

GENERAL DYNAMICS

NASSCO



Society of Naval Architects and Marine Engineers

A Shipbuilder's Perspective on
America's Marine Highway
Fred Harris – NASSCO

November 4th, 2010

Agenda

- General Dynamics/NASSCO Overview - Background



- America's Intermodal Transportation System - The Facts



- Marine Highway Cost Components



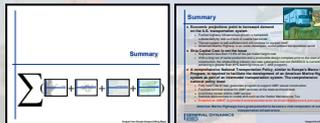
- European Marine Highway



- Policy Shifts for Success



- Summary



General Dynamics

Overview - Background

- **Headquartered in Falls Church, Virginia**

- Major facilities in the United States, Austria, Canada, France, Germany, Mexico, Spain, Switzerland and the United Kingdom



- **Sales reflect proven performance**

- 2008: \$29.3 billion
- 2009: \$31.9 billion
- 2010: Estimated sales greater than \$30B



- **Approximately 92,300 employees worldwide**

- **Operating Segments...**

- Aerospace
- Combat Systems
- Information Systems and Technology
- Marine Systems
 - Electric Boat - Groton, CT
 - Bath Iron Works - Bath, ME
 - NASSCO - San Diego, CA



General Dynamics/NASSCO

Overview - Background

- **NASSCO - Only full-service shipyard on the West Coast**

- Design, build and repair vessels for the U.S. Navy and commercial trades
- 3,700 direct employees, 275 long-term subcontractors and 650 TIMSA employees
 - Largest manufacturing and minority employer in San Diego
- 2009 U.S. economic impact of \$1.7B
- Delivered five ships in 2009; will deliver four in 2010
- CA 2009 Economic Impact of \$1.3B
- \$268.9M in facility investment since 2000

- **U.S. Shipbuilders support AMH as a vehicle to:**

- Expand modal transportation capacity
- Reduce environmental impact per ton-mile moved
- Preserve and enhance the shipbuilding industrial base
- Provide Jones Act vessels as a national resource for humanitarian aid
- Enhance National Defense during times of conflict
- Provide thousands of maritime jobs





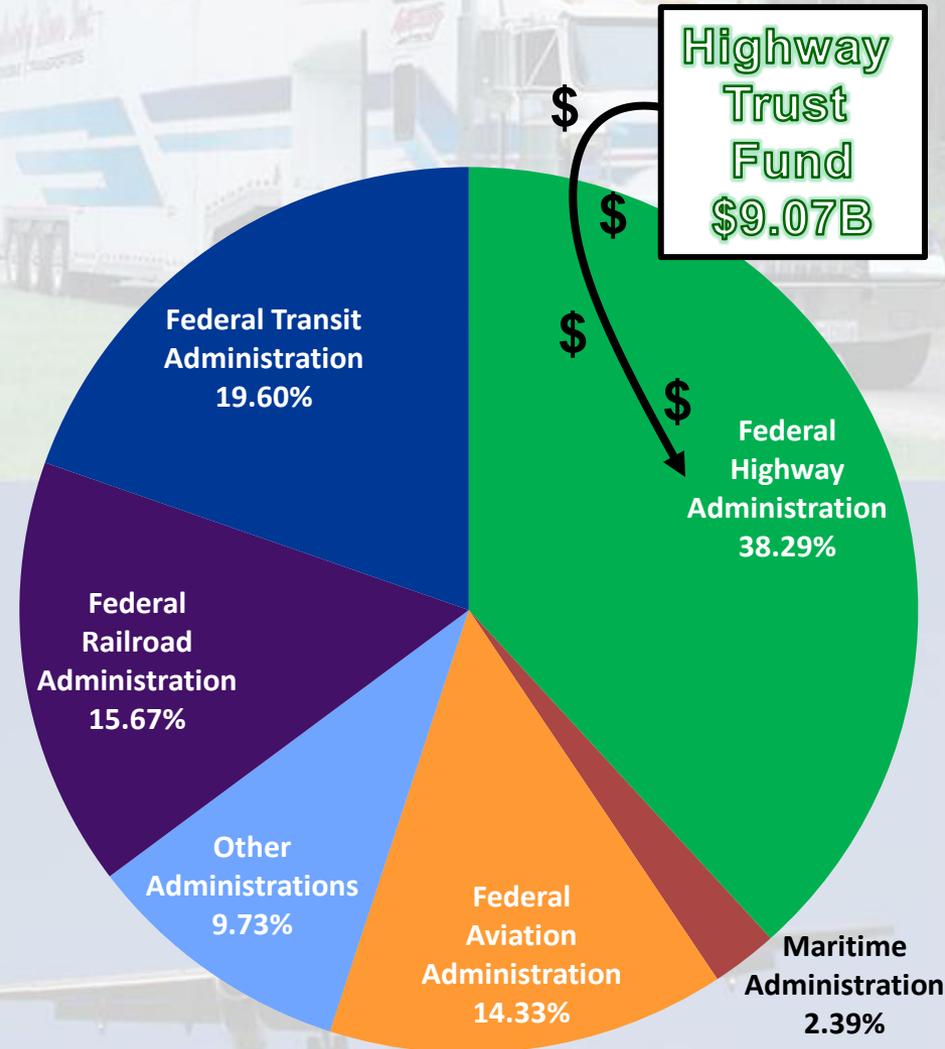
America's Intermodal Transportation System: The Facts

Department of Transportation (DOT) Budget, FY1981

Total Budget Value: \$23.83B

• In 1981...

- The Maritime Administration (MARAD) was integrated into DOT
- The DOT MARAD budget was \$568M (2.39%) – \$1.34B in 2010 dollars
- The DOT Federal Highway Administration (FHWA) budget was \$9.13B (38.29%)
- The U.S. Interstate Highway System was nearly self-sufficient
 - The Highway Trust Fund (HTF) supported ~99.5% of the U.S. Interstate Highway System funding requirements through Fuel Tax (Federal ¢18.4 / gallon, average State tax ~ ¢27.2 / gallon), user fees, and various tolls
 - Less than 1% of the required funding came from the General Fund receipts, bond issues, and designated property taxes



Operating Administration	Dollar Value	2010 Dollars**
Maritime Administration	\$568M	\$1.34B
Other Administrations	\$2.32B	\$5.47B
Federal Railroad Administration	\$3.73B	\$8.8B
Federal Transit Administration*	\$4.66B	\$11.0B
Federal Aviation Administration	\$3.41B	\$8.05B
Federal Highway Administration	\$9.13B	\$22.6B

