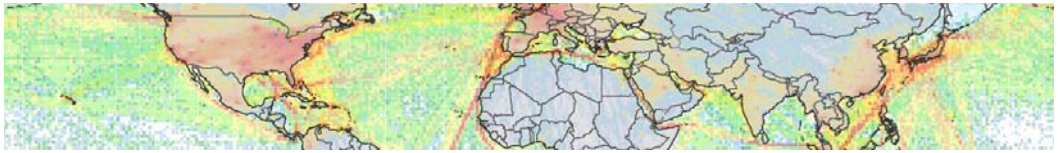
Data requirements and reporting in a charge-and-cap approach



Data requirements for an efficient price-quantity GHG emission mitigation scheme for international transport

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Agenda

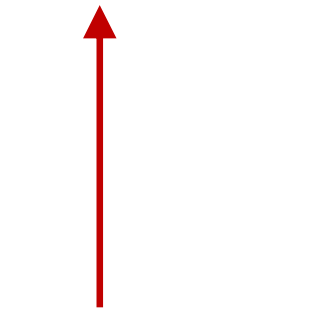
- A novel approach for international transport, “charge-and-cap”
  - What it is?
  - Data requirements
  - Reporting options
  - Beyond practical viability
    - Elements for political attractiveness on the example of IMERS: An International Maritime Emission Reduction Scheme

What is a charge-and-cap approach?

"Charge-and-cap" is a name I gave to:
A novel hybrid economic instrument based on a harmonized charge that is:

- **Using a carbon price established** by the large emitting industries
- **Delivering quantity target** through a "clearing house" for a sector, or its part (bubble[1])

GHG Policy Options



1. **Hybrid price-quantity**
2. Charges or GHG tax
3. Hybrid cap-and-trade scheme
4. Cap-and-trade with banking, borrowing, and allocation auctioning
5. Traditional cap-and-trade scheme
6. Non-market regulations and standards

[1] Bubble – a regulatory concept whereby several emitters are treated as if they were a single emission source.
[2] Benefits of a GHG tax could be 1/3 higher than those of cap-and-trade, on national level. Source: US CBO, 2007.

Data requirements

→ Eliminate or reduce impact of inaccurate data

Data Requirements (Practical Viability elements)	
1 **Scheme Design**	
1.1 Emissions allocation (parties, flags, routes, ..	-- (none; SBSTA option 1)
1.2 Allowances distribution (to participants)	-- (none needed)
1.3 Participating entities	Fuel payers (~ charterers); ship managers for reporting
1.4 Reporting, Verification & Compliance (RVC)	RV: direct; C for data & payments: in selected ports
2 **Implementation Feasibility**	
2.1 Accurate data availability	Emission growth; available
2.2 Minimum operational data	Fuel data, used or delivered; available
2.3 Reuse of existing data & work	Voyage data for V.; CO2 index once operational
3 **Scheme Parameters**	
3.1 Cap or aspirational goal	YES aggregated; for example: at 2005 level, or similar
3.2 Emission baseline (B) and/or growth (G)	Baseline NOT needed; Annual emission growth used

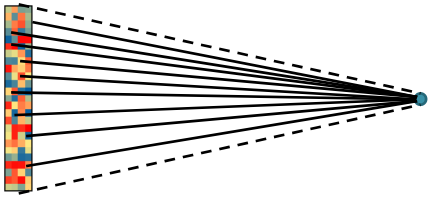
Fuel reporting options & implementation costs

