Grouping and evaluation of proposed MBMs (GHG WG 3/3): the position of Greece

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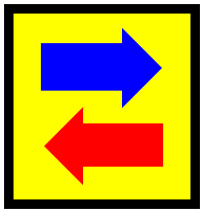


Outline

- Rationale of submission (GHG WG 3/3)
- Grouping of proposals in 4 groups
- Comparative assessment

Measures contemplated

- Technological
  - More efficient (energy-saving) engines
  - More efficient ship designs
  - More efficient propellers
  - Cleaner fuels (low sulphur content)
  - Alternative fuels (fuel cells, biofuels, LNG, etc)
  - Devices to trap exhaust emissions (scrubbers, etc)
  - Energy recuperation devices
  - “Cold ironing” in ports
- Logistics-based (operational)
  - Speed reduction
  - Optimized routing
  - Several others
- Market-based
  - Emissions Trading Scheme (ETS)
  - Carbon Tax/Levy on Fuel
  - Several others

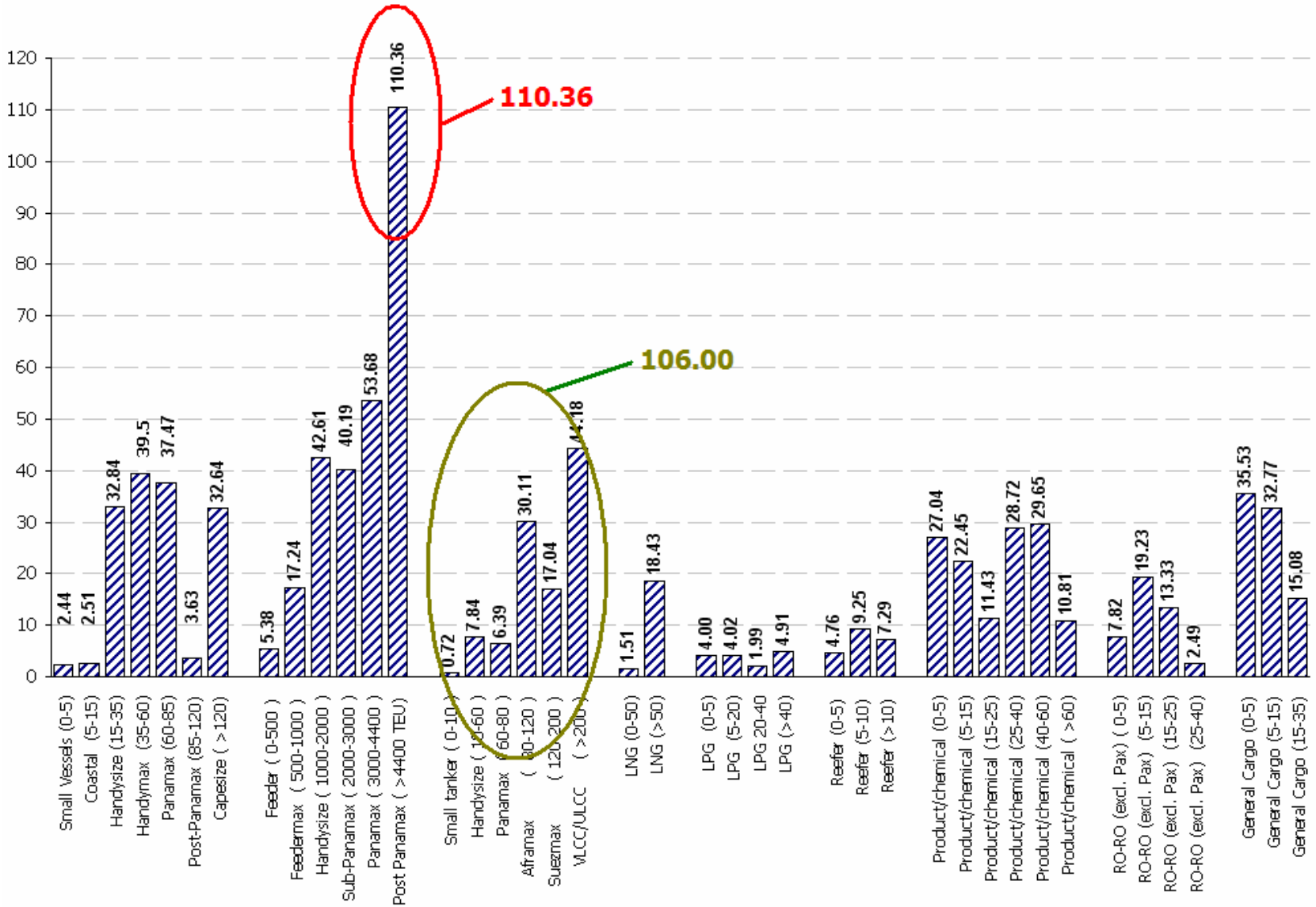
What an MBM can do

- May induce ship owners to adopt measures that will reduce CO2 emissions
  - Measures can be technological or logistics-based
- May also collect money to be used to reduce CO2 emissions outside the marine sector
- May use part of the money to support LDCs and R&D

Example

- Impose a Levy on bunkers
- May induce shipowners to slow steam
- CO2 is a non-linear function of speed
- Slow steaming would reduce CO2 emissions

CO2 emissions per vessel category (million tonnes)



Example #2

- MBM may induce shipowners to purchase ships that are more energy efficient (better engines, propellers, hulls, etc)
- They would invest in these technologies that would save CO2, rather than pay for the MBM

  (equivalent: buying a hybrid car)


SkySails
BELUGA PROJECTS

In-sector vs out-of-sector

- GHG reductions in 2 ways:
  - **In-sector** emissions reductions from shipping; or
  - **Out-of-sector** reductions through the collection of funds to be used for mitigation activities **in other sectors** that would contribute towards global reduction of GHG emissions

