IMO's technical cooperation and capacity building work to support the implementation of international regulations on energy efficiency for ships

ICAO/IMO Side Event
UNFCCC COP 21, 2 December 2015

Dr. Edmund Hughes
Head, Air Pollution and Energy Efficiency, International Maritime Organization (IMO)



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WORLD MARITIME DAY 2015 MARITIME EDUCATION & TRAINING

GHG emissions from ships

Third IMO GHG Study 2014 approved

Study found that for international shipping, the CO_2 estimate dropped from **2.8% in 2007** to **2.2% in 2012**.

Year	Global CO_2[1]	IMO GHG Study 2014 CO_2 Total shipping	Percent of global	International shipping	Percent of global
2007	31,409	1,100	3.5%	885	**2.8%**
2008	32,204	1,135	3.5%	921	2.9%
2009	32,047	978	3.1%	855	2.7%
2010	33,612	915	2.7%	771	2.3%
2011	34,723	1,022	2.9%	850	2.4%
2012	35,640	938	2.6%	796	**2.2%**
Average	**33,273**	**1,015**	**3.1%**	**846**	**2.6%**

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Trade growth

- Food, energy, raw materials and finished products
- Around 90 % of global trade by volume

Source: "Global Marine Trends 2030", Lloyd's Register/ QinetiQ/University of Strathclyde, 2013

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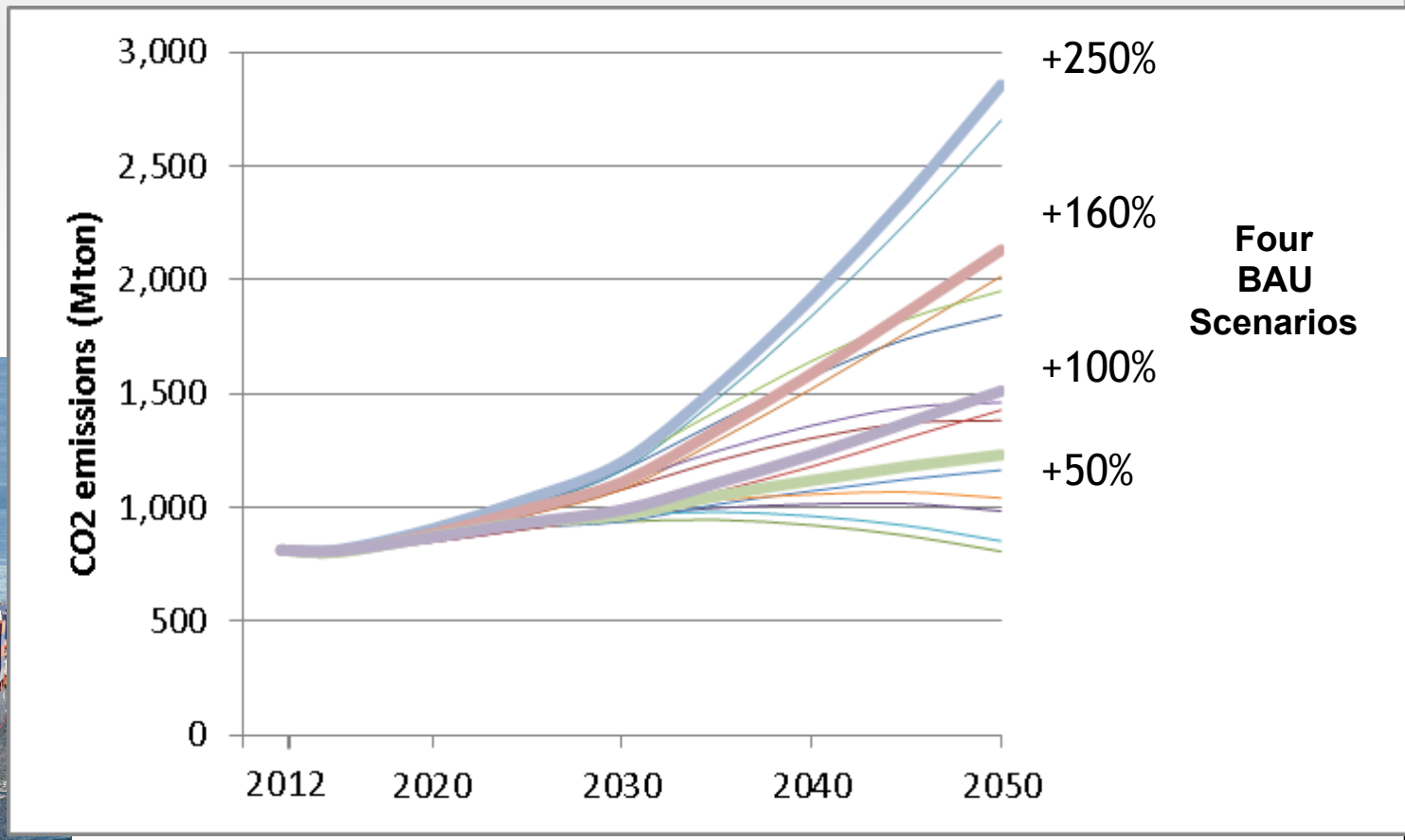
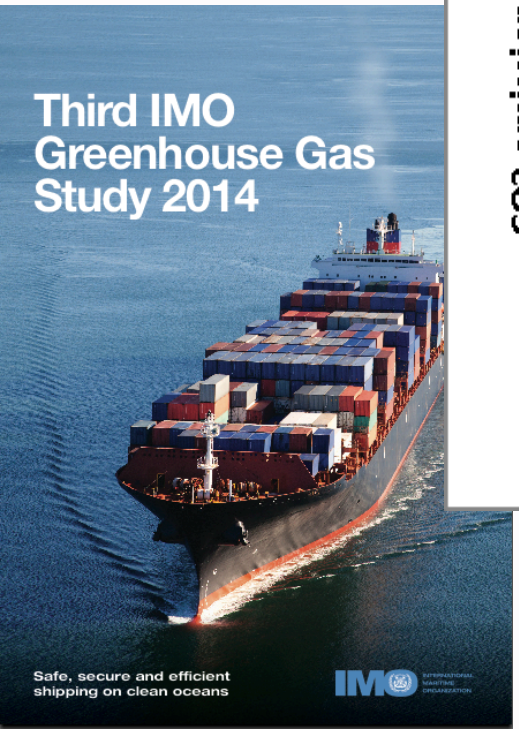
GHG emissions from ships

