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NEWSLETTER

Harbour Towage

September 2022

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1. TO OUR READERS

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Dear reader,

For the special occasion of the 2022 International Tug and Salvage Convention (ITS) in Istanbul at the end of September, we have prepared this special edition of the GMAP Maritime & Offshore Newsletter with the theme "Harbour Towage".

In this newsletter we give an overview of the current developments and market changes. Influences of stricter regulations concerning the environment, smarter tugs and the need for more efficiency, substantially enabled by increasing digitalization, new business models and new cooperations, will all have its impact on the towage landscape. And with this changing towage landscape companies will be impacted. Substantial investments are needed to be and stay a full participant in this new world.

On top of the developments and market changes, the industry faced with the COVID-19 pandemic and the geopolitical tensions influencing all impacting the world trade. The COVID-19 pandemic has made clear that worldwide supply chains are vulnerable. Therefore, new supply chains are being formed. The present geopolitical tensions are also influencing world trade. Important influence are the tensions between the USA and China and the Russia-Ukraine war. Despite all these challenges, the towage industry has proven to be very resilient.

Since the last industry gathering at the 2018 ITS in Marseille, the towage landscape reveals a tremendous change due to consolidation. Multi-port to global contracts, synergies and other efficiency gains fuel this wave of consolidation. Smaller players might be having more trouble to find their place in the changing landscape. This consolidation play and the robust performance of towage players, even throughout the COVID-19 pandemic, has also boosted the interest of financial investors in the industry.

The coming years will be interesting with the combination of the technical developments to make the worldwide towage fleet more efficient and environmentally friendly, and we expect to see a continuation of the consolidation play.

We of JBR and Global M&A Partners are looking forward to meet up with the industry at the ITS in Istanbul!

We hope you will enjoy reading our newsletter!

For now, we wish you and your family a good health. We hope you will enjoy reading our Newsletter.

The JBR Maritime and Offshore Team



2. HARBOUR TOWAGE INDUSTRY OVERVIEW

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2.1 A Brief Introduction

A (harbour) tug, more commonly known as a tugboat, is a secondary boat that helps in the mooring or berthing operation of a ship by either towing or pushing a vessel towards the port.

A tug is a special class of boat without which mega-ships cannot get into a port.

Along with the primary purpose of towing the vessel towards the harbour, tugboats can be engaged in providing essentials like water and air to the vessel.



Additionally, with the increased size of a boat, it needs tugboats to carry some of their domains and tow them through narrow water channels.



Key Services Offered by Harbour Towage Operators



Assist the vessel in docking and undocking



Assist the vessel to turn in a limited space



Offer necessary support to counteract the natural force



To help stop the vessel



Tow, push, or assist the vessel without propulsion or steering



Transport floating artifacts from one place to another



Fire Fighting assistance in ports or barges



Salvage boats and icebreakers

Different Circumstances Require Different Tug Types

- The uses and functions of tugs vary from port to port, as different ports have different requirements and intakes
- The difference in ports and their specifications, the various requirements for tugs in different conditions, the types of ships to be served by specific tugs, conditions of environmental protection, and the local rules and guidelines have led to the growing number of different tug designs
- The different ways propulsion systems are used have resulted in a variety of tug types

Classification of Tugs based on Purpose

- **Escort Tugs:** These tugs are designed to escort and maneuver ferries and barges to their destinations
- **Support Tugs:** These tugs provide support services at offshore sites along with towing operations and play a significant role in berthing operations. Different types of support tugs are explained in detail in the next section



2.2 Types of Tugs

Harbour tugs are primarily used to assist ocean-going vessels in ports. So, they are designed with high propulsion power for pulling and pushing vessels at a relatively low speed. They are highly maneuverable and have a high engine power.

Tugs with different design features have different handling characteristics. These could be a combination of hull profile, engine and/or rudder type and thruster's configuration and towing winch design, power and location. Some of the most common types of tugs are:

Conventional Tugs

- These are equipped with fixed propellers, single or twin screw, and single rudders with fixed nozzles. New tugs have steering or nozzles, controllable pitch propellers and nose rudders. Tugs may be fitted with a tunnel or retractable azimuth thrusters

Some general characteristics:

- Maneuverable, good steering ability, especially as a forward pulling tug
- Good sea-keeping ability
- Good bollard pull to power output
- Towing point is usually situated just aft of amidship



Azimuth Stern Drive (ASD) Tugs

- Azimuth, more commonly known as Azimuth Stern Drive (ASD), is equipped with two stern engines capable of generating a 360°, all-directional propulsion force. ASD tugs have a towing winch forward and, when commercially required, a towing winch and/or towing hook aft

Some general characteristics:

- Low relative draught
- Good steering characteristics, except when going astern at higher speeds
- Underwater hull form improves the dynamic stability of the tug
- Risk of girting/girding when towing over the stern
- Maneuverable and able to pull effectively over the stern or bow



Tractor Tugs

→ These tugs use a two-multidirectional propulsion unit, of which some are rather like large rotating outboard motors while the other consists of rotating vertical blades. This enables thrust units of the tug to be placed side by side facilitating spectacular maneuverability. The towing point can be placed much nearer the stern to get maximum output from the propulsion units

Some general characteristics:

- Full power available in all directions
- Quick response to engine movements
- Very maneuverable in tight sea spaces
- Reduced maneuverability if towing from forward at higher speeds
- Reduced directional stability, particularly in open waters
- Reduced bollard pull per kilowatt output
- Relatively deeper in a draught, therefore an increased risk of bottom damage from grounding



Rotor Tugs

→ The rotor tug is a patented tug design that uses a propulsion configuration consisting of 3 azimuthing thrusters placed in a triangular configuration.

Two units are placed forward and one astern on the centreline of the tug. This tug's maneuverability is reported to be better than other conventional designs

Some general characteristics:

- Highly maneuverable, useful in small spaces
- Good towing performance over the stern and bow
- Good residual redundancy in case of engine failure



Other Miscellaneous Tugboat Types

→ Voith-Schneider Tugs –

- The Voith-Schneider propeller is a specialized marine propulsion system – an advancement on the cycloidal drive
- It is highly maneuverable, as it can change the direction of its thrust almost instantly
- It allows thrust of any magnitude to be generated in any direction quickly, precisely, and in a continuously variable manner



→ Carousel Tugs –

- This tug won the Maritime Innovation Award in 2006
- The tug consists of interlocking inner and outer rings in which the former is connected to the boat, whereas the latter with the tug's body is connected to the towed ship through winches or hooks
- The tug utilizes the hull in a completely different manner for both braking and steering when escorting



→ Z-Peller Tugs –

- These tugs can have two towing locations, one forward and one amidship, and the main propulsion is from two rotating azimuth units that are placed rather like a traditional twin screw tug
- The azimuthing propulsion unit allows a 360° rotation about the vertical axis



→ Ice Tugs –

- These tugboats escort ferries or barges and serve as icebreakers or salvage boats to make ferries and barges to speed up to their destination



Other Miscellaneous Tugboat Types

→ Giano Tugs –

- These tugs are highly stable and can serve the purpose of both support as well as escort tug
- A high-tech tug that allows remote maneuvering through VSAT or 4G connections
- Its 360° rotation and excellent side-stepping speed made it to the top in terms of standards of tugs



→ Combi-Tugs –

- This tug combines a bow thruster and a nozzle fitted with a steering and a conventional screw tug to get improved maneuverability and some additional fitted devices like a thruster and steered nozzle
- Combi-Tugs are preferably the modification of twin-screw conventional tugs to achieve maximum efficiency



→ Eco Tugs –

- Hybrid technology tugs or tugs with LNG as a running fuel fall under the eco-tugs category
- These tugs serve the same purpose of escorting and supporting as the conventional tugs do but with less harming and polluting the marine ecosystem





2.3 Market Overview: Harbour Towage

According to Sea-web, as of 10 May 2022, there were 20,772 'sea-going' tugs over 100 GRT (Gross registered tonnage) worldwide, up from 20,222 (2.72%) and 18,697 (11.71%) in May 2021 and 2017, respectively. The total horsepower is 56 mn BHP (brake horsepower), up by 1.3 mn BHP (2.38%) over the past year.

The largest national fleet of tugs of over 100 GRT is under the Indonesian flag with 5,360 tugs totaling 9.5 mn BHP. The U.S., as the second-largest national fleet of tugs, operates 1,479 'sea-going' tugs of over 100 GRT, or 7.12% of the world market, totaling 5.5 mn BHP (9.82% of the global BHP). The average age of tugs worldwide is 22.9 years (built in 2000). The Unknown flag group is 10.7% of the world market, comprising 2,229 tugs totaling 4.1 mn BHP or an average of 1,862 BHP each with an average age of 35.2 years.

This large 'Unknown' group indicates to us that older, lower horsepower tugs may be falling off the radar. The average horsepower of the worldwide fleet over the last five years has held steady at 2,700 BHP.

