2016 NACo LEGISLATIVE CONFERENCE

Workshop on Freight Transportation
Workshop Block II

The Marriott Wardman Park Hotel *February 22, 2016*

Keeping Counties Moving: Understanding the Role of Freight Transportation as an Economic Engine

America's Maritime Infrastructure of Ports and Inland Waterways

M. John Vickerman

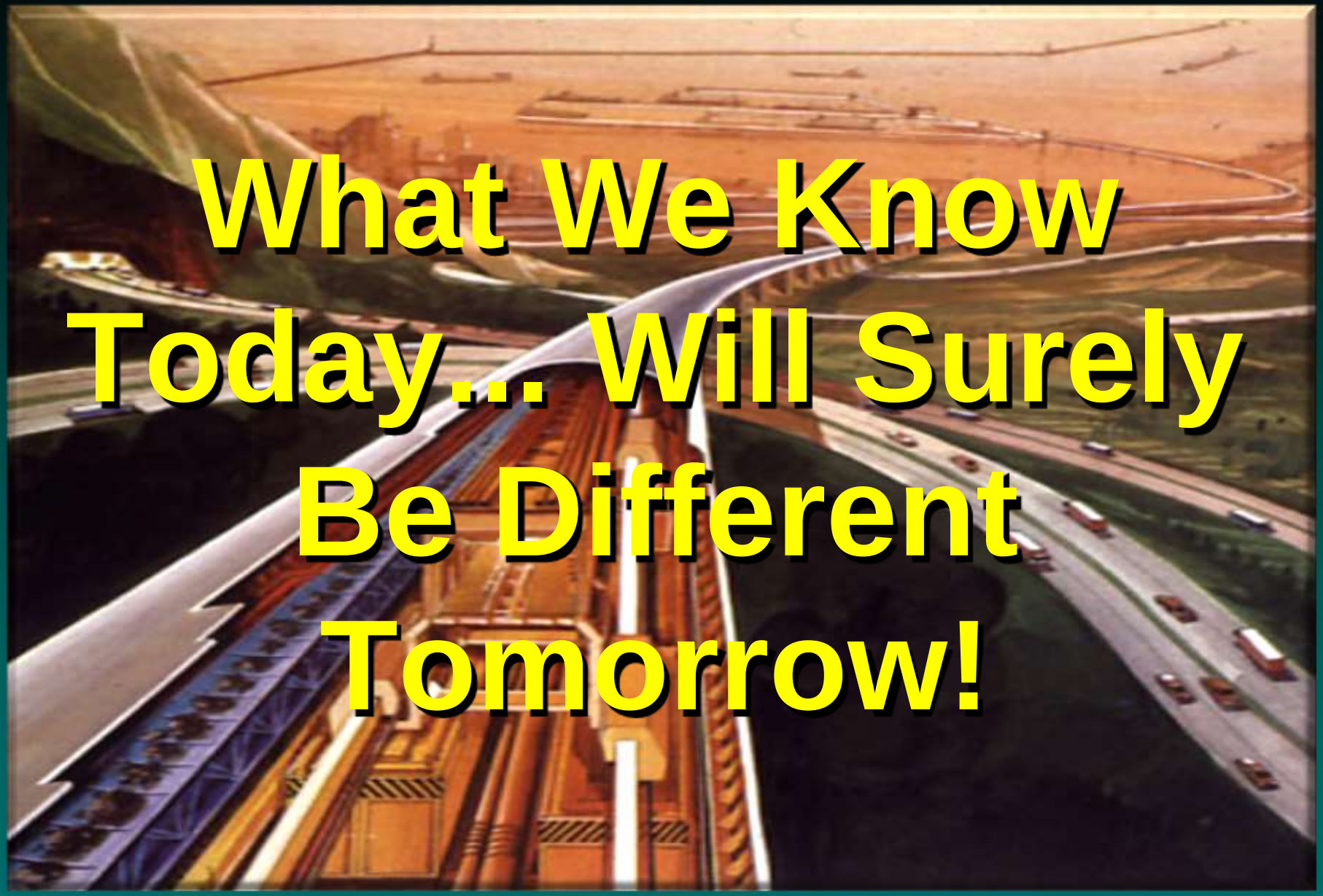
VICKERMAN & ASSOCIATES, LLC

Williamsburg, Virginia

Vessel Cargo Handling Circa 1955

Cargo Handling Circa 2010

US Navy Fast Frigate Circa 2045



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The Evolution of Today's Global Shipping Lanes

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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

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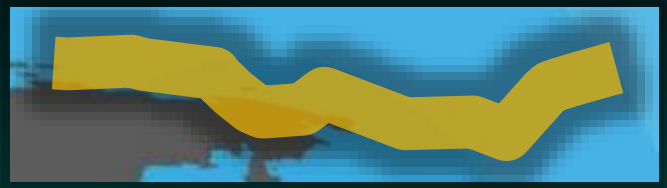
The World's Primary Shipping Routes



The Marine Silk Road

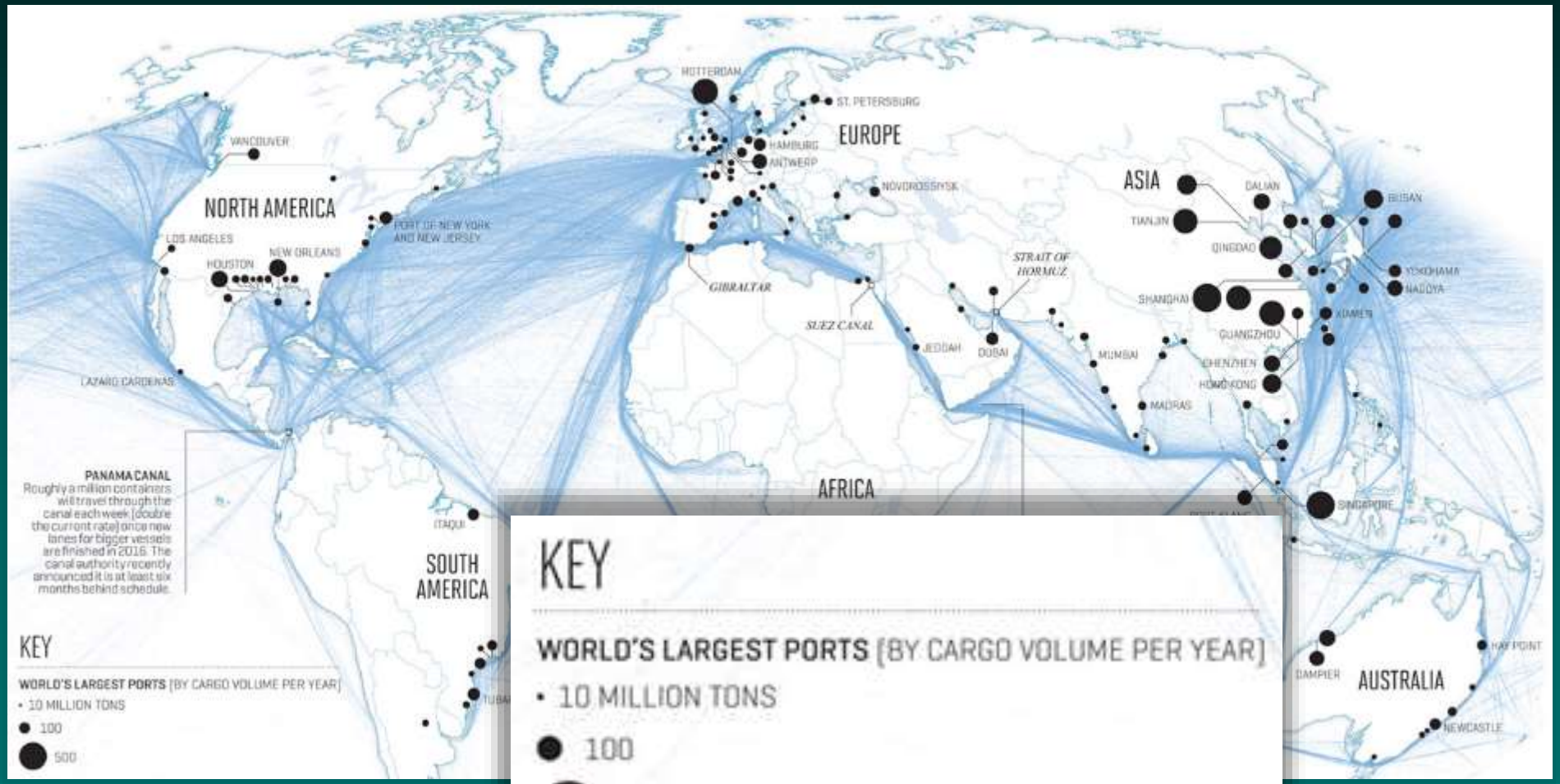
90% of Global Trade is Carried Out by Shipping

The Majority of Today's Ocean Trade is Conducted on the Marine Silk Road

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

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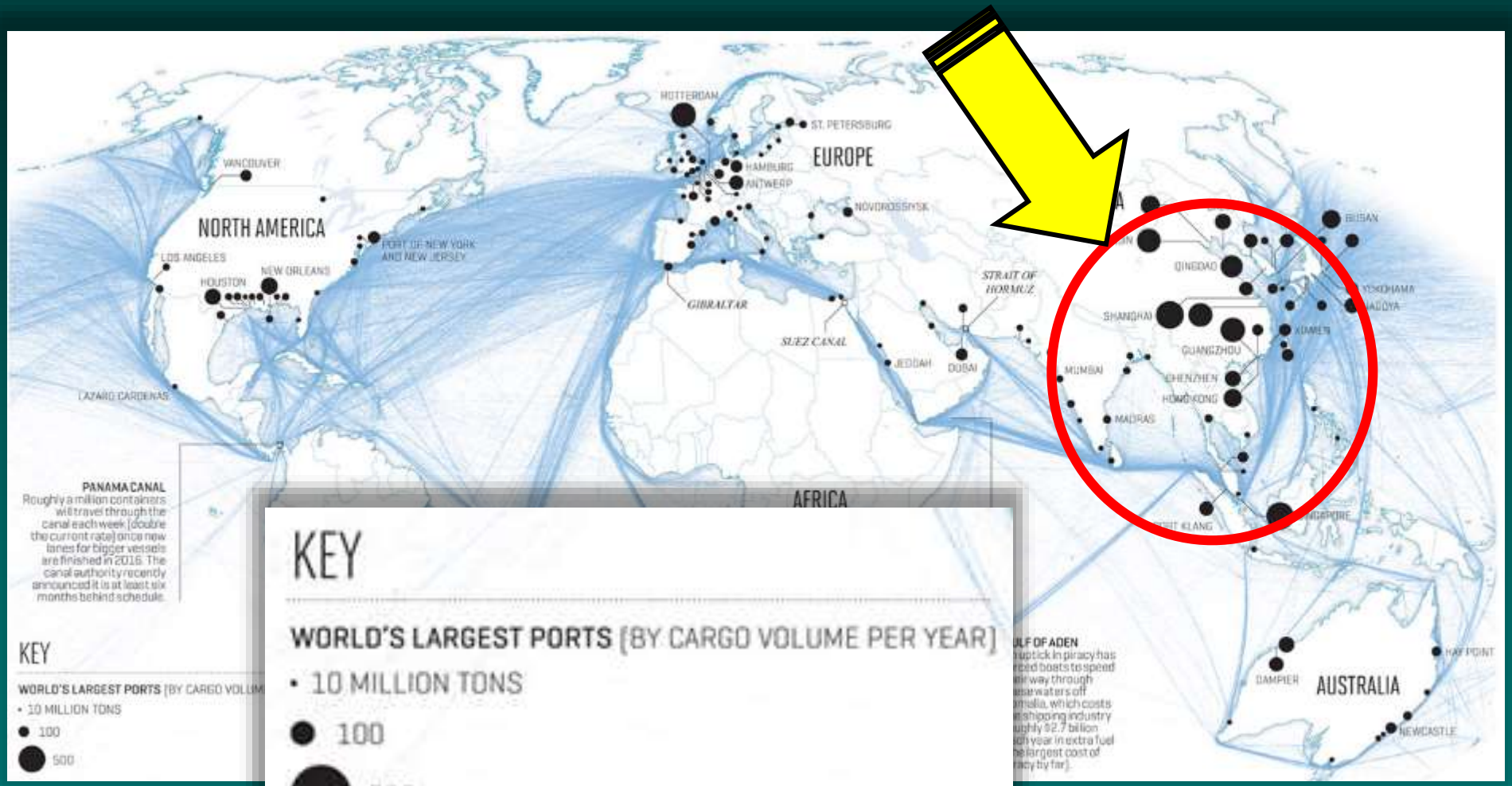
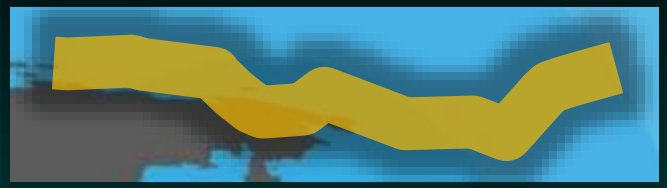
The World's Largest Ports Are Connected Via The Maritime Silk Road



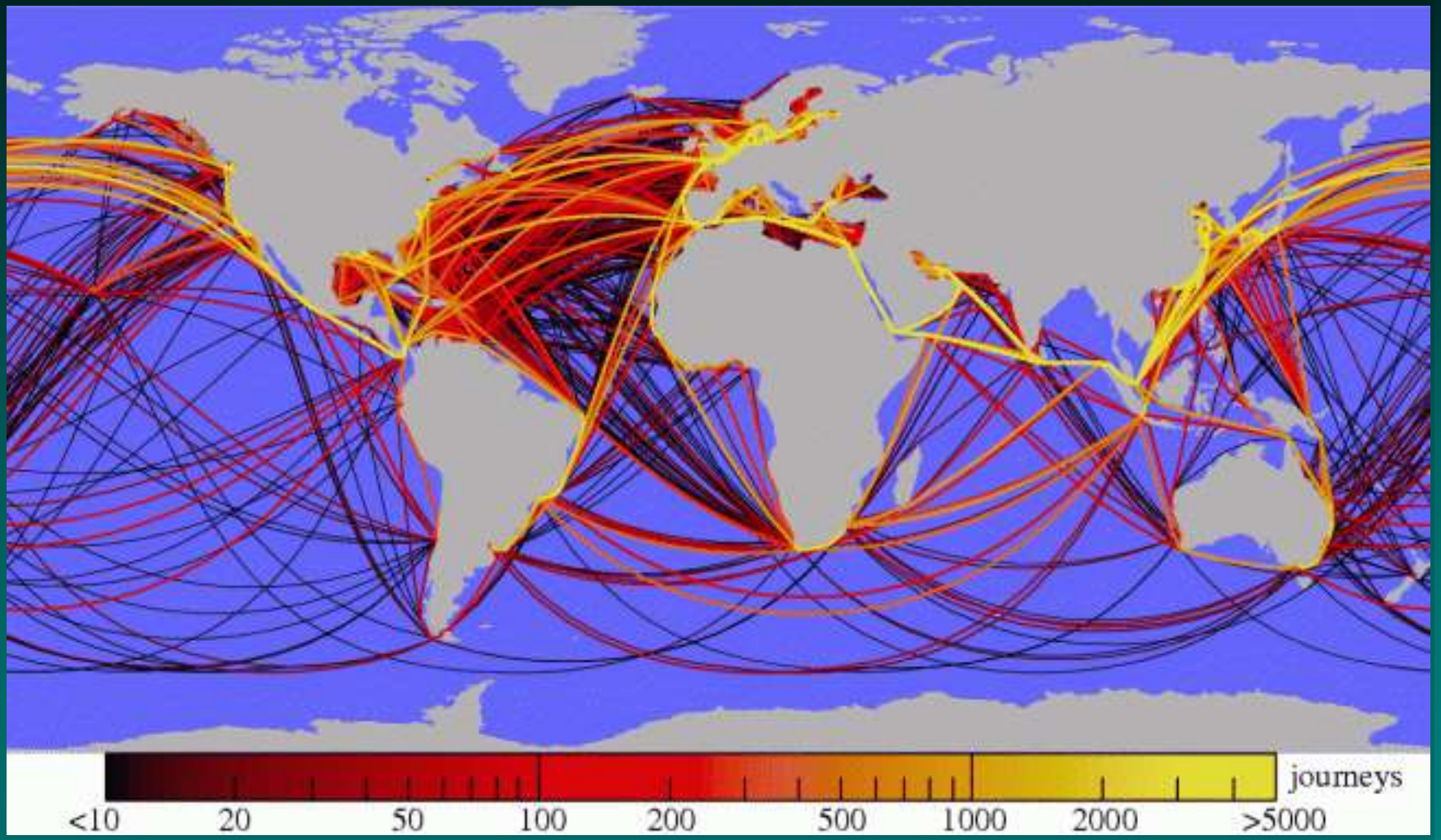
The World's Primary Shipping Routes



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



Source: Wired Science January 2010 Journal of the Royal Society: Interface

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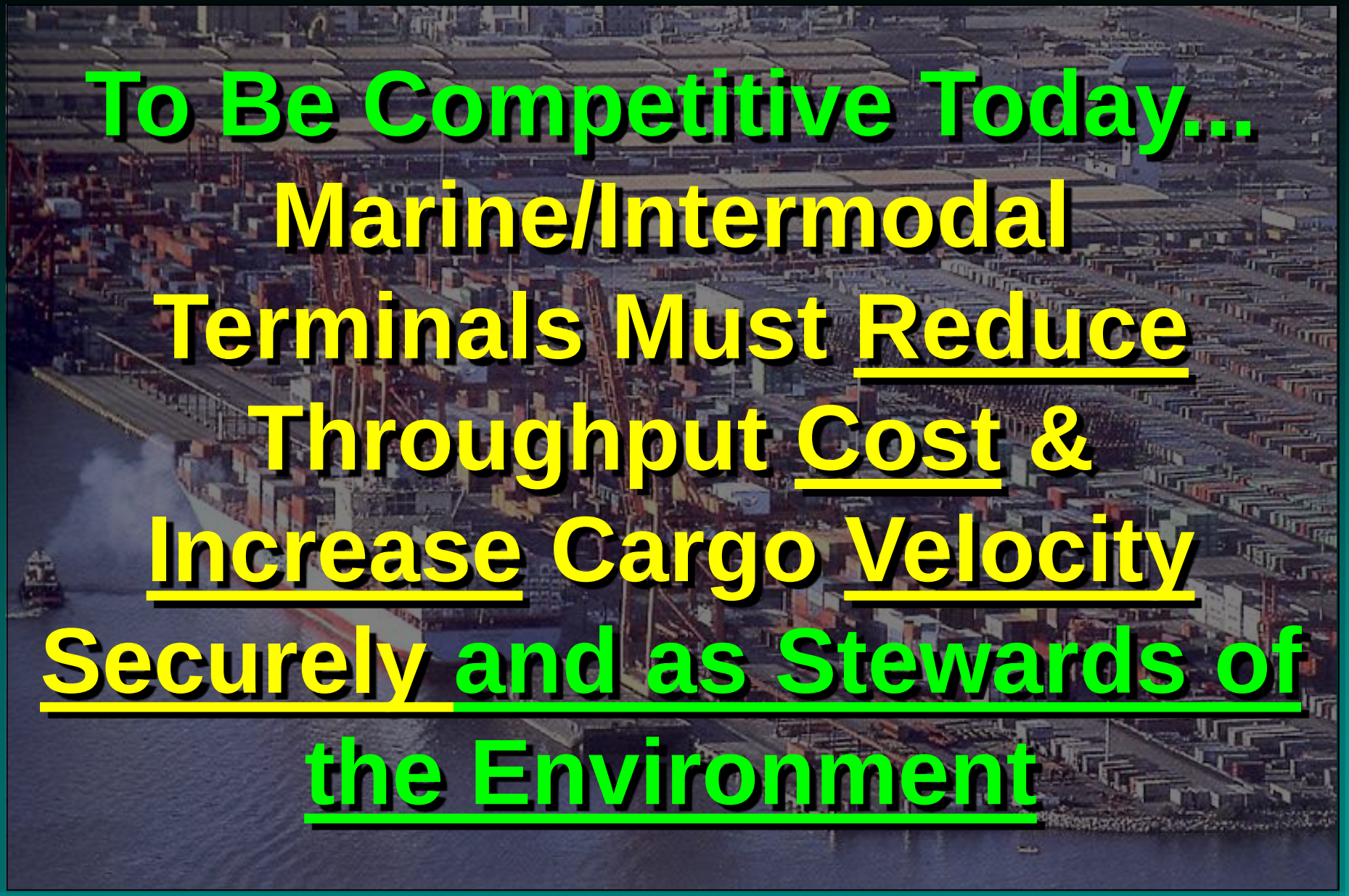

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International External Industry Pressures Driving Today's Logistics

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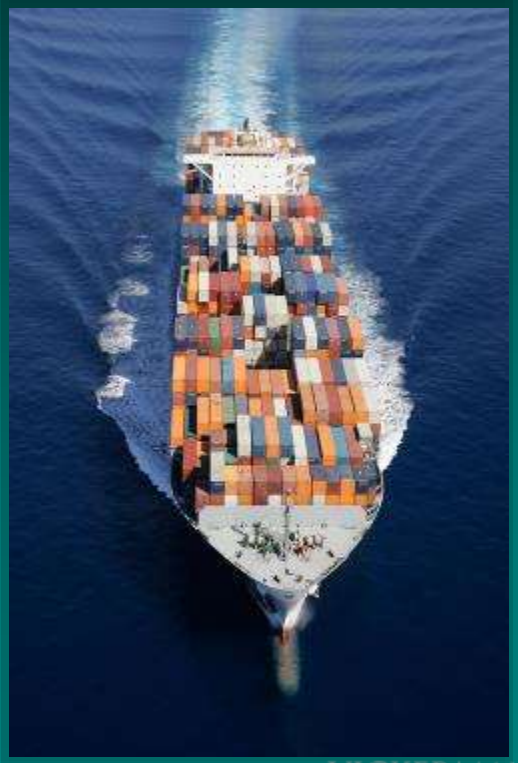
More than 98% of everything we consume, wear, eat, drive and construct is brought to us via ships through the North American port system.