→ Reduce reporting complexity and costs to participants

Maritime

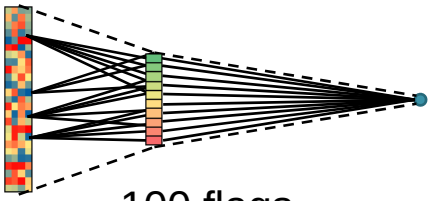
A. Ship Managers Direct

1,000 ship managers/ companies



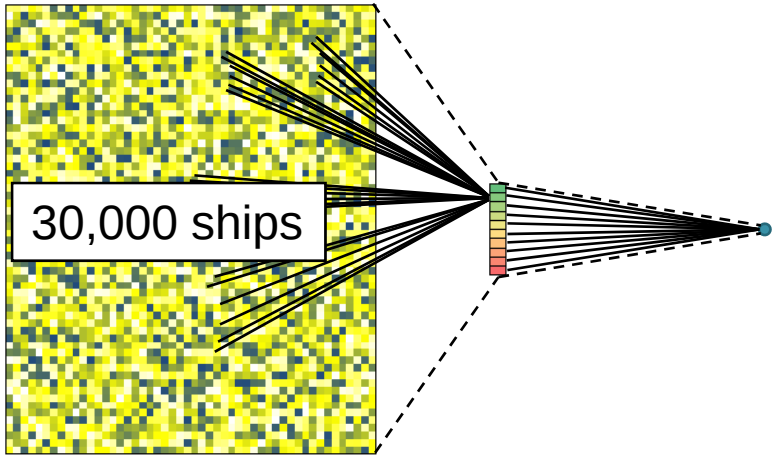
1 database
(fuel used ➔ CO_2 emissions calculated)

B. Ship Managers via Flag States



100 flags

C. Ships via Flag States



Scale: 1:10 (1 square = 10 ships, etc.)

	Time to Results	Reporting Effort	Project Risk	**COST Relative**
A	4 months	1	5%	**1**
B	24 months	5	20%	**100**
C	36 months	20	30%	**1,000**

Say: $1mln, $100mln and $1bn
Confidentiality and security are best for the simplest option.

Up-stream options, through suppliers

- less flexible – not shown

Reporting alternatives; Verification and Enforcement

→ Reuse available data and services

- Up-stream approach
  - Data and charges collected through fuel suppliers
  - In theory simpler but in practice probably not, also less flexible:
    - Very similar to tax on fuel, with its negative perception
    - More difficult to implement a supra-national approach, politically and operationally
    - Difficult to implement performance-based charges or incentives
- Secondary data
  - Data from fuel suppliers can be used for validation and proving the overall scheme consistency
  - Voyage data could be used for error validation (AIS, and similar)
- Verification and Enforcement
  - At selected ports
    - For submission of correct reports (versus bunker delivery notes, for instance)
    - For payment of charges
    - Raised through software tracking; spot checks

Reporting foundation

→ 1. Use real data, and learn; 2. Reduce risk of fraudulent behavior

Maritime

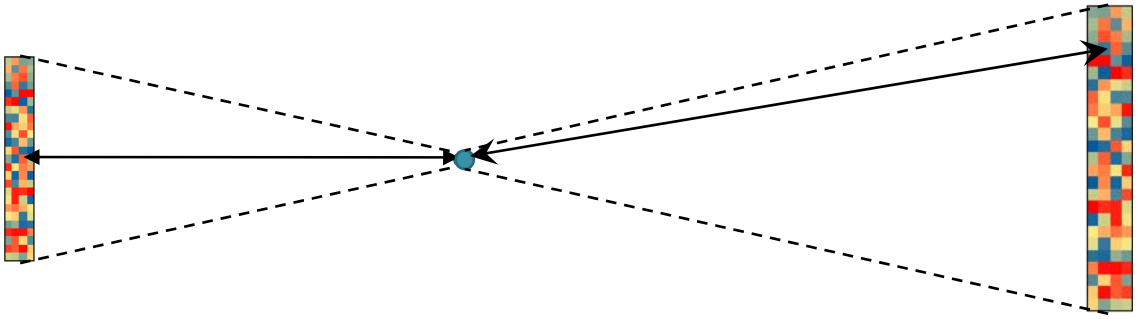
1. **Foundation -** Reporting of fuel per voyages completed in a given period (month)
   - **Compulsory** data (total fuel)

IMO #	Voyage	End Date	HFO	DO/GO
1234567	15	25 Jun 07	4,876	64

   - Optional entries: Call sign, Location, Distance (nm), Cargo (tons), Cargo (alt unit)
     - If collected the IMO CO_2 index could be calculated and used