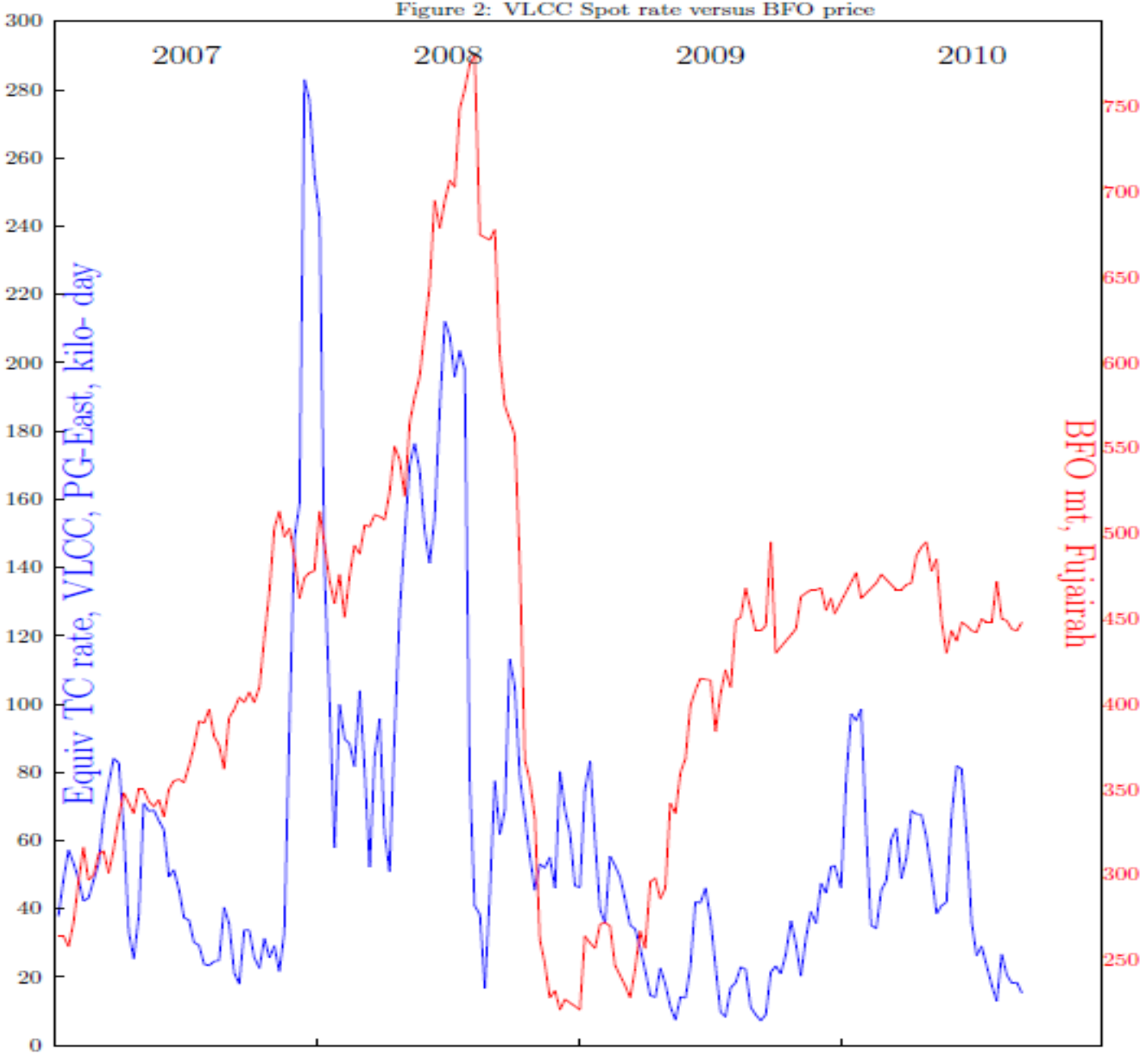
Greece

- Did not propose an MBM proposal of its own, BUT:
- Has actively followed all of the relevant discussions,
- Has participated at the Expert Group and
- Has studied and evaluated all MBM proposals with an utmost sense of objectivity and fairness.

Some basics

- **Ships do not trade at predetermined speeds**, as is implied by much of the discussion thus far.
- Those who pay for the fuel, that is, the ship owner if the ship is in the spot market on voyage charter, or the charterer if the ship is on time or bareboat charter, will **choose an optimal speed** as a function of
  - (a) bunker price, and
  - (b) the state of the market and specifically the spot rate

Figure 2: VLCC Spot rate versus BFO price



Basics ii

EG group report (paragraph 8.12):

- **“owners of ships on time charter or bareboat charter are insensitive to fuel consumption”**
- since the fuel is paid by the time charterer and not the owner.

Not true

- When a ship is fixed on time charter, the ship's speed and consumption are clearly described in the charter party. A ship with a poorer warranted speed and consumption will receive a lower charter rate than a ship with a better consumption curve.
- Under the circumstances, **the owner of a ship on time charter has every incentive to make any effort in order to economize on fuel consumption while on time charter.**

Basics iii

- Even though the owner's and time charterer's speed optimization problems may seem at first glance different, for a given ship the optimal speed (and hence fuel consumption) is in both cases the same.
- In that sense, from an emissions standpoint, **it makes no difference who is paying for the fuel,** the owner, the time charterer, or the bareboat charterer**.**

Owner in spot market

- s: spot rate ($/tonne)
- C: payload (tonnes)
- p: fuel price
- F(v): fuel consumption at speed v
- D: route r-trip distance
- E: OPEX ($/day)

$$\max_{v} \left\{ \frac{sC}{\frac{D}{24v}} - pF(v) - E \right\}$$

Time charterer

- R: demand requirements (tonnes/day)
- T: time charter rate ($/day)

$$\min_{v} \left\{ s \left(R - \frac{C24v}{D} \right) + T + pF(v) \right\}$$

$$\max_{v} \left\{ \frac{sC}{\frac{D}{24v}} - pF(v) - E \right\}$$

$$\min_{v} \left\{ s \left(R - \frac{C24v}{D} \right) + T + pF(v) \right\}$$

observation

- A Levy on fuel will induce slow steaming automatically- this will not happen with any of the other MBMs

Spot rate volatility

- A unique feature of the main ocean transportation sectors is spot rate volatility.
- This implies that the societal value of a ton/TEU-mile can vary by a factor of 10 in a few months.
- This in turns means that ships should be steaming much faster in booms than in busts, producing much more CO2 in booms and much less in slumps.
- A Levy can handle this automatically
- A permit system requires a complicated system of inter-period transfers to attempt to do the same thing. Meanwhile we will have massive swings in permit price. A speculator's dream.
- An ETS has never been tried in this kind of market.

