

# Urban Commerce & Security Study

Balancing Commerce and Security – An Urban Study with Maritime Application

Homeland Security University Programs Project



- *Problem:* There is often a perceived conflict between freedom of economic activity and the need for increased security. Nowhere is this more apparent than in urban areas such as Lower Manhattan and Los Angeles
  - Conflicting goals:
    - Enhance economic activity
    - Prevent terrorist attacks
  - But, are they always conflicting?
- The focus of this problem is core to the mission of DHS and directly supports the needs of the local first responder community



- The Urban Commerce and Security Study (U-CASS) project will develop and implement **operations research decision support tools** to enable local stakeholders to evaluate the **tradeoffs** and **synergies** of **security** measures and **economic activity** in urban areas
- S&T will:
  - Leverage University Center of Excellence (COE)-based research and funding mechanisms to uniquely address a strategic security challenge;
  - Address high-priority DHS mission requirements; and
  - Maintain focus on end-user needs





- S&T will manage this effort by integrating and coordinating a multi-disciplinary research team from three COE's – CREATE, NTSCOE (MTI) and CCICADA
  - The effort will apply the disciplines of economic modeling, threat analysis, and enhanced data analytics to shape the appropriate solution set
  - Directed outcomes include focused and validated decision support tools that will inform decision makers on the question of security and commerce balance





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## DHS S&T

- ▶ **S&T's Office of University Programs:** Program management, financial management, liaison with local stakeholders, DHS, and other Federal agencies

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## University COEs

- ▶ **Rutgers University – Command, Control, and Interoperability Center for Advanced Data Analytics (CCICADA):** Subject matter expertise in data analysis, operations research, measurement, law enforcement, risk assessment, data collection, and interviewing/expert elicitation
- ▶ **University of Southern California – Center for the Risk and Economic Analysis of Terrorist Events (CREATE):** Subject matter expertise in economic modeling, risk assessment, interviewing/expert elicitation, and methods of preference and probability elicitation
- ▶ **San Jose State University – Mineta Transportation Institute (MTI):** Subject matter expertise in terrorism, mass transportation security, threat analysis, and threat scenario generation; Provide network of high-level contacts with local stakeholder leadership

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## Local Organizations / Policymakers

- ▶ **Port Authorities**
- ▶ **Police Departments**
- ▶ **Offices of Mayor / Governor**
- ▶ **Local Economic development bodies**
- ▶ **Local private sector organizations (e.g., Chambers of Commerce)**





## GOAL

Develop and implement operations research decision support tools to enable local stakeholders to evaluate the tradeoffs and synergies of security measures and economic activity surrounding America's urban areas

### Research

- ▶ Stakeholder identification and outreach
- ▶ Data gathering: Risk, threat, costs, and countermeasures
- ▶ Expert elicitation
- ▶ Red teaming
- ▶ Threat scenario generation

### Analysis

- ▶ Creation of Operations Research (OR) models
- ▶ Model integration
- ▶ Incorporation/adaptation of various risk approaches and sensitivity ranges

### Integration

- ▶ Quality Control
- ▶ Training and Implementation Plan
- ▶ Transition tools to end users
- ▶ Generalization of model and tools





- Risk-based economic assessment of tradeoffs between security and commerce
- Generalized model for future analyses
- Tailored benefits for multiple project stakeholders:
  - DHS: Protect America's iconic landmarks and strategic centers of commerce
  - S&T: Demonstrate the power of University-based COEs
  - Local stakeholders: Ensure commercial potential of urban areas while taking aggressive security posture





# GARDEN STATE OFFSHORE ENERGY

*Renewing New Jersey's Energy Future.*



# Contents

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- Brief Background of the NJ Offshore Wind Industry
- Developer's perspective on maritime risks
- Public / Private Co-operation
- Questions?