2. If and when a market-based scheme is agreed, the "fuel payer" details are added (to reflect the various business models)

Fuel Payer ID
…



Ship Managers

"Fuel Payers" (charterers etc.; approx. 2,000)

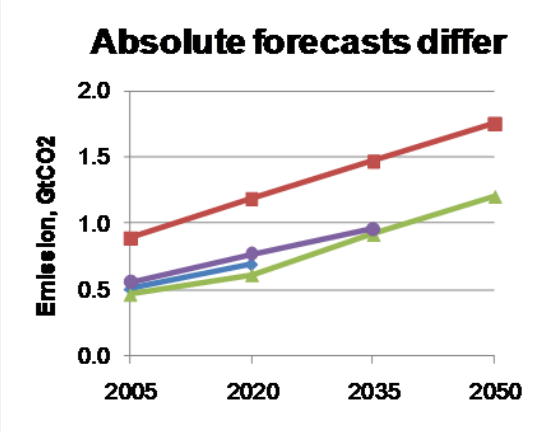
Fuel Reporting & Validation (incl. FP ID) (separate flows reduces risk of fraud)

Consolidation, billing & collection of charges

Relative scheme parameters might be best

→ Use reliable data

- A scheme that relies on relative parameters, such as emission growth, has many advantages
  - Issues of an unreliable emission baseline are avoided
  - Starting small and including new participants are easy
- Example for the shipping CO_2 forecasts



Normalized forecasts are very similar:

(after excluding military vessels, not present in all)

Source for multiple	2005	2020	2035	2050
IMO, 2000	1	1.36	-	-
Eyring, 2005	1	1.35	1.88	2.42
den Elzen, 2006	1	1.32	1.97	2.58
Eyring, 2007	1	1.39	1.92	-
IMERS average	**1**	**1.35**	**1.93**	**2.50**

Differences within 3%

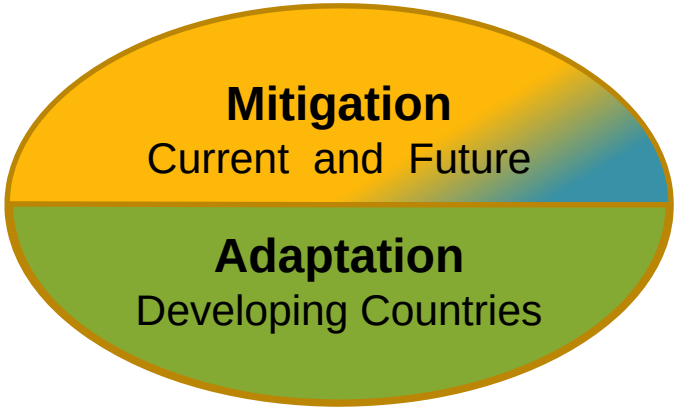
- *Efficiency depends on reliable data; a lesson from the EU ETS:*