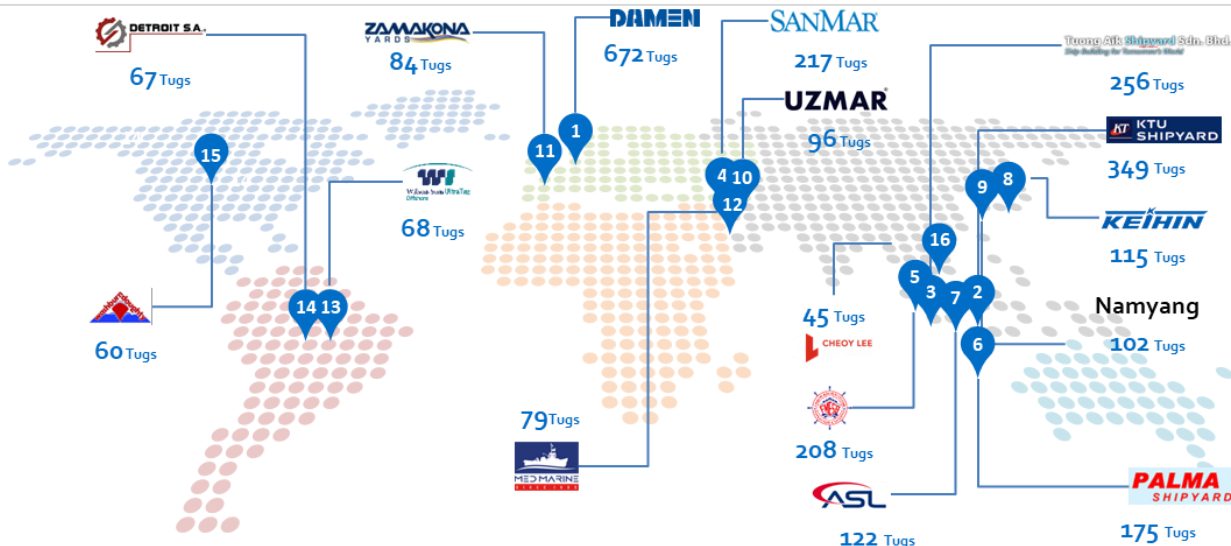
Flag	Total BHP	%	Number of Tugs	%	Avg BHP	Avg Age
Indonesia	9,466,348	16.8%	5,360	25.8%	1,766	12
USA	5,544,741	9.8%	1,479	7.1%	3,749	34
Japan	2,825,536	5.0%	778	2.8%	3,632	16
South Korea	1,880,227	2.3%	597	2.9%	3,149	25
Russia	1,533,122	2.7%	550	2.7%	2,787	27
Malaysia	1,241,772	2.2%	538	2.6%	2,308	16
India	1,469,734	2.6%	499	2.4%	2,945	20
Singapore	1,220,958	2.2%	444	2.1%	2,750	11
Panama	1,381,953	2.5%	444	2.1%	3,113	27
Turkey	1,151,181	2.0%	322	1.6%	3,575	15
Philippines	687,331	1.2%	290	1.4%	2,370	39
Italy	1,108,103	2.0%	289	1.4%	3,834	27
Brazil	1,149,206	2.0%	284	1.4%	4,047	16
Australia	1,184,728	2.1%	278	1.3%	4,262	18
Iran	586,568	1.0%	251	1.2%	2,337	29
China	772,172	1.4%	244	1.2%	3,165	25
United Kingdom	840,156	1.5%	241	1.2%	3,486	23
Canada	728,358	1.3%	239	1.2%	3,048	40
St Vincent & the Grenadines	957,163	1.7%	228	1.1%	4,198	12
Nigeria	549,031	1.0%	193	0.9%	2,845	30
Egypt	609,446	1.1%	177	0.9%	3,443	25
UAE	556,305	1.0%	176	0.9%	3,161	18
Spain	664,345	1.2%	174	0.8%	3,818	25
France	479,457	0.9%	171	0.8%	2,804	14
Vietnam	433,770	0.8%	167	0.8%	2,597	17
Mexico	638,620	1.1%	154	0.7%	4,147	23
Netherlands	537,928	1.0%	153	0.7%	3,516	17
Ukraine	280,437	0.5%	138	0.7%	2,032	36
Greece	310,140	0.6%	136	0.7%	2,280	39
Venezuela	442,288	0.8%	135	0.7%	3,276	26
Unknown	4,150,403	7.4%	2,229	10.7%	1,862	35
Worldwide	56,450,589	100.0%	20,772	100.0%	2,718	22



Current Global Tug Fleet

According to IHS Seaweb, the current global tugfleet has been built by around 2,300 shipyards . Of which about 150 yards account for half of the current global tugfleet -

Builder	Country	Tugs	Average Age
DAMEN		672	9
KTU SHIPYARD		349	8
Tuong Aik Shipyard Sdn. Bhd. <small>Ship Building for Tomorrow's World</small>		256	15
SANMAR		217	4
		208	10
PALMA SHIPYARD		175	12
ASL		122	13
KEIHIN		115	16
Namyang		102	12
UZMAR		96	6
ZAMAKONA YARDS		84	19
MED MARINE		79	4
WU <small>Wuhan Shipbuilding Office</small>		68	13
DETROIT S.A.		67	10
		60	12
CHEOY LEE		45	7





Responsibility of the Tug-Master

Tug masters are in command of the crew on tugboats. They assist the ships in moving in and out of harbors and through dangerous or difficult waterways.

Duties



Control the tugboat to tow and push ships



Assist in docking ships at wharves



Maintain and refuel the tugboat



Direct the work of the tugboat's crew



Ensure the safety of the tugboat and its crew



Help fight fires or oil pollution at sea



Place buoys to mark hazards at sea



Take part in salvage work



Assist in rescue operations

Skills & Knowledge

- Knowledge of tides, waters, coastlines, marine hazards, the weather, and knowledge of how these affect ships
- Navigational skills
- Skills to maneuver the tugboat to provide the greatest amount of assistance to ships
- Knowledge of the harbor's safety procedures, safety rules, and codes of practice
- Good communication and leadership skills



3. KEY DRIVERS

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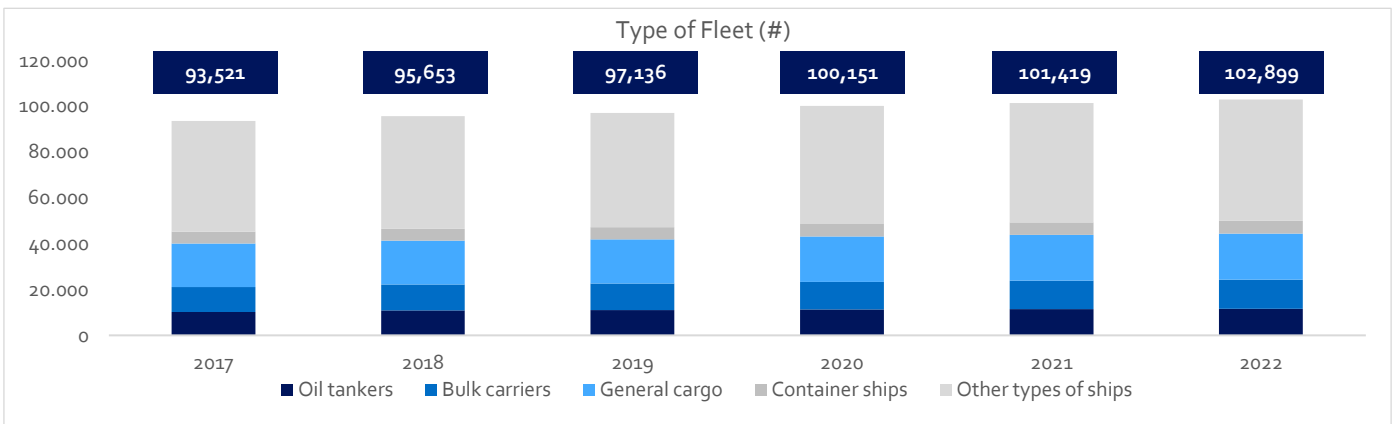


3.1 Maritime Transport Services – Towage Business Case

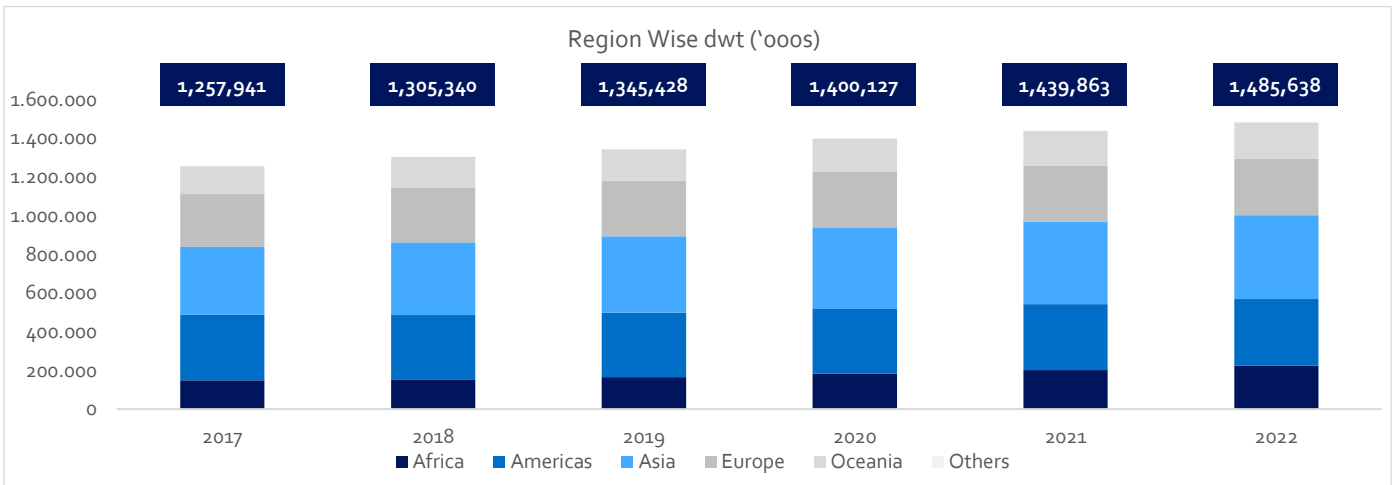
Maritime transport supports the global supply chain links and economic relations, with shipping and ports handling more than 80% of the global commercial trade by volume and more than 70% by value.

The global shipping fleet comprised ~100,000 ships (self-propelled vessels above 99 GRT) consisting of tankers and container ships, bulk carriers, dredgers, cruise and passenger vessels, tugs, and offshore service vessels.

The economy, demography, resources, and environment, have the highest measurable impact on future trade & shipping.



- From Jan 2021 to Jan 2022, global commercial shipping fleet grew by 1.7%, to 102,899 ships of 100 GRT and above



In the 12 months prior to 1 January 2022, the global commercial shipping dwt grew by 3.2%, to 1,485,638,000 dwt of capacity. This increment is in line with the industry standard of ~3.4% CAGR since 2017.

The highest increase in dwt has come from Africa, a 12.1% increase in 2022 as compared to 2021. This is because of the initiatives taken by African countries to build in-house vessels using cheap labour and resources.