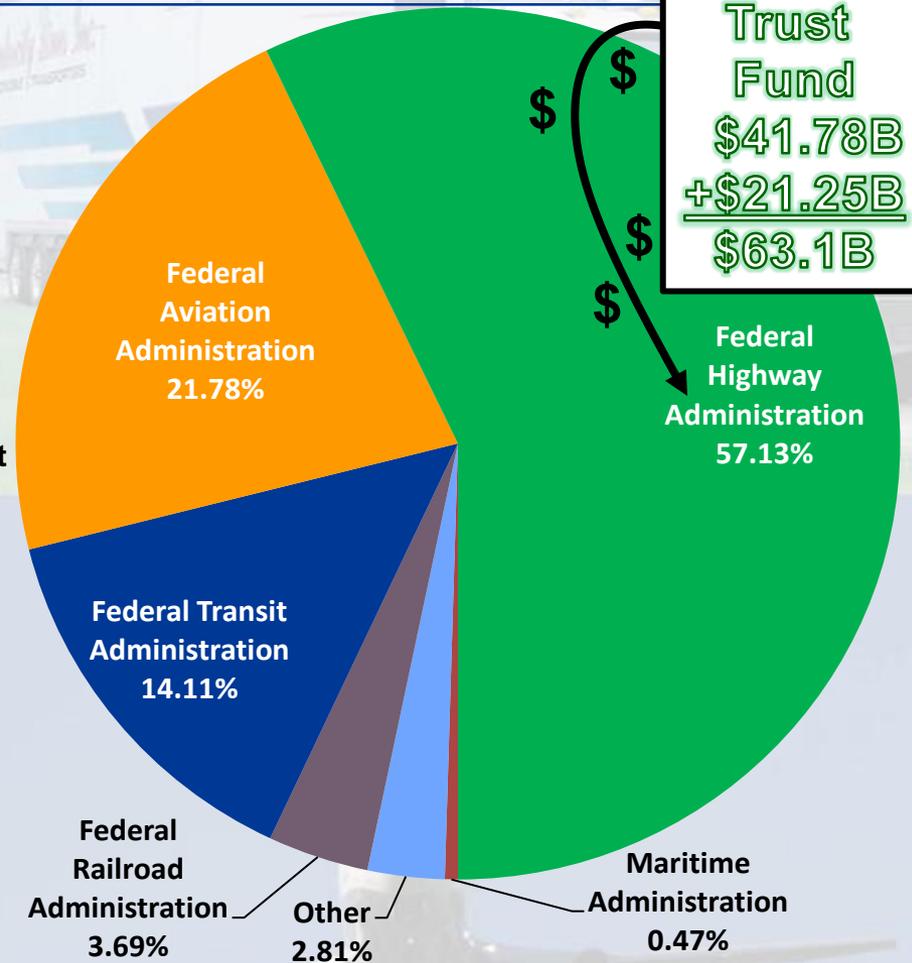
Department of Transportation Budget, FY2010

Total Budget Value: \$73.3B

- In 2010...
 - The DOT MARAD budget is \$346M (0.47%)
 - **\$222M** less than in 1981
 - The DOT FHWA budget is \$41.85B (57.13%)
 - **\$32.72B** greater than in 1981
- In March of 2010, the HTF balance was ~\$7B
 - H.R. 2847 injected **~\$19.5B** into HTF to maintain solvency for FY2010² (Bill passed March 4th, 2010)
- Through September of FY2010, the U.S. Highway Trust Fund distributed **\$63.1B** in funding to the FHWA – **\$21.25B** greater than the FHWA FY10 budget
 - Federal-Aid Highways \$30.7B
 - Other \$24M
 - Highway Infrastructure Investment, Recovery Act: \$11.9B
 - Other Programs: \$20.4B

Total YTD:
\$63.1B

Operating Administration	Dollar Value
Maritime Administration	\$346M
Other Administrations	\$2.059B
Federal Railroad Administration	\$2.71B
Federal Transit Administration ³	\$10.34B
Federal Aviation Administration	\$15.96B
Federal Highway Administration	\$41.85B \$63.1B



The 1981 MARAD Budget is ~3.87x greater than the 2010 MARAD Budget (in 2010 dollars)

GENERAL DYNAMICS



1. Source: Final Monthly Treasury Statement of Receipts and Outlays of the United States Government, Sept. 2010 (<http://www.fms.treas.gov/mts/mts0910.pdf>)

2. Source: <http://www.gop.gov/bill/111/2/hr2847houseamendments>

3. Note: The Federal Transit Administration System includes: buses, subways, light rail, commuter rail, streetcars, monorail, passenger ferry boats, inclined railways, or people movers

U.S. Transportation System

Highway System - Past

- **History of the U.S. National System of Interstate Defense Highways**

- Planning began in 1938 by the passage of the “Federal-Aid Highway Act”
- In 1941, Franklin D. Roosevelt appointed an executive committee to evaluate the need for a national defense and emergency transportation system
- Federal-Aid Highway Act of 1944 formally announced the new infrastructure program
- In 1947, the Federal Works Administration designated the first 37,700 miles of the system
- The Federal-Aid Highway Act of 1952 authorized the first funding of \$25M per year for FYs1954 & 1955
- Legislation in 1954 authorized an additional \$175M annually for FY 1956 and 1957 (not including user fees)

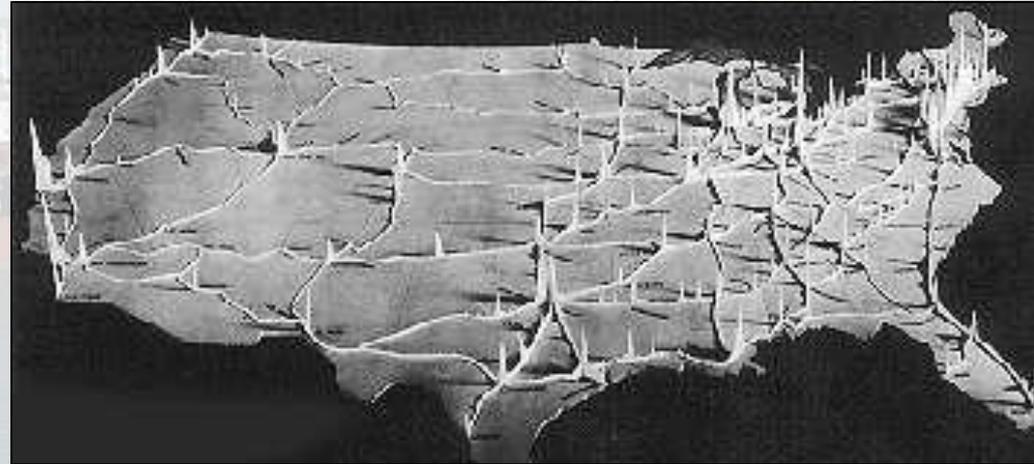


Illustration of peak traffic volumes based on statewide planning surveys of the 1930s

U.S. Transportation System (cont.)

