



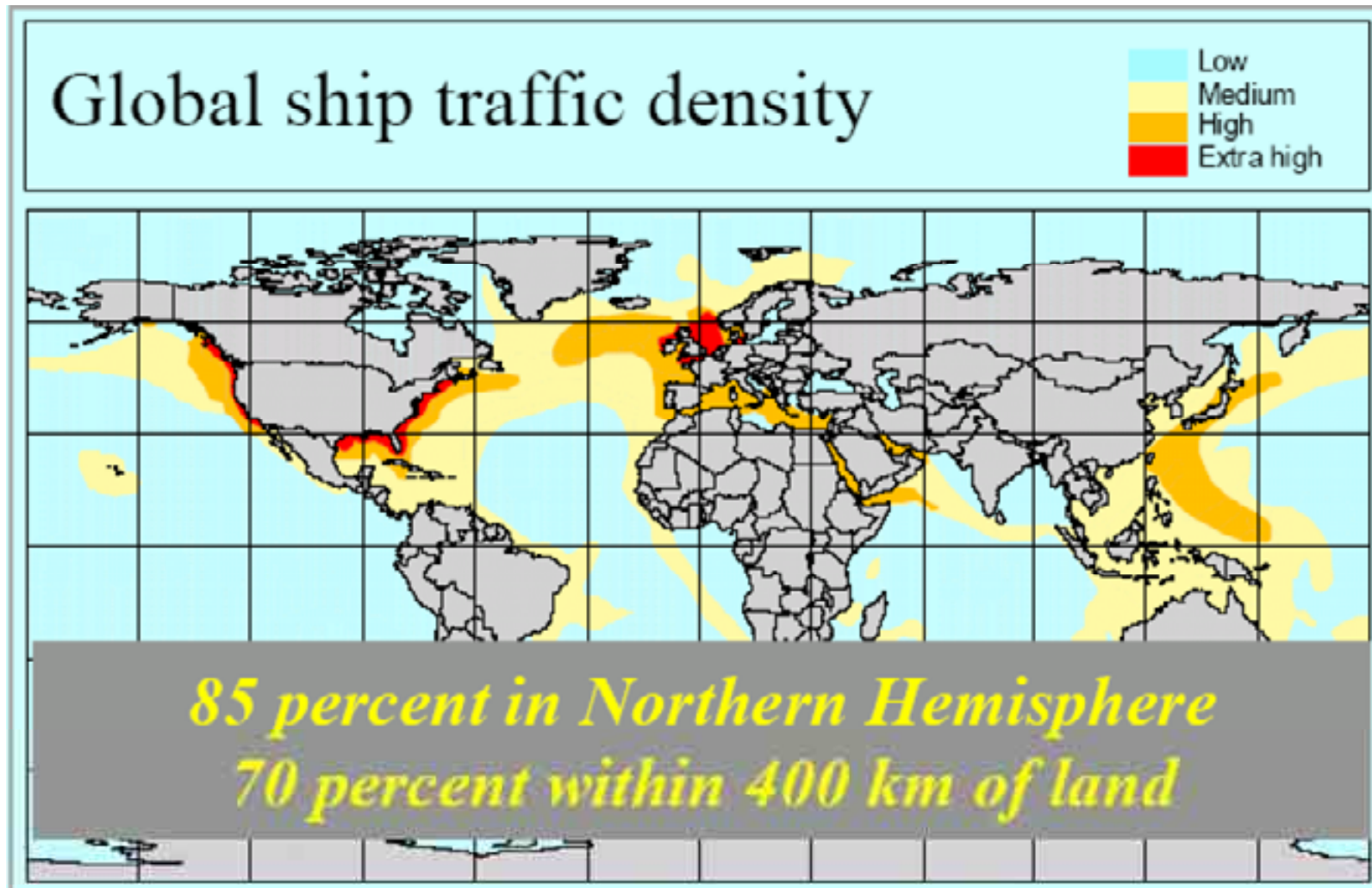
*DNV Triple-E*TM

A Verifiable Environmental & Energy Efficient Rating Scheme

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Shipboard Emissions - A Global Concern



Ocean Transport is Preferred on a ton-mile Basis

- Estimated Carbon Released - Pounds per ton-mile
 - Air Cargo – 1.78
 - Truck – 0.37
 - Train – 0.23
 - Sea Freight – 0.09
- Ships Represent the most Carbon Efficient Method of Transport
- But, Ships produce about 3% of Global Emissions Today