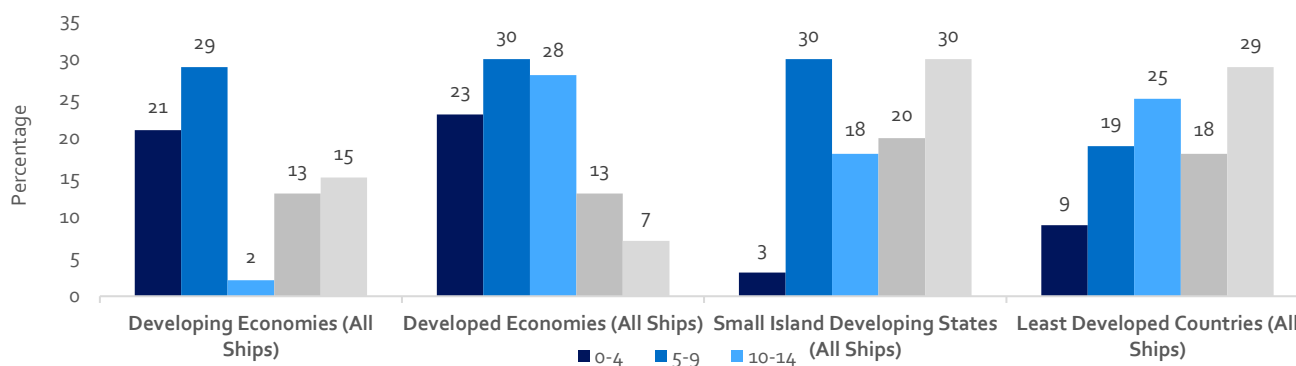
Fleet Structure, Age, and Vessel Size

Around 30% of the world fleet’s carrying capacity was in ships aged five to nine years old at the start of 2021. In addition, the proportion of vessels aged 10 to 14 years has steadily grown to 25%.

The oldest ships are often found in the least developed countries (LDCs), where over 30% of ships are over 20 years old. In comparison to developing or developed countries, LDCs have a greater number of ships aged 15 to 19 years.

Vessel Type		Age in Years					Average Age	
		0-4	5-9	10-14	15-19	20+	2021	2020
Bulk Carriers	% of Total ships	18	37	24	10	10	10.6	10.2
	% of dwt	22	40	23	9	6	9.5	9.3
	Average vessel size (dwt)	90,447	78,409	68,583	68,807	46,623	NA	NA
Container Ships	% of Total ships	14	19	32	17	17	13.2	12.7
	% of dwt	20	29	29	14	7	10.4	9.9
	Average vessel size (dwt)	74,632	78,802	46,897	42,345	21,975	NA	NA
General Cargo	% of Total Ships	5	10	16	9	59	27.1	26.3
	% of dwt	8	20	23	10	40	19.9	19.3
	Average vessel size (dwt)	5,992	7,493	5,494	4,372	2,660	NA	NA
Oil Tankers	% of Total ships	14	17	21	13	35	19.5	19.0
	% of dwt	25	21	28	19	8	10.9	0.4
	Average vessel size (dwt)	96,122	65,148	72,208	80,802	12,346	NA	NA
Others	% of Total ships	10	17	17	9	47	23.6	23.0
	% of dwt	20	16	23	11	30	16.1	15.8
	Average vessel size (dwt)	9,236	4,562	6,524	5,953	3,014	NA	NA
All	% of Total ships	11	18	19	10	42	21.6	21.1
	% of dwt	22	29	25	13	11	11.2	10.8
	Average vessel size (dwt)	43,346	34,175	28,112	27,809	5,505	NA	NA

Age Distribution of Fleet per Development Status of Countries as of 2021 (%)



- The new scope of demand seems to come from the ‘developed and developing economies’ as SIDSs and LDCs are more dependent on 15+-year-old vessels. This can be due to the high cost of R&D in manufacturing such huge sea-going vessels

- **Small Island Developing States (SIDS):** A distinct group of 38 UN Member States and 20 Non-UN Members/Associate Members of the United Nations regional commissions facing unique social, economic, and environmental vulnerabilities
- **Least Developed Countries (LDCs):** Low-income countries confronting severe structural impediments



Ports and the Shipping Fleet

Ports and terminals are critical components of the global supply chain as they serve as entry and exit points for cargo worldwide. Cargo ships worth mns of dollars must turn around rapidly, loading or discharging their contents as soon as possible.

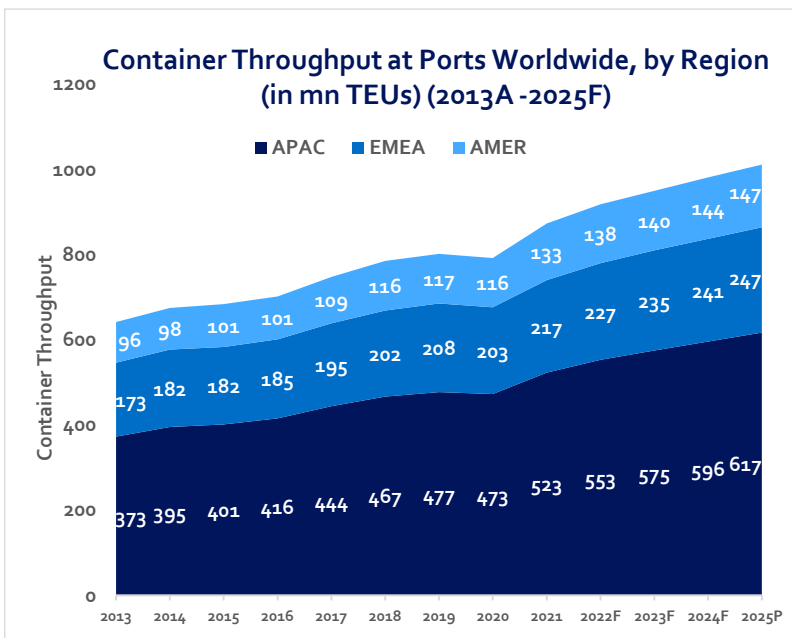
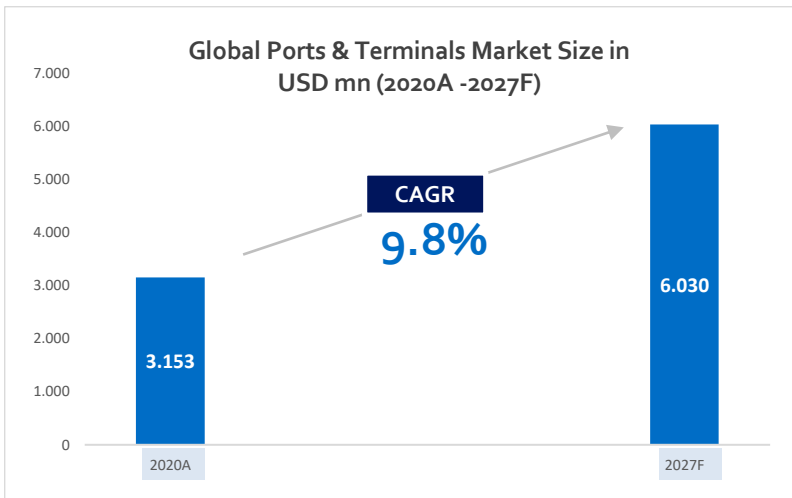
As per Research and Markets, the ports and terminals global market reached USD3,135.3 mn and is predicted to grow by 9.8% for the period 2020–2027 and reach USD6,030 mn by 2027.

Moreover, the data forecasted for 2022 to 2025 is to understand the global market overview of ports and terminals in these major regions. The APAC region has always been dominating in terms of container throughput, followed by the EMEA region. The AMER region captured the least share compared to these two regions.

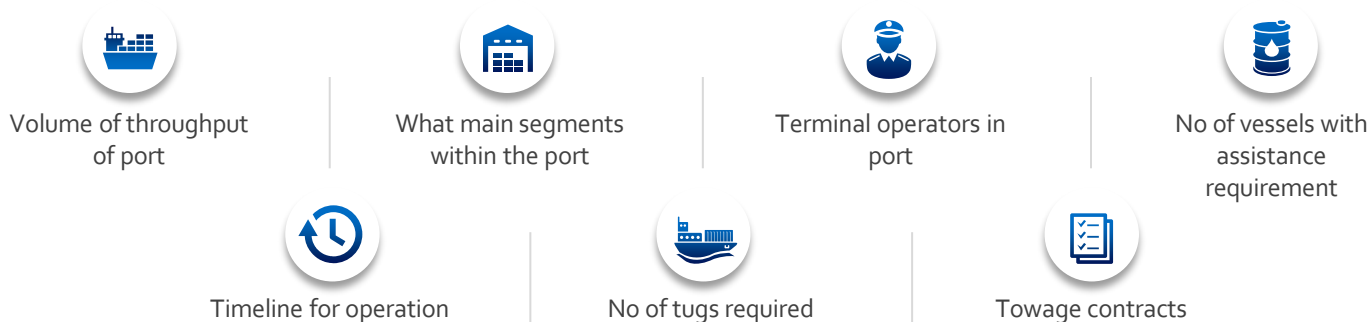
The container throughput has always been on a rising trend with positive year-on-year (YoY) growth for all the regions in 2013-25P except for 2020. The COVID-19 pandemic is one of the major reasons for this significant downfall.

The towage industry is an auxiliary industry of the ports and terminals industry. These are mandatory services needed to be provided by ports and terminals.

The continuous growth in port calls and terminal expansions will in turn increase the throughput and traffic leading to growth in tugboat industry.



As a towage company, to Create Value, the Following Issues are of Importance





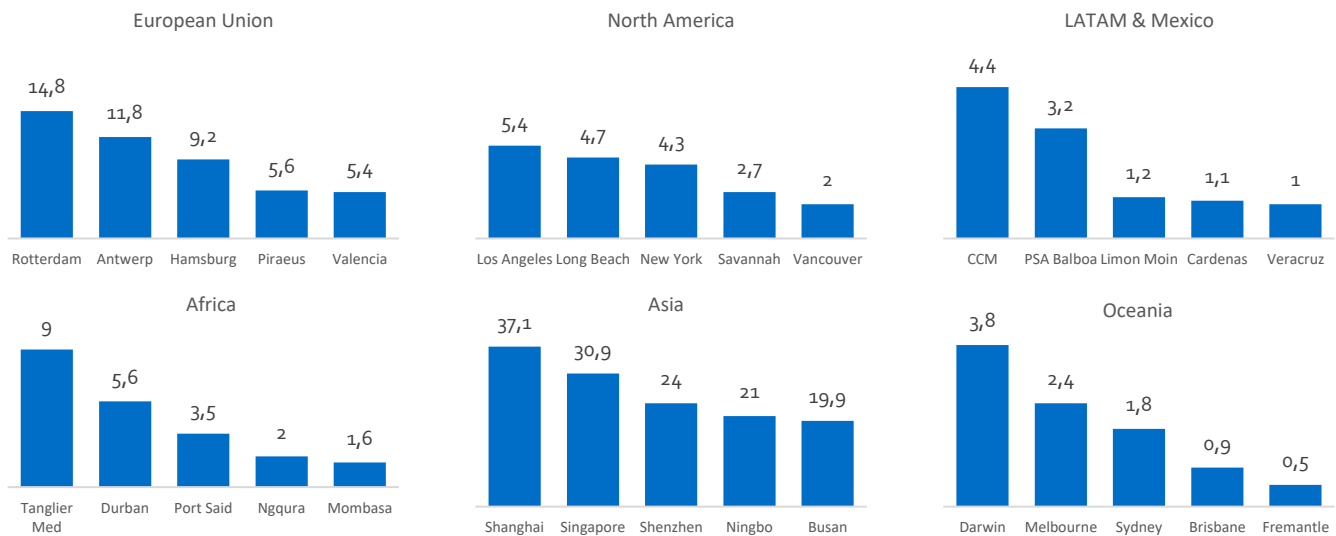
3.2 Trade Determines Throughput in a Port

The ports and terminals market is heavily dependent on global imports and exports. According to a UNCTAD report issued on November 2021, the value of global imports and exports of goods reached USD5.6 tn in the 3Q of 2021, setting a new quarterly record.

