Planning For Future Transportation Technologies

John Vickerman
Norfolk, Virginia
Agenda

- External Industry Pressures
- Port Security Technological Change
- International Cargo Demand Trends
- The Asian Import Trade Challenge
- North America Forecasted Cargo Volumes
- North American Port & Intermodal Capacity
- International Port Productivity Comparisons
- Vessel Technology Trends
- Environmental Concerns for Vessel Emissions
400 Years Ago
A Voyage of Three Vessels
Created the First Permanent English Port in Jamestown, VA

In 1600, Queen Elizabeth I Granted a Royal Charter to the Honourable East India Company, First Joint-Stock Company (Forerunner of the Corporation), to Develop Far East Trade
M/S EMMA MÆRSK  Circa 2007

Deadweight Tonnage: 156,907 tons
LOA: 1,302 feet;  Crew: 13

Godspeed Brigantine, Circa 1607
Deadweight Tonnage: 40 tons
LOA: 88 feet;  Crew: 13
Port & Intermodal External Industry Pressures
Global Trade: Current Course & Direction?

Cargo Demands, Capacity, Funding, Port Productivity & Environmental Challenges

North American Port Gateways
Vessel Cargo Handling Circa 1950
US Navy Fast Frigate Circa 2035
What We Know Today... Will Be Surely Be Different Tomorrow!
To Be Competitive Today...
Marine/Intermodal Terminals Must Reduce Throughput Cost & Increase Cargo Velocity Securely and as Stewards of the Environment
Functional Classification of Global Maritime Cargoes

All Maritime Cargo

<table>
<thead>
<tr>
<th>General Cargo</th>
<th>Bulk Cargo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Break Bulk</td>
<td>Liquid Bulk</td>
</tr>
<tr>
<td>Neo-Bulk</td>
<td>Dry Bulk</td>
</tr>
<tr>
<td>Sacks, Cartons, Crates, Drums, Pallets, Bags</td>
<td>Grain, Sand &amp; Gravel, Scrap Metal, Coal/Coke, Clinker, Fertilizer</td>
</tr>
<tr>
<td>Lumber, Paper, Steel, Autos</td>
<td>LNG, Petroleum, Molasses, Chemicals, Vegetable Oil</td>
</tr>
<tr>
<td>Containerized</td>
<td>Containers, Lift On/Lift Off (Lo/Lo), Roll On/Roll Off (Ro/Ro)</td>
</tr>
</tbody>
</table>
The “Port”
One of the Many Diverse Constituencies in the Cargo Transportation Logistics Chain

Objective:
A multimodal “Seamless” integrated world wide cargo conveyance system.
The Global Container Industry Continues to Consolidate...

- Total number of slots
- Slots controlled by top 20 carriers
- Slots controlled by 4 global alliances

Thousands of TEU Slots in Operation and on Order

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of Slots</th>
<th>Slots by Top 20 Carriers</th>
<th>Slots by 4 Global Alliances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>5,053</td>
<td>2,244</td>
<td>1,479</td>
</tr>
<tr>
<td>2000</td>
<td>8,180</td>
<td>4,850</td>
<td>2,674</td>
</tr>
<tr>
<td>2005</td>
<td>9,763</td>
<td>6,881</td>
<td>2,827</td>
</tr>
</tbody>
</table>

- 44.4% in 1995
- 59.3% in 2000
- 70.5% in 2005

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The North American Freight Paradox: The Nation’s Ports and Their Intermodal Linkages are Experiencing the “Best of Times and the Worst of Times” in Terms of Growth and Demands on Capacity
At current productivity and growth levels by 2020, North American ports & their associated intermodal systems will be severely congested. In today’s supply chain, congestion can’t be an excuse...
Poll of the Top 1000 “Blue Chip” Multinational Shipper Priorities

- 43% Schedule Reliability & Consistency
- 38% Competitive Freight Rate
- 12% Transit Time & Speed
Today’s Logistics Truth:

