NAPA WINTER MEETING
Port Industry Update

Capt. Jeffrey Monroe, MM, AMPE

Senior Port and Maritime Consultant-HDR

Education Director-International Association of Maritime and Port Executives

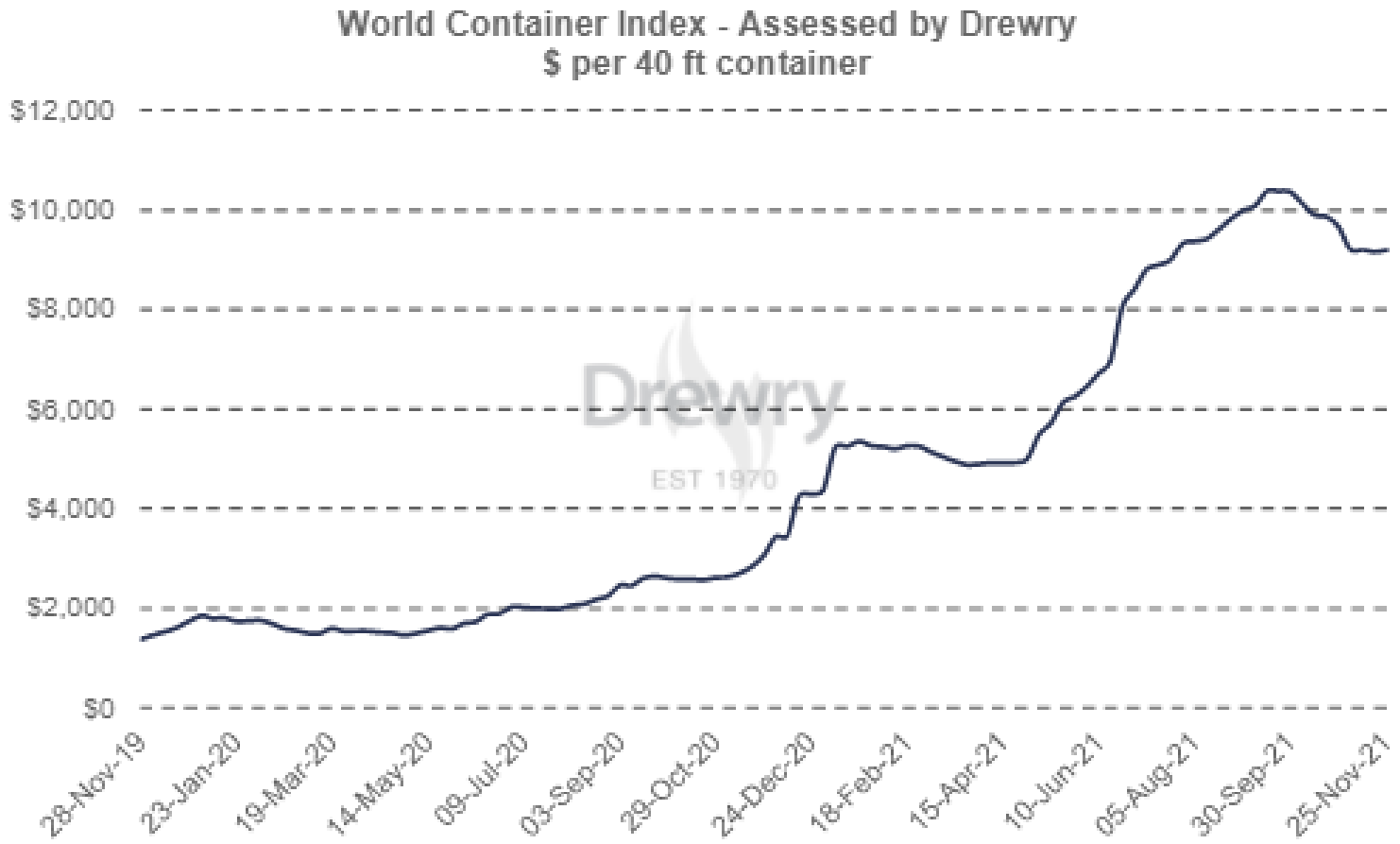
Today's Key Issues

- High Volumes at World Ports
- Port Infrastructure Improvements
  - Road, Rail and Waterways, Terminals
- Impacts of Larger Vessels
- Port Resiliency Related to Natural Disasters
- Environmental Protection and Pollution
  - Permitting Delays
- World choke points and Port Congestion
  - Terminals and Access, Empty Container Buildup
- Trucking delays, lack of drivers, warehouse space
- Logistic Supply Chain Delays

Port Volumes

- Very strong Volumes in United States ports in 2021
- Expected to continue into 2022.
- International trade around 12% of all cargo movements in North America (Increasing)
- Significant backlog of empties
- Congested Asian and North American Ports
- Very High Container Rates
- Consistent container rate increase to continue over next several months

Drewry World Container Index

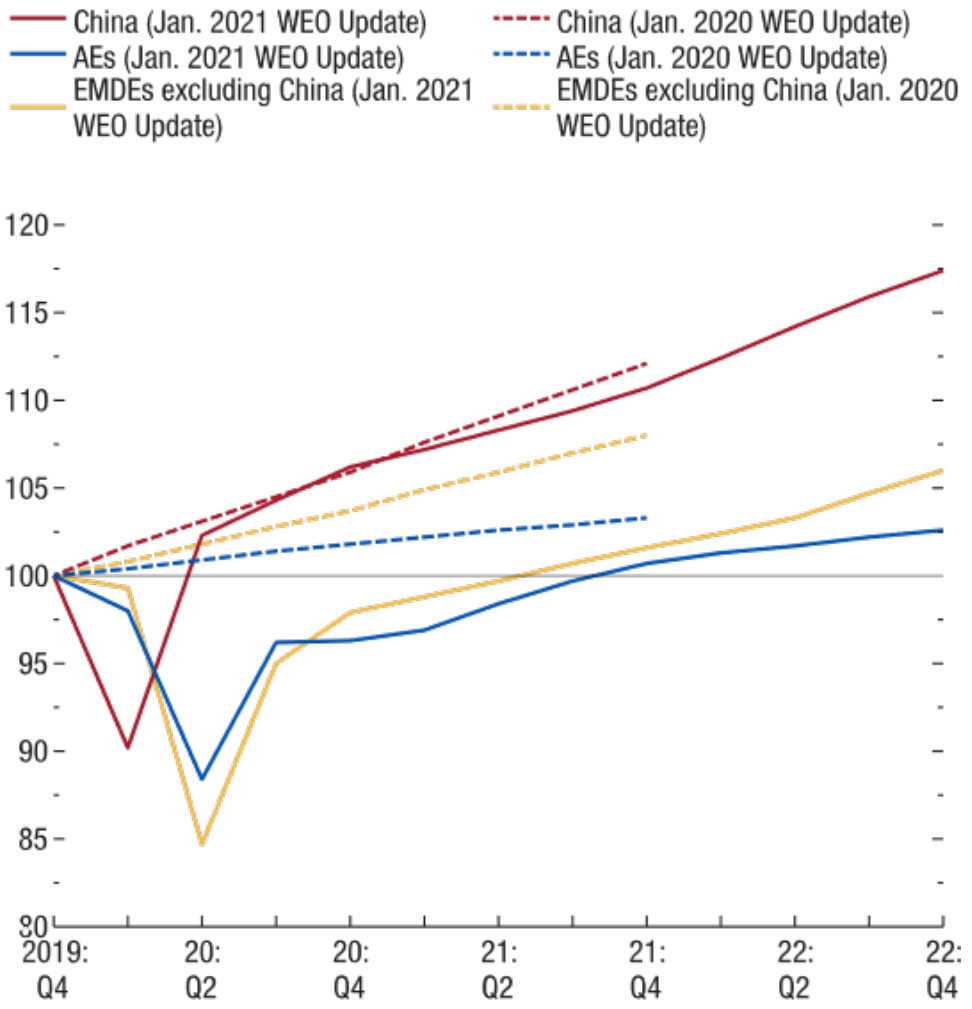


Route Costs

Route	11-Nov-21	18-Nov-21	25-Nov-21	Weekly change (%)	Annual change (%)
Composite Index	$9,193	$9,146	$9,186	0%	224% ▲
Shanghai - Rotterdam	$13,801	$13,400	$13,475	1% ▲	375% ▲
Rotterdam - Shanghai	$1,580	$1,577	$1,583	0%	36% ▲
Shanghai - Genoa	$12,438	$12,420	$12,435	0%	274% ▲
Shanghai - Los Angeles	$9,947	$10,038	$10,085	0%	150% ▲
Los Angeles - Shanghai	$1,303	$1,275	$1,281	0%	147% ▲
Shanghai - New York	$12,718	$13,139	$13,230	1% ▲	166% ▲
New York - Rotterdam	$1,189	$1,187	$1,186	0%	83% ▲
Rotterdam - New York	$6,255	$6,272	$6,232	-1% ▼	209% ▲

Recovery Forecast 2021-2022

Figure 1. Divergent Recoveries: WEO Forecast for Advanced Economies and Emerging Market and Developing Economies
(Index, 2019:Q4 = 100)



Source: IMF staff estimates.
Note: AEs = advanced economies; EMDEs = emerging market and developing economies; WEO = World Economic Outlook.

