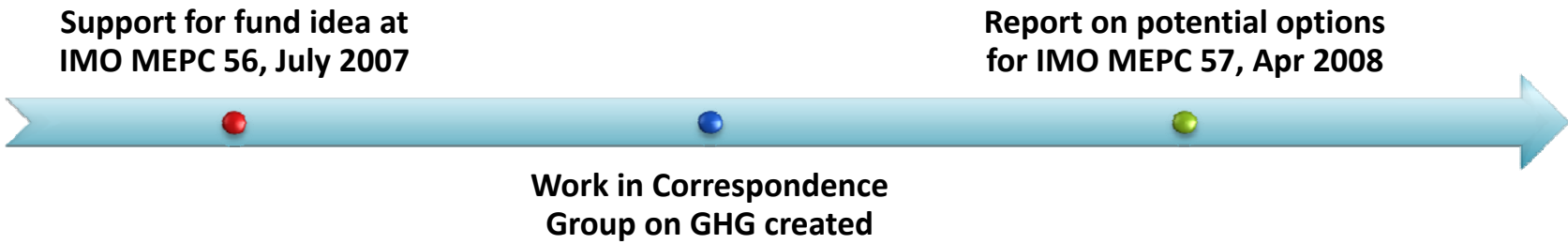
=> Significant global funds raised



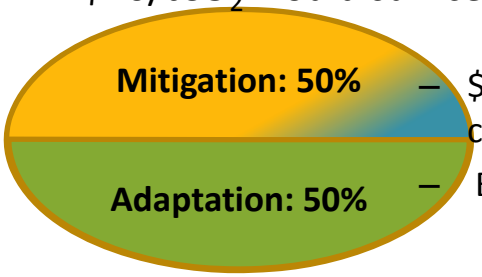
Unit charge depends on emissions growth above the cap/goal and the forward market price for CO_2 (assumed as $25/tCO$_2$). Unit maritime emissions charge for 2010 is estimated at $10/tCO2. Recovered through increased charges for goods shipping of around 3% (**end customer impact: <u>0.1%</u>**). Total funds raised will exceed $4bn per annum.

Multilateral Status, and Estimated Costs

- **Multilateral process** is slow, but **necessary to start at scale**
  - Concept submission to the IMO MEPC 56 by Norway *(high level submission)*
    - Significant support for the idea at MEPC, limited reservations *(hard work behind)*
      - » MEPC, the influential Marine Environment Protection Committee



- **Minimizing costs, maximizing benefits** (example)
  - International transport is crucial for trade and sustainable development
  - **Impact on end user prices: 0.1%** (shipping costs of goods +3%)
    - $\$10/tCO_2$ would suffice (= 40% of carbon price of $\$25/tCO_2$)



- $\$3/tCO_2$ for offset, \$1 for near improvements, \$1 for accelerating future step changes
- Each $\$5/tCO_2$ goes for developing countries
  - To be managed by World Bank, go to the UN Adaptation Fund, or similar

Benefits to Developing Countries

- Major funding for adaptation to climate change
  - Estimated at $2bn per annum (assuming equal split of funds & market price of $25/$tCO_2$)
    - Thus far the international community has promised $200m for adaptation measures, but the required funds are estimated at tens of $billions
- Significantly increased demand for Clean Development Mechanism (CDM) & Joint Implementation (JI) projects within the first Kyoto period (2008-2012)
  - The oversupply of CDM/JI drives the prices down
  - The additional global demand estimated at 40 MtCO2 in 2010 (valued at $1bn)
- Infrastructure improvements, especially in straits between developing countries
  - Projects similar to the Marine Electronic Highway in the Straits of Malacca and Singapore
- Transfer of technologies and stimulation of innovation worldwide to reduce fuel and therefore emissions, and costs

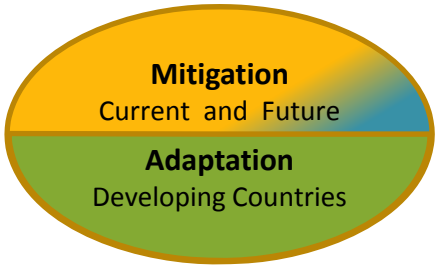
Benefits to Ship Owners & Charterers

- Hassle free solution for CO2 emissions with minimal administration costs
  - No allowances to manage, no individual cap to comply with, services provided, no set-up costs
- No impact on international competitiveness
  - Level playing due to global implementation
- Increased cash flow (EBIDTA) as a result of improved operations and reduced fuel
- Reduced risk of fuel disputes
- Compliance easily verifiable
  - Via fuel and voyage data, and analytical tools
- Reduced risk of multiple regulations
- Benefits of better image (clean transport, social responsibility)