Basics v: weak vs. strong drivers

EG report (para. 9.62):

- GHG Fund proposal is a weak driver for uptake of in-sector technological measures to reduce emissions
- the various ETS proposals are strong drivers

Greece's position:

- NOT TRUE!

Why is that

- To achieve the same amount of CO_2 reduction, if we assume equal efficiency for both systems*, the Levy and the ETS carbon price must be the same.
- We get to choose either the target reduction (for the ETS proposal) or the target Levy (for the Fund proposal). Either can be high or low (our choice).
- If one goes for a modest target reduction, the carbon price will be low, in fact close to zero according to the MAC curves submitted by DNV.

*which is not true!

Revenues generated

- Postulated in report higher for ETS than for GHG Fund
- If carbon price and CO2 reductions are same, revenues will be the same, w/o accounting for admin. costs (higher for ETS)
- Therefore net revenues from Levy will be greater for any carbon price.

Implications

- in-sector CO_2 reductions for the GHG Fund proposal can be **much higher** than those shown in the EG report
- the GHG Fund proposal has an in-sector GHG reduction potential **much higher** than its own proposers may realize

Critical parameter: fuel price

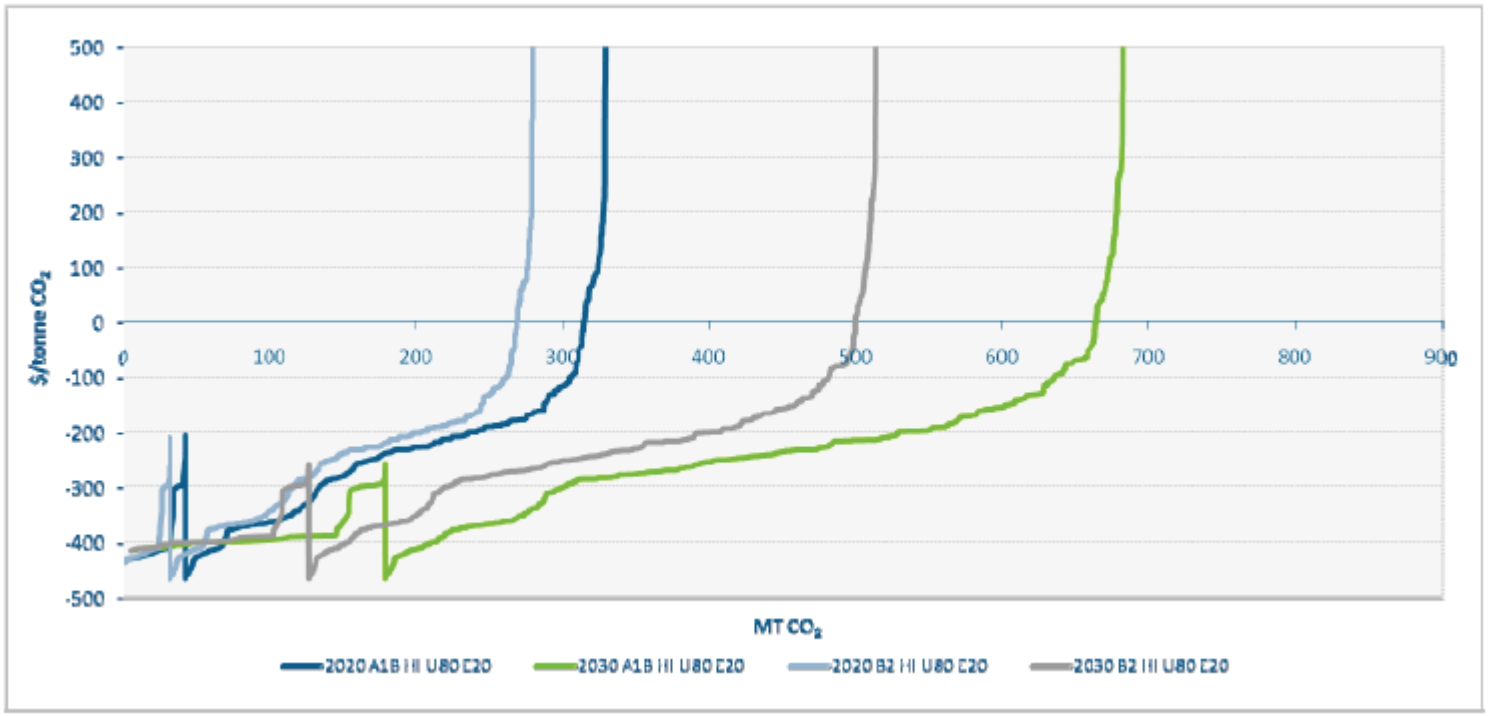
- Much of the CO2 reduction will come because of measures that become cost-effective as fuel prices go up
- It is very likely that fuel prices will be much higher in the future