Higher Import Container Volumes

60% Import/40% Export–2020

NRF-2.1 to 2.2 million TEU imports rest of 2021 due to capacity/port delay issues

Source: NRF/Hackett Associates Global Port Tracker

Worldwide Shipping 6/1/2021

Source: Statista

- 95,000 Vessels in excess of 1,000 Gross Tons
- 54,000 merchant ships in international trade

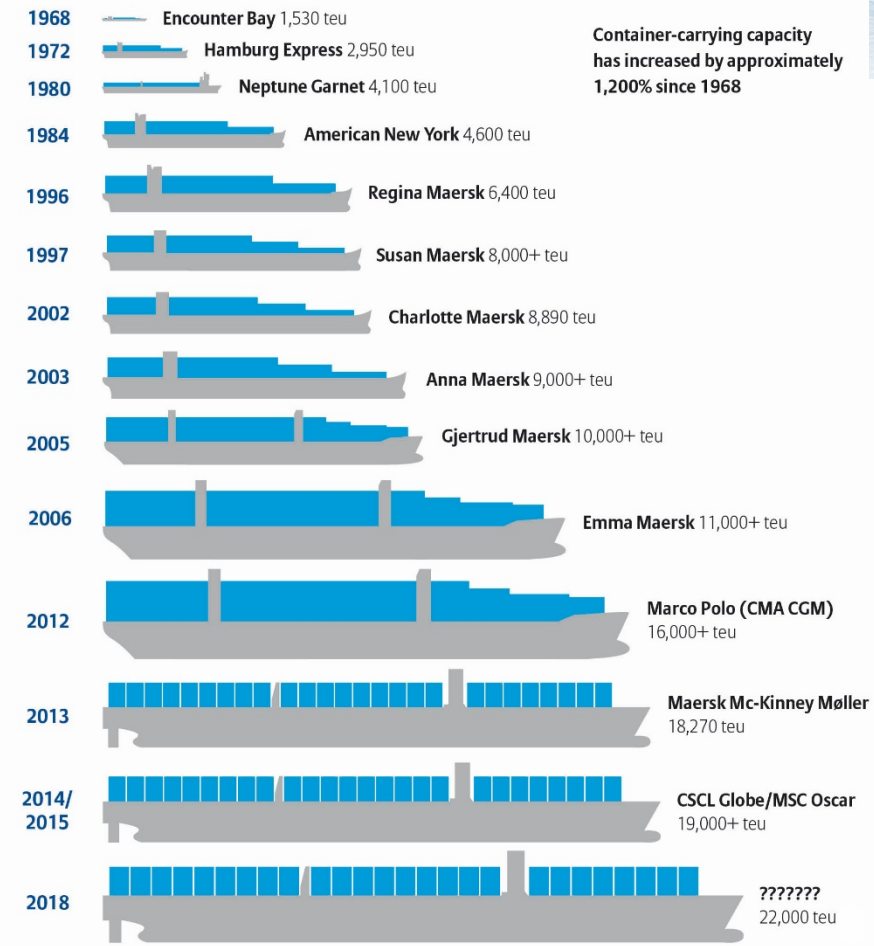
VESSEL TYPE	2020 COUNTS–Trend
Bulk Carriers	12,144 +
General Cargo	17,112 +
Crude Oil Tankers	8,033 +
Container	5,360 +
Chemical Tankers	5,734 +
RO-RO, PAX (Cruise)	5,057 +
LNG Tankers	2,035 +

SHIP ORDERS
Carriers Flush with Cash

- New ship orders set record high 2021
  - Orders doubled since January
- 381 ordered in 2021, 3.44 million TEU capacity to date, up from 2.5 mil in January
- Total orderbook is 5.3 million TEU's
  - Highest level was 6.8 mil TEU's in 2008
- 60-16,000 TEU ships on order
- More versatile 13,000-16,000 TEU ships preferred than ULCS.
  - Only 22 New Orders
    ULCS 23,000 to 24,000 TEU's

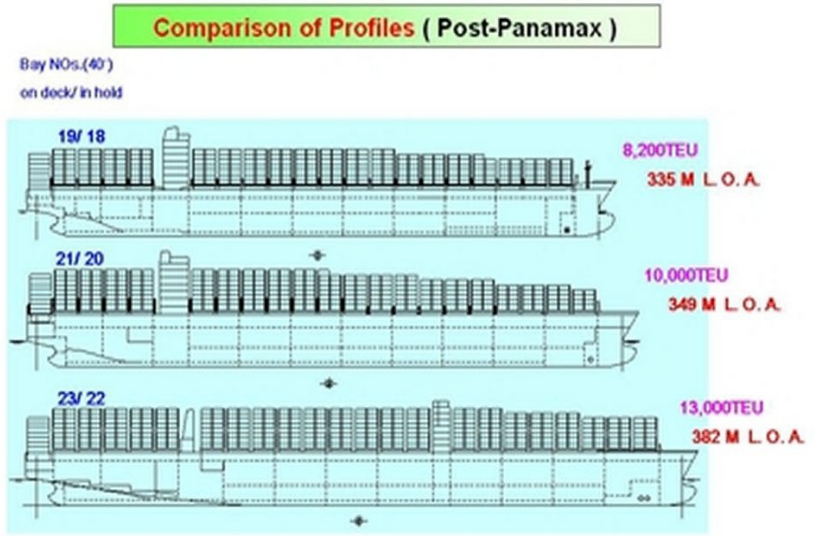
Fleet Changes
New Focus on Flexibility

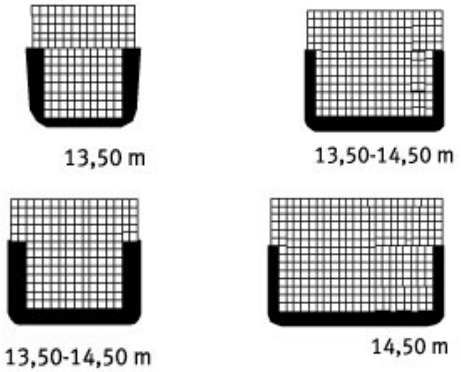
50 years of Container Ship Growth



Container-carrying capacity has increased by approximately 1,200% since 1968

Graphic: Allianz Global Corporate & Specialty.
Approximate ship capacity data: Container-transportation.com





MAERSK MADRID-EEE Mark II

20,568 TEU's; 1,309 Ft LOA; 192 Ft Beam, 48 Ft Draft
23 Cells Across; 11 Ordered-$1.8 Billion

2 NEW CMA-CGM 22,000 TEU ULTRA-LARGE CONTAINER SHIPS

- 220,000 dwt vessels (construction started in China)
- First ultra-large container ships to burn LNG
- LOA 400 meters (1,312 feet), Beam 61.3 meters (201.1 feet), Depth 33.5 meters (110 feet) in depth.

MSC Gulsun-23,000 TEU's

- LOA 1,312 Feet, Beam 202 Feet, 24 Rows Across
- 210,000 MT Gross Tons, 197,500 MT Deadweight
- Run: Xingang, China to Northern Europe
- 4 Extra Port Days anticipated, 12 More Being Built

WORLD'S 2nd LARGEST CONTAINERSHIP

Hyundai Merchant Marine (Korea)

HMM ALGECIRAS (1st of 12 New Ships)

LOA 399.9 M (.4 Kilometer) 1,312 Ft. .25 Mile

Beam: 61 M, 200.13 Feet, DEPTH: 33.2 M, 108.92

Capacity: 23,962 TEU's Flag: Panama

CS EVER ACE

WORLD'S LARGEST NOW IN SERVICE, 24,000 TEU's,
LOA 1313 Ft, Beam 204 Ft , Draft 53 Ft

Recent Smaller Containership Deployments/Orders

- MSC 8-9,500 TEU ships
- Maersk 7-3,600 TEU ships
- Evergreen 2-1,800 TEU Ships, 2 sets of 11 ships each (one class at 2,300 TEU and 2nd set of 3,000 TEU's), new class of 15,000 TEU ships
- CMA CGM 28 DANUBE Class Ships: 9,400 to 10,900 TEU's

- MSC Ship Widening Existing Ships
  - Increase of 30% capacity per vessel

Amerimax 16,000 TEU's
CS BENJAMIN FRANKLIN

Ocean Carrier Alliances-2021

COVID Forced Management Improvements

U.S LOOKING INTO COMPETITION IMPACTS

SYMPHONY OF THE SEAS

Largest Cruise Ship Class Currently

- Royal Caribbean Oasis-class
- 228,000 gross tonnage
- Length: 1,188 feet (362m)
- Beam: 154 feet (47m)
- Draft: 30 feet (9.1m)
- 18 Decks, 2,747 Staterooms

- Speed: 22 knots (41 km/h; 25 mph) cruising
- Capacity: 6,680 passengers, Crew: 2,200
- $1.35 Billion