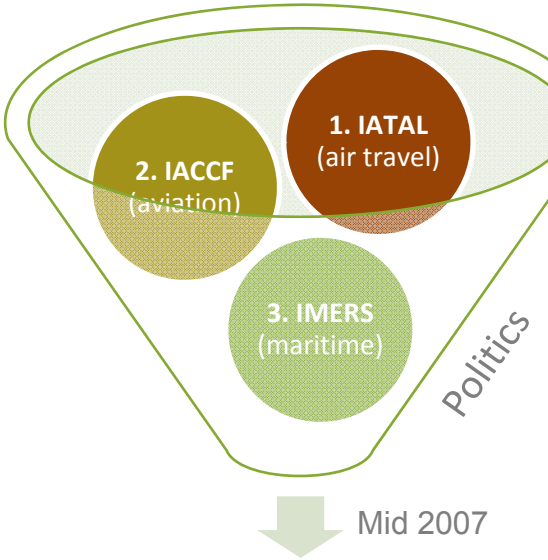
Climate change action makes a good business sense

Wrap-up & Discussion

- Major problems can be addressed at scale with a hybrid price-quantity instrument:
  - Maximum efficiency with minimum rate
    - Global; at 40% of the market carbon price, lower than typical trading schemes, and lower than tax systems linked by value to carbon price
  - Delivers not only the current emission reductions, the quantitative cap, but also stimulates longer term technology innovation & transfer
  - AND contributes major funding for adaptation in developing countries, within the overall low cost!



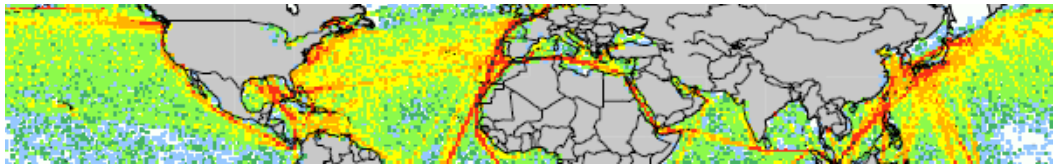
- The challenge and opportunity for international shipping:
  - If a global approach is not found complex & expensive solutions are likely to emerge
    - Such as trying to include shipping in a regional trading scheme
    - Local funds likely to go to priorities different than development, climate change and even shipping improvements
  - More a political than economic or technical issue; needs pushing



- Discussion
  - Experiences and lessons learned
  - Can this thinking, approach work elsewhere?