“The customer wants more and is willing to pay less for it.”
Today: Global Trade is an Intermodal System

Typical Transit Days: Hong Kong to New York

43 Days Transit Time Reduction (-72%) in 35 years

Source: Kansas City Southern Railroad
We do not have an “intermodal system” as such. Rather we have an aggregation of multiple, private and public modes, each of which are “stove-piped” within their own individual areas of interest with little or no true cross communication and collaboration.
Recent Private Investment in North American Port Logistics Infrastructure
## Impacts of Recent M&A Transactions on the Port & Terminal Operating Industry

<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Target</th>
<th>Acquisition Value</th>
<th>EBITDA Multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morgan Stanley</td>
<td>Montreal Gateway</td>
<td>CDN $450 M</td>
<td>22.4</td>
</tr>
<tr>
<td>Macquarie Bank</td>
<td>Halterm, Halifax</td>
<td>CDN $173 M</td>
<td>22.9</td>
</tr>
<tr>
<td>Ontario Teachers</td>
<td>Orient Overseas</td>
<td>US $2,400 M</td>
<td>26.9</td>
</tr>
<tr>
<td>Goldman Group</td>
<td>Assoc. British Ports</td>
<td>£ 2,500 M</td>
<td>14.6</td>
</tr>
<tr>
<td>DP World</td>
<td>P&amp;O</td>
<td>£ 3,880 M</td>
<td>16.3</td>
</tr>
<tr>
<td>Babcock &amp; Brown</td>
<td>PD Ports Group</td>
<td>£ 260 M</td>
<td>12.6</td>
</tr>
<tr>
<td>AIG Global</td>
<td>DP World NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Average Container Terminal EBITDA Multiple:** 24.6
Changes in West Coast Port & Intermodal Cargo Transloading
Emergence of the **Inland Port - Rail Logistics Park** is Changing West Coast Trans-loading Long Term Trends

Inland Port Logistics Rail Parks Attracting Major Import DCs

Example: BNSF’s Alliance, TX and Joliet, IL Logistics Park & UP’s Global IIIL Rochelle, IL

Disembark Ops Handled Not at West Coast Ports but at Inland Rail Logistics Park which is close to the Consumer

TTX 2006 International Transportation Flow Study:

- 2000: 28% Transload
- 2004: 24% Transload
- 2005: 20% Transload

Dedicated DC Volume is primary reason

Wal-Mart’s 3.2 million sf Joliet Import DC
Recent Changes in Domestic Distribution

**Direct absorption: Warehouse/distribution**
January 2004–April 2006 (per million square feet)

- Seattle: 11.2
- Portland: 2.7
- Northern Calif.: 1.9
- Denver: 2.1
- Southern Calif.: 
- Phoenix: 7.0
- Chicago: 35.3
- Kansas City: 4.6
- Indianapolis: 5.0
- Memphis: 8.6
- Dallas: 7.0
- Houston: 13.0
- Tampa/St. Petersburg: 3.6
- N.J.: 4.8
- Baltimore: 5.6
- Atlanta: 22.2
- Hartford: 2.0
- Boston: 2.4
- Orlando: 5.4
- Miami: 6.6

Central Logistics Park, Chicago (Joliet Arsenal BNSF)

Largest Intermodal Rail Terminal in the US
2006 Wal-Mart Opening of a 3.2 Million Sq Ft Distribution Center
Port Security
Technological Change
Ports are Experiencing Dramatic Surges in Seaport Security Costs

Port of Miami’s Security Costs Today are 600% Higher Than that of 2001
US Port Security Breach: Supply Chain Disruption

Port Security War Game—Economic Impact

Exhibit 4

Day 1: Ports of Los Angeles and Savannah shut down
Day 4: Customs closes all ports and border crossings
Day 12: U.S. ports reopen
Day 20: Railcar explodes in Chicago; 24 hour stand-down
Day 26: Ports return to normal schedule, inspection rate