WONDER OF THE SEAS

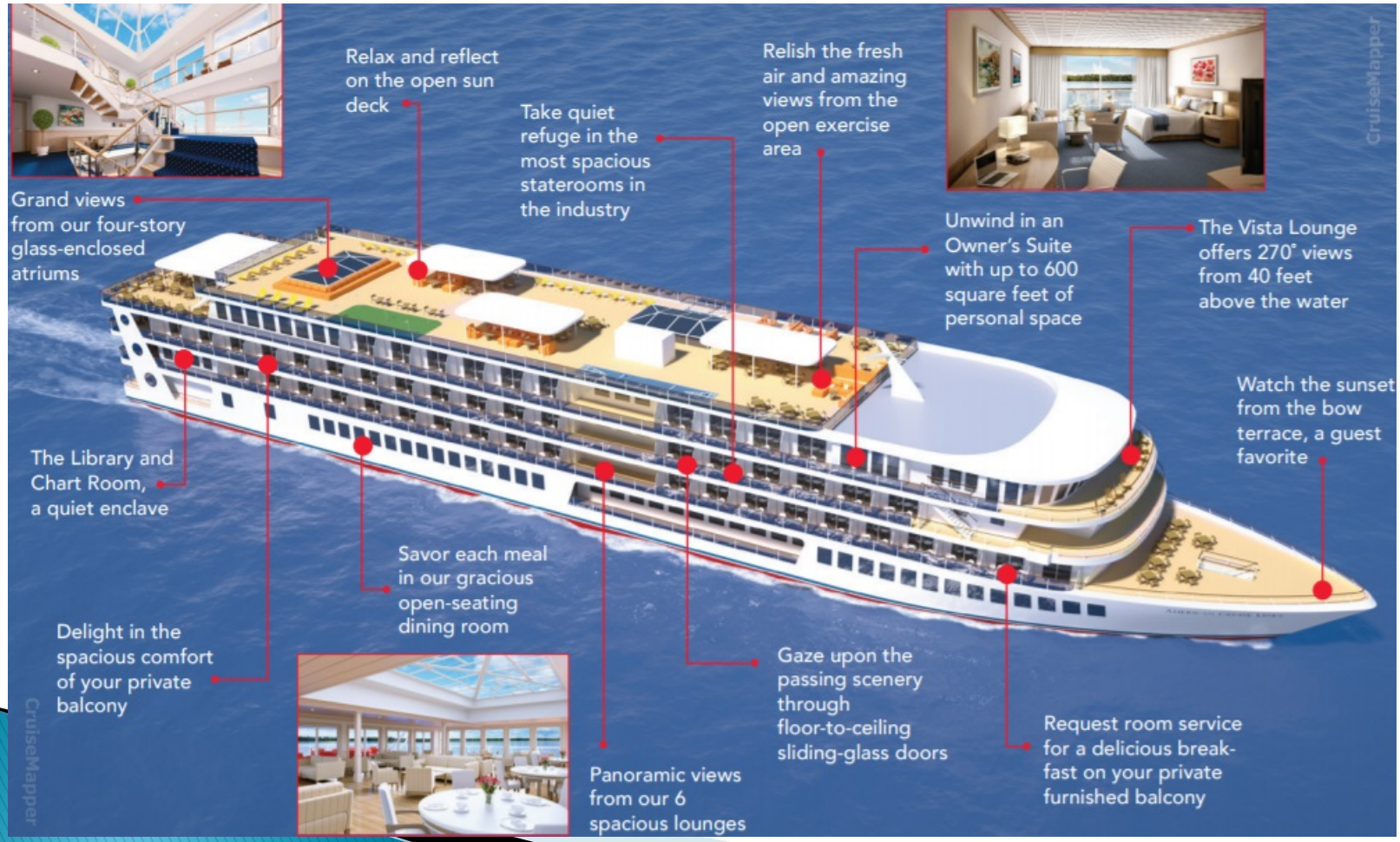
World's Largest Cruise Ship-RCI

1,188 LOA; 236,857 GT

6,988 PAX, 2,300 Crew

POCKET CRUISE SHIPS

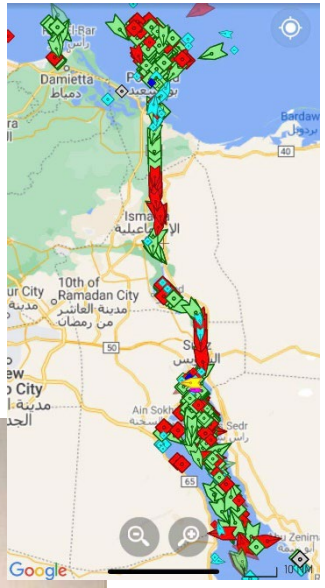
- AMERICAN SONG (2018), AMERICAN HARMONY (2019)
- Lower Mississippi and West Coast (20 new deployments 2018)

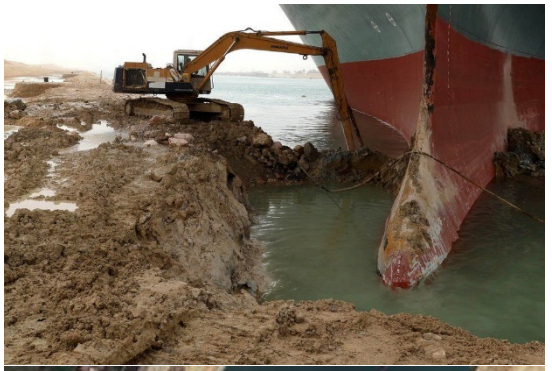


Fleet Reductions Through Ship Scrapping of Older Tonnage

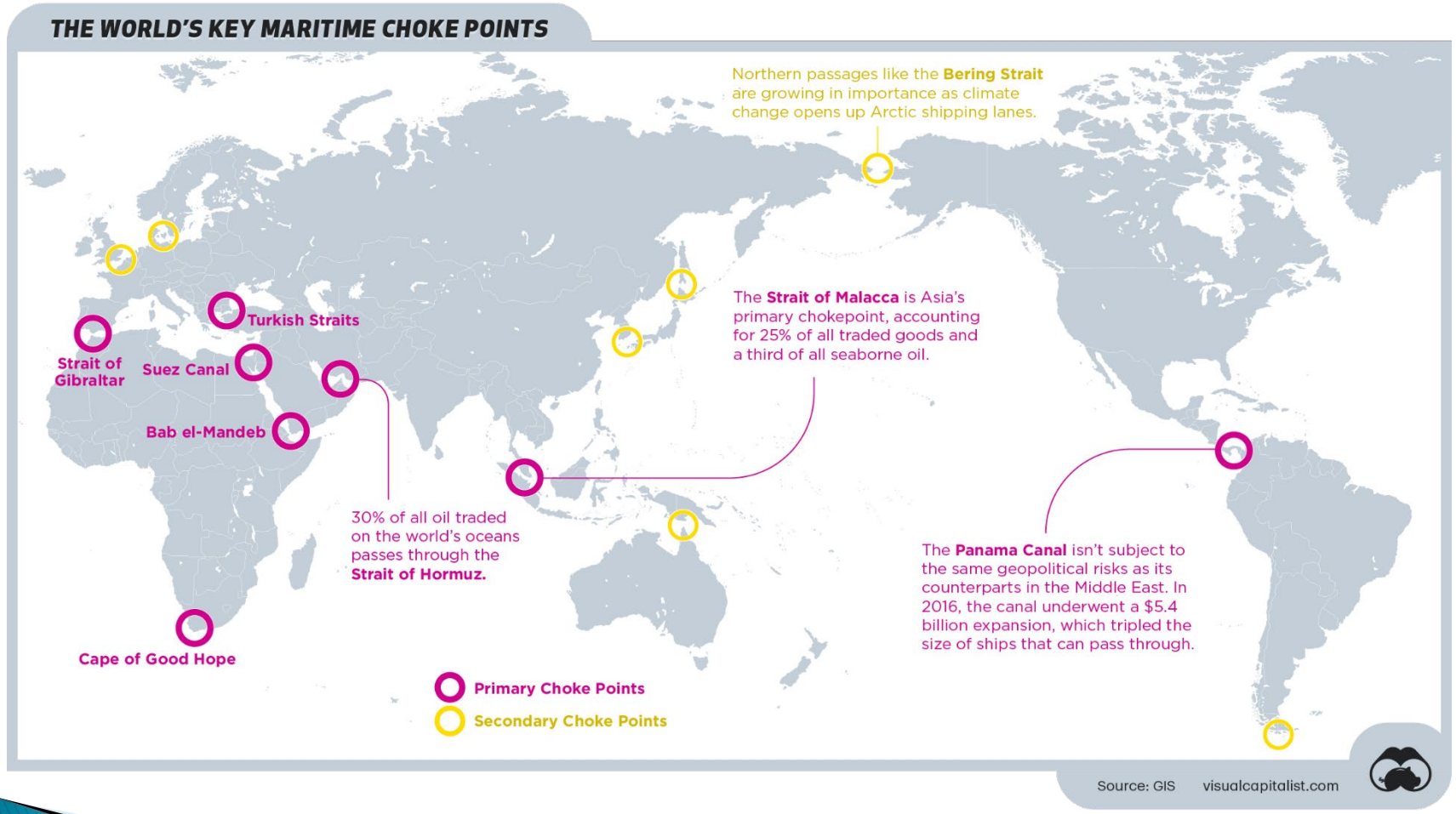
Larger Ship Problem

Heavier Volume Transit Interruptions





Choke Points in International Shipping



Ship Backlogs Fall 2021

- November 2021
- 100 ships in LA/Long Beach, 62 on berth, 32 containerships
- 14 Day+ average wait;
- 170,000 to 180,000 TEU moves per week
- Call cancellations
- Alternative routes/ports by carriers
- Extra Loaders (additional calls)
- Lines trying to reduce Asia backlogs
- Build up of Empties

Why Has Logistics Gone to Ship?

- High volume increase in overloaded system
- 25% above normal volumes
  - 40% Asian Imports through LA/LB
- Terminals congested-buildup of empties
- Highway and rail network congestion
- Gate issues and turnaround time in terminal
- Truck and truck driver shortage
- Lack of warehousing, warehousing hours
- Lack of inclusive public transportation policy
  - **We knew this was coming a decade ago!**

FMC FOCUSED ON CONTAINER MOVEMENTS

- Creating 6 supply chain innovation teams
- Looking at timing related to return of empties
- Ports working with carriers to have “sweeper” ship calls to remove empties

Hub and Spoke System Expansion

TOP 10 WORLD PORTS

MILLIONS OF METRIC TONS 2021 (Projected)

RANK	PORT	COUNTRY	TONS
1	Shanghai	China	760
2	Singapore	Singapore	650
3	Ningbo-Zhoushan	China	625
4	Shezhen	China	610
5	Guangzhou	China	590
6	Tangshan	China	570
7	Qingdao	China	550
8	Ningbo	China	535
9	Port Hedland	Australia	515
10	Rotterdam	Netherlands	500

Top 11-20 WORLD PORTS

MILLION METRIC TONS 2021 (Projected)

RANK	PORT	COUNTRY	TONS
11	Dalian	China	490
12	Zoushan	China	435
13	Busan	South Korea	415
14	Rizhao	China	400
15	Yingkou	China	400
16	South Louisiana	USA	310
17	Zhangjiagaug	China	305
18	Caofeidiam	China	300
19	Yosu	South Korea	295
20	Yantai	China	290

U.S./Canada PORT RANKINGS: Prj-2020

Total Metric Tons (MIL) 361 Ports/176 Ports

1. South Louisiana:	308.0	1. Vancouver:	104.7
2. Houston:	240.9	2. St. John, NB:	30.5
3. New York/Jersey :	126.7	3. Come-By-Chance:	27.1
4. New Orleans:	87.8	4. Port Hawkesbury:	26.3
5. Beaumont:	87.2	5. Montreal:	24.8
6. Long Beach:	78.2	6. Sept-Iles:	24.6
7. Corpus Christi:	85.8	7. Quebec/Levis:	24.6
8. Baton Rouge:	68.7	8. Port-Cartier:	17.9
9. Los Angeles:	60.2	9. Prince Rupert:	14.9
10. Hampton Roads:	57.7	10. NFL-Offshore:	14.0

