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SOBENA
Sociedade Brasileira de Engenharia Naval

Context of Low Carbon Maritime Navigation & Port

& A SHORT OVERVIEW OF BRAZILIAN ACADEMIC STUDIES 2021

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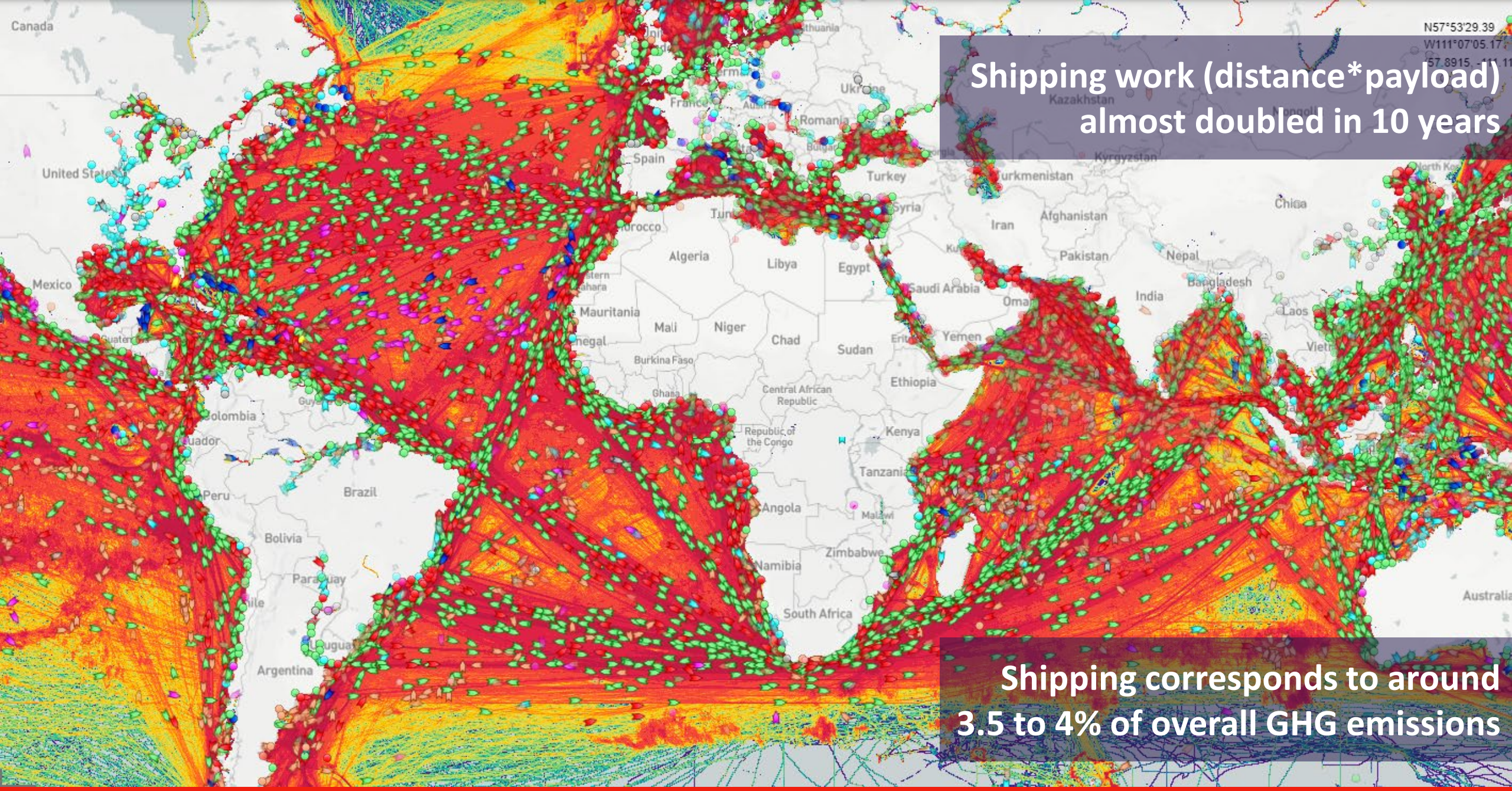
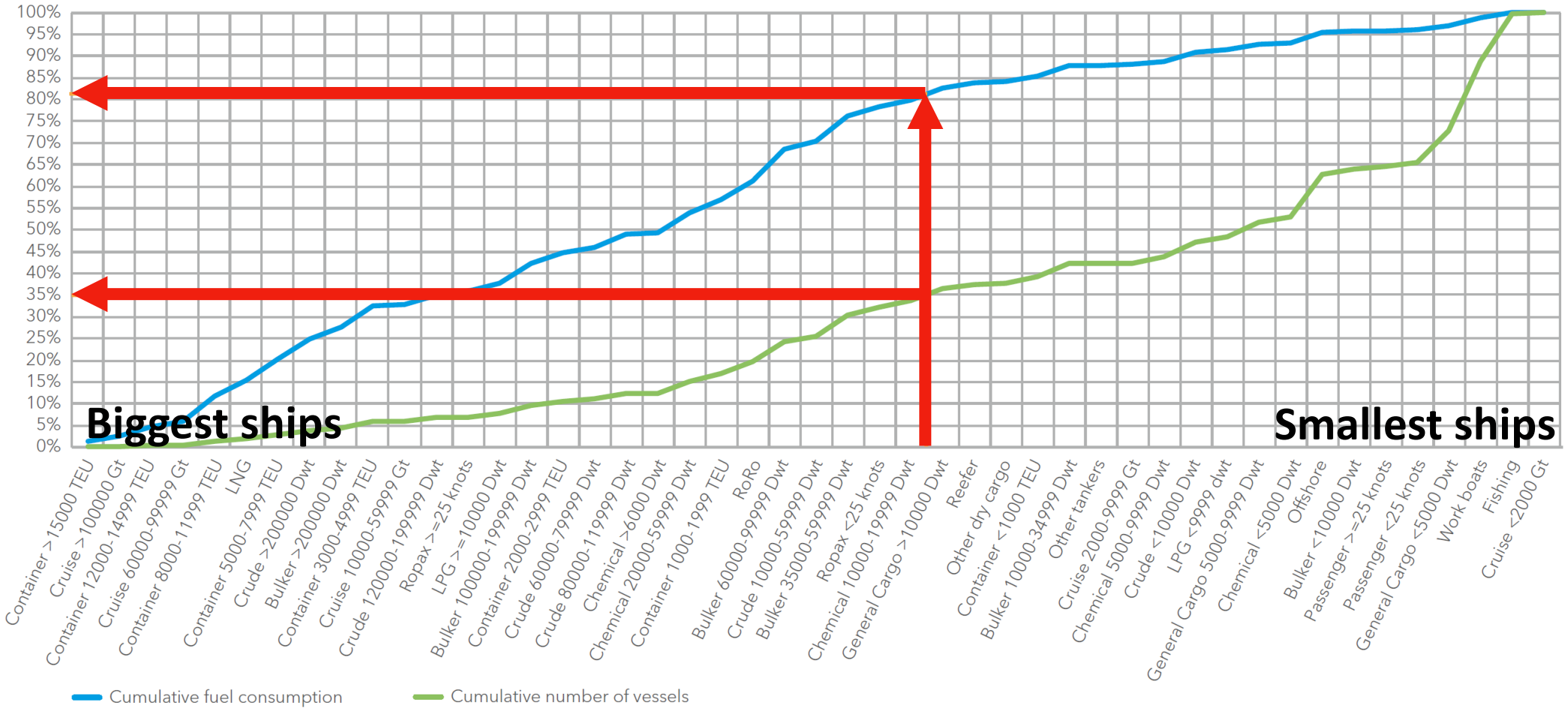
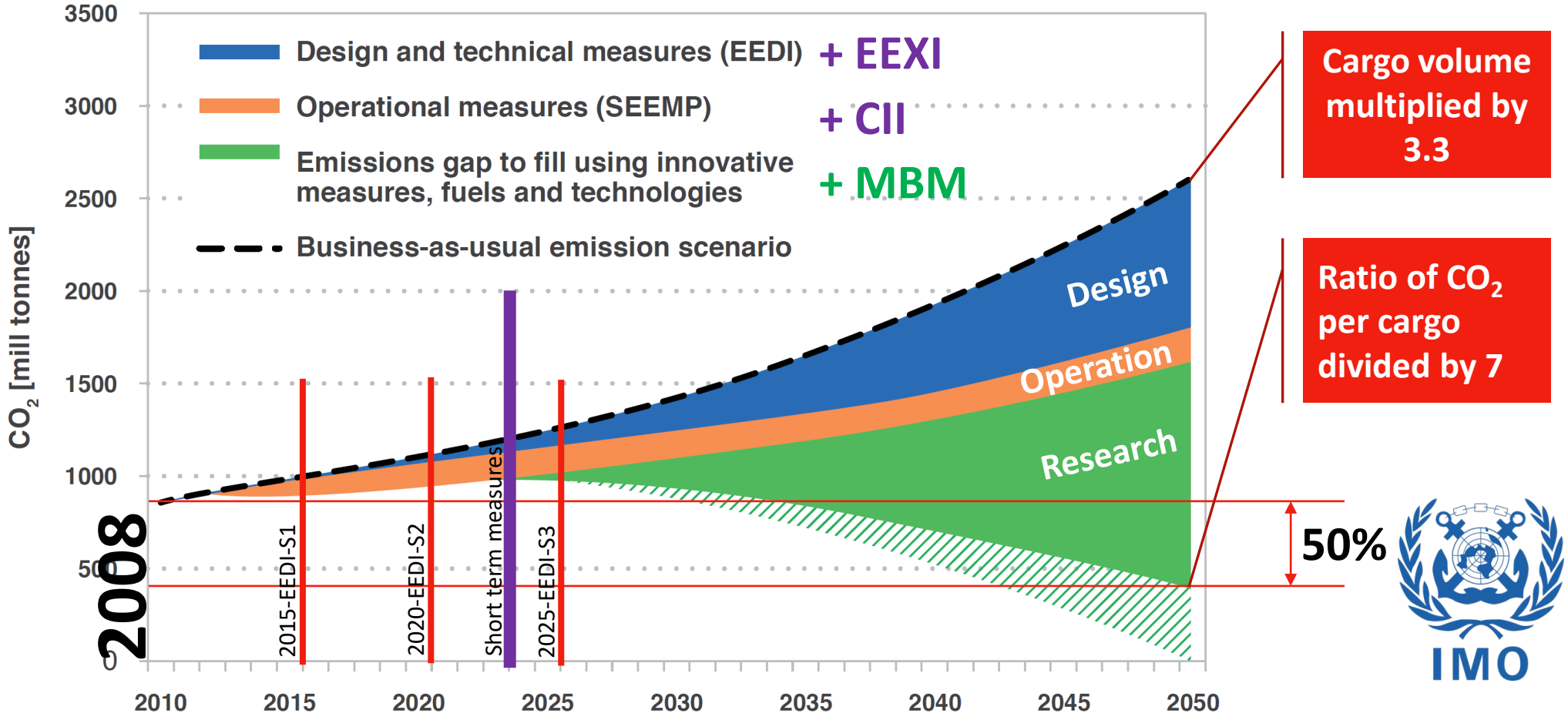