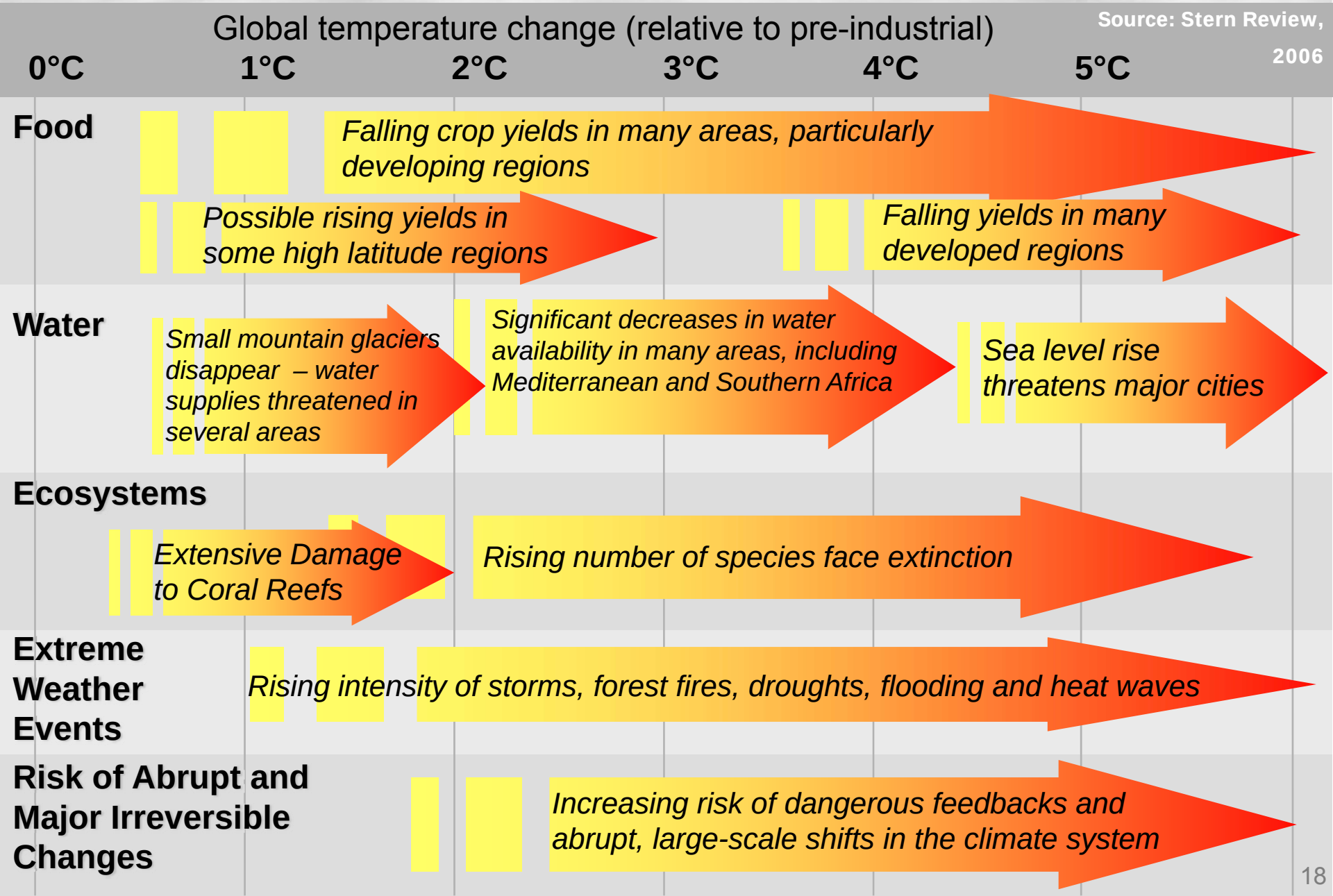
#3; other?