Sources: USACE and Transport Canada

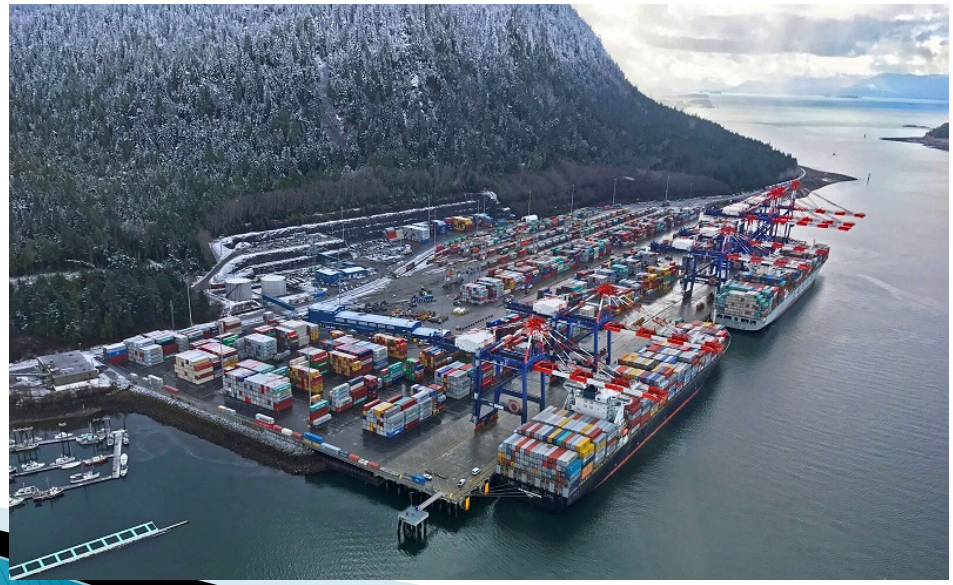
Winners and Losers (Total Tons)

Source: Lloyds CY 2020

Winners		Losers	
Zhuhai	+69.7%	Khofakkan	-46.4%
Barcelona	+32.7%	Giora Tauro	-12.5%
Tangshan	+30.7%	Dammam	-11.3%
Mundra	+27.7%	Port Klang	-9%
St. Petersburg	+26.8%	Algeciras	-7.8%
Gdansk	+22.7%	Dandong	-6.2%
Bandar Abbas	+22.7%	Melbourne	-5.4%
King Abdullah	+20.9%	Felixstowe	-4.1%
Savannah	+19.7%	Koohsiung	-1.9%
		Alexandria	-1.3%

Top Global Terminal Operators

1. COSCO-China Shipping 91.3 mil TEUs
2. Hutchinson Ports 82.3 mil TEUs
3. APM Terminals 76.3 mil TEUs
4. PSA International 73.9 mil TEUs
5. DP World 68.7 mil TEUs



10 LARGEST CONTAINER SHIPPING COMPANIES IN THE WORLD

1. APM-MAERSK

2. MSC – MEDITERRANEAN SHIPPING COMPANY

3. COSCO – CHINA OCEAN SHIPPING COMPANY

4. CMA-CGM

5. HAPAG-LLOYD

6. ONE – OCEAN NETWORK EXPRESS

7. EVERGREEN LINE

8. YANG MING MARINE TRANSPORT

9. HYUNDAI MERCHANT MARINE

10. PIL PACIFIC INTERNATIONAL LINE

900 Million TEU's Handled Worldwide 2020

Top World Container Ports-2020

(Source: Lloyds)

		Millions of TEU's
1.	Shanghai	43.9
2.	Singapore	37.8
3.	Ningbo-Zhoushan	28.5
4.	Shenzhen	25.9
5.	Guangzhou	23.8
6.	Busan	22.5
7.	Qingdao	21.5
8.	Hong Kong	18.8
9.	Tianjin	17.5
10.	Rotterdam	15.5

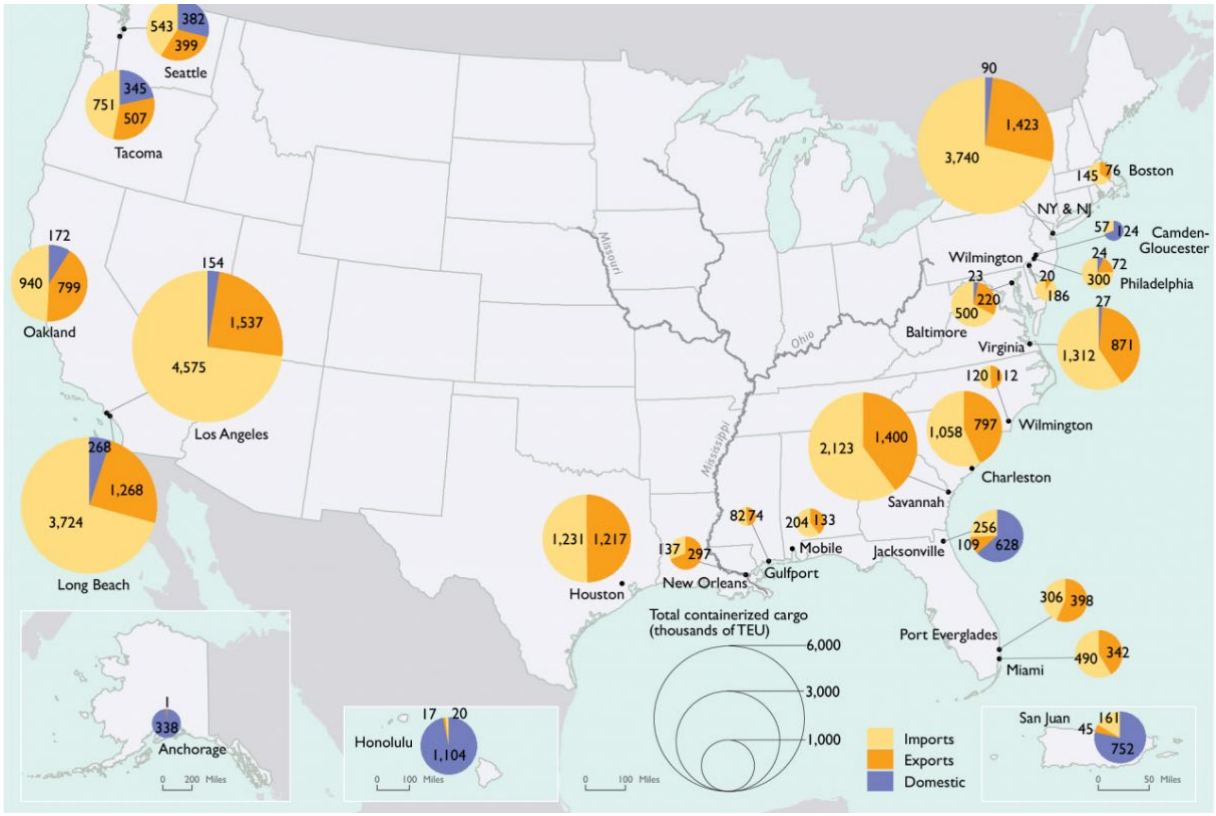
U.S. CONTAINER PORT RANKINGS

Top 100 World Container Ports-2020

(Source: Lloyds/US DOT)

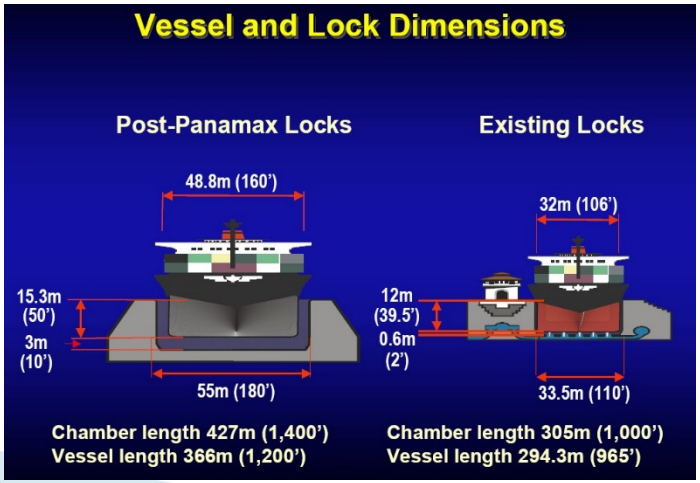
WORLD RANKING

21. LA/Long Beach
23. NY/NJ
38. Savannah, GA
47. Seattle/Tacoma
62. Houston
65. Virginia
79. Oakland

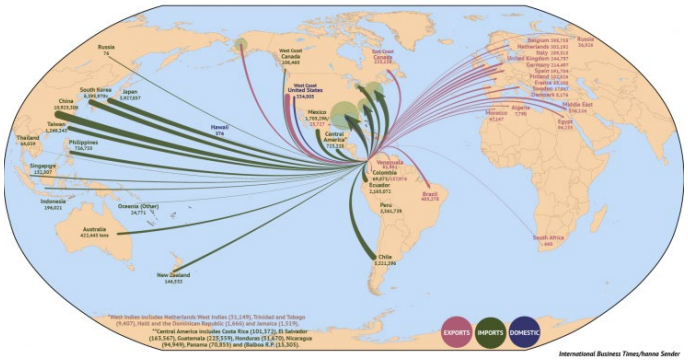


The Panama Canal

- 7% of World Trade Uses Canal
- 13, 424 Transits 2021 To Date
- $2.6 billion in tolls collected
- 296,990,600 Metric Tons Transported
- Most transits were Neo-Panamax vessels
  - 365.96 meters in length, 48.3 meters breath, 14,863 TEU's



