Innovation to decarbonise shipping: challenges and opportunities

Harilaos N. Psaraftis
Professor
Technical University of Denmark
Reference

Education

• Teaching many maritime courses, including the “Innovation in Shipping” course, Bayes Business School, London

Research

• 42+ years of maritime R&D (MIT, NTUA, DTU)
• ≈15 years involvement in the IMO process
• ≈15 years of R&D on shipping emissions (GHG and other)
• Recent & ongoing DTU R&D projects
### AEGIS project on autonomous shipping (EU H2020)

- **LEADER:** SINTEF OCEAN (Norway)

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**ADVANCED, EFFICIENT & GREEN INTERMODAL SYSTEMS**
Relevance to developing countries, including LDCs/SIDS

• AEGIS will develop solutions that
  – are cost-effective and suitable for smaller ports and trade volumes
  – will encourage modal shifts from road to sea (or rivers), hence reducing GHGs
  – can provide benefits to LDCs/SIDS from more efficient inter-island transport where cargo transfers from or to international trade take place
Talk overview

• Some basics
  – Innovation in shipping
  – The quest for win-win solutions

• A recent IMO submission
  – Relevant to developing countries, incl. LDCs/SIDS

• Important industry initiatives

• Challenges/opportunities

• Conclusions
BASICS: Innovation requires R&D

THE PURSUIT OF ZERO CARBON SHIPPING, FULLY INTEGRATED INTO A DIGITALISED GLOBAL SUPPLY CHAIN, REQUIRES RESEARCH AND DEVELOPMENT INVESTMENT AT A SCALE HITHERTO UNSEEN.
BASICS ii: Innovation is very urgent

- Reduce annual GHG emissions by $\geq 50\%$ by 2050 (vs 2008 levels)

- Reduce annual CO2 emissions per transport work by $\geq 40\%$ by 2030, pursuing efforts towards $70\%$ by 2050 (vs 2008 levels)

- Bold solutions are needed asap!
BASICS iii: Innovation can be unequal

• Developed countries likely to benefit more from related R&D

• Developing countries: more difficult

• LDCs/SIDS: even more difficult

• Q: what can be done?
The 3 dimensions of green

- Source: UNCTAD
The quest for WIN-WIN solutions

• What does “win-win” mean?

• It means a set of solutions which are “win” with respect to both economic and environmental (and also social) criteria

• Problem: Finding win-win solutions may not always be easy!
WIN-WIN for whom?

STAKEHOLDERS
- Shipping companies
- Port & terminal operators
- Cargo owners (shippers)
- Shipbuilders
- Engine & equipment manufacturers
- Fuel producers
- non Governmental Organisations (NGOs)
- Environmental organisations
- R&D organisations and universities
- LDCs/SIDS
- Other developing countries
- Developed countries
IMO submission

INTERSESSIONAL MEETING OF THE
WORKING GROUP ON REDUCTION OF
GHG EMISSIONS FROM SHIPS
7th session
Agenda item 2

FURTHER CONSIDERATION OF CONCRETE PROPOSALS TO IMPROVE THE
OPERATIONAL ENERGY EFFICIENCY OF EXISTING SHIPS, WITH A VIEW TO
DEVELOPING DRAFT AMENDMENTS TO CHAPTER 4 OF MARPOL ANNEX VI AND
ASSOCIATED GUIDELINES, AS APPROPRIATE

Detailed impact assessment of the mandatory operational goal-based
short-term measure

Submitted by Denmark, France and Germany
2 journal papers produced

**Impact assessment of a mandatory operational goal-based short-term measure to reduce GHG emissions from ships: the LDC/SIDS case study**

Harilaos N. Psaraftis¹ · Thalis Zis¹

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**Impacts of short-term measures to decarbonize maritime transport on perishable cargoes**

Thalis P. V. Zis¹ · Harilaos N. Psaraftis¹

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Main takes

• Several positive impacts
  – Possibly lower transport cost
  – Cost-effective energy efficiency gains