Highway System - Past

- **Congestion on our roads is growing; Vehicle miles traveled (VMT) per year are growing at a greater rate than miles of roadway:**
 - National Highway System consisted of ~566,000 lane miles in 2006 (~38K in '47)
 - Approximately **83%** of the National System of Interstate and Defense Highways is more than 30 years old
 - Between 1985 - 2006, VMT increased by nearly 100%, while highway lane miles increased only 5% during this same period
 - Between 1982 - 2005, the time drivers spent in congested traffic in rush hour increased from 29% to 63%
 - Between 1982 - 2005, the number of congested highways grew from 29% to 48%
 - The cost to construct one lane-mile of new highway ranges from \$6-\$70M



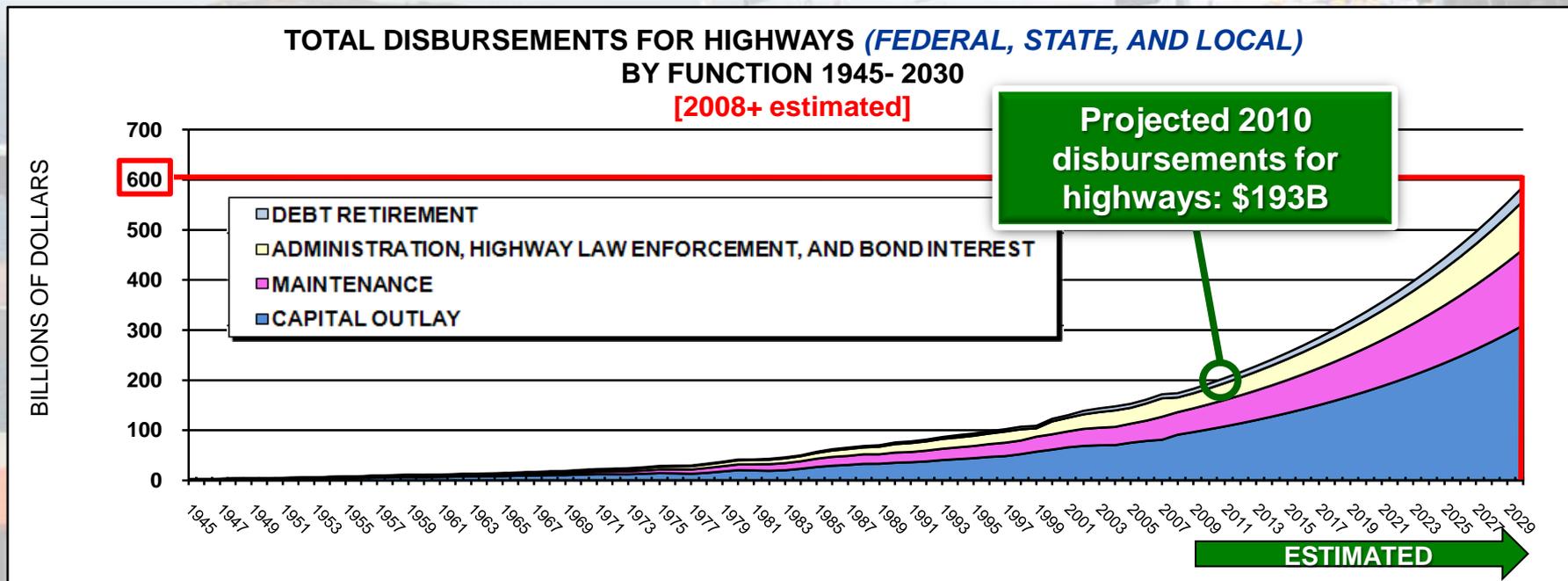
Truck Traffic, 1998



Truck Traffic, Est. 2030

U.S. Transportation System (cont.)

Highway System – Current/Future



- The National System of Interstate and Defense Highways is aging and in need of continued repair/replacement
- The FHWA has seen a significant increase in spending...
 - In 2006, the U.S. Interstate Highway System² spent: **\$34.2B**
 - In 2008, the U.S. Interstate Highway System³ spent: **\$45.2B**
 - In 2010, the U.S. Interstate Highway System⁴ spending expected to exceed: **\$63.1B**

By using the rate of escalation in spending from 1998 to 2008, it is estimated that yearly highway disbursements will approach \$600B by FY2030

U.S. Transportation System (cont.)

Highway System - Summary

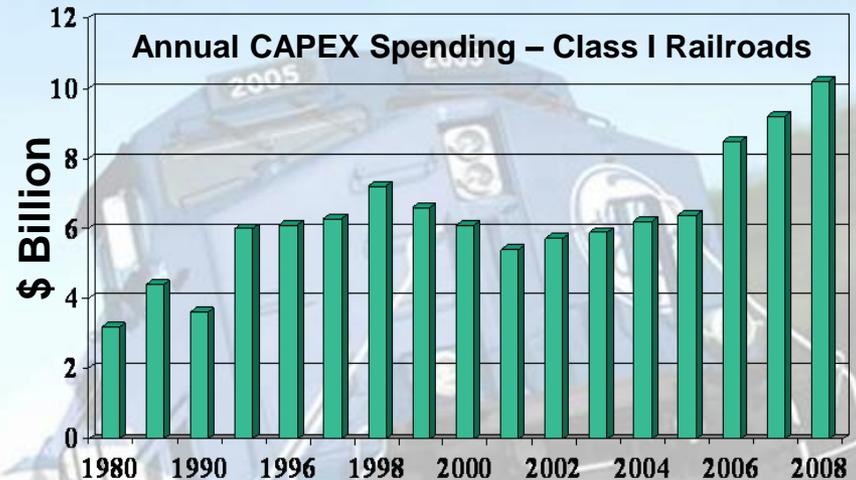
- Over the past decade, the U.S. Interstate Highway System funding requirements have grown roughly 2x faster than U.S. Gross Domestic Product
- The System is aging and highway expansion is not keeping pace with the increase in VMT
- Congestion is rapidly increasing
- New highway infrastructure is cost prohibitive and room for expansion does not exist in large metropolitan areas where relief is most needed
- The American Taxpayer will continue to heavily supplement user fees to pay for highway services, support, & expansion

Without relief from other modes of transportation, the highways will face increasing challenges due to deteriorating infrastructure, escalating maintenance costs, and VMT outpacing new construction at a rate of 20 to 1

U.S. Transportation System (cont.)

