



الأكاديمية العربية للعلوم والتكنولوجيا والنقل البحري
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The International Maritime Transport and Logistics Conference "Marlog 9"
Impacts of the Fourth Industrial Revolution on Port-City Integration
"World Port Sustainability Program Aspects"



**A REVIEW OF ENERGY EFFICIENCY IMPLEMENTATION
BARRIERS IN THE MARITIME SHIPPING SECTOR**

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Outline

- Introduction with an overview of the literature.
- Research Gap.
- Methodology and motivation.
- Findings.
- Conclusion.
- Recommendations.



Introduction

What is GHGs?

"Greenhouse gases" means those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and re-emit infrared radiation.

(UNFCCC, 1994)

Main Contents

CO₂ (Carbon dioxide) 76%

CH₄ (Methane) 16%

N₂O (Nitrous oxide) 6%

Other greenhouse gas

Hydrofluorocarbons (HFCs),

Perfluorocarbons (PFCs),

Sulphur hexafluoride (SF₆),

unspecified mix of HFCs and PFCs (MIX)

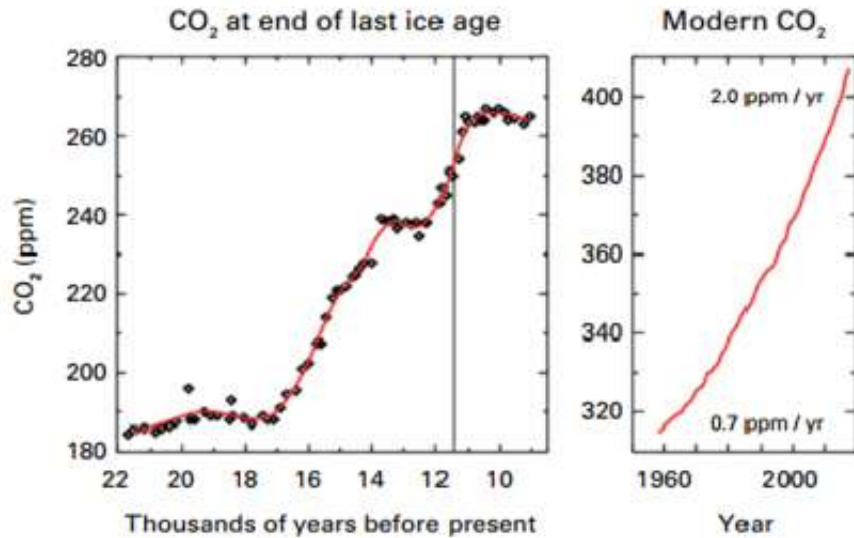
Nitrogen trifluoride (NF₃)

CO₂ 76%

How much it is environmentally beneficial to reduce this percentage???

Introduction

Why there is a need for GHG emissions control?



(WMO, 2017)

Decrease in sea-ice cover



Acid rain



Climate Change



Desertification



Rise in sea-level

Shipping industry's footstep



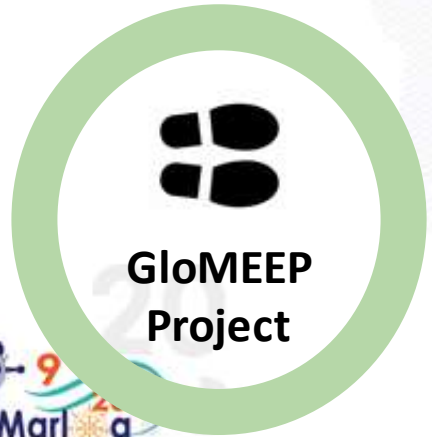
EEDI SEEMP

MARPOL Annex VI on energy efficiency for ships, mandating **EEDI for new ships** and **SEEMP for all ships**



Global MTTC Network

Help beneficiary countries limit and reduce GHG emissions from their shipping sectors through **technical assistance** and **capacity building**



GloMEEP Project

Build understanding and **knowledge of technical** and **operational energy-efficiency measures**



Assessment of the Energy Efficiency Management (GHG Emission Control measures) in the maritime context by SWOT



S strength	<ul style="list-style-type: none">● legally binding energy-efficiency measures (e.g. EEDI, SEEMP)● Capacity Building for states about energy efficiency measure e.g GloMEEP and GMN Projects● Alternative fuel vessel (regional)● Emission Control Areas (ECAs)
W weakness	<ul style="list-style-type: none">● Implementation challenges (data collection, regulations)● Lack of available supply chain and infrastructure● EEDI applies only to new ships● Capital cost
O opportuni	<ul style="list-style-type: none">● Market based approach (e.g, CORSIA) (International scope)● Utilizing renewable energy (e.g, solar, wind)● New technology (e.g, electrical energy cars)● Appling tax on GHG emissions (national scope)
T threat	<ul style="list-style-type: none">● Disincentive for industry about tax (e.g ICS)● Climate change denial● Low priority on some governments list● Shortage of information (education, monopoly)● Slow improvement of Renewable energy technology

Where is the research Gap ?!!