- Shipping CO_2 emissions are projected to increase by 50% to 250% in the period to 2050, despite fleet average efficiency improvements of about 40%





Ref: Third IMO GHG Study 2014

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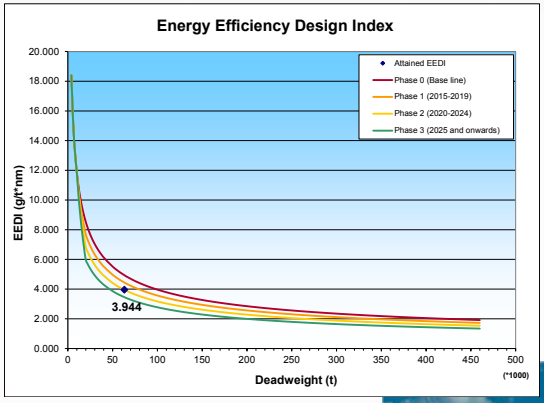
Work to address GHG emissions

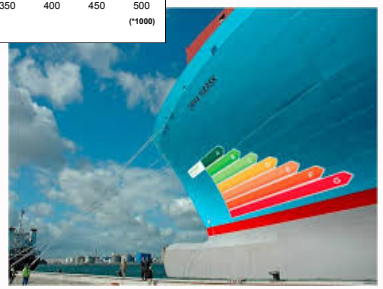
- **IMO Resolution A.963(23) "IMO Policies and Practices Related to the Reduction of Greenhouse Gas Emissions from Ships", adopted by Assembly 23 in December 2003**

- **IMOs work to address GHG emissions has three distinct routes:**
  - Technical
  - Operational
  - Market-based Measures (MBM)



Energy Efficiency of Ships

- **Energy Efficiency Design Index (EEDI)**
  - Applicable to all ships 400 gross tonnage and above
- **Ship Energy Efficiency Management Plan (SEEMP)**
  - Applicable to all ships in operation



- **Energy Efficiency Operational Indicator (EEOI) – voluntary**
- **Data collection system (under development)**