$50 Billion Loss

Cargo Backlog Cleared in 60 Days

Source: Booz Allen Hamilton

Backlog | Loss
Equipment and Technologies
Security Container Inspection

100% Radiological Inspection Regime

Gamma-Ray Scan

SAIC Configuration
A radiation portal monitor is a detection device that provides Customs and Border Protection (CBP) with a passive, non-intrusive means to screen containers and trucks as well as other conveyances for the presence of nuclear and radiological materials.
Plastic Scintillators Versus Spectral SPMs

First generation Radiation Portal Monitors (RPM), have been referred to as… Kitty Litter Detectors because they couldn’t differentiate between dangerous and non-dangerous sources, spectral devices referred to as Spectroscopic (SPM), can identify isotopes.
Spectroscopic (Spectral) SPM Array

Fig. 2. Detected spectra for coherent addition of eleven 75mm NaI DSN detectors with a 0.01Ci source, a typical portal monitor detection of the same source, and detection of a 0.1Ci source using only one DSN detector, as well as an average single DSN detector sensing a 0.01 Ci source.
Safe Port Act of 2006 (HR 4954 - The Security and Accountability For Every Port Act)

- 100% scanning using visual imaging and radiation detection
- Deployment radiation detection equipment in the 22 largest US seaports by the end of 2007 with screening of all ports handling inbound containers by end of 2008.
- Transportation Worker Identification Credential (TWIC) card required in top 40 US ports in specified security zones by January 1, 2008
- Codification of ATS, CSI and C-TPAT "Greenlane".
Secure Freight Initiative (December 7, 2006)

• DHS & DOE to deploy combination of existing programs – Unification of First and Second Lines of Defense

• Deploy scanning equipment globally to capture data on all containers bound to the US

• $30 Million from USDOE NNSA SLD & $30 Million from DHS ($10 M per port max. per Secretary Chertoff)

• Phase I Ports:
  • Minor Ports: Qasim Pakistan, Puerto Cortes Honduras, Southampton UK (Complete by Summer 2007)
  • Major Ports: Salalah Oman, Singapore, Busan Korea (Gamman Terminal)
Once We Find a “Dirty Nuclear Threat”…
What Do We Do With It?, How Do We Contain It?
Port of Los Angeles/Port of Long Beach
Joint Container Inspection Facility (JCIF)

$65 M High Tech Model Facility to be Replicated at all US Container Gateway Ports Under a TSA/DHS Grant
International Maritime Cargo Demand Trends
World Bank’s 2010 “Global Economic Prospects”

World Output will Increase 33% in 10 years

- 2000: $30 Trillion
- 2010: $40 Trillion
Ocean Container Trade Volume Will Continue to Grow Faster than the World Economy

Global container growth has outpaced GDP growth by more than 300% in the past 5 years

Source: Global Insight World Service and World Trade Service
In the past five years, container trade in North America has increased by 6.85% CAGR reaching 48 million TEU in 2005.

North American container trade is predicted to soar by 50 percent to 72 million TEUs by 2015.

Source: TranSystems, Containerization International Statistics
World Container Forecast to 2024 in TEUs
(186% Increase in Next 20 Years)

Source: Global Insight, 2004
2004 World Container Gateways
“The World’s Top 10 Ports”

In 2011 Hong Kong Alone will Equal the Top 15 US Container Ports

Source: Port Engineering Management, Vol. 22- Issue 6 - December 2004
Projected 2015 Global Distribution of Container Volumes

Asia = 57% of the Global Total Volume

Source: UNESCAP 2005
### Global Market Economic Shifts (Country GDP Rank)

