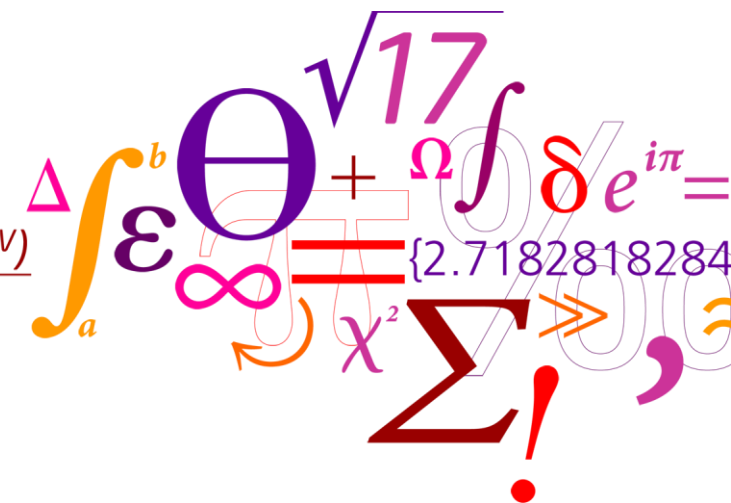


Innovation to decarbonise shipping: challenges and opportunities



Harilaos N. Psaraftis
 Professor
 Technical University of Denmark

$$P(i|V) = \frac{\partial \ln G(eV)}{\partial V_i}$$


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)
- \approx 15 years involvement in the IMO process
- \approx 15 years of R&D on shipping emissions (GHG and other)
- Recent & ongoing DTU R&D projects

AEGIS project on autonomous shipping (H2020)

LEADER: SINTEF OCEAN (Norway)



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

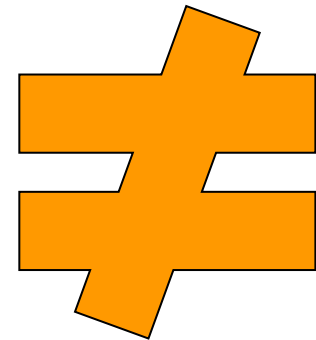
- Reduce annual GHG emissions **by \geq 50% by 2050** (vs 2008 levels)
- Reduce annual CO₂ emissions per transport work **by \geq 40% by 2030**, pursuing efforts towards **70%** by 2050 (vs 2008 levels)



- Bold solutions are needed asap!

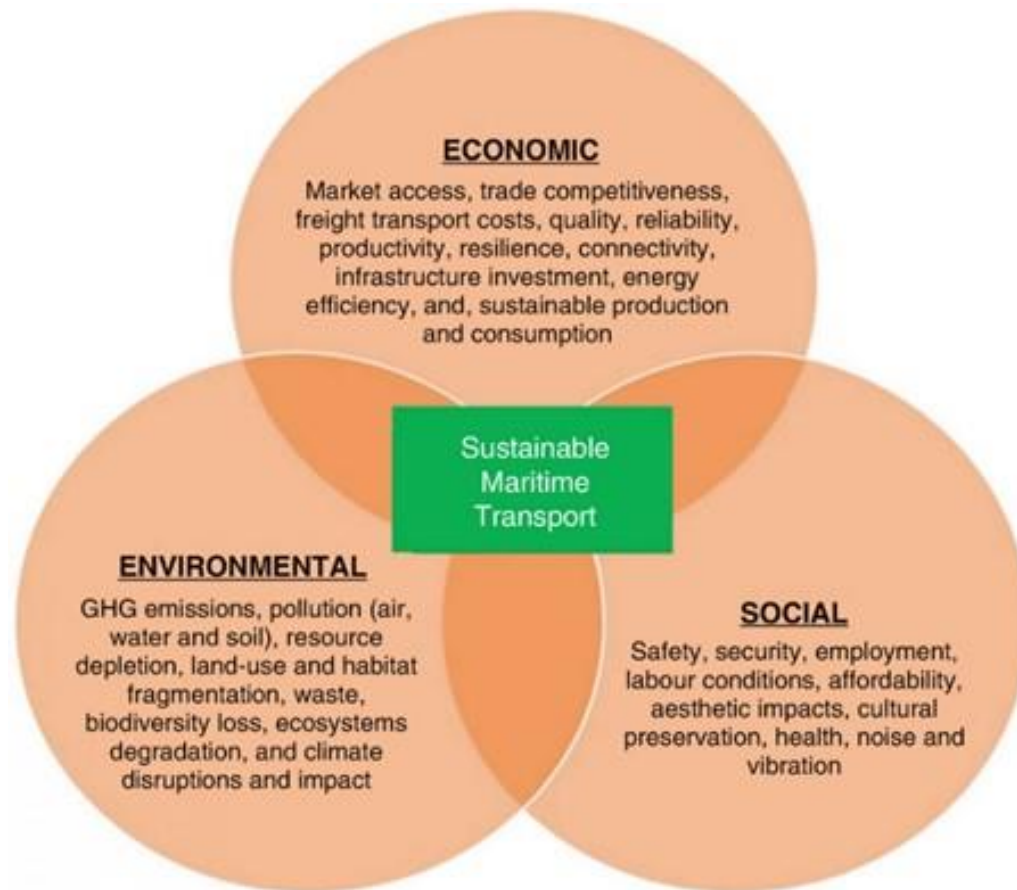
BASICS iii: Innovation can be unequal

- 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!



