



2010 Marine Terminal Management Training Program

SESSION VI: Continuing Evolution of Marine Terminal Design and Cargo Handling Systems

Presented By
M. John Vickerman



Williamsburg, Virginia



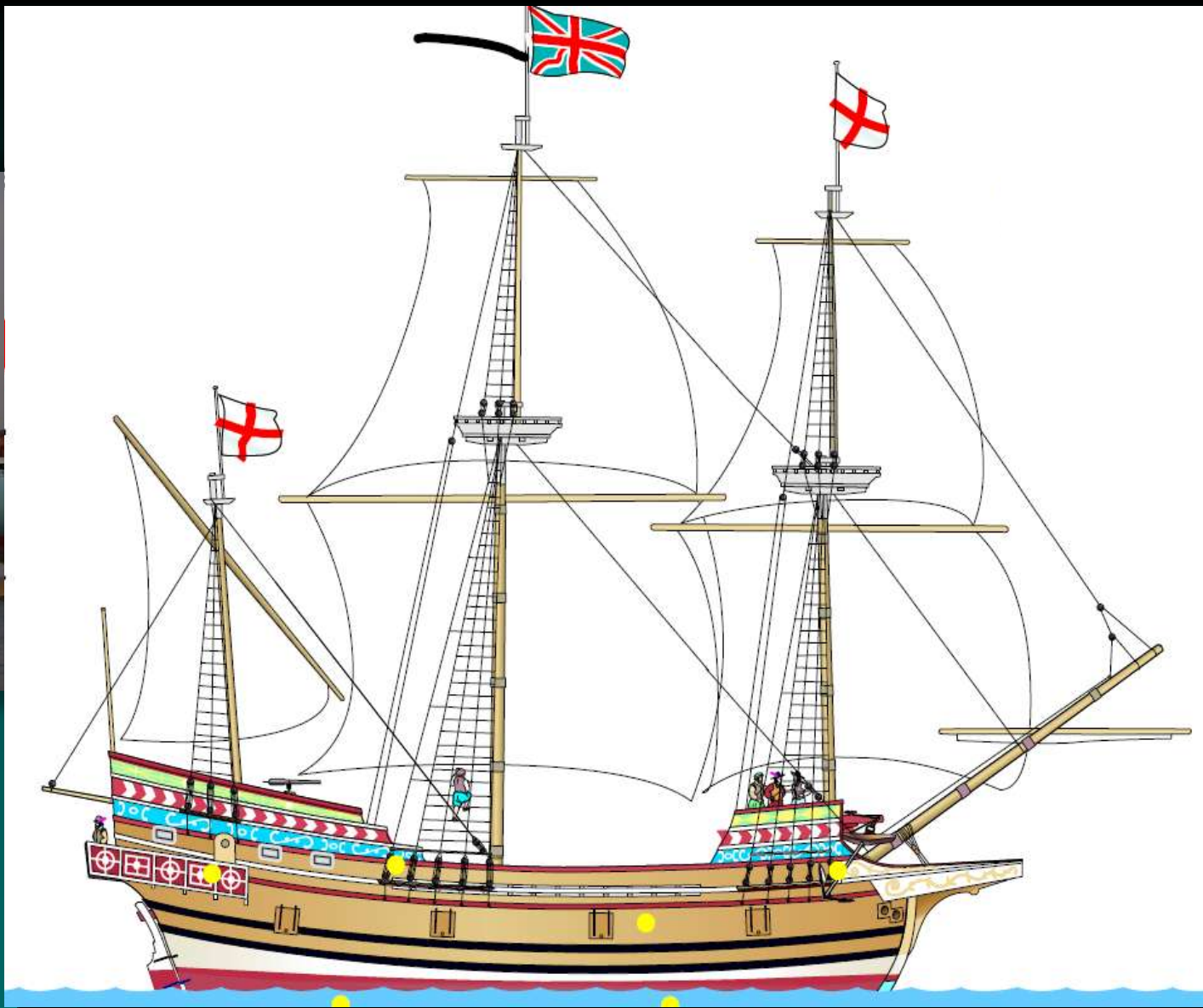
400 Years Ago

A Voyage of Three Vessels Created the First Permanent English Port in Jamestown, VA



*13 Years Before the Pilgrims Landed at Plymouth,
Three Brigantine Vessels of the Virginia Company
of London Landed in Jamestown, Virginia*





Godspeed Brigantine, Circa 1607

Deadweight Tonnage: 40 tons

LOA: 88 feet; Crew: 13



Vessel Cargo Handling Circa 1955






Cargo Handling Circa 2009

US Navy Fast Frigate Circa 2045





**What We Know
Today... Will Be
Surely Be Different
Tomorrow!**



International Port External Industry Pressures Driving Today's Logistics

A large container ship is shown from a high-angle perspective, sailing on a turbulent sea with white-capped waves. The ship's deck is visible, covered with stacks of colorful shipping containers. The ship's superstructure, including masts and cranes, is prominent against the overcast sky. The overall scene conveys a sense of maritime activity amidst challenging weather conditions.

***The Sea State of Trade Is
Dramatically Changing...***


***The More It Changes....
The More It stays The Same***

Global Trade: Current Course & Direction?

*Financial Global Meltdown,
Cargo Demands,
System Capacity, Funding,
Port Productivity &
Environmental Concerns*

*North American
Port Gateways*

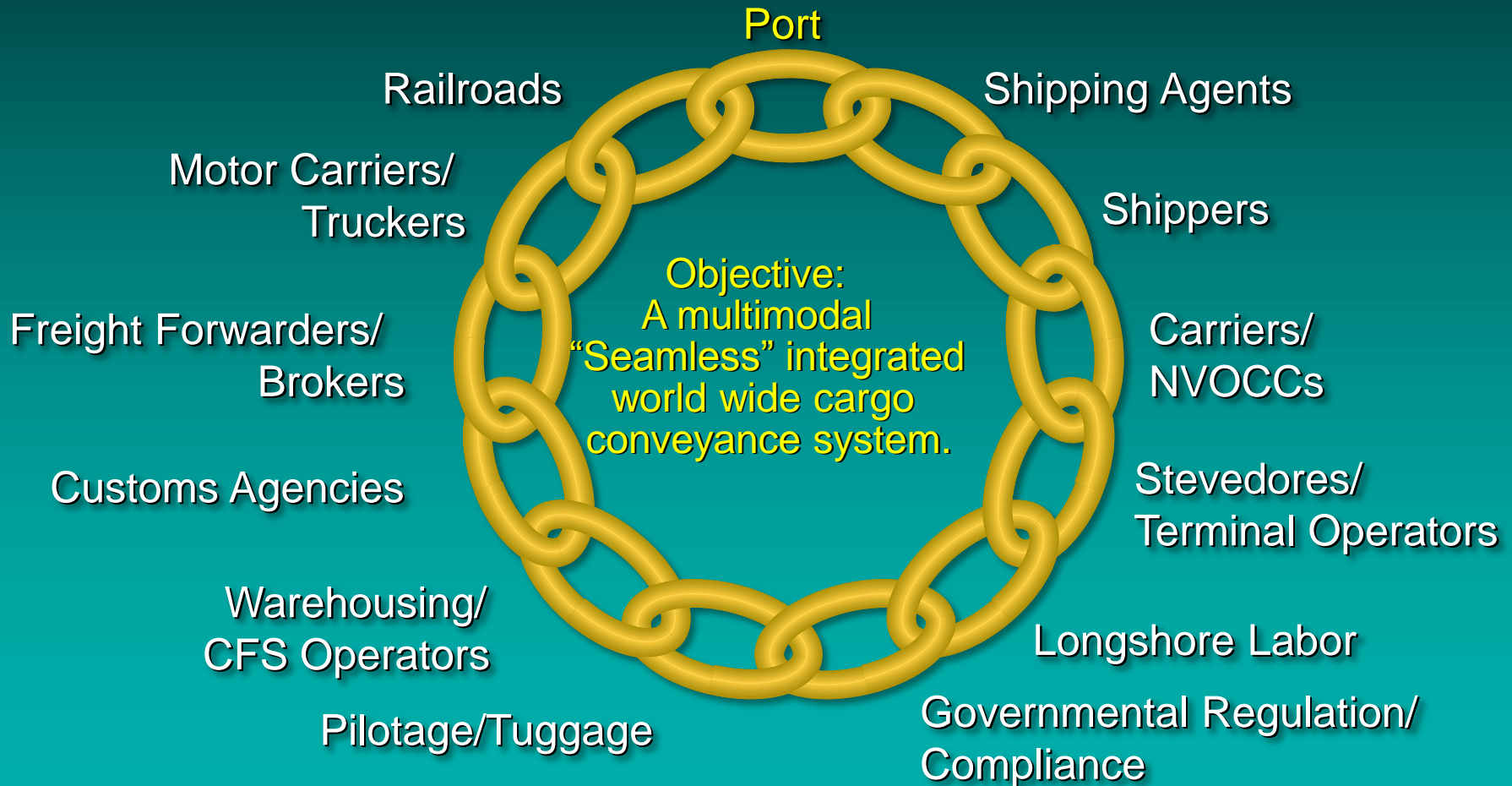




To Be Competitive Today...
Marine/Intermodal
Terminals Must Reduce
Throughput Cost &
Increase Cargo Velocity
Securely and as Stewards of
the Environment

The "Port"

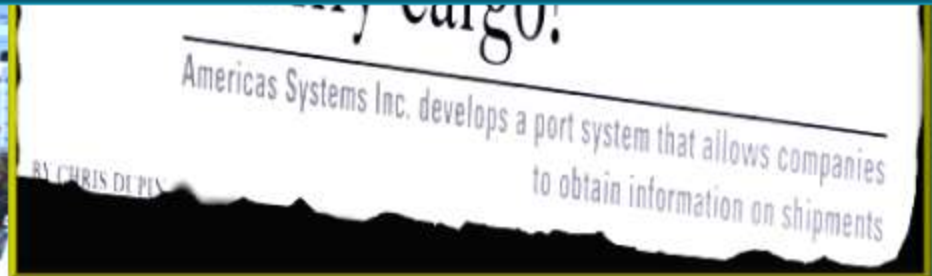
One of the Many Diverse Constituencies in the Cargo Transportation Logistics Chain



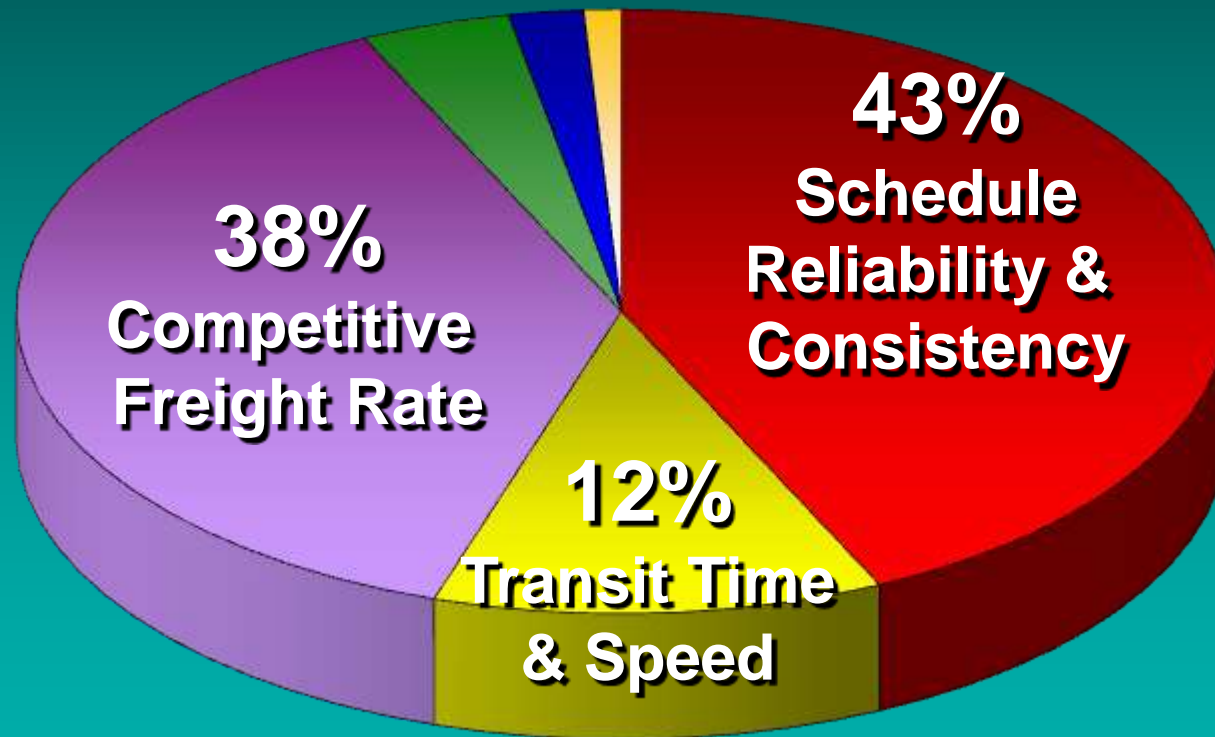


**At Current Productivity and Growth Levels by
2020**

**North American Ports & Their Associated
Intermodal Systems Will Be Severely Congested.**



Poll of the Top 1000 “Blue Chip” Multinational Shipper Priorities



Today's Logistics Truth:

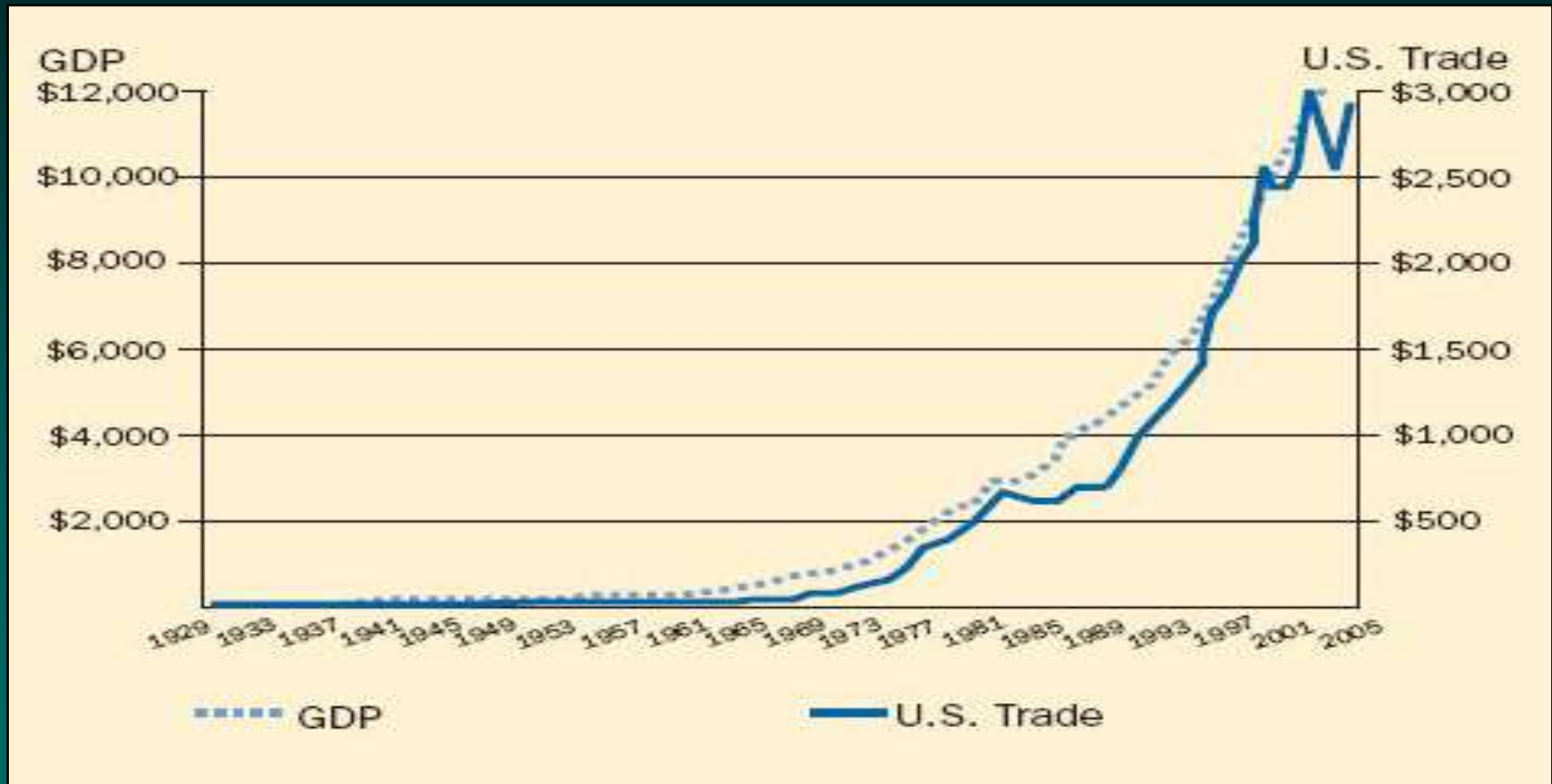
*“The customer
wants **more** and
is willing to pay
less for it.”*



International Maritime Cargo Demand Trends

Relationship Between US Trade and US Prosperity

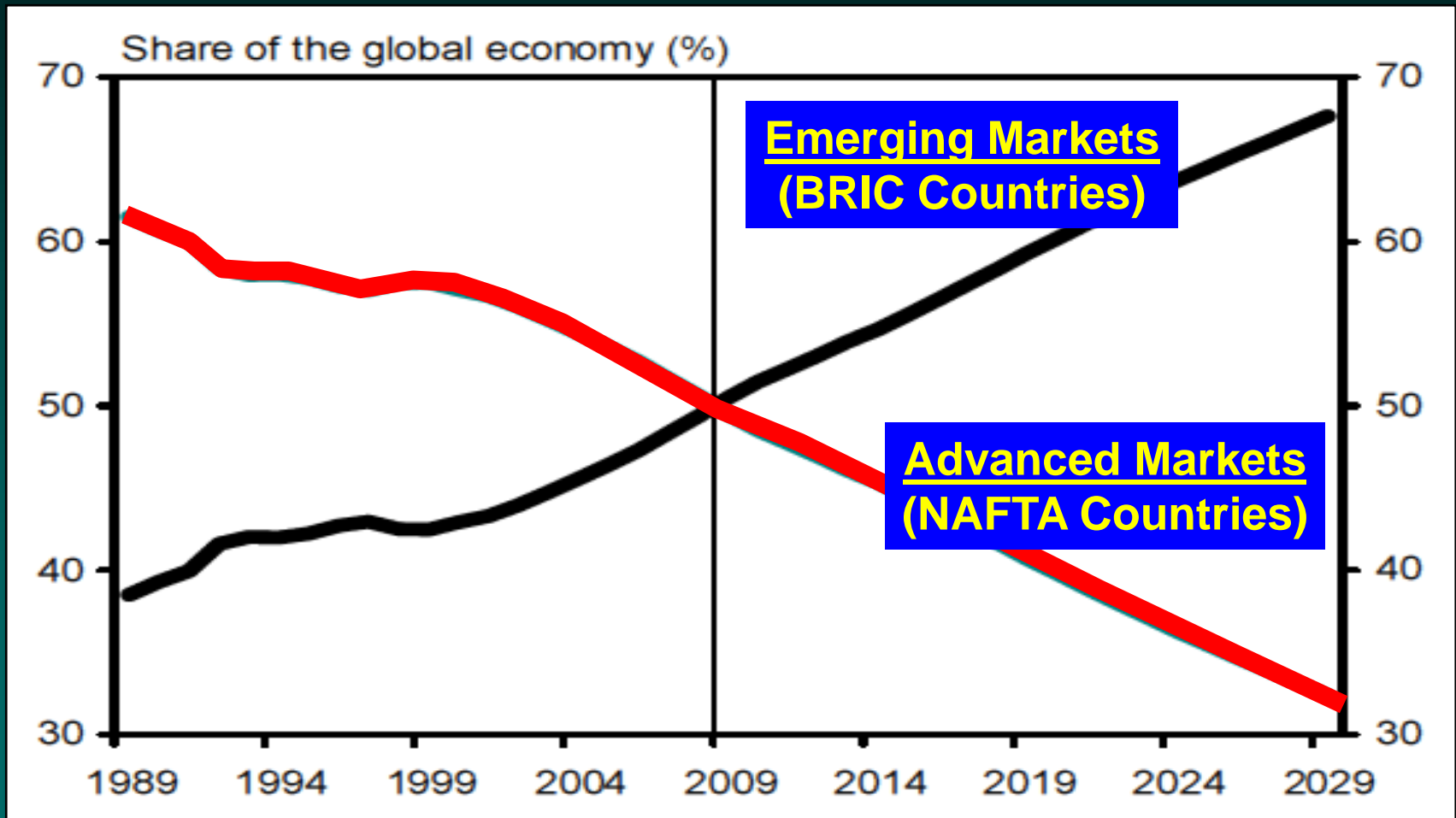
(US Trade & Gross Domestic Product - \$ Billions)



Source: USDOT Based on USDOC Data

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...