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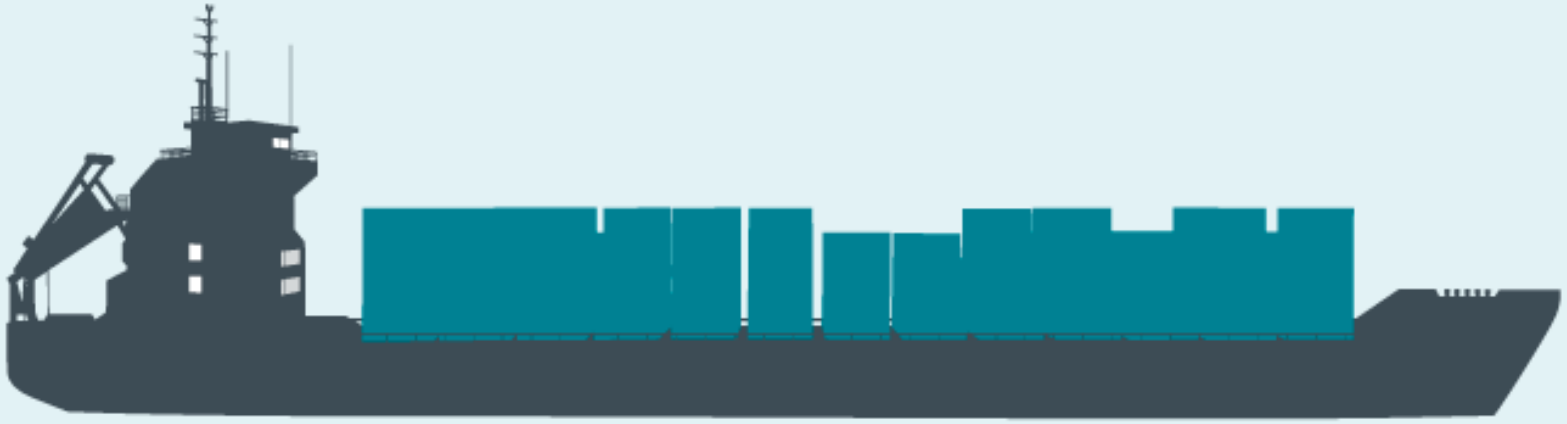
Potential energy efficiency improvements

Operational
Weather routing **1-4%**
Autopilot upgrade **1-3%**
Speed reduction **10-30%**

Auxiliary power
Efficient pumps, fans **0-1%**
High efficiency lighting **0-1%**
Solar panel **0-3%**

Aerodynamics
Air lubrication **5-15%**
Wind engine **3-12%**
Kite **2-10%**



Thrust efficiency
Propeller polishing **3-8%**
Propeller upgrade **1-3%**
Prop/rudder retrofit **2-6%**

Engine efficiency
Waste heat recovery **6-8%**
Engine controls **0-1%**
Engine common rail **0-1%**
Engine speed de-rating **10-30%**

Hydrodynamics
Hull cleaning **1-10%**
Hull coating **1-5%**
Water flow optimization **1-4%**

Source: International Council on Clean Transportation (ICCT), Long-term potential for increased shipping efficiency through the adoption of industry-leading practices, Wang & Lutsey, 2013

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Regulation 23 MARPOL Annex VI

Promotion of technical co-operation and transfer of technology relating to the improvement of energy efficiency of ships

1 Administrations shall, in co-operation with the Organization and other international bodies, promote and provide, as appropriate, support directly or through the Organization to States, especially developing States, that request technical assistance.

2 The Administration of a Party shall co-operate actively with other Parties, subject to its national laws, regulations and policies, to promote the development and transfer of technology and exchange of information to States which request technical assistance, particularly developing States, in respect of the implementation of measures to fulfil the requirements of chapter 4 of this annex, in particular regulations 19.4 to 19.6.

Resolution MEPC.229(65)

IMO's response path to promote technology transfer and capacity building

Reg. 23, MARPOL Annex VI, MEPC Res. 229(65), TT-EG

ITCP: Awareness raising and capacity building tools

Major Projects: Capacity building & private sector partnerships

Global network to promote technology cooperation and transfer?