Additional Materials



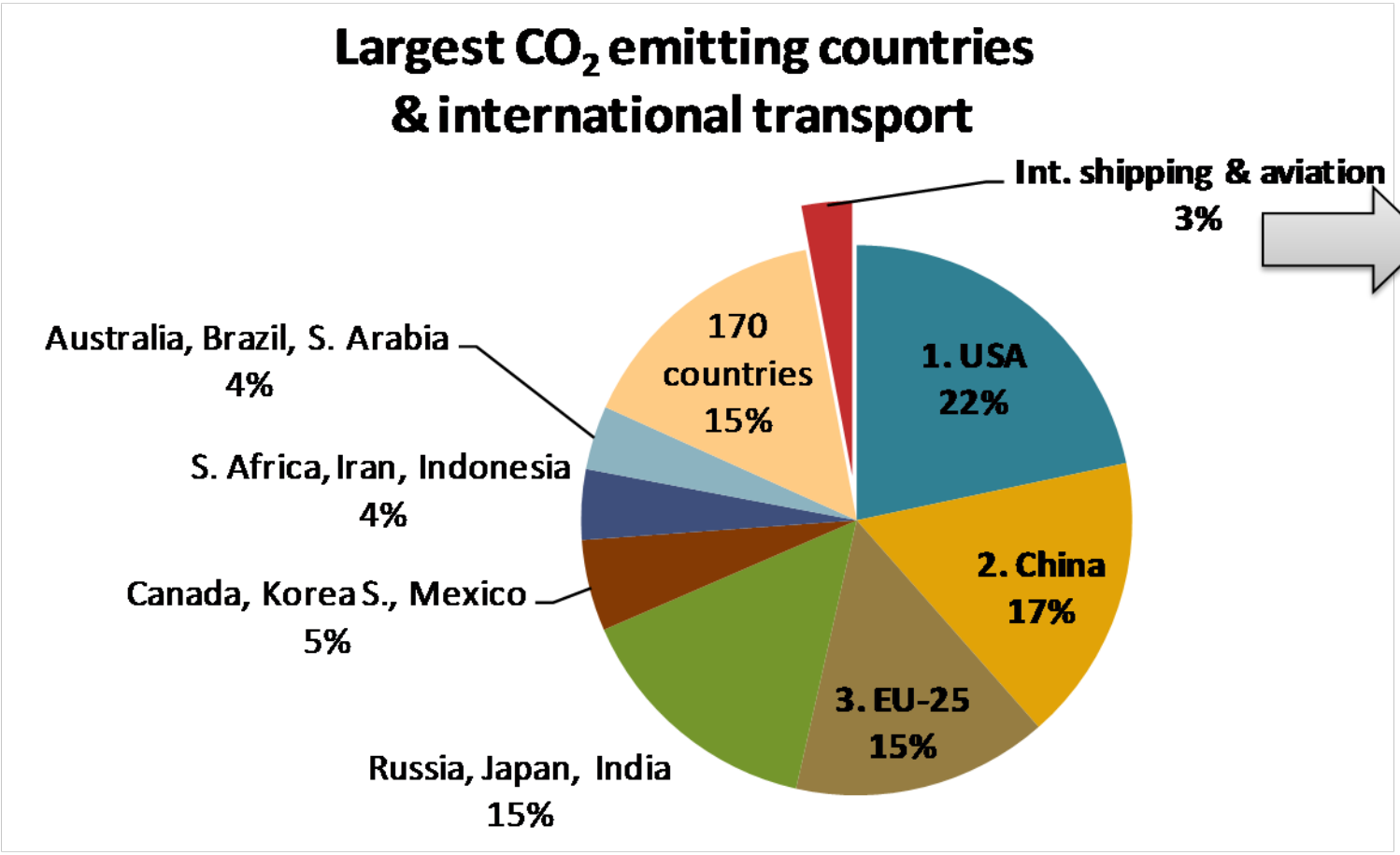
Backup slides and further information

Projected Impacts of Climate Change



Tackling International Transport CO_2 Emissions ...

Emissions are Far from Small*, and Grow Rapidly



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Source data: wri.org + bunker estimates for 2003

IMERS Key Details #1 of 2

1. Common but differentiated responsibility principle.
   - The differentiation is achieved by providing major contributory funding to climate change adaptation in developing countries.
2. Emission allocation: None.
   - The scheme achieves an emission cap on international shipping emission through a hybrid price-quantity mechanism that is linked to established emission markets, thereby delivering the reduction in the most cost effective manner.
   - The scheme avoids the complex problem of allocating emission allowances to countries, flags, routes or ships, and associated issues, such as lack of a reliable emission baseline, high transaction costs for small emitters etc.
3. Emission baseline: relative measures used, avoiding controversies of absolute emission baselines.
   - The relative emission growth drives the charges in the scheme, while the amount of monies raised is a function of absolute emissions.
4. Emission growth. In this example 2.1% annual growth, on average.
   - The emission growth ratios were found to be remarkably similar for the majority of emission forecasts even when the absolute shipping emissions varied by as much as a factor of 2.
5. Emission cap. At 2005 level till 2050, assumed.
   - A global cap for CO_2 emissions from international shipping is assumed at a constant level till 2050 and equal to the emissions of 2005. For illustration purposes we use an estimate of just under 500 $MtCO_2$ for 2005.
6. Fund structure and goals. A maritime GHG fund is proposed to be established under the IMO to directly collect and invest funding.
   - The investments comprise mitigation and adaptation, wherein the mitigation is for the current and future maritime emission reductions, while the adaptation funding is for the developing countries only, to be managed separately. Here, the adaptation and mitigation parts are assumed equal (50:50).
7. Price impact. Shipping costs of goods increased by just 3% translating to a **0.1% impact on end customer prices**.
8. Funding and equity. The funding is raised through an emission charge.
   - The charge applies to all participating ships and is calculated as emissions multiplied by a unit emission charge.