ORIGINS & DESTINATIONS



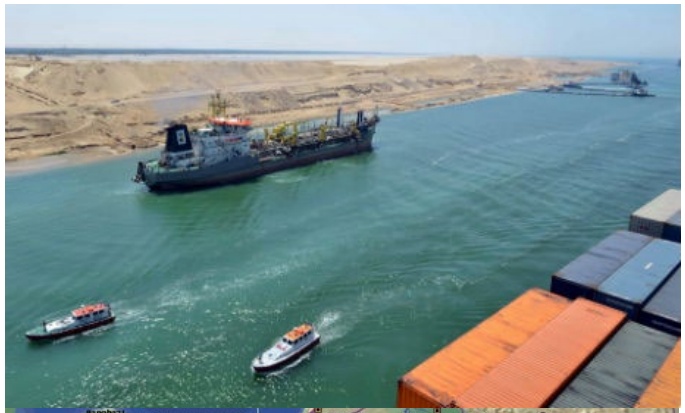
Top O/D Countries

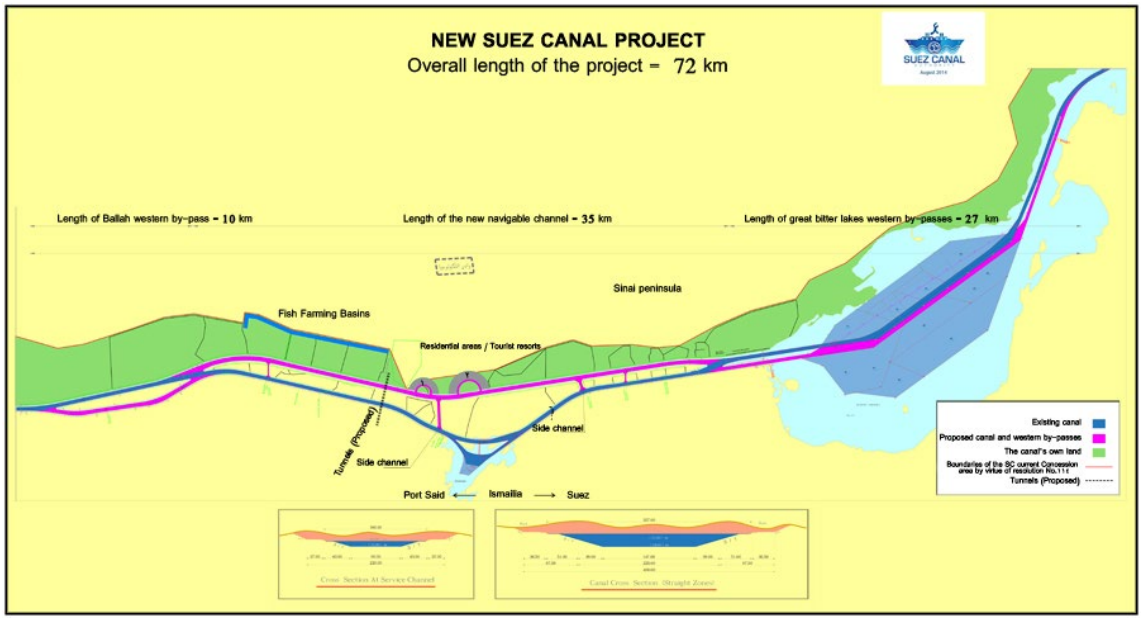
1.	United States	70.0%
2.	China	16.3%
3.	Mexico	11.8%
4.	Chile	11.8%
5.	Japan	11.8%
6.	Peru	9.3%
7.	Columbia	9.1%
8.	Republic Korea	9.2%
9.	Ecuador	5.2%
10.	Canada	4.7%
11.	Guatemala	3.0%
12.	Panama	2.8%
13.	Trinidad	1.9%
14.	Spain	1.9%
15.	Netherlands	1.8%

CANAL DE PANAMÁ

Suez Canal

- 193.30 KM (120.11 MI) Long, 24 M (79 Ft) Deep, 205 M (673 Ft) Wide
- 100 ships per day average, 20,000 total transits, Traffic Volumes Up
- Ships up to 240,000 DWT, 20 M (66 Ft) Draft, 68 M (223 Ft) Air Draft





Panama Vs. Suez Canal Hong Kong to NY/NJ

- **Ship Size:** The Suez Canal can carry a higher load than a ship going through the Panama Canal.
  - Panama Canal max size 14,800 TEUs,
  - Suez Canal max size 18,000 +TEUs.

- **Transit time**: Panama routing takes 26 days versus 27 days via Suez at non-stop transit at 18 knots.
  - however, due to routing, stops and other factors, each ship takes “11 days longer” for total transit time.

- **Cost Savings Per TEU**:
  - Panama Canal-Cost per TEU is $1,250USD
  - Suez at $850USD per TEU.

- **Tolls on Fully Loaded 4,800-TEU Container Ship:**
  - Panama charges roughly $450,000USD
  - Suez Canal Charges $489,600USD.

Tuas Terminal-Singapore Singapore Port Authority-PSA

- Full Buildout 2040
- 65 Million TEU Capacity
- Phase One Done 2021
  - 20 Million TEU's
  - $1.82 Billion USD
  - 20 Deepwater Berths
  - 5.3 mi (28,215 ft) dock
  - 729 acres of New Land
- Thai Kra Isthmus Route
  - Part of China's Silk Road
    - China/Indonesia Treaty
  - Doing a Land Route
    - 2 new ports
    - Canal Plan Scrapped

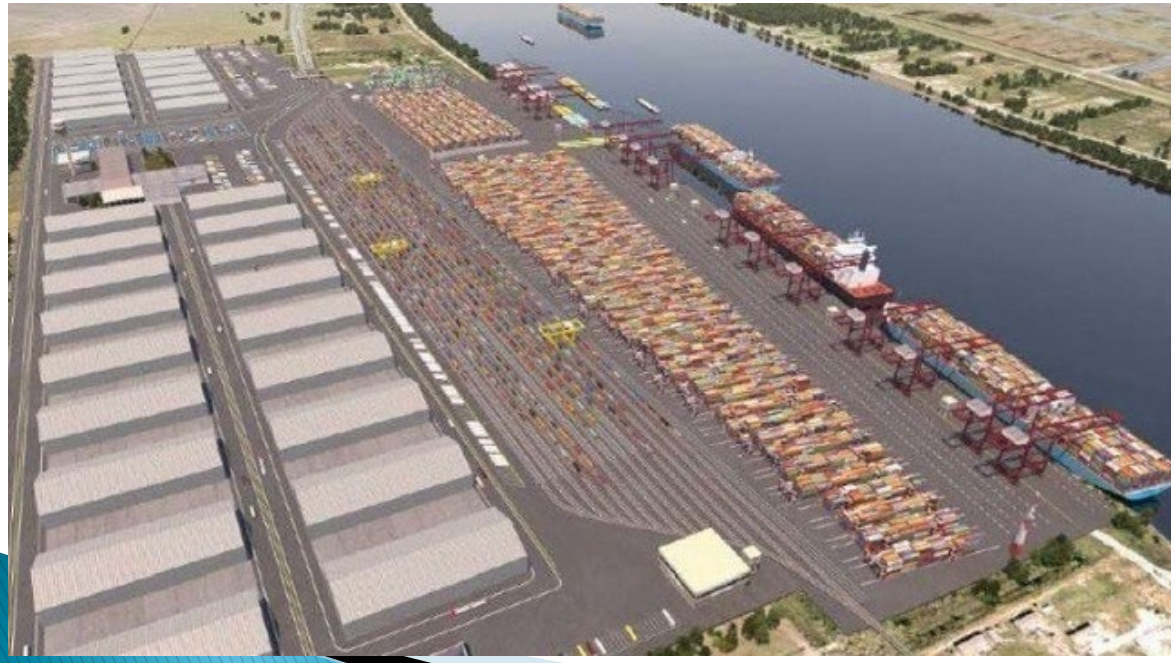
Singapore Port Authority Acquisitions

- Plus 10% Global Growth–4th largest operator
- Purchased HALTERM in Halifax in Aug 2019
- Entered US market with purchase of Penn Terminals September 2019
- Major investor and manager in Port of Mariel, Cuba since 2011

Plaquemine LA Mega-Port

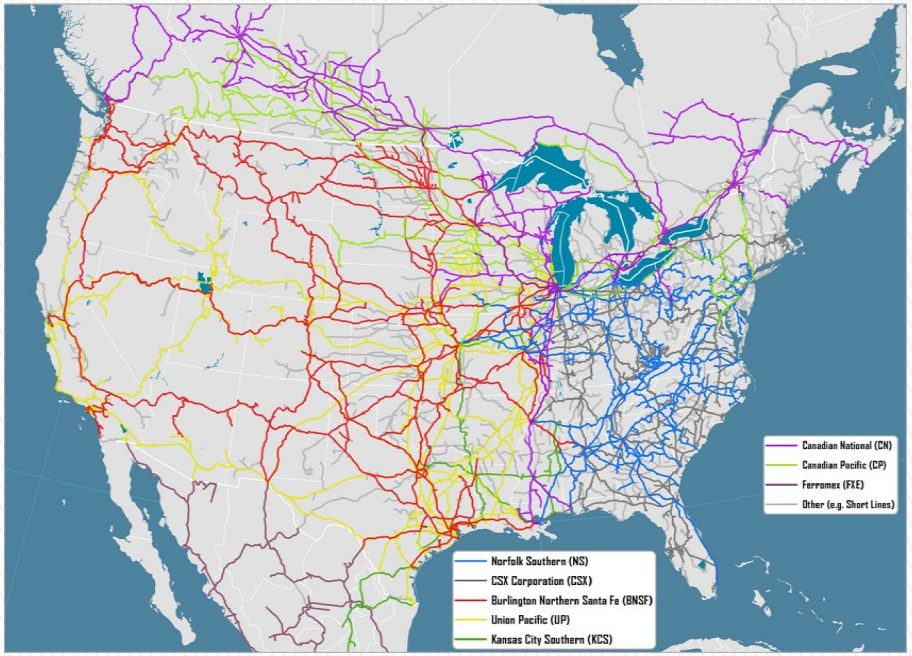
INLAND RIVERS PORTS & TERMINALS, INC. AN ASSOCIATION