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
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<tr>
<td>#1</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>USA</td>
<td>CHINA</td>
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<tr>
<td>Japan</td>
<td>Japan</td>
<td>CHINA</td>
<td>CHINA</td>
<td>CHINA</td>
<td>USA</td>
<td>USA</td>
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<tr>
<td>Germany</td>
<td>Germany</td>
<td>Japan</td>
<td>INDIA</td>
<td>Japan</td>
<td>INDIA</td>
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<tr>
<td>UK</td>
<td>UK</td>
<td>Germany</td>
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<td>France</td>
<td>CHINA</td>
<td>UK</td>
<td>Russia</td>
<td>Russia</td>
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<td>Brazil</td>
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<td>Italy</td>
<td>France</td>
<td>INDIA</td>
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<td>Germany</td>
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<td>Russia</td>
<td>Italy</td>
<td>Brazil</td>
<td>France</td>
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<tr>
<td>Russia</td>
<td>Brazil</td>
<td>Brazil</td>
<td>Italy</td>
<td>Italy</td>
<td>Italy</td>
<td>Italy</td>
</tr>
</tbody>
</table>

Source: Global Insight, 2005
The Growing Asian Import Trade Challenge
Global Interdependent Economics Have Resulted in a Major Product Sourcing Shift to Asia

Source: Clarkson Research Studies
Today, more than 60% of all North American container trade is with Asia. European container flows have held steady (19% market share).

Source: PIERS; Port Reported Throughput; Norbridge Analysis
Last 5 Years Asia- US Container Trade Increased 12% CAGR and China Accounted for 95% of the Increase

Surpassing the US for the first time since the end of World War II, China (not including Hong Kong) has become Japan’s largest trading partner in 2006

Source: PIERS, Port Reported Throughput, Norbridge
China-US: Twin Engines of the World

Population:
US: 298 million
China: 1,307 million
(1/5 World)

The number of Chinese children in elementary school is equivalent to the total US population.
Mainland China Container Port Growth (Compound Annual Growth Rates)

5 Yr Average = 27.2%
Increased Volume
China’s Ministry of Railways Signed a 5 year Cooperation Agreement with the US BNSF Railroad for Intermodal Rail Development

- Develop China’s high volume efficient intermodal network
- $242 billion program to 2020
- On-dock & near-dock intermodal transfer yards at ports
- Ministry to build 18 mega-terminals with 7 at seaports, 40 smaller Intermodal terminals
Shanghai International Shipping Center
Yangshan Deep Port & Logistics Park

New Port City

New Logistics Park

20 Mile New Port Access Bridge Constructed in 3 yrs

54 New Berths
Emerging New Mexican Intermodal Gateways & Corridors – Nearly 4 Million TEUs

**Emerging New Mexican Intermodal Gateways & Corridors – Nearly 4 Million TEUs**

**Lazaro Cardenas**
- Phase I - 700K TEU
- Fut. Phase - 2.0 mil TEU

**Punta Colonet**
- 1 mil TEU Throughput

**Guaymus**
- 1.0 mil TEU

**Lazaro Cardenas**
- Phase I - 700K TEU
- Fut. Phase - 2.0 mil TEU
New North American Container Gateway

Prince Rupert Port Authority
the new world port
opening a new world of opportunity
The Emerging CN Transcontinental Land Bridge

Prince Rupert

Northeast Gateway

Pacific Gateway

Unconstrained, fluid rail line

Better grades across CN network

22 hours shorter by rail to Chicago than Vancouver (CP)

Initial Transit Times
Chicago 107 hours
Toronto 108 hours
Montreal 115 hours
Memphis 135 hours
Melford International Terminal Inc.
Strait of Canso – Northeast Gateway

A Project Developed By Trident Holdings Inc.
Southeast Asian Manufacturing Centroid Shift

Current Inbound U.S. Cargo Flow

U.S. Intermodal Rail Flow

Western Centroid Shift

Eastbound: All Water Flow

Eastbound: US Intermodal Rail Flow
Southeast Asian Manufacturing Centroid Shift

Current Inbound U.S. Cargo Flow

U.S. Intermodal Rail Flow

Westbound All Water/Suez Flow

Westbound Intermodal U.S. Flow

Western Centroid Shift
Can North American Marine Terminals Handle the Forecasted Freight Volumes ?...
By 2020 Most US Container Port Gateways Will Double or Triple in Volume

