2nd Annual Maritime Risk Symposium
Rutgers Center for Advanced Infrastructure and Transportation

7-9 November 2011 Piscataway, NJ

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Agenda

1. Risk Mitigation Post 9-11
2. Economy, Security, Environment
3. Maritime Security Risk Management
4. Environmental Risk Management
5. MLL Emergency Response
6. Teambuilding and Exercises

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Our Challenge:

The Transportation System is Designed to SPEED commerce, not IMPEDE commerce!

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Post 9-11 Commercial Maritime Security

1. International Ship and Port Facility Security Code (ISPS)
2. Maritime Transportation and Security Act of 2002 (MTSA)
3. Security and Accountability For Every (SAFE) Port Act of 2006
4. Transportation Worker Identification Credential (TWIC)
5. C-TPAT/Container Security Initiative

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Analyzing Risk

1. All Hazards
2. Developing Security Plans for New Ships
3. Operational Threat Assessments
4. BIMCO's Automated Voyage Risk Assessment (AVRA)
4. Situational Risk Assessments
5. Using Exercises to Identify Risk
6. Independent Analysis for Risk Consequence

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Piracy Security Umbrella

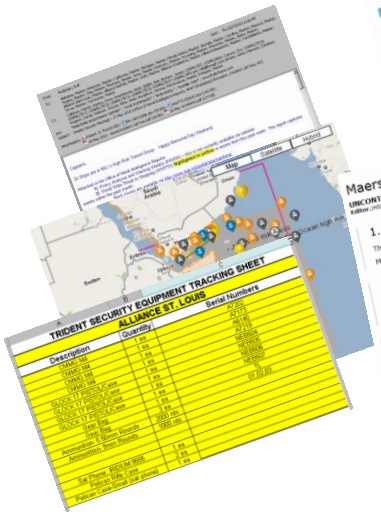
INFORMATION

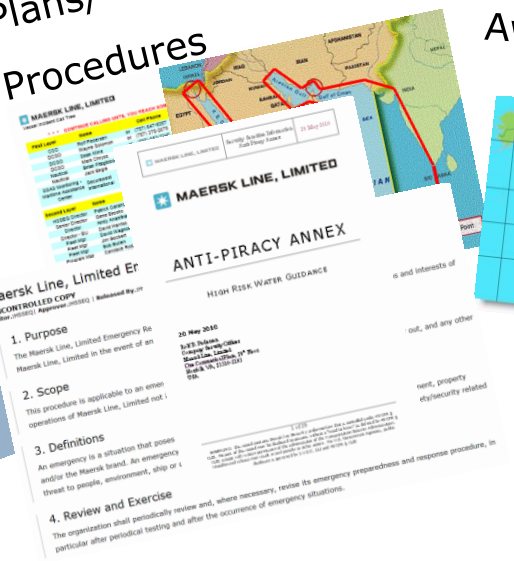
Plans/ Procedures

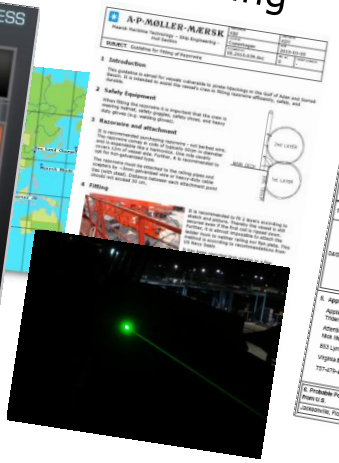
Situational Awareness

Physical Hardening

Armed







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The Environment

Coastal and Marine Spatial Planning

MARPOL Annex VI emissions control

Right Whale Seasonal Management Areas

Ballast Water Management

Grey Water Management