Railroad System

- **Land Grants and Government loans financed east-west expansion (1800's to early 1900's)**
 - Provided public lands along strategic corridors
 - Railroads and the Government were able to sell, lease or mortgage lands previously provided to finance further expansion
- **Freight Railroads are privately owned**
 - Since deregulation in 1980, the number of Class I rail providers has dropped from 27 to 7
- **Committed to capital investments**
 - Over \$148B invested from 1980 to 2008 to improve rail system infrastructure
- **Financing readily available**
 - The Railroad Rehabilitation & Improvement Financing (RRIF) program authorizes the Federal Railroad Administrator to provide direct loans and loan guarantees up to \$35B. (\$400M of direct loans and loan guarantees authorized in 2010²)
- **Federal Railroad Administration (FRA) estimates tonnage on the railroad system will increase 88% through 2035**
- **“Historically, only two modes of freight transportation, rail and pipeline, are self-sustaining, meaning that they have the ability to finance, build, and maintain their infrastructure.”**



Source: Association of American Railroads; "Railroad Facts," various editions for historic results

Class I railroads will need to invest \$135B from '07 to '35 to meet forecast demand; without this investment, 30% of all rail-miles will be operating above capacity

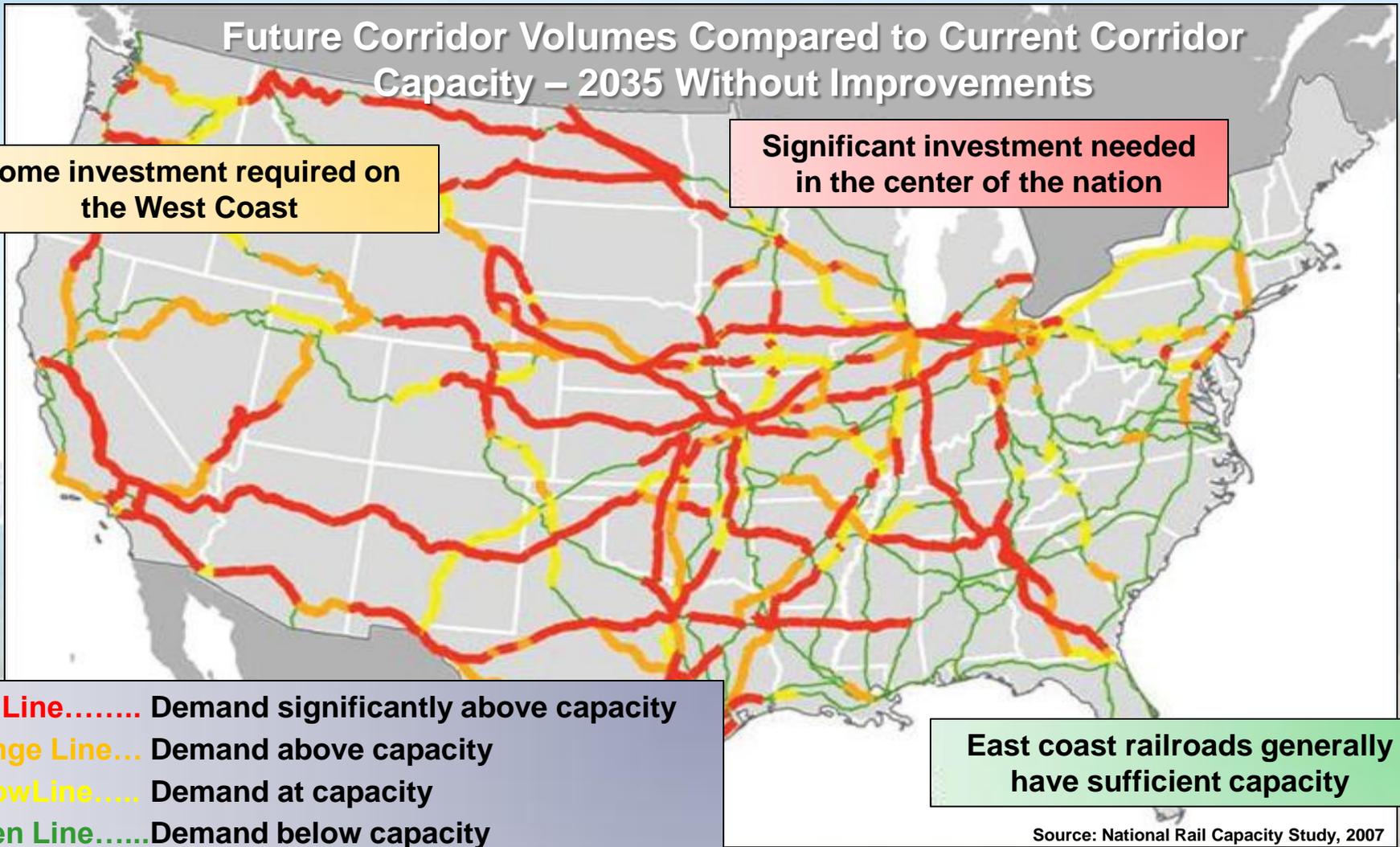
U.S. Transportation System (cont.)

Railroad System

Future Corridor Volumes Compared to Current Corridor Capacity – 2035 Without Improvements

Some investment required on the West Coast

Significant investment needed in the center of the nation



American Marine Highway, 2007-2009

Background

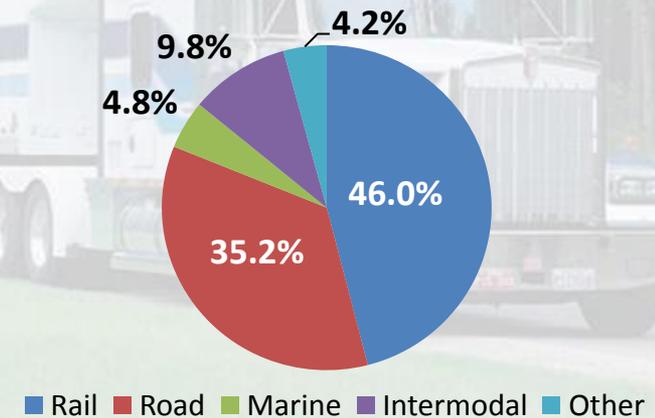
- **Dec. 19, 2007: President George W. Bush signed into law the Energy Independence and Security Act of 2007**
 - Contains provisions establishing a formal marine highway program within the federal government
 - The new law:
 - Provided authorization but no appropriation
 - Defines “marine highway” or “short sea” transportation as “the carriage by vessel of cargo in containers, loaded on the vessel by cranes or by means of wheeled technology”
 - Requires the designation of transportation projects to mitigate landside congestion, encourage the development and expansion of vessels, shippers, port and landside infrastructure, and marine transportation strategies by state and local governments.
- **Oct. 9, 2008: DOT announced a new service on the James River from the Port of Norfolk to the Port of Richmond**
 - New route expected to shift more than 4,000 trucks-worth of cargo off Interstate-64 and onto the waterway
- **Nov. 13, 2008: SeaBridge Freight started container-on-barge service between the Port of Brownsville, TX and Port Manatee, FL**
- **Apr. 2009, Eco Transport announced expected launch of its first short sea shipping venture between the ports of Oakland and Stockton, California**
 - Recently announced service to begin in early 2012