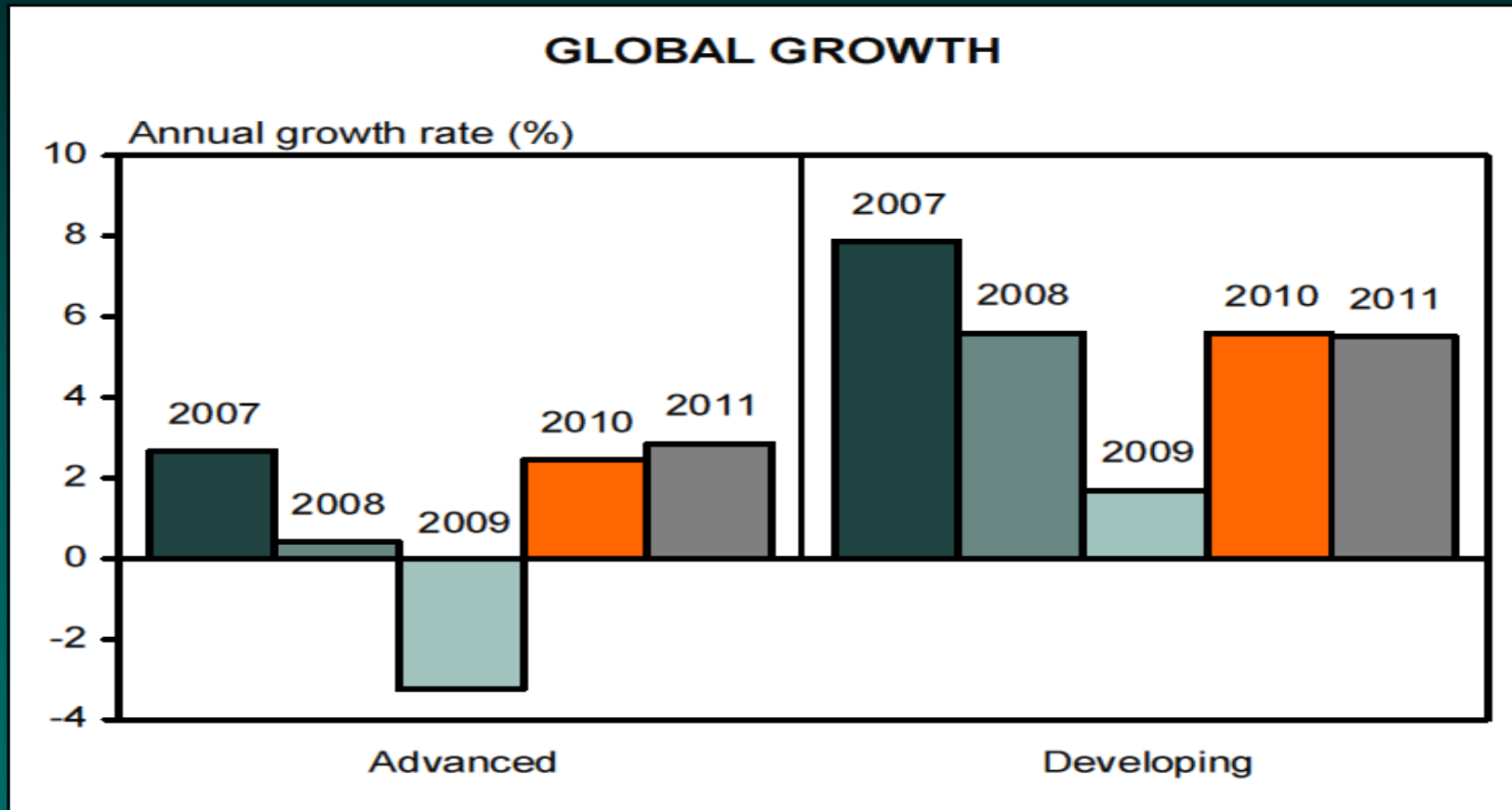


Source: IMF - Forecast by TD Economics, December 2009

Advancing vs. Developing Countries

Global Growth Rates

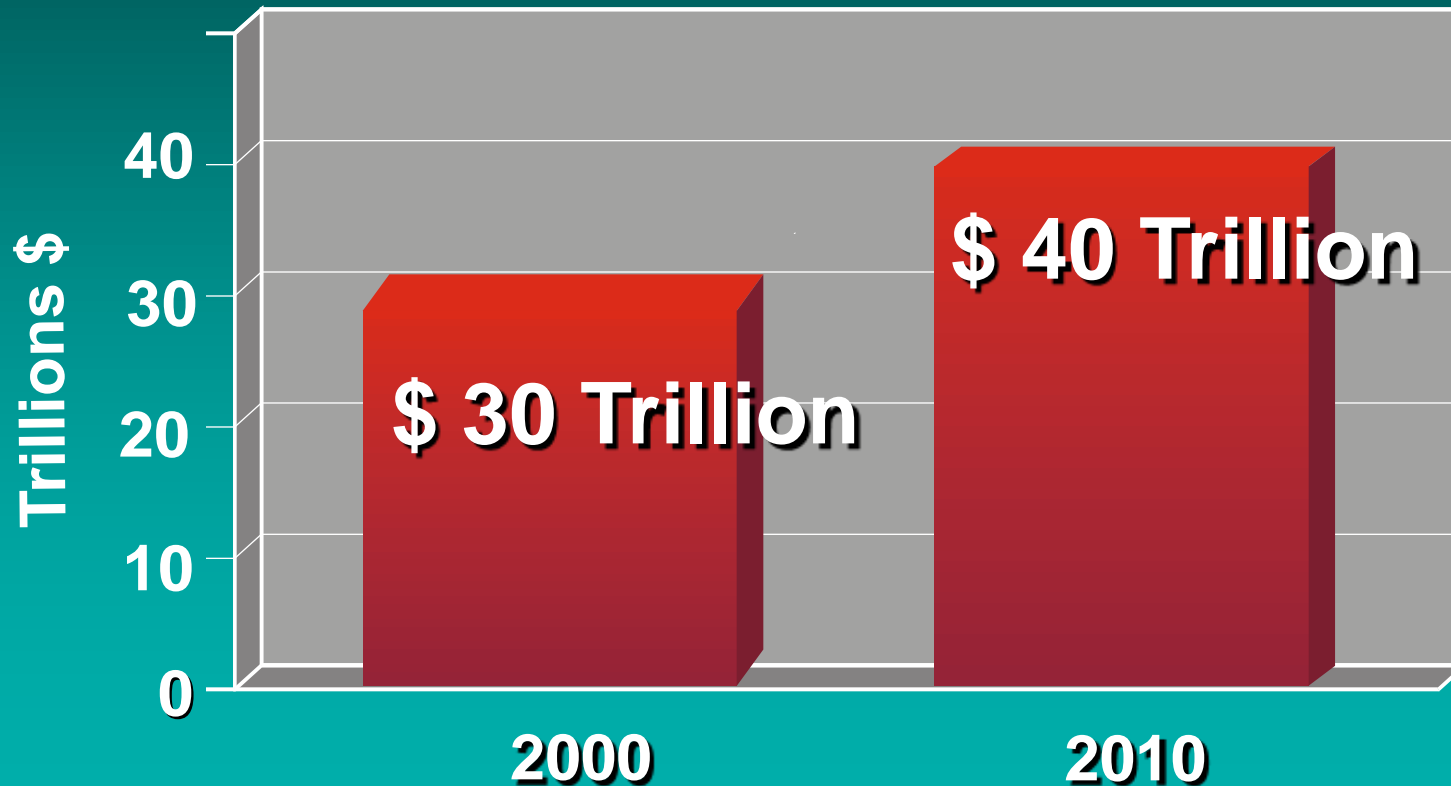
The “*Great Recession*” Appears to Have Ended at the End of 2009.
Initial Indicators Point to a World Economy Expected to
Expand by 3.8% in 2010/2011



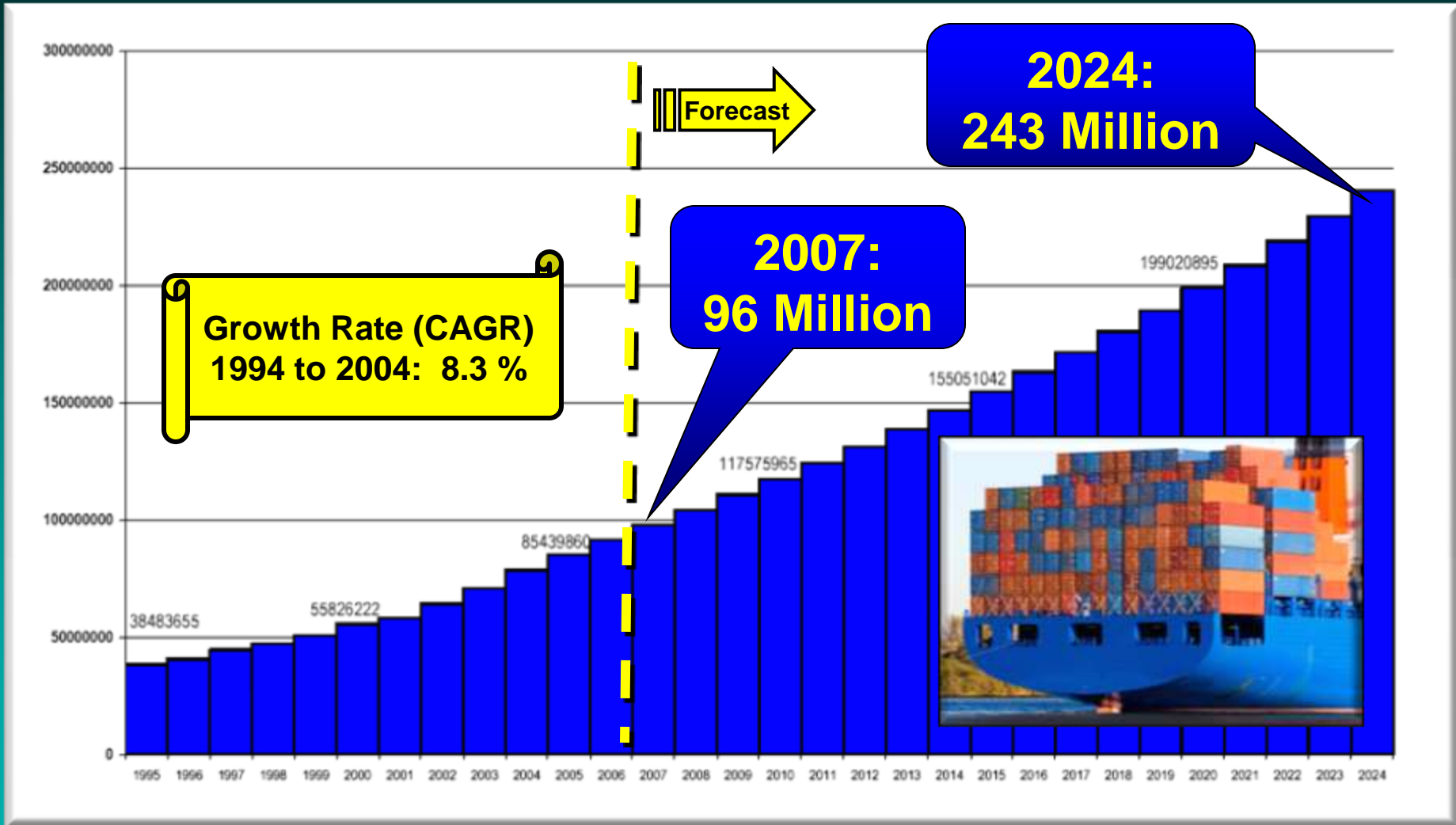
Source: IMF - Forecast by TD Economics, December 2009

World Bank's 2010 "Global Economic Prospects"

World Output will Increase 33% in 10 years



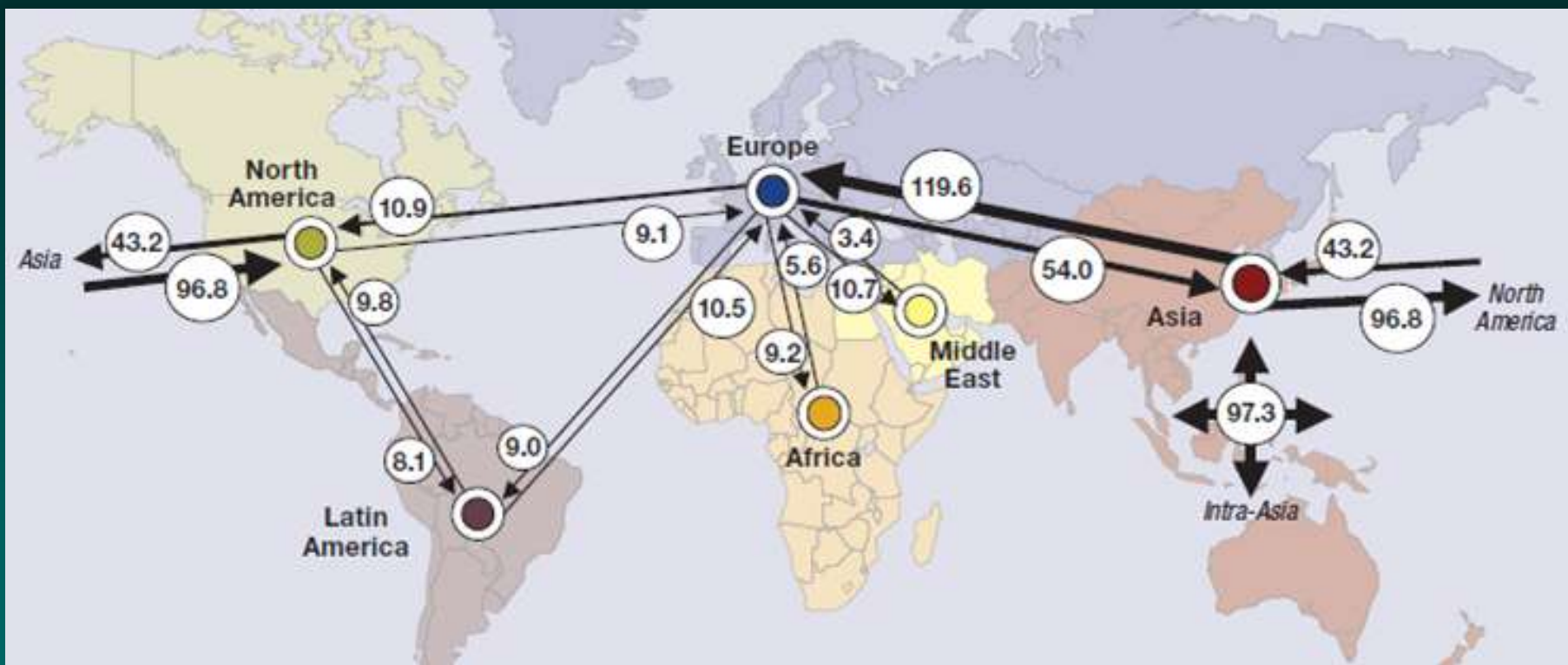
World Container Forecast to 2024 in TEUs (186% Increase in Next 20 Years)



Source: Global Insight

Primary Containerized Ocean Freight Flows

(Billions of Laden FEU-Kilometers, 497 Flows)

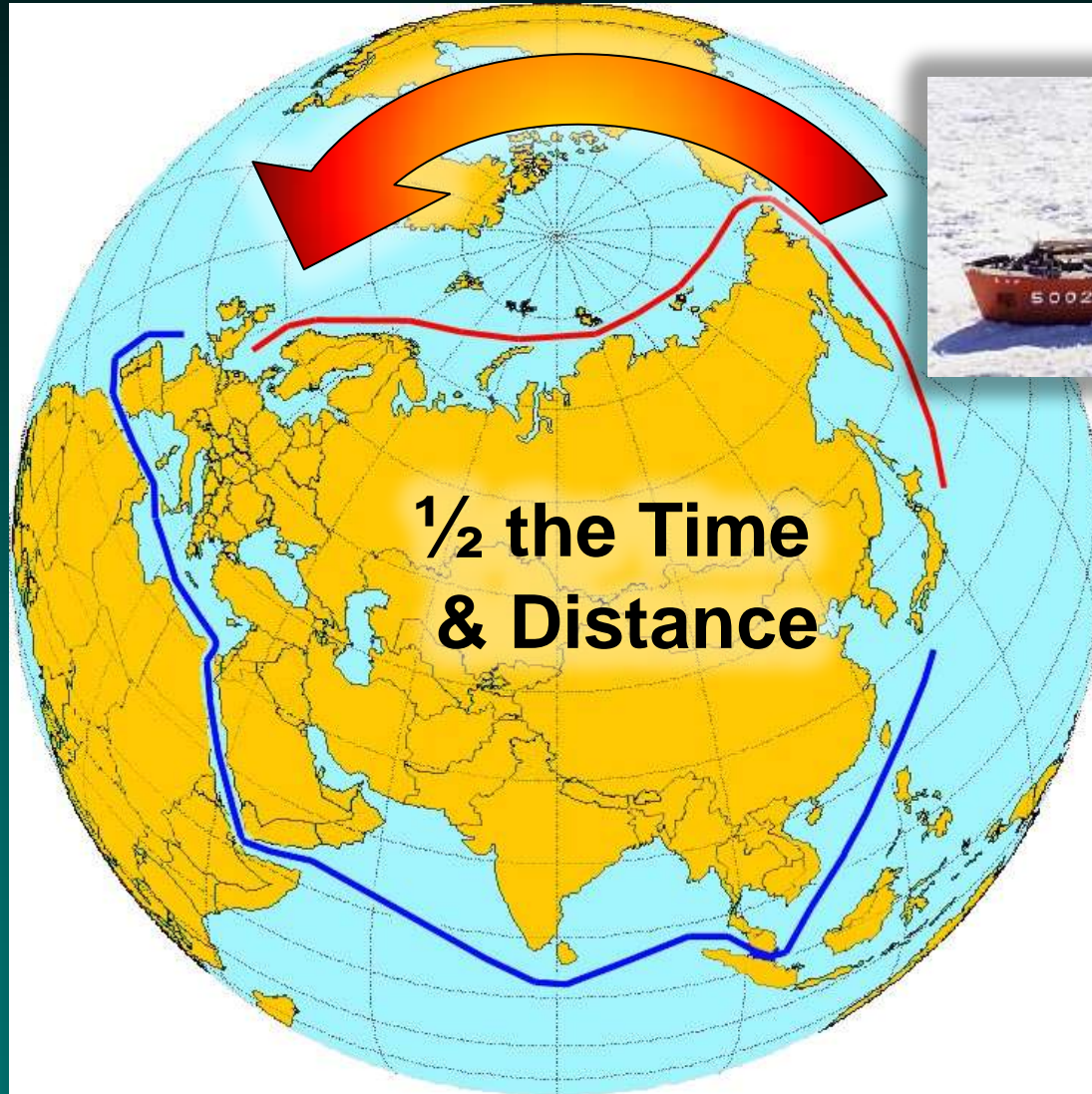


One FEU-Kilometer = a 40 foot container transported one Kilometer

Source: American Shipper July 2009 – MergeGlobal SeaFlow Model

Shorter –Faster Arctic Ocean Route

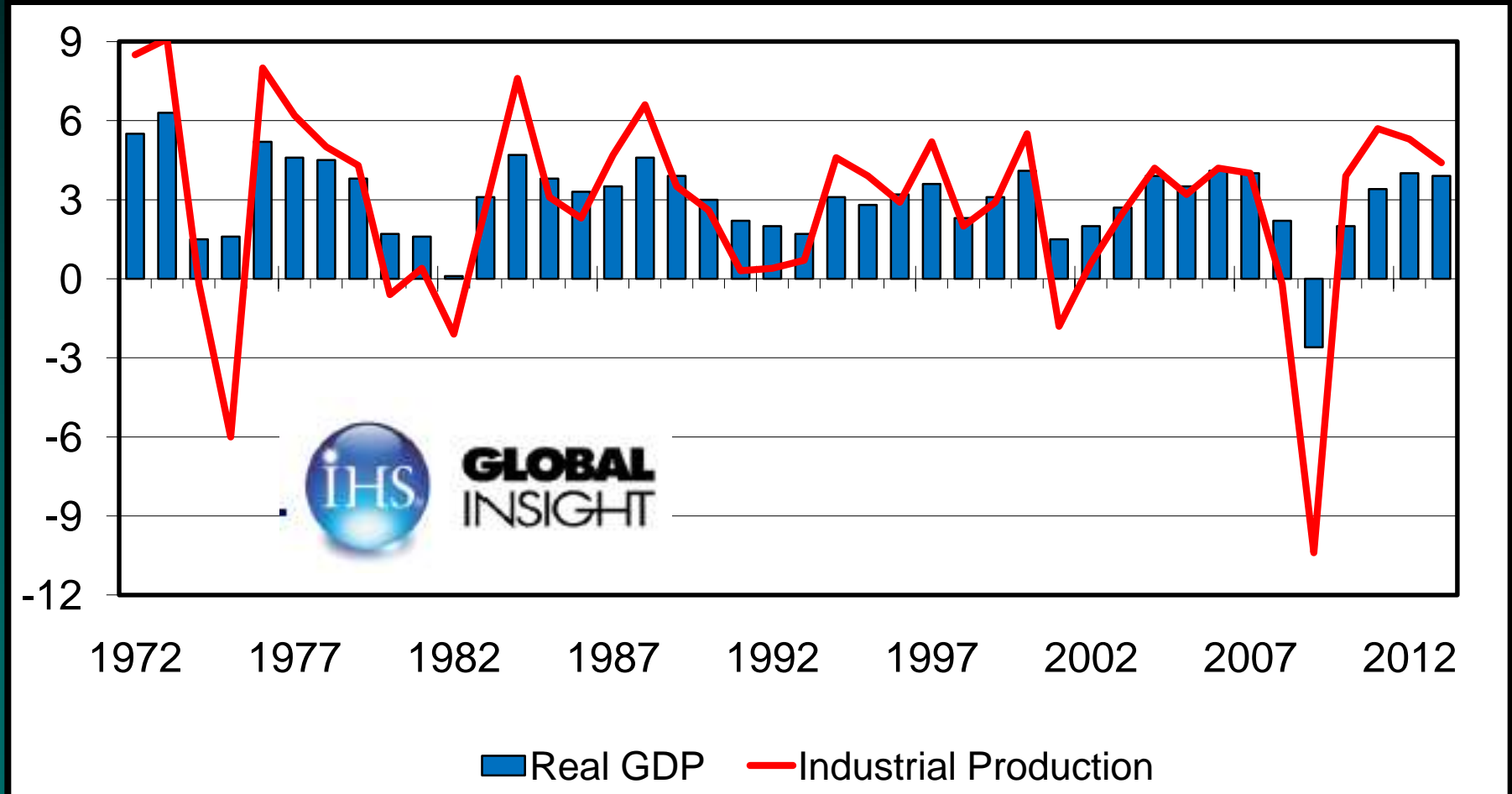
2+ Months A Year Using Convoys



Global Financial & Trade Growth Recovery: A 2011 Reversal?