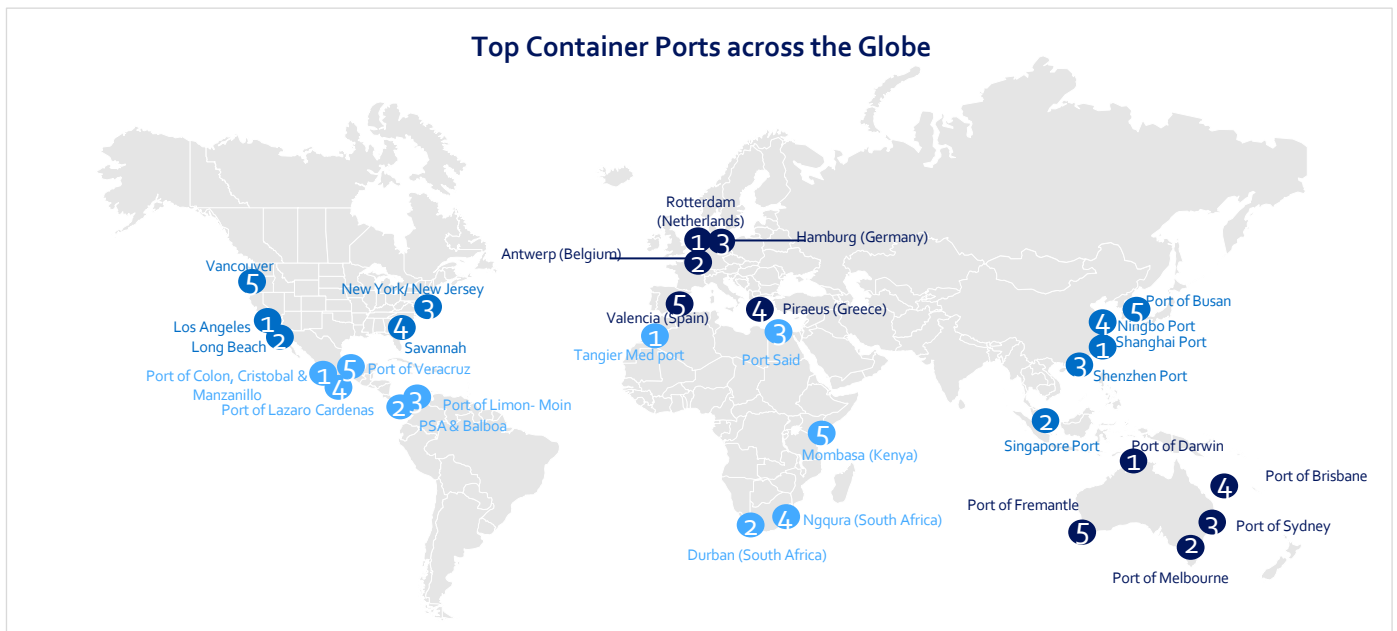
The positive trend in international commerce in 2021 was mostly due to a robust recovery in the demand because of the easing of the pandemic restrictions, economic stimulus packages, and commodity price hikes. The 2022 outlook for global imports and exports is predicted to be highly uncertain depending on geopolitical tensions amid the US – China – Taiwan tensions and Russia – Ukraine war .

Ports and terminals are primarily utilized for trading goods globally. Thus, the market is dependent on the trade volume globally.

Top Container Ports Across the World according to the TEU Throughput



Top Container Ports across the Globe





Drivers for Increased Trade

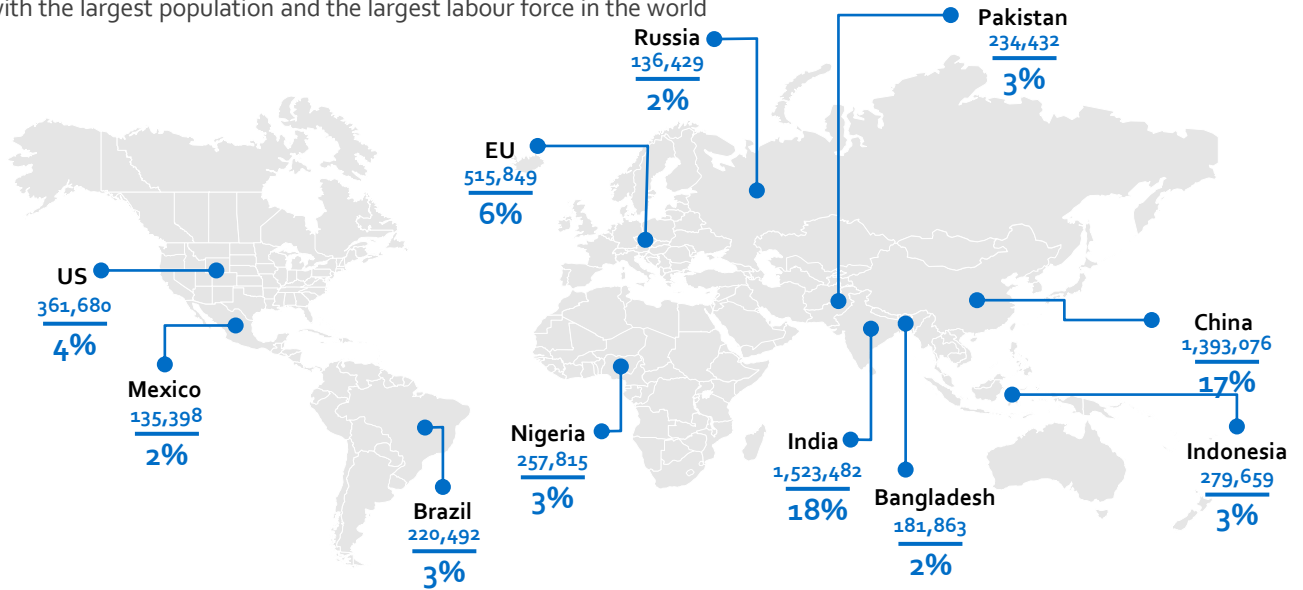
- ✓ The marine world in 2030 is expected to be different from 2022, affected by the rise of emerging countries, new consumer classes, and an increase in resource demand
- ✓ The shape of the marine world in 2030 will depend on tri-polar interactions
- ✓ A rise in all three sectors will lead to increased trade resulting in growth in the towage business



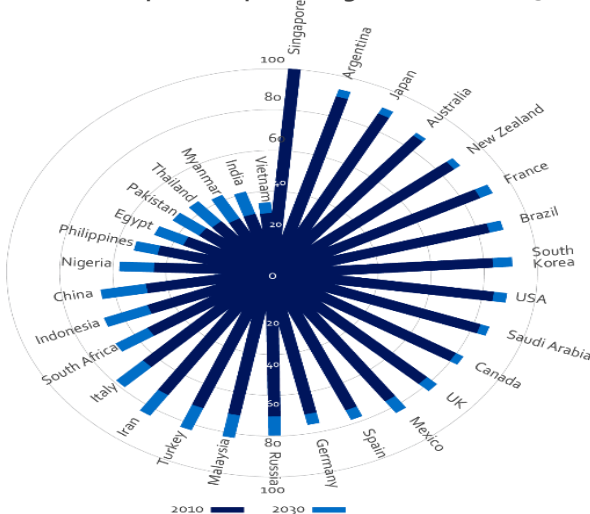
Global Population

The global population reached 6.90 bn in 2010. China and India were the two most populous countries worldwide collectively accounting for 37% of the world population

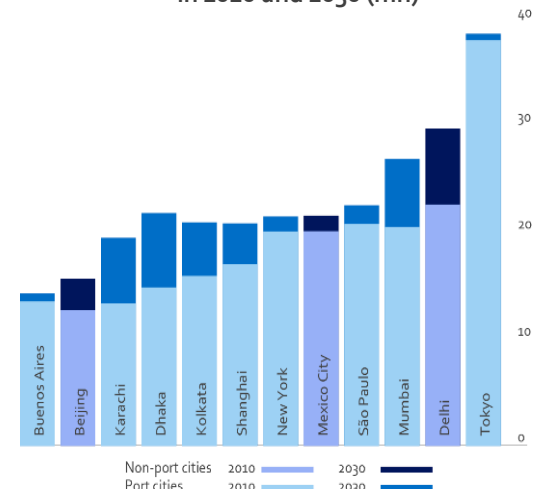
The global population is likely to reach 8 bn by 2030, with 96% of growth coming from developing countries. India will overtake China with the largest population and the largest labour force in the world



Urban Population percentage in 2010 and 2030



Population of Top Urban Agglomerations in 2010 and 2030 (mn)



China, Bangladesh, Nigeria, and Turkey will be among the largest countries by growth share (%) in urbanization over the next 10 years.

The earth's urban landscape is expected to continue shifting toward emerging nations over the next 20 years.

Economy

In the global market, new economies will rebalance the world's economic power by 2030.

In terms of GDP, China, India, and Brazil will be rated among the top five largest economies along with the United States and Japan, with China contributing around 20% of the global GDP.

Developed countries, such as the United States, Japan, and some of the Western European countries, will lose economic leadership.

Developing countries are trying to outperform the established economies.