American Marine Highway, 2010

- **Feb. 2010: \$1.5B pool of money released to 51 projects for general transportation infrastructure improvement through DOT Transportation Investment Generating Economic Recovery (TIGER) grants**
 - \$72.14M, or 4.8% allocated for maritime based projects (e.g. Revitalizing Maine's Ports - \$14M, California Green Trade Corridor/Marine Highway Project - \$30M)
- **Apr. 2010: DOT Marine Highway Program was authorized via Title 46, Code of Federal Regulations, Part 393**
 - Paving the way for future Marine Highway efforts
- **Apr. 2010: DOT announces program to expand use of Marine Highway**
 - Regional transportation officials able to apply to have specific transportation corridors designated as a Marine Highway – making them eligible for future preferential treatment with federal assistance
- **Apr. 2010: MARAD releases solicitations for Marine Highway Project designation**
 - Designation as a “Marine Highway Project” allows venture to be eligible for a piece of **\$7M in grant money**
- **Jul. 2010: MARAD releases RFPs for Marine Highway Benefit Calculator and “Portfolio of Ships”**
 - Benefit Calculator – Web based tool allowing for quick analysis of Marine Highway benefits
 - Portfolio of Ships – Package of ship designs to serve multiple AMH markets
- **Aug. 2010: DOT identifies 18 marine corridors, 8 projects, and 6 initiatives for further development as part of Marine Highway**

Tiger I Grant Allocation



Marine Highway Program

Ongoing Activities

- **Aug. 2010: DOT identified 11 corridors, 4 connectors, 3 crossings, 8 projects, and 6 initiatives**

➤ Corridors

- M-5: U.S. West Coast
- M-580: Oakland to Sacramento
- M-84: Connects Columbia & Snake Rivers
- M-10: Gulf of Mexico from Brownsville, TX to Jacksonville, FL
- M-49: Atchafalaya River, J. Bennet Johnson Waterway, and associated channels
- M-55: Portions of Mississippi and Illinois River
- M-65: Portions of Mobile, Tombigbee, and Black Warrior Rivers
- M-70: Connects Ohio, Mississippi, and Missouri Rivers
- M-90: Includes Great Lakes & Erie Canal
- M-95: U.S. East Coast
- M-2: Includes all of Puerto Rico

➤ Connectors

- M-40: Includes the Arkansas, Verdigris & White Rivers
- M-87: Includes all of the Hudson River
- M-64: Includes portions of Hampton Roads, the Chesapeake Bay, and the James River
- M-5: Includes routes consists of the Pacific Ocean coastal waters and the Inside Passage

➤ Crossings

- M-75: Includes the Detroit River, Lake Erie, from Detroit, MI, to Toledo, OH
- M-71/77: Includes portions of Lake Erie between ports in Ohio and Ontario
- M-A1: Includes the Upper Cook Inlet, the Matanuska and Susitna Rivers (Alaska)

➤ Projects

- Cross Sound Enhancements Project
- New England Marine Highway Expansion Project
- **Cross Gulf Container Expansion Project (\$3.34M)**
- **Tenn-Tom Freight Project (\$1.76M)**
- Gulf Atlantic Marine Highway Project
- Detroit/Wayne County Ferry Project
- Trans-Hudson Rail Service Project
- **James River Container Expansion Project (\$1.1M)**

➤ Initiatives

- Hudson River Food Corridor Initiative
- **New Jersey Marine Highway Initiative (\$250k)**
- East Coast Marine Highway Initiative
- **West Coast Hub-Feeder Initiative (\$275k)**
- Golden State Marine Highway Initiative
- **Illinois-Gulf Marine Highway Initiative (\$275k)**

- **Oct. 2010: \$600M pool of money released to 42 projects for general transportation infrastructure improvement through DOT TIGER II grants**

- \$94.84M or 15.8% given to ports for infrastructure improvements (e.g., rail connections, terminal expansion, and new facilities)

GENERAL DYNAMICS



Source: http://www.marad.dot.gov/documents/Marine_Highway_Corridors13_Sep_10.pdf
http://www.marad.dot.gov/documents/MarineHighway_Project_Description_Designated.pdf
http://www.marad.dot.gov/documents/MarineHighway_Initiative_Descriptions_Designated.pdf