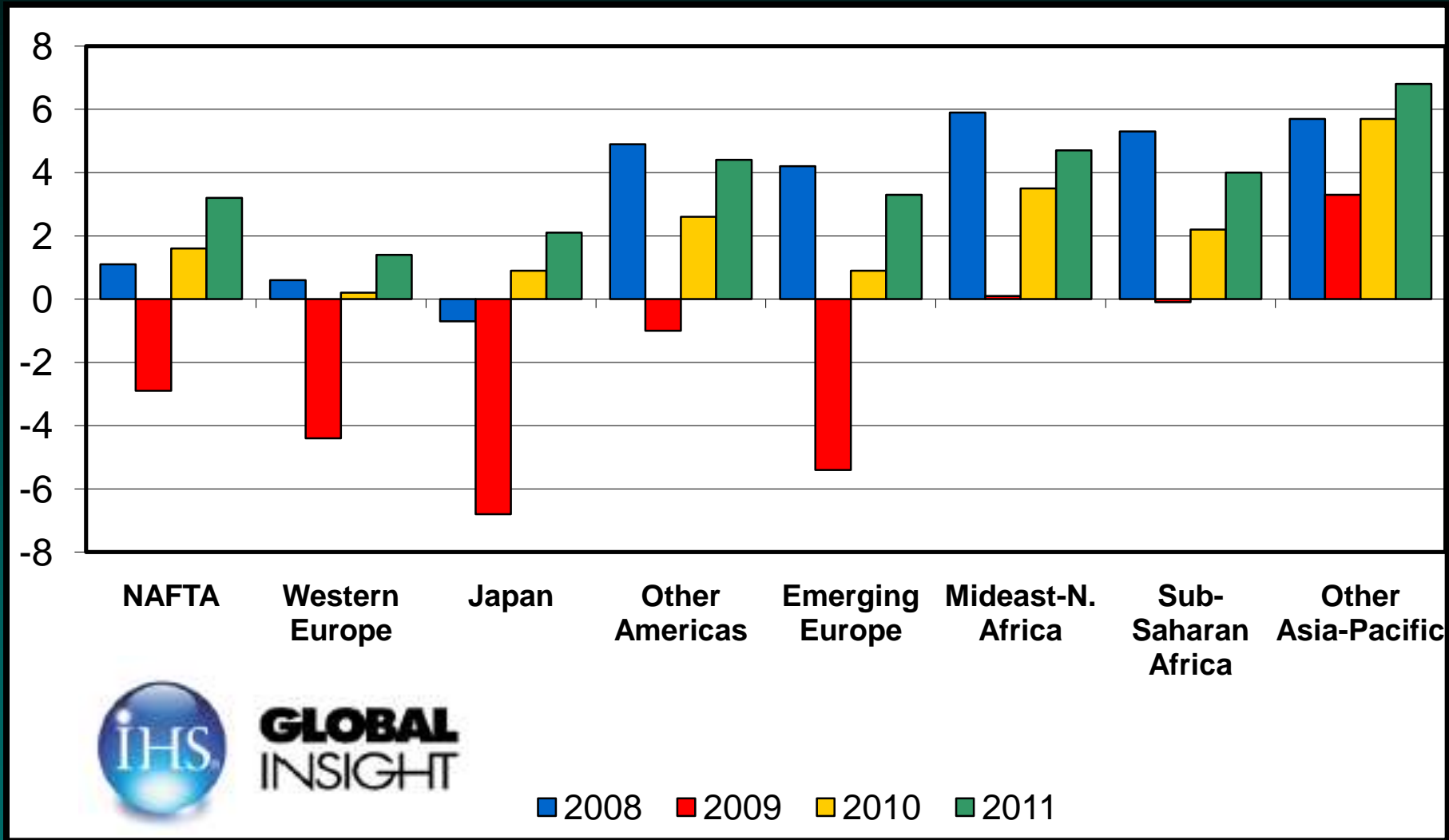
The World Economy Has Suffered the Worst Recession of the Postwar Era (Percent Change)



Source: IHS Global Insight

Economic Performance Varies by Region

(Real GDP, Percent Change)



**GLOBAL
INSIGHT**

■ 2008 ■ 2009 ■ 2010 ■ 2011

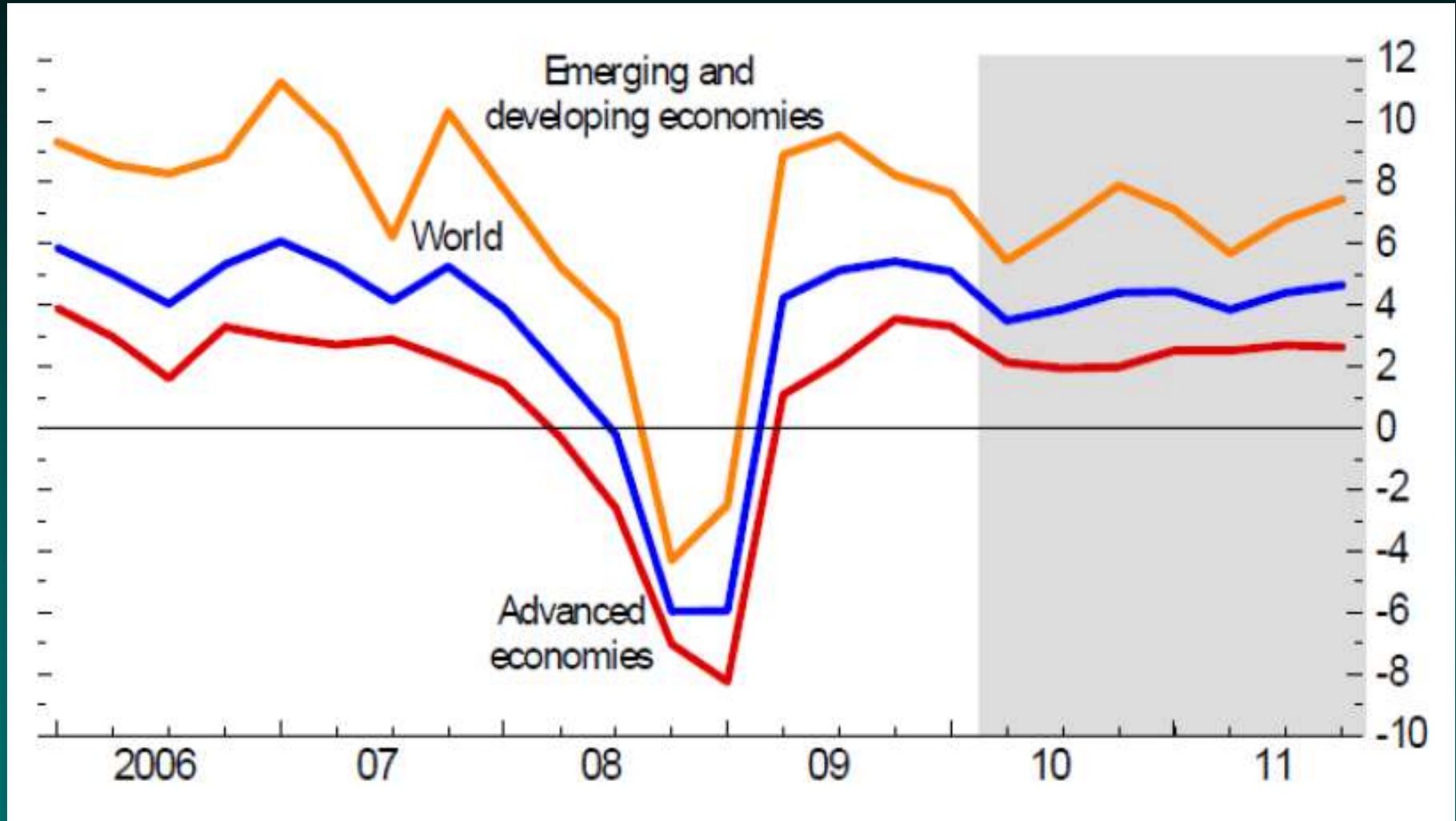
Source: IHS Global Insight

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IMF World Economic Outlook – July 2010

(%; quarter-over quarter, annualized)

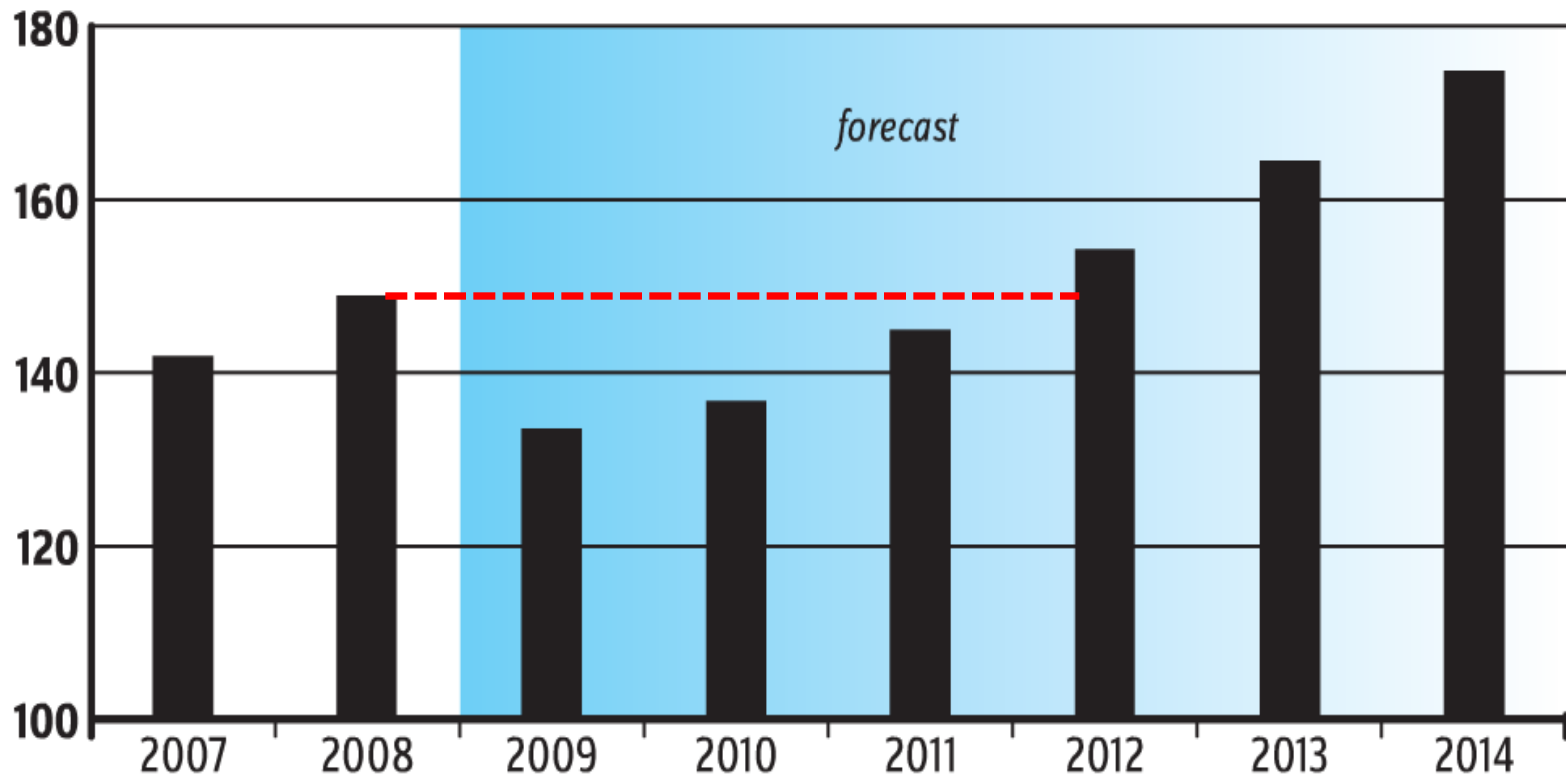


Source: IMF Staff Estimates

World Container Growth Forecast

(Including full & Empty Containers, Port to Port, and Transshipment Volume in Millions of TEUs)

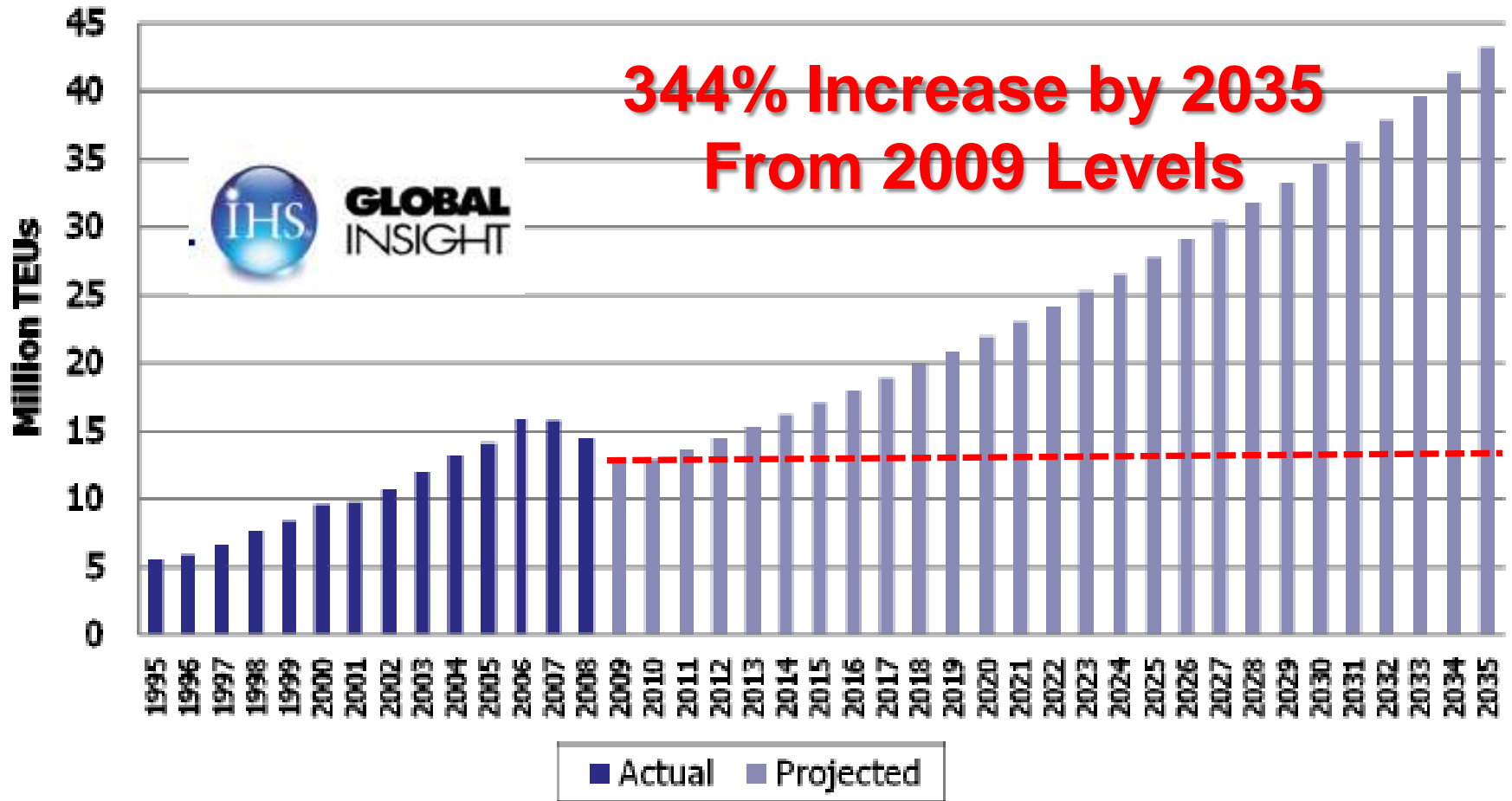
Drewry estimates worldwide container volume will surpass the 2008 level in 2012.



Source: Drewry Shipping Consultants



San Pedro Bay (POLA +POLB) Container Volume Forecast



Annual Growth Rate in Recovery Averages Around Five Percent

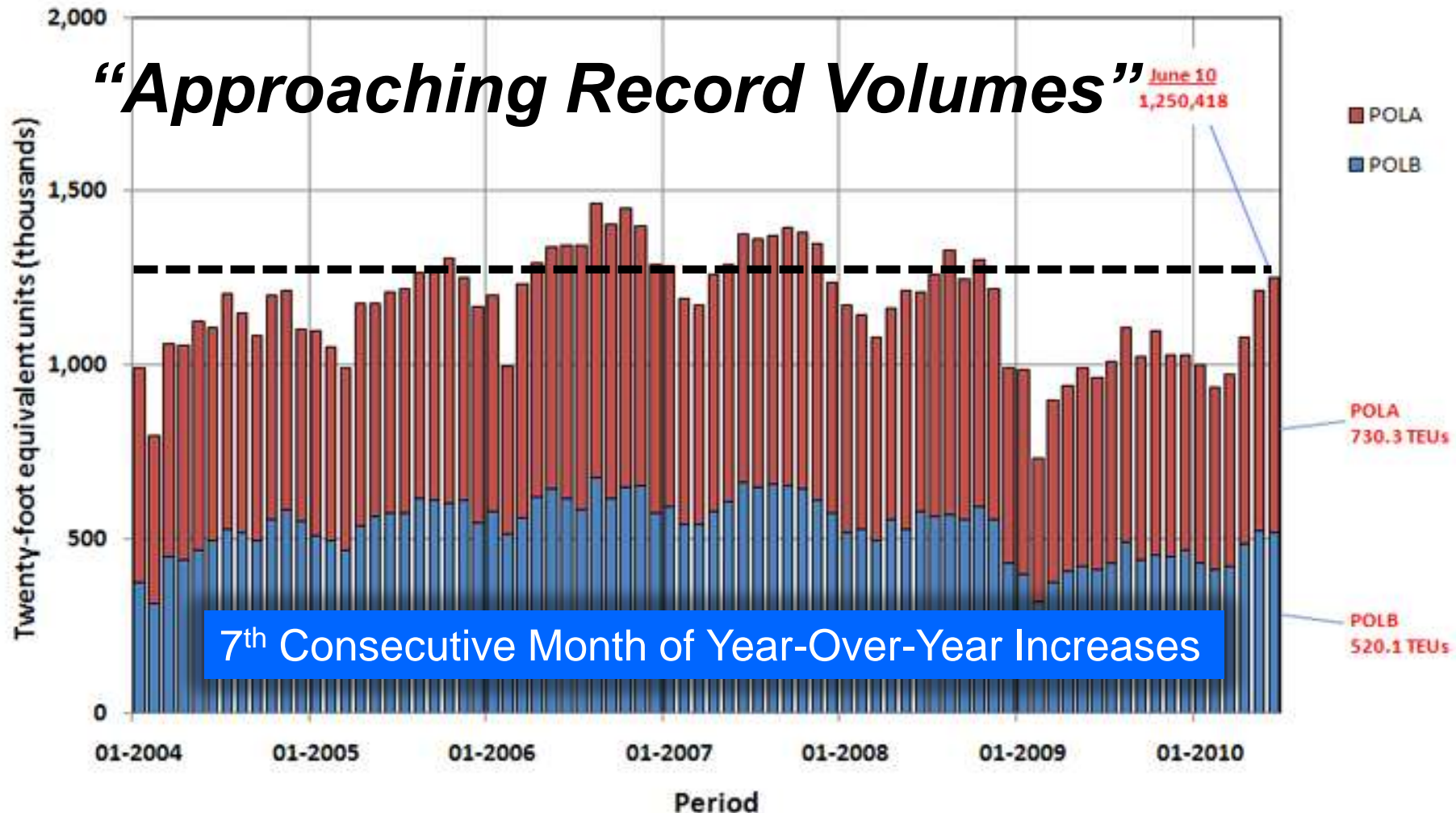
Source: HIS Global Insight 2010 Forecast