IMERS Key Details #2 of 2

1. Unit emission charge. An initial charge of $10/tCO2 would deliver the funding required.
   - This charge is calculated from the relative emissions above the cap and the market carbon price of $25/tCO2, further adjusted for future mitigation, and adaptation. The calculations include estimates for the appropriate levels of mitigation funding.
2. Scheme coverage. Global, ships > 400 GT, around 35,000 ships. International emission, CO_2 only.
   - Approximately equal to 80% by number, 99% by tonnage, 95% by emissions.
3. **Annual quantum of funding:** mitigation and adaptation, in excess of **$4bn pa.**
4. **Results**. Total emissions reduced by around 0.7% to 1% annually till 2050
   - We estimate that the combination of the market mechanism, additional technical and operational industry improvements, including the mitigation programmes paid for by a portion of the funds raised, will bring the reductions. The **emission impact** till 2100 would be **more than halved** due to the reduced growth and the effect of bringing forward step changes by up to 10 years.
5. The environmental result of the scheme:

	By 2050, $GtCO_2$	**2051-2100**, $GtCO_2$
Emission avoidance:	7	21
Emission mitigation (offset):	8	10
Total environment:	**15**	**31**

6. Operational details : obtaining data and charges.
   - We suggest that ship managers are responsible for reporting the amount of fuel used for the voyages ended in the previous month. We further suggest that fuel payers, typically charterers, are responsible for payment of monthly emission invoices to the fund directly, without a transit through national systems (another option is to collect an emission surcharge through suppliers when fuel is sold).
7. Enforcement. In selected ports.
   - Both for the provision of fuel data, and for payment of the emission charges for the period ending three months earlier, when needed. GHG accounting and verification will be subject to ISO 14064.
8. Adjustments to new realities. Periodic IMO governance mechanisms would allow for adjustment of charges and funding policy to new realities.

Complexity and Scale

Potential Number of Ships within the Scheme

- Scheme coverage for ships > 500 GT (preferred option >400 GT, as per MARPOL)
  - 75% by number of ships (32 thousands of ships)
  - 99% by tonnage of ships (570 millions GT); around 95% by emissions
    - Relevant statistics for ship number and tonnage are aggregated below (for cargo carrying ships)
  - Around 1,000 ship managers

Distribution of fleet in 2005 by type and size

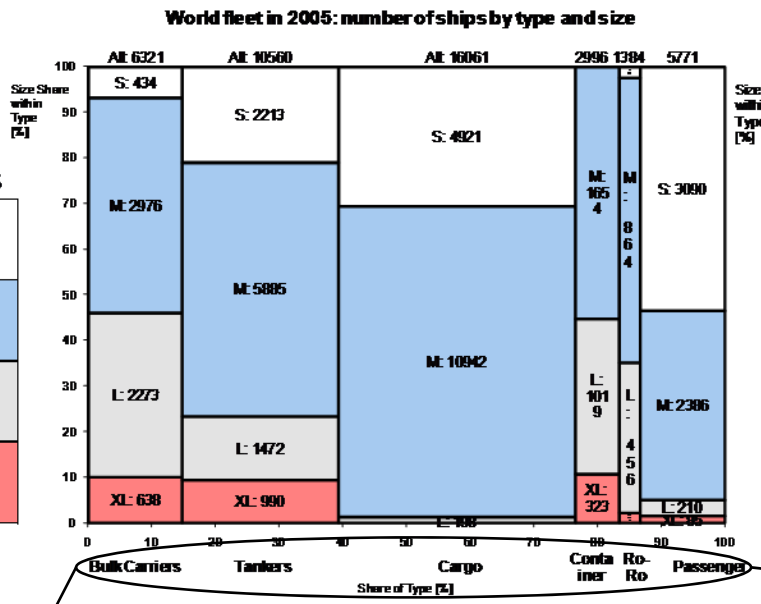
1. NUMBER of ships (Total ships = 43,093)