• Possibility of some negative impacts
  – Difficulty to finance retrofitting of old ships or investment in new ships
  – Higher freight rates
Challenges/opportunities

• How can innovation be incentivised so that LDCs/SIDS, or developing countries in general,
  – Can get **maximum benefits** from decarbonisation measures?
  – Can **best mitigate** possible negative impacts?
Critical roles

(list is not complete)

• Role of the IMO (forthcoming meetings on decarbonisation: October and November 2021)
• Role of the EU (recent ”Fit for 55” package)
• Role of academia and R&D (expand the knowledge base and make it accessible)
• Role of industry (recent initiatives)
Important industry initiatives
More than 150 signatories

Getting to Zero Coalition

Decarbonizing Shipping: A Call to Action
No Time to Waste!

Climate Emergency

2050

Everyone Has to Take Action

Governments Dialogue

Collaboration

Private Sector

New Technologies Digitalization

Incentives Implementation Plans

Regulations

Policies

Support Industrial Scale Zero Emission Shipping Projects

Infrastructures

Change of Mindset

Educate Politicians

Change View Fast!

Zero Emission Vessels = Default Choice

Support Developing Countries

Global Synergy Effort

Global Playing Field

Viable

Involves the Entire Supply Chain

Regulatory Framework

Pathway Future

Let's Move Together!

Leads the Way

Technical - Commercial

Fuel is Ready

Technology is Ready

Companies Industries Regions Financial Institutions
Among other things

“Meeting the future demand for zero emission shipping will require massive investments, especially in the production of zero emission fuels. This creates new growth and job opportunities – not least in developing countries and emerging economies – that must be unlocked to achieve an equitable transition.”
BIGGEST PROMISE

Alternative, low carbon fuels

• High on IMO and EU agendas
• High on some industrial stakeholders agendas
• Biggest obstacle: these fuels need to become economically viable to be used
• What’s the best way ahead?
• Opportunity for developing countries?
Conclusions

• There are both challenges and opportunities to identify and develop win-win innovation solutions
• Need for further R&D, knowledge transfer & technology transfer is important
• Forthcoming discussions at the IMO and the EU on shipping decarbonisation can be critical in that regard
• Role of industry is critical
Our papers (sample)

- Psaraftis, H.N., 2019, Speed Optimization vs Speed Reduction: the Choice between Speed Limits and a Bunker Levy, Sustainability, 11, 2249; doi:10.3390/su11080000
- Lindstad, E., Borgen, H., Eskeland, G., Paalsson, C., Psaraftis, H.N., Turan, O., 2019 The Need to Amend IMO’s EEDI to Include a Threshold for Performance in Waves (Realistic Sea Conditions) to Achieve the Desired GHG Reductions, Sustainability 11, 3668; doi:10.3390/su11133668.
- Psaraftis, H.N., 2019, Speed Optimization vs Speed Reduction: are speed limits better than a bunker levy? Maritime Economics and Logistics 21, 524–542, doi.org/10.1057/s41278-019-00132-8
- Psaraftis, H.N., Lagouvardou, S., 2019, Market Based Measures for the reduction of green house gas emissions from ships: a possible way forward, Samfundsekonomen, 4/19, 60–70.
- Lagouvardou, S., Psaraftis, H.N., Zis, T., 2020, A Literature Survey on Market-Based Measures for the Decarbonization of Shipping, Sustainability, 12(10), 3953; doi.org/10.3390/su12103953
Recent books

Green Transportation Logistics
The Quest for Win-Win Solutions

Sustainable Shipping
A Cross-Disciplinary View

Harilaos N. Psaraftis, Editor
Link to some decarb papers

• https://www.dropbox.com/sh/hf1f4lb3qsk7n77/AAC34Ms8zu_wDEWvmZqWNyu4a?dl=0

• Or, drop me an email, hnpsar@dtu.dk
THANK YOU VERY MUCH!

• hnpsar@dtu.dk