Building up a compelling international proposition

IMERS: 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



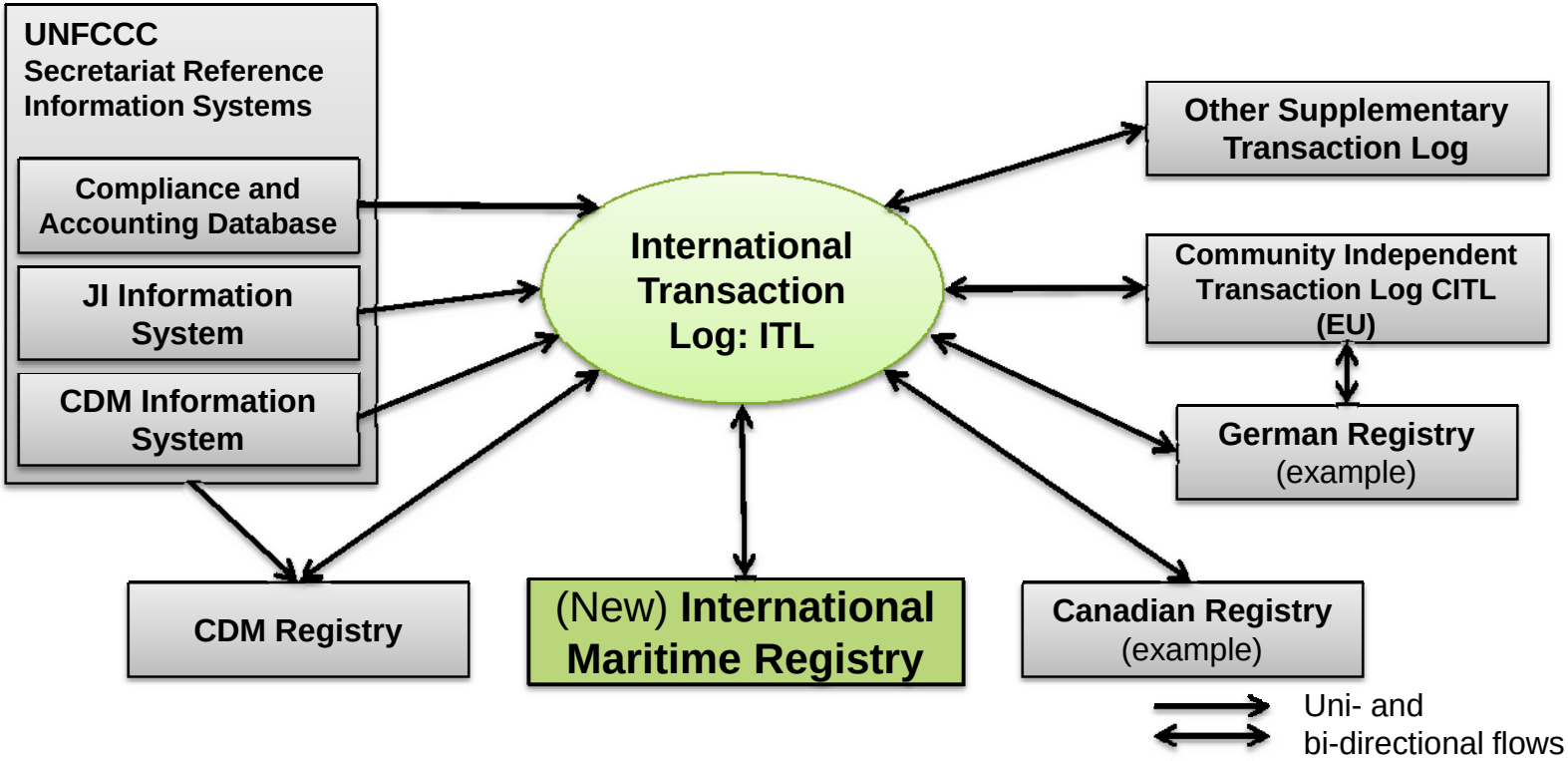
Key design details:

- **No allocation** of emissions to countries, **one aggregated emission cap**
- **A fund** established to invest in 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 & a quantity target

International reporting and mitigation compliance

→ Integrate in a flexible manner

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

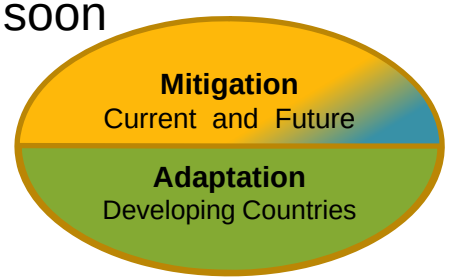


- International and domestic reporting
  - GHG emissions from the domestic sectors of sea-going ships could be provided/aggregated by the scheme for the parties and/or UNFCCC *(assuming no change in the IPCC rules)*