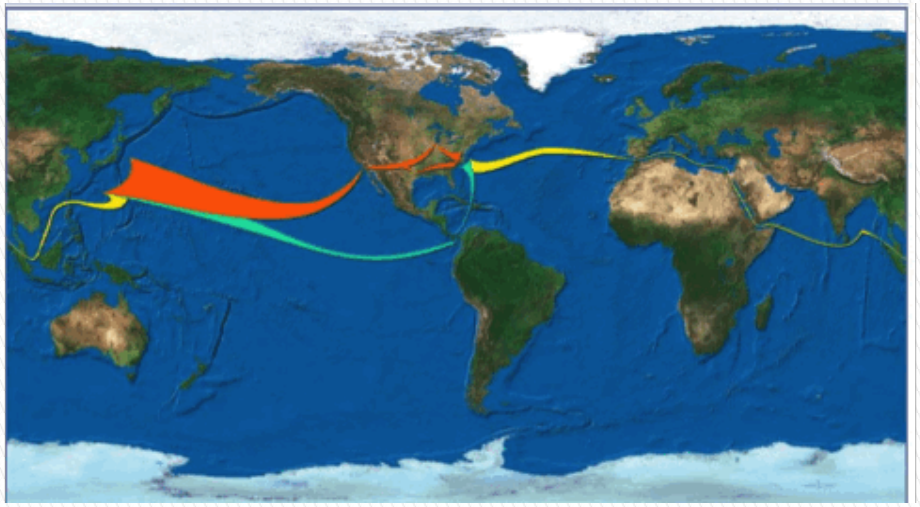
- APMT will be new operator when developed
  - 8,200 feet of river frontage, 50-Foot-Deep Berths
  - Initially 1,000 acres/5,000 available
- Extension of rail lines into site



Trends in the Next Decade

- Railroads remain challenged by extensive gridlock & equipment shortages
- Railroad Mergers
  - CP/KCS, CSX/Pan AM
- Spine Car Manufacturing Up
- Trucking Rates
  - 60% Growth in Truck Traffic over next 30 years
  - Higher rates
  - Driver Shortages/ELB Impacts
- New Maritime Hub-Cuba
- High container rates
  - MT Container Shortages/Backlogs
- Regulatory issues
- Technology changes
- Offshore wind port selection
- Autonomous Vessels
- New Vessel Fuels





Salvage and Marine Firefighting Requirements-SMFF

- Regulations in place since 2008-also under OPA 90
- No specific regulations-left to each port district
- Compliant SMFF response plan "ensures" by "contract or other approved means" that "capable" response equipment and personnel are "available" anytime a vessel response plan (VRP) is activated

EMISSION CONTROLS

Sulphur Emission Control Areas (SECA) 1/1/15

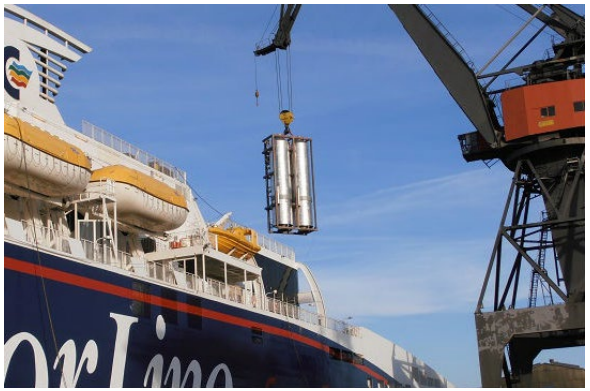
Sulphur Fuel Content < .1%

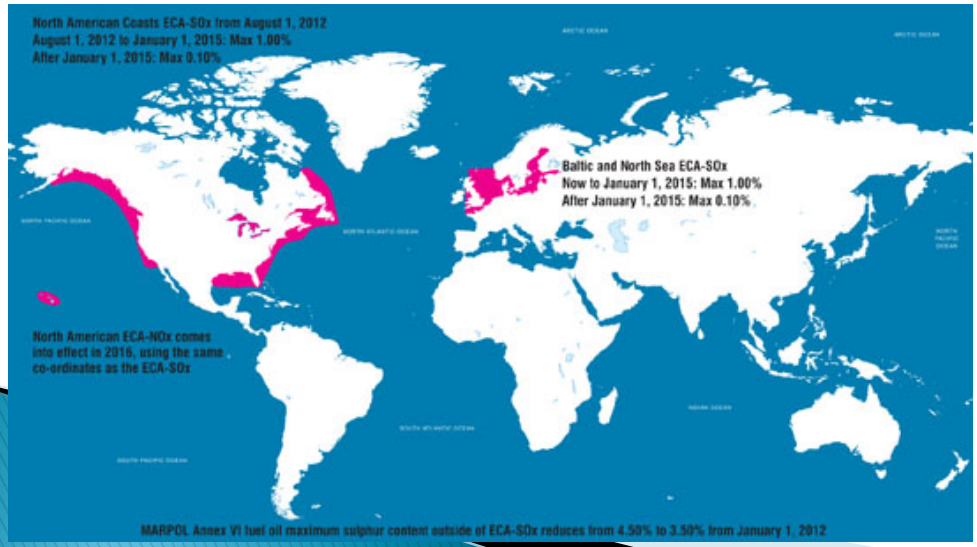
2020-Expanded LS Fuel <.5% Worldwide

- EPA/IMO Tier 3 and Tier 4 Marine Diesel Engines
- Exhaust System Scrubbers
- **Fuel Changes-** Vessels, Trucks, Rail

HFO(Heavy Fuel)>MGO (Marine Gas Oil) >ULS Fuel

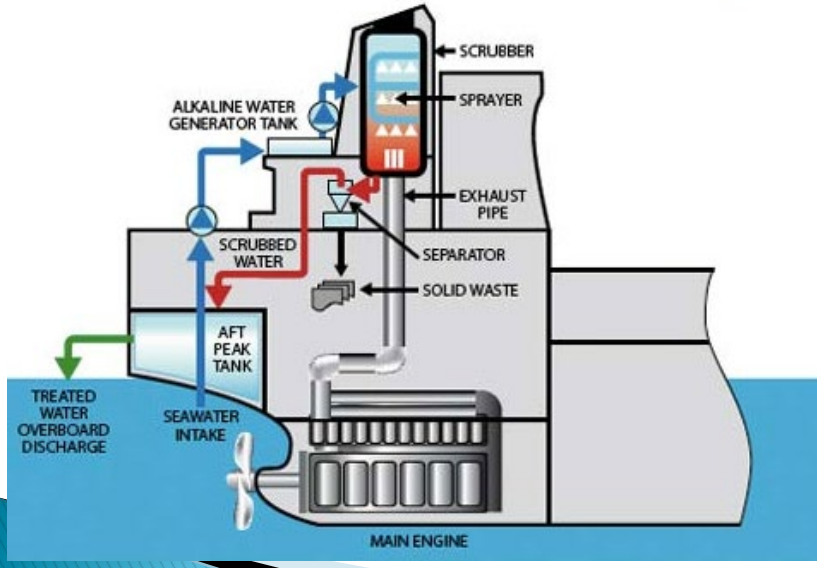
- Cold Iron Shore Power Systems
  - (Alternative Marine Power-AMP) Less New Systems

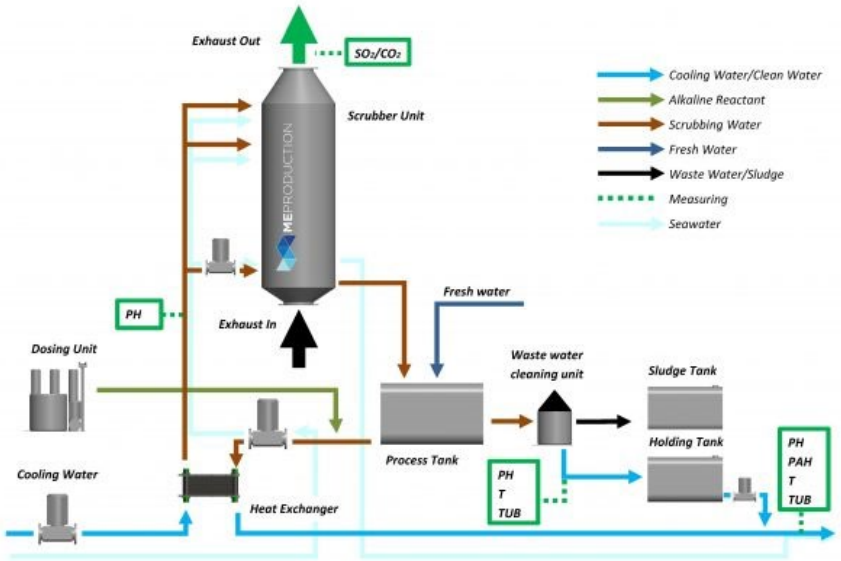




Scrubber Issues for Ports

- Next several years, shift to ULSD-availability concerns
- Estimated 500 scrubber refits per year-equipment availability
- Longer term-new ships built with scrubbers
- Shift to scrubbers for older vessels as equipment is available
- Open loop scrubber (left) discharge pollution issues