Catalyze institutions and financing for sustainable marine transport

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Transfer of technology for ships

Work plan tasks of TT-EG

Task 1 - Assess the potential implications and impacts of the implementation of the regulations in chapter 4 of MARPOL Annex VI, in particular, on developing States, as a means to identify their technology transfer and financial needs, if any

Task 2 - Identify and create an inventory of energy efficiency technologies for ships

Task 3 - Identify barriers to transfer of technology, in particular to developing States, including associated costs, and possible sources of funding

Task 4 - Make recommendations including the development of a model agreement enabling the transfer of financial and technological resources and capacity-building between Parties, for the implementation of the regulations in chapter 4 of MARPOL Annex VI

➢ **Report to MEPC 69 (April 2016)**

IMO-Singapore Future Ready Shipping conference on Maritime Technology Transfer and Capacity Building, September 2015

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More information

- **UNDP-GEF-IMO Global Maritime Energy Efficiency Partnerships Project (GloMEEP Project) launched in September 2015**
  - focus in particular on building capacity to implement technical and operational measures in developing countries, where shipping is increasingly concentrated
  - 10 Lead Pilot Countries – support provided to enable governments to pursue legal, policy and institutional reforms
  - create global, regional and national partnerships to build the capacity to address maritime energy efficiency and for countries to mainstream this issue within their own development policies, programmes and dialogues
  - US$13.7 million budget (US$2million cash)
  - Global Industry Alliance to support industry innovation to support the effective implementation
- **Global network of Maritime Technology Cooperation Centres (MTCC)**
  - maritime version of Climate Technology Centre & Networl concept proposed to act as a sustainable institutional framework to catalyze capacity building and technology transfer

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Resolution MEPC.229(65)

- Technical cooperation and capacity building
- Contributions and support for implementation of energy efficiency measures
- Establish an Ad hoc Expert Working Group on facilitation of Transfer of Technology for ships (AHEWG-TT)
- IPR
- Promotion of provision of
  - transfer of energy efficiency technologies for ships;
  - research and development for the improvement of energy efficiency of ships;
  - training of personnel, for the effective implementation and enforcement of the regulations in chapter 4 of MARPOL Annex VI; and
  - the exchange of information and technical co-operation relating to the improvement of energy efficiency for ships;

Computer tool for appraisal of technical and operational measures

- **IMO project using funds donated by Transport Canada**
- **Appraisal tool developed by DNV GL (based on their experience and analysis)**

Output data calculated based on the input values provided

Input data to change vessel segment, vessel size and fuel price

Cost efficiency curves for each measure evaluated in the model (ranked from left to right). Each bar represents a measure (color coded and numbered) represented in the table below.

The height of the bar indicates the cost efficiency of the measure [$/ton CO_2] over the lifetime of the vessel while the width represents the effect measured in ΔEEDI (left) and ΔEEOI (right)

Energy Efficiency Appraisal Tool

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Input data

Select vessel type:	Crude oil tanker
Select vessel size:	>200000 Dwt
Fuel price [$/ton]:	600

Output data — **Before / Optimal / All**

EEOI [g CO_2/ton nm]:	7,9 / 6,7 / 6,1
EEDI [g CO_2/ton nm]:	2,5 / 2,4 / 2,2
Fuel [tonnes/year]:	9186 / 7799 / 7065

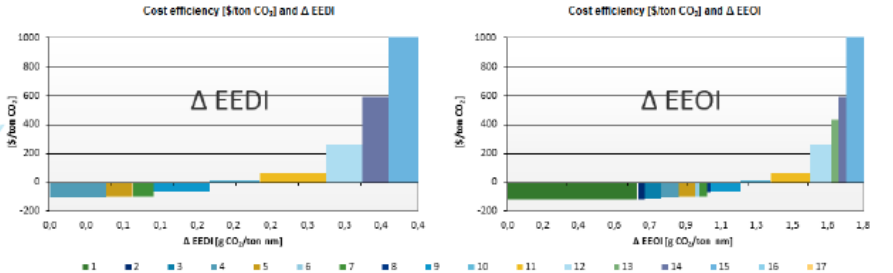
Reference values

TW [million tons x nm/year]:	3 652
Sailed distance [nm/year]:	97 398

Instructions

1. Select vessel type/size from the drop down menus and enter fuel price
2. Apply measures from the drop down menus or measure buttons.
3. Press "Calculate" to run the model

Cost abatement curves



Measure	Include?
Kite	Yes
Fixed Sails or Wings	Yes
Solar Panels	Yes
Electronic Engine Control	Yes
Waste Heat Recovery	Yes
Hull Coating	Yes
Air Cavity Lubrication	Yes
Contra-Rotating Propeller	Yes
Propulsion Efficiency Devices	Yes
Frequency Converters	Yes
Exhaust Gas Boilers	Yes
Efficient Lighting System	Yes
Trim/Draft Optimization	Yes
Weather Routing	Yes
Voyage Execution	Yes
Steam Plant Improvements	Yes
Propeller Condition	Yes