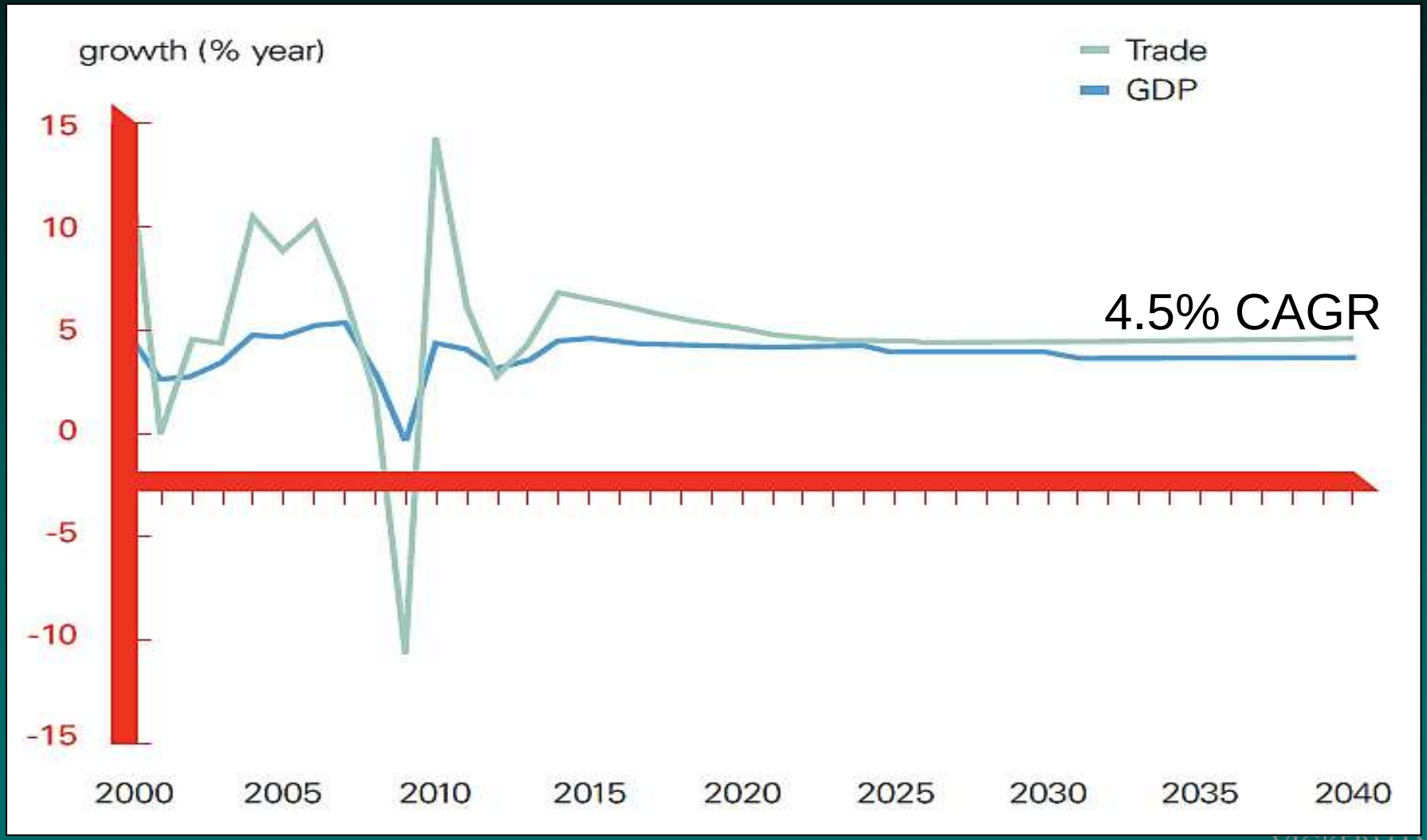
Relationship Between US Trade and US Prosperity – 1930 to 2005

(US Trade & Gross Domestic Product - $ Billions)

Source: USDOT Based on USDOC Data

Growth in GDP and World Trade

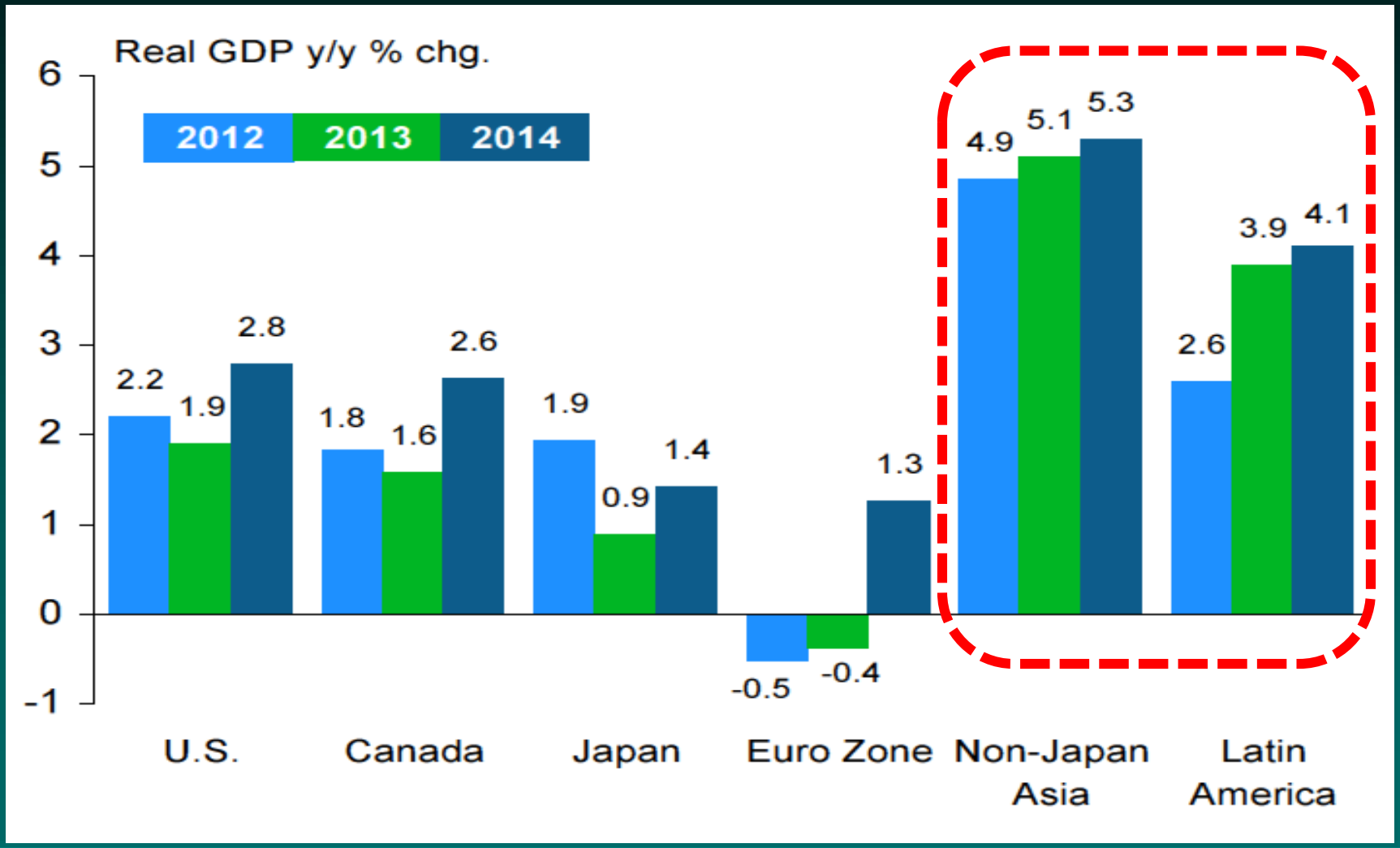
World trade will grow by 73% in the next 15 years. With merchandise trade volumes in 2025 hitting $43.6 trillion compared to today's $27.2 trillion



Source: Oxford Economics 2013

Continuing Economic Global Growth

International trade is set to significantly grow despite current economic uncertainty in the U.S. and elsewhere around the world



Source: TD Economics Forecast as of March 2013

Who Decides Where the Cargo Goes & Why?

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Who Owns & Controls Today's Cargo?

- The "***Shipper***" or "***Beneficial Cargo Owner***" *(BCO)*
- **BCO** = **Importer of record**, the entity that physically takes possession of cargo at destination and **does not act as a third party** in the movement of such goods
- The person or company who is usually the **supplier or owner of commodities shipped**.

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Key Success Factor:

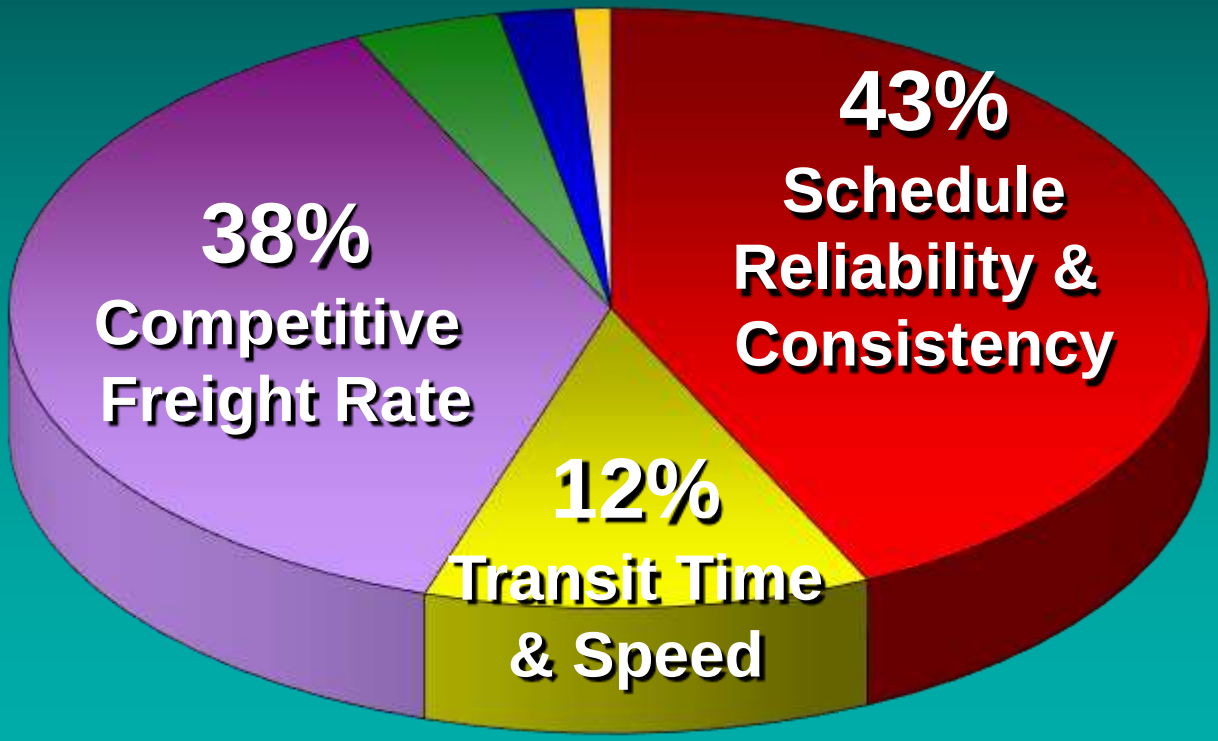
Cargo Will Flow "*Downhill*" to the

"*Lowest Cost - Best Service Levels*"

(Total Logistics Costs From Origin to Destination)

Above All Be MARKET DRIVEN

Poll of the Top 1000 "Blue Chip" Multinational Shipper Priorities



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Today's Logistics Truth:

"The customer wants more and is willing to pay less for it."

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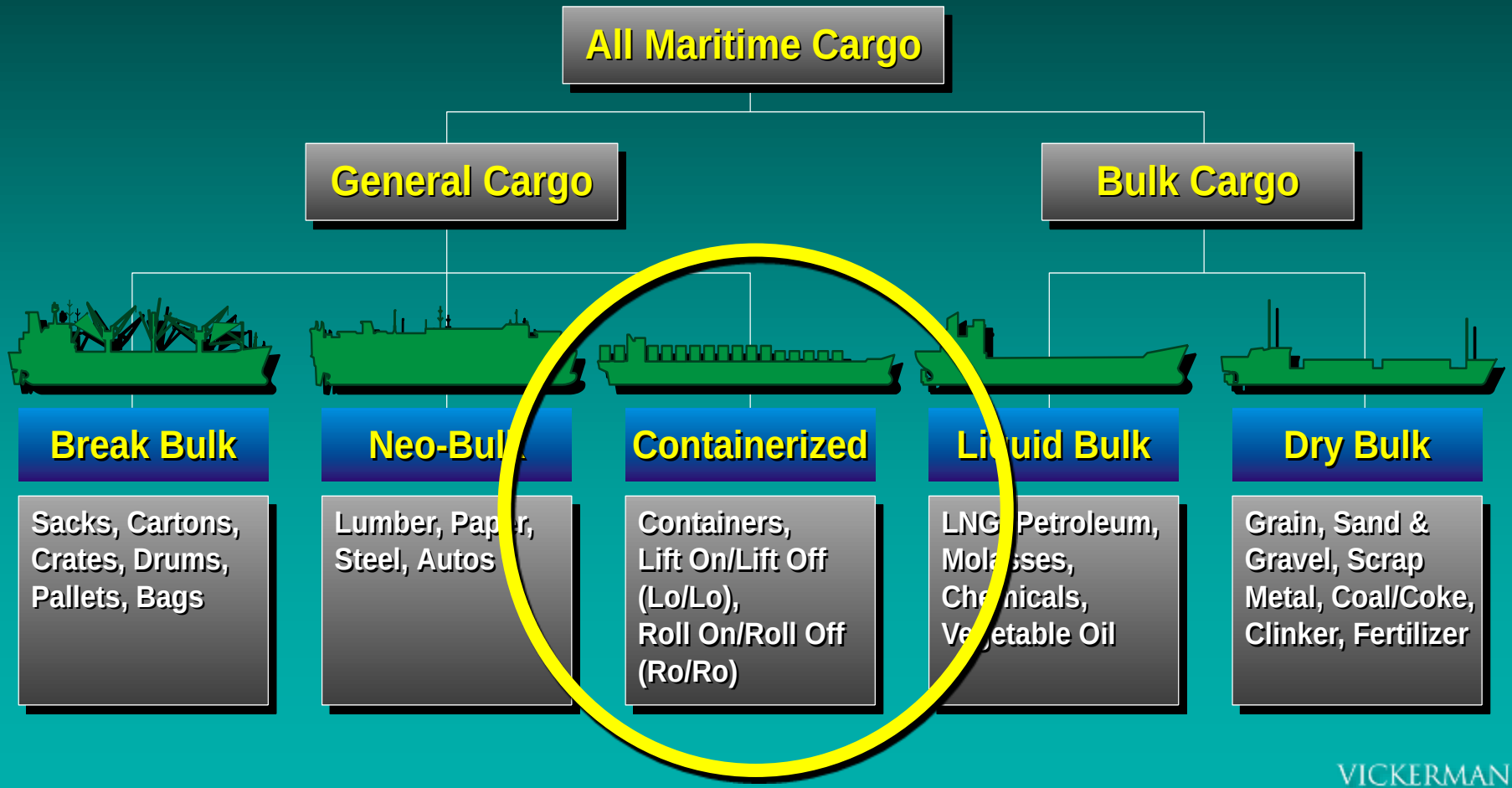
Functional Classification of Global Maritime Cargoes



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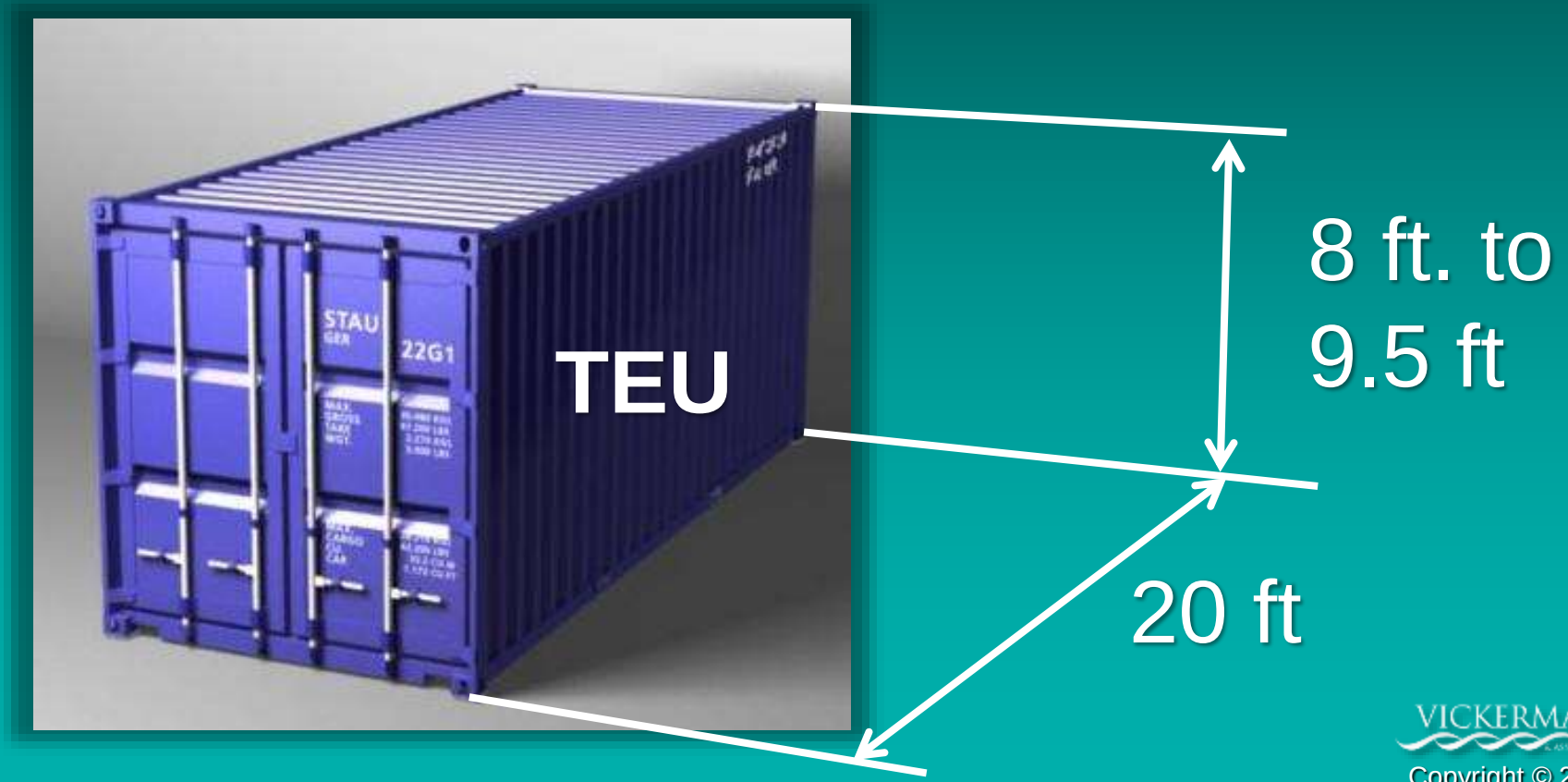
The TEU (Twenty Foot Equivalent Unit)

"The Port & Container Shipping Unit of Measure"

1 TEU = One 20 ft. ISO Container

1 FEU = 2 TEUs = One 40 ft. Container



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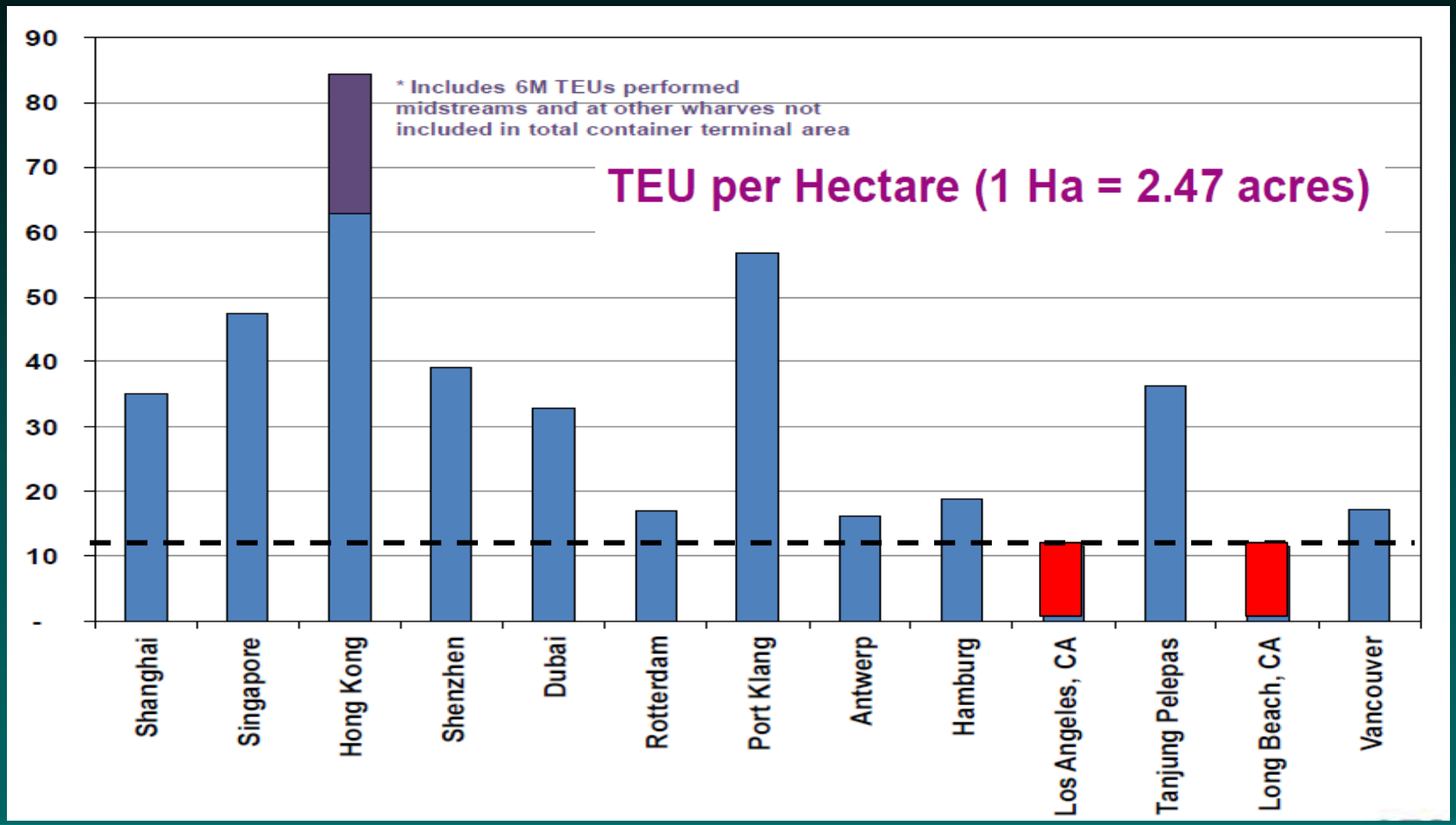
How Much Can a Single Container Hold?