Received grants from pool of \$7M

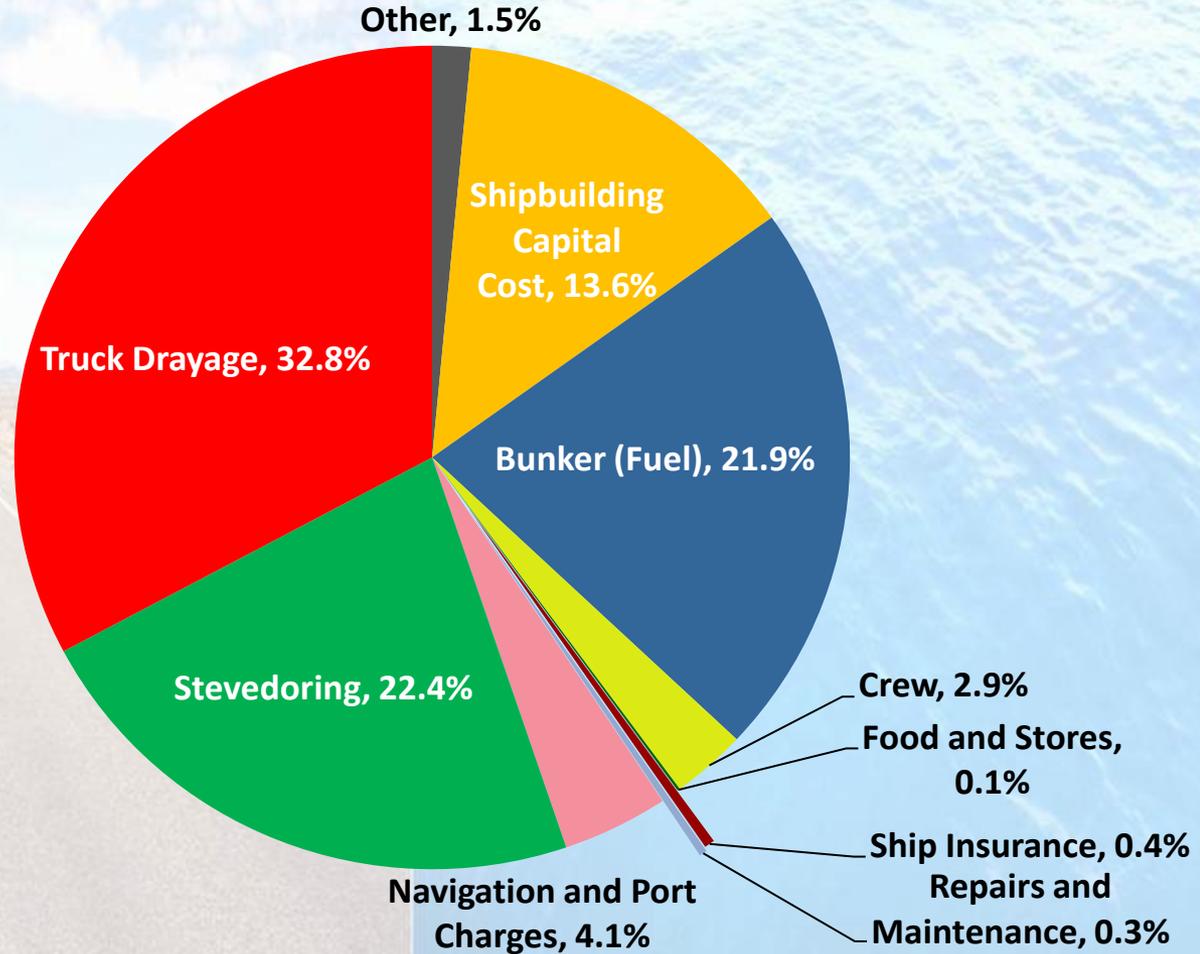


Marine Highway Cost Components

Marine Highway Cost Components

Two Sides to the Story – Land/Sea Sides

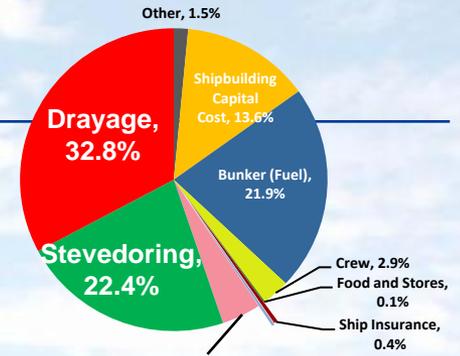
Breakdown of Freight Cost on a per Trailer Basis
Center for Commercial Deployment of Transportation Technologies (CCDoTT)



Land Side

Cost Components (Cont.)

- **Drayage – (32.8%)**
 - Movement of a container or trailer to or from the intermodal terminal to or from the customer's facility
 - Labor - union or non-union
 - Quoted spot rates push Marine Highway economics towards unprofitability
 - Example: NY to JAX
 - Truck \$1,550.00
 - AMH (incl drayage): \$2,648.93
- **Stevedoring – (22.4%)**
 - Costs of loading or unloading a ship's cargo
 - Labor - union or non-union
 - Typically very expensive, sometimes upwards of \$200 on a per trailer basis
- **Port Fees – (4.1%)**
 - Including but not limited to dockage rate, equipment charges (e.g., trailer ramp, mule truck), & land rental fees
 - Labor - union or non-union
 - Harbor Maintenance Tax (HMT) – 0.0125% of Cargo Value



Navigation and Port Charges, 4.1%



Drayage



Stevedoring

Most Land Side costs are not well understood by the maritime community as a whole; mutually beneficial business relationships with established service providers must be developed

Sea Side

Cost Components (Cont.)

Breakdown of Freight Cost on a per Trailer basis
Center for Commercial Deployment of Transportation Technologies (CCDoTT)

- **Ship Capital – (13.6%)**

- Actual construction cost of the ship and financing
- Many studies to date have assumed a ship built in America but for the price of one built in Korea

- **Fuel – (21.9%)**

- Emerging technology will assist in reducing fuel consumption
- Reducing speed also reduces fuel consumption

- **Crew & Food – (3.0%)**

- Regulated by USCG
- Some studies to date have assumed ship operating at reduced crewing after negotiating with the Coast Guard

- **Insurance and Maintenance - (0.7%)**

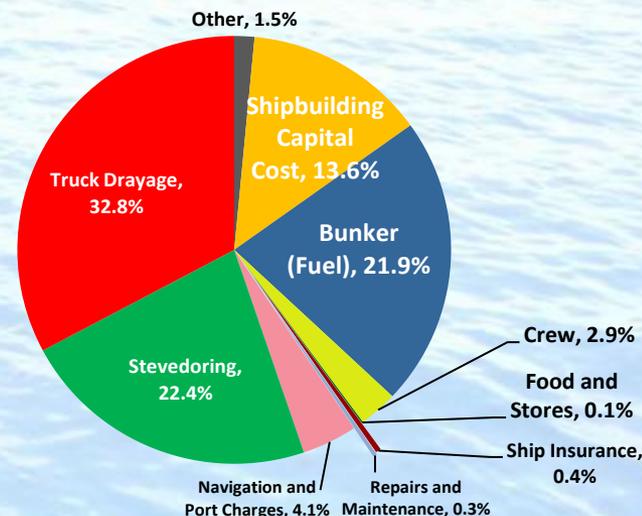
- Insurance depends upon vessel and operational environment, cost can surpass \$1M per year
- Maintenance costs are variable depending upon propulsion plant, vessel configuration, and design. Operational environment, and corporate maintenance policy is also a large factor

- **Pilot & Tugs – (1.5%)**

- Depending upon port and length of pilotage, Pilot and tugboat fees can make up a large piece of cost model
- For tugboats, prices can range from \$2k-\$5k per hour