Marginal Abatement Cost (MAC): dollars per ton of CO2 averted

Let A be a CO2 abatement measure

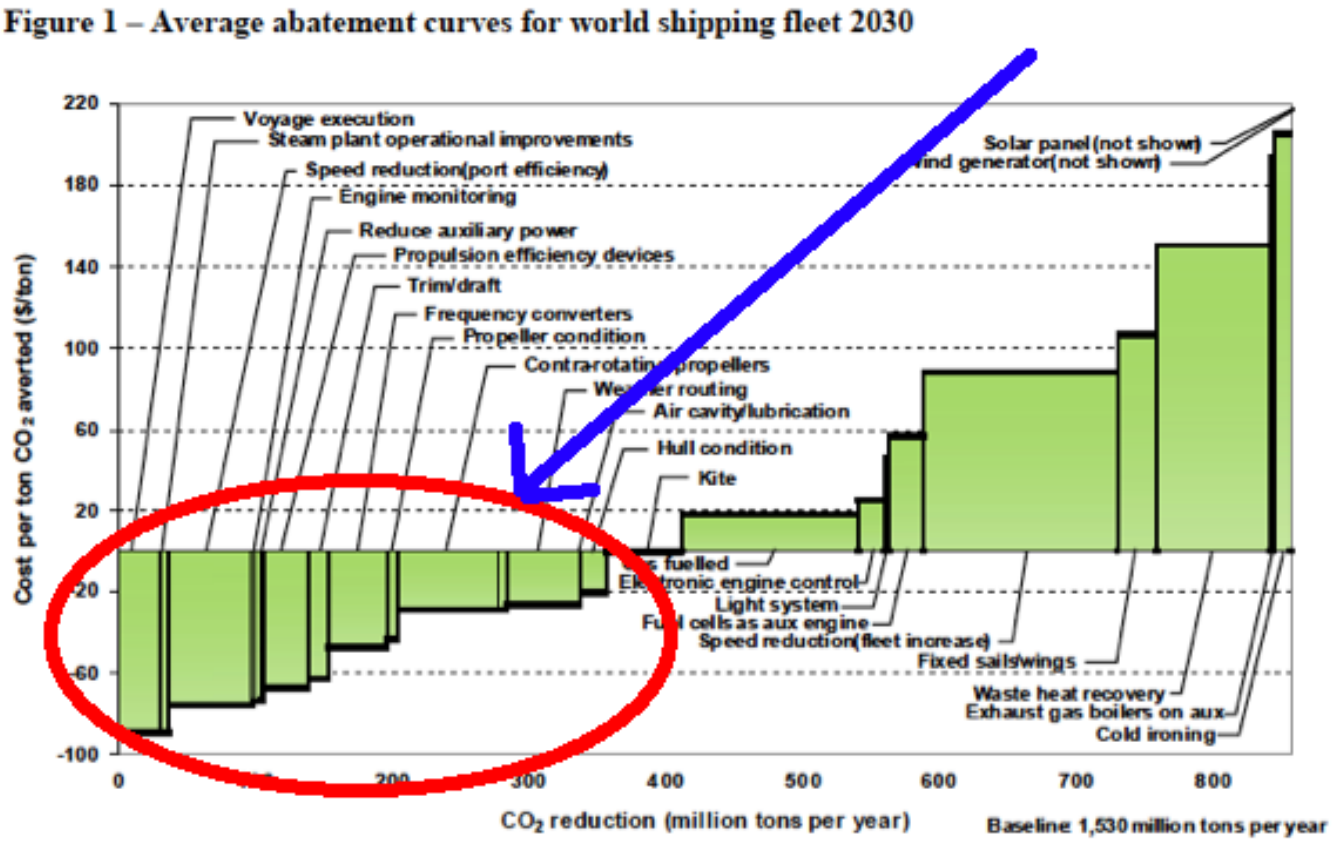
- MAC(A) = ΔNCOST(A)/ΔCO2(A), where
  - ΔNCOST(A) = Net cost differential in implementing A
  - ΔCO2(A) = tons of CO2 averted by A
- ΔNCOST(A) = ΔGCOST(A)- ΔFUEL(A)*PFUEL, where
  - ΔGCOST(A) = Gross cost differential in implementing A
  - ΔFUEL(A) = Fuel consumption averted by implementing A
  - PFUEL = fuel price
- **MAC(A) = ΔGCOST(A)/ΔCO2(A) – PFUEL/F**
  - F = CO2 coef (between 3.02 and 3.11)

DNV's MAC curves

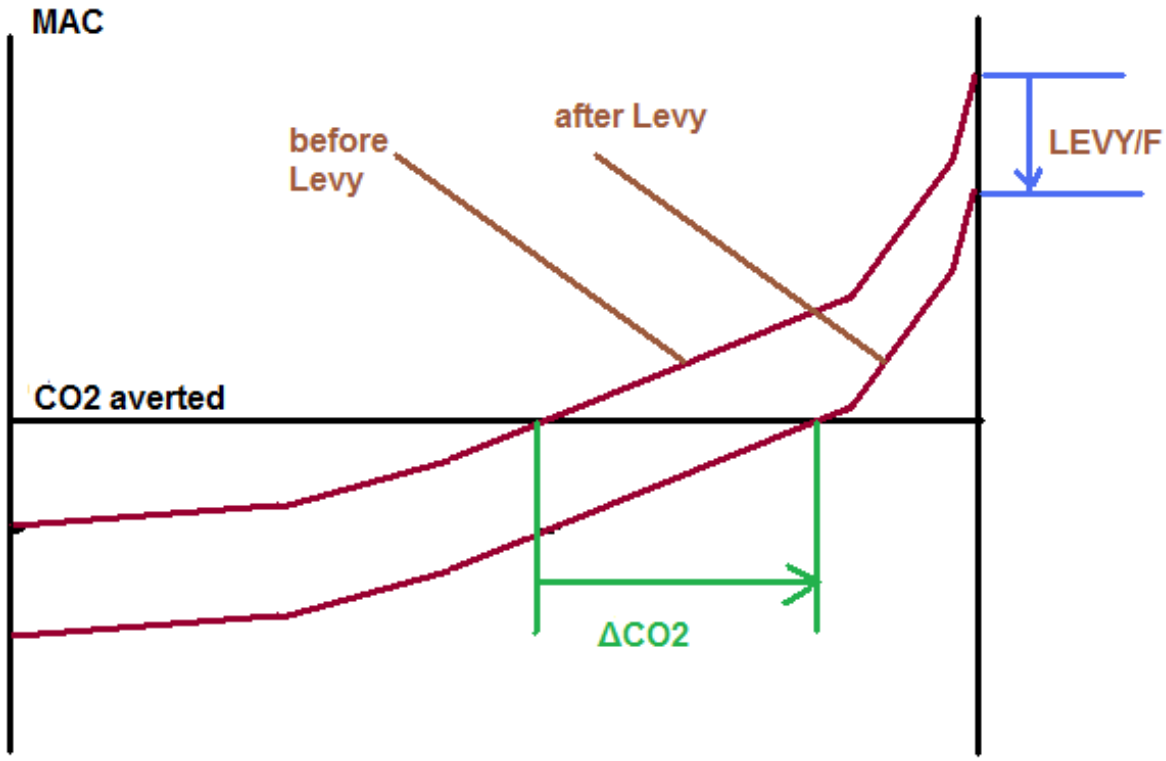


DNV's MAC curves ii

- MAC<0



Effect of Levy using MAC curves



How much CO2 can a Levy reduce?