Wrap-up, Q&A

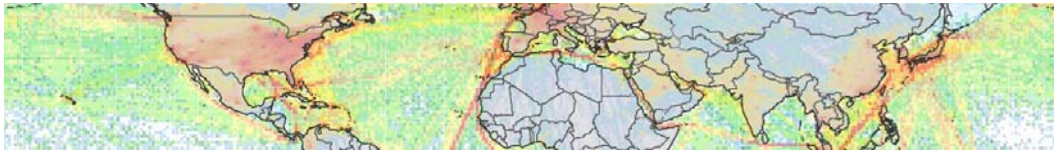
- GHG data issues can be addressed with a charge-and-cap instrument
  - Emission allocation and allowances distribution → eliminated
  - Absolute emission baseline → not needed; emission growth used instead
  - Reporting → simplified; effort for participants → reduced
  - Resulting lower costs and simplicity translate to → better compliance

- The challenge and opportunity for international shipping
  - Data and policies must work cost-effectively together, and soon
  - A differentiated mechanism combining mitigation with adaptation has been proposed for IMO
  - If a global approach is not found, complex and expensive solutions are likely to emerge



- Q&A

Additional Materials



Backup slides and further information

Status of the idea

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

- **Market-based policies are far superior** at the lowest cost than non-market regulations and standards to reduce emissions
  - More leadership, push and pull, is needed
  - Compliance is much easier if costs are lowered

Collection and Investment Sides

IMERS sample portfolio split and details

International Governance (IMO)

Portfolio split; Annual level of charges

Data and Charges Collection

1. Fuel data

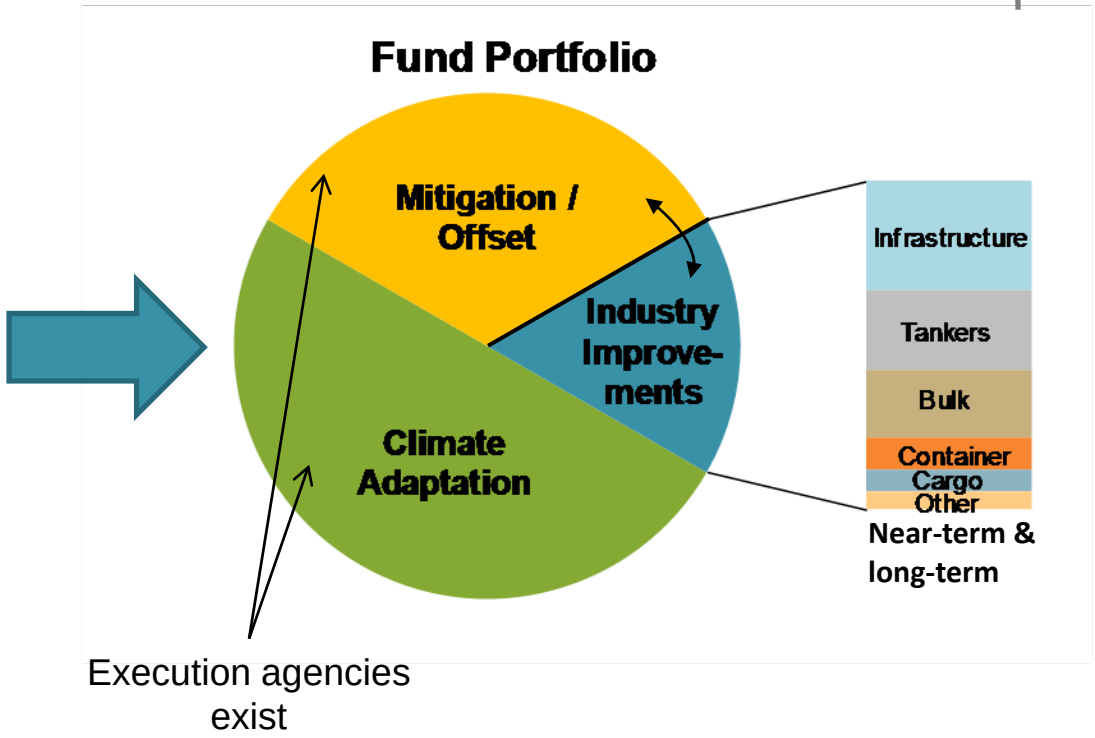
2. Charge = Emissions x Unit charge

Example: Unit charge in 2010 = \$10/tCO_2

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

International emissions covered ~ 0.4 $GtCO_2$

→ Significant global funds raised



Execution agencies exist

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.