dreamstime.com

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

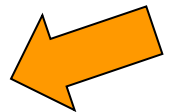


IMO submission

**E**

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

ISWG-GHG 7/2/20
7 February 2020
ENGLISH ONLY



**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


Int Environ Agreements
<https://doi.org/10.1007/s10784-020-09523-2>

ORIGINAL PAPER



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

**FOCUS:
LDCs/SIDS**

Harilaos N. Psaraftis¹  · Thalís Zís¹

Accepted: 22 December 2020
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Maritime Economics & Logistics
<https://doi.org/10.1057/s41278-021-00194-7>

ORIGINAL ARTICLE



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

**FOCUS:
South America**

Thalís P. V. Zís¹ · Harilaos N. Psaraftis¹

Accepted: 26 May 2021
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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)

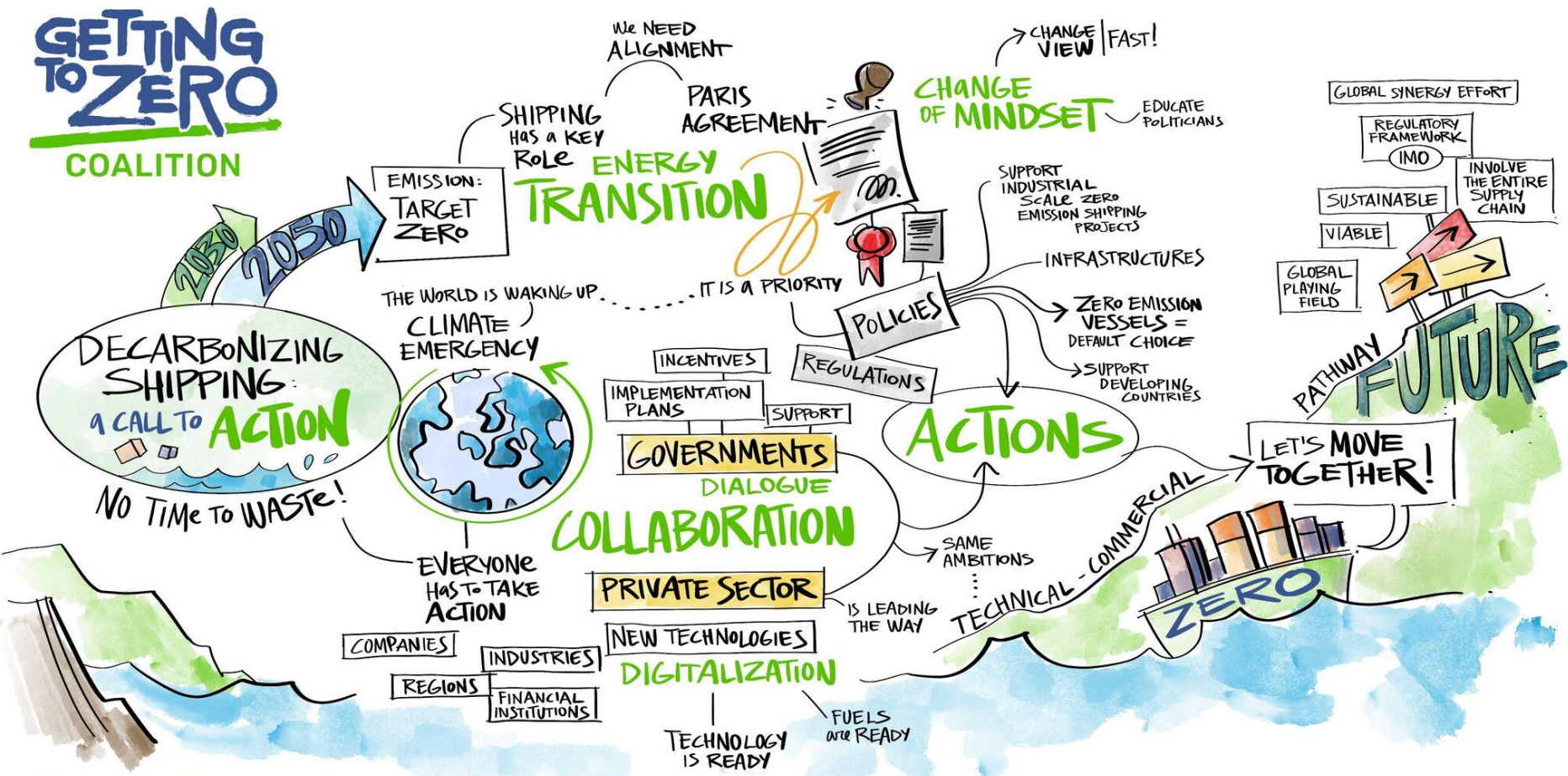
- Role of the IMO (forthcoming meetings on decarbonisation: October and November 2021)
- Role of the EU (recent "Fit for 55" package)
- Role of academia and R&D (expand the knowledge base and make it accessible)
- Role of industry (recent initiatives)

Important industry initiatives



More than 150 signatories

GETTING TO ZERO
COALITION



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?

