

# Synergies between noise reduction and decarbonisation

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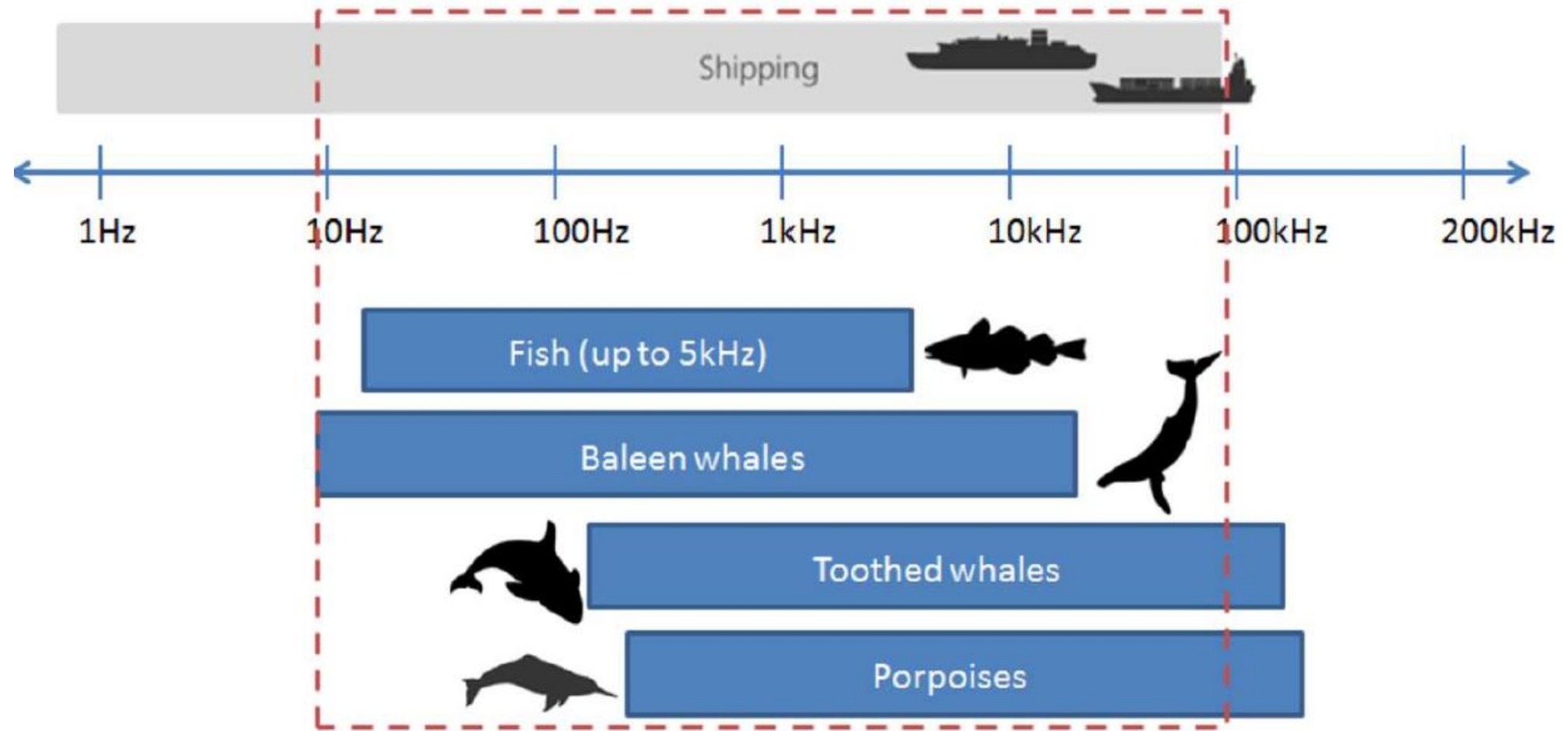




- Background
- IMO's revised guidelines.
- Synergies between efficiency and reduction of Underwater Radiated Noise (URN)
- Things to avoid
- Assessment of impact