Anti-Fouling Regulations

Cold Iron Shut-downs

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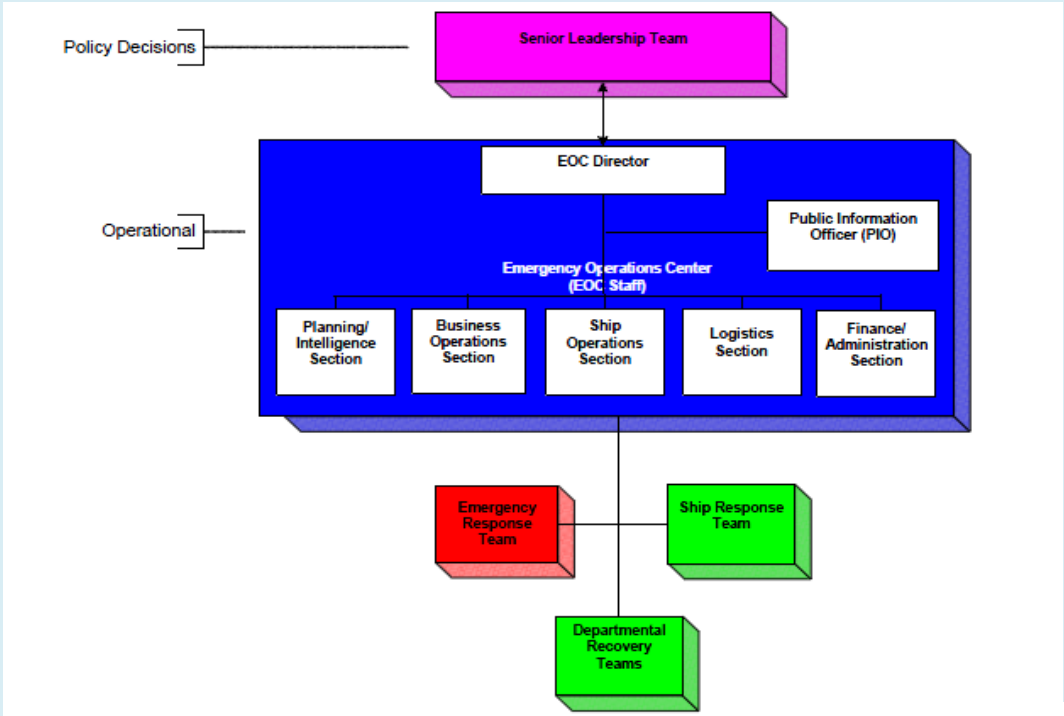
MLL Emergency Response

1. Crisis Management Plan
2. Business Continuity Plan
3. Emergency Operations Center



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MLL Emergency Response

2011 Examples:

- Maersk Constellation Detention
- ASRY Shipyard
- Japanese Earthquake/Tsunami
- Fukushima Reactor Response
- Maersk Virginia/Hurricane Ophelia

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Operations, Exercises and Lessons Learned

1. Maersk Alabama Attack
2. Maersk Michigan Terrorist Attack Exercise
2. Maersk Rhode Island Oil Spill TTX
3. Business Continuity Plan Exercise
4. Hurricane Irene BCP Operation

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18th Century Maritime Security

The Great Chain – 1778 to 1782
West Point to Constitution Island

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MLL welcomes the opportunity to help sustain our environment and economy through coastal and marine spatial planning

Maersk Line, Limited is engaged in activities tied to National Coastal and Marine Spatial Planning

- Ballast Water Technologies
  - Maersk Line, the global container shipping business, is leading the industry in developing new ballast water management systems
- Right Whale Safety
  - Through our partnership with the National Marine Fisheries Service at NOAA, we are ensuring the safety of the whales while continuing to meet commercial requirements

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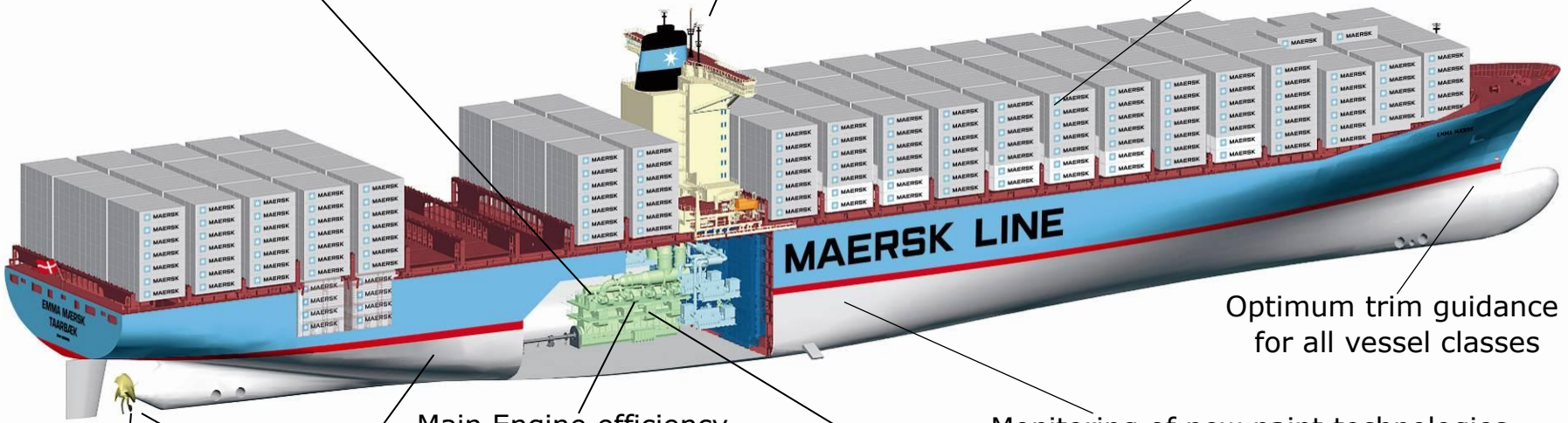
Across its fleet, Maersk has implemented numerous efficiency-gaining and emission-reducing technologies and processes