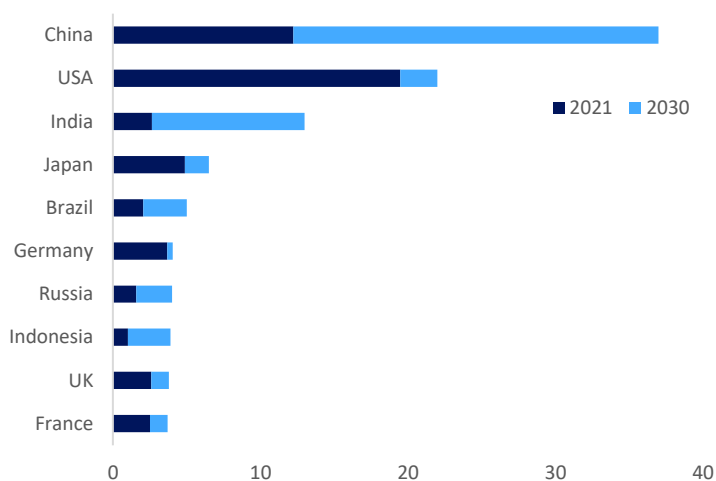
In 2030, China will lead the global economy, while the United States and India will enjoy strong growth. China is expected to overtake the United States in terms of GDP in the 2020s.

India is expected to achieve remarkable development as a world financial powerhouse going from 5th place in 2022 to 3rd place in her 2030s doubling the GDP in the process.

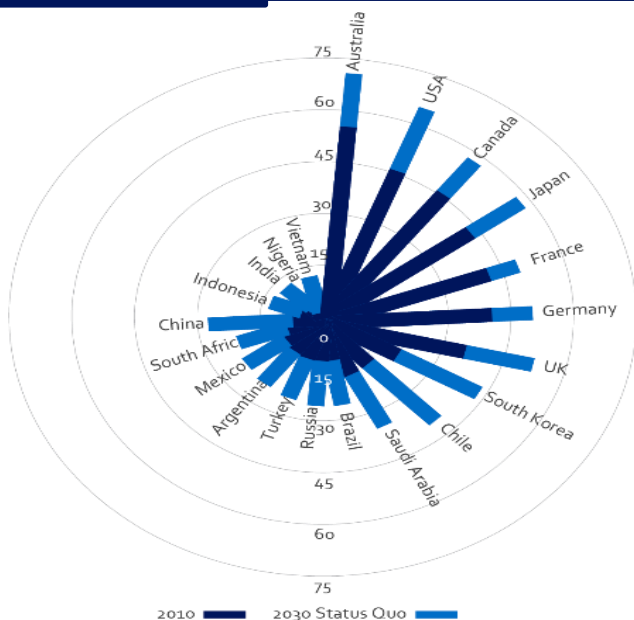
Brazil's economy due to political stability will rise to top five.

Indonesia is expected to make tremendous progress by her 2030 and rank in the top 10.

List of Countries ranked by Real GDP in USD tn (2021 – 2030)



GDP per Capita



The highest per capita GDP ranks will continue to be filled with highly urbanized developed countries like Australia, the United States, and Canada.

The highest growth in GDP per capita will be in the medium- or low-income countries such as China, India, Vietnam, and Indonesia.

The increased income will bolster the demand for energy, food, consumer goods, and infrastructure that will expand trade and shipping activities.

Contrary to the favourable market environment, China's manufacturing sector is expected to be under pressure to transform from labour-intensive to a higher-productivity business.

Although several emerging economies are projected to overtake the developed countries in terms of the overall size and rate of growth, the Emerging 7 (E7) countries will still lag well behind the G7 in terms of GDP per capita even in 2050.

- Increase in GDP per capita will drive demand, resulting in increased trade of goods through ports and vessels
- Towage industry being the auxiliary industry, will benefit from the growth in GDP and per capita income

International Trade

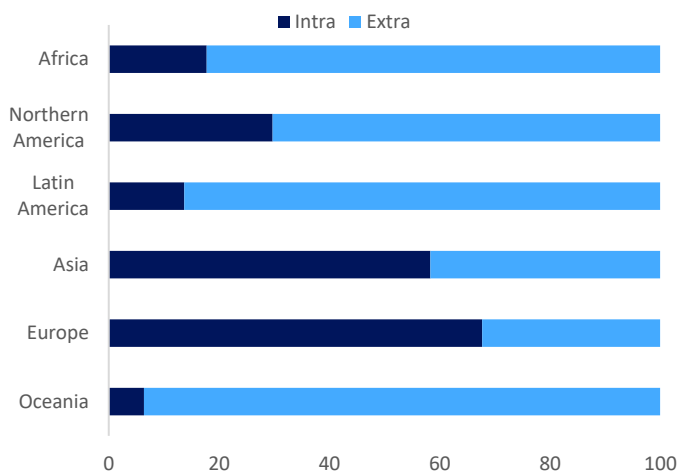
The value of international commerce rose in Q1 2022, despite the fact that its expansion slowed down.

Global trade as a whole increased to a record level of roughly USD7.7 tn in Q1 2022, up about USD1 tn from Q1 2021 and about USD250 mn from Q4 2021.

Trade in goods (merchandise) and trade in services both grew during Q1 2022:

- About USD6.1 tn worth of goods were traded (an increase of about 25 per cent relative to Q1 2021, and an increase of about 3.6 per cent relative to Q4 2021)
- About USD1.6 tn worth of services were traded (an increase of about 22 per cent relative to Q1 2021, and an increase of about 1.7 per cent relative to Q4 2021)

Intra- and Extra-Regional Exports, 2020

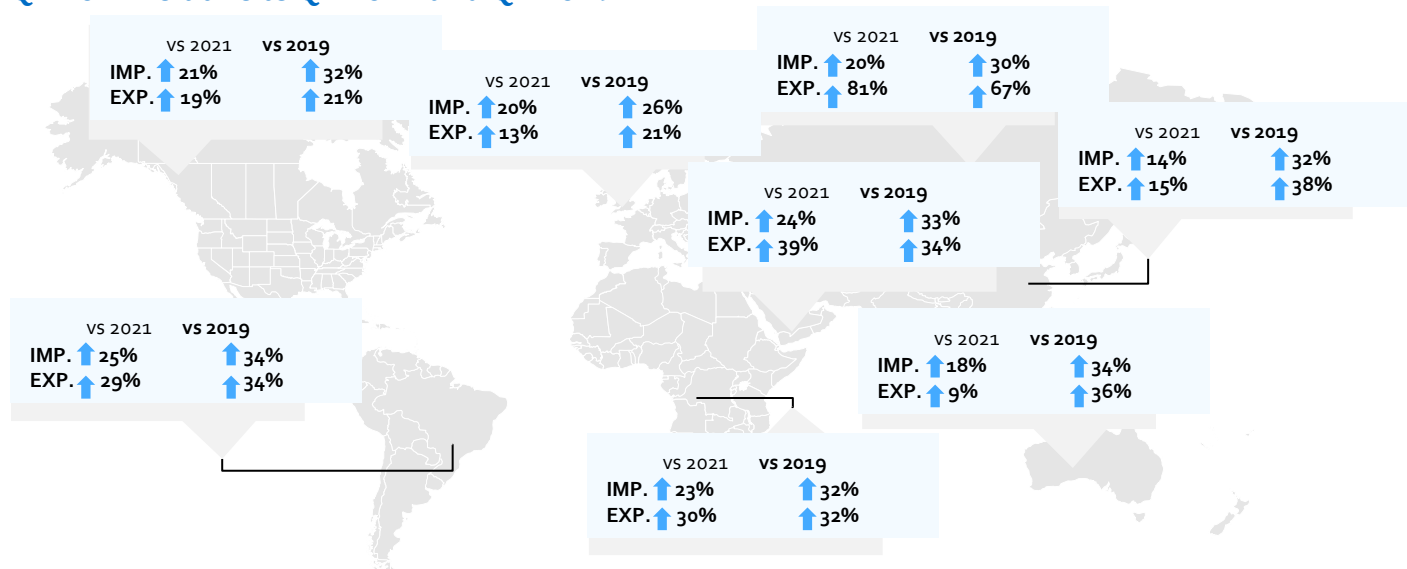


During Q2 2022, trade growth is predicted to continue to be positive but modest. However, increased trade will be observed between intra-regional areas, doubling by 2030.

The rise of trade blocks within more regions may continue to promote intra-regional trade for the next 10 years. In Q1 2022 trade growth rates remained strong across all the geographic regions. Export growth has been stronger in commodity-exporting regions as prices have increased.

With maritime handling 80% of cargo services, the towage industry will get a mega push.

Q1 2022 relative to Q1 2021 and Q1 2019



The rest of 2022's trade volumes are projected to be negatively impacted by rising interest rates, end of economic stimulus programmes and mounting global debt. These macroeconomic trends will be reflected in global trade, resulting in slower trade growth.

International Trade Tensions



US-CHINA TENSIONS

- China has launched multiple missiles into Taiwan’s coastal waters after the United States Speaker’s visit. This has underlined the risks to the global supply chains from escalations between Beijing and Taipei
- The Taiwan Strait is the primary shipping route between China and Japan, the world’s second- and third-biggest economies, and Europe. It also serves as a trading route for South Korea to transport manufactured goods from Asian factories to Europe via the Suez Canal
- According to Bloomberg, 50% of the global container fleet and 88% of the world’s largest ships by tonnage passed through the Strait in 2021
- Prolonged or regular drills in the Taiwan Strait could create significant disruptions in Taiwan’s trade with the rest of the world and global supply chains



UKRAINE-RUSSIA WAR

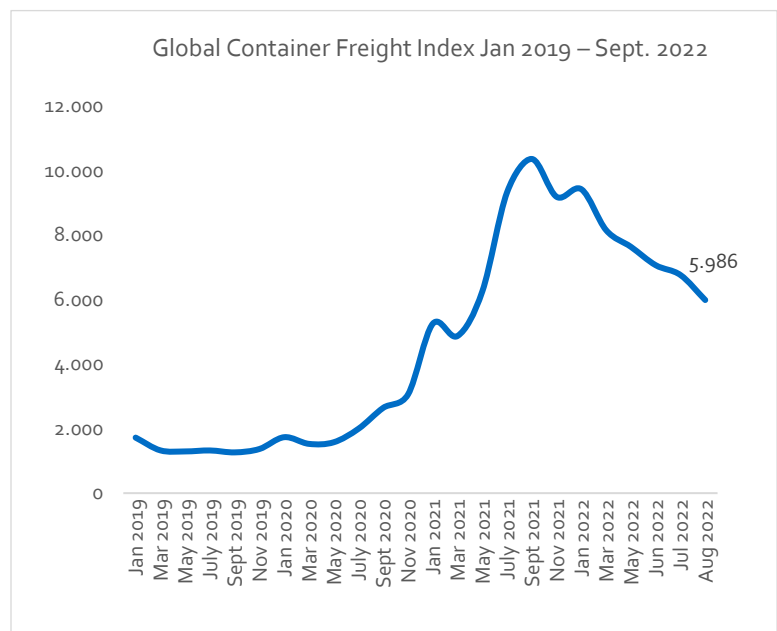
- The ongoing conflict between Russia and Ukraine has reduced the forecast of global trade growth for 2022, from the 3.7% to 2.4 –3%
- The conflict has pushed the prices of food and energy higher and reduced the availability of goods exported by Russia and Ukraine. The two countries exported around 25% wheat, 15% barley, and 45% sunflower products globally in 2019
- Russia alone accounted for 9.4% of the world trade in fuels, including a 20% share in natural gas exports. Russia is one of the major global suppliers of palladium and rhodium, which are crucial elements in producing catalytic converters for automobiles impacting delivery and timeline study

GLOBAL CONTAINER FREIGHT CHARGES ARE AT AN ALL-TIME HIGH

Container freight rates increased considerably between January 2019 and June 2022. There was a specifically steep increase in the global freight rates of nearly USD10,400 in September 2021. In June 2022, the global freight rate index stood at USD7,100.