Select all measures | Select no measures

Calculate

Abatement summary

ID	Measure	Uncertainty [%]	Type of measure [T/O]	Cost efficiency [$/ton CO_2]	Fuel reduction [%]	Δ EEDI [%]	Δ EEOI [%]	CAPEX [$]	Accumulated CAPEX [$]	Payback period [years]	Accumulated payback period [years]
1	Steam Plant Improvements	< 10 %	O	-122	8,4 %	n/a	8,4 %	0	0	1,0	1,0
2	Trim/Draft Optimization	< 10 %	O	-118	0,5 %	n/a	0,5 %	25 000	25 000	1,0	1,0
3	Voyage Execution	10-30 %	O	-114	1,1 %	n/a	1,1 %	10 000	35 000	1,0	1,0
4	Propulsion Efficiency Devices	< 10 %	T*	-106	1,3 %	2,5 %	1,3 %	133 000	168 000	3,0	1,0
5	Exhaust Gas Boilers	< 10 %	T	-101	1,2 %	1,2 %	1,2 %	75 000	243 000	2,0	1,0
6	Weather Routing	10-30 %	O	-99	0,3 %	n/a	0,3 %	15 000	258 000	2,0	1,0
7	Efficient Lighting System	< 10 %	T	-98	0,6 %	0,9 %	0,6 %	100 000	358 000	4,0	1,0
8	Propeller Condition	< 10 %	O	-67	0,3 %	n/a	0,3 %	8 000	366 000	1,0	1,0
9	Frequency Converters	10-30 %	T	-64	2,3 %	2,6 %	2,3 %	810 000	1 176 000	10,0	2,0
10	Contra-Rotating Propeller	10-30 %	T	15	2,5 %	2,3 %	2,3 %	1 333 000	2 509 000	25+	4,0
11	Air Cavity Lubrication	10-30 %	T	63	3,1 %	3,2 %	3,1 %	3 384 000	5 893 000	25+	7,0
12	Kite	> 30 %	T	264	1,7 %	1,8 %	1,7 %	1 887 000	7 780 000	25+	10,0
13	Hull Coating	< 10 %	O	431	0,5 %	n/a	0,5 %	651 000	8 431 000	25+	12,0
14	Fixed Sails or Wings	> 30 %	T	589	0,7 %	1,3 %	0,7 %	1 000 000	9 431 000	25+	15,0
15	Waste Heat Recovery	< 10 %	T	1 176	1,3 %	1,3 %	1,3 %	9 500 000	18 931 000	25+	25+
16	Solar Panels	> 30 %	T	2 799	0,1 %	0,1 %	0,1 %	1 370 000	20 301 000	25+	25+
17	Electronic Engine Control	< 10 %	T	0	0,0 %	0,0 %	0,0 %	544 000	20 846 000	25+	25+

Version 1.0: Normal mode

Reference values based on the vessel type and size segment applied

Instructions providing guidance on how to use the model.

Measure selection chosing what measure to include in the model

Resulting table with more detailed information on each measure evaluated in the model

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IMO-Singapore Future Ready Shipping conference

- highlighted need for enabling environments to be developed
- current status of maritime technology and future trends highlighted
  - smarter, data driven, greener ships
  - fully connected wireless onboard & digitally connected via satellite
  - new cleaner fuels
  - new flexible propulsion technologies
  - new materials
- knowledge gap and readiness of maritime companies to effectively deploy new technologies could be addressed through the use of testing facilities, e.g. "Maritime Energy Test Bed" at Singapore's Nanyang Technological University
- beyond the “hardware” aspect, the role of the seafarer needs greater consideration without which technology cannot be effectively utilised

Technical cooperation and capacity building efforts

- **Integrated Technical Cooperation Programme**
  - Includes funding for the training and capacity-building activities in ship energy efficiency
- **Major Projects on Capacity Building**
  - IMO-KOICA Project on “Building Capacities in East Asian Countries to Address GHG Emissions from Ships”
- **Global Maritime Energy Efficiency Partnerships Project (GloMEEP)**
  - GEF-UNDP-IMO partnership to support increased uptake and implementation of energy efficiency measures for shipping
  - Seeks to catalyze an innovative public-private sector partnership through a new Global Industry Alliance (GIA) for maritime energy efficiency
- **Maritime Technology Cooperation Centre Network (MTCCN)**
  - Preliminary concept to create regional outreach, capacity building, and information exchange

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Thank you for listening

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