# The URN issue



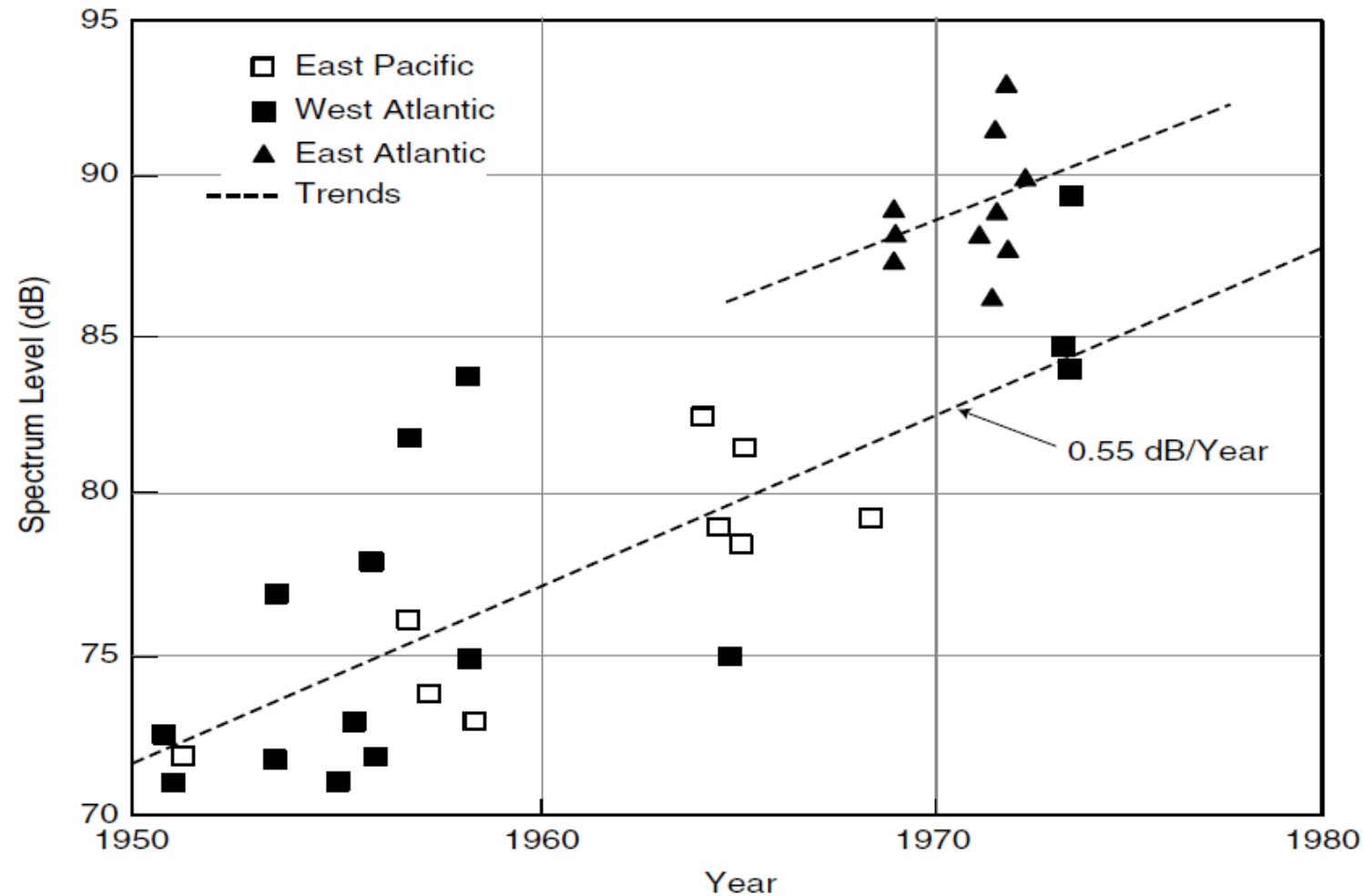


FIGURE 2-7 Long-term trend for low-frequency ambient levels for period 1958–1975. SOURCE: Ross, 1993, courtesy of Acoustics Bulletin.