Benefits to Developing Countries

- Major funding for adaptation to climate change
  - Estimated at $2bn per annum (assuming equal split of funds & carbon 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 (~ 50:1 ratio)
- Significantly increased demand for CDM & JI projects within 1st KP period
    - CDM = Clean Development Mechanism, JI = Joint Implementation, 1st KP - the first Kyoto period from 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

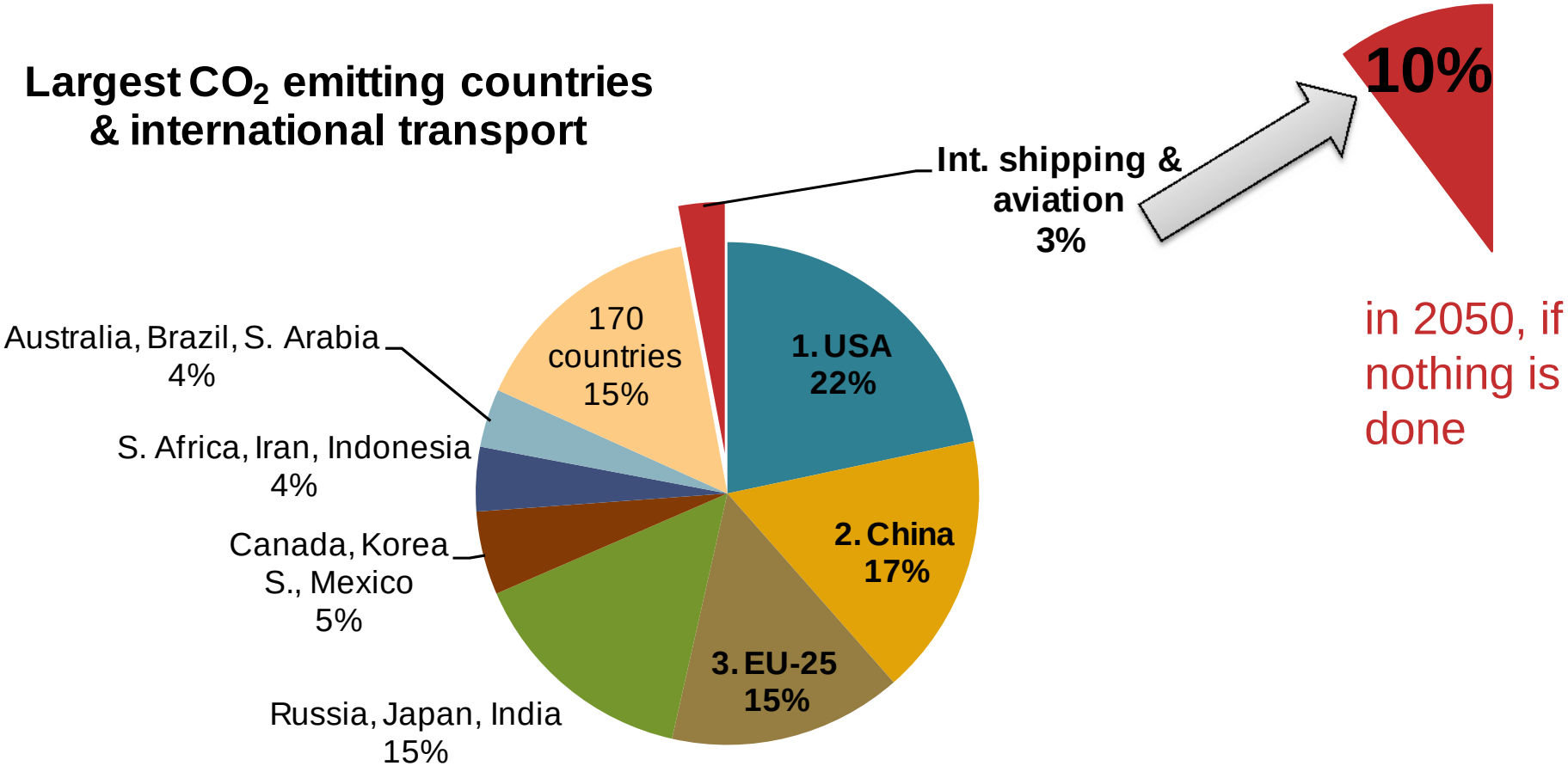
- Hassle free solution for CO2 emissions with minimal administration costs
  - No allowances to manage, no individual cap to comply with, services provided, no set-up costs
- No impact on international competitiveness
  - Level playing due to global implementation
- Increased cash flow (EBIDTA) as a 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