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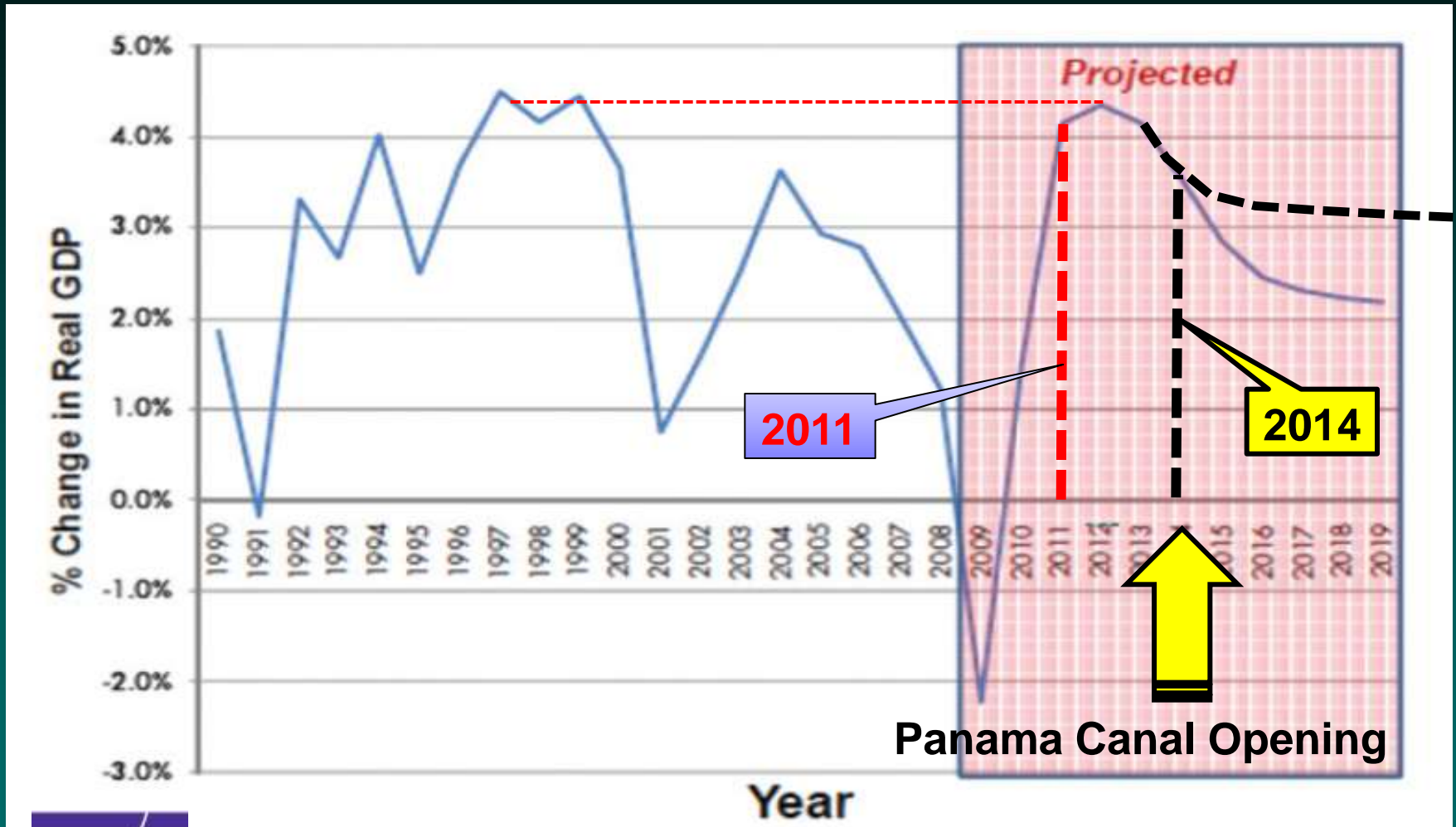


San Pedro Bay (POLA + POLB) TEU Container Traffic 2003 to 2010



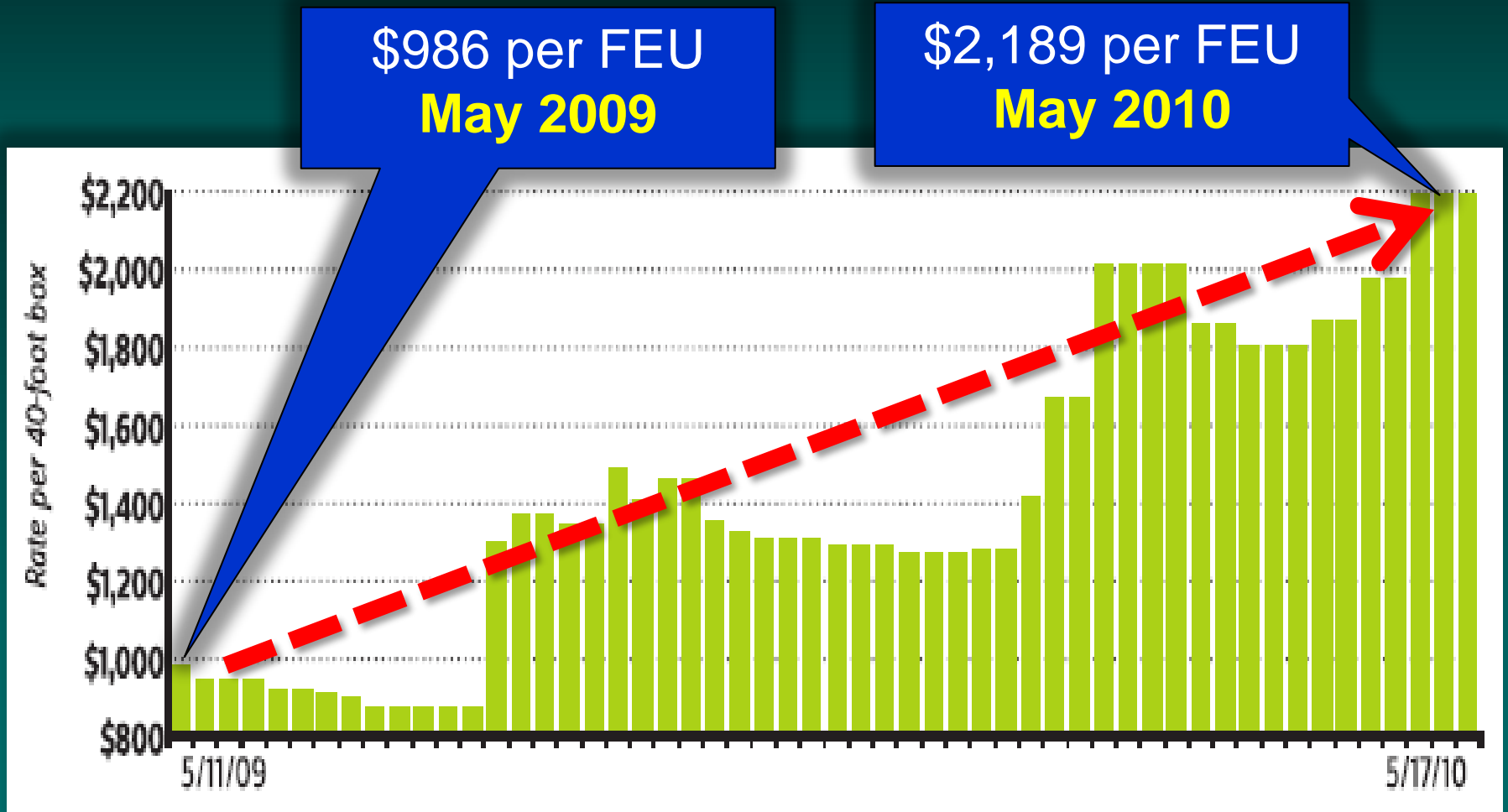
Source: Ports of Long Beach and Los Angeles

Congressional Budget Office (CBO) Forecast Percent Change in Real GDP – June 2009



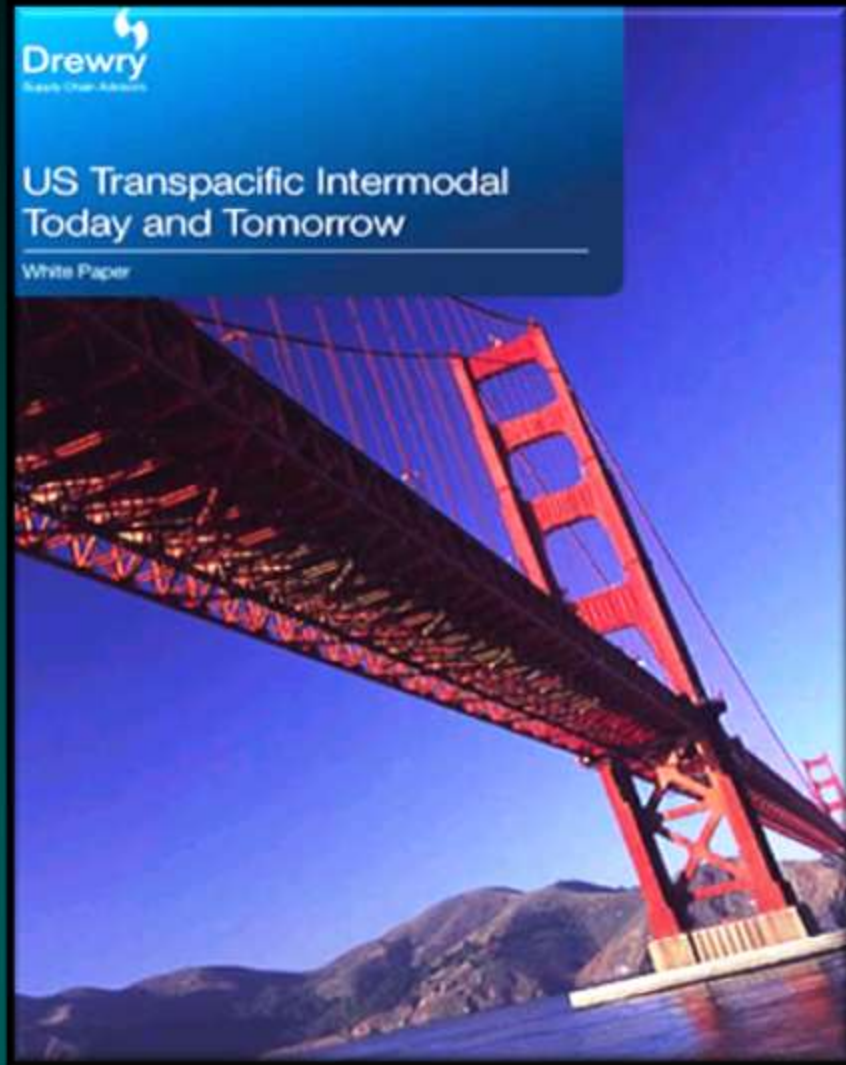
Source: Rand Corp. Fast Forward –
Key Issues in Modernizing the US Freight Transportation Systems

2009 - 2010 Container Rate Benchmark (Average FEU Spot Rate in US Dollars)



Source: Drewry Shipping Consultants [Journal of Commerce May 24, 2010

New Market Shift For North American Ports

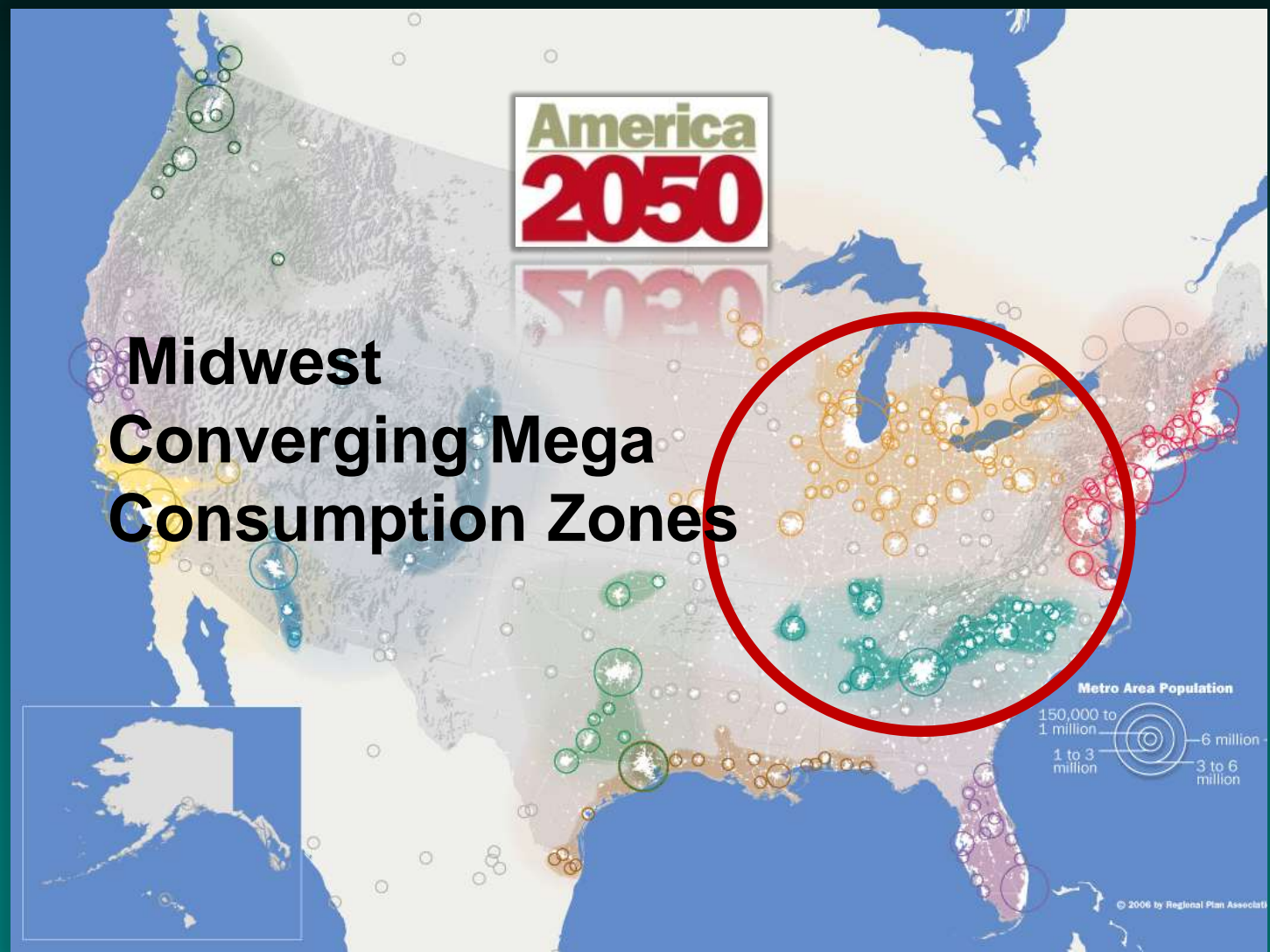


After Years of Dominating North American Maritime Trades, US West Ports are Threatened...

Converging Economic Forces Now Favor Growth of the Gulf and East Coast Ports for Asian Trade via the Midwest!

North American Emerging Mega-Regions

Future US Growth Areas



**Midwest
Converging Mega
Consumption Zones**

Source: America 2050 Prospects - Regional Plan Association



Recently Moody's Revised Its Outlook for the US Port Industry From Stable to NEGATIVE!

Moody's noted that for "ports serving significant levels of *discretionary cargo to Midwest Markets*, competition has few geographic barriers as intermodal flexibility, rail rates, and volatile bunker fuel prices play into the relative cost structure."



Moody's Investors Service



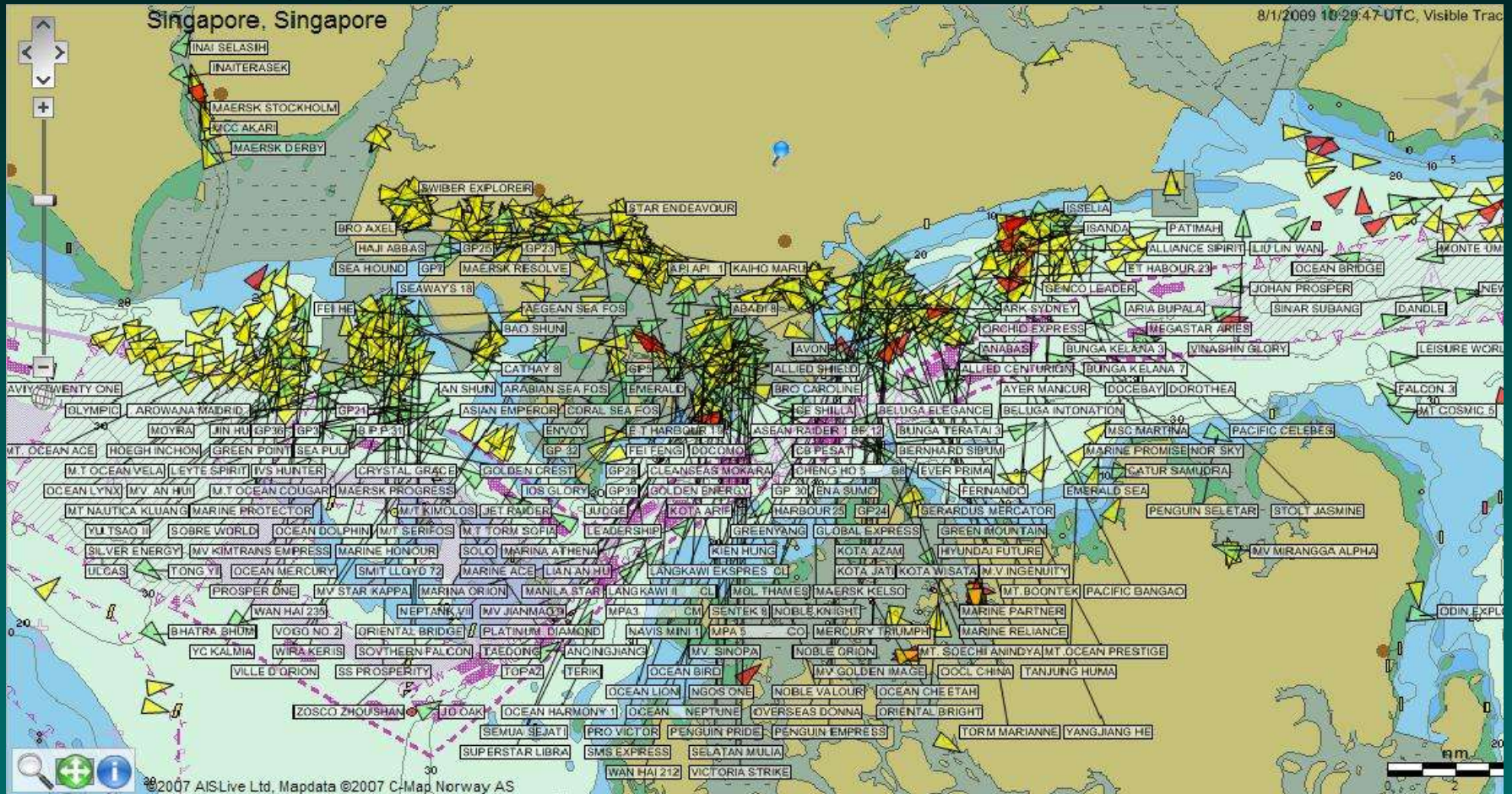
Moody's | Economy.com

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Essence of World Economic Crisis