(Example 40 ft. Container)

						Example Value $
	=	1,890 Cases	@	$25.50/Case	=	$48,195
	=	315 20” TVs	@	$299/TV	=	$94,185
	=	10,000 Pairs	@	$30/pair	=	$300,000
	=	432,000 Packs	@	$4.00/Pack	=	$1,728,000

Top Global Container Port Productivity

(TEUs/Hectare in Thousands)



Global Ocean Carriers & Terminal Operators
Do Not Consider North American Ports as
"Best Case Practice"

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International Maritime Cargo Demand Trends

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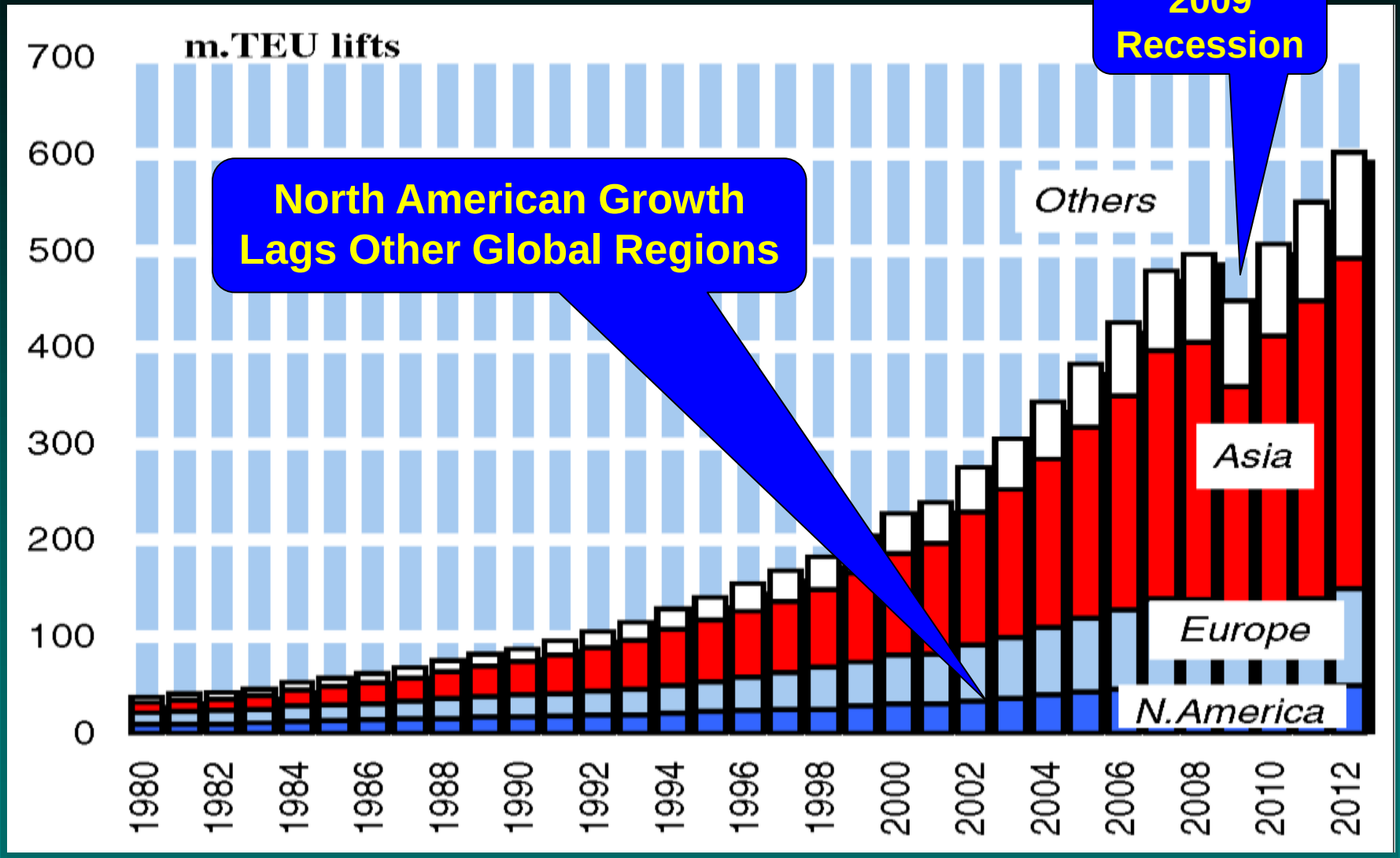
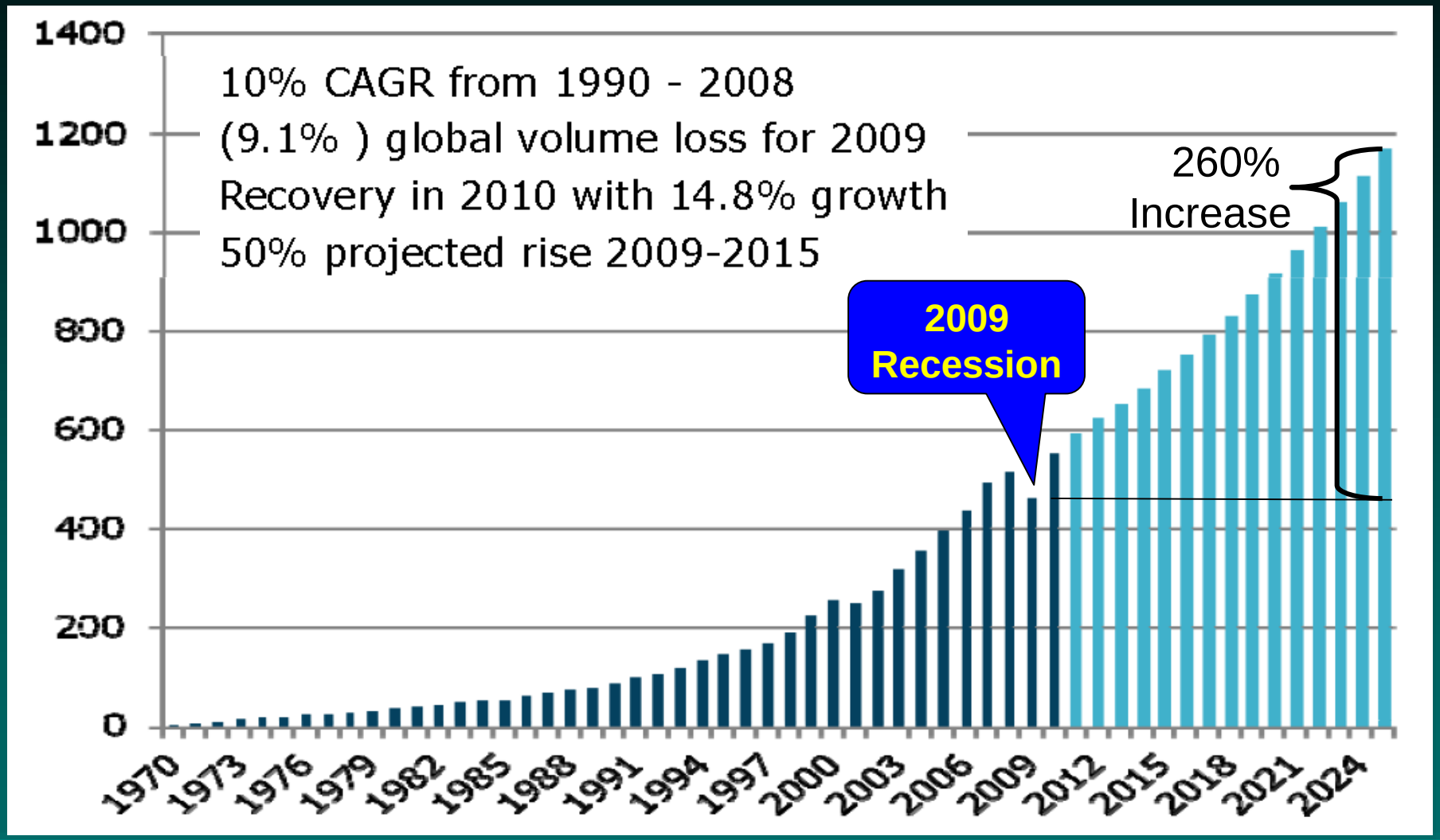
Historical Global Container Market Demand
(Millions of TEUs)



Source: Drewry Shipping Consultants

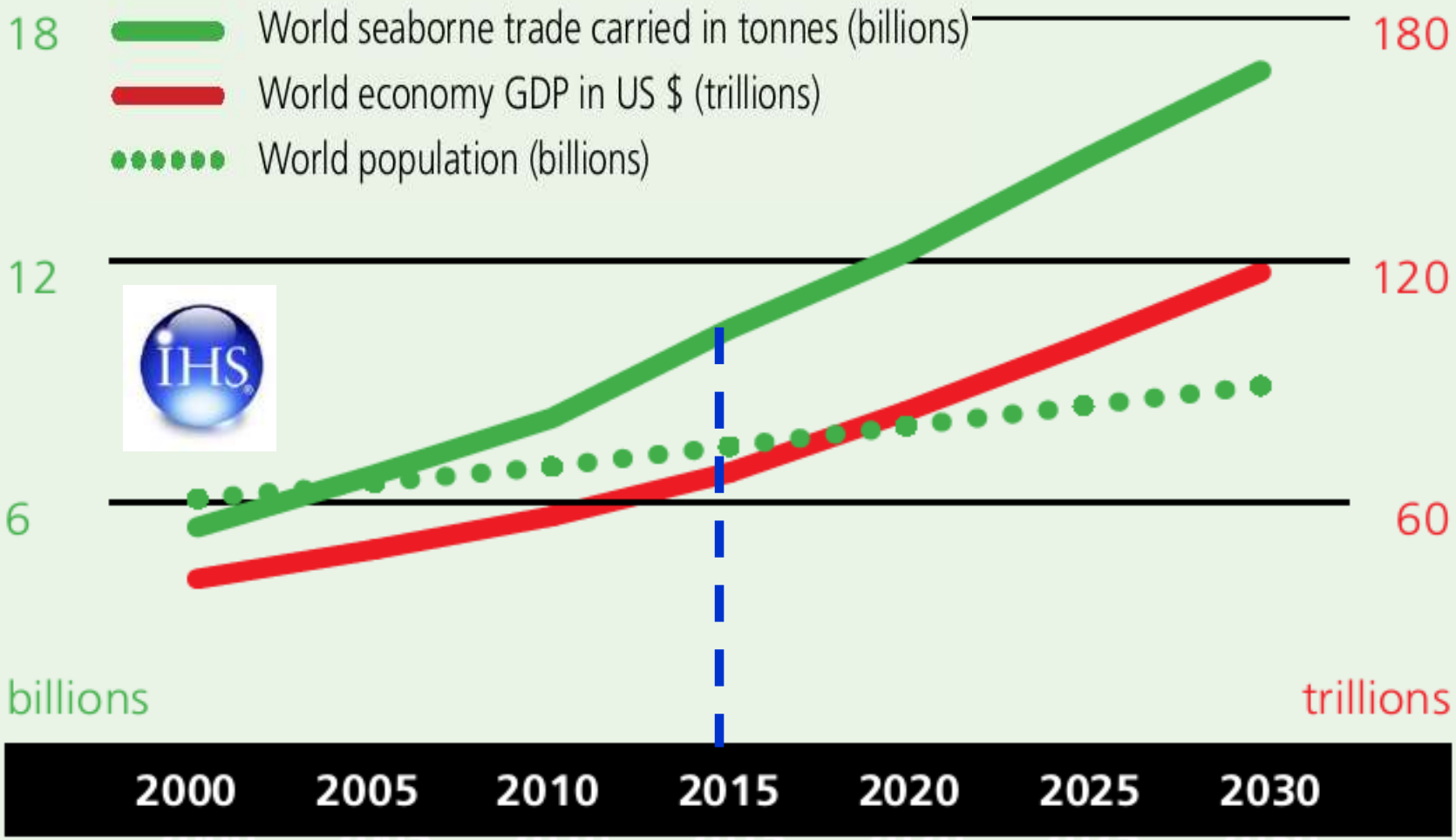
2025 World Container Port Market Demand

(Millions of TEUs)



Source: Drewry Shipping Consultants October 2011

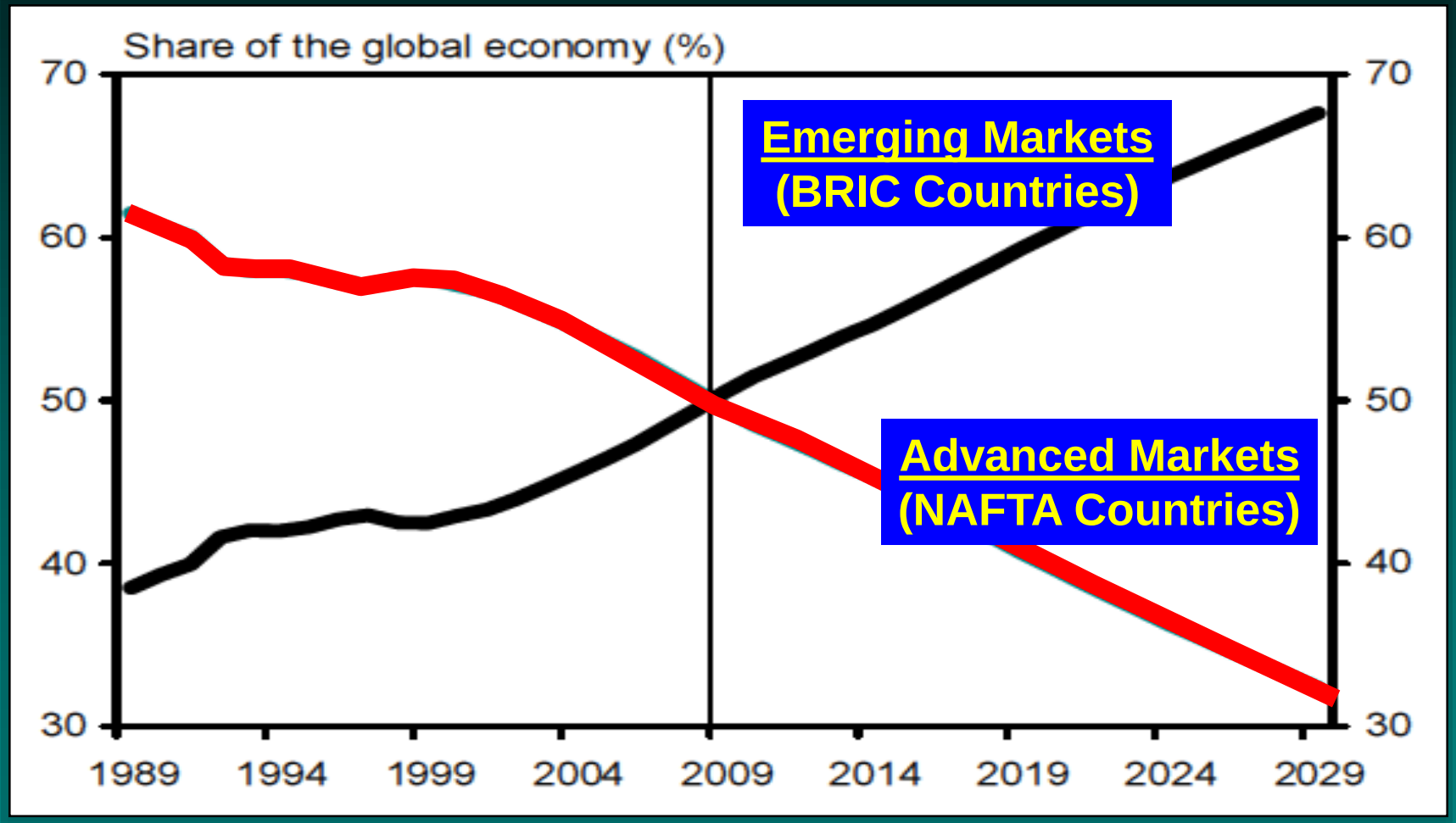
2015 Predicted Increases in World Seaborne Trade & Global Population



Source: IHS Global Insight – World Seaborne Trade, OECD Statistics, UN Population

A Turning Point in Global Economic History

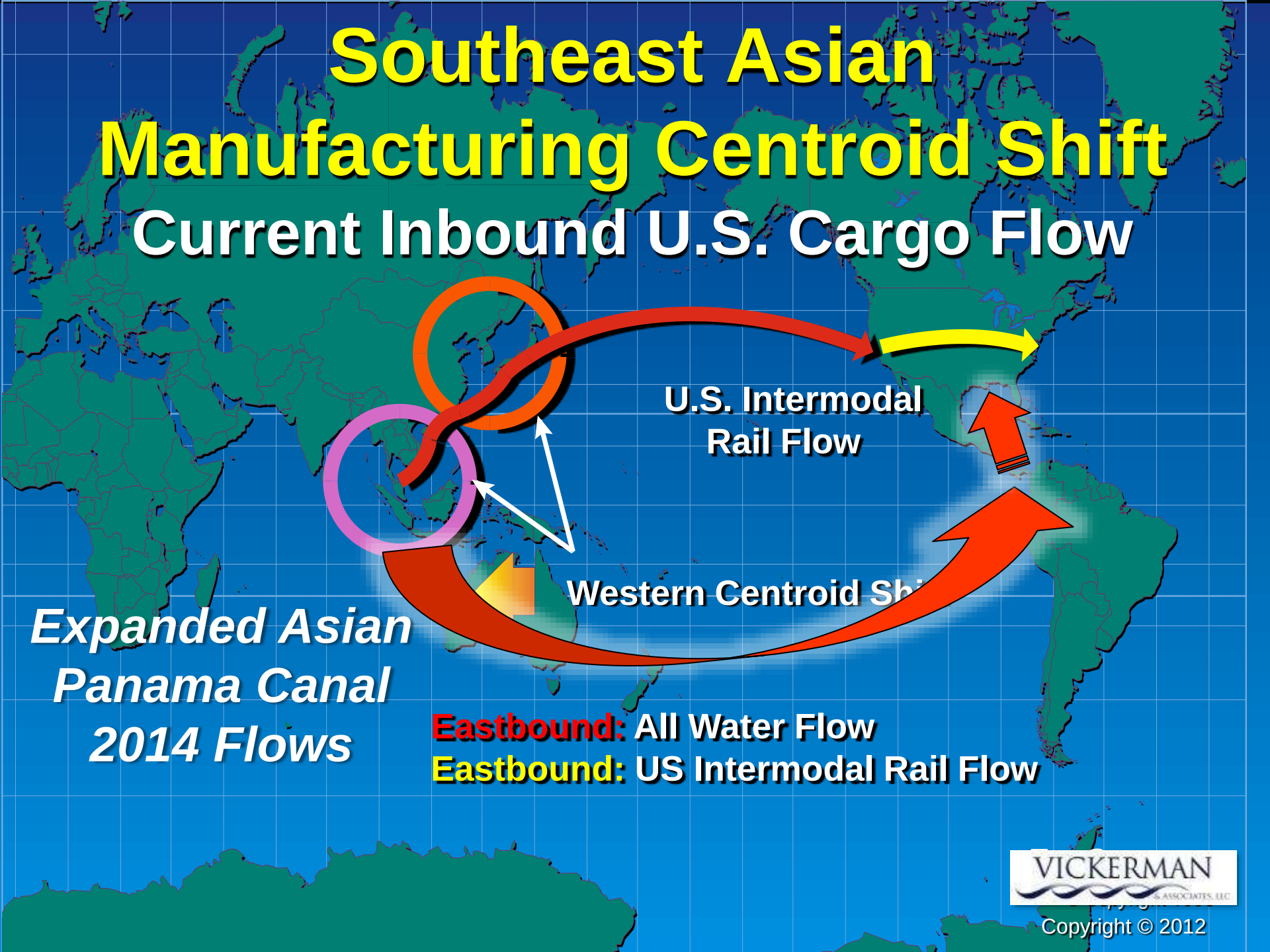
The Advanced Economies Will Decline From 2/3 share of the Global Economy to a 1/3 Global Share. The Global Economy Will See Higher Average Pace of Growth in the Future…



Source: IMF - Forecast by TD Economics, December 2009

Southeast Asian Manufacturing Centroid Shift

Current Inbound U.S. Cargo Flow



Expanded Asian Panama Canal 2014 Flows

Eastbound: All Water Flow
Eastbound: US Intermodal Rail Flow

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Southeast Asian Manufacturing Centroid Shift

Cu Flow

U.S. In
Rail Fl

With Manufacturing Centroid Shifts Into Vietnam and/or India, The North American East Coast will See Dramatically More Westbound Suez Traffic

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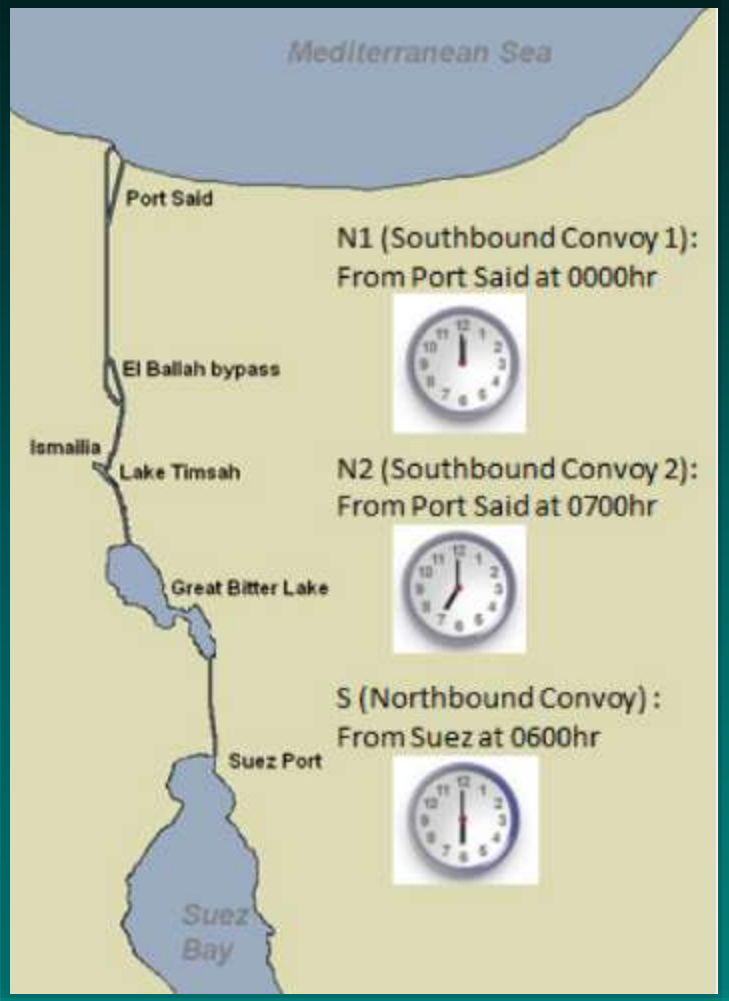
Suez Canal's $8.5 Billion Expansion Plan

(A New $4 Billion 45-mile-long parallel channel and Global Logistics Park)

3 Daily Convoys:

2 Northern Convoys
1 Southern Convoy



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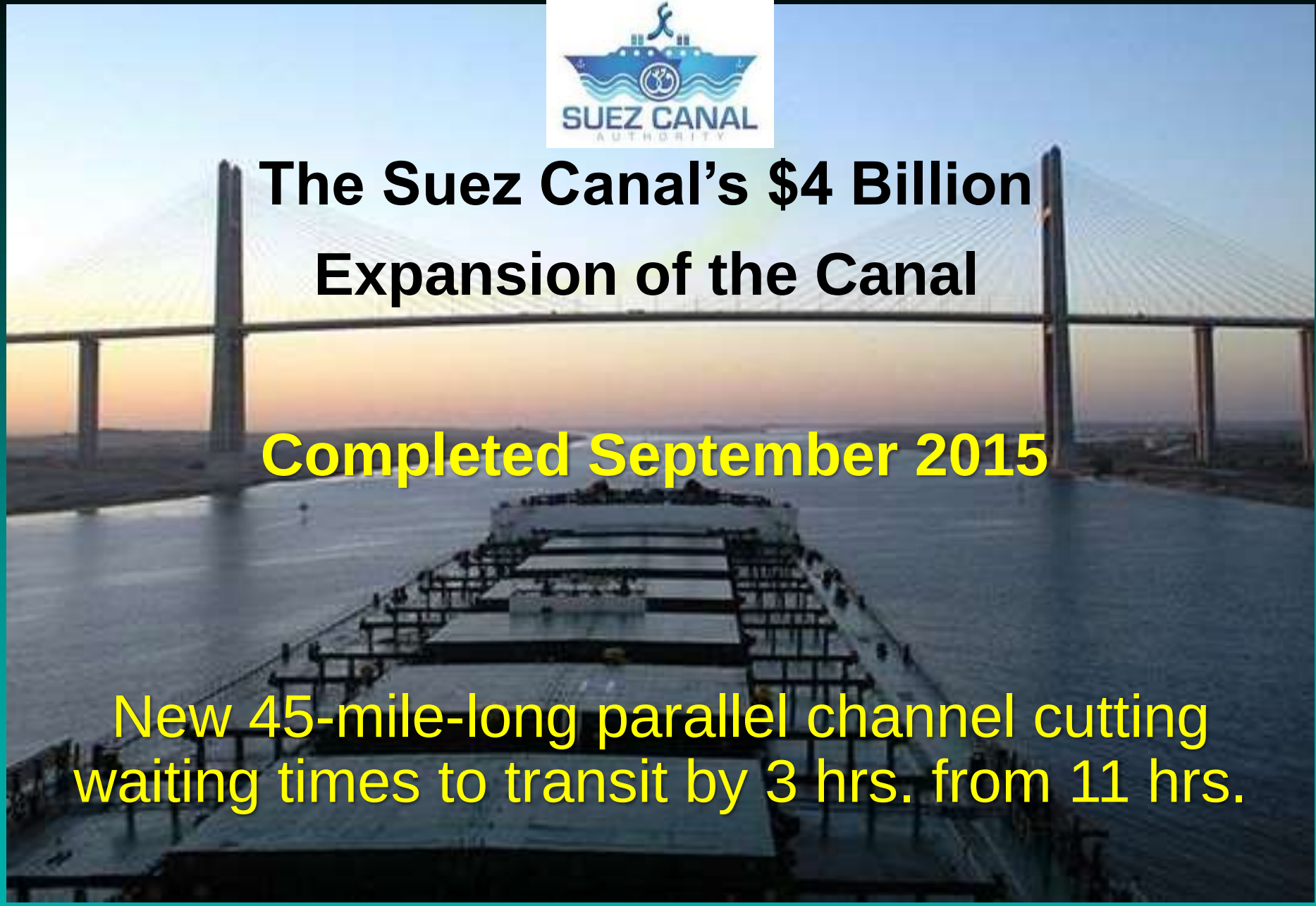

The Suez Canal's $4 Billion Expansion of the Canal

Completed September 2015

New 45-mile-long parallel channel cutting waiting times to transit by 3 hrs. from 11 hrs.