- **Environmental - (? – Cost not identified in study)**

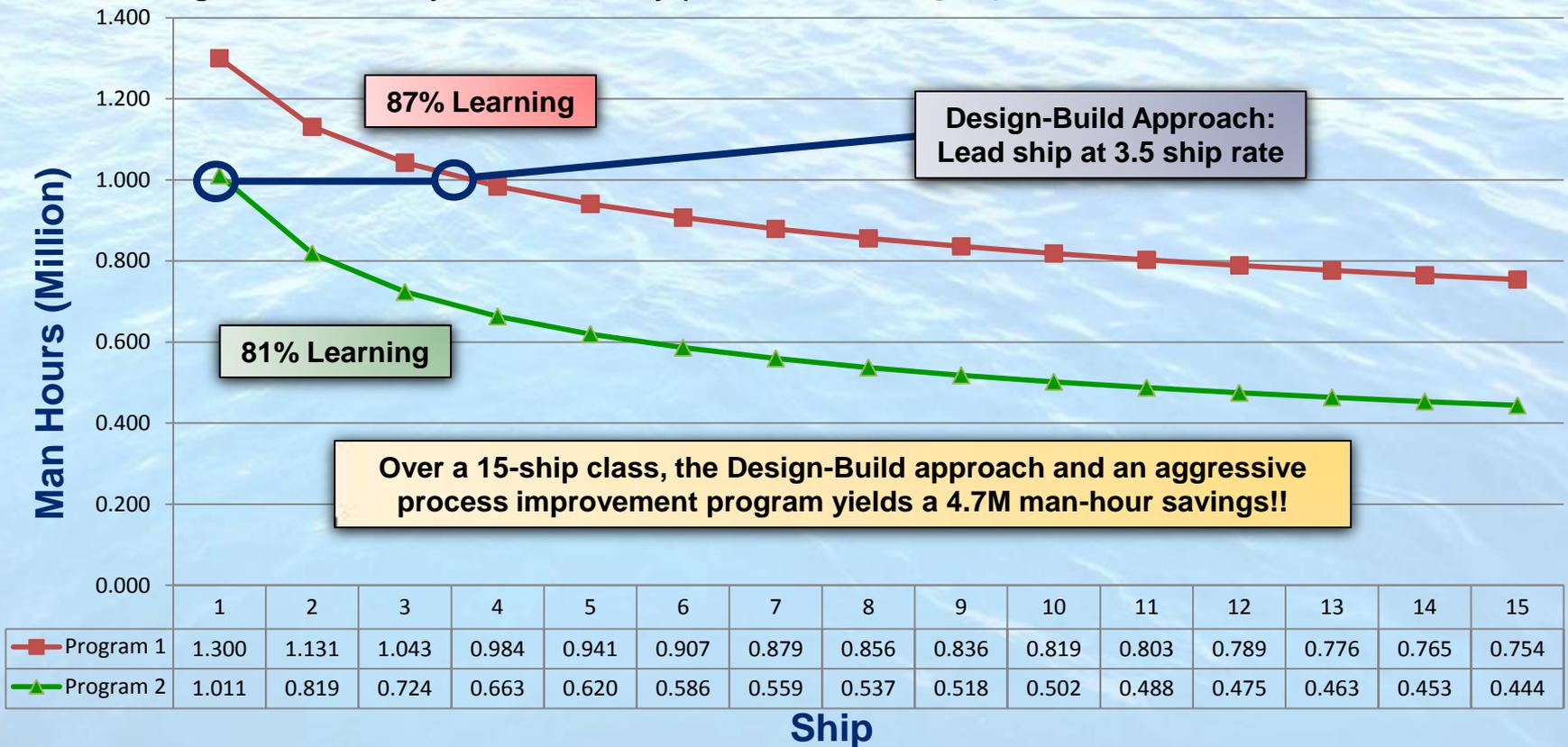
- By 2020, regulations will mandate environmentally friendly marine vessel operations
 - SOx 9x lower than today (Jan. 2015)¹
 - NOx 5x lower than today (Jan. 2016)¹
 - Ballast water regulations – Ballast water must be treated to less than 10 organisms per m³ or exchanged at 200 NM out to sea (Jan. 2009)²
- Establishment of Emissions Control Areas within 200nm of coastline will ensure drastic reductions in marine vessels contributions to local air pollution



Shipbuilding Capital Costs

Possible Savings

- Recent NASSCO studies have shown that a 200 Trailer AMH vessel can be constructed for ~\$150M with ~1.3M man-hours
 - Note: Shipbuilding capital cost is 13.6% or \$300M for a 450 trailer RoRo and \$150M for a 200 trailer RoRo. With either case, shipbuilding cost can be substantially reduced based on incorporation of design-build and with detailed design and planning completion prior to SOC
- 81% Learning Rate is currently best in industry (NASSCO T-AKE Program)



A map of Europe and its surrounding regions, including parts of North Africa, the Middle East, and Iceland. The map is light gray with black text labels for countries and cities. A prominent blue title 'European Marine Highways' is centered over the map. A blue horizontal line is drawn across the map, passing through the title. A blue vertical line is on the left side of the map. The title is in a bold, sans-serif font. The map shows major cities like London, Paris, Berlin, Rome, and Moscow, and countries like France, Germany, Italy, Spain, and Turkey. The Black Sea and Mediterranean Sea are also labeled.

European Marine Highways

European Marine Highway



MARCO POLO | 
NEW WAYS TO A GREEN HORIZON

● Marco Polo Program

- “...It is estimated that every Euro of Marco Polo funding generates social and environmental benefits worth 10 Euros or more.”¹
- Research or study projects are not eligible for funding
- Projects operated by commercial entities not the Government
 - Funding is a vehicle to get project started, not used for project sustainment
- Only international routes are considered
- First Marco Polo Program ran from 2003-2007
- Second Marco Polo Program has grown beyond the first
 - Runs from 2007-2013
 - Countries bordering with the EU are eligible for funding
 - Increased budget from €102 to €450 million Euros (\$136M to \$600M USD)

Five Goals²:

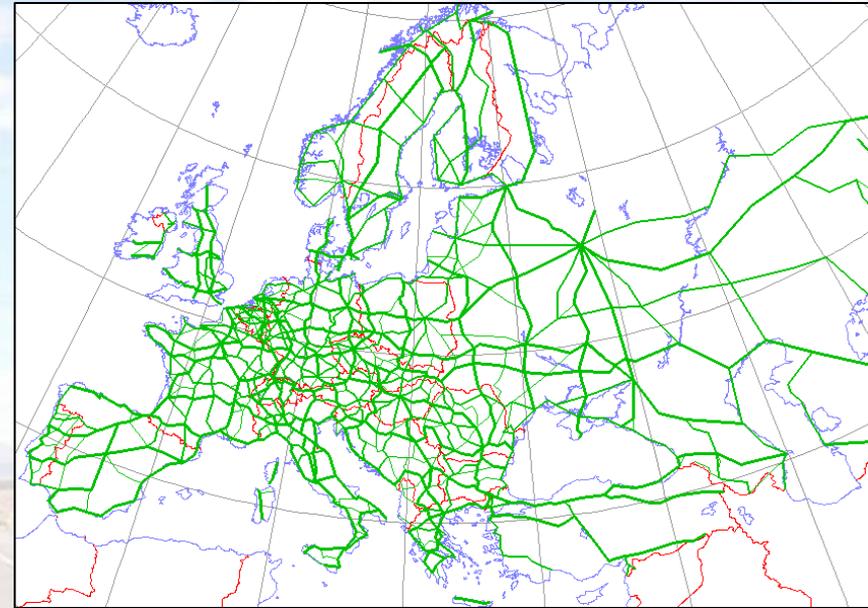
1. Utilize alternatives to roads such as Short Sea Shipping, railways, and inland waterways
2. Support innovations to overcome technological barriers to intermodal transport
3. Use motorways of the sea in combination with other modes of transport
4. Reduce the need to transport by road via improved logistics
5. Address training and other “soft” factors within the transport business