Empty Idle Ships in Singapore Harbor January 9, 2009 AIS Ship Position Plot



Source: January 9, 2009 Spore AIS Ship Position

Essence of World Economic Crisis

Empty Idle Ships in Singapore Harbor

10% of the World Fleet

***A 10.4 Million TEU Container Fleet
...At Anchor!***



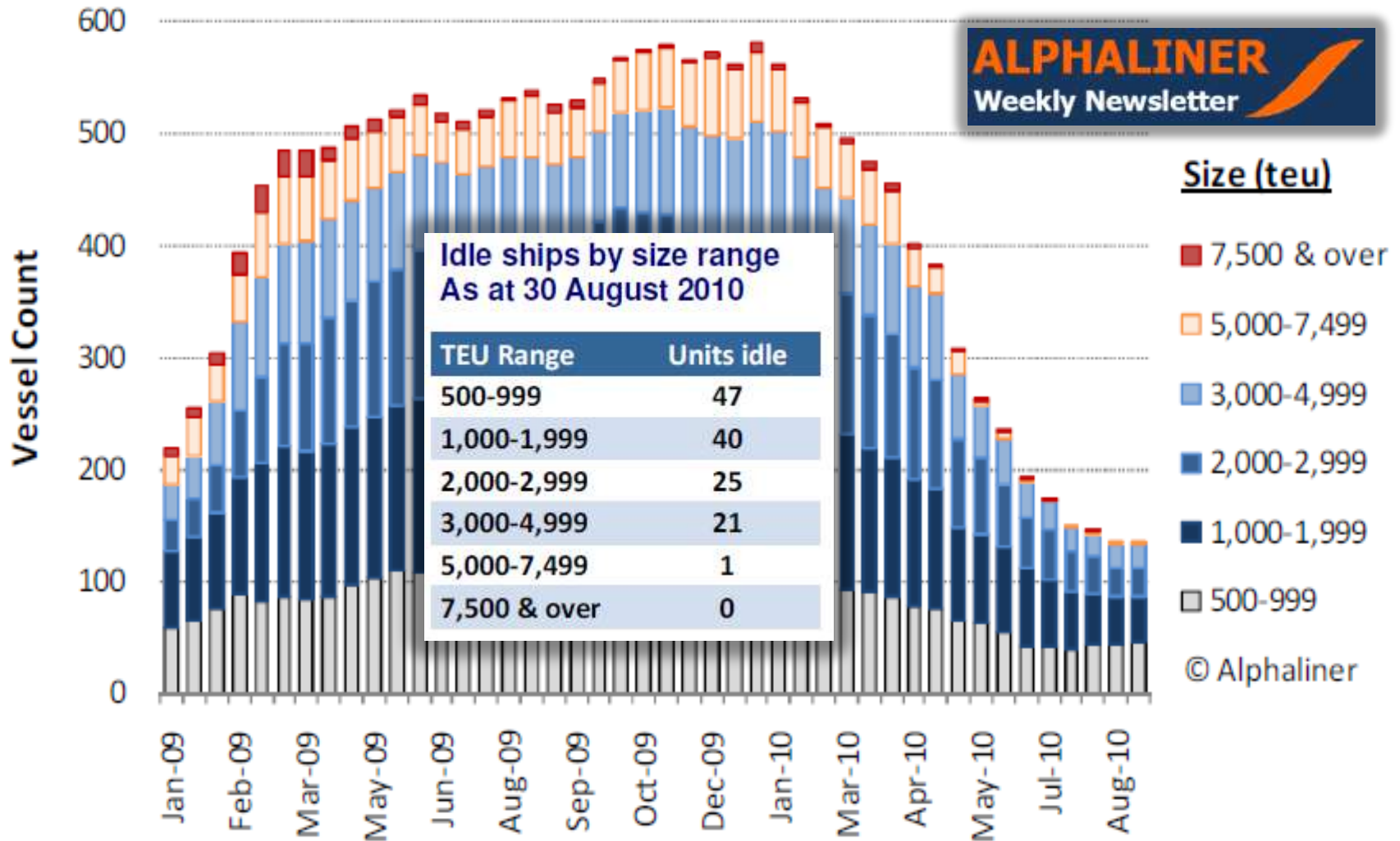
Source: February 20, 2009 Aerial Photo

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Idle Containerships by Size Range

(Rapid Reduction Currently Stands at 1.7% of Total Capacity)



Source: Alphaliner Newsletter August 30, 2010



The Growing Asian Import Trade Challenge

Global Market Economic Shifts (Country GDP Rank)

	2000	2010	2020	2030	2040	2050
#1	USA/CA	USA/CA	USA/CA	USA/CA	USA/CA	CHINA #1
	Japan	Japan	CHINA	CHINA	CHINA	USA/CA #2
	Germany	Germany	Japan	Japan	INDIA	INDIA #3
#5						
#6						
#7						
#8	Brazil	INDIA	Russia	France	Germany	Germany
#9	INDIA	Russia	Italy	Brazil	France	France
	Russia	Brazil	Brazil	Italy	Italy	Italy

Dramatic Market Shifts are Underway that will Affect the Very Core of US Trade and Transportation

China-US: Twin Engines of the World



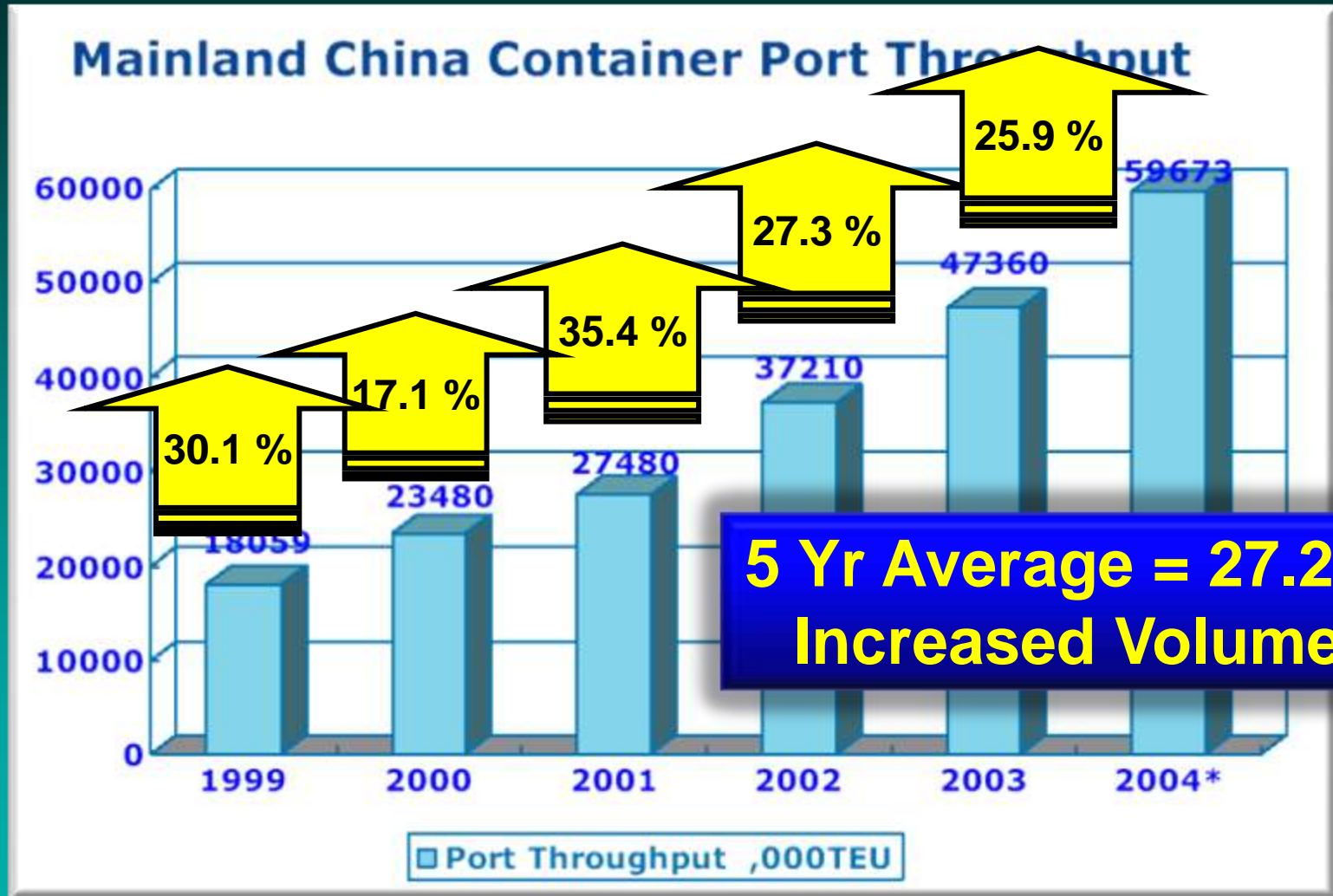
Population:

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)



2010 Asia-Europe Westbound Container Traffic

*10th Consecutive Year-Over-Year Monthly Gain
Trade volume for All Trade Lane Container Carriers*

China Breaks Container Traffic Record

Chinese Ports hit an All-Time Monthly High of 12.44 Million TEUs in May 2010 - Foreign Trade Surged by nearly 50% from a year ago. Six of the Top 10 Chinese Ports Booked Record Volumes.



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

交通部第三航务工程勘察设计院制



Shanghai International Shipping Center

Yangshan Deep Port - 20 Mile Bridge Access

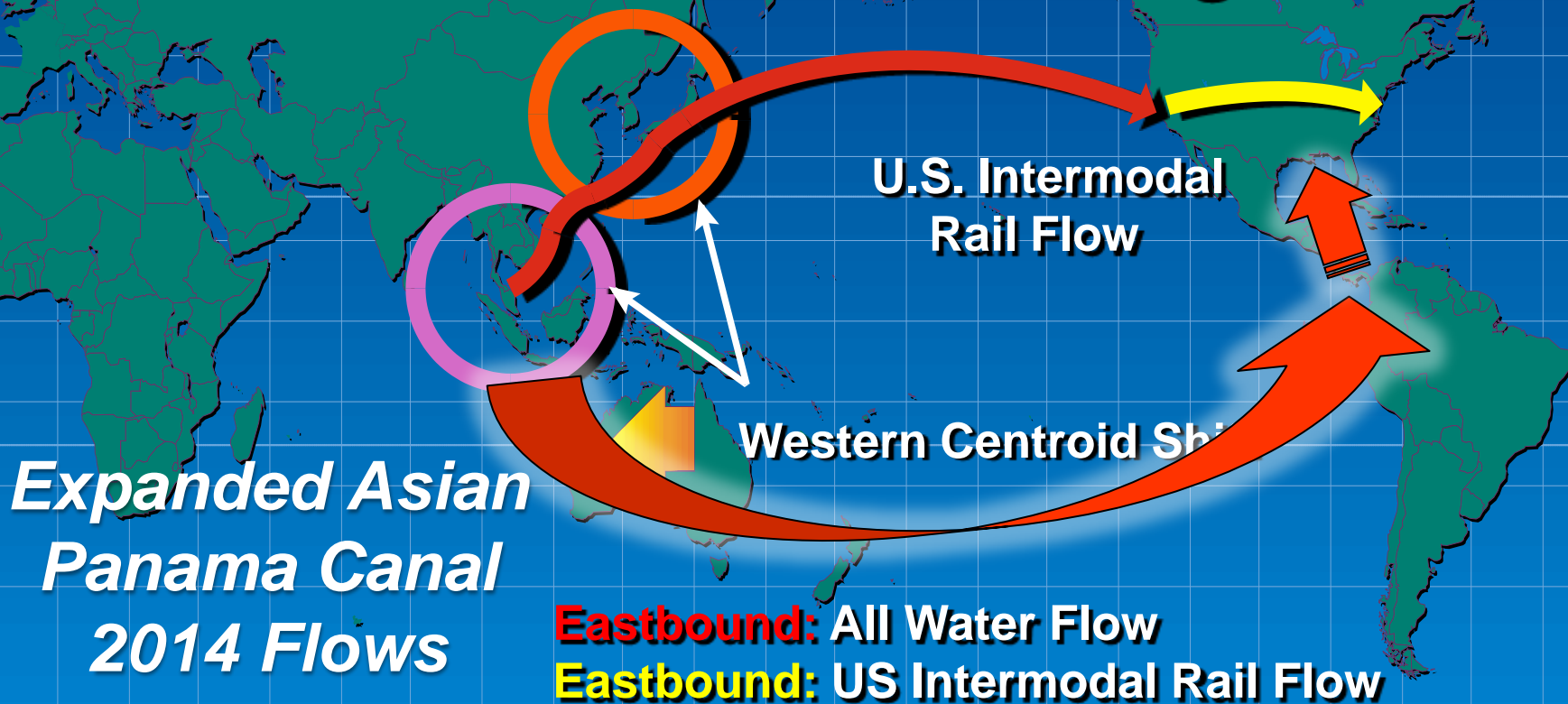


Lengthening Supply Chains Create Opportunity



Southeast Asian Manufacturing Centroid Shift

Current Inbound U.S. Cargo Flow



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**

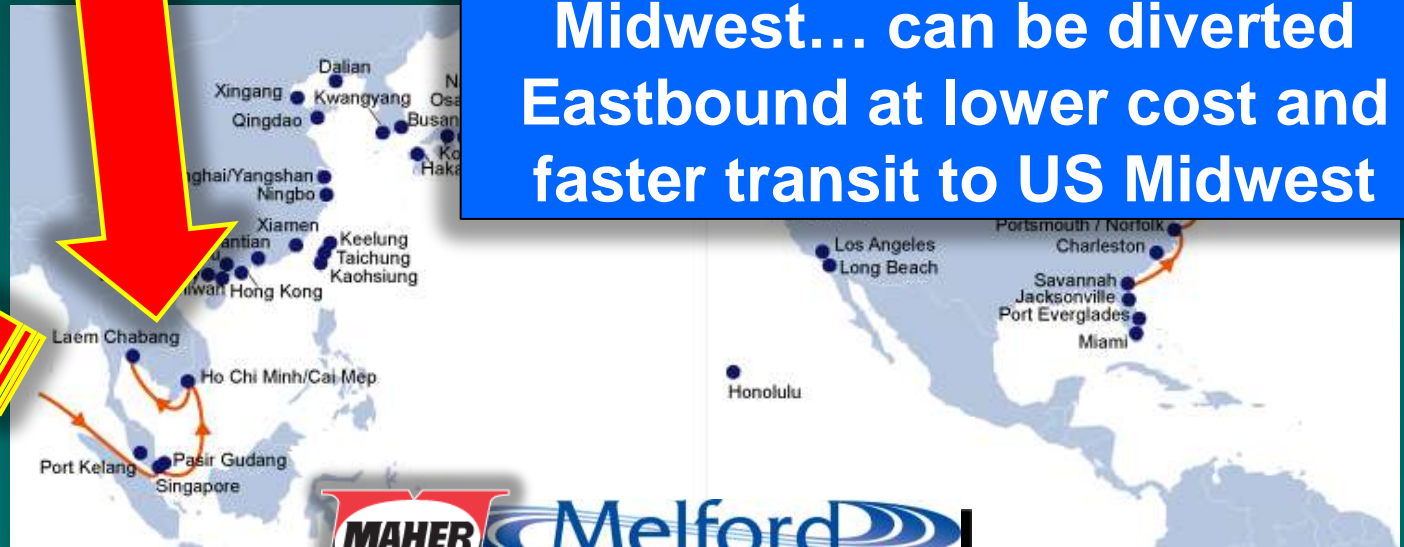
2010 Westbound Suez Canal Container Vessel Traffic



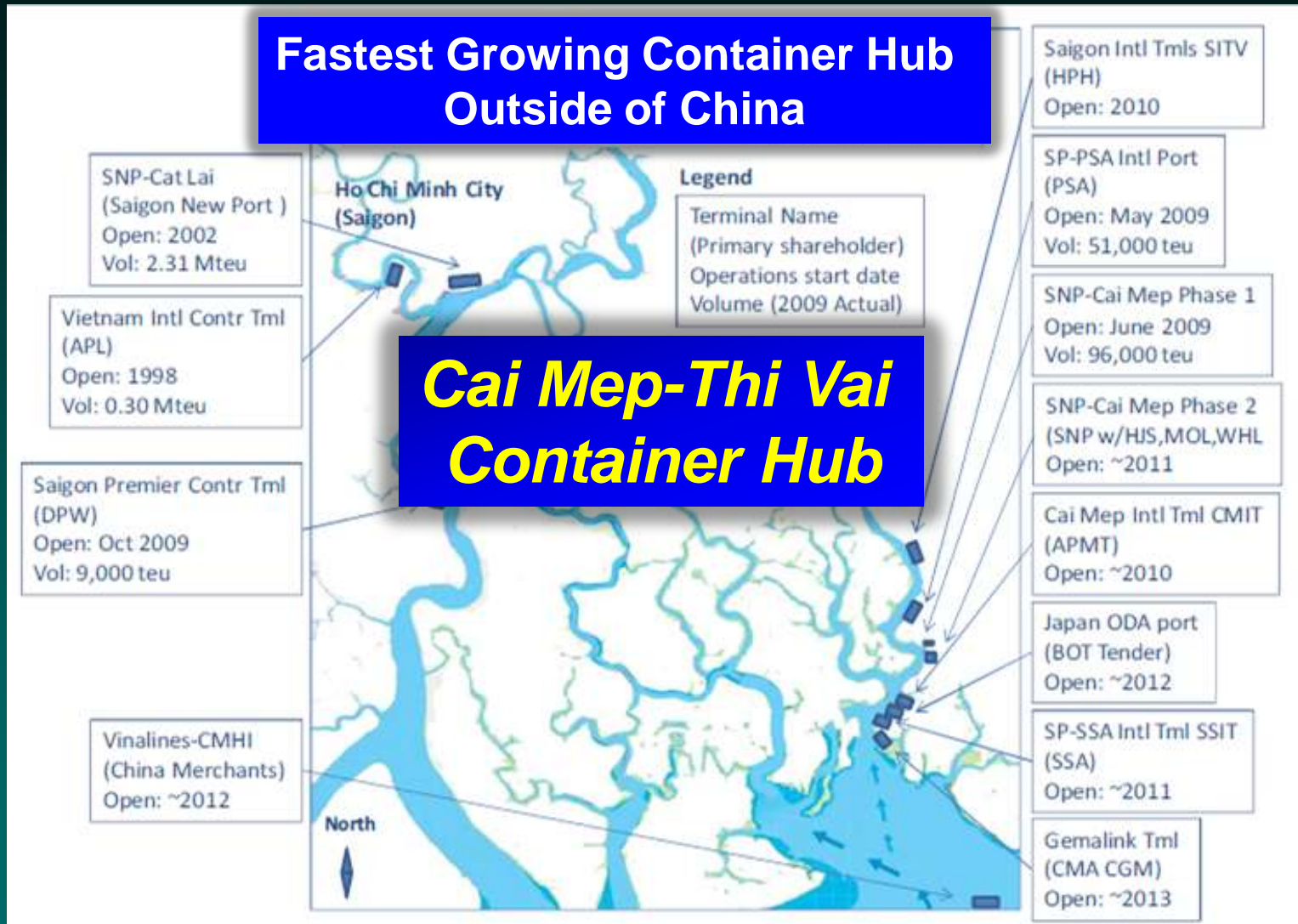
Grand Alliance - Hapag-Lloyd Service Routes



Potential Huge Volumes:
South East Asian origin cargo currently moves westbound to LA/LB and land-bridged to US Midwest... can be diverted Eastbound at lower cost and faster transit to US Midwest



Ho Chi Minh City Regional New Container Terminals (12 Terminals in 14 years)



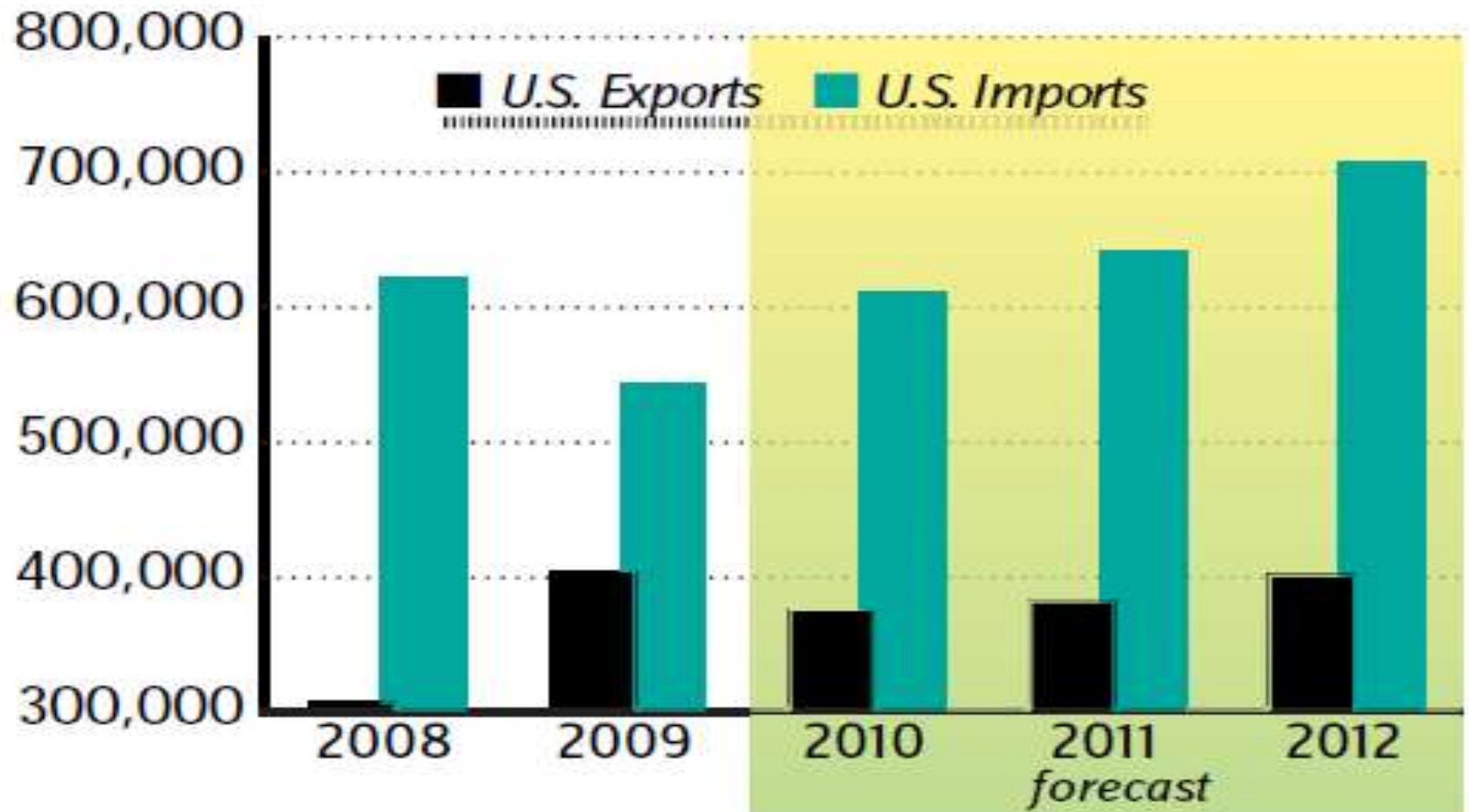
Source: Alphaliner Newsletter August 30, 2010