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Dredging 180 Million Cubic Meters (35-kilometers-long and 24-meters-deep) Shipping Route in Less than One Year

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Egyptian Jet Fighter Escort Selfie

(Taken with the New Expanded Suez Canal in the Background)

Source: Photo Courtesy of MIRASCO, August 2015

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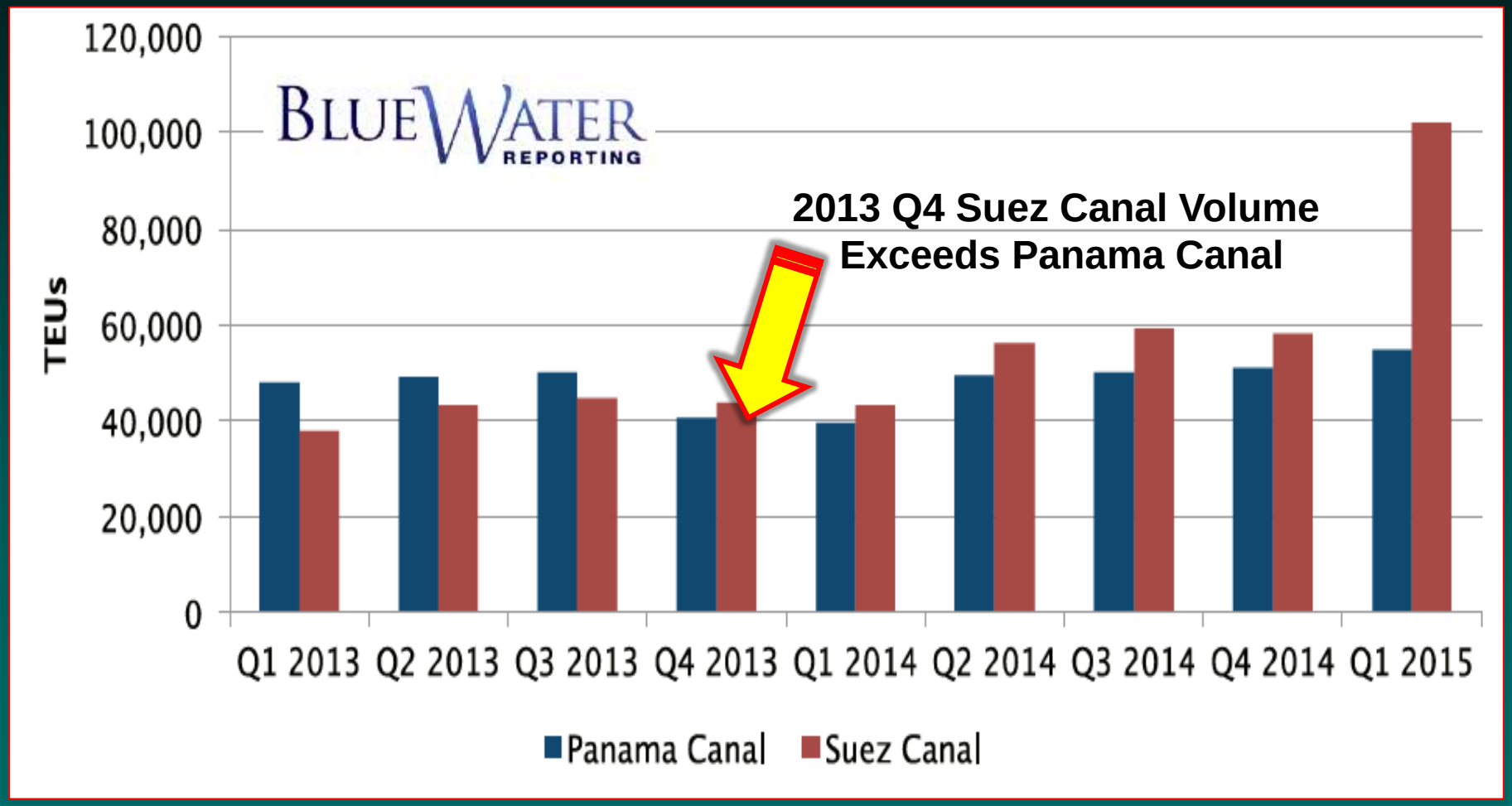
Asia-North America Weekly Throughput:
Panama Canal vs. Suez Canal



Source: American Shipper May 2015

The Growing Asian Import Trade Challenge

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Container Transhipment World Records

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

China-US: Twin Engines of the World

Population:
US: 314 million
China: 1,344 million
(1/5 World)

The number of Chinese children in elementary school is equivalent to the total US population.

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Shanghai International Shipping Center

Yangshan Deep Port & Logistics Park

New Logistics Park

20 Mile New Port Access Bridge Constructed in 3 yrs

54 New Berths

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Shanghai International Shipping Center

Yangshan Deep Port - 20 Mile Bridge Access

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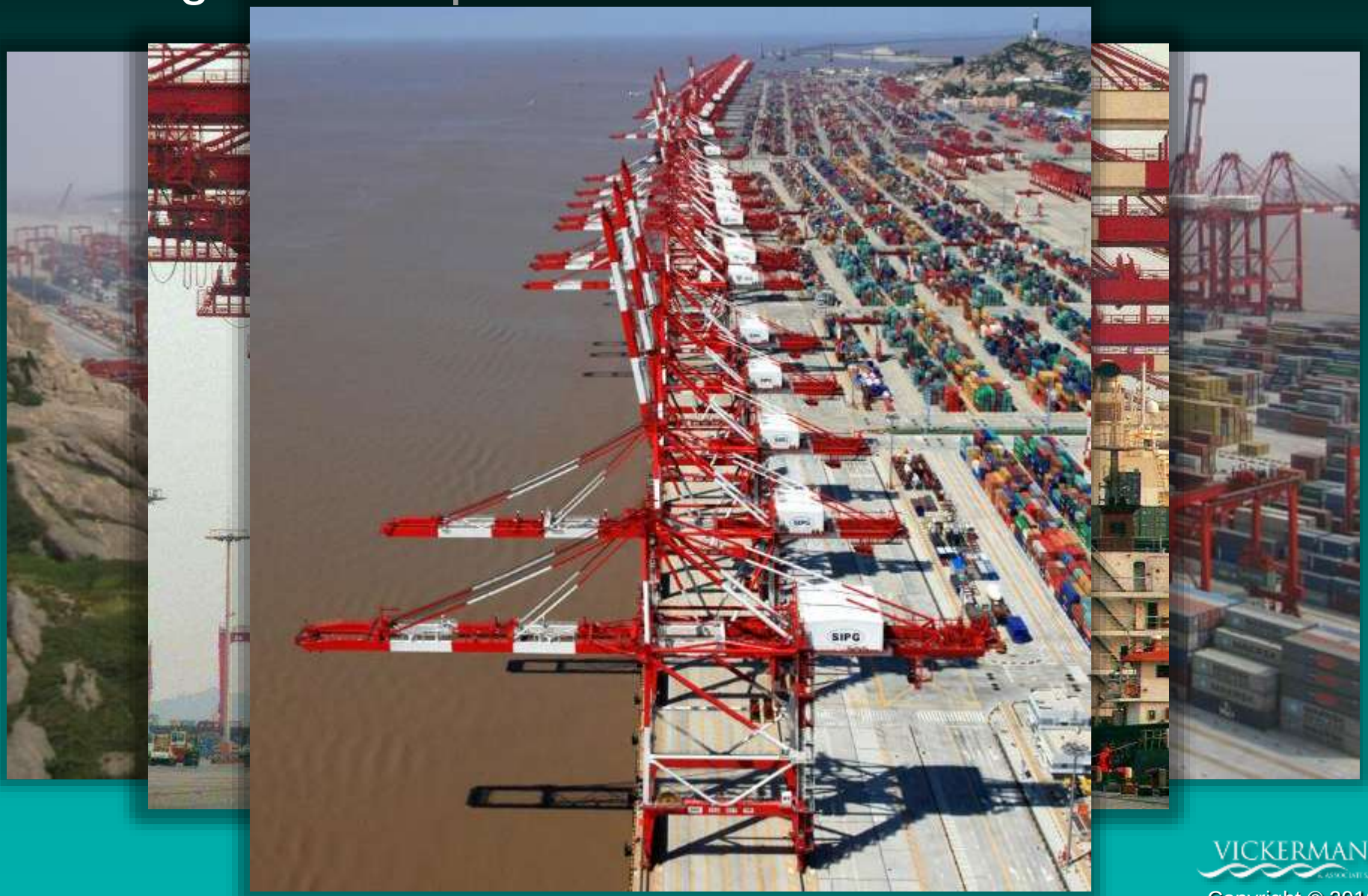
Shanghai Yangshan Deep-Water Harbour

Yangshan Deep Port – 54 Berths East China Sea



Shanghai International Shipping Center

Yangshan Deep Port & Logistics Park

Shanghai Port Set a 2011 Record by Handling over 30 million TEUs

North American Cargo Demand Trends

(Dé jà vu Experience)

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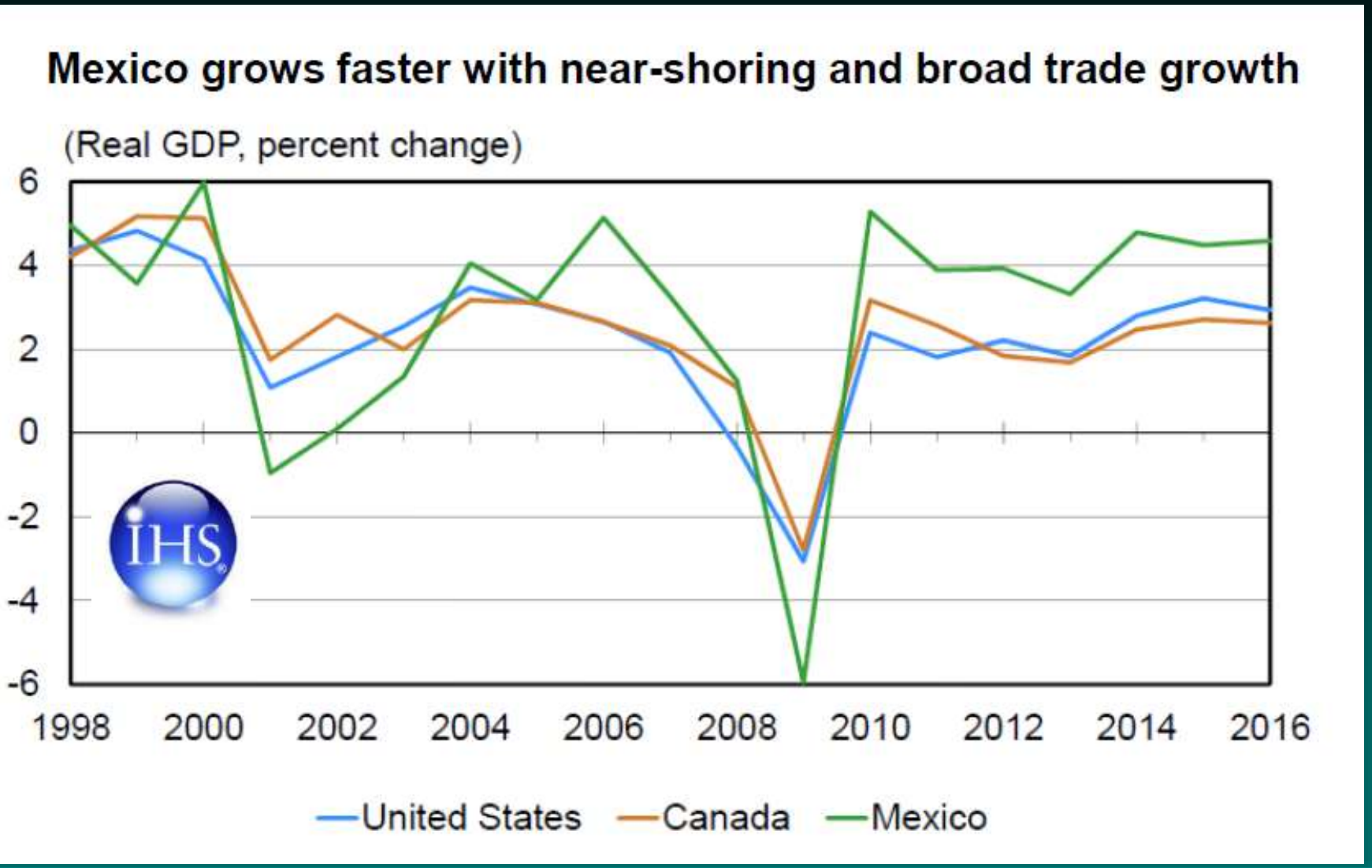
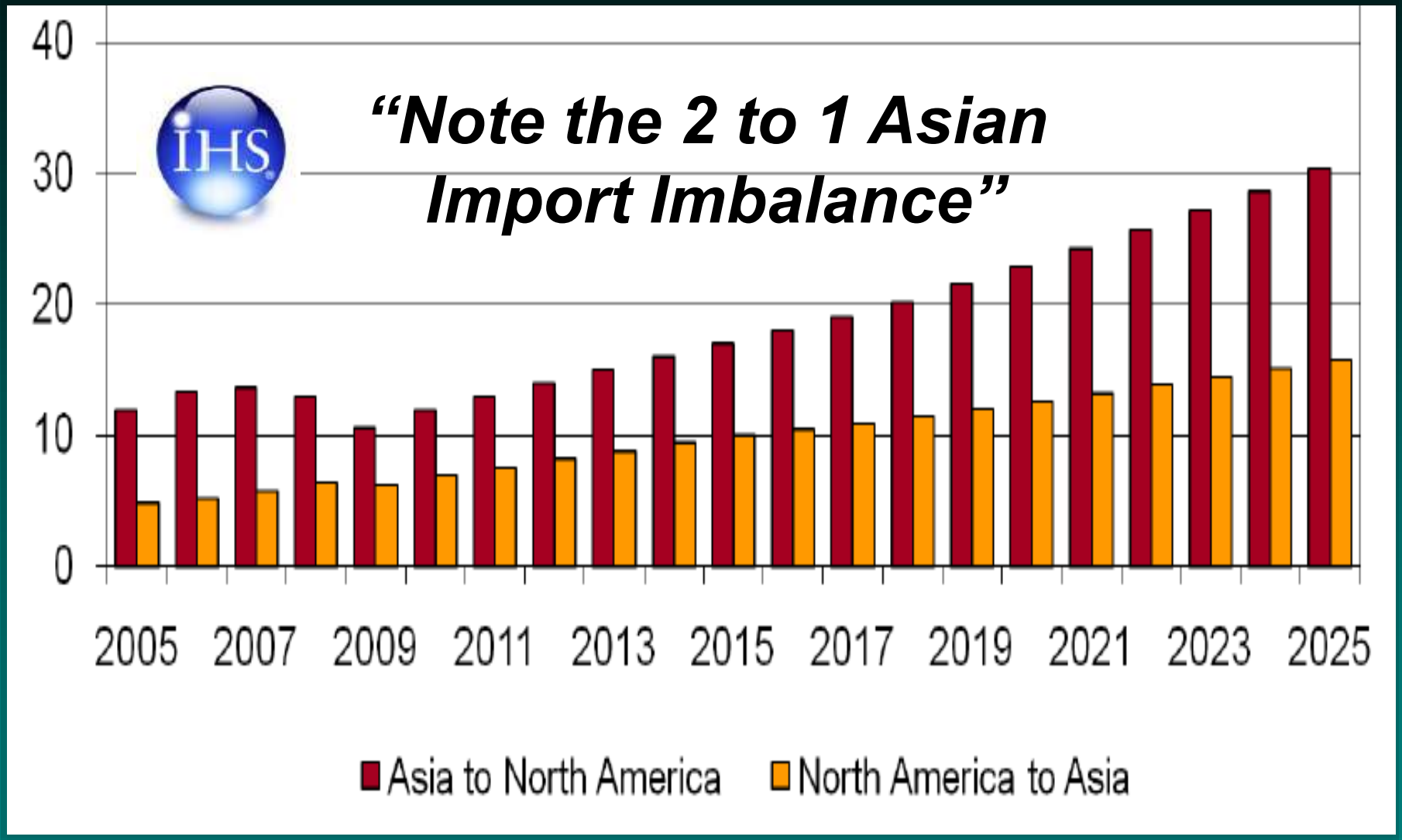
NAFTA Trade Partners Are Growing



Source: IHS Global Insight – World Trade Service

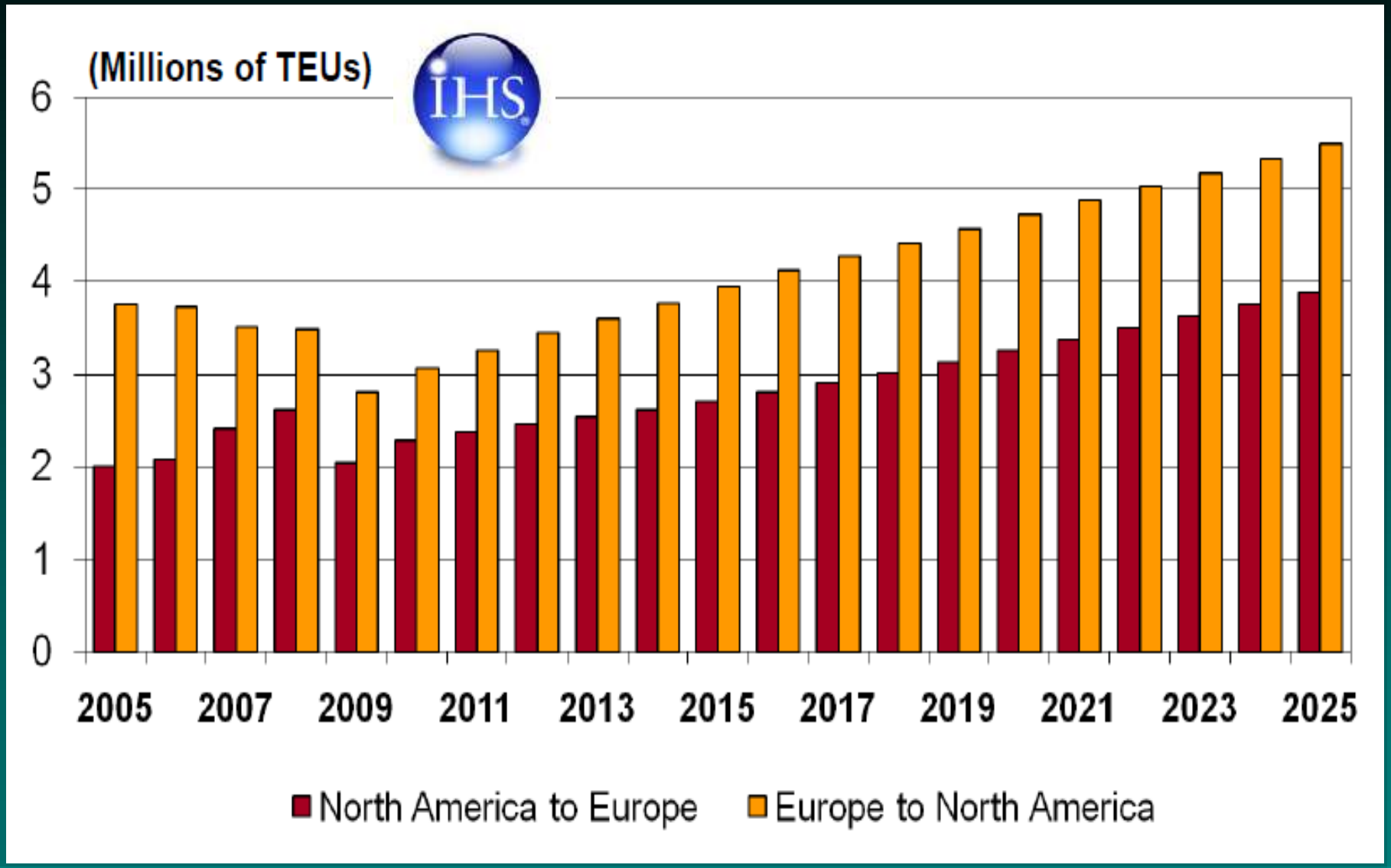
Transpacific Container Trade Recovery

(Millions of TEUs)