Currently the rates have fallen ~15% to USD5,986.

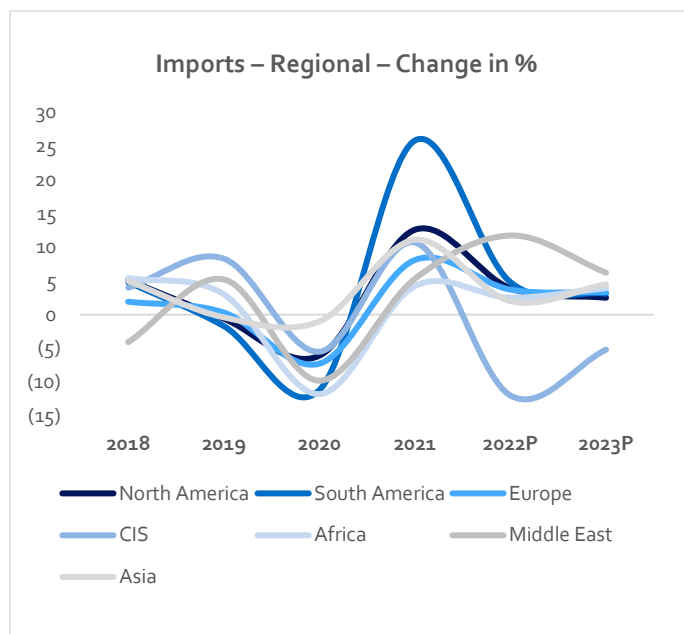
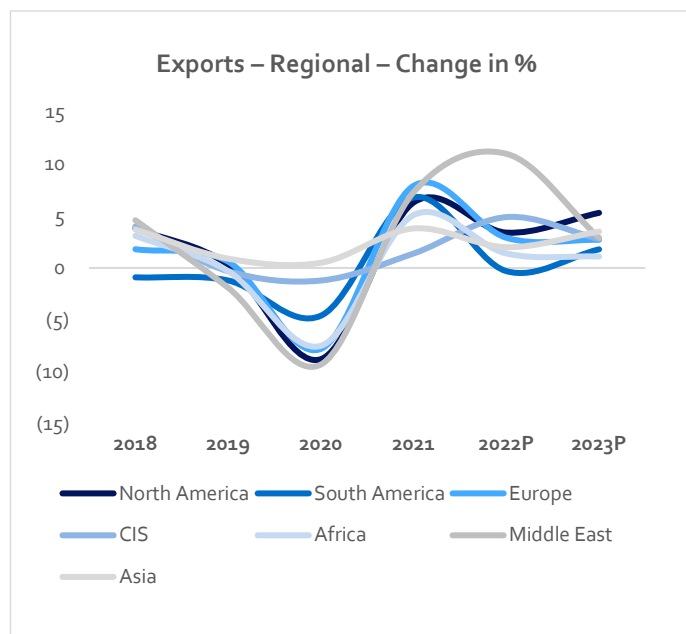
The last two years were volatile for shippers globally. At the beginning of the COVID-19 pandemic, attempts to hedge against dramatic rate drops via capacity management contributed to increased prices when consumer demand shot up in 2020.





Regional Trade

- Regional trade blocks are expected to perform a positive role in stimulating trade activities and growth
- Regional trade blocks operate efficiently and showcase potential where companies are allowed to integrate with other companies in the region for production and distribution networks
- Such trends create a built-in pressure that helps form better coordination at a multinational level. The companies find it easier to go global and define the rules of exchange for the future
- The world merchandise trade volume is expected to grow by 3.0% in 2022 (down from 4.7% previously) and 3.4% in 2023. However, these figures may be subject to revision due to uncertainty regarding the course of the conflict in Ukraine
- The CIS region will see a 12% decline in imports and a 7.9% drop in GDP in 2022, but exports will grow by 4.9% as other countries continue to rely on Russian energy
- Services trade will also be affected by the conflict in Ukraine, including the transport sector, which covers container shipping and passenger air transport
- The year 2021 saw a bounce back in trade volumes after the fall of 2020 with an average of 9.8% backed by Asia at 14.8%
- All other regions faced a below-average bounce back, including North America, South America, and the CIS region
- Trade costs will rise in the short run as sanctions, export restrictions, energy costs, and disruptions continue



Increased exports and imports across the spectrum will lead to higher trade, which will lead to higher maritime transit and a rise in the demand from developing countries in the Middle East, Africa, and Europe.

This leads to a higher demand for towage equipment and capital requirements, which will drive the demand for tugboats and towage services.



3.3 Rising Living Standards Increase Trade Commodities

Crude Oil



CONSUMPTION

- According to the World Energy Report 2021, the oil and gas demand is rising in line with the growing population, economy, and prosperity. China will overtake North America to become the largest oil consumer in 2030. In 2021, the United States consumed 19.7 mn barrels per day against 11.8 by China. This scenario is bound to change as the Lloyds Register forecasts China's consumption to triple while being 35% higher than the United States



PRODUCTION

- Most of the growth in crude oil production is from the Middle East. The recent oil discovery in Brazil, Canada, and the United States will give them a competitive edge. Russia's oil fields in Western Siberia will diminish
- Currently, the United States has the highest production of 11.5 mn barrels per day compared to Russia and Saudi Arabia's 10.5 mn barrels daily



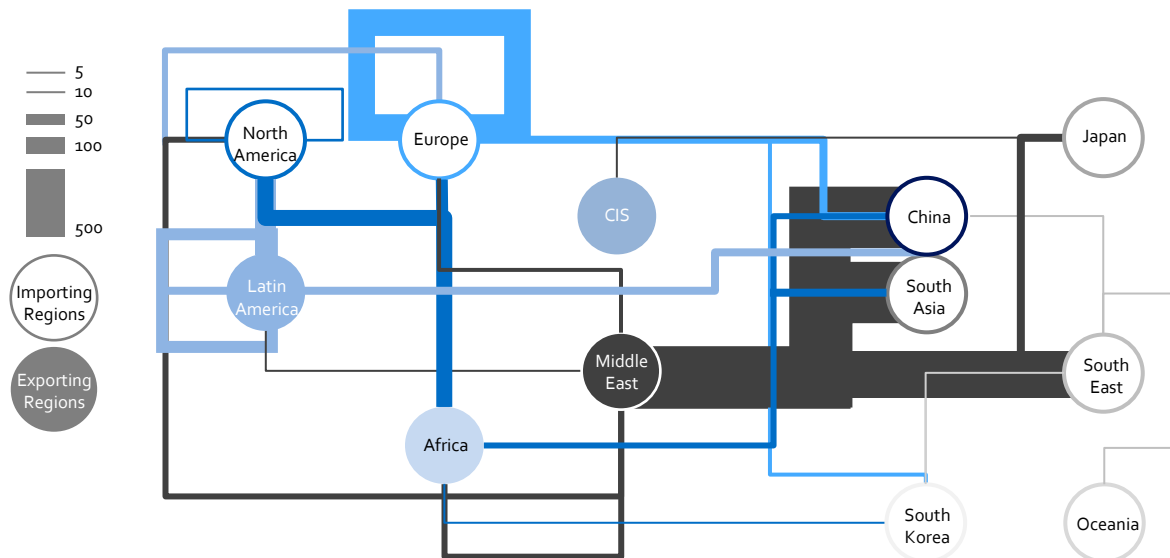
RESERVES

- The crude oil's reserves-to-production ratio of the world is reported to be about 55 years. It is suggested that there should be sufficient oil to match the demand after 20 years. Globally, crude oil production is expected to increase to meet the growth in consumption. The world's crude oil supply is set to rise by 38–63% by 2030
- Venezuela has the highest oil reserves in the world, with more than 300 mn barrels in reserves. Saudi Arabia has the second-highest oil reserves in the world at 297.5 bn barrels



TRADE

- According to Lloyds Register, crude oil accounted for about 25% of goods shipped by sea in 2021
- The Middle East will dominate crude oil exports in 2030. China and South Asia will significantly increase their crude oil imports by 2030 and join Western Europe as dominant importers. However, imports in North America and Japan will decline gradually over time. The economic uncertainties in China and South Asian countries are expected to negatively impact crude oil trade from the Arabian Gulf to China and South Asia
- The following chart depicts 2030 – Expected Trade Routes for Crude Oil



Gas



CONSUMPTION

- According to the World Energy Report 2021, the United States will remain the biggest gas consumer in 2030 and China will showcase the largest growth rate in gas consumption by 2030. Gas consumption in the Middle East and Europe will overtake oil consumption by 2030. Russia will dominate in natural gas by 2030



PRODUCTION

- Russia and the United States currently produce 1,635 bn cubic meters of natural gas daily. It is expected that they will remain the major natural gas producers in 2030. Russia's gas production will shift to Eastern Siberia and the Arctic region. Russia is a major gas supplier for the EU, with an increasing demand from the EU. In the wake of the Russian-Ukraine war gas exports from Russia towards the EU has decreased substantially. Gas export towards Middle East's natural gas production could be constrained by the lack of export infrastructure, technical and economic challenges in the production field, and domestic policy



