Panel I: Global Maritime Outlook
(Impacts on North American Ports)
"In the next 10-15 years world trade is projected to grow significantly. It is estimated that this growth will result in a doubling of seaborne trade volumes from 10 billion tons of cargo annually today to 20 billion tons of cargo around 2030".

Source: Danish Maritime Forum, 24-28 October 2016
Three Mega Trade Trends to 2030

Global population is likely to be 8.5 billion by 2030, with 96% of growth coming from developing countries. India will overtake China with the largest population.

Global GDP could grow THREE TIMES within 20 years. The countries with the largest growth in per capita GDP will be China, Vietnam, India and Indonesia. Purchasing power in developing Asia will rise 8 times between 2010 and 2030.

40% HIGHER ENERGY DEMAND in 2030. China oil consumption could triple, overtaking the USA to become the largest oil consumer. The USA will remain the biggest natural gas consumer, while China will see the largest growth in natural gas consumption.

Source: Global Marine Trends 2030 – QinetiQ – Lloyd’s Register
The Evolution of Today’s Global Shipping Lanes
The Maritime Silk Road Replaced the Overland Silk Road as the Primary Trading Route Across Eurasia After the Tang Dynasties (618 to 907)
The Marine Silk Road was a Precursor to:

Today’s modern supply chain logistics, distribution and shipping transportation networks
90% of Global Trade is Carried Out by Shipping

The Majority of Today’s Ocean Trade is Conducted on the Marine Silk Road
Maersk’s Global Trading Routes Today
Indian Ocean Electric Blue Shipping Lane Trails
From the Marine Silk Road
The World’s Largest Ports Are Connected Via The Marine Silk Road

Where are the Biggest Ports?

KEY
WORLD’S LARGEST PORTS (BY CARGO VOLUME PER YEAR)
- 10 MILLION TONS
- 100
- 500
The World's Largest Ports Are Connected Inside This Circle Via The Marine Silk Road
Global Shipping Routes Plotted by AIS GPS

Today’s Busiest Shipping Routes:
(1) Panama Canal, (2) Suez Canal, (3) Offshore China

International External Industry Pressures Driving Today’s Logistics
More than **98%** of everything we consume, wear, eat, drive and construct is brought to us via ships through the North American port system.
Growth in GDP and World Trade

World trade will grow by 73% in the next 15 years. With merchandise trade volumes in 2025 hitting $43.6 trillion compared to today’s $27.2 trillion.

CAGR = 4.5%

Source: Oxford Economics 2013
World Trade’s Share of the Economy Grows Again

Globalization trend is shifting, not reversing, long-term.

(World imports, percent of GDP)

% INCR = 37%

Source: IHS Global Insight – World Trade Service
Long Term GDP Annual Growth Rates

Source: OECD Economic Forecast

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2017 AAPA Facilities Engineering Seminar

International Maritime Cargo Demand & Logistics Trends
Southeast Asian Manufacturing Centroid Shift

With Manufacturing Centroid Shifts Into Vietnam and/or India, The North American East Coast will See Dramatically More Westbound Suez Traffic
Suez Canal’s $8.5 Billion Expansion Plan
(A New $4 Billion 45-mile-long parallel channel and Global Logistics Park)

3 Daily Convoys:

2 Northern Convoys
1 Southern Convoy
The Suez Canal’s $8.5 Billion Expansion of the Canal

Completed September 2015

New 45-mile-long parallel channel cutting waiting times to transit by 3 hrs. from 11 hrs.
Dredging 180 Million Cubic Meters (35-kilometers-long and 24-meters-deep) Shipping Route in Less than One Year
Egyptian Jet Fighter Escort Selfie
(Taken with the New Expanded Suez Canal in the Background)

Source: Photo Courtesy of MIRASCO, August 2015
The Number of Ships Able to Navigate the Suez Canal Simultaneously Has Increased from 23 to 97, Thus **Doubling the Suez Canal Capacity by 2023**
The Continuing Asian Import Trade Challenge
Of the 10 busiest ports in the world, Nine are in Asia, of the top 10, Six are on the Chinese mainland.