Tackling International Transport CO_2 Emissions ...

Emissions are Far from Small*, and Grow Rapidly

Largest CO_2 emitting countries & international transport



* 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 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

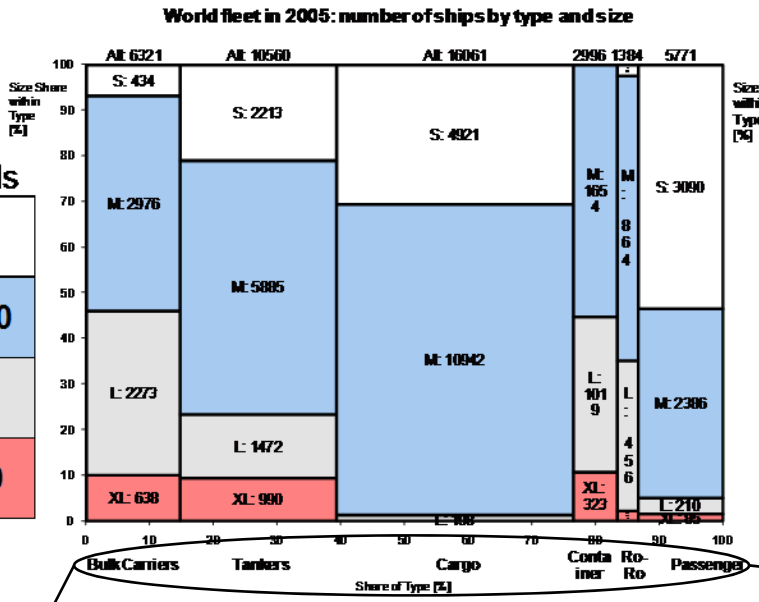
Potential Number of Ships within the Entire Scheme

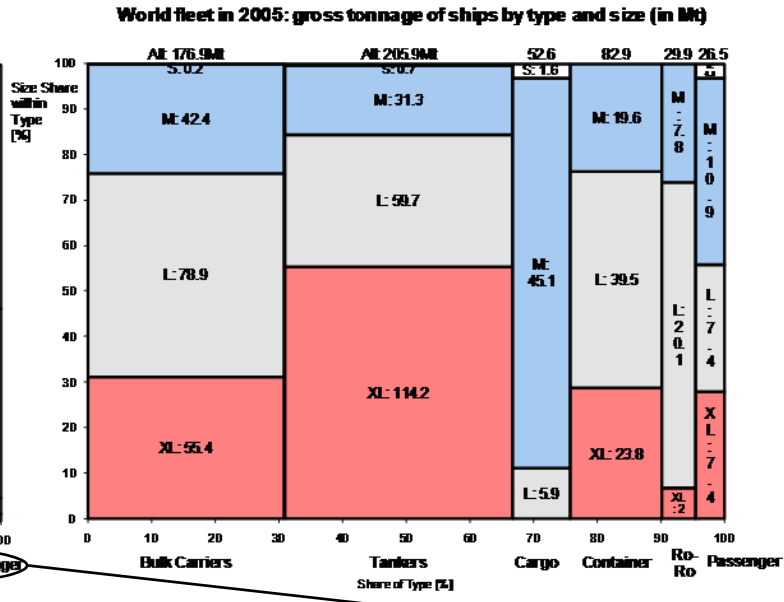
- Sample coverage for ships > 500 GT (recommended option >400 GT, as per MARPOL)
  - 75% by number of ships (32 thousands of ships)
  - 99% by tonnage of ships (570 millions GT); around 95% by emissions
    - Relevant statistics for ship number and tonnage are aggregated below (for cargo carrying ships)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