Other Initiatives

- Alternative fuel tests
- New propulsion technologies
- ISO 14001 certified
- Crew awareness and engagement
- SOx scrubber studies
- QUEST: Low energy chilled containers
- Modified bulbous bow
- Micro bubbles
- Ballast water optimization and treatment systems

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This year Maersk Line ordered 10 Triple-E vessels, the largest and most efficient vessels ever to be built

- 18,000 20-foot containers
- Each vessel is expected to be 1,310 feet long
- 35% less fuel per container than similar vessels
- Delivery between 2013 and 2015
- 16% more capacity than Maersk Line's largest existing vessels (PS-class ships)

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Fuel switches provide immediate air quality benefits

Fuel Switch Programs

California – Fuel switched from 24nm from shore. Maersk Line volunteered to lead the pilot program in 2006, and fuel switch has been required since July 2009

Houston – Voluntary program began in November 2009 with similar parameters to California, like 24nm

Washington and British Columbia – Fuel switched at dock since pilot begin in 2006

Hong Kong – Voluntary program to switch to low sulfur fuels while at berth during 2011-2012. It is first of its kind in Hong Kong, Pearl River Delta, and Asia.

March 31, 2006: Mærsk Mc-Kinney Møller stands on the dock at Pier 400 in Los Angeles with the Sine Maersk at berth behind him. The vessel was the first to perform a fuel switch as part of a Maersk Line environmental initiative in California.

Emissions Reductions:

SOx: 95%

Particulate Matter: 86%

NOx: 6-12%

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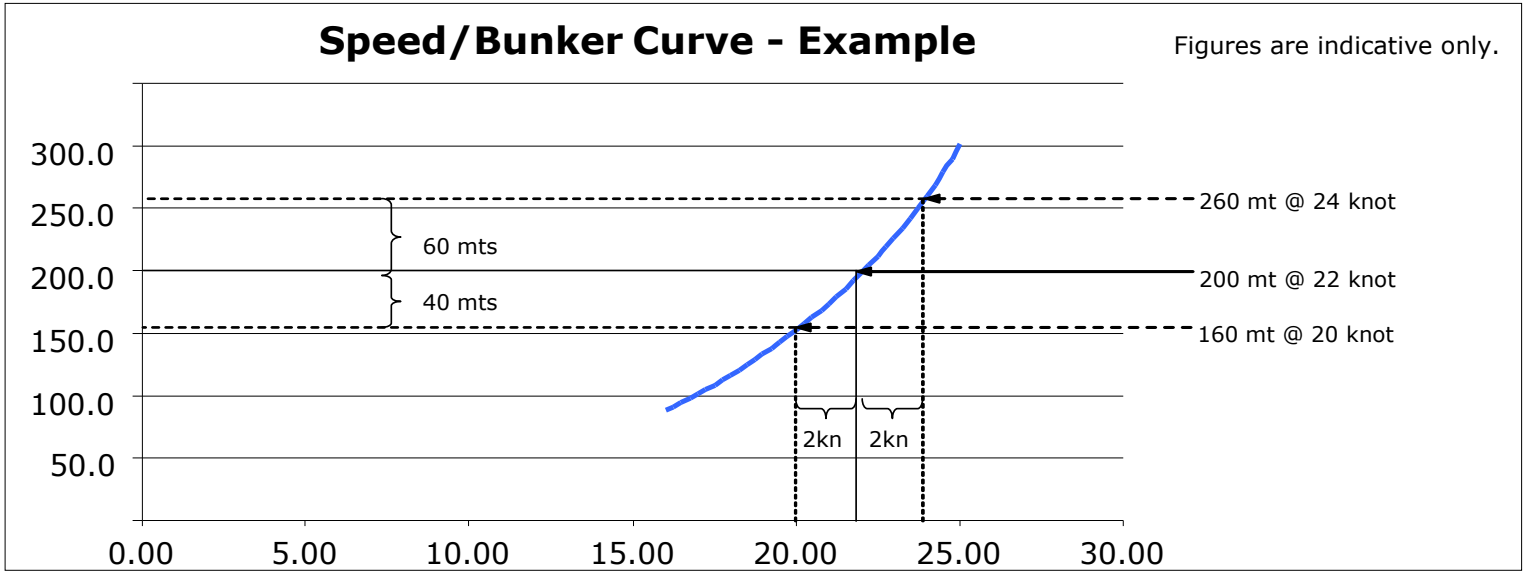
Slow steaming has a resounding effect on emission reductions