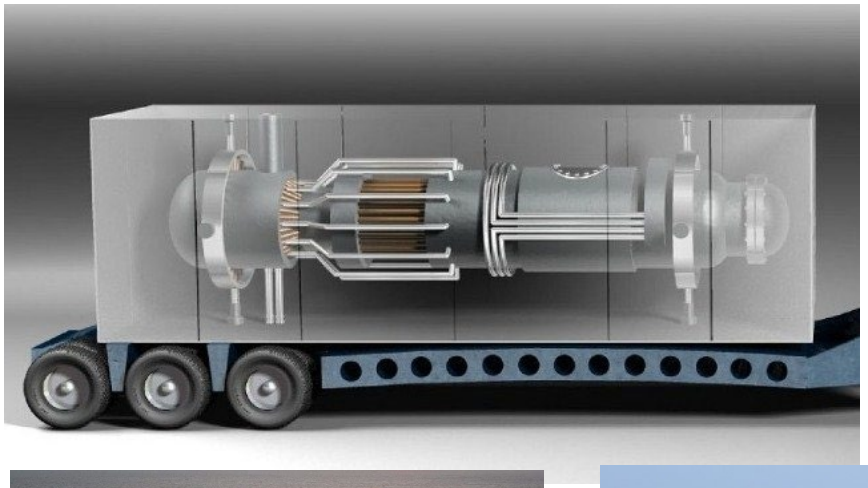


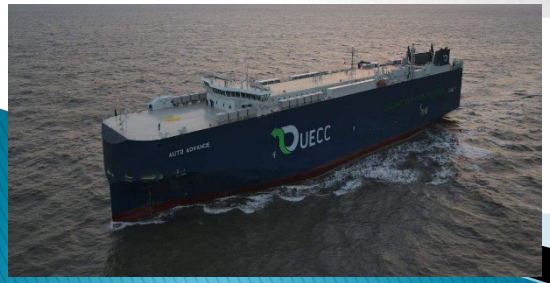
Fuel Supplies at Ports

- Mostly ships use Heavy Sulphur Fuel Oil-HSFO
- 117 of the 168 Containerships on order:
  - Using scrubbers fitted at the build yard
- 34 additional will be LNG capable
- 29 of 168 will be dual fuel-HSFO/LNG

New Marine Propulsion

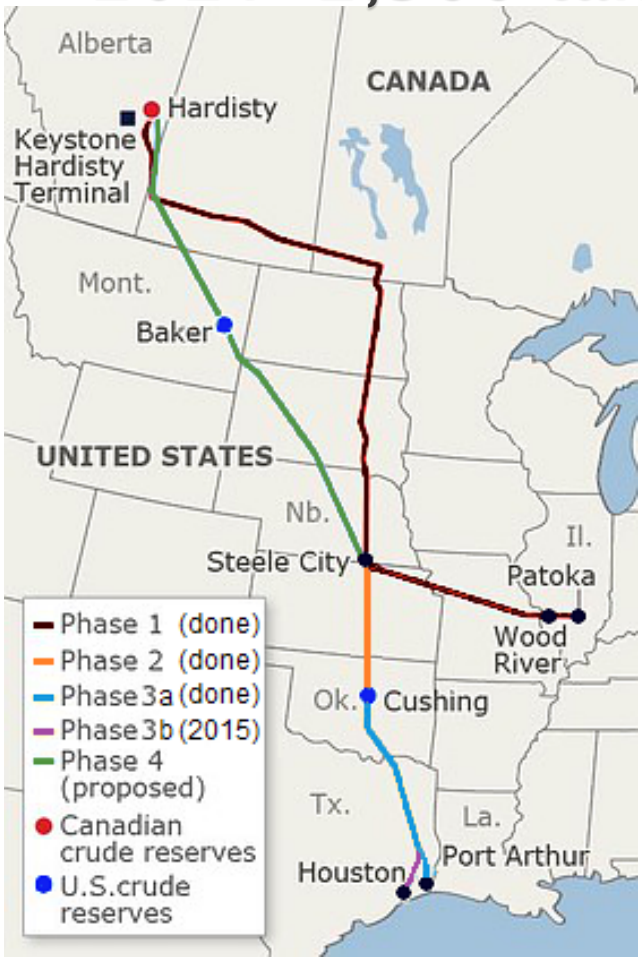
- Use of containerized microreactors being developed
  - Supported by US Department of Energy
  - Development would include marine propulsion
- Ammonia Being Tested for Ship Propulsion
- Electric, Hybrid, H1Fuel Cell, Methanol, LNG

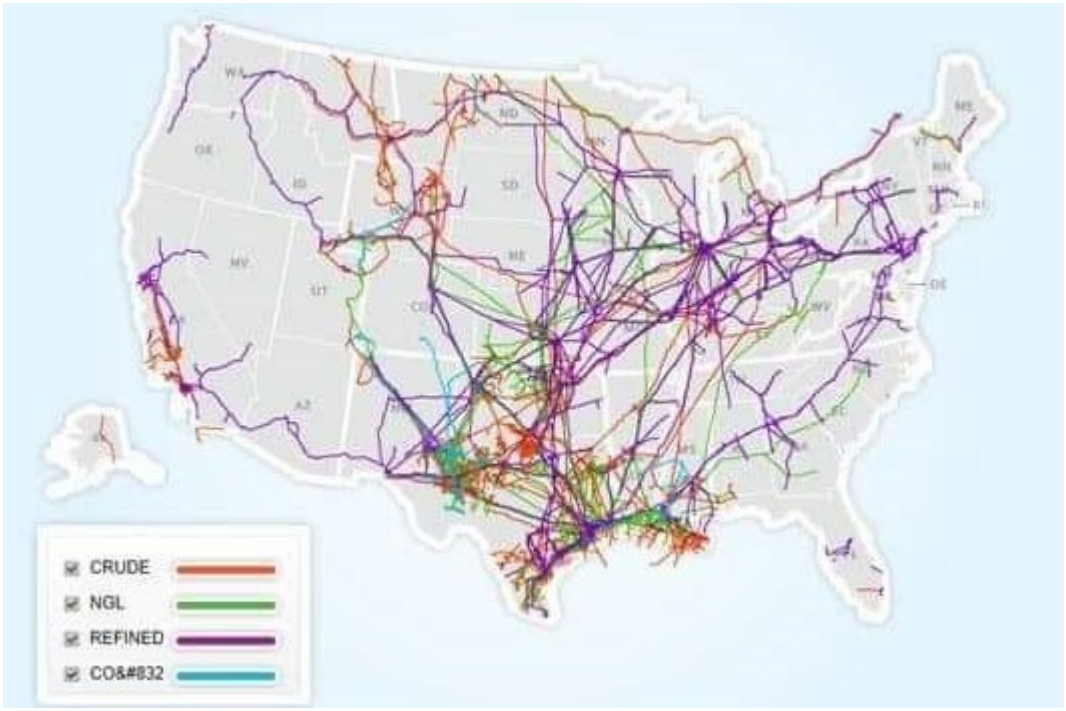




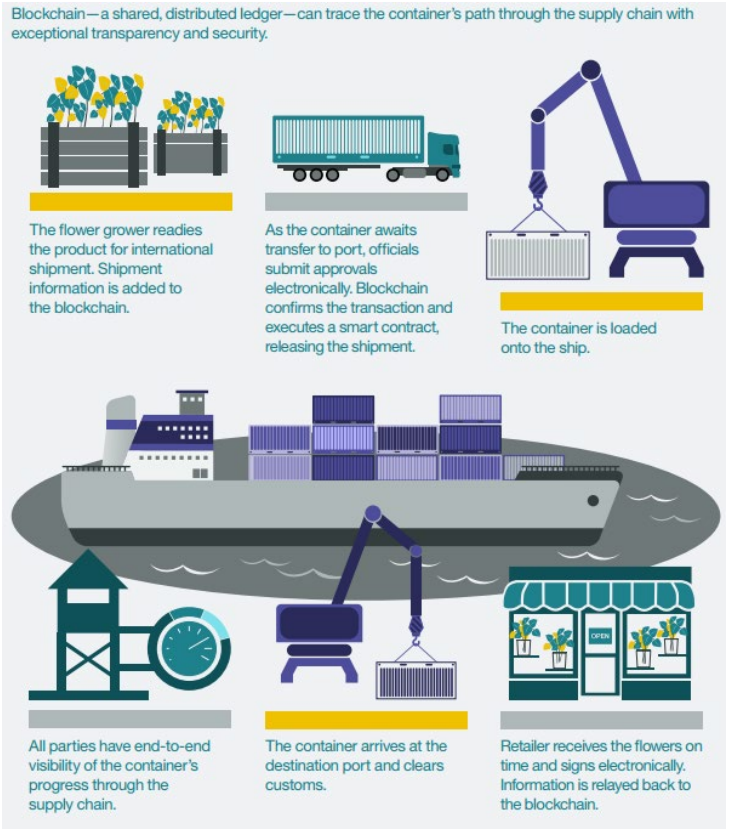
Crude Oil Pipelines

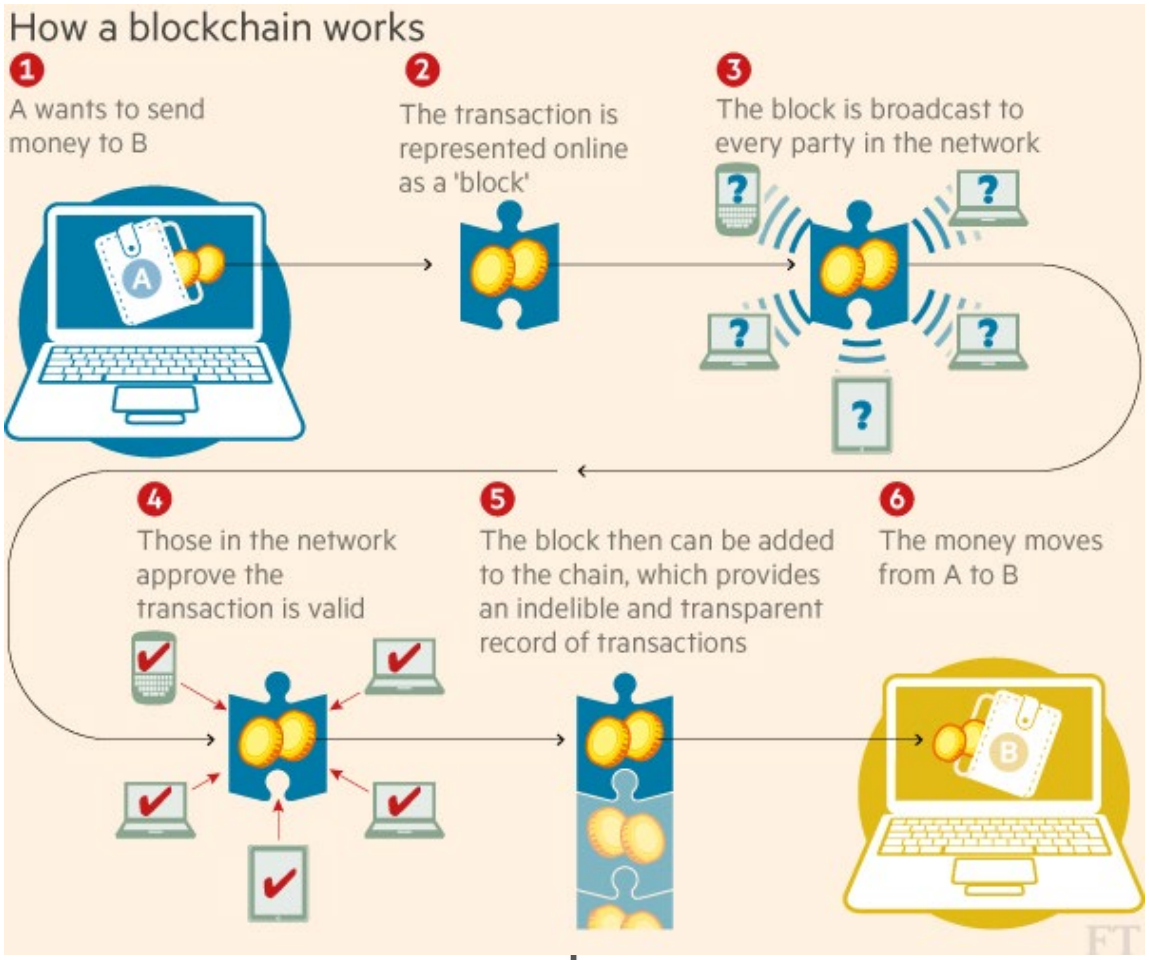
2021-2,500 tank cars/week-90 million bbls