A Strong Business Case for Efficiency

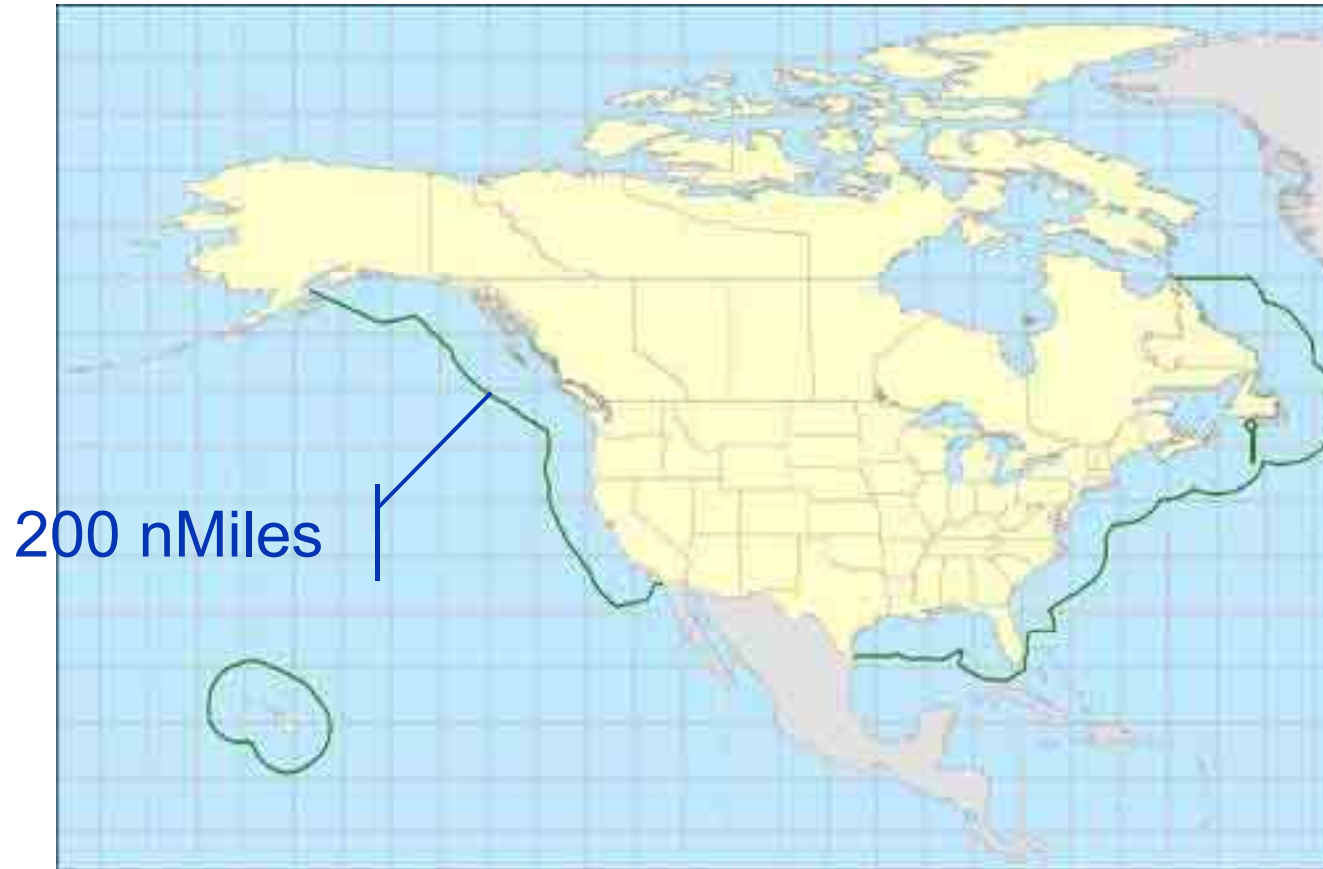
- Shipping burns heavy fuel at 333 MTpa
- At \$400/ton cost is \$135 billion/yr
- CO₂ emission is around 1 billion tons/yr (“Big Emitter”)



IMO Moving in a “Green” Direction

- MARPOL - Annex VI *Prevention of Air Pollution from Ships* (in force May-05) -A three tier approach to NOx and SOx reduction
- Adopted in MEPC58 October 2008.
- EU Directive EC 2005/33
 - Ships to reduce sulfur in liquid fuels to 0.1% (from 1.5% in 2005) for all EU ports.
- Requirements for North American Emissions Control Areas (ECA)?