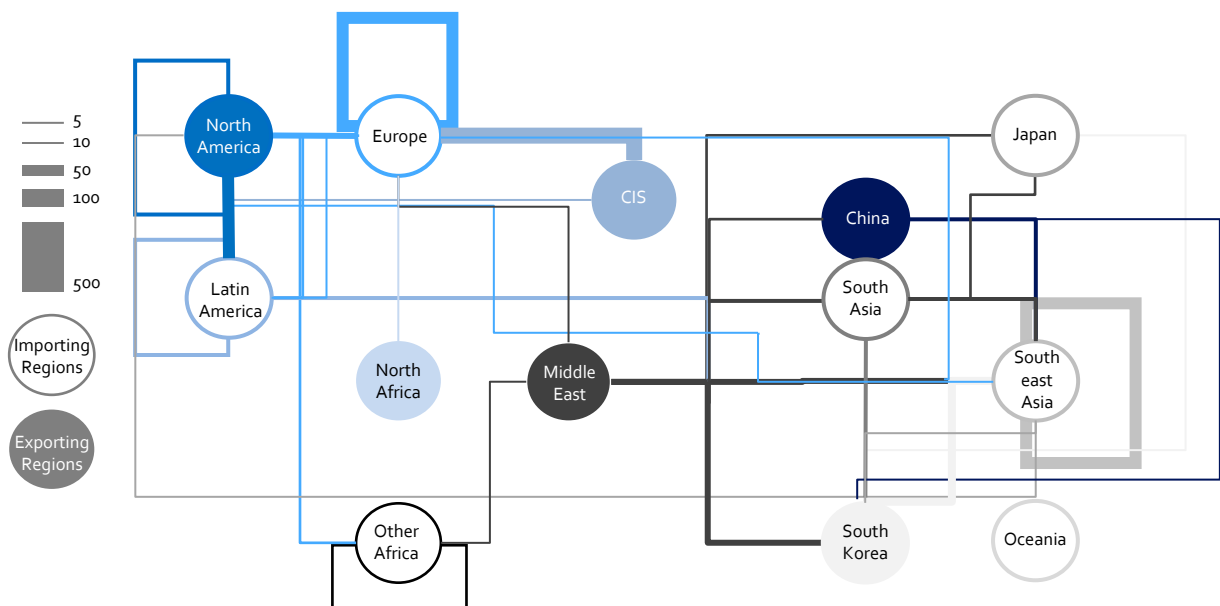
RESERVES

- The ratio of natural gas reserves to production in 2021 is about 60-65 years. Recent developments in horizontal drilling and hydraulic fracking have released shale gas reserves, and other new discoveries, safety and environmental issues arising from the implementation of new technologies, may hinder the growth of shale gas production. If these barriers can be overcome, global energy markets could enter the gas age



TRADE

- The highest growth in LNG imports is expected from the potential markets of India and China. Gas imports will be dominated by Europe, Japan, China, and India in 2030. In 2030, Australia and Qatar will dominate LNG exports
- East Africa, including Mozambique, is likely to be a new hotspot in LNG exports due to its recent large offshore discoveries. Key seaborne trade routes for natural gas include Australia to China and Japan
- Routes with the largest increases include Qatar to India and the United Kingdom, Australia to China and Japan, Nigeria to China and the United Kingdom, Egypt to India and the United Kingdom, and the CIS region to Japan
- The following chart depicts 2030 – Expected Trade Routes for Natural Gas Carriers



Coal



CONSUMPTION

- According to Lloyds Register 2022, the two countries that will consume the most coal globally are China and India. China will account for almost 60% of the global coal use by 2030. India currently consumes 12.5% of coal and is likely to expand to more than 16% by 2030



PRODUCTION

- The world's coal production is expected to double by 2030. China is set to achieve the largest coal production and growth. Most of the world's coal production is for domestic markets. Currently, Asia Pacific is the largest coal producer, with 31.1 bn tons garnering a 77.3% stake in the global market



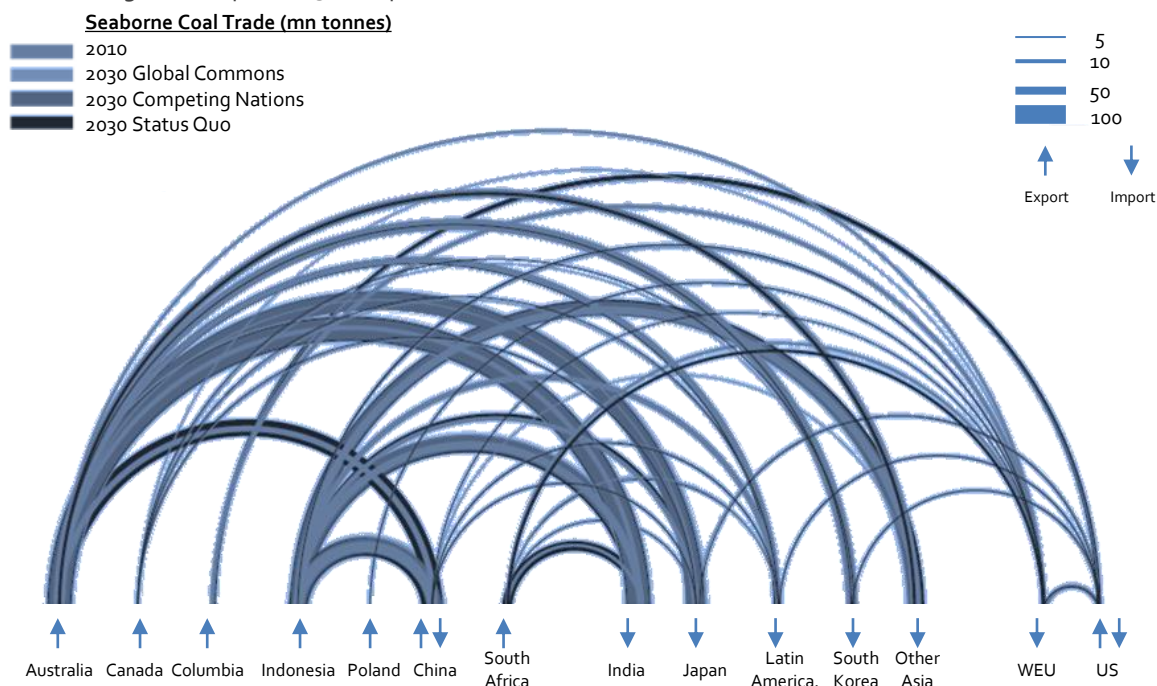
RESERVES

- Coal reserves represent around 140 times the 2011 annual world coal production in 2022. Hard coal is the most widely used coal grade today, contributing to 86% of the world's coal demand
- Top 5 countries, the United States, Russia, Australia, China, and India, hold 75% of the world's coal reserves



TRADE

- Coal is the major dry-bulk cargo. About 67% of coal transported is steam coal, while the remaining 33% is coking coal which is essential for steel production
- India and China will dominate coal imports in 2030. India to overtake China and become the biggest coal importer before 2030
- Enhanced productivity of in-land coal production will be a changing point for the global coal trade. Indonesia was the next largest coal exporter in 2021; however, the government is curbing its exports to conserve the limited coal reserves for the country's expanding domestic use. This, in turn, will enhance the export profile of Australia
- The following chart depicts 2030 – Expected Trade Routes for Coal



Iron ore



CONSUMPTION

- According to GlobalData, China accounted for a major share of the global iron ore consumption, followed by India, Russia, and Japan in 2020
- India is expected to be a key contributor to growth, with output expected to grow mainly with the support of infrastructure development plans and growing steel production



PRODUCTION

- Australia is the leading iron ore producer worldwide, producing 38% of the total world production, with Brazil (LATAM) in second with a 17% market share. This scenario is expected to remain the same in 2030 as well
- By 2030, India may see the most significant iron ore production growth, between 3 to 5 times, over the next decade



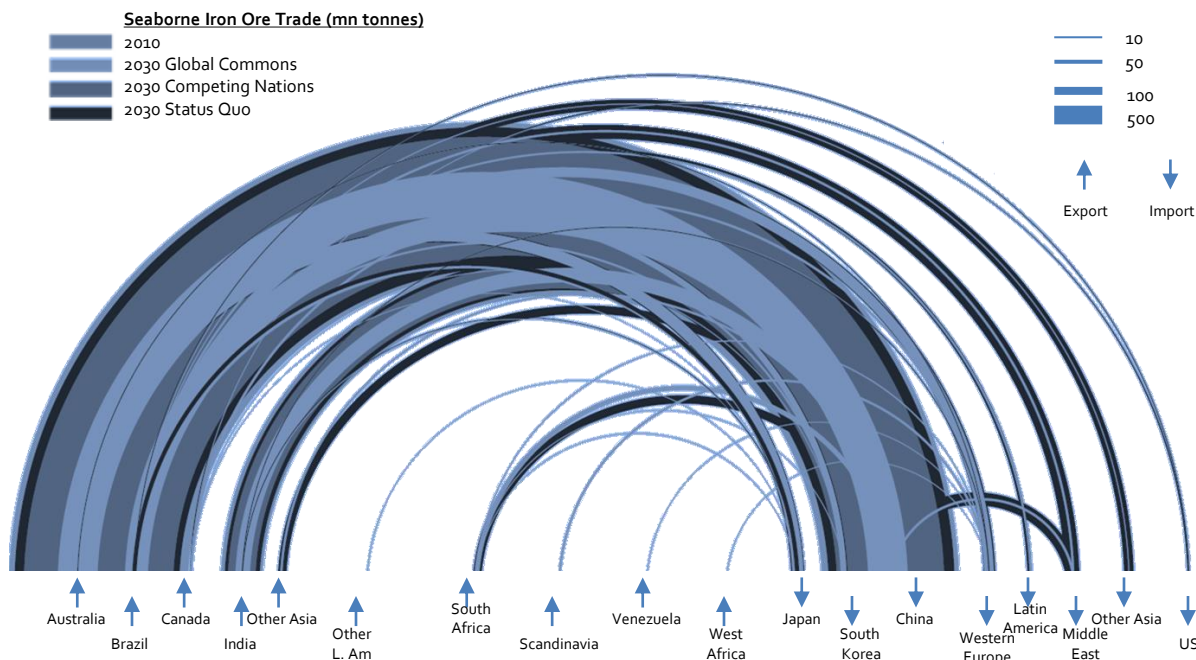
RESERVES

- As of June 2021, 7 countries – Australia, Brazil, China, Russia, Ukraine, Canada, and India – held about 140 bn tons of iron ore in their reserves. The top 2 – Australia and Brazil – cumulatively held 41% of iron ore reserves and are expected to be in this order by 2030