- With a base BFO price of $465/tonne, a $50/tonne bunker Levy will achieve a 6% reduction in total VLCC emissions over their life cycle*.
- A reasonable estimate of the reduction for a $150/tonne Levy is 11.5%.

*Devanney, J.W. (2010), “The Impact of EEDI on VLCC Design and CO2 Emissions”, Center for Tankship Excellence, USA (www.c4tx.org)

Grouping of proposals

- There is NO unique grouping!

- STEP 1: 2 groups must be GHG Fund (group A) and ETS (group B)
- ‘orthogonal’ (mirror) mechanisms
  - Fund: set target price (Levy)
  - ETS: set target reduction

Grouping of proposals ii

- STEP 2: See if other proposals can be assigned to groups A or B
- If yes, ok
- If no, form separate group

Grouping of proposals iii

- LIS/VES: Front end similar to GHG Fund

BUT:

- Levy (fee) applies only to ships with ‘bad’ EEDI

New group C

- Hybrid proposals that centrally embed EEDI as part of their mechanism

- LIS/VES (EIS)
- SECT

Grouping of proposals iv

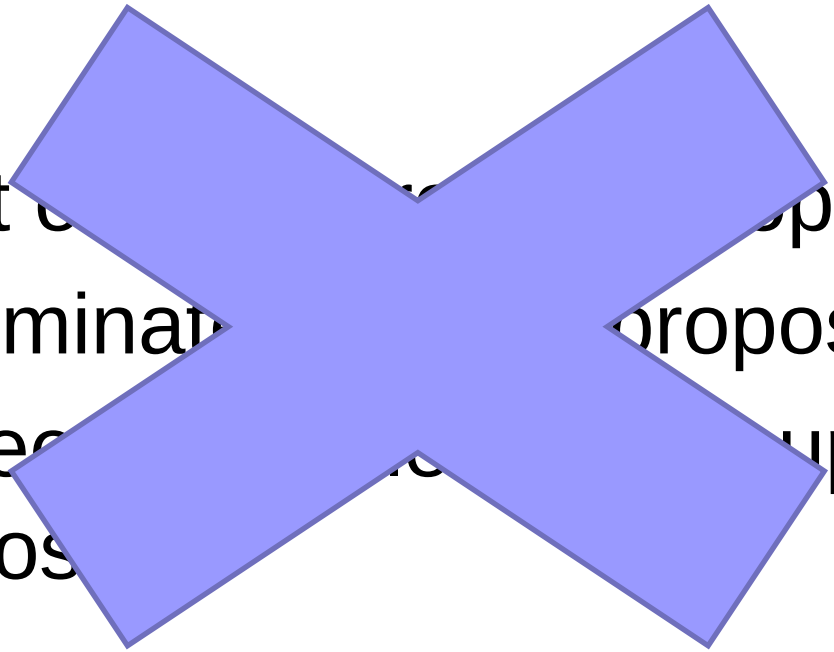
4 groups:

- Group A: GHG Fund proposal (Denmark et al)
- Group B: ETS proposals (Norway, France, UK)
- Group C: Hybrid proposals based on EEDI (USA's SECT, Japan's/WSC's LIS/VES)
- Group D: All other proposals (Jamaica's PLS, IUCN Rebate, Bahamas)

Approach

- I: put on hold group C proposals
- II: eliminate group D proposals
- III: keep on table only group A and B proposals

Approach



- I: put e posals
- II: elimina roposals
- III: ke up A and B propos

- KEEP ALL ON THE TABLE

group C proposals

Group C

- USA's SECT
- Japan's LIS
- WSC VES

- Different, but all embed EEDI as part of their formulation

Issues

- EEDI is an index for new ships
- If any group C MBM is adopted, EEDI will also be applied to existing ships (indirectly, but surely)

Questions:

- How is EEDI going to be applied to existing ships?
- Has this been discussed within the EEDI group?
- Has the impact of this been assessed?
  - Eg, trials to establish speed at 75% MCR
- Have the mechanisms and the costs for doing so been thought out?

Problem with all “hybrid” schemes

- New ships will be impacted in **two ways**, one direct (according to whatever provisions will be adopted as a result of the EEDI deliberations) and one indirect (via the provisions of the hybrid MBM proposal).
- Existing ships will be impacted in **one way**, indirectly, only via the provisions of the hybrid MBM proposal.
- Ships with a good EEDI will effectively enjoy a lower carbon price, a dis-incentive to slow steam and emit less CO2

If a hybrid MBM is adopted

- Additional deliberations of MEPC as regards EEDI (still ongoing) will be warranted, to take into account that **EEDI will also be applied to existing ships.**
- Scheme to conclude EEDI has no provision from the possible introduction of an MBM based on EEDI

Issues

- Where will discussion on EEDI for existing fleet take place?
  - Here?
  - MEPC 62?
- What will be the support for EEDI extension to existing fleet?

Group D proposals

- Jamaica's STEEM (PSL) proposal
- IUCN's Rebate proposal
- Bahamas proposal

- Common feature: little or nothing in common with a specific other group

Bahamas' proposal

- ORIGINAL PROPOSAL: (basically) do nothing

Bahamas' new proposal
(GHG-WG 3/2)

- Subscribes to the assumption that owners of ships on time charter or bareboat charter are insensitive to fuel consumption since the fuel is paid by the time charterer and not the owner (para. 8.12 of the EG report). As said earlier, this assumption is wrong.
- It is actually impossible to establish a reliable Energy Efficiency Operational Indicator (EEOI) for any ship with just 2-3 years of data, especially in the tramp/bulk sector.
- Establishing EEOI baselines is absolutely impossible too.