Source: DRI/McGraw Hill
North American Maritime Container Current and Future Trade Growth
(Top 10 Ports)

By 2020 demand will exceed current capacity of many U.S. ports by as much as 200%.
The Port Landside Access Challenge
Future US Truck Traffic Growth
In Urban Consumption Zones

Today vs 2020

Source: USDOT FHWA Freight Analysis Framework
POLA/POLB Challenge: Truck Congestion

Goods movement is a major contributor to traffic congestion and a bottleneck to future growth.

I-710 Typical Day  I-710 During 2002 Port Lockout
Intermodal traffic in US has nearly doubled in the past 15 years.

Intermodal Growth 1990-2005
Container and trailer units (in millions)

Annual Intermodal Volume Figures, 2001-2005

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Containers</td>
<td>7,921,213</td>
<td>8,588,822</td>
<td>9,472,518</td>
<td>10,283,491</td>
<td>11,057,610</td>
</tr>
<tr>
<td>Trailers</td>
<td>2,413,933</td>
<td>2,345,508</td>
<td>2,424,407</td>
<td>2,639,545</td>
<td>2,584,262</td>
</tr>
<tr>
<td>Total Rail Intermodal Volume</td>
<td>10,224,942</td>
<td>11,191,142</td>
<td>11,903,121</td>
<td>12,923,036</td>
<td>13,641,872</td>
</tr>
</tbody>
</table>

Source: AAR
US Intermodal Main Line Train Speed
(Miles per Hour)
Future US Rail Traffic Flows

Today

2020
We Must Change Our Course

Capacity vs. Demand Bottom Line: Balancing Capacity and Demand is Both a Public and Private Issue

North America’s future economic and environmental health is at risk as a result of declining transportation efficiency and reliability.
North American Port & Intermodal Capacity Trends
2010 Projected Public Port Capacity Shortfall

75% of the 16 Ports Studied will have Significant Capacity Problems by 2010.
Explosive Southern California Port Container Growth Forecasted

Approx. Current Capacity

Source: TranSystems, American Association of Port Authorities Statistics

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Global Port Terminal Productivity

North American Ports Are Not As Productive As The Most Productive International Ports By a Factor Of More Than 4 To 1
## Global Marine Terminal Productivity

**(Circa 1999 to 2004)**

*(Throughput measured in TEUs/Acre/Year)*

<table>
<thead>
<tr>
<th></th>
<th>1999</th>
<th>2004</th>
<th>5YR CAGR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asian Ports</strong></td>
<td>9,272</td>
<td>16,595</td>
<td>15.3%</td>
</tr>
<tr>
<td><strong>European Ports</strong></td>
<td>4,284</td>
<td>6,396</td>
<td>15.4%</td>
</tr>
<tr>
<td><strong>United States Ports</strong></td>
<td>2,894</td>
<td>4,028</td>
<td>7.7%</td>
</tr>
<tr>
<td><strong>US West Coast Ports</strong></td>
<td>3,543</td>
<td>4,944</td>
<td>7.5%</td>
</tr>
<tr>
<td><strong>US Gulf Coast Ports</strong></td>
<td>3,149</td>
<td>4,635</td>
<td>9.4%</td>
</tr>
<tr>
<td><strong>US East Coast Ports</strong></td>
<td>2,021</td>
<td>2,661</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

Source: 1999 - 2004 CI Database, Seaports of the Americas, Port Data
Maritime Vessel Technology Trends
April 26, 1956

58 Modified 35-foot Truck Containers

The deck of the Ideal X at Port Newark preparing for the historical sailing of the world's first containership.