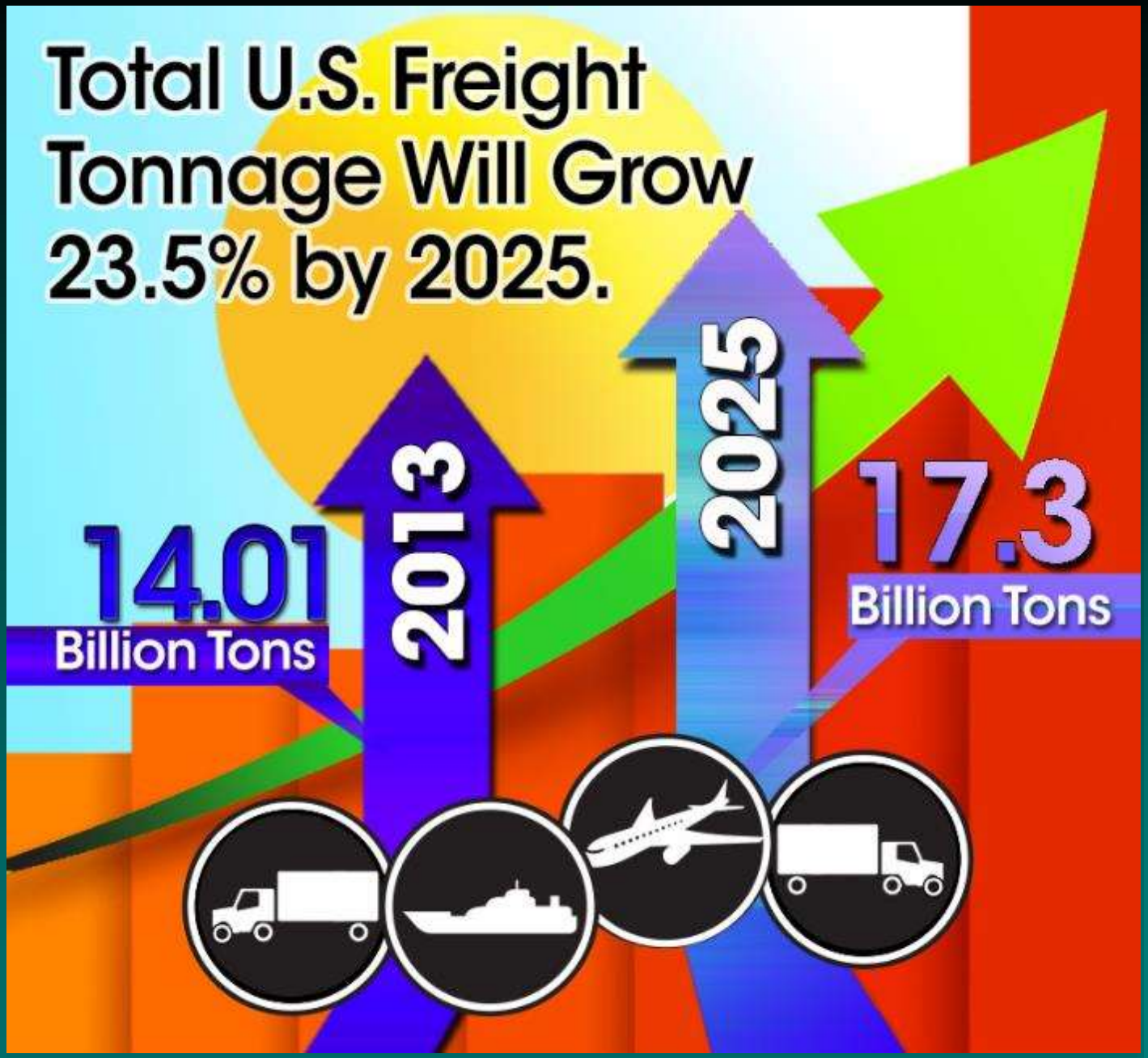


Source: IHS – Global Insight -The Global Outlook – October 14, 2010

Transatlantic Container Trade Recovery



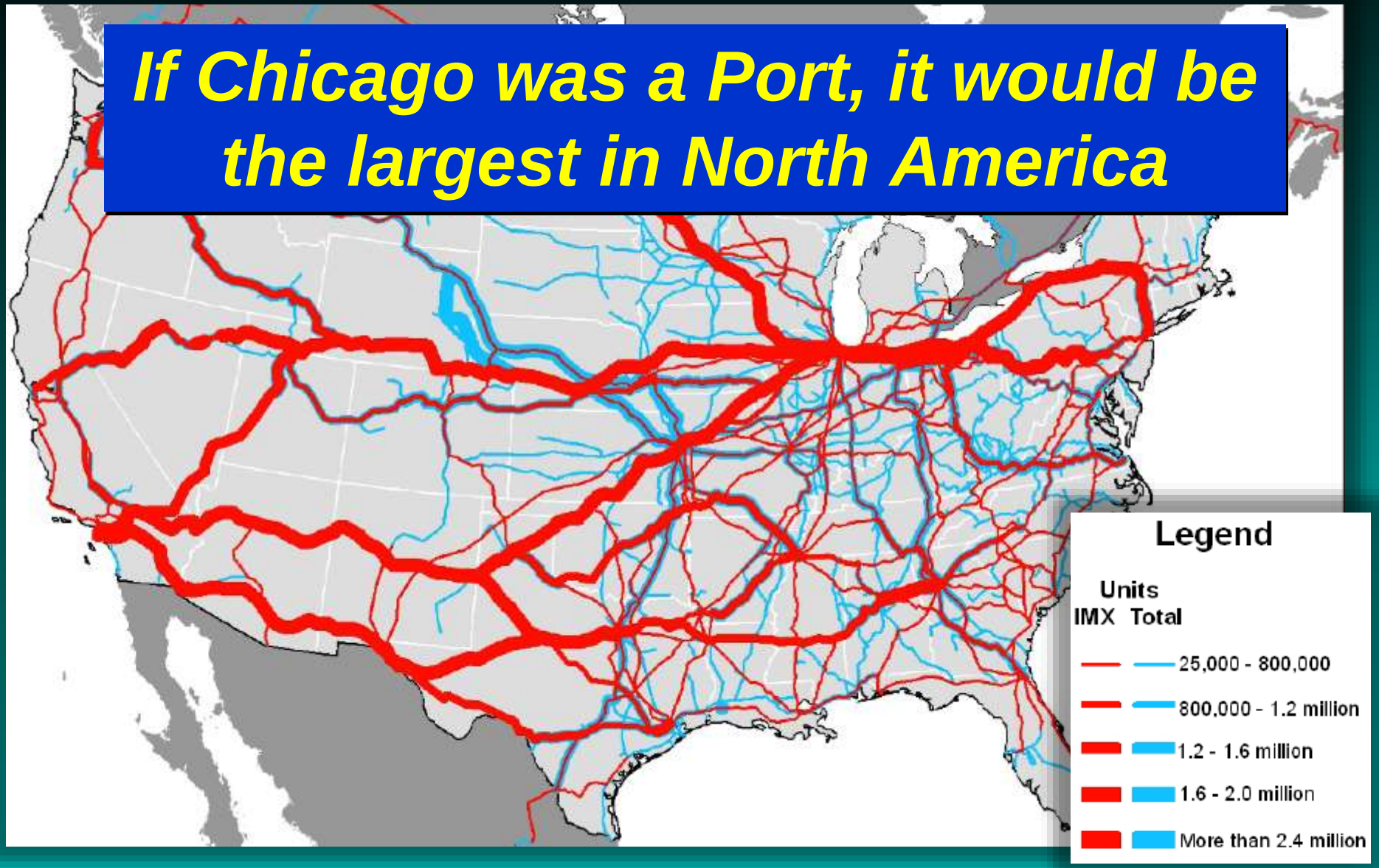
Source: IHS – Global Insight -The Global Outlook – October 14, 2010



Source: ATA US Freight Transportation 2025 Forecast

2035 Intermodal Rail Car Volumes

If Chicago was a Port, it would be the largest in North America



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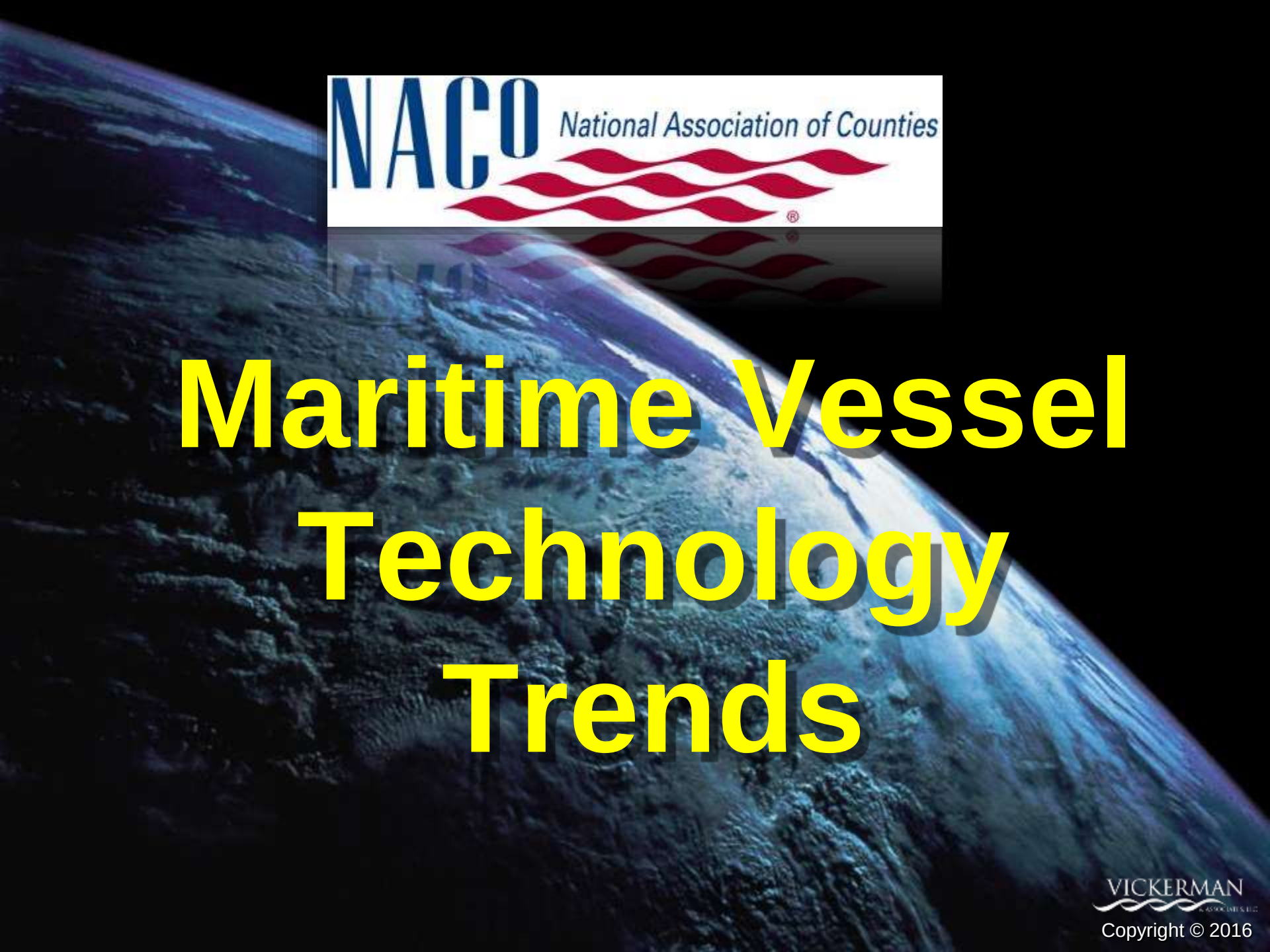

Maritime Vessel Technology Trends

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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)

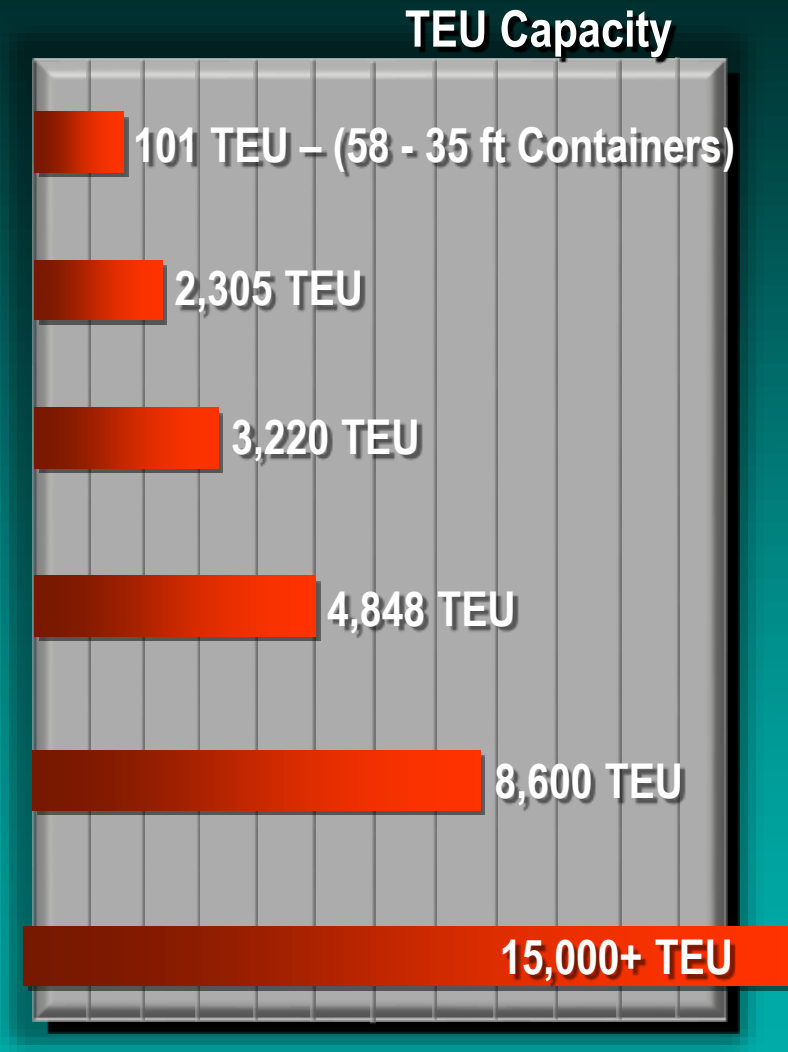
2nd Generation (1970 - 1980)

3rd Generation (1985)

4th Generation (1986 - 2000)

5th Generation (2000 - 2006)

6th Generation (2006 - 2012)



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World Container Ship Evolution

24% increase** in the average container ship size from **2008 to 2012

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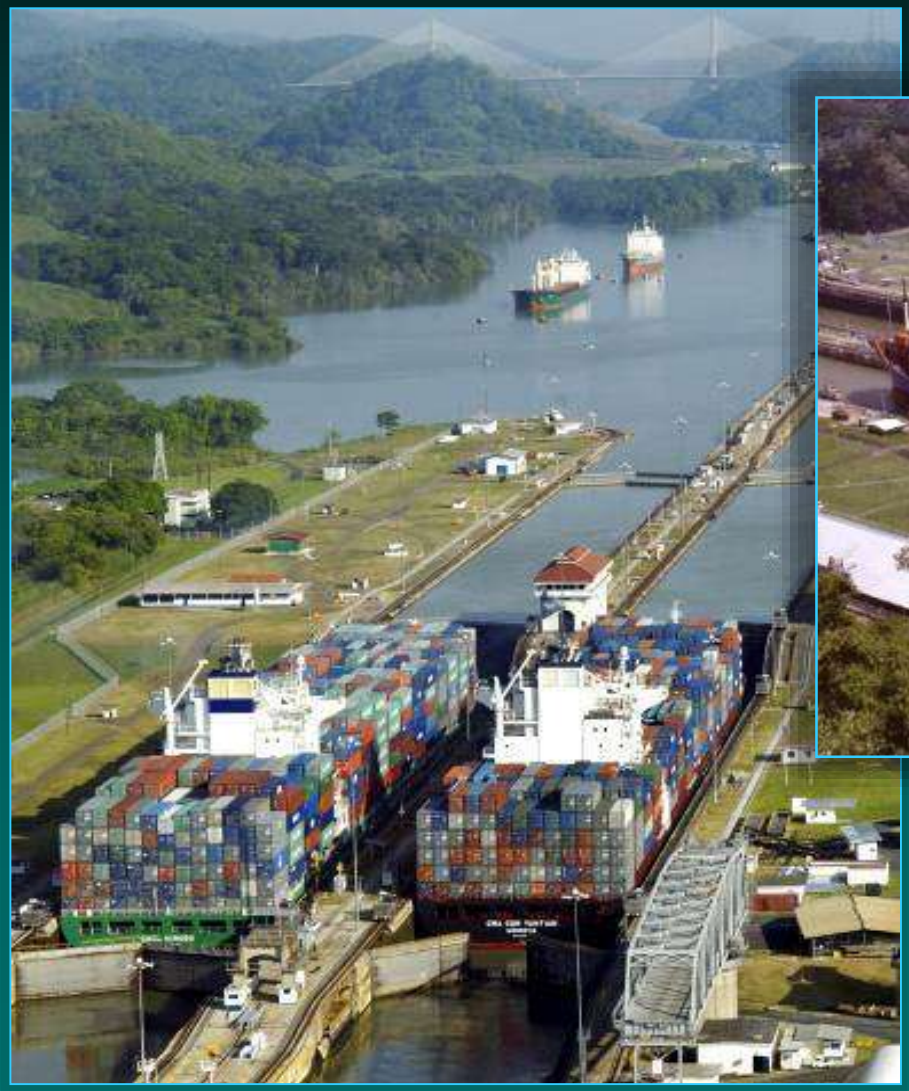
World Container Ship Evolution

24% increase in the average container ship size from 2008 to 2012

The Stage is set to Jump again to 23,000 TEU Mega Container Vessels

Madison Maersk (3,928 TEUs) in the Panama Canal

(Current Max Panamax Vessel Approx. 4,800 TEUs)



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*Maersk's New 30 Vessels (ordered) are **4** Times the Current Size of the Panama Canal & **1.5** times the Size of the Expanded Panama Canal*

MAERSK LINE, LIMITED

February 2011: A.P. Moller-Maersk Orders 30 – 18,000 TEU Container Vessels "*Largest in the World*"

23 Containers Wide – 9 Tiers Above the Hatch

2018: Ultra-Large 20.000 TEUs Container Ships

2015: Maersk Planning Orders up to
10 New 20,000 TEU Ships ($1.5 Billion Order),
Evergreen, Seaspan and United Arab Shipping Company (UASC)
are also looking at 20,000 TEUs

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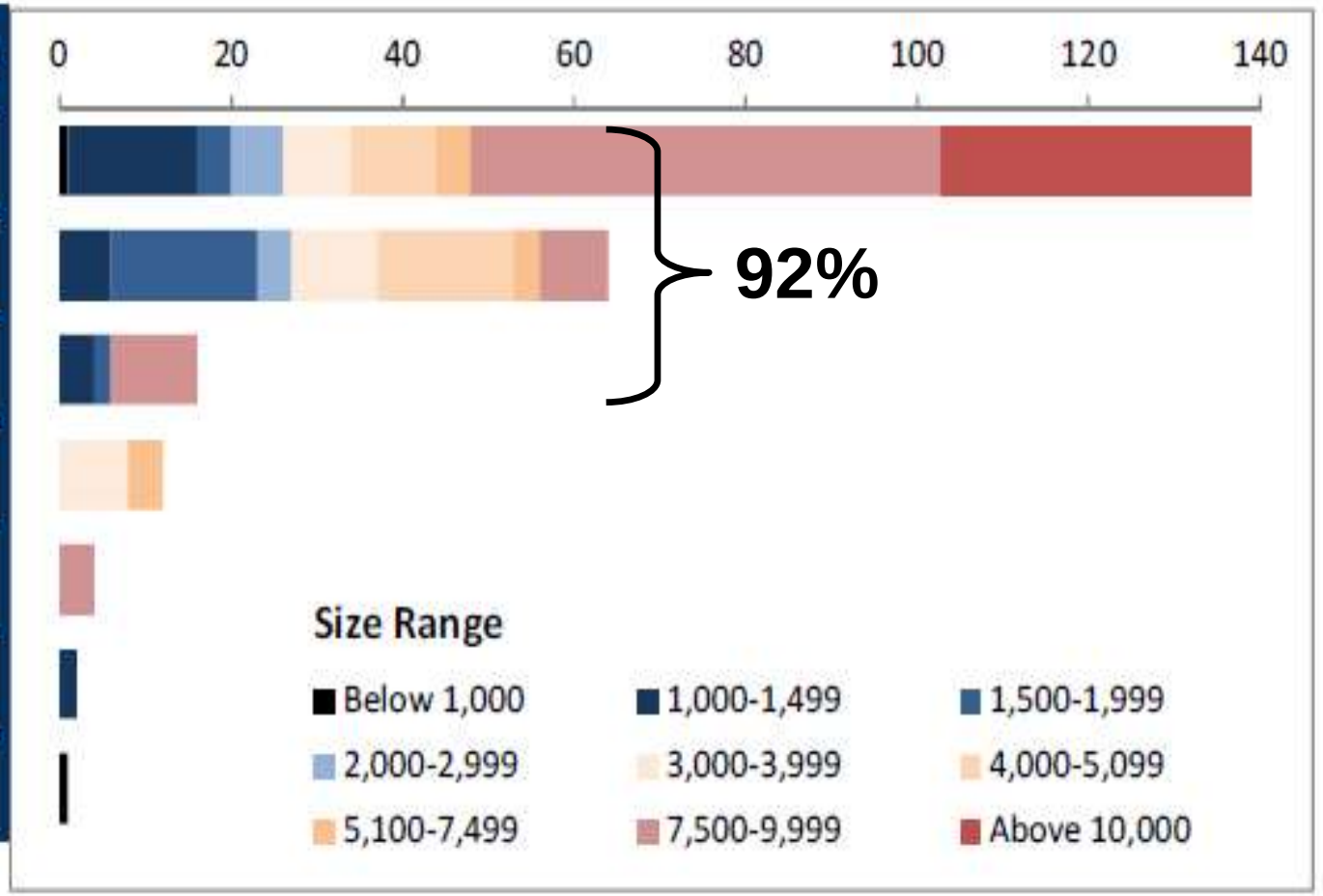
Containership Orders – Country of Build

(Orders Since January 2010)

Country	Units
S Korea	139
China	64
Taiwan	16
Philippines	12
Romania	4
Japan	2
Germany	1



Source: Alphaliner Newsletter Volume 2011 Issue 21

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Future Container Vessel: NYK Super Eco Ship

NYK LOGISTICS & MEGACARRIER

Future Container Vessel: NYK Super Eco Ship

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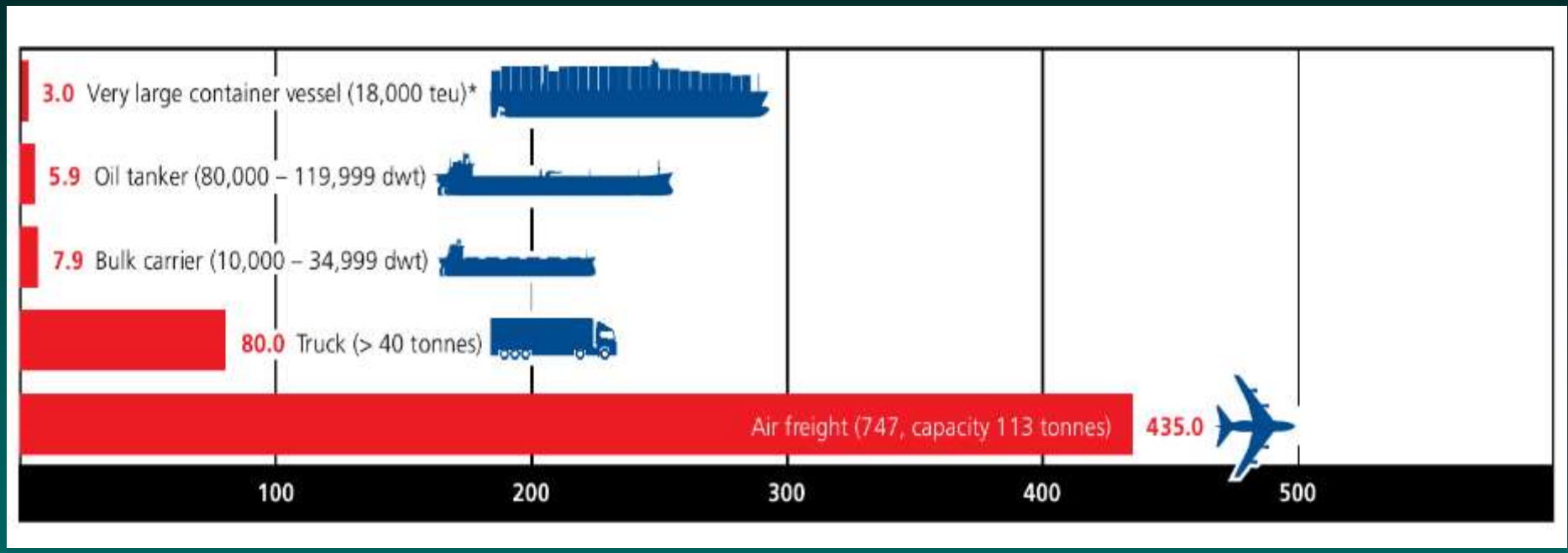
Comparison of Typical CO^2 Emissions For Freight Transport Modes

(Grams per Tonne-km)



The ocean shipping industry is the only industrial sector which is already compliant by a legally-binding IMO global agreement to reduce CO2 emissions.