# Background of NJ Offshore Wind Industry

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- 2004 – 2006
  - Blue Ribbon Panel created to identify and weigh costs and benefits of developing offshore wind considering both economic and environmental costs and benefits
  - Panel recommended offshore wind test project not to exceed 350MW
- 2007 – 2008
  - NJBPU issues solicitation for test project
  - Five companies responded
  - GSOE selected as the solicitation winner
  - Energy Master Plan issued with goal to develop 1000MW of offshore wind by 2012 (3,000MW by 2020)
- 2010 – present
  - Offshore Wind Economic Development Act (“OWEDA”) signed into law to spur economic development and job creation from the emerging offshore wind industry in New Jersey
  - Targets 1,100MW of offshore wind (floor); state would like to see 3,000MW
  - Last stages of regulatory rule process prior to solicitation for competitive bids (expected summer 2012)

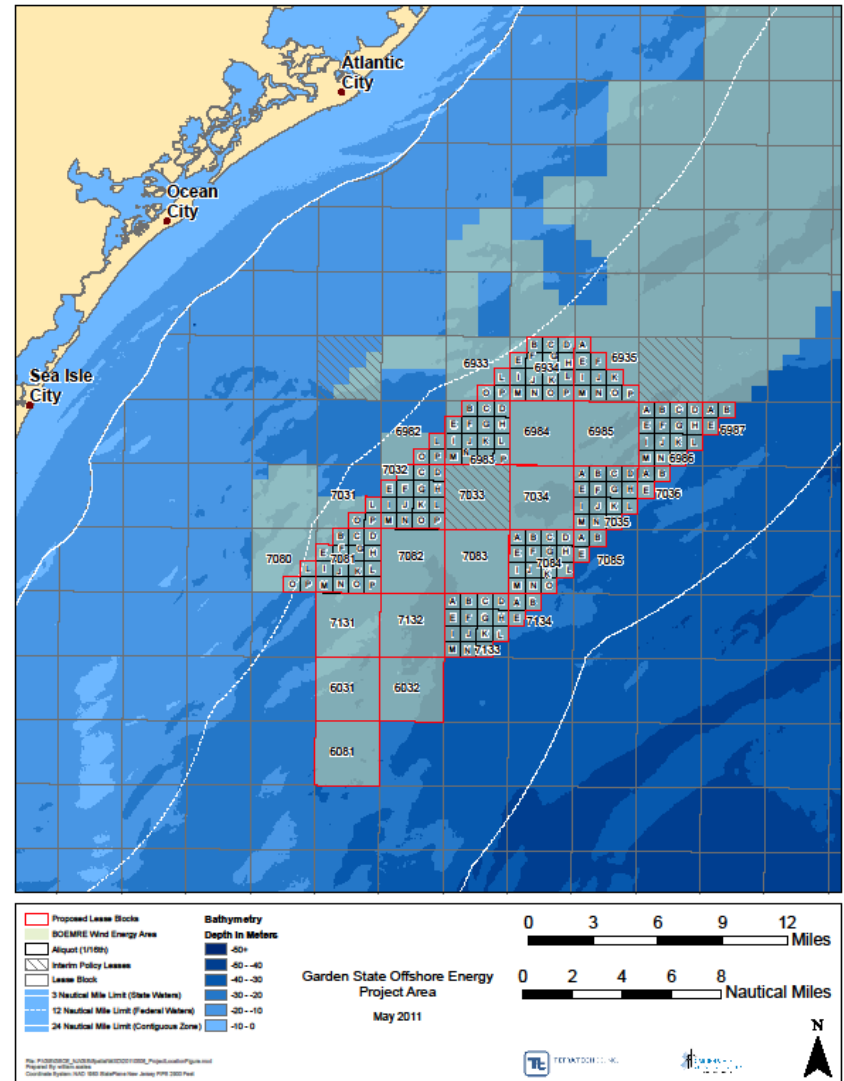
# Developer's perspective on maritime risk

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- Five areas identified
  - Structure (e.g. – size of projects in Wind Energy Area)
  - Technical (e.g. – grid reliability, reserve capacity, reliability etc.)
  - Operating (e.g. – personnel safety, turbine availability, etc.)
  - Natural Disasters (e.g. – hurricanes, icing, etc.)
  - Terrorism

# Structure

- Large Scale projects
  - GSOE project site roughly 120 square miles in size; or the size of Essex County, NJ
  - 60-150 turbines
  - $\frac{3}{4}$  of mile spacing between each turbine
  - Offshore substations =  $\sim 5,000$  sq. ft.
- Large scale shared area requires coordination with shipping and fishing industry
- Increased maritime traffic, modified ship routes, size of ships, recreational and commercial fishing activities, anchor areas, etc. all contribute to risk profile