IUCN's Rebate Mechanism proposal

- "Piggy back" concept
- Use any of the MBM proposals as basis*
- Give a rebate to developing countries according to their imports

*GHG Fund used as an example

What's wrong with IUCN?

- Tries to improve on the GHG Fund giving it certain degrees of flexibility (upper and lower bounds on price)
- This however destroys the price certainty inherent in the Levy as proposed by the GHG Fund.
- In that respect, the GHG Fund scheme provides higher investor certainty
- Has higher admin. costs than GHG Fund

Jamaica's PSL proposal

- All vessels calling at a port pay a charge based on amount of fuel consumed by the vessel on its voyage
- Aim: internalize external costs
- STEEM system of monitoring

- Other than carbon leakage, would create distortion in trade flows and a non-level playing field among both shipping companies and ports.
- Phased implementation would create all kinds of transient distortions, which are likely to continue indefinitely.

Comparison of groups A and B

- Group A: GHG Fund
- Group B: ETS

Denmark's GHG Fund proposal

(+Cyprus, Nigeria, Marshall Islands & IPTA)

DANISH MARITIME AUTHORITY

- Impose a Levy on bunker fuel
  (DK calls it "contribution")
- 2 options:
  - Option 1: collect by Bunker Supplier
  - Option 2: collect by Shipowner

- According to US CBO study, Levy is most efficient way to reduce emissions

Discussion

- Cost certainty: Investors respond better to a known price
- Administrative burden: lower than all other schemes (except Bahamas original proposal)
- Practical feasibility: reasonable (can be modeled after IOPCF)
- Can handle slow steaming automatically

Norway's ETS proposal

(+UK, France, Germany)

NORWEGIAN MINISTRY OF THE ENVIRONMENT

- Cap-and-trade system
- Put a cap on emissions
- Auction and sell permits

- EU ETS: largest ETS market
- Claim: "100% reduction certainty"

Claim:100% Reduction certainty

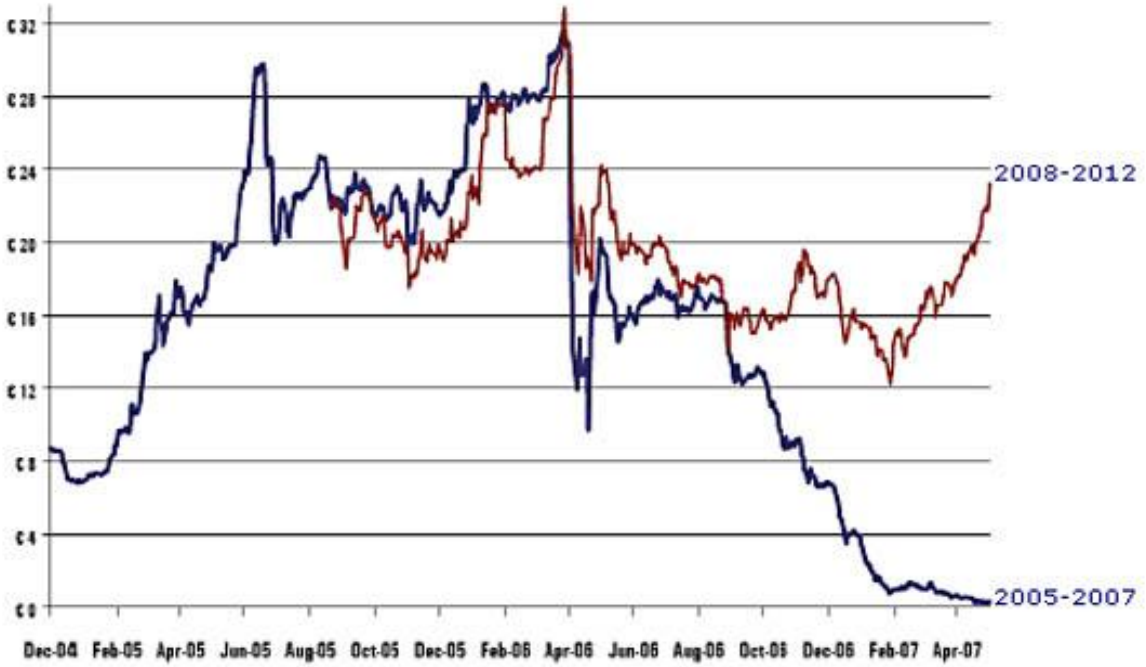
- Set a cap
- Only auction permits within that cap, no more

- Possible problem: at what price?