Proposed ECA for North American Coastal Waters



Adopted in MEPC 60 with planned enforcement - August 2012

MEPC Circulars - the Foundation for *DNV Triple-E™*

- MEPC/ Circular 471 July 2005 - IMO's Interim Guideline for Voluntary ship CO2 Emission Indexing - Urged the MEPC to develop strategies for reducing CO2 and NOx
- MEPC.1/Circular 589 March 2008 asked MEPC to develop a system to limit or reduce GHG emissions and describe GHG efficiency of operation and design (**EEOI & EEDI**)
- Latest Circular is MEPC/Circ 684 Aug 09, "Guidelines for Voluntary use of Ship Energy Efficiency Operational Indicator," a *consistent* approach

EEOI - IMO Energy Efficiency Operational Indicator



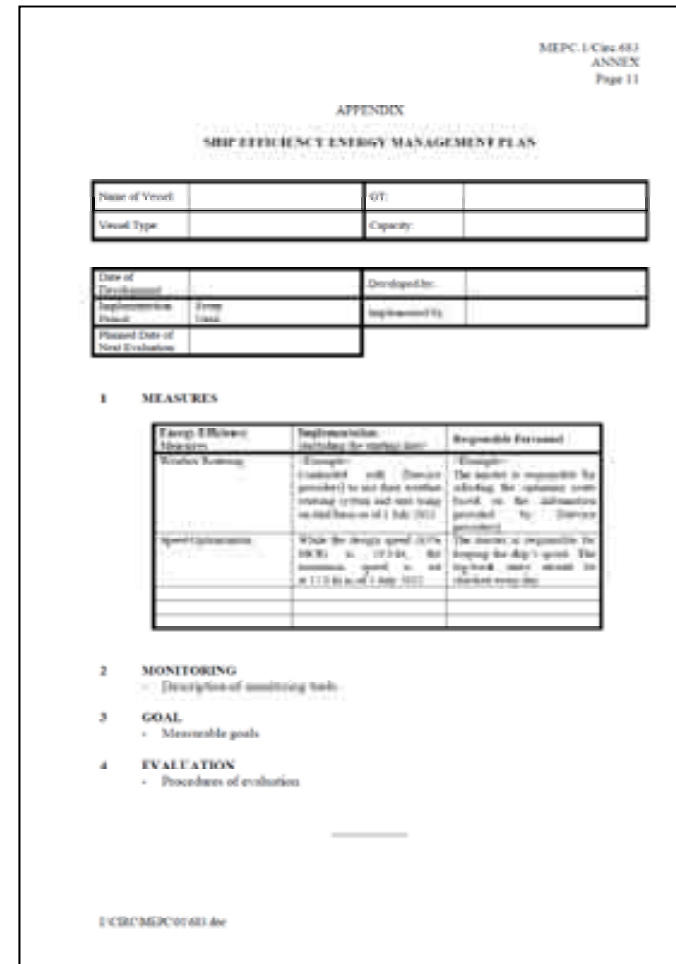
Index calculation based on:

- Total fuel consumption
- Actual distance traveled (from log book)
- Cargo mass or alternative cargo unit

$$\text{Index} = \frac{\sum_i FC_i \times C_{Carbon}}{\sum_i m_{cargo,i} \times D_i} \quad (\text{gram CO}_2/\text{tonne identical mile})$$

DNV Triple-E™ Incorporates MEPC 683 (SEEMP)

Ship Energy Efficiency Management Plan



It References Energy Efficiency Design Index

$$\textit{Attained design EEDI} = \frac{\textit{Environmental cost}}{\textit{Benefit for society}}$$

$$\textit{Attained design EEDI} = \frac{C_F \textit{ SFC } P}{\textit{Capacity } V_{ref}}$$

- Calculated in grams CO₂ / capacity * nm

DNV Triple-E™ - A Verifiable Tool to Reduce Costs & Demonstrate Environmental Performance

Four Performance Levels:

- 1. Leading** environmental performance
- 2. Sustained** environmental performance
- 3. Systemized** environmental performance
- 4. Heightened** environmental awareness