Source: IMO GHG Study, 2009 (*AP Møller-Maersk, 2014)

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New Era of LNG Vessels is on the Horizon:

Will LNG be the Fuel of the Future for Shipping ?

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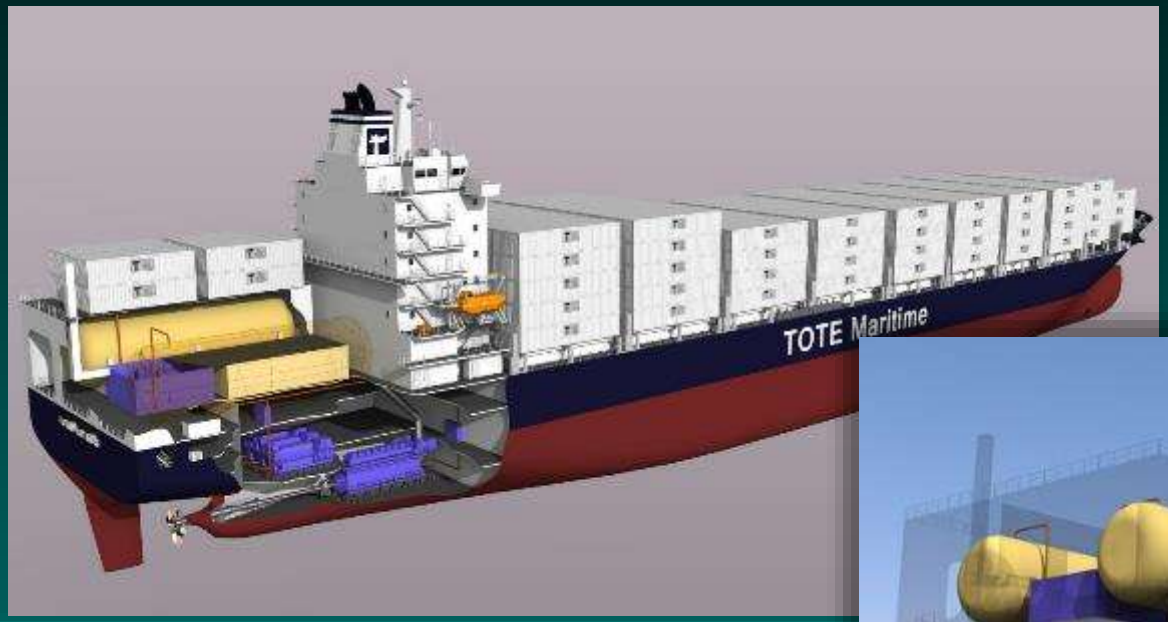
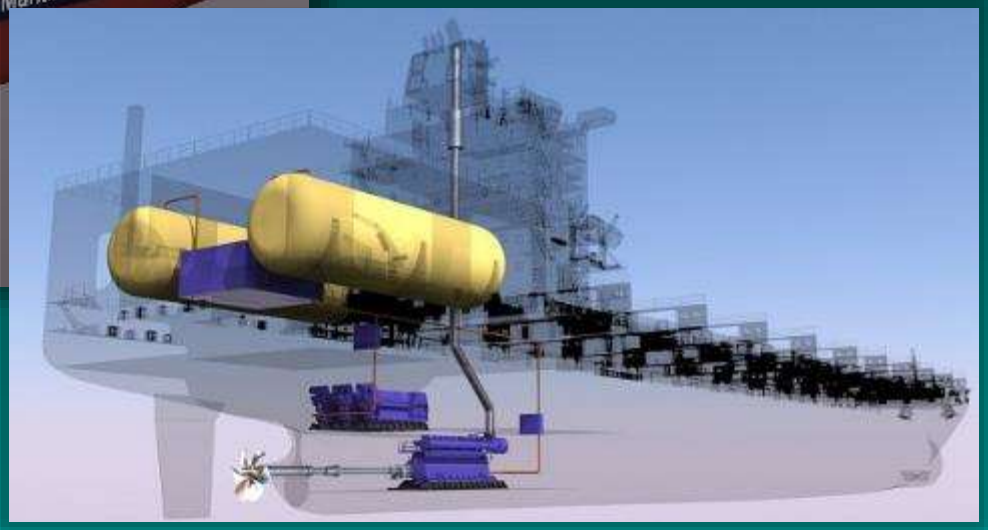
TOTE Orders Two New LNG Powered Container Ships & Two RO/RO Conversions: Largest LNG Powered Ships in the World

These ships will be the largest ships in the world powered primarily by Liquefied Natural Gas (LNG).

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

Kawasaki Heavy Industries 9,000 TEU container ship Fuelled by LNG

A new type of LNG tank that provides more space for container cargo.

Germanischer Lloyd (GL) & IHI Marine United Inc. (IHIMU)

Concept Study 13,000 TEU Container Vessel Fuelled by LNG

The eFuture 13000C design (©IHIMU)

LNG Vessel Bunkering: *North American Ports Are Not Prepared…*

Panama Canal Expansion: New Capacity

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Panama Canal Route

ACP

The Autoridad Del Canal de Panama

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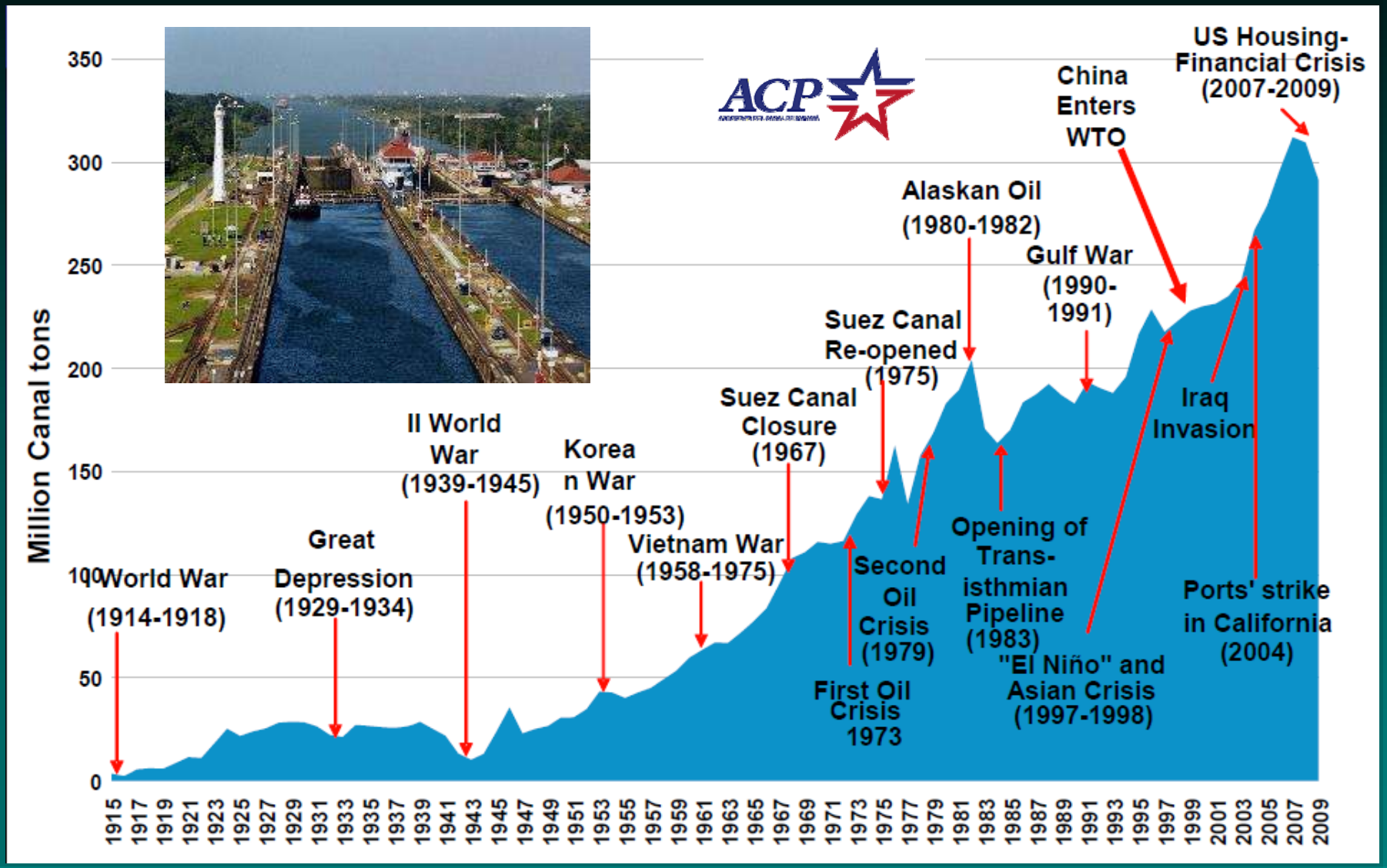
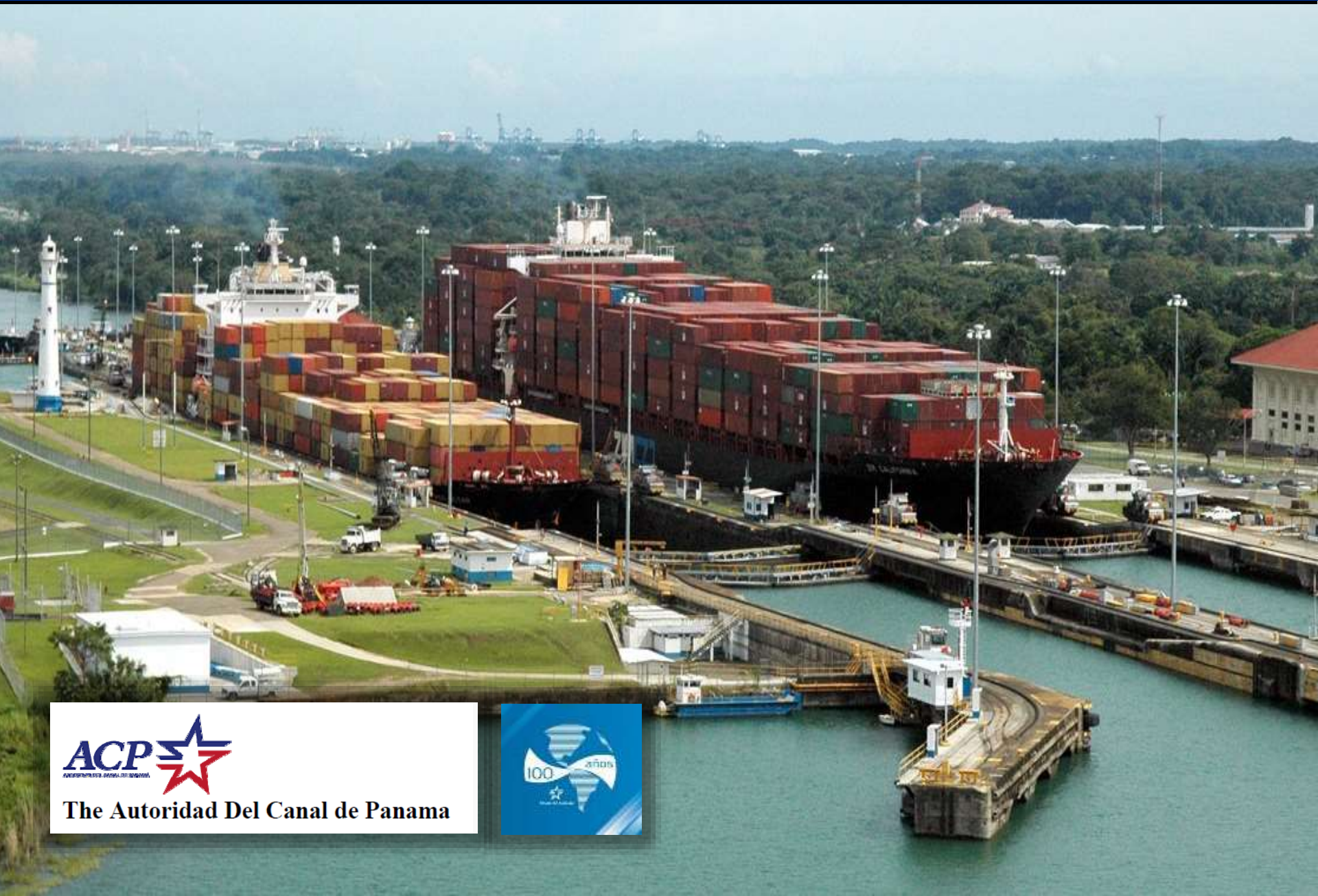
Panama Canal Historical Tonnage Traffic



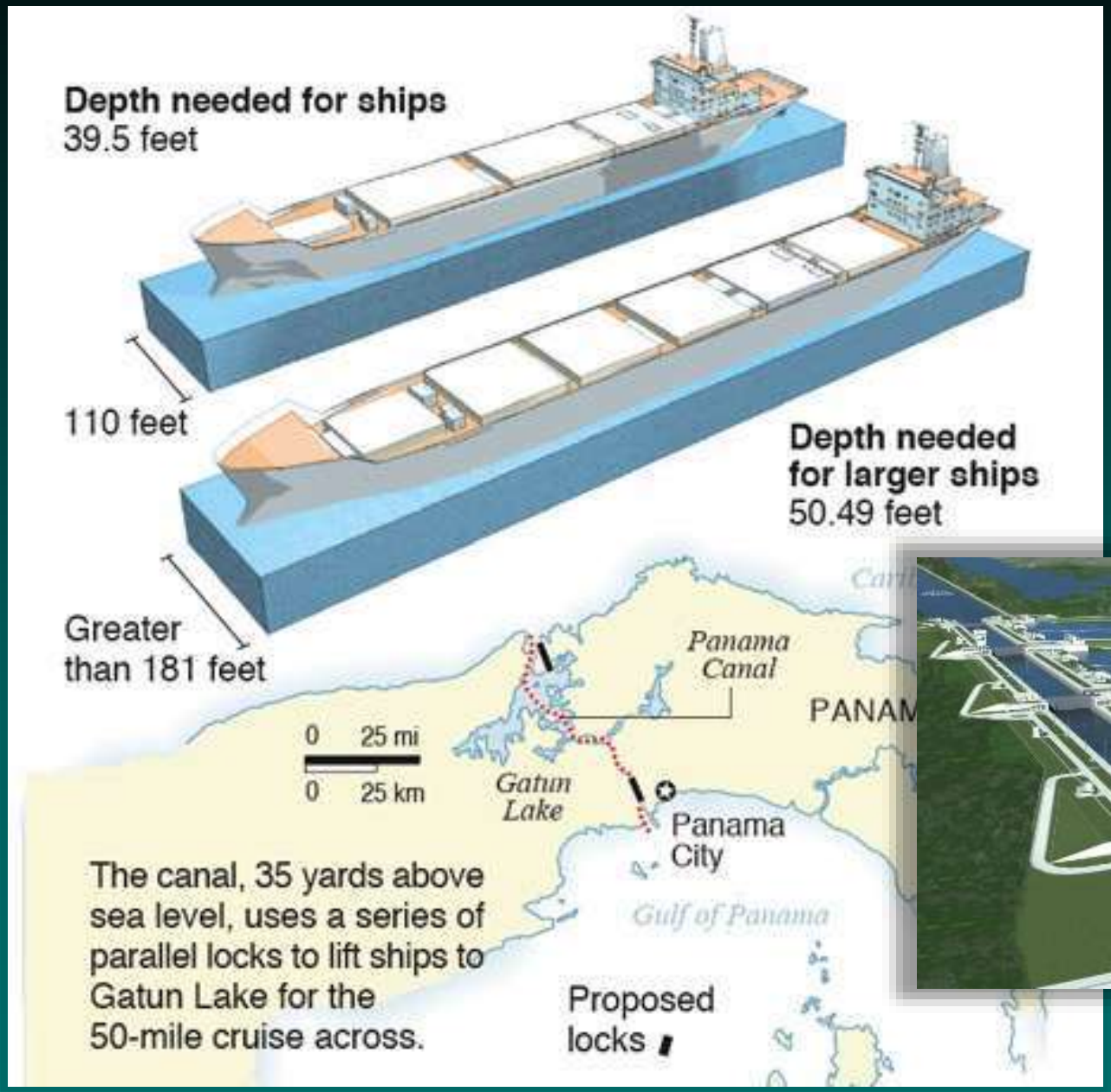
Source: ACP Data

The Panama Canal Circa 1914

Panama Canal Today



Expansion of the Panama Canal: Circa 2016



Post 2016 Panama Canal

The Autoridad Del Canal de Panama

Panama Canal Third Lane Expansion
Circa Early 2016

ACP
The Autoridad Del Canal de Panama

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A $5.25 Billion Investment in a 3rd Set of Locks Equating to 16% of Panama's National GDP

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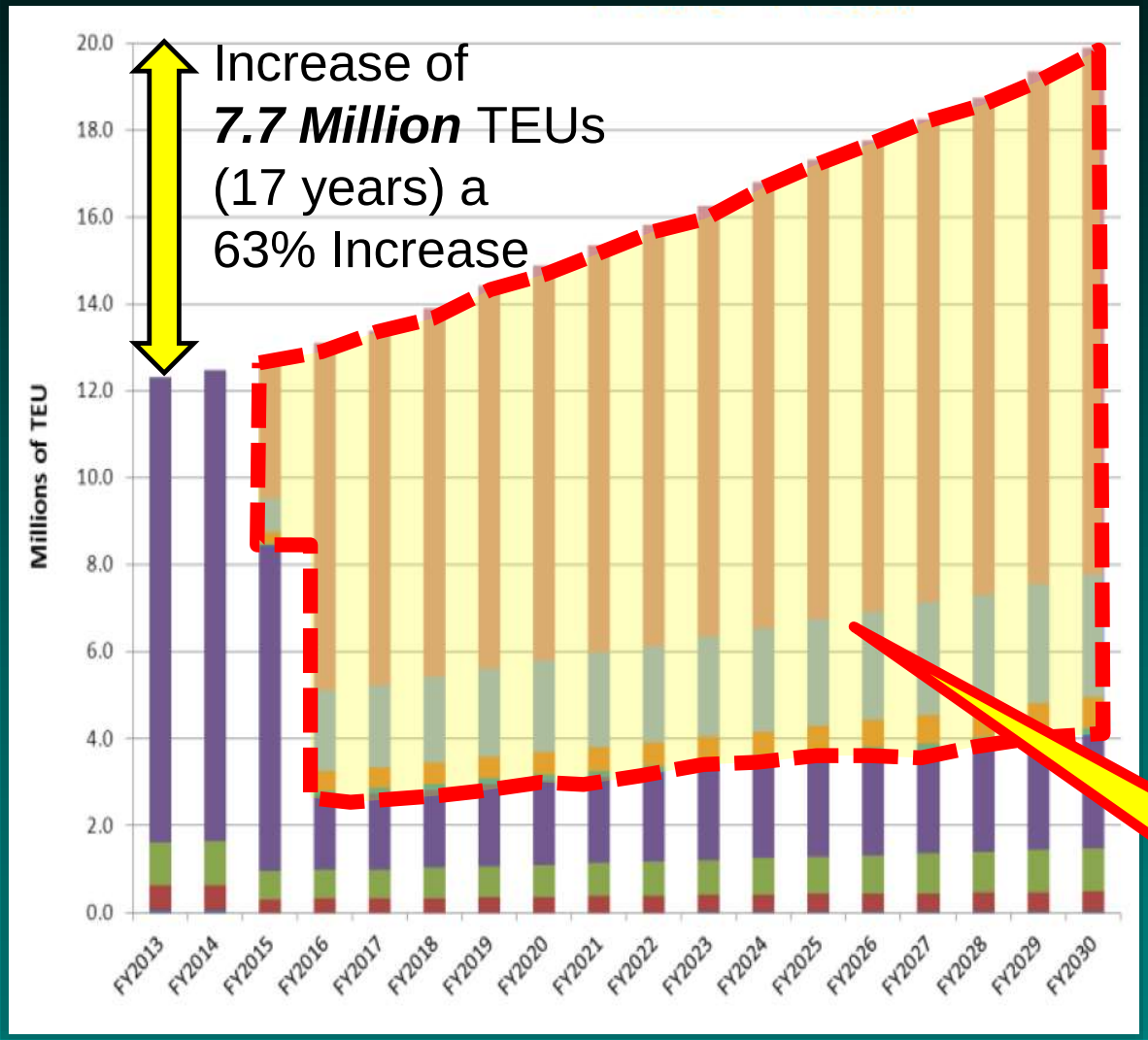
Canal TEU Forecast by Vessel Beam

(FY2013 to FY 2030 – Millions of TEUs)



ACP
The Autoridad Del Canal de Panama

- 140' or more
- 120' – 139.99'
- 107' – 119.99'
- 100' – 106.99' (> 39.5' Draft)
- 100' – 106.99' (< 39.5' Draft)
- 91' – 99.99'
- 80' – 90.99'
- Less than 80'

Beyond Current Panamax Width

Source: Container Market Segment and Transhipment Study – Oct 2012 ACP/M&N

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A Larger Share of Other Vessels Will be Able to Transit the Canal - Fully Loaded