EU ETS carbon price

carbon price volatility

Not a very good incentive for investors



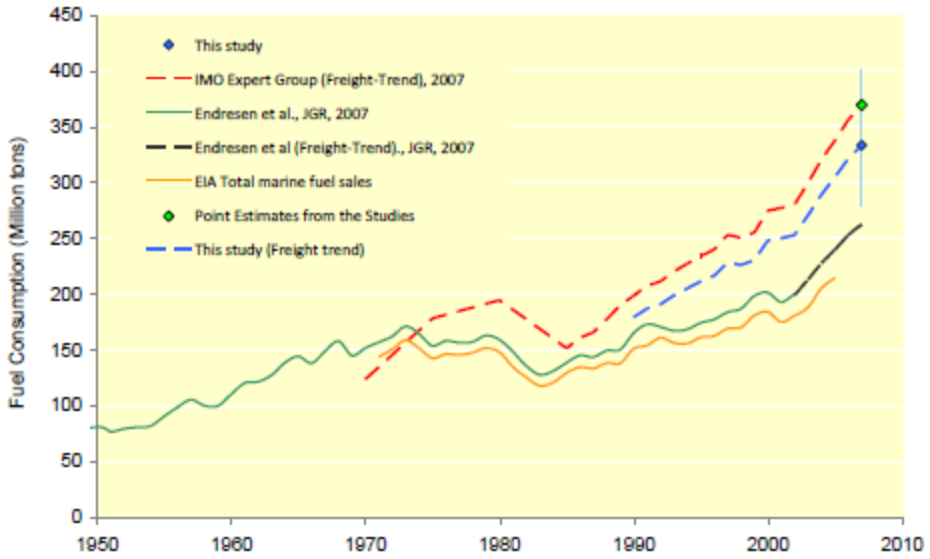
ETS for the Ship

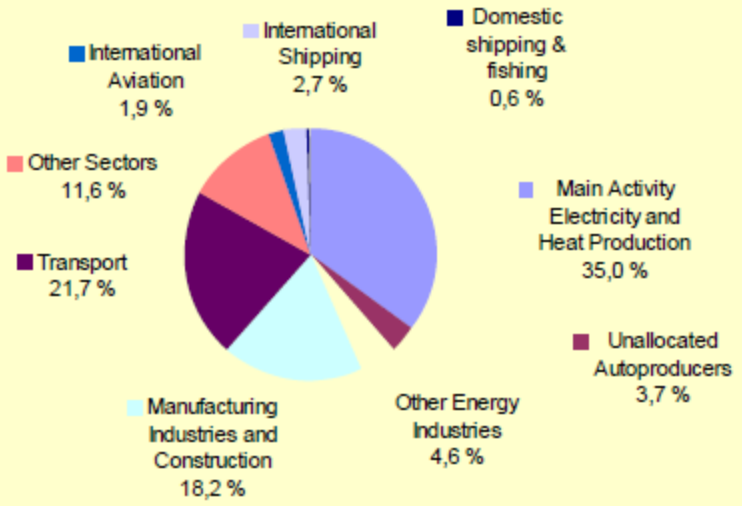
- (ETS) Permit
  - ✓ Registered in the International ETS Registry
  - ✓ System in place to operate in the ETS
  - → ETS Certificate
- Allowance (Quota)
  - The ETS Market Place*
    - * ✓ Auction rules ✓ Trading rules ✓ Price
- Record keeping
  - ✓ Transaction log
  - ✓ BDN
  - ✓ Log consumption
- Surrendering
  - ✓ Flag/RO approves emission reports
  - ✓ Periodic surrendering of allowances to ETS Registry
  - → ETS Certificate: Renewal Endorsement
- Cancelling
  - ✓ Periodic cancelling of the quotas done by the Registry

Norwegian Ministry of the Environment, MBM-EG – May 2010

Administrative burden

- Higher than GHG-Fund
- May exempt ships > certain DWT
- May exempt traffic thru island states
- Exemptions may induce carbon leakage and could be impossible to monitor





- 400 GT = 60,000 ships covering about 91% of the total CO_2 emissions
- 500 GT = 45,000 ships covering about 87% of the total CO_2 emissions
- 2,000 GT = 30,000 ships covering about 80% of the total CO_2 emissions
- 10,000 GT = 16,000 ships covering about 67% of the total CO_2 emissions

Greece's position

- A Levy scheme is much to be preferred to ETS or the other proposals.
- A Levy is aimed at internalizing the societal cost of CO_2 emissions.
- Economists have known for a long time that the efficient way to handle pollution is to put a price on it.
- A pollution Levy re-establishes market forces.
- A Levy is efficient in that, whatever level of emissions reduction is achieved, it will be achieved at least cost to society, that is, with a minimum wastage of resources.

Greece's position ii

- A Levy scheme is the simplest and most cost effective way to reduce CO_2 emissions and is also consistent with the "polluter pays" principle.
- A number of documents by prominent organizations compare Levy and ETS and conclude that Levy is more efficient.
- Levy further avoids a multitude of problems associated with other proposed schemes, particularly those associated with ETS.

Greece's position iii

- A Levy achieves price certainty that ETS does not: investors will respond to price, not cap.
- A Levy is the only MBM that can induce slow steaming, in fact it can do this automatically.
- The administrative burden of an ETS will be substantially higher than that of a Levy.
- ETS is more prone to carbon leakage, evasion and fraud than a Levy.