Huge Population Growth Over Next Decade

Top 10 countries to add 422 million people by 2020

Country	2010	2020	Nominal Change	% Change
India	1,173,108,018	1,326,093,247	152,985,229	13.0%
China	1,330,141,295	1,384,545,220	54,403,925	4.1%
Ethiopia	88,013,491	120,420,018	32,406,527	36.8%
USA	310,232,863	341,386,665	31,153,802	10.0%
Nigeria	152,217,341	182,344,492	30,127,151	19.8%
Pakistan	177,276,594	204,274,257	26,997,663	15.2%
Congo	70,916,439	95,605,489	24,689,050	34.8%
Indonesia	242,968,342	267,532,450	24,564,108	10.1%
Bangladesh	158,065,841	180,753,264	22,687,423	14.4%
Brazil	201,103,330	222,607,506	21,504,176	10.7%

India Plans to Triple Port Capacity by 2020 US- India Containerized Trade



Source: PIERS Global Intelligence Solutions

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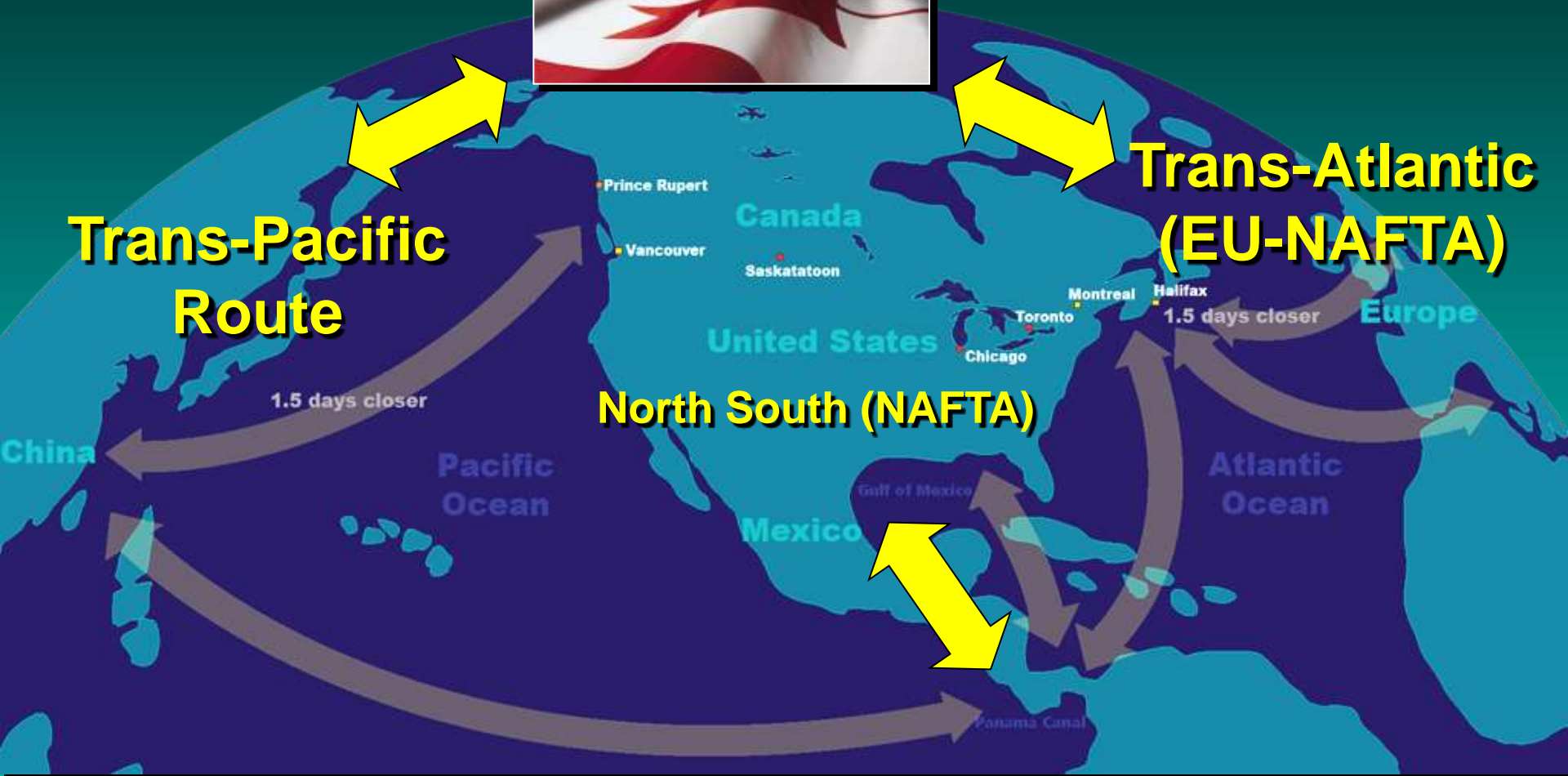
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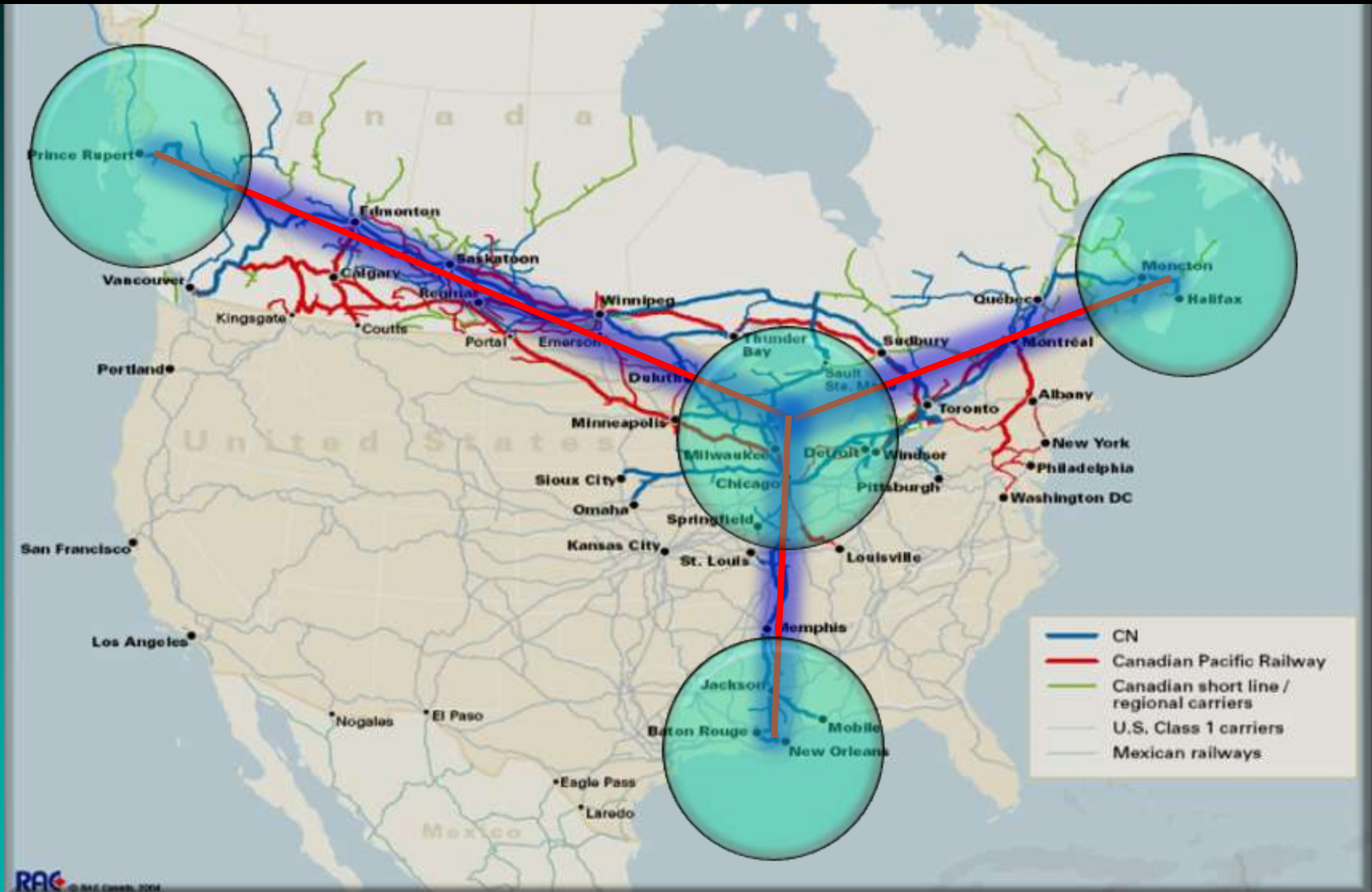
Canada's Intermodal Land Bridge

Canada's Strategic Global Location

(Shortest Trade Routes to Asia and Europe)



Canada's Intermodal Rail Network



New Terminals Are Being Built on All Three Coasts to Support Asian & South American Trade Linkages

Port of Prince Rupert



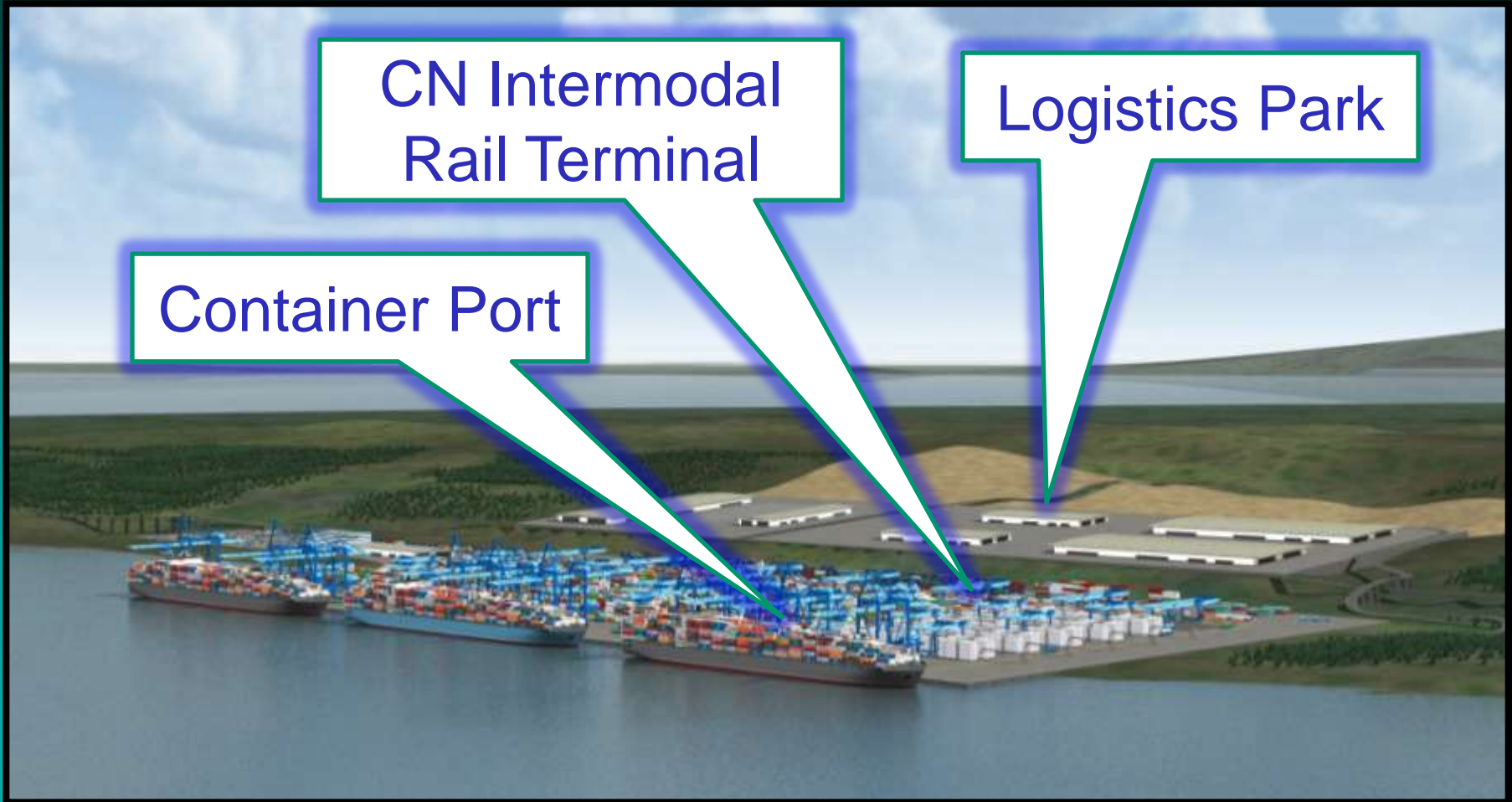
LIGTT



Maher Melford Automated Container Port & Intermodal Logistics Park



Melford International Terminal Project Components





- ***315 Acre Terminal***
- ***Intermodal Rail Terminal***
- ***1500 Acre Logistic Park***

First Phase:

- **2 Berths**
- **1.5 M TEU Capacity**
- **250 Acre Logistic Park**
- **\$420 million USD**

Melford

***Closest East Coast Port To
Europe and the Suez:***

- **29 Hour Sailing
Advantage on New York**
- **36 Hour Sailing
Advantage on Norfolk**



Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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2013 Deployment of the First North American Automatic Guided Vehicle (AGV) Terminal





Inland Ports: Europe's Current Strategy Applications



The Inland Port

“The Concept of an Inland Port System as a Regional Competitive Advantage”

Inland Ports Defined

A Convergence of Logistics Trends



Short Sea Shipping Technology



Intermodal Rail



Logistics



Automation



Distribution Center



Rotterdam World Gateway- EUROGATE Builds an Inland Container Port Network

ECT Main Terminal



Maasvlakte 2 Plan



European Shortsea Network



Short Sea Container Inland Port



The Dutch Transport Ministry and Port of Rotterdam Authority (PoRA) signed a Founding Agreement on June 29, 2009

The Town of Alblasterdam, East of Rotterdam will get a Container Transferium (CT), ***a Inland Port Container Transfer Facility*** to be operated by Binnenlandse Container Terminals Nederland (BCTN).

“This is the first time the Port Authority has promoted such a partnership. PoRA to promote transport by rail and water and to shift containers from road to the other modes of transport in order to reduce the number of trucks in the road.”

Dutch Transport Ministry Inland Port Container Transferium (CT) Strategy

*(Noord River, Town of Alblasserdam
€38 million, open by end-2012)*



Dutch Transport Ministry Inland Port Container Transferium (CT) Strategy

*(Noord River, Town of Alblasserdam
€38 million, open by end-2012)*





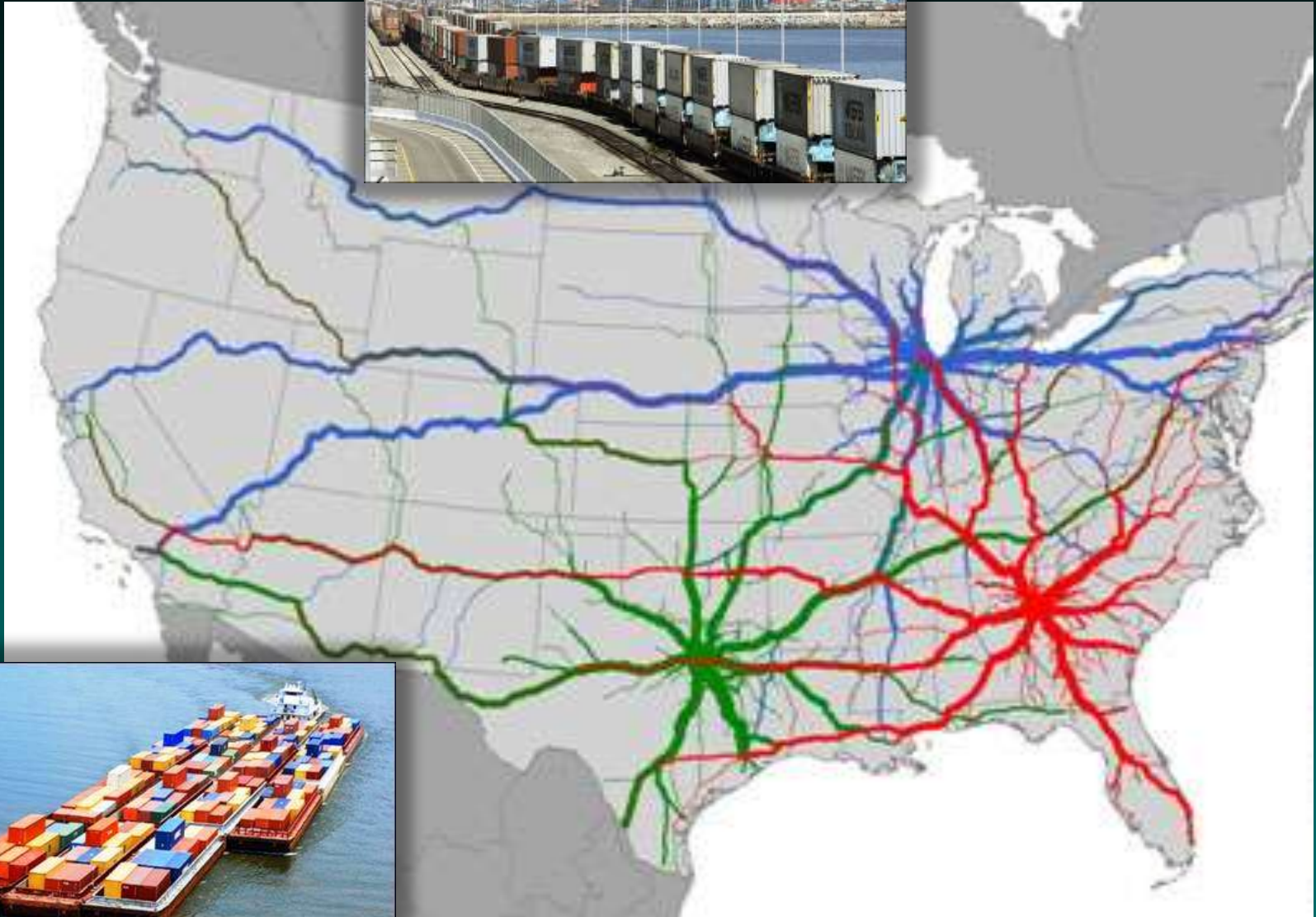
***North American
Inland Ports:
Connected to Emerging
Trade Corridors***

Emerging New Trade Corridors



Source: NASCO

Current Largest US Distribution Markets



Source: HIS Global Insight

Emerging Major Inland Port Logistics Centers

Throughput Capacities in Millions of TEUs



BNSF Logistics Park, Joliet. IL

A New Model For Freight Logistics Centers



Wal-Mart's New 3.4 million SF (78 acres under roof) Import Distribution Center

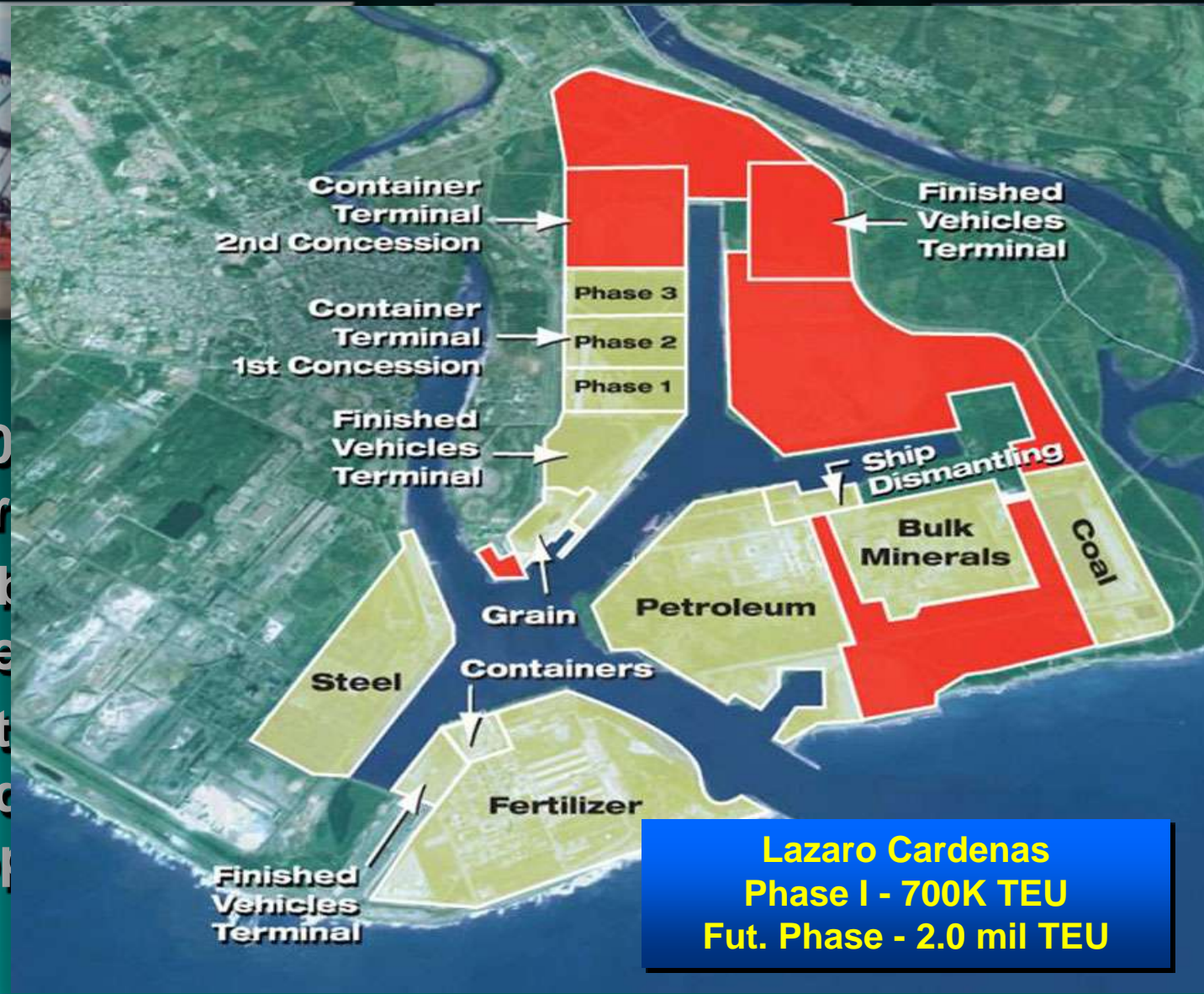


The Cost of This Import Distribution Center was Paid for by the Savings in Truck Drayage Between the Warehouse & the Intermodal Rail Terminal