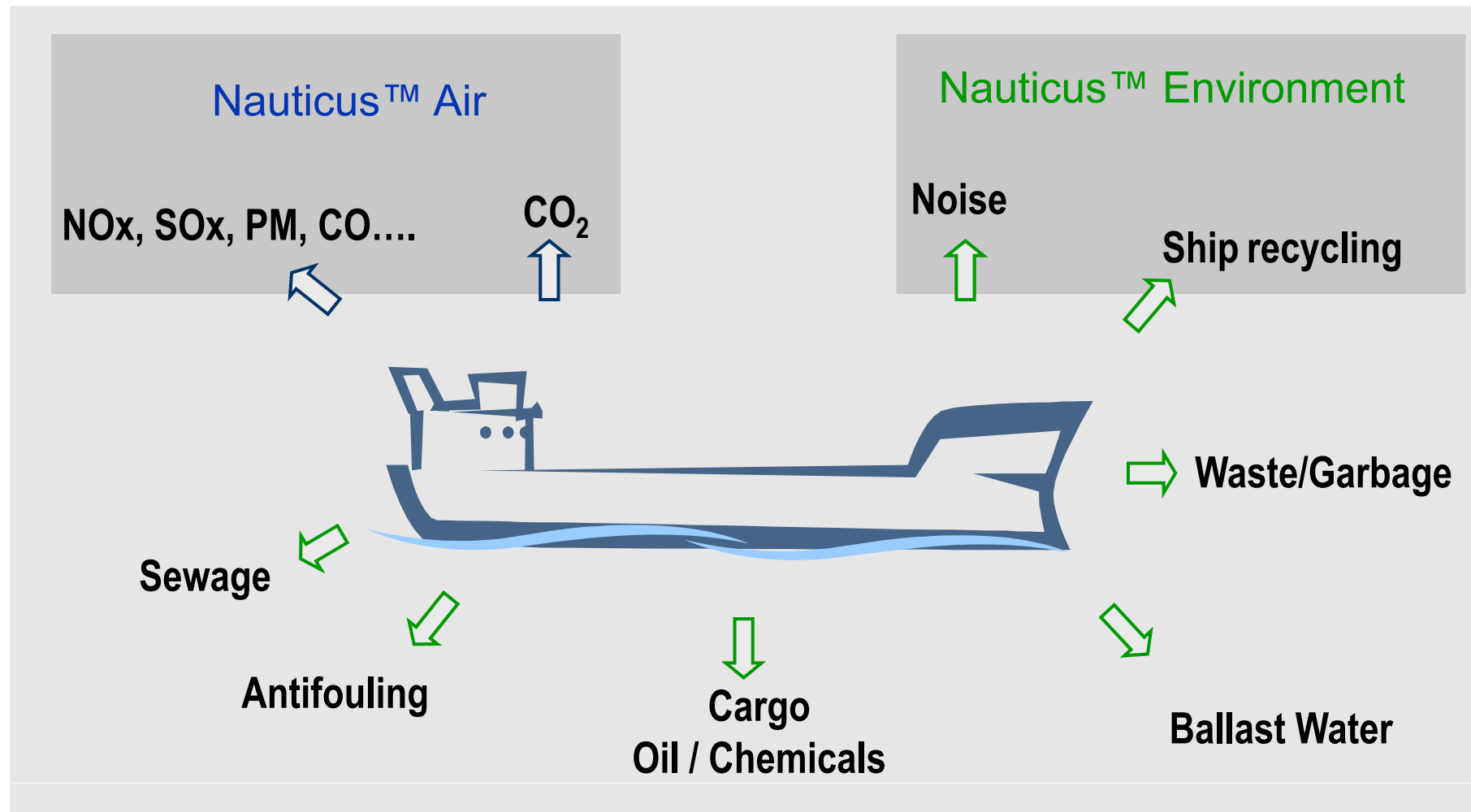


Levels Indicate Increasing Efficiency & Performance

- *DNV Triple-E™* Exceeds the Requirements of ISO 14001
- Each Level Focus on Performance of the following:
 - People and competence
 - Operation
 - Design
- “Leveling Up” requires audited improvement of
 - Environmental and operational performance
 - Personnel competence and leadership
 - Environmental design performance

DNV's Tracking Tool - Nauticus™ Air/Environment

You can't manage what you can't measure!



DNV Ratings and Results

*Triple-E*TM Performance Rating is Attained Through:

1. Self-assessment
2. DNV Verification
3. DNV's *Triple-E*TM Affirmation



DNV's *Triple-E*TM rating scheme showcases the Ship Owner's commitment to efficient operation and environmental responsibility

Summary - Benefits to Ship Owners

- A simple initiative for energy efficient operations
- Tool to improve bottom line by reducing fuel cost
- Objective assessment of individual ships' performance irrespective of age, flag, and technical standard
- Implementation is flexible and can accommodate emerging regulations and industry trends
- Simple start-up identifies environmental targets
- Advanced levels indicate continuous improvement

Corporate Climate Change Planning & *Triple-E*TM

- DNV through its climate change services group offers Cli-MitTM Navigator, a structured internal process for dealing with regulatory and financial uncertainties around climate change
- Folding *Triple-E*TM data into Cli-MitTM Navigator helps to:
 - Better understand the impact of carbon pricing on your shipping business through forecasting & analysis (Market Analyzer)
 - Manage risk to structure a market based, corporate strategy (GHG Business Planning Model)
- DNV's Climate Change Services Group can help your company make better business decisions

DNV Triple-E™

A Verifiable Environmental & Energy Efficient Rating Scheme



Safeguarding Life, Property and the Environment

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MANAGING RISK

DNV