Ok then this is the gap you mean? **NO !!! Please let me explain**

- While Energy efficiency implementation process in progress, several barriers have led to the energy efficiency gap.
- Those barriers found to be varied in perspective due to different research approaches.
- Our research intended to review the literature carried out on energy efficiency implementation barriers and high light the most reliable combination.



The Methodology and motivation

- *Although the barriers to energy efficiency in shipping are not widely discussed in the published literature.*
- *That made the reviewing for all the latest research articles easier to stand on the current maritime energy efficiency implementation barriers.*
- *Categorize/gather and qualitatively describe them in one document.*
- *To help the maritime energy manager to overcome barriers and undertake the most optimum decision while implementing energy efficiency measures in their organization.*



Findings:

Jafarzadeh and Utne are stated that the barriers are grouped into seven main categories as followed. (i) Information barriers, (ii) Economic barriers, (iii) Intra-organizational barriers, (iv) Inter-organizational barriers, (v) Technological barriers, (vi) Policy barriers, and (vii) Geographical barriers .



Contents lists available at [ScienceDirect](#)

Energy

journal homepage: www.elsevier.com/locate/energy

A framework to bridge the energy efficiency gap in shipping

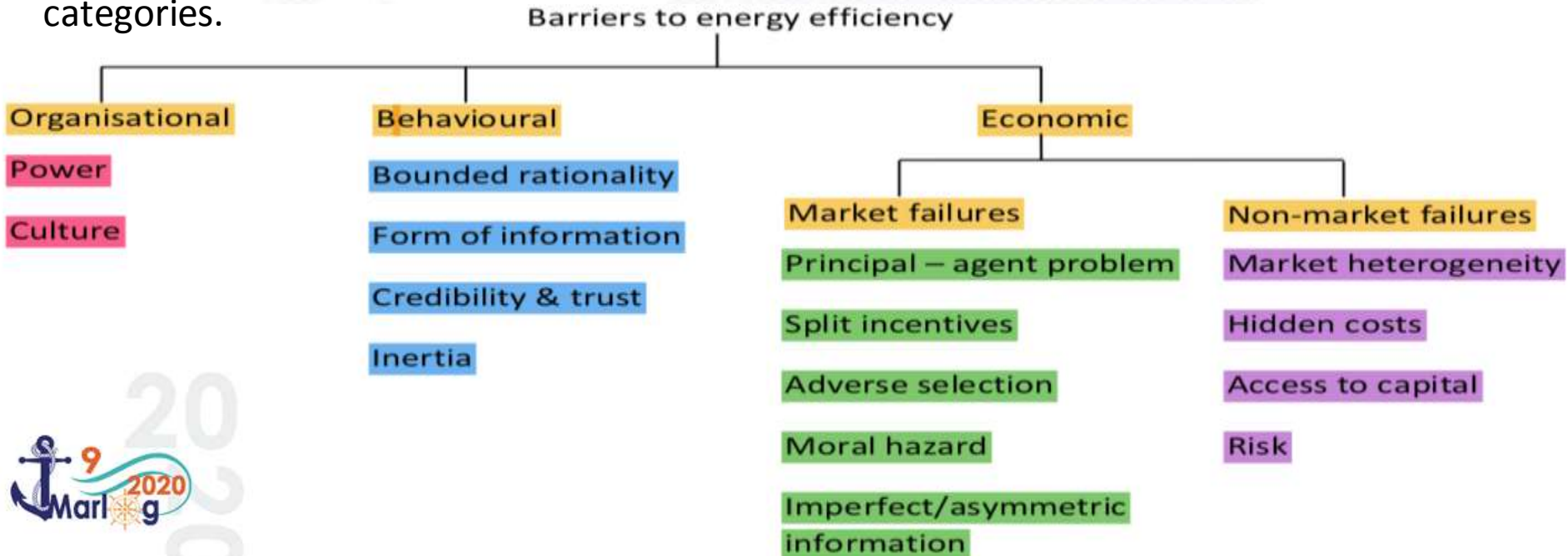
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Findings:

Rehmatulla in his PhD Thesis created one of the most detailed categorizing for energy efficiency barriers. Then extract from it a paper with Smith handling the economic energy efficiency barriers with its sub categories.



Findings:

- Dewan, Yaakob and Suzana end to very similar categories to Jafarzadehs' and Uten.
- While Olcer and Ballini interpret decision-making challenges in selecting the best emission reduction measure as a barrier.
- Kitada and Olcer advocated that the barriers could be categorized as follows: safety and reliability, technical uncertainty, behavioural barriers, market constraints, financial and economic constraints and finally complexity . And added managerial difficulties in auditing the work done by the subsidiary or outsourced firms as a barrier.



Conclusion

- The Authors agree that all the previously mentioned barriers categorization can include under only three main categories
- Human element barriers
- Policy and regulation barriers
- Technical and innovation barrier
- What meets the IMO categorization and recommendations

Recommendations

- *More scientific research is required*
- *Cooperation between member states in the knowledge transfer*
- *Regulations ratification and Implementation (MARPOL annex VI)*
- *Includes energy efficiency in specialized universities curriculums*
- *Market based measures (carbon price)*
- *CSR implementation*
- *Refer the barriers classification to the IMO*



Thank you for your attention



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