April 2006:

50 Year Anniversary of the Container

In 1955 Malcolm McLean, sold McLean Trucking, and secured a bank loan of US$42 million to build the world's first container ship.
World Container Ship Evolution

1st Generation     (Pre-1960 - 1970)
1,700 TEU

2,305 TEU

3rd Generation       (1985)
3,220 TEU

4,848 TEU

5th Generation     (2000 - 2005)
8,600 TEU

Ideal X
Full Cellular
Panamax
Post Panamax
Super Post Panamax

6th Generation ???

Panamax
Post Panamax
Super Post Panamax

TEU Capacity

Copyright © 2007
2006 New Build Orders

Expansion of World Post-Panamax Container Fleet

- 31% “Mega Ships”
- 8,000+ TEUs
- 6,000 – 7,999 TEUs
- 4,000 – 5,999 TEUs
- 2,000 – 3,999 TEUs
- Less than 1,999 TEUs

More than half of world fleet will be Post-Panamax by 2011

Source: ISL, July 2006
Madison Maersk (3,928 TEUs) in the Panama Canal

(Current Max Panamax = 5000 TEUs)
Panama Canal Transit Reservation Demand

Third Lane Canal Expansion

$5.25 Billion

2007: 5,000 TEU
2014: 10,500 TEU

Existing

New

Source: ACP Expansion Proposal
Today’s Mega Ships - Measuring Up

- Regina Maersk – 1043 Ft, 140 Ft wide, 6000+ TEUs

- Eiffel Tower – 990 feet
10,000 TEU Container Ships Currently on Order

Zim orders **four 10,000 TEU container ships** from Hyundai Shipyards in Korea; will double its carriage capacity
Zim will take delivery of the ships, second half of 2009

Cosco orders **four 10,000 TEU containerships** from Hyundai Heavy Industries to be delivered in 2008
$505 M Deal

Source: North Sea Terminal Bremerhaven GmbH & Co
### 2005 COSCO Orders Four 10,000 TEU Vessels

<table>
<thead>
<tr>
<th>Specification</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>LENGTH OVERALL</td>
<td>349 M (1145 FT.)</td>
</tr>
<tr>
<td>BREADTH</td>
<td>45.6 M (149.6 FT.)</td>
</tr>
<tr>
<td>MAX. DRAFT</td>
<td>14.5 M (47.6 FT.)</td>
</tr>
<tr>
<td>OPERATING SPEED</td>
<td>25.8 KNOTS (29.7 miles/hr)</td>
</tr>
</tbody>
</table>

Source: Lloyd's Register, February 2005
The new-build known as “M/S Emma Maersk”, was christened at the Odense-Lindo Shipyard in Denmark in August 2006. The nominal capacity of the new vessel could be as high as 14,000 TEUs based on its reported LOA of 397 m, Beam of 56 m, Draft of 15.5 m, Gross Tonnage 170,974 gt, Speed 25.5 knots.

Source: Journal of Commerce August 2006, Marine Log December 2006
A.P. Moller-Maersk L Class M/S Emma Maersk
(14,000 TEU Vessel - 22 Containers Wide)

Length: 1,302 ft, Width: 207 ft, Net Cargo: 123,200 tons
**Key Cranes: 10**, Engine: 14 in-line cylinders diesel engine (110,000 BHP)
Cruise Speed: 31 mi/h, Full Crew: 13, Construction cost - US $145 M+

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The Hatch-Less Container Vessel

Per P&O Nedlloyd:
• 15% Faster Port Productivity
• 84% Less Re-Stows
• Less Damaged Boxes
Containerships & Recent Cruise Vessel Technological Advances...What’s Next?

SSP Propulsion
Schottel / Siemens

Azipod
Eagle Class Cruise Vessel
The 15,000 TEU Containership

“...the ship is a flight of fancy... but such a ship is within the current state of the shipbuilder’s art...”