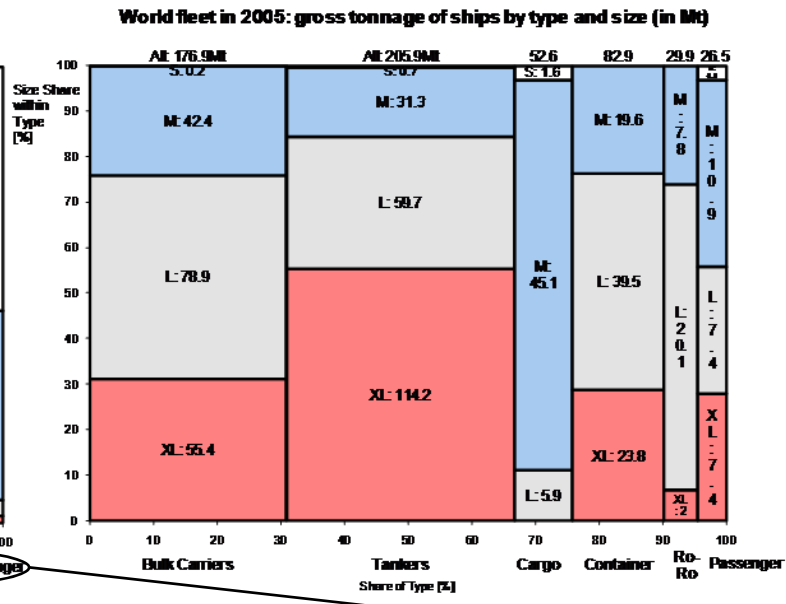
2. TONNAGE of ships (Total tonnage= 574.7 Mt)

Ship sizes & GT thresholds

S (small):	**GT< 500**
M (medium):	**500 - 25,000**
L (large):	**25,000 - 60,000**
XL (very large):	**GT>60,000**

Based on source data from: Equasis, 2007



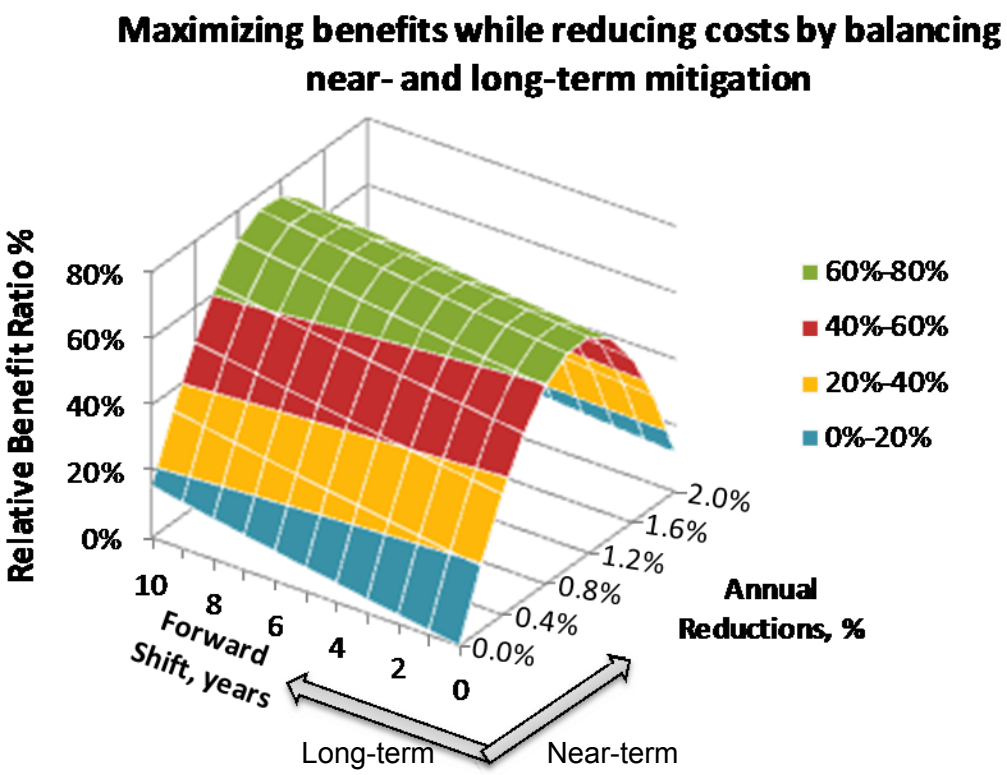


Ship Types: Bulk Carriers | Tankers | Cargo | Container | Ro-Ro | Passenger

Balancing Benefits and Costs

- Why not target much higher reductions?
  - The cost of significant emission reductions in international transport will stay much higher than in other sectors, such as power industry, for decades
  - Funding is needed to invest in reductions but the market will drive in which sectors the largest reduction happen