Okeanos Foundation for the Sea:

*“we call for initial global action that will reduce the contributions of shipping to ambient noise energy in the 10-300 Hz band by 3dB in 10 years and by 10dB in 30 years relative to current levels.”*



- Also known as the “megaphone effect”.
- Relates to the disproportionate impact on ambient noise that is attributed to URN sources in coastal areas with sloping bottoms.
- URN from such locations can travel much greater distances than URN generated in the deep ocean.
- Can limit IMO’s ability to reduce ambient URN, because not all URN sources in coastal regions are within IMO’s remit.

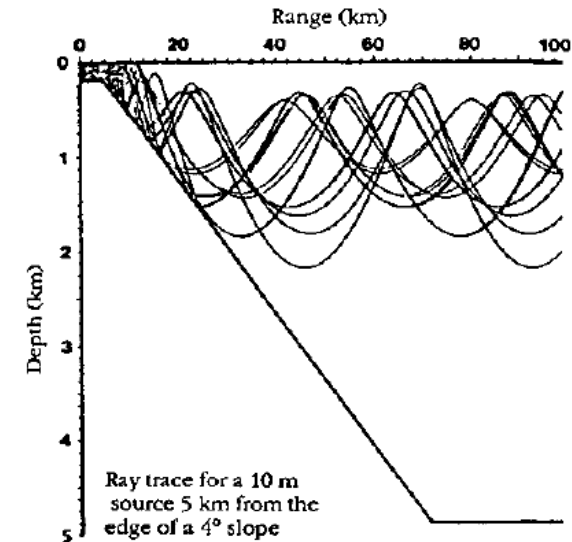


Fig. 5. Raytrace explanation of coastal enhancement effect



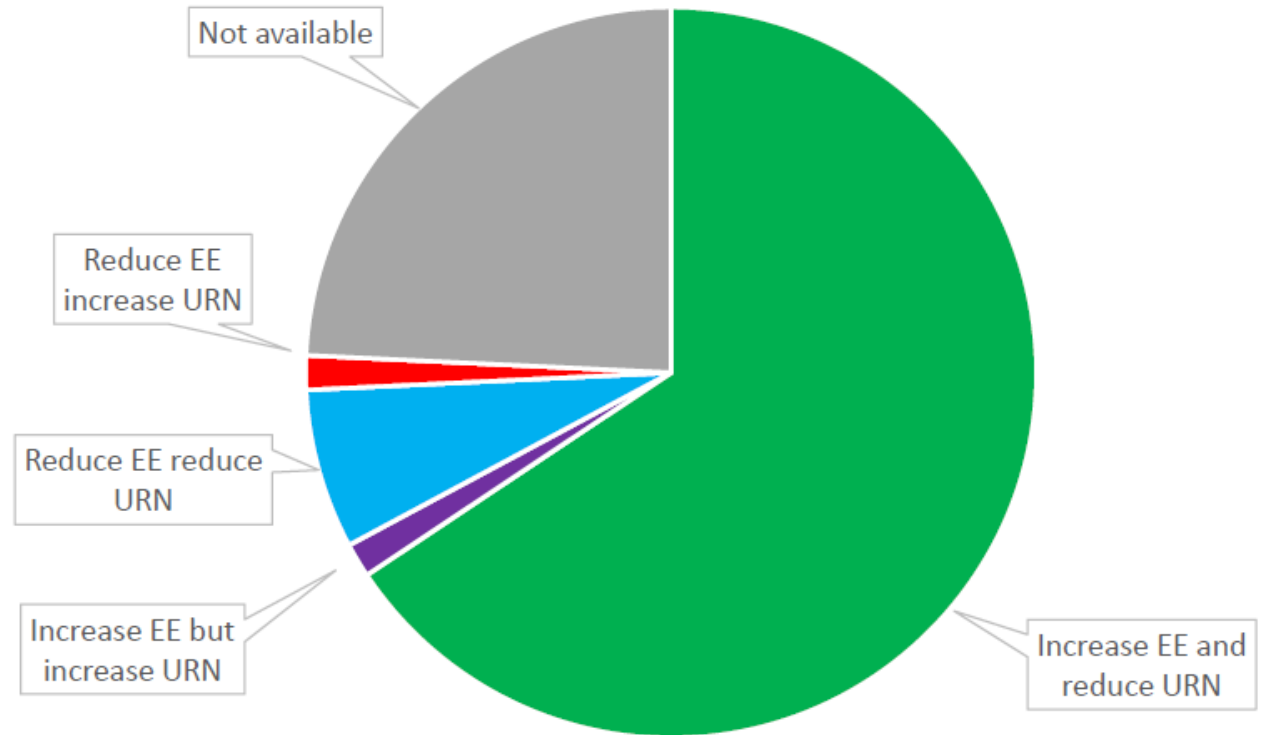


- In July 2023, the new version was approved as circular MEPC.1/Circ.906
- Key features are :
  - They apply to new and existing ships.
  - They are non-mandatory with no specified reduction limits.
  - Ship noise signatures are initially baselined by measurement or prediction.
  - A noise management plan is developed by the ship owner.
  - They include suggestions for incentivising uptake, e.g. via reduced port dues.
  - They are currently within a 3-year experience building phase.
  - The guidelines make reference to the various quiet ship notations offered by class, and adoption of one of these can provide a more formalised approach with more rigid and ambitious noise reduction targets.
- ICS is raising industry awareness of the new guidelines and encouraging their adoption by ship owners.

# Synergies between Energy Efficiency (EE) and URN



- The majority of efficiency measures are also known to reduce URN
- For about two thirds of the measures there is clear synergy and co-benefit
- In effect energy efficiency is noise reduction.
- With a little care in selection of energy efficiency measures, a welcome by-product with no additional CAPEX will be noise reduction.







Some examples:

	Impact on energy efficiency	Impact on URN	