The Port of Shanghai is No. 1, and The Port of Singapore is No. 2.

These Two Ports are Larger Than All North American Ports Combined.
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
Shanghai International Shipping Center
Yangshan Deep Port - 20 Mile Bridge Access

“Second Longest Ocean Bridge in the World”
Shanghai Yangshan Deep-Water Harbour
Yangshan Deep Port – 54 Berths East China Sea
Shanghai Port Set a 2011 Record by Handling over 30 million TEUs
Maritime Vessel Technology Trends: Emergence of the Neo-Panamax Vessel
Largest Container Ship Yet to Call on the Port of Virginia – May 8, 2017

COSCO Development Container Ship – 13,092 TEUs
May 8, 2017 Largest Container Vessel to Call at the Port of Virginia

COSCO Development Container Ship – 13,092 TEUs

Containership COSCO DEVELOPMENT at 1,200 feet long and 158 feet wide, it is 100-plus feet longer than the U.S. Navy’s newest aircraft carrier the Gerald R. Ford.
Relative Size of the Mega Container Vessel

COSCO DEVELOPMENT
Largest Ship to Call at the Port of Virginia, May 2017
50 Years of Container Vessel Evolutionary Growth

Source: Allianz Global Corporate & Specialty - Data: Container-Transportation.com
MSC Orders 11 New 22,000-TEU Vessels
CMA-CGM Orders 9 New 22,000-TEU Vessels

FUEL COST OPTIONS: $136 million per vessel if a conventional fuel system with scrubbers is chosen, or about $154 million should a dual-fuel alternative – which would allow for the use of LNG – be selected instead.

Source: American Shipper - Lloyd’s List
‘Megamax’ Containership Deliveries of 18,000 to 22,000 TEUs

2018 – First delivery of a 22,000 TEU ship - The highest year on record for ULCV deliveries - 1.12 million TEU booked for delivery.
The Biggest Ship Ever in San Francisco Bay

CMA CGM Benjamin Franklin

1,300 ft. LOA, 177 ft. beam, 18,000 TEUs

Source: CMA CGM, The SF Chronicle
The Biggest Ship Ever in San Francisco Bay
CMA CGM Benjamin Franklin
1,300 ft. LOA, 177 ft. beam, 18,000 TEUs

Source: CMA CGM, The SF Chronicle
South Korea’s Samsung Heavy Industries:

*OOCL Mega Ships 21,100 TEU* to be delivered November 2017

Six ordered at 21,100 TEU, total cost of US$950 million. The contract also includes options for six additional units.
Maersk’s Triple E Container Ship

1.5 times the Size of the NEW Panama Canal

Wide Body Shallow Draft 18,000 TEU Vessel

(Same Design Draft of the 8,000 TEU Susan Maersk)

(Design Draft of 14.5 Meters = 47.57 feet)
Vessel Size Expansion - Terminal Impacts

(Port Terminal Infrastructure & Equipment Geometry Impacts)

Source: Georgia Ports Authority and Vickerman & Associates

New Panamax (2014/15) 12,600 TEU

Current Panamax 4,800 TEU

Super Post Panamax 18,000 to 22,000 TEU

Depths 48 to 54 ft

Increased Terminal Throughput

Height Above Deck

Storage Area Impacts

Boom Outreach
North American Inland Waterway Vessel Evolution
Emerging Container On Barge (COB)
Proposed Domestic AMH/Short Sea Container Services

Proposed New England Marine Highway Project's articulated tug barge short sea container service connecting New York City and Portland, Maine - 900 TEUs

Proposed MARAD ATB Ro/Con – HEC Design - 886 TEUs, Design Draft 14.1 ft. – 14 Knots
American Patriot Holdings, LLC (APH)
Prototype Container Vessel

A “State of the Art” Hull Design to Ensure Optimal Speed in All River Conditions Utilizing LNG as Main Propulsion Fuel
American Patriot Container Transport, LLC. (APCT)Vessel Fleet Characteristics