## Technical

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- Although most turbines have good track record, turbine availability and reliability impact:
  - Electric grid reliability and short/long term transmission planning
  - Reserve capacity requirements
    - intermittency of wind resource requires standby reserves in the event of a drop off (think Texas!)
  - Submarine cables are exposed to natural and accidental failure risk

## Operating

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- Ocean environment has a great deal of influence on turbine availability and reliability
  - Corrosion, humidity
  - Sea state (waves, current, tide, etc.)
  - Ability of personnel to safely access turbines for O&M, etc.)
- Negligible spill /environmental risk

# Natural Disasters

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- Natural disasters pose structural and operational risks to offshore wind farms despite technological features designed to mitigate risk impacts
  - Hurricanes (high wind, waves)
  - Nor'easters (high wind, waves)
  - Earthquakes/tsunamis (structural)
  - Significant storm winds, wave heights
- Offshore wind industry cooperative initiatives
  - Meteorological forecasting modeling
  - Oceanographic modeling
  - Marine Mammal / Avian studies

# Terrorism

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- Project locations 10-25 miles offshore pose security risks
  - Typically unmanned
  - Over 1 hour to reach project sites from shore
  - Passive security measures most likely (security cameras, sensors)
  - You can't fence off 120+ square miles of ocean
  - Concurrent uses of the area poses challenges to site security/integrity (recreational/commercial fishing, scientific research, shipping lanes, etc.)



## Terrorism cont

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- U.S. Coast Guard will be primary risk mitigant:
  - Do they have the necessary resources (ships/aircraft, personnel, training, etc.) to undertake monitoring/response capabilities?
  - Are there other or new technologies (like sub-sea detectors) that can assist a project owner and government agencies like the USCG in fulfilling security requirements
- Other risk mitigants?

# For further information

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A photograph of a Maersk Line container ship docked at a port. The ship is blue and white, with 'MAERSK LINE' visible on its side. It is surrounded by large blue cranes and other port infrastructure. The sky is blue with some clouds. A semi-transparent blue banner is overlaid on the top half of the image, containing text.