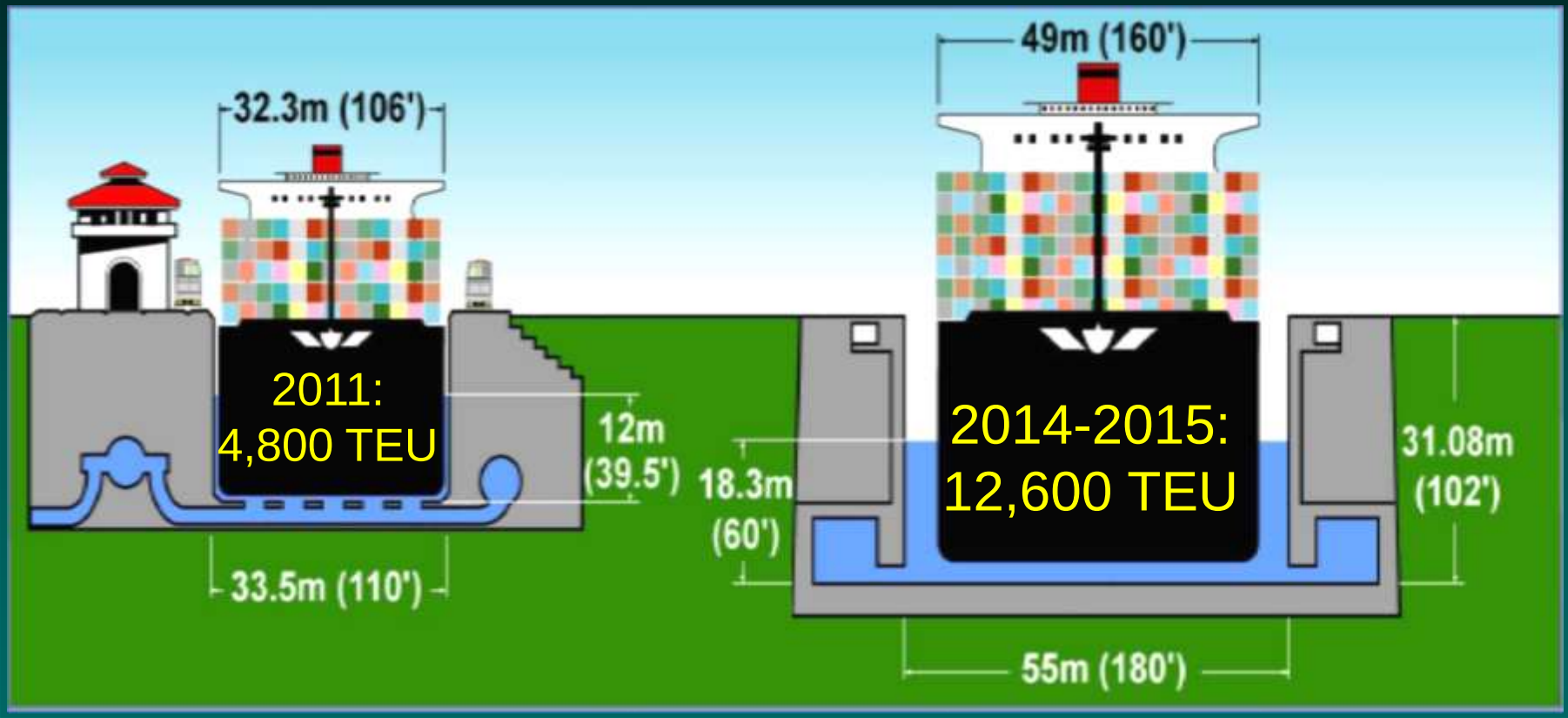
Crude Oil - 0% to 42%

LNG - 10% to 90%

Dry Bulk - 55% to 80%

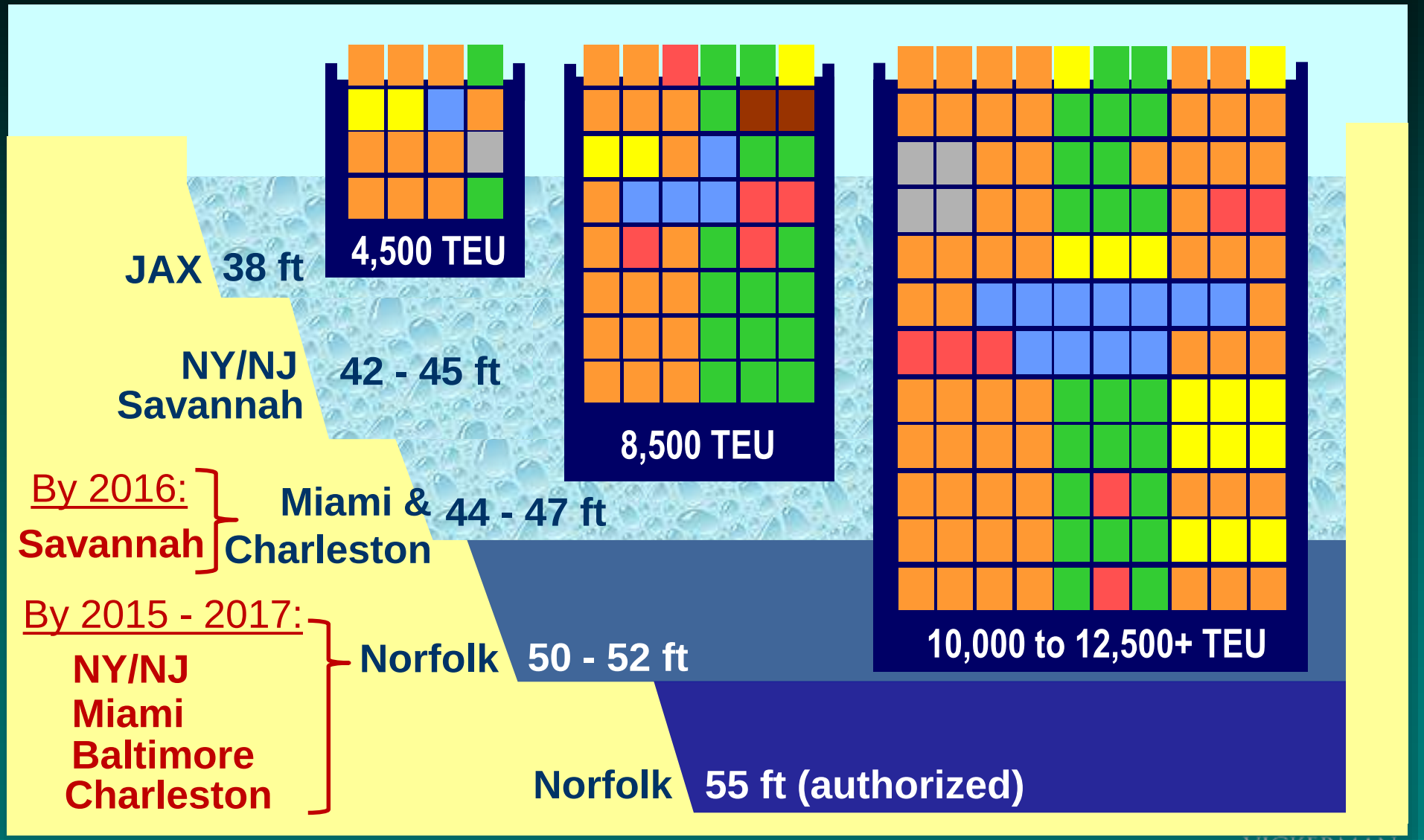
The Autoridad Del Canal de Panama

Panama Canal Third Lane Expansion Capabilities



Source: ACP Expansion Project

Today Only the VPA & PANY/NJ Can Handle The New 2016 Panamax Vessels Fully Loaded



Source: Virginia Port Authority (VPA)

Port Authority of New York & New Jersey Entrance Channel & Harbor Dredging Program

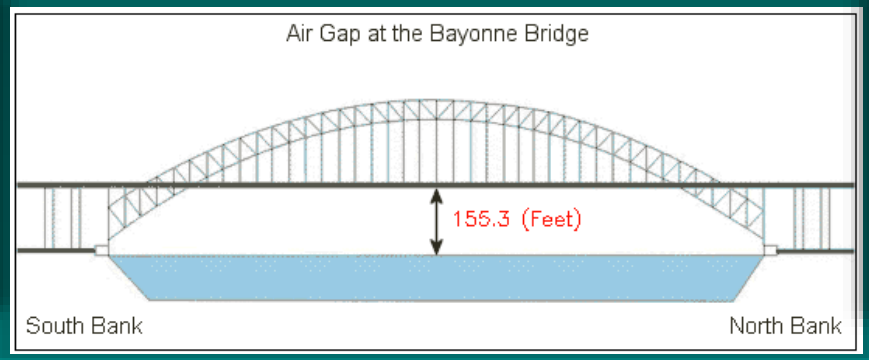
($1.6 Billion Program, Completion December 2014)

Raising of the Bayonne Bridge

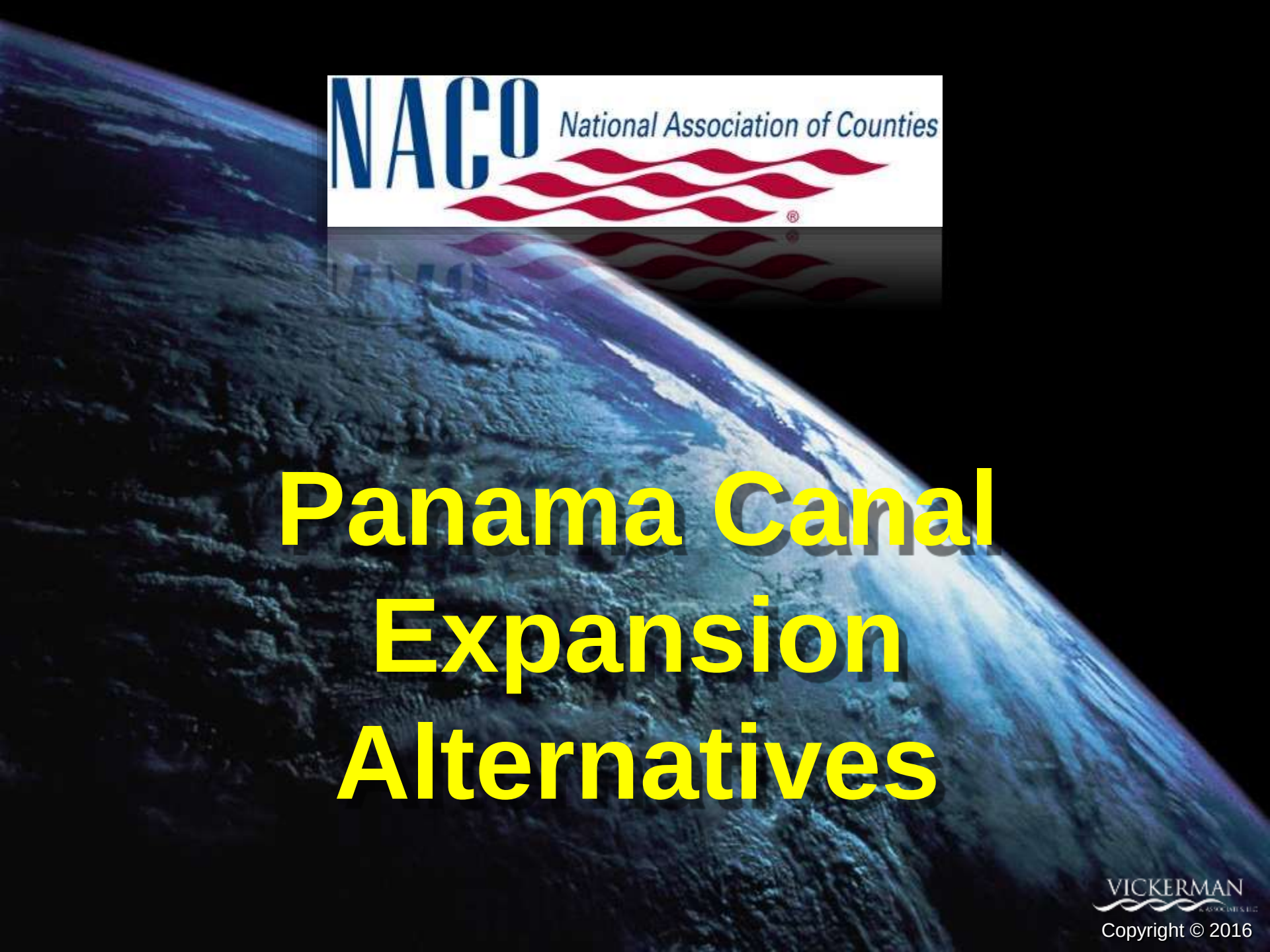
(Estimated at $1.2 billion)

Future Clearance: 214 ft

Current Clearance: 155.3 ft



VICKERMAN & ASSOCIATES, LLC



Panama Canal Expansion Alternatives

VICKERMAN & ASSOCIATES, LLC

Nicaragua's $40 Billion Contract with Chinese HKND to Dig a Rival to the Panama Canal

Alternative "Dry Canal" Proposals to Counteract Anticipated Canal Fees/Costs

APM Terminals announced $1 billion Container Port in Costa Rica

China's proposal: 136-mile "dry canal" (Pacific Port of Buenaventura & Atlantic Coast Port of Cartagena in Colombia.

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Emerging New Caribbean Transhipment Center

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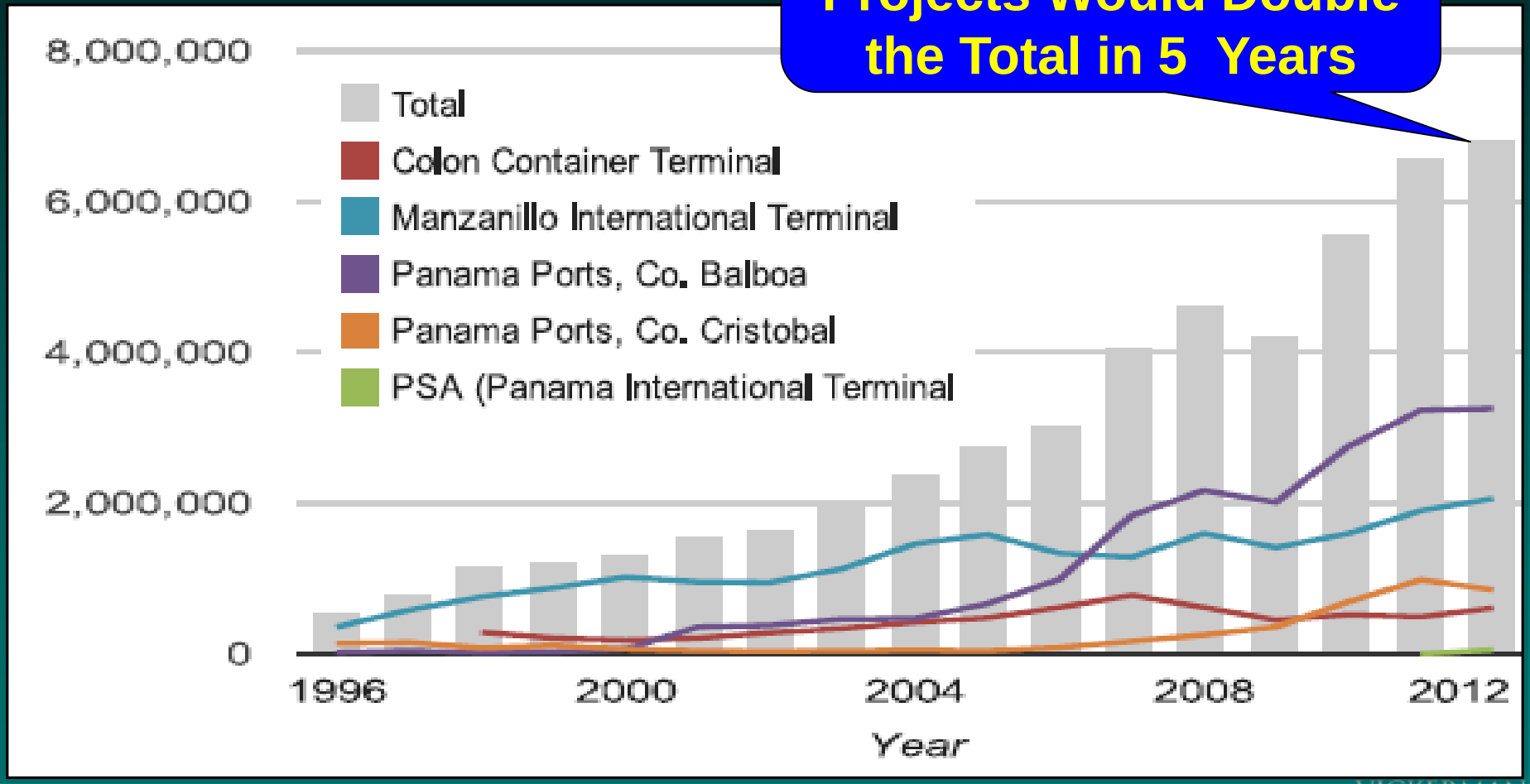
Panama Ports Annual *Transhipment Growth*

"The Singapore of Latin America"

Proposed New Port Projects Would Double the Total in 5 Years



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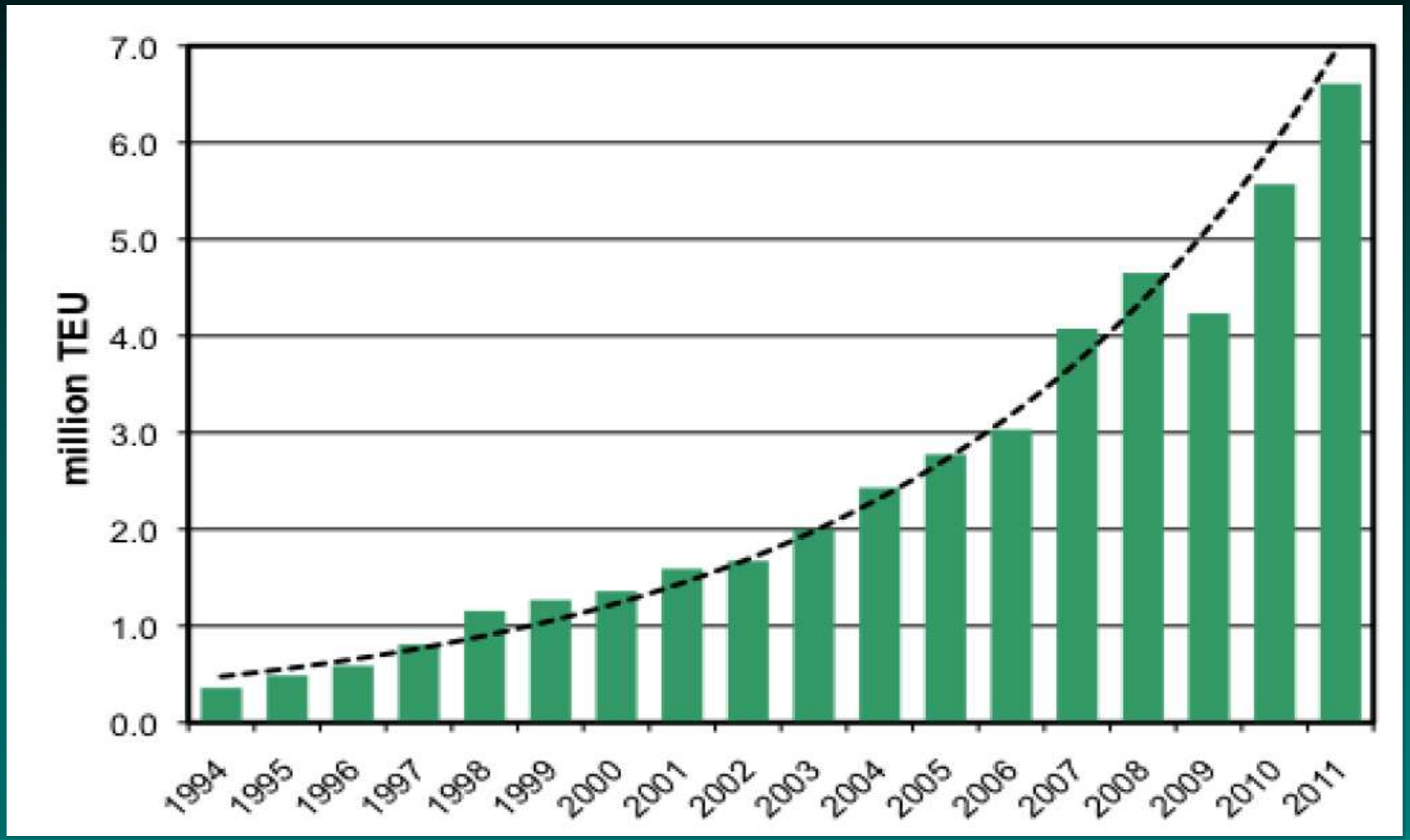
Panama Ports Container *Transhipment Growth*



6.8 Million TEUs – 18.5 % Growth Rate

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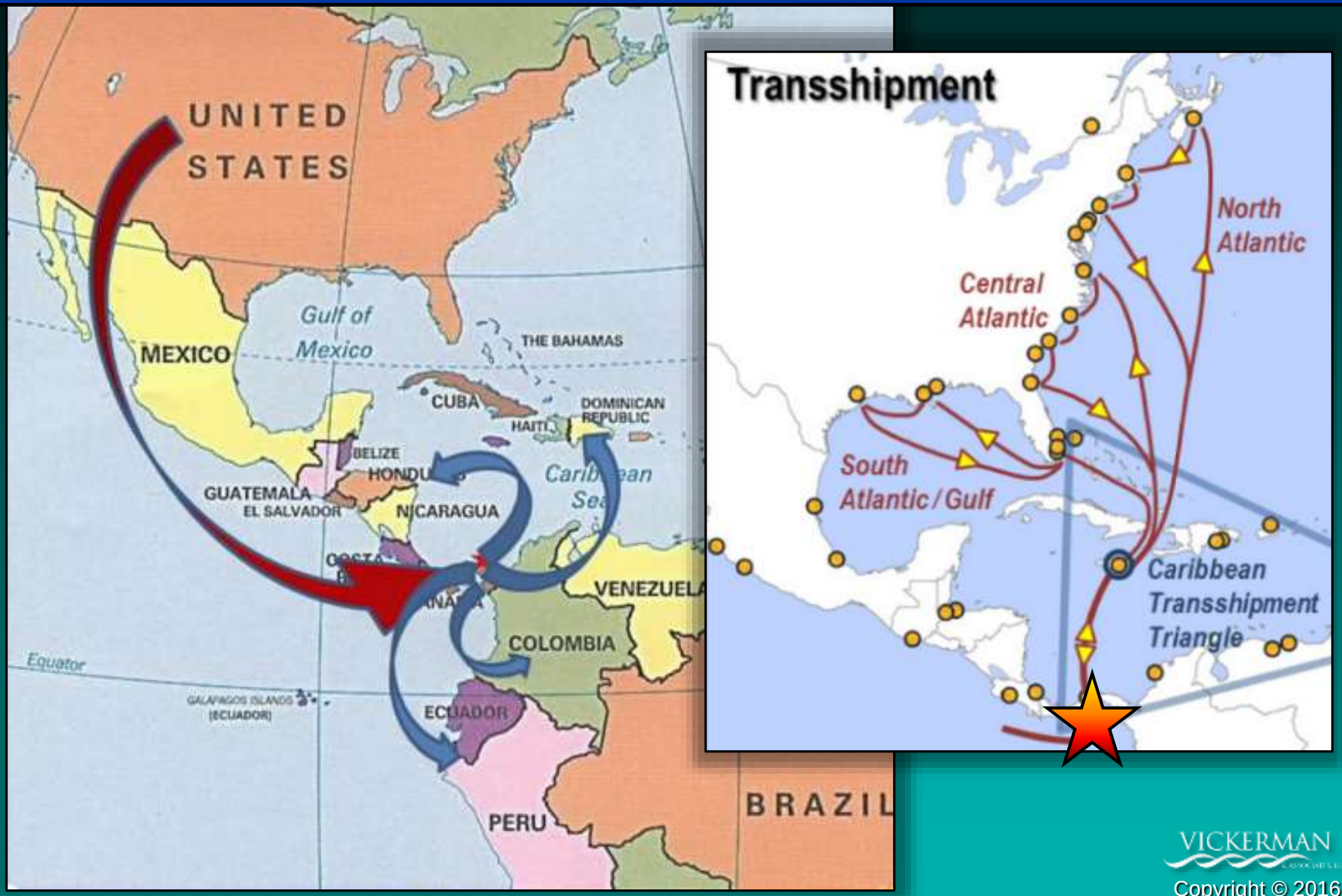
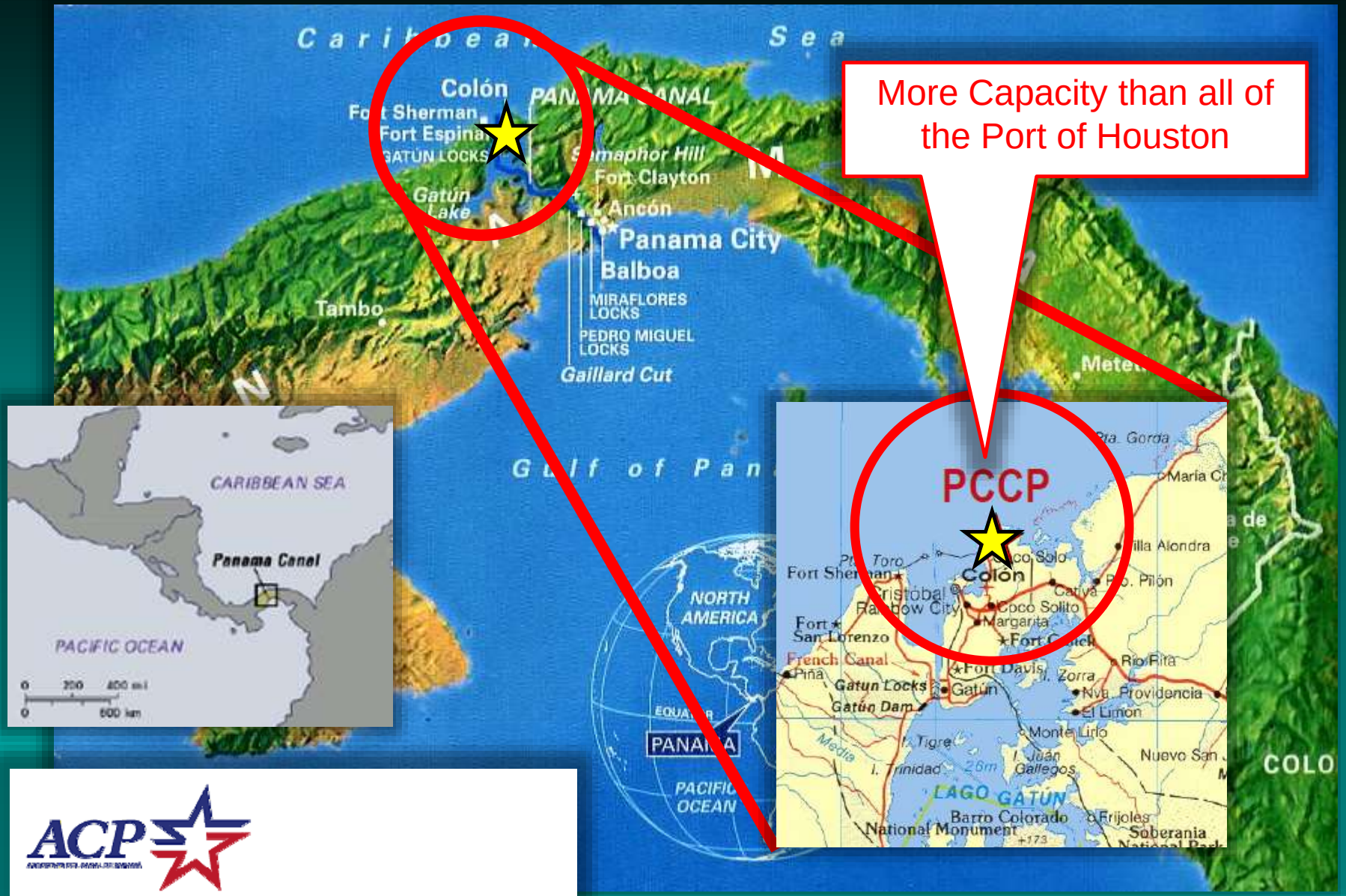
The Panama Canal Expansion Will Move the Caribbean Transhipment Center Point to Panama



New Panama Canal Pacific Entrance Ports

The Autoridad Del Canal de Panama

New Panama Canal Atlantic Entrance Port



The Autoridad Del Canal de Panama

Panama Canal
Large Vessel
US Market Penetration

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The Primary North American Competitor to the Panama Canal is the Class I Rail Intermodal System

(Potential Increased Service Offerings and System Capacity)

Source: USDOT Maritime Administration (MARAD) 2009

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Panama Canal Vessel Deployments Will Determine New US Logistics Patterns

The Distance to New Orleans and Savannah Via the Panama Canal

A Competitive & Robust Landside Access to the Gateway Port's Inland Market will be a Key Success Factor!