The European Union has ensured the success of Marine Highways through the Marco Polo Program

Road Systems

Europe

- **European short sea shipping has flourished:**
 - **Geography**
 - Marine Highways tend to form out of necessity; any market where the water route is shorter and less expensive will always win over the more costly land route
 - Due to Europe's vast mountain ranges, large metropolitan areas, and limited highway expansion ability, the Marine Highway has grown significantly
 - **Safety**
 - In the last 10 years, 2 million people have been killed or seriously injured in road crashes in the countries of the European Union²
 - Annual crash costs are approximately €160B
 - European Interstate system is not as large as U.S. Highway system²
 - European roadway systems are known to be older, narrower, and not able to handle increased land freight shipping²



European E-Road Network

Sources

1. <http://www.britannica.com/EBchecked/topic/505109/road/71914/National-and-international-highway-systems>
2. <http://www.saferoaddesign.eu/key-facts.aspx>
3. Brooks, Mary R. et al. "Short Sea Developments in Europe: Lessons for Canada." July 2009: 5

Because of the inability to expand existing roadway systems and the high cost of fuel, European shippers are economically driven to use Marine Highways over traditional truck shipments



Policy Shifts for Success



The Role of Shipbuilders and Transportation Industry Collaborate to Provide Affordable, Responsive Technology

- **Establish true partnerships between maritime and landside interests to drive out costs in drayage, port fees and stevedoring**
- **Develop highly producible AMH vessel designs with low total ownership cost that will:**
 - Meet the needs of several markets
 - Maximize series production, thereby reducing non-recurring engineering and vessel construction costs
 - Leverage international ship designs and construction experience
- **Embrace the technology for efficient “green” vessels to ensure state, local, and federal support for AMH**
 - Must incorporate highly efficient, state-of-the-art, and environmentally friendly marine engine technology as well as emissions mitigation technologies
 - Turn Air Quality Boards into allies

U.S. Shipbuilders are prepared to work with industry to develop suitable AMH designs, drive down capital costs, and leverage emissions mitigation and fuel efficiency technologies.

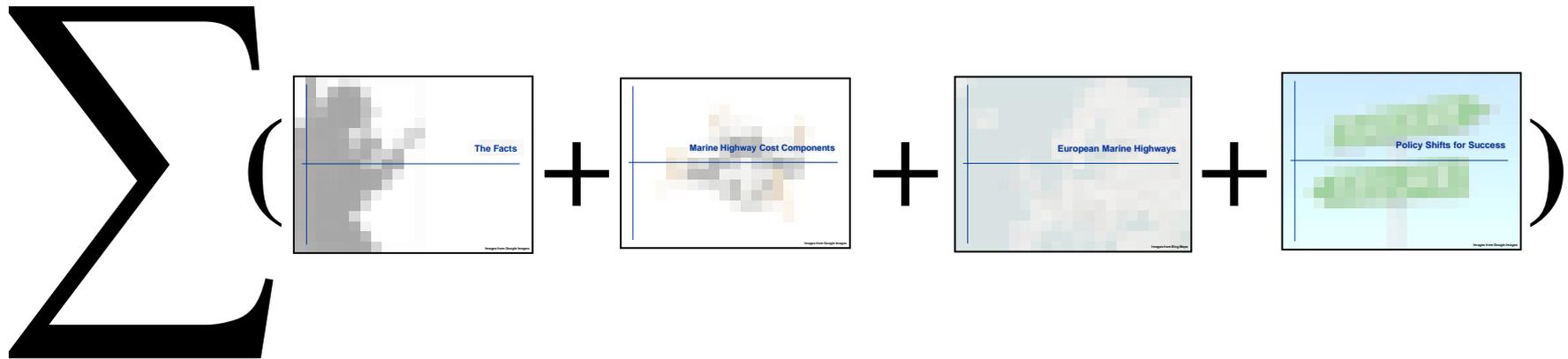
The Role of Government

National Transportation Policy

- **Develop a National Transportation policy, led by DOT, inclusive of all modes of transportation, which:**
 - Fosters inter-agency cooperation within DOT
 - Encourages inter-state cooperation with respect to freight mobility
 - Supports inter-regional cooperation through Metropolitan Planning Organizations (MPOs)
 - Provides direction from the Federal level while reaching down to State and local levels
 - Funds the Title XI loan guarantee program and designates a portion specifically to support AMH vessel construction
 - Facilitates terminal access for AMH ventures at the state and local level
 - Incentivizes state and local participation in AMH port initiatives by making Infrastructure improvement funding available (such as TIGER) contingent on their participation
 - Incentivizes modal shift to AMH service through:
 - Tax breaks for users of AMH service
 - Increased user fees on highly congested highways
 - An increase in the fuel tax
 - Removes disincentives to modal shift such as the Harbor Maintenance Tax
 - Establishes an American Marine Highway Infrastructure Fund (AMHIF) to provide long-term financial assistance for AMH terminal infrastructure and port equipment
 - Funding infrastructure for ports, rail hubs, and other distribution centers – *Allowing for improved technology and reduced freight dwell time*
 - Funding market studies to determine corridors that are ready to support the American marine highway - *MARAD to provide funding for market studies*

AMH will require a strong national policy supported and sustained by Federal funding, as has been the case for other modes and as done internationally.

Summary



Summary



- **Demand on the U.S. Intermodal Transportation System will continue to grow at a rapid pace**
 - Further highway infrastructure growth is substantially hampered by cost and lack of usable real estate
 - The rail system is self-sufficient. It will continue to increase capacity and meet demand for the foreseeable future
 - American Marine Highway is an under-developed, under-utilized transportation asset
- **Ship Capital Cost is not the issue**
 - Represents less than 13.6% of the per trailer freight cost
 - With a long run of serial production and a producible design complete prior to the start of construction, the shipbuilding industry can take substantial cost out (NASSCO is currently achieving a greater than 81% learning curve on T-AKE program)
- **A comprehensive National Transportation Policy, similar to Europe's Marco Polo Program, is required to facilitate the development of an American Marine Highway system as part of an intermodal transportation system. The comprehensive national policy must:**
 - Fund the Title XI loan guarantee program to support AMH vessel construction
 - Facilitate terminal access for AMH ventures at the state and local level
 - Incentivize modal shift to AMH service
 - Remove disincentives to modal shift such as the Harbor Maintenance Tax
 - **Establish an AMHIF to provide financial assistance for terminal infrastructure & port equipment**

American Marine Highways have great potential to become a vital component of our transportation infrastructure