# 2<sup>nd</sup> Annual Maritime Risk Symposium Rutgers Center for Advanced Infrastructure and Transportation

7-9 November 2011      Piscataway, NJ



## 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



# Our Challenge:

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





## 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



## 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





# 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**

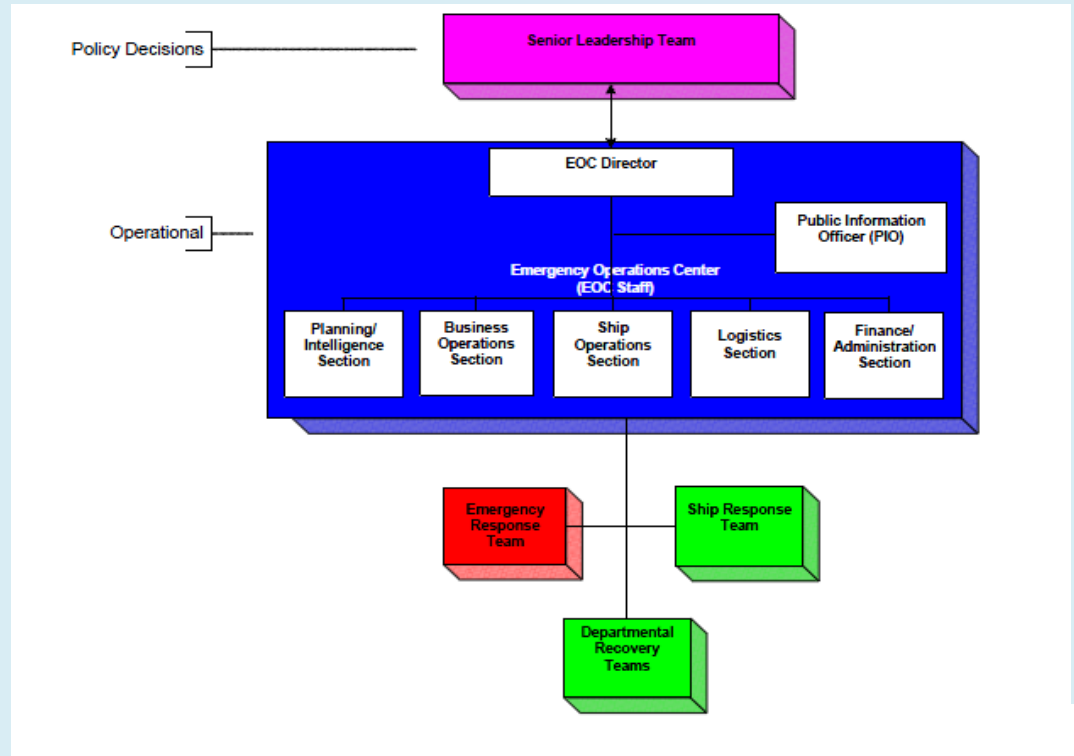
**Cold Iron Shut-downs**





# MLL Emergency Response

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







## **MLL Emergency Response**

### **2011 Examples:**

**Maersk Constellation Detention**

**ASRY Shipyard**

**Japanese Earthquake/Tsunami**

**Fukushima Reactor Response**

**Maersk Virginia/Hurricane Ophelia**



## 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



# Questions & Answers



# 18<sup>th</sup> Century Maritime Security



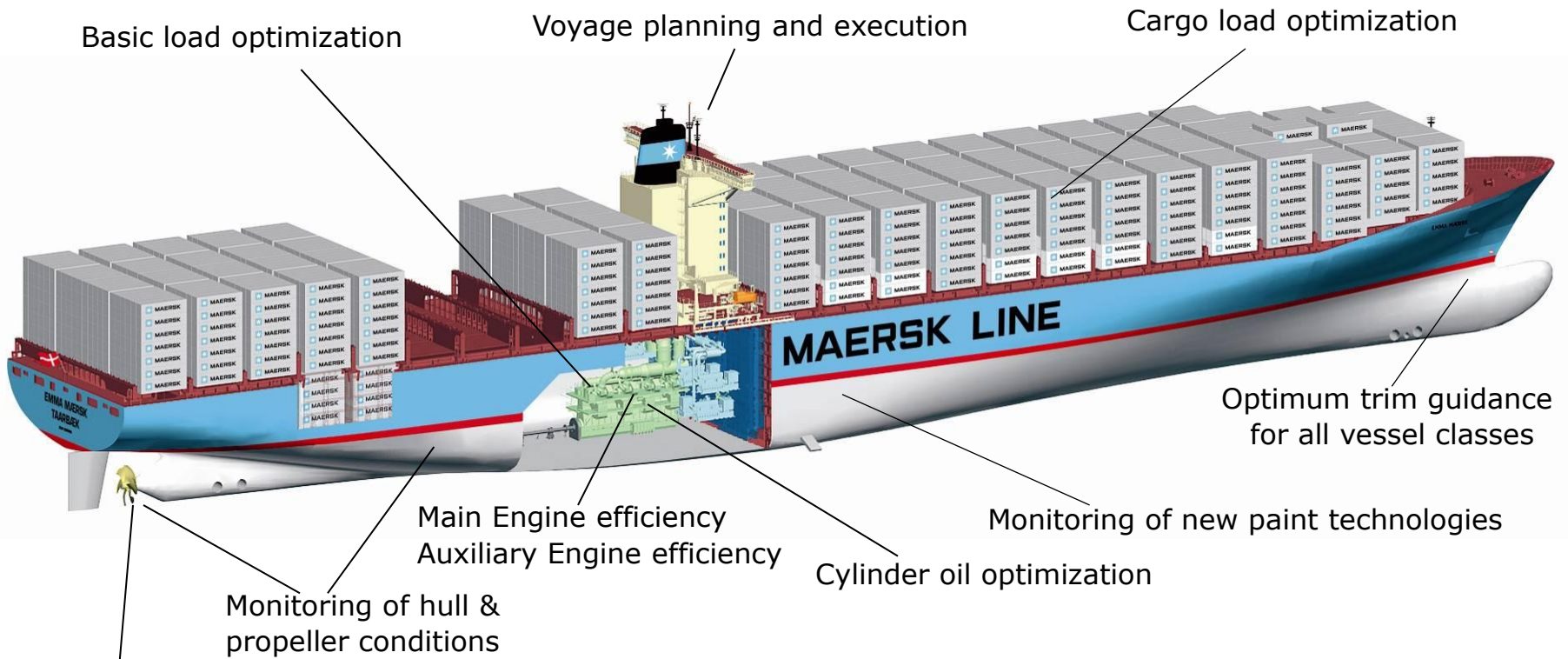
**The Great Chain – 1778 to 1782  
West Point to Constitution Island**