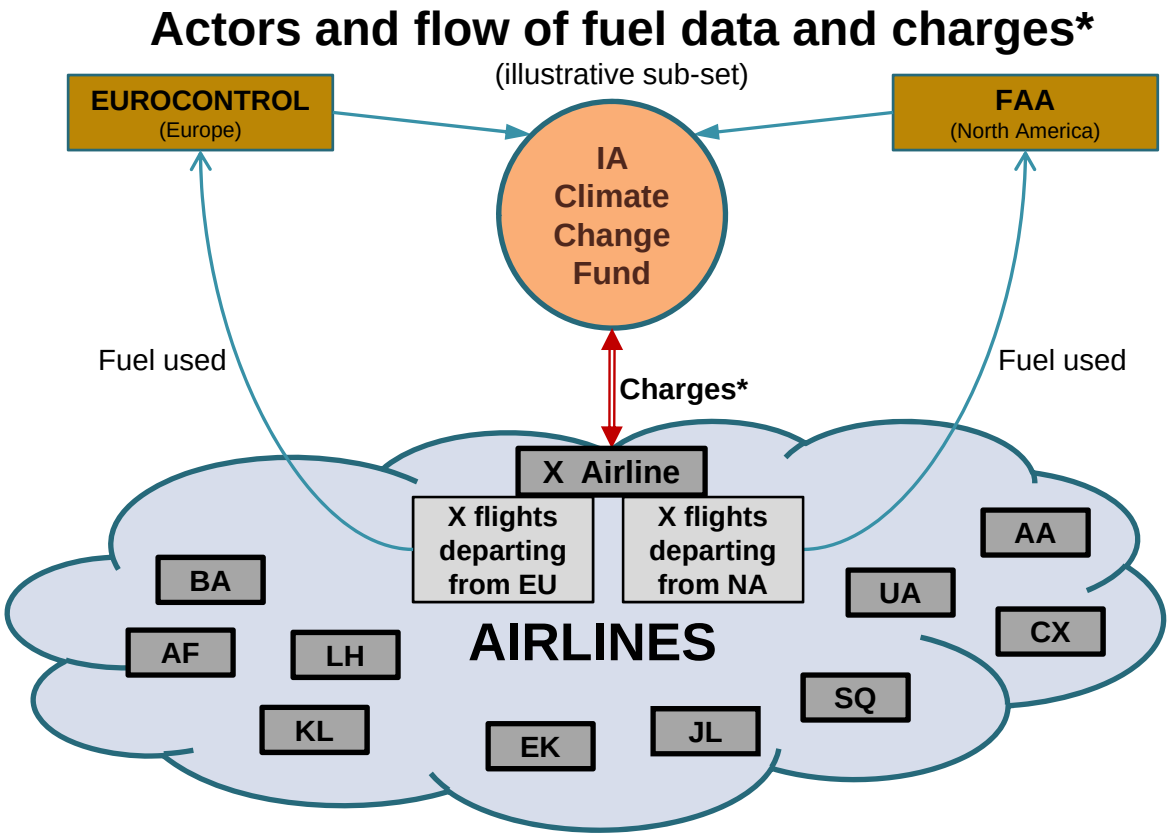
S (small):	**GT< 500**
M (medium):	**500 - 25,000**
L (large):	**25,000 - 60,000**
XL (very large	**GT>60,000**

Based on source data from: Equasis, 2007

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

Charge-and-cap with a Fund for Aviation

- Idea can be applied to international aviation, and I floated it in early 2007
  - International Aviation Climate Change Fund under ICAO (IACC Fund); timing was wrong then
  - Data can be collected through the traffic management organizations (ATM))
  - A multiplier for non-CO2 effects can be easily implemented



*Collection of charges could also be outsourced to some air traffic management organizations as many are equipped to do so.