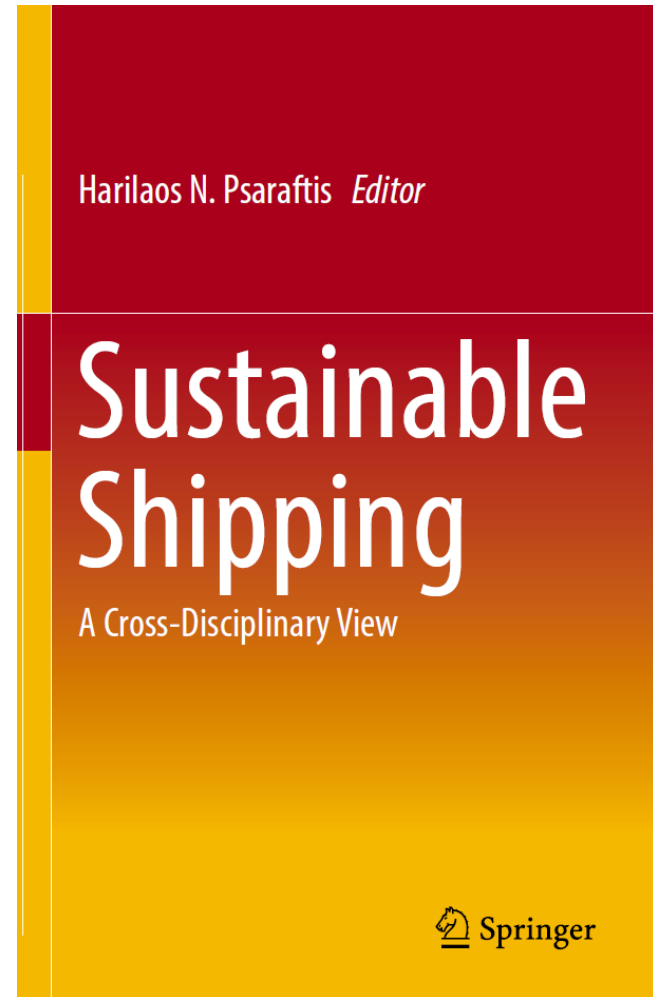
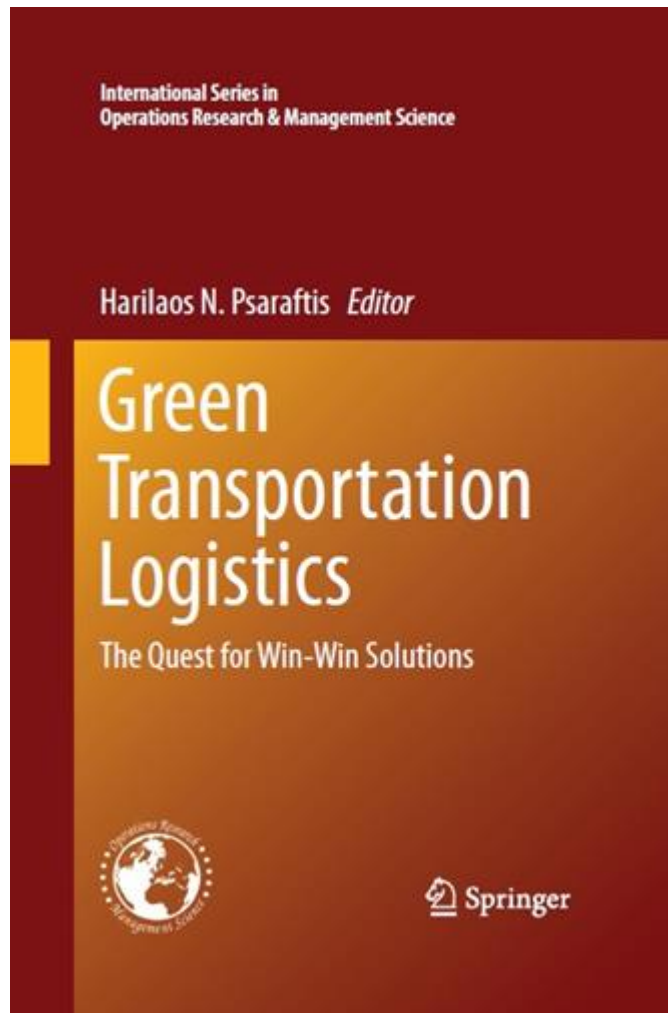
Conclusions

- 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

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Recent books



Link to some decarb papers

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- Or, drop me an email, hnpсар@dtu.dk

THANK YOU VERY MUCH!

- hnpsar@dtu.dk