		dB	Frequencies
<b>Hull cleaning</b>	< 5%	< 5	All
<b>Bulbous bow</b>	3 to 5%	< 5	All
<b>Flow straightening, e.g. propeller boss cap fins</b>	-3 to 7%	5 to 10	< 1000 Hz
<b>Propeller maintenance</b>	2 to 5%	< 5	All
<b>Contra rotating propellers</b>	< 6%	5 to 10	40 to 300 Hz
<b>Air lubrication</b>	4 to 12%	> 10	20 to 80 Hz
<b>Wind assisted propulsion</b>	< 13%	5 to 10	All

For comparison, please remember the Okeanos foundation target of 3dB reduction (10 to 300 Hz) in 10 years.



- Optimisation of the propeller blade area ratio.
- Slow running of vessels with controllable pitch propellers.





To counteract the increase due to growth in trade and also achieve the target 3db reduction:

**Requires a 4.8 dB reduction in average URN from individual ships**

**Reduces 3 db (Okeanos target)**

Density of ship traffic goes up 50%  
**Ambient URN increases 1.8 dB**

$$L_n = L_s - 95 + 10 \log \delta + 10 \log \frac{1}{\alpha_T H}$$

Ambient noise in dB

Average sound source level per ship

Density of ship traffic

Attenuation factor

Water depth

Constant



- Our industry can play a significant role in controlling URN.
- The revised IMO guidelines on URN reduction provide ship owners a flexible and pragmatic approach to managing URN reduction. ICS encourages their adoption.
- Class Society quiet ship notations offer an alternative or supplementary approach, providing a more formalised methodology.
- With careful selection of the energy efficiency measures, compliance with the IMO GHG regulations can be ensured, whilst also achieving beneficial URN reduction at minimal additional cost. Such a pragmatic approach is consistent with the Okeanos target reduction of 3db per decade.
- During the 3 year experience building phase, ICS would welcome the feedback of ship owners that have used the new guidelines. If proved effective and a good uptake can be confirmed, the need for additional measures or hard enforcement may be allayed.



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Thank you for your attention