<table>
<thead>
<tr>
<th>LOA Feet</th>
<th>Beam Feet</th>
<th>TEU Capacity</th>
<th>Vessel Drafts</th>
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<tr>
<td>592</td>
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New Era of LNG Vessels is on the Horizon: LNG will be the Fuel of the Future for Shipping
TOTE Orders Two New LNG Powered Container Ships & Two RO/RO Conversions: Largest LNG Powered Ships in the World

Two 839-foot Orca-class vessels to liquefied natural gas-diesel dual fuel operation for Seattle-Alaska service and two 764-foot new-builds for the Florida-Puerto Rico trade
LNG Vessel Bunkering: North American Ports Are Not Prepared...
Panama Canal Expansion: New Capacity is Not Sufficient for 2030 Trade Volumes
The first ceremony began on the Atlantic side at the new Agura Clara Locks, followed by the new Cocoli Locks on the Pacific side.
Panama Canal Third Lane Expansion Capabilities

Neo-Panamax: 12,600 TEUs

Length of Post-Panamax Vessel: 366m

Post-Panamax
Draft: 15m

Old Panamax: 4,800 TEUs

Length of Panamax Vessel: 294m

Panamax
Draft: 12m

Source: ACP Expansion Project, Circle of Blue January 27, 2015
The Panama Canal Currently Accounts for 3% of the Volume of Global Trade, this Share Will Increase to 6 - 7 % over the next decade

Source: ACP Expansion Project, Circle of Blue January 27, 2015
The New Third Lane Locks will **Add More than 6,000 Vessel Transits** Through the Panama Canal and will Double the Cargo Volume Transported

Source: ACP Expansion Project, Circle of Blue January 27, 2015
Emerging New Caribbean Transshipment Center
(Large Ship to Feeder Vessel Transfer)
The Panama Canal Expansion Will Move the Caribbean Transhipment Center Point to Panama
More Capacity than all of the Port of Los Angeles
New Panama Canal Atlantic Entrance Port

More Capacity than all of the Port of Houston
North American Vessel Transshippment:
(Globally Transshipment accounts between 25 and 50% of all container volumes – In the US it’s < 15%)

Induced Transshipment/Feeder Ship Operations
Large Container Vessel Market Penetration into the US Midwest
New Container Port Battleground Region
(Representing 15% of the US GDP)

Source: Boston Consulting Group & C. H. Robinson
The Panama Canal will prove to be a strong contender for Asian trade serving not only the US East Coast, but ALL of the Gulf and the Most of the Midwest by 2018.

Source: Potential Effects of the Panama Canal Expansion on the Texas Transportation System, Texas DOT, Cambridge Systematics October 2011
America’s New Energy Self Sufficiency
US oil production recently hit a 20-year high and could surpass Saudi Arabia’s output by 2019.

The US has a 100-year supply of natural gas, & will be the world’s largest natural gas producer by end of 2017.

Source: US Energy Information Administration, US Department of Energy
July 25, 2016 First Ever LNG Vessel Transits the New Panama Canal Locks

The Expanded Canal can accommodate 90 percent of the world’s LNG tankers, which will have a major impact on global LNG flows and offer numerous benefits to shippers.
Global energy market trends are set to transform the maritime industry, with major investments to be ploughed into new LNG terminals and huge projected growth in exports expected in the coming years.

Consider: The United States is poised to become one of the world’s top LNG exporters in the next five years, the Canal will allow vessels departing the U.S. East and Gulf Coast for Asia to enjoy significant reductions in voyage times (up to 22.8 days roundtrip), making U.S. gas deliveries to major Asian importers very competitive. Vessels departing the U.S. Gulf Coast for the West Coast of South America will similarly experience generous time savings.
US Natural Gas Production
(Trillions of Cubic Feet)

By 2020, U.S. is Projected to Be a Net Exporter of Natural Gas

Source: Derived from US Energy Information Administration: EIA AE 02014
International Gross Fixed Capital Formation as a Percent of GDP

(US is 32\textsuperscript{nd} in the World - Below OECD Nations)
Thank You