The Lázaro Cárdenas First Phase Opportunity



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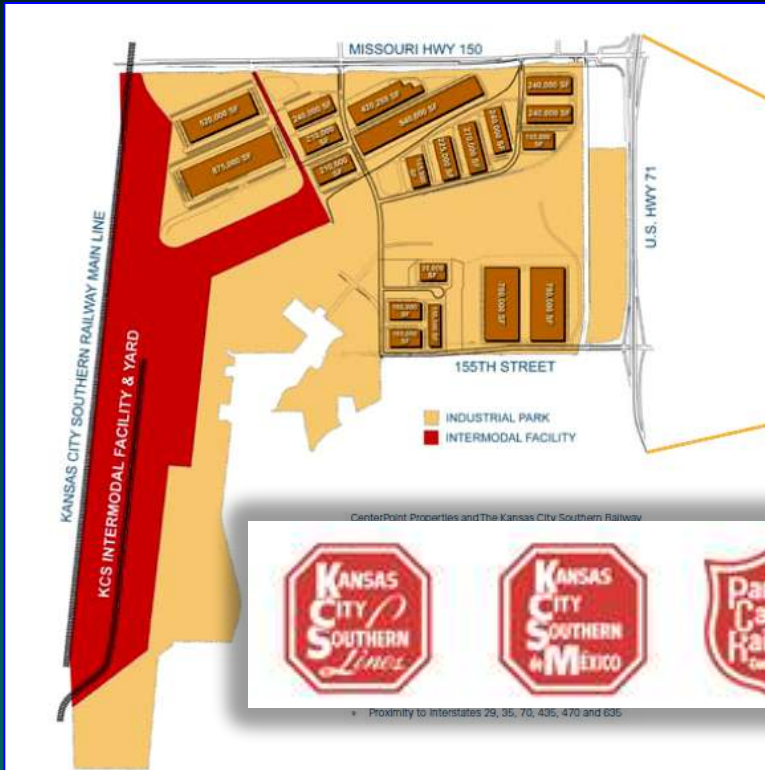


Source: Kansas City Southern (KCS) Railroad, February 2007



CENTERPOINT – KCS
INTERMODAL
CENTER

CenterPoint – KCS Intermodal Center Inland Port Solution



- 1,348 Acre Logistics Park
- 970 Acre Industrial Park
- 7.4 M SF Building Area

CenterPoint – KCS Intermodal Center Kansas City, MO




CENTERPOINT – KCS
INTERMODAL
CENTER



The Inland Port:

***“With Integrated JIT Delivery:
The Inland Port Can Greatly
Increase the Freight System
Capacity”***

An aerial photograph of a port facility, likely an inland port, showing a large area with numerous shipping containers and trucks. The port is situated in a flat, open landscape with some greenery in the distance. A large blue rectangular overlay is positioned in the center of the image, containing white and yellow text.

The Inland Port:
***“The Concept of an Inland
Port System as a Regional
Competitive Advantage”***
Leveraging Supply Chains



Louisiana International Deep Water Gulf Transfer Terminal: *Deep Water Port Commission*



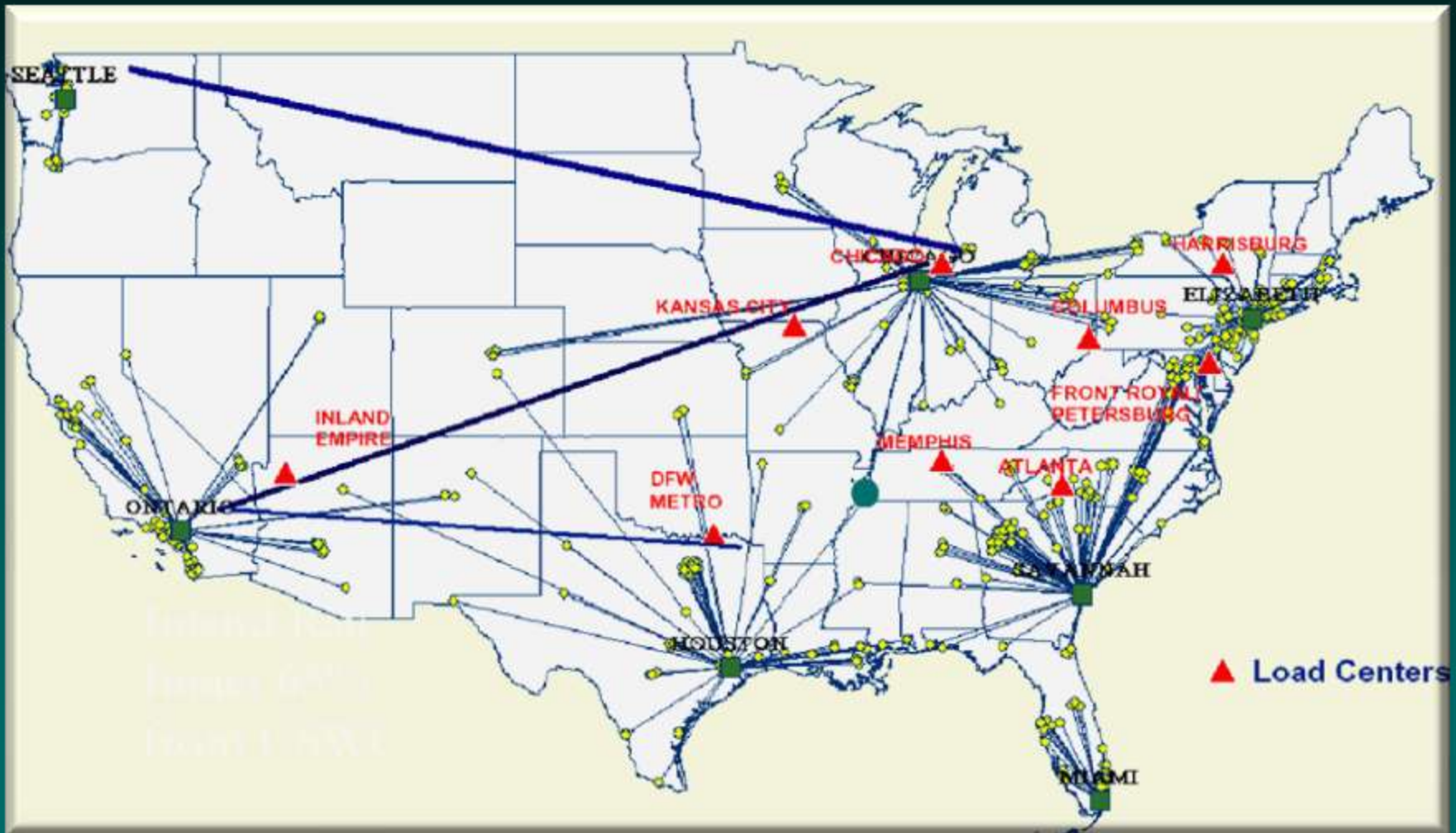


Louisiana International Deep Water Gulf Transfer Terminal: "Gateway to the Americas"





The Vision for the **LIGTT Concept:** Integrated Hub & Spoke Distribution System





The Vision for the LIGTT Concept: An Integrated Hub & Spoke Distribution System




**Using the Mississippi
River as a Strategic
Highway:
Change US Midwest
Supply Chain Distribution
Logistics Networks...
*Achieving Better
Reliability, Lower Cost,
and Greater Market Share***



International Port Productivity Comparisons



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)

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

Source: 1999 - 2004 CI Database, Seaports of the Americas, Port Data



Maritime Vessel Technology Trends

The Future of Container Ship Carriers?

**Shoals of Red Ink:
\$19 Billion in Losses in 2009**



April 26, 1956

58 Modified 35-foot Truck Containers

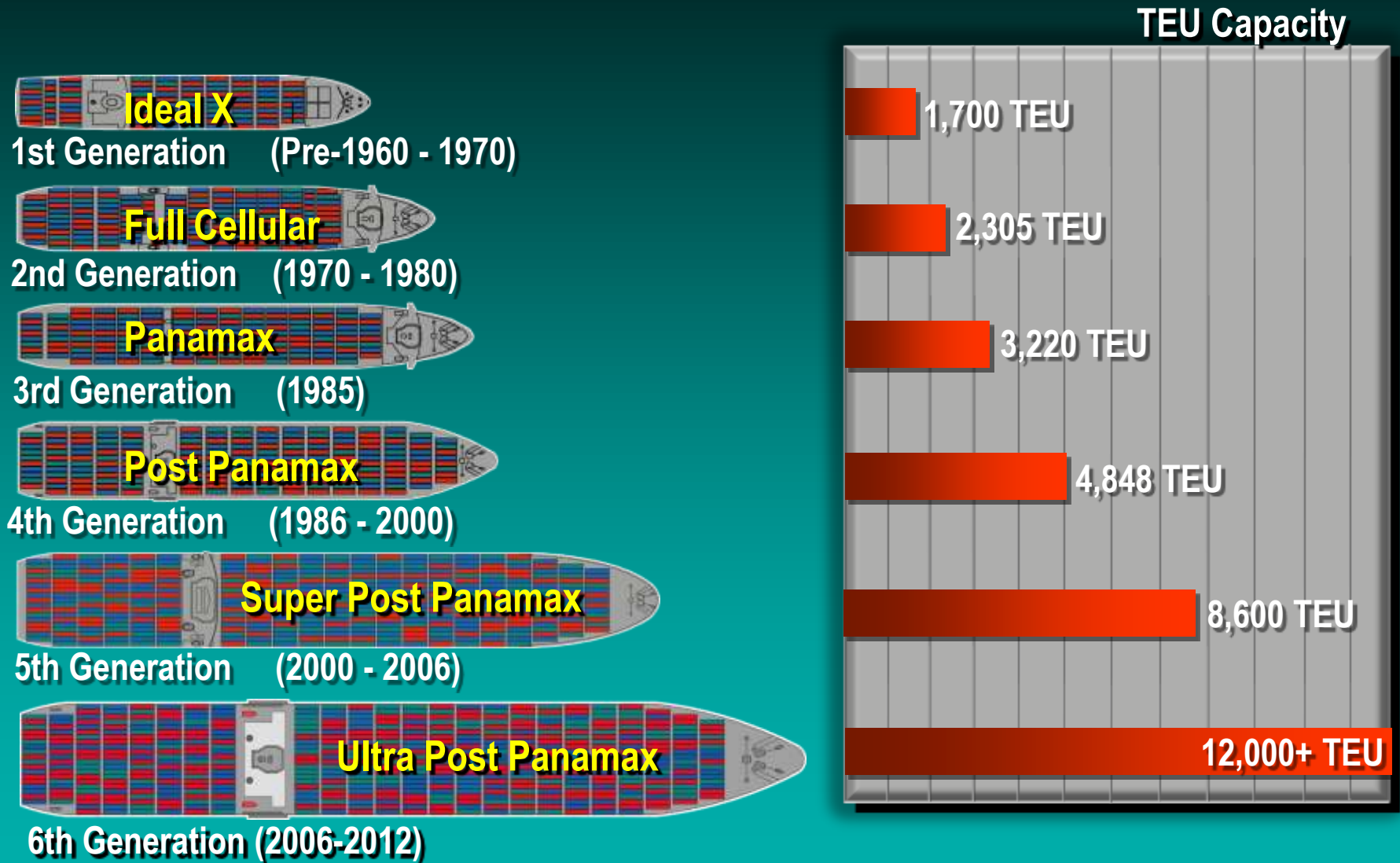
The deck of the *Ideal X*
at Port Newark
preparing for the
historical sailing
of the world's first
containership

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



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

(Current Max Panamax Vessel = 4,500 to 5,000 TEUs)





A.P. Moller-Maersk September 2006 Service Announcement for 14,000 TEU Vessel



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


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A.P. Moller-Maersk L Class M/S Emma Maersk

(14,000 TEU Vessel - 22 Containers Wide)



Maersk Line's E-class Container Vessel: *Ebba Maersk*, set a world record for the number of slots when it carried 15,100 TEU



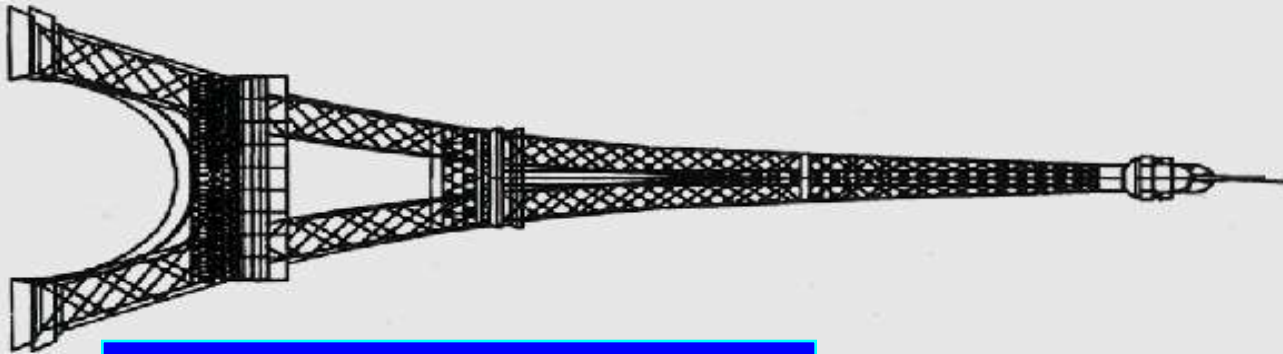
Length: 1,302 ft, Width: 207 ft, Net Cargo: 123,200 tons

Quay 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+

Source: Maritime World Logistics Inc. January 2007

Today's Mega Ships - Measuring Up



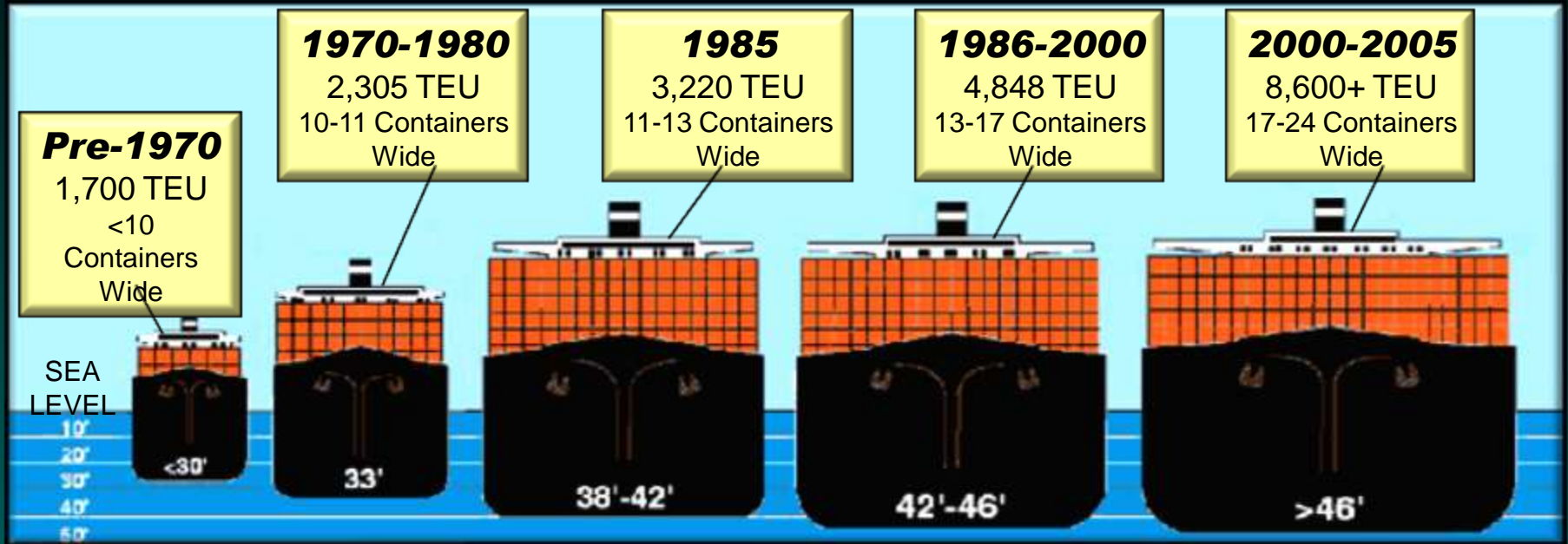
Eiffel Tower – 990 feet



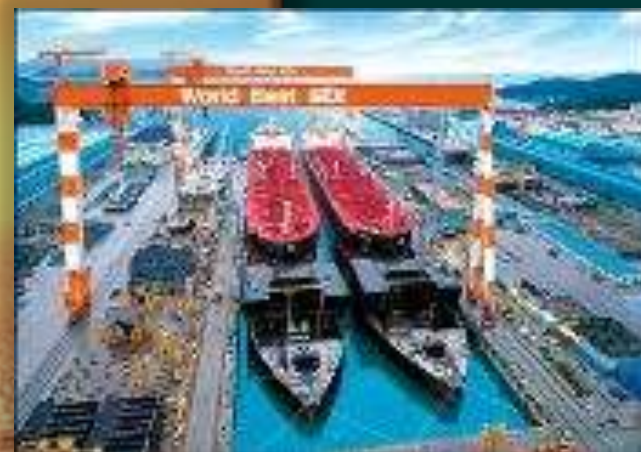
Regina Maersk – 1043 Ft, 140 Ft wide, 6000+ TEUs

Today's Mega Ships - Measuring Up

How Wide, How Deep?



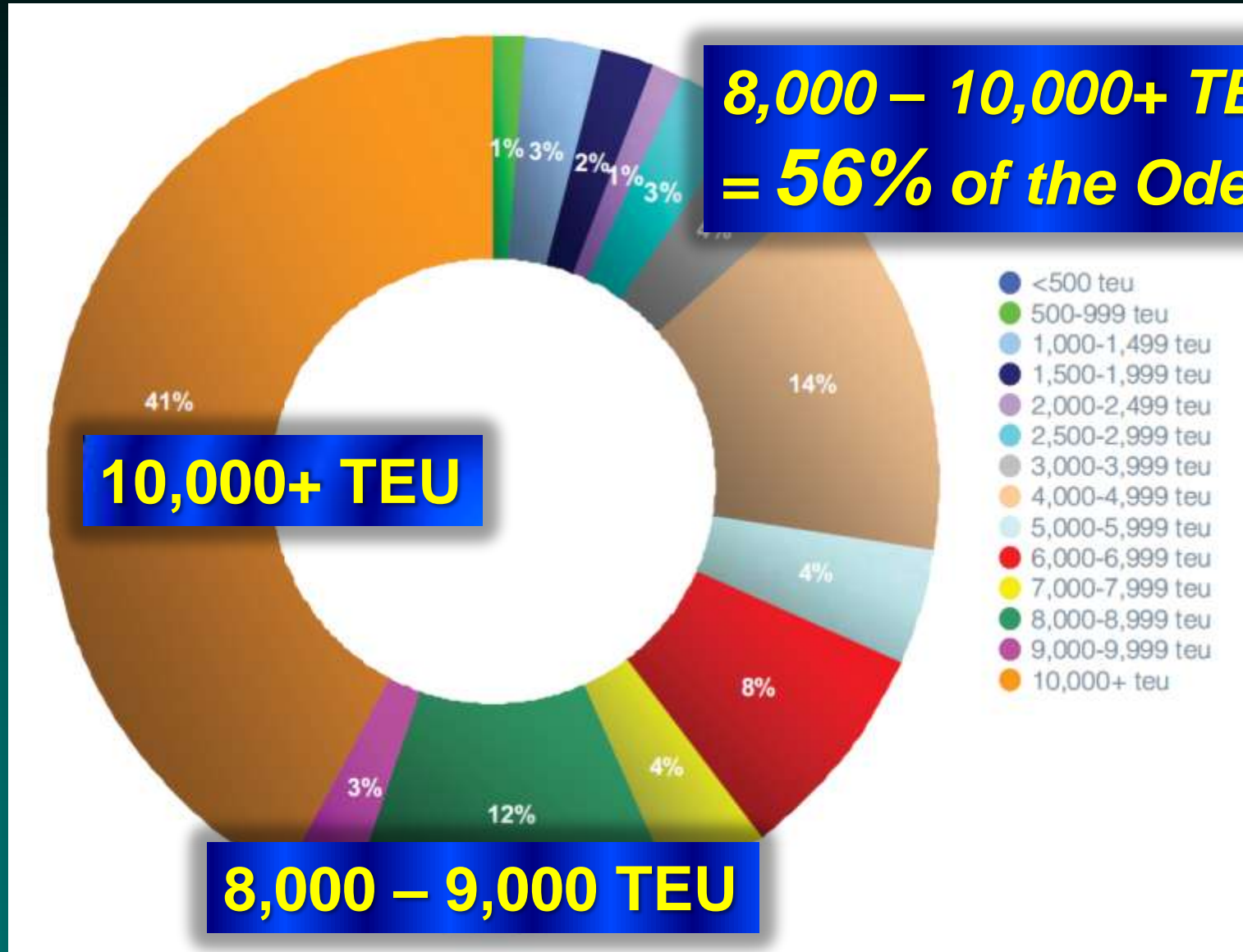
A Container Ship Capable of Fitting 22,000 Containers - Designed by South Korea's STX Shipbuilding Co



Both one and two-propeller types with the ability to reach 24 to 26 knots. 460m in length, 60m wide and 30m high. They are capable of saving more than 40% on the unit transportation cost.