World commercial fleet growing by 3.15%/year • 1.86 billion DWT • 93161 vessels

35% of the global fleet is responsible for more than **80%** of GHG emissions from shipping



IMO strategies to reduce GHG emissions



Carbon Intensity Index (CII)

If you not comply … here the options

(1) EST

(1) Energy-saving technologies	1	Main Engine Tuning
	2	Common-rail
	3	Electronic engine control
	4	Frequency converters
	5	Speed control of pumps and fans
	6	Steam plant operation improvements
	7	Waste heat recovery
	8	Exhaust gas boilers on auxiliary engines
	9	Propeller-rudder upgrade
	10	Propeller upgrade (nozzle, tip winglet)
	11	Propeller boss cap fins
	12	Contra-rotating propeller
	13	Propeller performance monitoring
	14	Propeller polishing
	15	Air lubrication
	16	Low-friction hull coating
	17	Hull performance monitoring
	18	Hull brushing
	19	Hull hydro-blasting
	20	Dry-dock full blast
	21	Optimization water flow hull openings
	22	Super light ship
	23	Reduced auxiliary power demand (low energy lighting etc.)

(2) Renewable

(3) New fuels

(4) Less speed

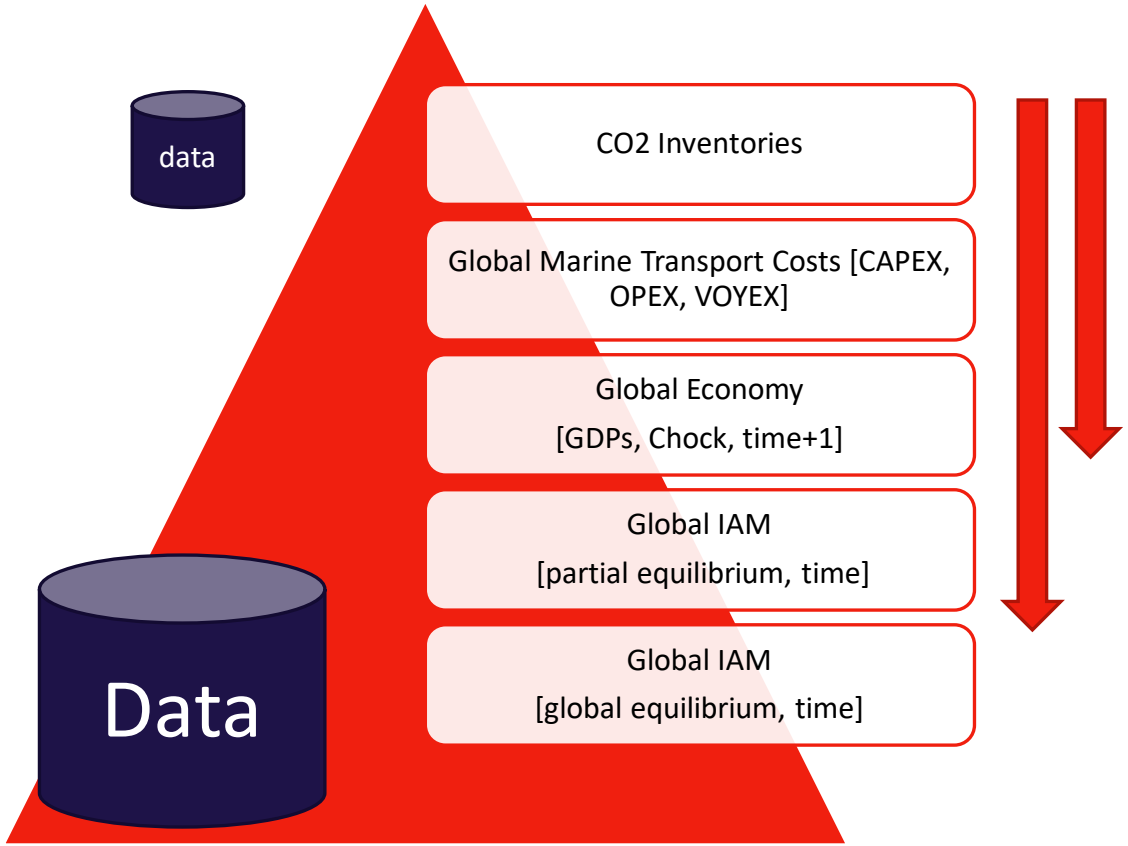
(2) Use of renewable energy	24	Towing kite
	25	Wind power (fixed sails or wings)
	26	Wind engines (Flettner rotor)
	27	Solar panels
(3) Use of alternative fuels	28	LNG + internal combustion engine (ICE)
	29	LNG + fuel cells (FC)
	30	Methanol + internal combustion engine (ICE)
	31	Ethanol + internal combustion engine (ICE)
	32	Hydrogen + internal combustion engine (ICE)
	33	Hydrogen + fuel cells (FC)
	34	Ammonia + internal combustion engine (ICE)
	35	Ammonia + fuel cells (FC)
	36	Synthetic methane + internal combustion engine (ICE)
	37	Synthetic methane + fuel cells (FC)
	38	Biomass methane + internal combustion engine (ICE)
	39	Biomass methane + fuel cells (FC)
	40	Synthetic methanol + internal combustion engine (ICE)
	41	Biomass methanol + internal combustion engine (ICE)
	42	Synthetic ethanol + internal combustion engine (ICE)
	43	Biomass ethanol + internal combustion engine (ICE)
(4) Speed reduction	44	Speed reduction by 10%

Port solutions: Cold Ironing, Virtual arrival (reduce speed if no slot at the port terminal)

Some academic contributions from Brazil

Towards Integrated Assessment Models

Simple,
Short term assessment,
Low development cost.



Complex,
Long term assessment,
High development cost.

IMO
4th GHG study

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Some key points to take away

Some Brazil research teams, mainly UFRJ|COPPE and USP|FIPE has developed consistent contributions

Challenges are:

- Better understanding of Well-to-Tank of renewable fuels (how to produce fuel?)
- Check that proposed policies will not have a rebound effect (spill over) on national emissions (IAM can solve this issue)
- Provide tools for ship and port operators to choose the best solution for their fleets

Contact information

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