- Study started in 2007, covered 110 vessels
  - Maersk collaborated with engine manufacturers
- Results:
  - OK to operate as low as 10% engine load
  - Traditional range is 40 – 60%
  - Manufacturers have changed recommendations
- Over 100 vessels used since 2007, resulting in:
  - More flexible voyage & schedule planning
  - 10 – 30% fuel savings and reduced CO2

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The U.S. Government is working with Maersk Line, Limited (MLL) to realize increased fuel efficiency and lower emissions

Advanced Waste Heat Recovery System (AWHR)

- MLL completed technical and cost analyses for installing AWHR systems on two U.S. Navy (Military Sealift Command) ship classes
- MLL expects to proceed with design and installation on selected ships later in 2011

Vessel Performance Management System (VPMS)

- This program will support the Military Sealift Command's fuel conservation goals by helping them operate and manage their vessels more efficiently

Biofuel Experiment

- In collaboration with the U.S. Navy, MLL will test the use of Navy-developed biofuels on marine engines

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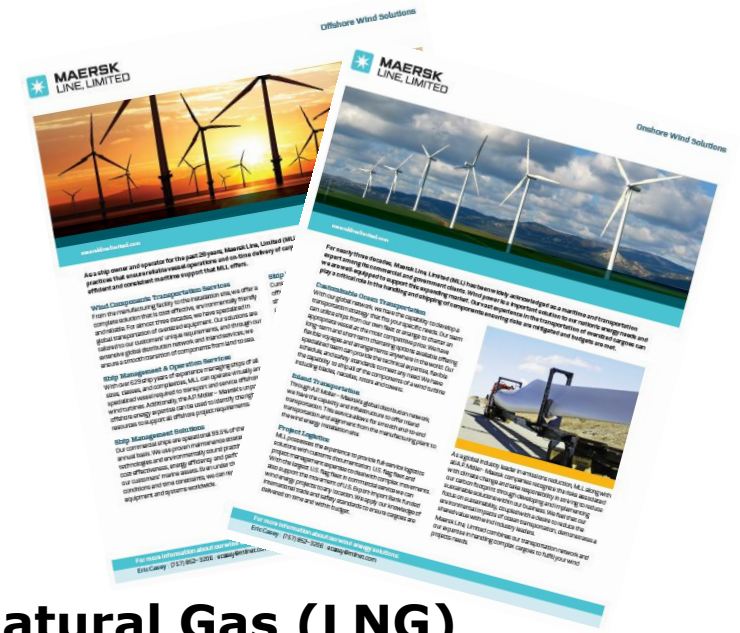
The development of clean energy markets aligns with Maersk Line, Limited's values

- **Wind Energy**
  - Wind is one potential solution to our country's need for renewable energy
  - MLL wants to become a maritime partner for offshore and onshore wind energy projects



- **Liquefied Natural Gas (LNG)**
  - LNG is clean fuel but adoption is limited by availability
  - MLL is looking to transport small-scale quantities of LNG safely, reliably and economically
  - We have developed 2 articulated tug-barge (AT/B) concepts with Argent Marine to distribute LNG – bulk and intermodal

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