# 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

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



Propeller technology enhancements

## 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



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



### **Triple-E**

**E**conomy of Scale  
**E**nergy Efficiency  
**E**nvironmental Improvements

- 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)

# 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.

### Emissions Reductions:

SOx: 95%

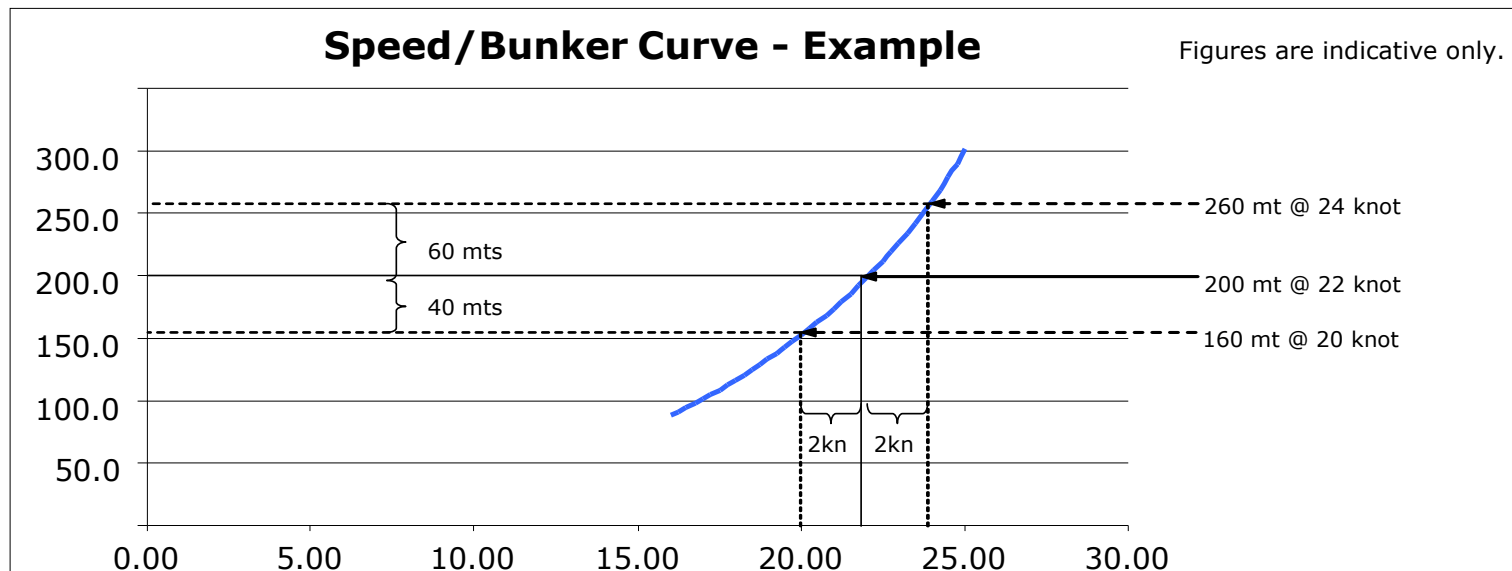
Particulate Matter: 86%

NOx: 6-12%



*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.*

# 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

# 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





# 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



**MAERSK LINE, LIMITED** Liquefied Natural Gas Concept Overview

As a ship owner and operator for the past 20 years, Maersk Line, Limited (MLL) has been a pioneer in the development of the world's largest and most advanced fleet of ships. As a ship owner and operator for the past 20 years, Maersk Line, Limited (MLL) has been a pioneer in the development of the world's largest and most advanced fleet of ships.

**Wind Concept Overview**

From the wind energy industry, we have learned that offshore wind energy is a viable and growing market. As a ship owner and operator for the past 20 years, Maersk Line, Limited (MLL) has been a pioneer in the development of the world's largest and most advanced fleet of ships.

**Energy Management & Operations Overview**

Our energy management and operations team is focused on reducing our carbon footprint and improving our operational efficiency. We have implemented a number of measures to reduce our energy consumption and improve our operational efficiency.

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**MLL Concept**

**Intermodal Concept**

For more information about our services, please contact us at [info@maersk.com](mailto:info@maersk.com) or call us at 1-800-368-5848.

## • 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