R. G. McLellan, P&O Containers
The 15,000 TEU Containership

LOA. = 400 m (1,312 ft.)
Draft = 14 m (46 ft.)
BEAM = 69 m (226 ft.)
Container Ship-in-a-Slip Concept
The 18,000 TEU Malaccamax
Reported Predictions/Benefits

• By 2010 on Asia-Europe Trade Route
  • 30% **Cheaper** than 4800 TEU Panamax Vessel, primarily due to “Economies of Scale”
  • US$40/TEU Savings

Source: Dynamar Consultancy, Rotterdam
Emergence of North American Fast Feeder Short-Sea Coastal Vessels

The New Frontier: Transshipment and Short Sea

2,000 - 3,000 TEU Feeder Ship

10,000 to 15,000 TEU Mega Ship
Short Sea Shipping
Coastwise Maritime Trade

Taking Freight off of Congested Roads
Emerging Viable Container On Barge Coastal Shipping Concepts & Inland Intermodal Port Potential
High-Speed, Low Wake, Intermodal Float Technology
Growing Environmental Concerns for Marine Vessel Emissions
Global Freight Energy Use is on the Rise

Source: 2005 Haagen Smit Worldwide Emissions Overview & NRDC “Harboring Pollution”
Global Diesel PM & NOx Baseline Projections

Land Based Pollutants Have Declined with Regulation, but the Unregulated Marine Based Pollutants are Increasing

Absent New Standards and Regulations the Pollutant Baselines Are Forecast to Rise

Source: 2005 Haagen Smit Worldwide Emissions Overview
Pollution Sources
US Ports vs Other Industries...
We Need To Do Better

Source: 2005 Haagen Smit Worldwide Emissions Overview & NRDC “Harboring Pollution”
Transportation Diesel Pollutants are Putting Our Health in Jeopardy

Progress has stalled and diesel emissions from ships, locomotives and port complex are projected to increase.

Source: SCAQMD, Multiple Air Toxics Exposure Study II, March 2000
South California Environmental Challenges

The “Diesel PM Death Zone”

- Environmental Constraints are Growing
- POLA/POLB Have had 40 major Projects Held up for Years
- State Looking Into User Fees

I-710 Typical Day from POLA/POLB

Cancer Risk Per Million
Cost-Effective Air Quality Emission Reduction Improvement Measures

Modernize truck fleet:
- Scrap dirty old trucks
- Retrofit all other pre-2007 trucks

Upgrade all cargo handling equipment with electric equipment or clean fuels

Use clean marine fuels
- Provide onshore electric power for ships at berth (Cold Iron)

Replace locomotives with cleaner technologies, fuels, and explore rail electrification

Source: Southern California Association of Governments
POLA/POLB PierPass

Use of Peak Traffic Period Pricing to Better Align Freight System Costs and Benefits

Photo courtesy of PierPass
POLA/POLB PierPass

Initial Results

- Collaborative effort by marine terminal operators in LA/LB.
- $40/teu fee imposed on local cargo moving via truck during peak hours.
- Initial results show 30% of total truck traffic moving off-peak.
- Reduced port-related truck congestion at peak times; however, no substantial impact on turnaround times yet.
MAGLEV Cargo Conveyor Demonstration Project

Transrapid Freight Vehicle Concept

Victorville
Port & Intermodal Terminal
Competitive Mandates

Ports & intermodal linkages must change the current cost versus value relationship in the logistics chain. Become Value Added Multipliers...

Successful ports & intermodal terminals in the next decade must invest in and leverage technology to improve terminal productivity, cost, effectiveness and reliability for all modes of transportation...securely as environmental stewards.
Planning For Future Transportation Technologies

Thank You
400 Years Ago
A Voyage of Three Vessels
Created the First US Port
in Jamestown, Virginia

In 1600, Queen Elizabeth I Granted a Royal Charter to the Honourable East India Company, First Joint-Stock Company (Forerunner of the Corporation), to Develop Trade
M/S EMMA MÆRSK  2007

Deadweight Tonnage: 156,907 tons
LOA: 1,302 feet;  Crew: 13

Godspeed Brigantine 1607
Deadweight Tonnage: 40 tons
LOA: 88 feet;  Crew: 13