ANNEX

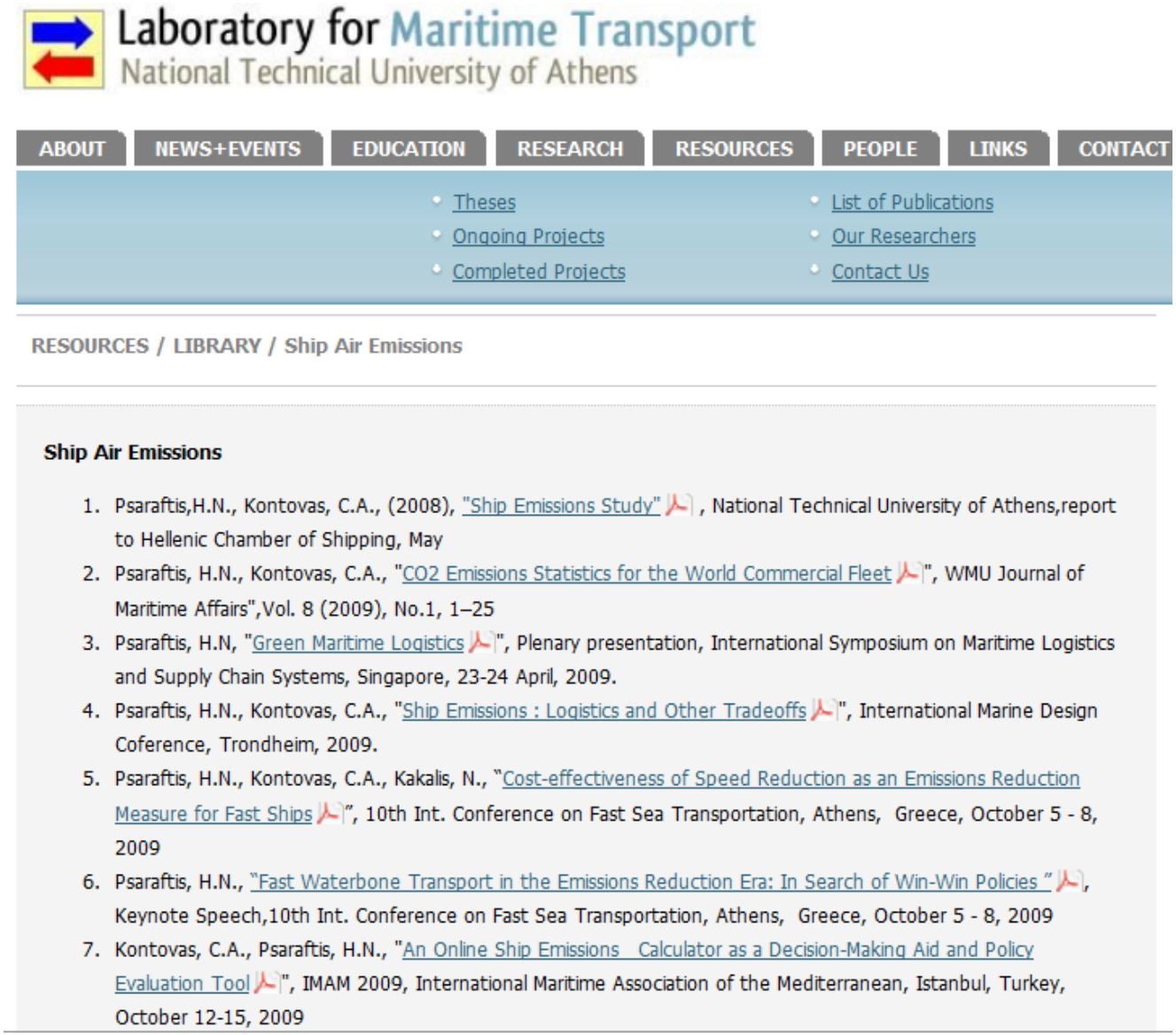
HORIZONTAL ASSESSMENT OF ALL MBM PROPOSALS

1 The set of Tables 1a and 1b below represents Greece's opinion on how each of the MBM proposals stands with respect to the main criteria and some other criteria. Comments on criteria 6 (compatibility to UNFCCC and other international laws) and 9 (compatibility with existing IMO framework) have been omitted as they are covered by the Report of the Expert Group. Due to space limitations, each table only covers 4 proposals. The ETS proposals are combined.

Table 1a

Main criterion	GHG Fund (Denmark)	Leverage Incentive Scheme (Japan)	ETS (Norway, UK, France)	SECT (USA)
1 **Environmental effectiveness** (certainty of a MBM achieving specific reduction target)	There may be less certainty of CO_2 reductions than ETS, but MAC curves of DNV can give an estimate. If the price is the same, the CO_2 reductions are the same as the ETS*. Offsets can contribute to meeting a target. * assuming equal cost effectiveness which not the case.	Lower than GHG Fund, but may have side-effects due to possible distortions induced by misuse of EEDI (e.g., an underpowered ship has a low EEDI but may emit more CO_2).	There may be higher certainty of CO_2 reduction, but the reduction target is arbitrary (or difficult to determine). Plus, enforcing the cap can be difficult and carbon price may skyrocket if close to the cap. Significant carbon leakage risks exist (e.g., if not all ships are covered, some countries like LDCs excluded, etc.).	Low. CO_2 reduction certainty does not exist, as the scheme trades on EEDI. No attempt to compute CO_2 directly.
2 **Cost effectiveness**	High. Costs are known as price is known. Simplest scheme (except Bahamas). According to several studies, levy is most efficient way to reduce emissions.	High, but lower than GHG Fund, due to costs of tracking EEDI.	Low. High administrative costs, very unpredictable carbon price.	Low. Combines problems of ETS with EEDI distortions and other problems.
3 **Incentives to technological change**	High. Investors will respond to known price.	High, but lower than GHG Fund, due to possible mixed EEDI signals (e.g., invest in underpowered ships).	Low. Investors will not know what future prices they will encounter and will pay high administrative costs.	Same as above. May provide the wrong signals in favour of low-EEDI ships than may emit more CO_2.

http://www.martrans.org/lemis.htm



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Ship Air Emissions

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Laboratory for Maritime Transport | SHIP EMISSIONS - LABORATORY F...

NATIONAL TECHNICAL UNIVERSITY OF ATHENS
LABORATORY FOR MARITIME TRANSPORT

Ship Emissions Calculator

VESSEL DETAILS

SELECT SHIP TYPE: Dry Bulk Carrier | SELECT SHIP SIZE: Handysize BC | Slow Speed En

ROUTE: Tubarao-Rotterdam | TRIP DISTANCE: 4974 nm | 9232 km

PAYLOAD (tonnes): 25000 | DWT (tonnes): 27000

OPERATIONAL DETAILS

STATE	TIME (days)	SPEED (knots)	FUEL OIL S %	FUEL OIL Consumption (tonnes/day)	DIESEL OIL S %	DIESEL OIL Consumption (tonnes/day)
SEA LADEN	15.94	13	3.5	24	1.5	0
SEA BALLAST	15.94	13	3.5	24	1.5	0
PORT (loading,discharging)	4		3.5	4.5	1.5	0

EMISSIONS

	CO2	SO2	NOx
ROUNDTRIP EMISSIONS KG PER tonne TRANSPORTED	99.31	2.19	2.73
ROUNDTRIP EMISSIONS GRAMS PER LADEN tonne-MILE	19.97	0.44	0.55
ROUNDTRIP EMISSIONS GRAMS PER LADEN tonne-KM	10.76	0.24	0.30

SHOW/HIDE DETAILED RESULTS | CALCULATE | HELP | ABOUT

DETAILED RESULTS

				EMISSIONS		
TOTAL BALLAST-LADEN DISTANCE		nm	9,948.00			
LADEN tonne-MILES		tonne*nm	124,350,000.00			
TIME IN PORT		days	4.00			
TRIP DURATION	SEA-LADEN	days	15.94			
TRIP DURATION	SEA-BALLAST	days	15.94	CO2	SO2	NOx
TOTAL RTRIP DURATION		days	35.88	tonnes	tonnes	tonnes
CONSUMPTION FO	SEA LADEN	tonnes	382.62	1,212.89	26.78	33.29
CONSUMPTION DO		tonnes	0.00	0.00	0.00	0.00

Thank you very much!