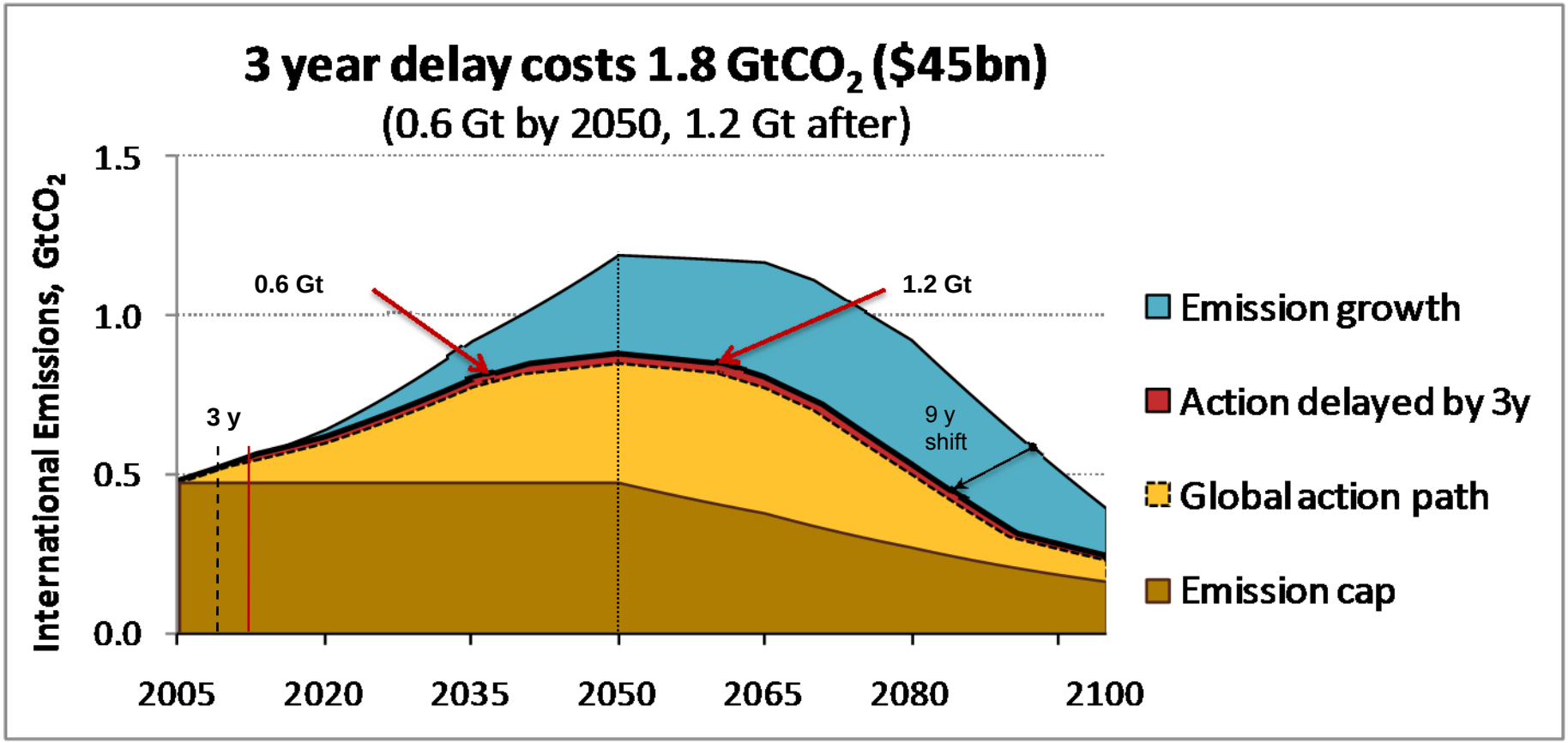
Illustrative sensitivity analysis to maximize environmental benefits while minimizing the costs
(40:60 weightings between the two goals)



Cost of 3 years delay (by 2050) **= 1 year of emissions ... or $15bn.**

Action can halve the impact and pay for improvements!

- Let's assume emission reduction potential of 0.7% pa, delayed by 3 years:
  - Improvements start 3 years later
  - Bringing forward step changes is reduced by 1 year (from 10 to 9)
    - The impact and cost of delay is shown below



International Mitigation Compliance

- Addition of a single maritime registry will guarantee compliance with the current and any future GHG regime

Adding **maritime** to the network of linked registries