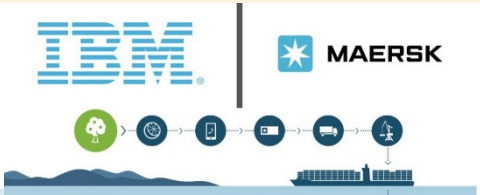




Welcome Expanded Blockchain Technology to the Port Industry







China AIS Tracking-Data Restrictions

- China has passed a new Data Security Law
- No AIS Tracking Data to International Firms
  - 90% drop off in reporting from China ships
  - Focused on ship movements around China
- Unknown impact on cargo reporting?

Autonomous Vessels

- Law Enforcement, Fire Services, Offshore, Research, Military
- First Commercial Vessel Testing Underway–IMO Guidelines Out
  - NYK Maritime Autonomous Surface Ships (MASS) Manned Coastal Vessel
- Significant Longshore Union Opposition Growing

CS YARA BIRKELAND

Length: 261 Feet
Draft: 16.4 Feet Beam: 49 Feet
Speed: 6 Knots, 12 Knots Max.
Builder: Marin Tekknik
Crew: 0
Owner: Yara International
Capacity: 120 TEU

Automated Terminals-2021

- Many partially automated terminals
- FULLY AUTOMATED (More or Less) TERMINALS
  - Qingdao New Qianwan Container Terminal – QQCTN
  - Victoria International Container Terminal, Melbourne – VICT
  - Algeciras – TTI
  - Long Beach Container Terminal – LBCT
  - Yangshan Port Project – Shanghai
  - Maasvlakte – Rotterdam
  - Singapore PSA Terminal

BOXBAY Advanced Container High-Bay Storage Rack System

- First Segment Built and Tested in 2021
- 11 Stories Tall, triples yard capacity by 300%
- Containers in separate compartments
- Decrease vessel handling time by 30%
- Eliminates shuffling and restacking, no weight limits

Coastal Wind Farm Expansion

- **Jones Act Issues for Installation**

- **Specialized Support Vessels**
  - BLOUNT/MAPC Chartwell 24 Support Vessel
  - LOA 78 FEET, Beam 29 Feet, Draft 4 Feet
  - 3 to 6 Crew, 24 PAX, 754 Sq.Ft. Deck Cargo Area

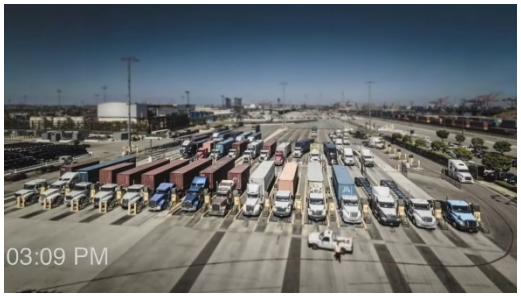
- WF Ports:
  - Massachusetts
  - Rhode Island
  - Connecticut
  - New York
  - New Jersey
  - Maryland
  - Virginia

LEGAL ISSUES ASSOCIATED WITH SHIPS and CARRIERS

- Oil, sewage and air pollution, Fuel issues
- Ship liens and arrest
- Marine accidents-groundings, collisions
- Crew injuries
- Line Bankruptcies and Stranded crews
- Crew confinement: asymmetric migration
- Pandemic restrictions-vaccinations
- Union contract disputes
- Crew arrest
- Stowaways, illegals

Legal Issues Associated with Vessels, Port Development and Growth

- Opposition to LNG & Crude Export Facilities NE-NW
- Waterway Disputes About Vessel Transits
- Limits on Cruise Ship Visits NE-SE
- Vessel Air and Water Pollution (NDZ, EICA)
- Road and Rail Corridor Noise and Congestion
- Rail-Trails
- Light
- Endangered Species



PORT AND TERMINAL LEGAL ISSUES

- Requests for proposals->contract services
- Construction failures
- Acquisition contracts
- Service provider failures
- Regulatory violations
- Site and water pollution
- Tariff inadequacies
- Personnel injuries
- Cargo damage claims
- Community Opposition
- Labor Issues

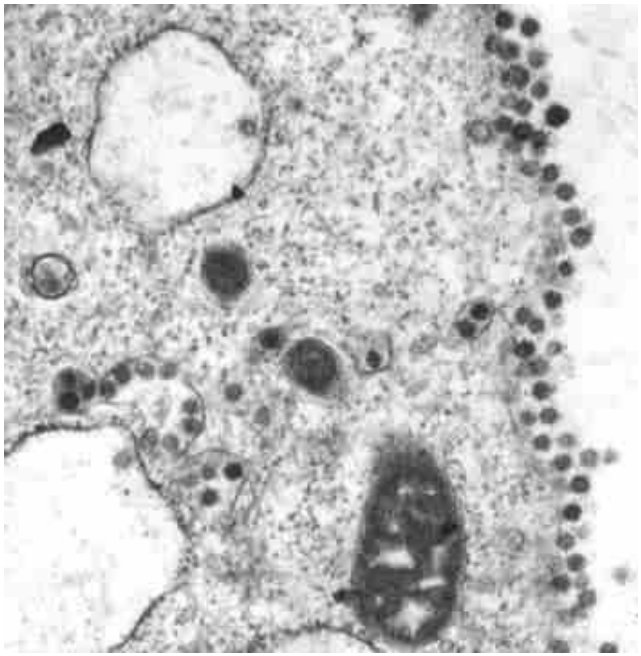
Legal Issues Associated with Port and Terminal Delays

- Failure to meet obligations of contracted transportation services
  - Cargo delivery delays-truck, rail, ship, ports
  - Cargo damage
  - Shipper's not receiving empty containers: agri-cargo
  - Equipment breakdowns
- Demurrage charges due to pick-up delays
- Community disputes due to increased traffic
- Overweight trucks
- Driver hours/license issues
- Shipper port pricing disputes

Cases to Watch 11/21

- Citgo Refining v. Frescati Shipping (safe berths)
- Antares Maritime vs. Port of New Orleans (berths)
- Jolly v. Hoegh Autoliners (Marine Terminal Liability)
  - Liability for Third Party Non-Seafarers (Firefighters)
- Curtis Mills v. SCSPA (Personal Injury)
- IFG Holdings v. Navigation Maritime Bulgare
  - (Tariff applicability)
- ILA v. SCSPA (Labor Jurisdiction)
- Northwester Selecta v. Guardian Insurance
  - (Cargo damage due to COVID)
- FMC Interpretive Rule on Unreasonable Practices

New Normal
Best Practices-Pandemics
There is No Playbook



- General Protections from Pandemics
- Handling Crew Changes
- Safe Operations
- What to do with a confirmed case
- Cleaning and disinfecting
- Handling electronics and equipment
- Provision and handling of clothing
- Utilizing CDC Guidelines
- Public and employee communications
- Track Your Actions, Efforts and Costs-Develop A Playbook

Blast from the Past
TITANIC II–Due ~~2022~~ 2025

- LOA 883 Feet, Beam 105 Feet, 56,000 GRT, Draft 26 Feet, Diesel Propulsion
- Builder CSC Jinling, Nanging China, $500 Million
- 2,434 Pax, 900 Crew
- Will follow the original route
  - Southampton to New York
- *Tickets soon on sale*

Newfoundland Begins Iceberg Construction Project

A PROUD CORPORATE PARTNER OF THE IAMPE

Port Development, Management, Operations, Navigation, Engineering, Architecture, Economics

The International Association of Maritime and Port Executives

A Non-Profit Industry Association

Dedicated to the Education and Development of Port and Maritime Professionals

Providing Low-Cost Educational Programs, Professional and Accredited Certifications in Management and Operations

www.iampe.org

"For a World Connected By Water"

2021-2022 Program Locations

Maritime Port Executive, Inland Maritime Port Executive, Marine Terminal Operator, IMDG, Commissioners Seminar, Continuing Education, CLE

Sept-Portland, ME Cont Ed/CLE

Oct-IRPT Comm. Seminar-Biloxi

Nov-MPM/MPE Port Tampa Bay

Nov-AAPA MPE Phoenix, AZ

Dec-IMPM/IMPE Decatur, AL

Feb-MPM/MPE San Juan

March-MPM/MPE Norfolk, VA

March-IMPM/IMPE Bienville, MS

April-AAPA MPE Savannah, GA

May-MPM/MPE Houston, TX

June-MPM/MPE New York

Nov-MPM/MPE Charleston, SC

Dec-MTO Gulfport, MS

Dec-MPM/MPE Gulfport, MS

registration@iampe.org

2021

2022

Questions?