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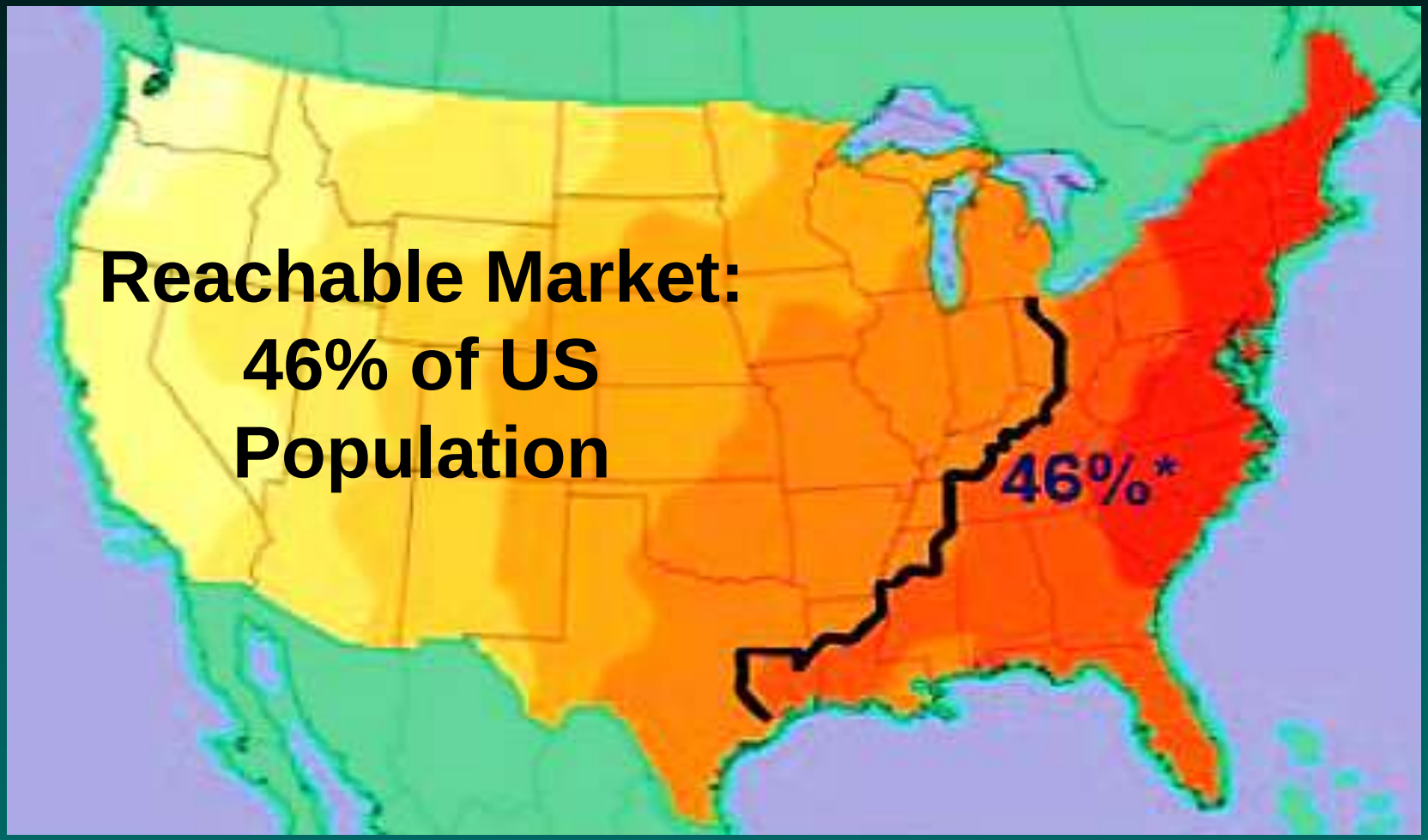
Today's US Market Penetration

Panama Canal Economies of Scale with permit deeper market penetration into the US

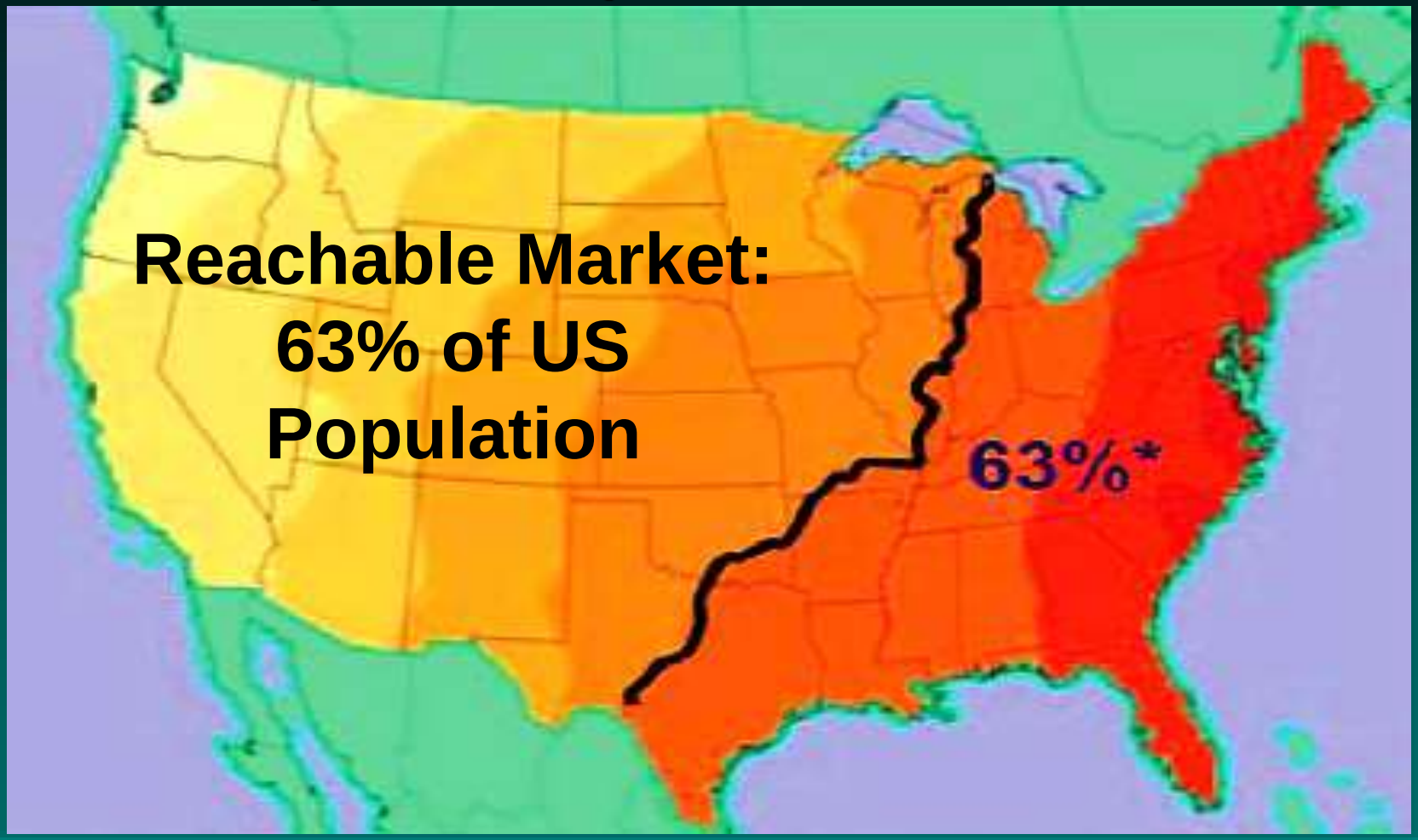


4,000 TEU ship, all-water.

Source: PB Consultants - CSX Transportation May 12, 2011 - Director of Strategic Analysis

Dramatic US Market Penetration after 2016

Panama Canal Economies of Scale with permit deeper market penetration into the US



8,000 TEU ship, all-water.

Source: PB Consultants - CSX Transportation May 12, 2011 - Director of Strategic Analysis

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Dramatic US Market Penetration after 2016

Panama Canal Economies of Scale with permit deeper market penetration into the US

Source: ACP Expansion Project – Rodolfo Sabonge AAPA January 24, 2013

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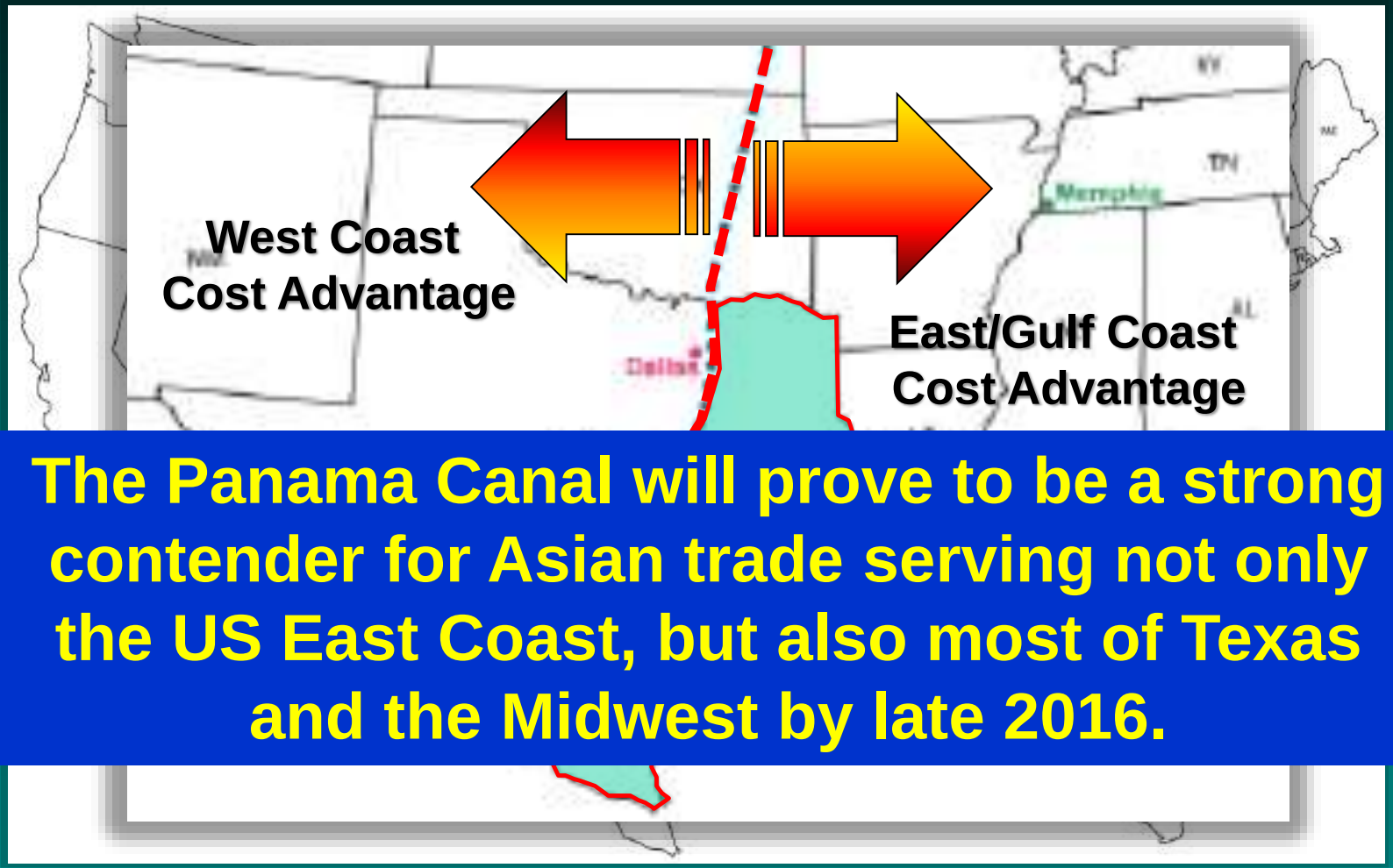
Dramatic US Market Penetration after 2016

Panama Canal Economies of Scale with permit deeper market penetration into the US

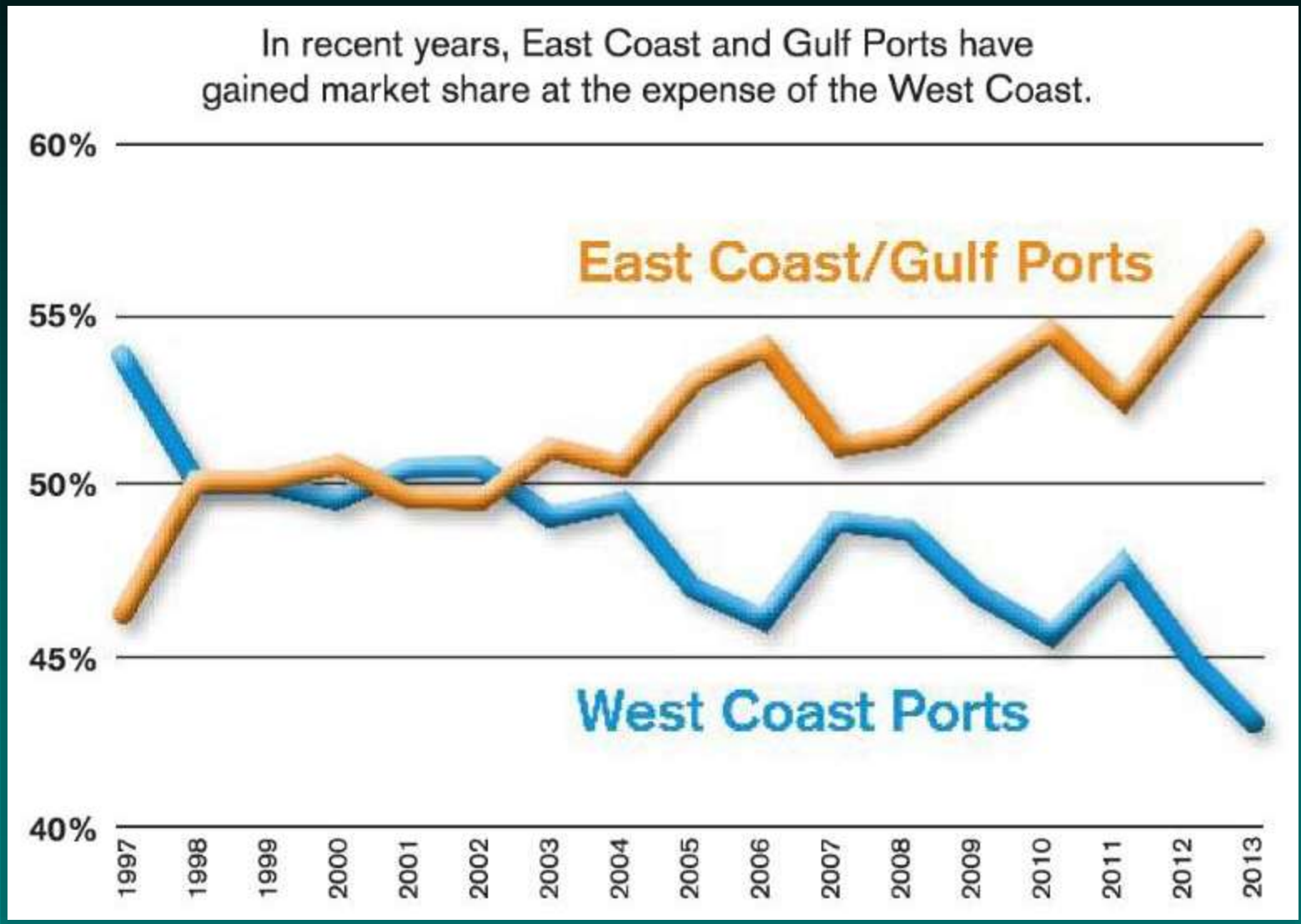


The Panama Canal will prove to be a strong contender for Asian trade serving not only the US East Coast, but also most of Texas and the Midwest by late 2016.

Source: Potential Effects of the Panama Canal Expansion on the Texas Transportation System, Texas DOT, Cambridge Systematics October 2011

Share of US Containerized Cargo – Imports

(US East Coast vs US West Coast Share)



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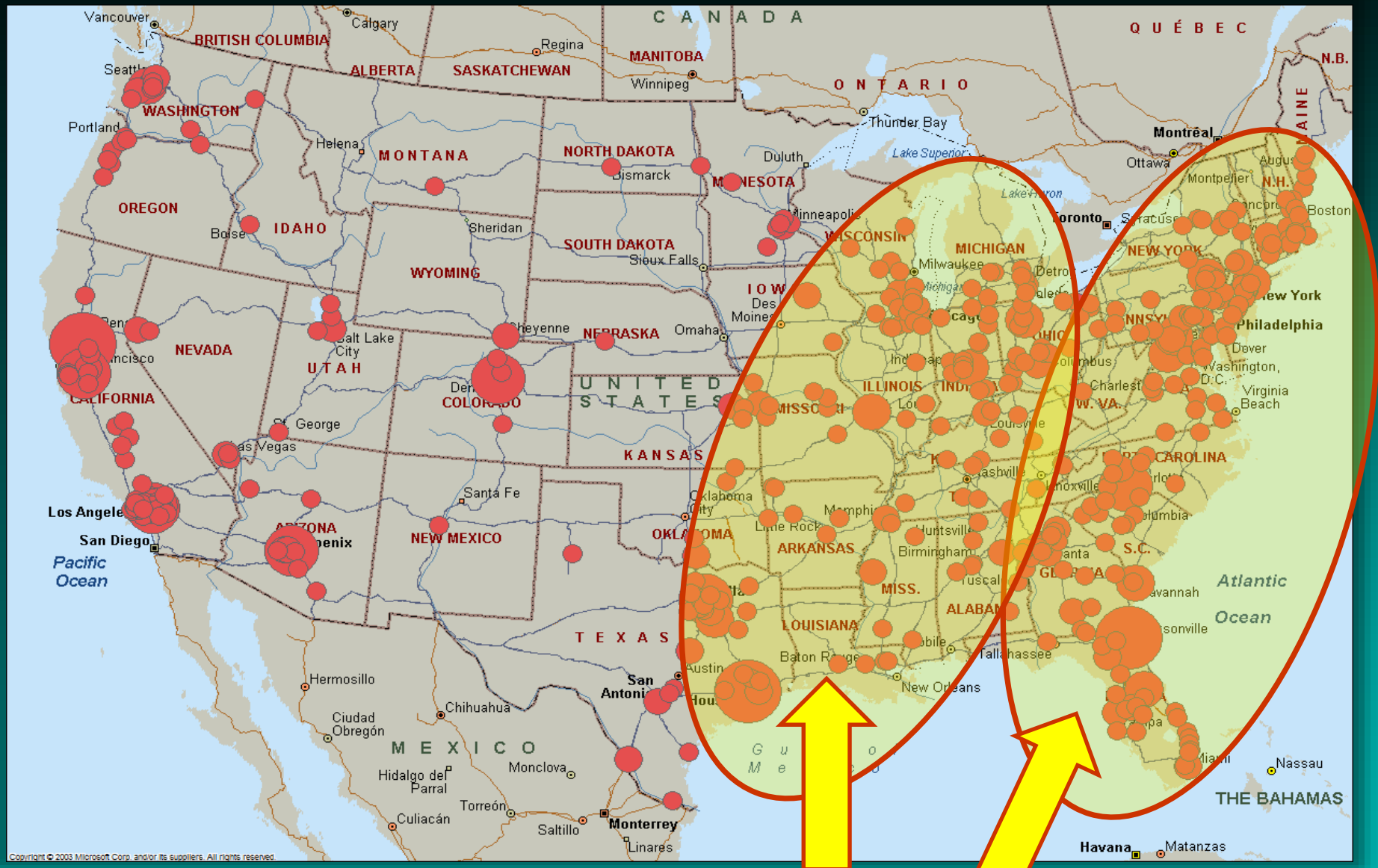
Key US Inland Port & Distribution Centers




NACo
National Association of Counties
Current
North American
Capital Spending
VICKERMAN
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International Gross Fixed Capital Formation as a Percent of GDP

(*US is 32nd in the World - Below OECD Nations*)