Total Containership Order Book by TEU Range

(% of TEU Capacity)



Source: Drewry 2010 Container Forecaster

Evergreen to Order 100 New Containerships for delivery 2010-2011



32 vessels of a new type with a capacity of 8,000 TEUs each
20 additional S-type (7,024-TEU) ships
20 additional U-type (5,364-TEU) ships
20+ 2,000-TEU feeder ships of a new type

Source: JOC April, 9 2010



Panama Canal Expansion: New Capacity

Post 2015 Panama Canal Environment



**What Does the Competitive Environment
Look Like FIVE Years From Now?**



Current Panama Canal Constraints

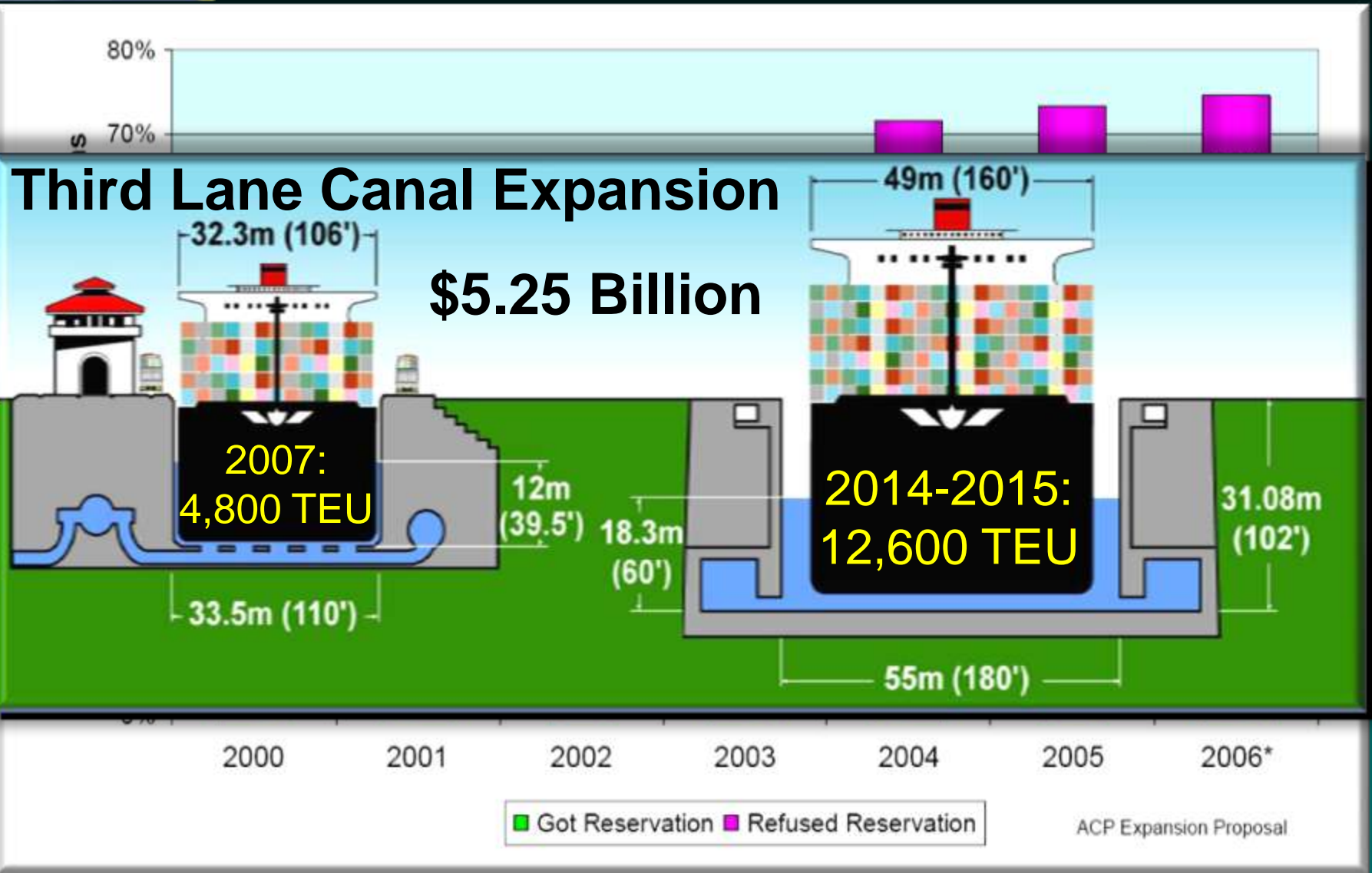
Madison Maersk (3,928 TEUs)

(Current Max Panamax Vessel = 4,800 TEUs)





Panama Canal Transit Reservation Demand



Source: ACP Expansion Proposal

The Post Panamax Boom Favors All-Water Service Routes

GAME CHANGER

Expansion of the Panama Canal will reshape global trade patterns

August 15, 1914 marked the start of a revolution in global trade and transportation. It was on that day that a cargo ship called the S.S. Ancon made the first passage through the Panama Canal. And if all goes according to plan, on August 15, 2014—or some day soon afterward—will mark the dawn of another new era, for it's then that the Panama Canal Authority expects to complete the expansion of the canal, just in time for the 100th anniversary of the waterway's opening.

Two new sets of locks—one on the Pacific side, the other on the Atlantic side—will be able to accommodate 12,000-TEU ships. That's more than twice the current maximum capacity of 5,000 TEUs.

"It opens a wide range of possibilities to both carriers and customers," said Frankie Lau, OOCL's marketing director for North America. "You can deploy larger vessels, which will create economies of scale. It

All-water ports are "all in"

An update on some of the contenders for the post-Panamax boom

US Southeast & US Gulf Coast Ports can directly benefit from the Panama Canal's new Lane Opening 2014/15



consulting firm, John Wheeler, general manager of trade development for the Georgia Ports Authority, puts the figure higher, at



Benefits of the New Panama Canal New Lane Opening December 2014/15

- A **Doubling of Capacity** & Change in Shipping Patterns for Asian Cargo to North America
- By 2020, **64 % of the PCA will be containerships**
- An Immediate Savings to Exporters of **30 %**
- Movement of discretionary cargoes from west coast ports including Los Angeles and Seattle, and the Class I railways
- It costs as much as **\$1,000 more per cargo container to use trains than ships – all water**

The New Post Panamax Boom Favors All - Water Service Routes with the Following Vessel Characteristics:



- Vessel Capacity: **9,000 to 10,000 TEUs**
- Vessel Draft: 46 to 50 feet (tropical fresh water)
- Required Port Channel Depths: **50 to 54 feet**
- LOA: 1,000 to 1,200 feet
- Beam: 140 to 160 feet



The Container Ship Colombo Express (8750 TEU)



Southeast Louisiana Asian Routing Comparison – Shanghai to New Orleans



Source: Parsons Brinkerhoff - Napoleon Avenue Container terminal Development

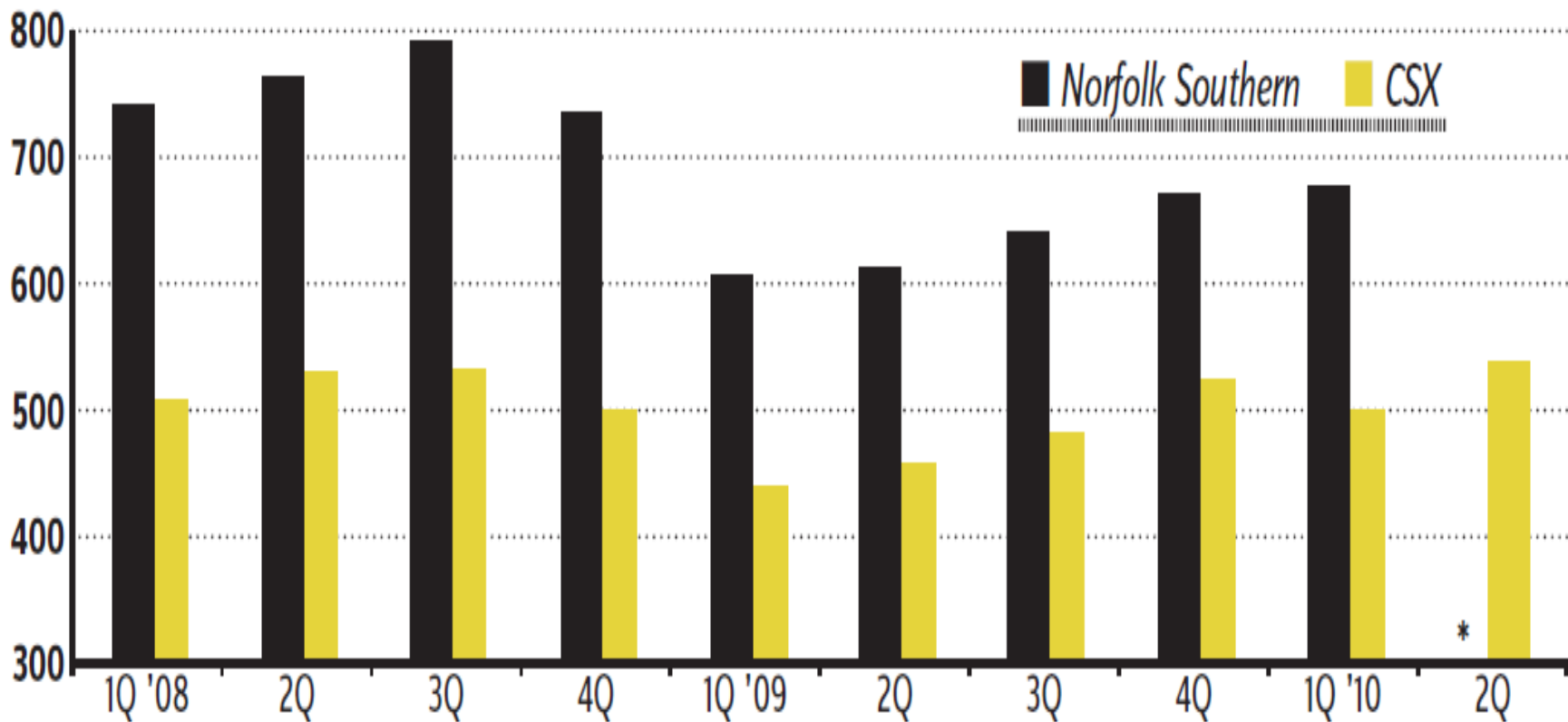


North American Class I Rail Intermodal Competition

Norfolk Southern vs CSXT/CSXI

(Quarterly intermodal volume, 1000s of carloads)

Norfolk Southern is set to capture a majority of Southern PRC Midwest Bound Cargoes



Source: NS and CSX Railroad Annual Reports

Norfolk Sothern Heartland DST Corridor

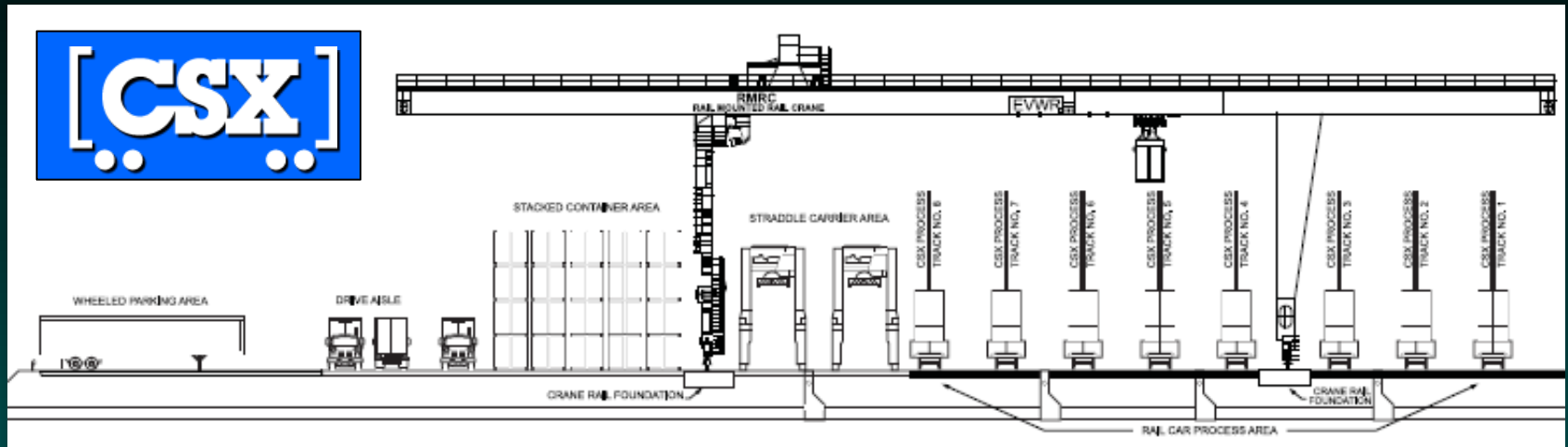
(Carrier Opinions on the corridor are undecided)



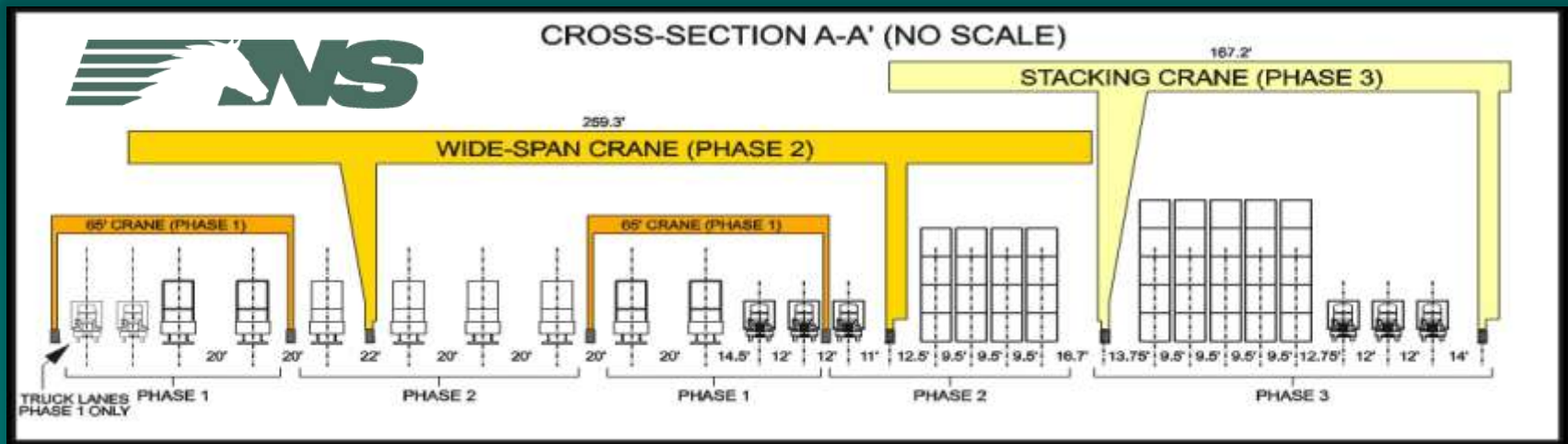
\$842 Million CSX National Gateway



Emerging US Green Inland Port Technologies



CSX High Density Intermodal Crane Configuration



NS High Density Nested Crane Configuration

CSX Rail Mounted Gantry (RMG) Cranes North Baltimore Ohio Rail Hub



Automated Intermodal Rail Terminal Concepts - Europe

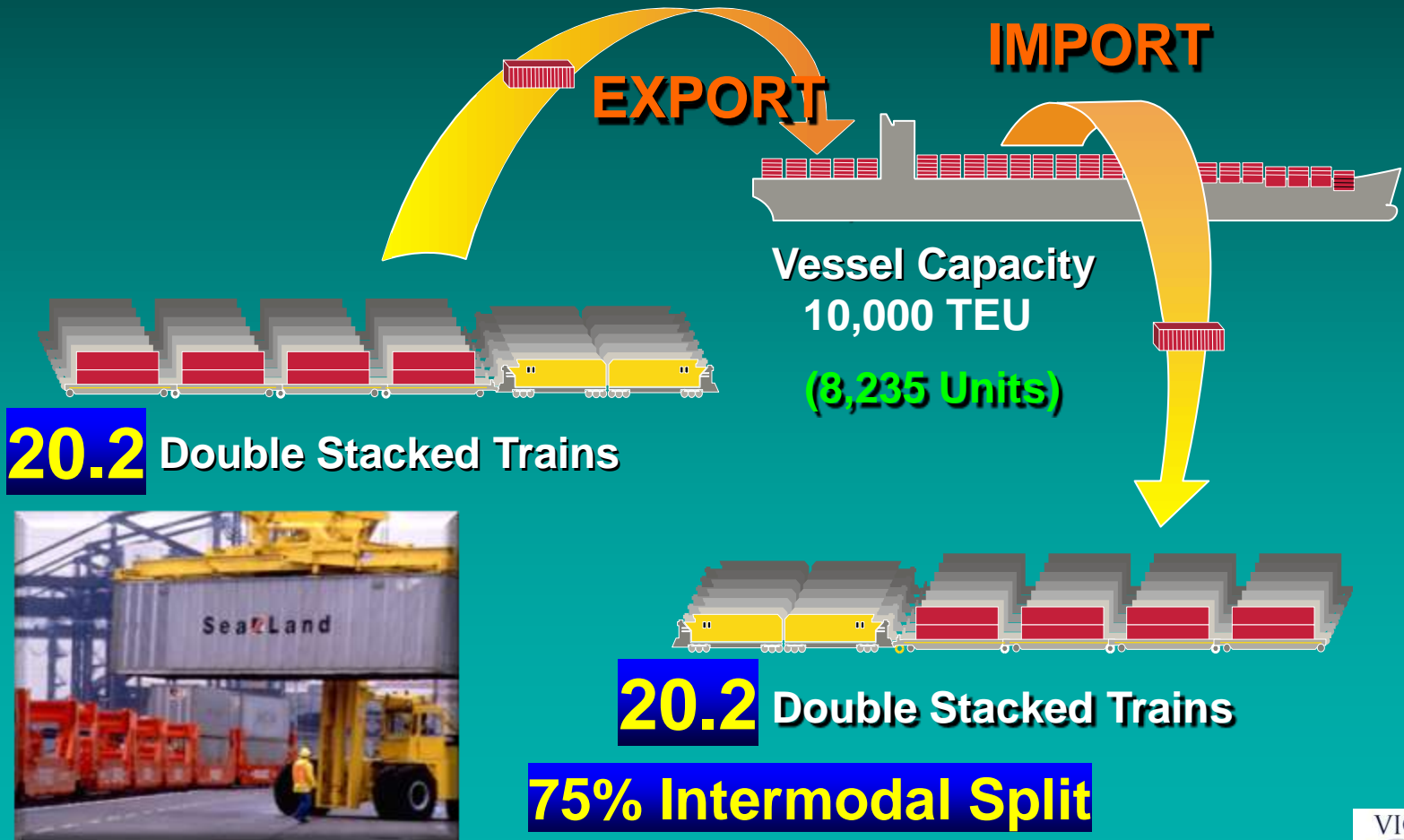


**Automatic Stacking
Cranes (ASC)**



**Automatic Guided
Vehicles (AGV)**

A 14,000 TEU Mega-Container Vessel Can Produce High Intermodal Rail Volumes (One Weekly Vessel Call)



Container Dwell:

The Average Length of Time an Average Container Remains on the Terminal

U.S. Marine Container Terminal Dwell:

6 to 8 Days
(Average)



North American Intermodal Rail Terminal Dwell:

1 1/2 - 2 Day (Average)

When You Reduce Terminal
Dwell by One Half

You Double the Terminal
Throughput...without Building!



***SESSION VI:
Continuing Evolution of
Marine Terminal Design and
Cargo Handling Systems***

Thank You