TRADE

- Trade routes between Australia, Brazil, India, and China will lead the table and also contribute the largest increase. China is a major iron ore producer, but its domestic mines only met 42% of the demand in 2021. This is because China needs to import higher grade iron ore from overseas
- Oceania and Brazil, will continue to dominate the export market with significant growth. India will remain number three in terms of exporting iron ore growing less rapidly
- The following chart depicts 2030 – Expected Trade Routes for Iron Ore



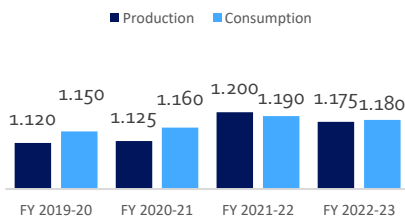
Grains



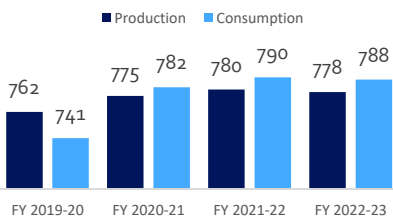
CONSUMPTION

- According to May 2022 report by United States Dept. of Agriculture (USDA), the total 2022–23 grain consumption is expected to outshine the total production

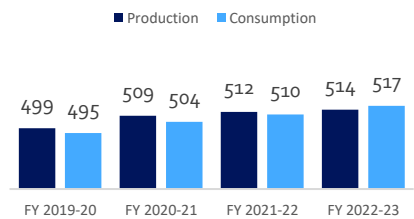
Global corn consumption and production



Global wheat consumption and production



Global rice consumption and production

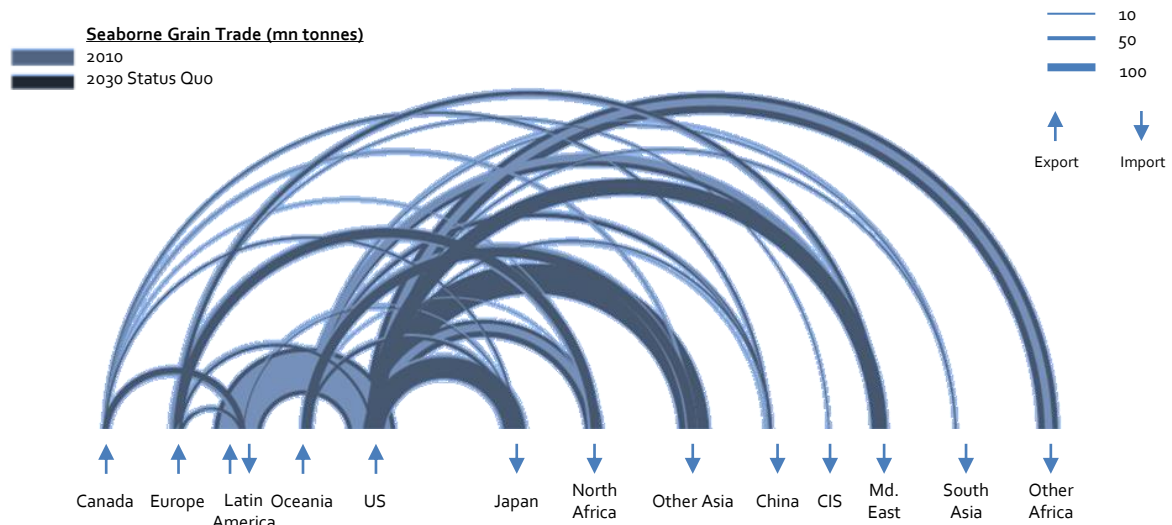


- The global corn production is forecast down due to a cut in Ukraine and the United States, although China and the EU are expected to have smaller crops as well. Argentina and Brazil will have record production. For global consumption, both feed and non-feed uses are expected to decline modestly
- The global wheat production is forecast down with smaller crops in Ukraine, Australia, Argentina, the EU, and China. The overall consumption is down with lower feed and residual use only partially offset by higher food, seed, and industrial (FSI) use. Food consumption will continue to rise as the population increases
- The global rice production is forecast at a record, with larger crops in South and Southeast Asia, including India, Indonesia, Bangladesh, Thailand, and Pakistan. Global consumption is expected to rise, also a record, primarily in India, China, and Sub-Saharan Africa



TRADE

- IMPORTS** – As per Lloyds Register, there will be a significant increase in imports of grains in Africa and the Middle East. In 2030, grain imports are likely to be dominated by Africa, Latin America, the Middle East, and Southeast Asia
- EXPORTS** – A significant increase in exports from the United States and the CIS countries. The United States will dominate grain exports in 2030, accounting for 40% of the world’s total exports
- The following chart depicts 2030 – Expected Trade Routes for Grains



Containers

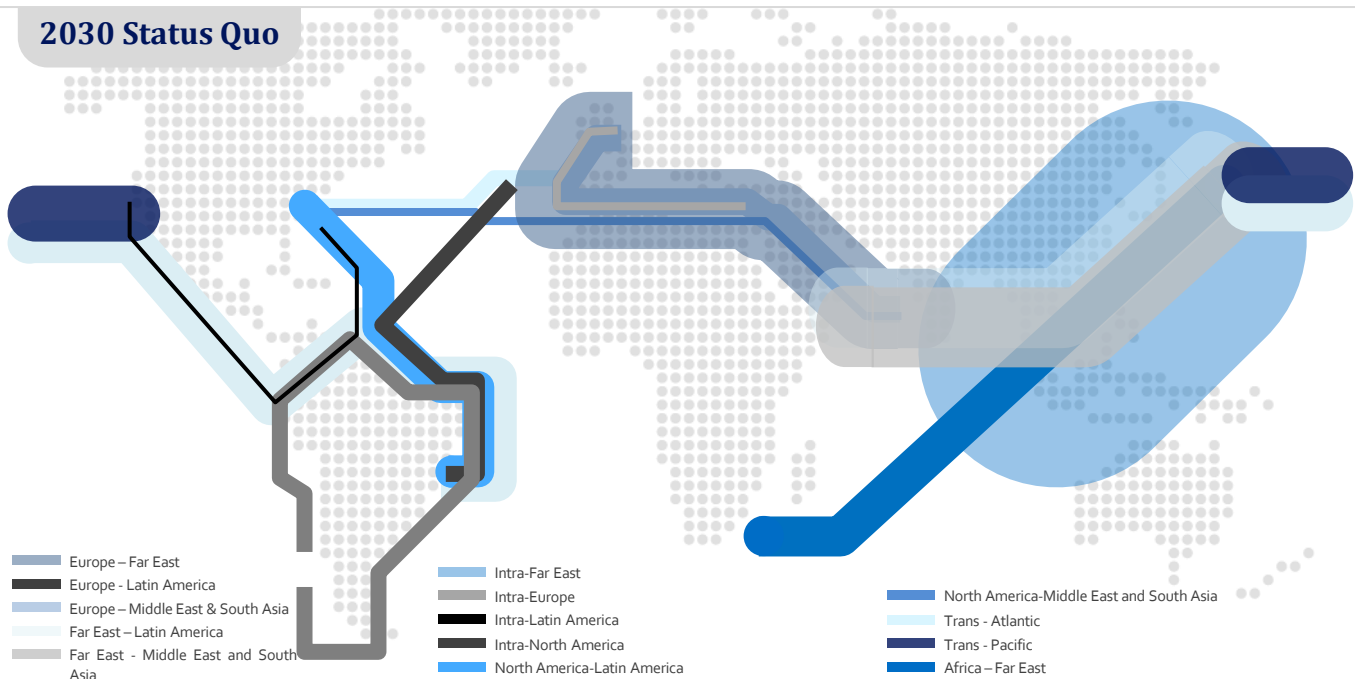
- In 2030, China will still enjoy its leading role in primary container trades, while Latin America will face the highest uncertainties. However, Latin America will remain the fourth, after Southeast Asia. It depends on the potential and challenges of industry reforms and transforming Latin American society into an economy with competitive manufacturing and growing consumption power



TRADE

- GTAS Forecasting’s forecast a strong recovery in container trade with an annual growth rate amounting to 9.3% and volumes reaching 171.1 mn TEU by 2022
- The global CAGR for containerized trade is projected to reach 3.2% in the medium-term (2022–25) and 2.9% in the long term (2022–30)
- As per Lloyds Register 2022, the highest growth in container trade will be between the Far East and the Middle East over the next decade
- The Indian Ocean and the Asia Pacific region will be at the center stage of the global container market. There will also be significant growth in trade between the Far East and Latin America
- The following chart depicts 2030 – Expected Trade Routes for Containerships

2030 Status Quo



Rising Living Standards Contribute to Increase Trade in Commodities



Rising standards of living globally will create demand for all major transportation products. Therefore, the demand for ships and the number of calls are expected to increase accordingly



This will usher in strong growth for the global Marine and Offshore (M&O) business, driving its growth directly



Naturally, the towing industry, which supports the M&O industry, will benefit from increased commodity trading, which will lead to more leverage in the towing industry



3.4 Worldwide Fleet



Total Fleet Size

- The growth in the total fleet size over the years has significantly increased the demand for auxiliary support during docking and undocking
- The average vessel size in the ocean is continuously increasing due to the developing economies supporting most of the shipbuilding exercises by providing governmental support
- The total dwt grew by 3.04% in 2021 and is expected to grow further by 3.0% in 2022
- The others category has been the slowest movers with the COVID-19 extending lives of vessels by a couple of years



Bulk Carrier Fleet

- The dry bulk demand is expected to increase by 0.2% in 2022 and settle at 1.7% in 2023, compared to 2.2% in 2021
- The global container trade growth will slow in response to high inflation, endemic consumer pattern, and supply constraints after outstanding growth in 2021, reducing the minor bulk shipments



Fleet Registration by dwt 2021

- According to Clarksons research, in 2021, Panama had the highest share of dwt registered, with Liberia close in second
- This trend is bound to remain the same over 2022 and 2023 as new orders are at a low of 6% of the previous year for the industry
- Vietnam has seen the highest rise in 2021 dwt compared to 2020 and has risen by 12.1%.
- The top 35 countries have seen a rise of ~2.7% compared to the ~3.0% overall
- In 2030, China will see the highest growth in fleet ownership, growing to 19%

World Fleet by Principal Vessel Type, 2020–2021 (1,000 dwt and percentage change)

Principal Types	2020	2021	% Change
Bulk Carriers	879,725	913,032	3.79
Oil Tanker	601,342	619,148	2.96
Container Ships	274,973	281,784	2.48
Others	238,705	243,922	2.19
OSV	84,049	84,094	0.05
Gas Carriers	73,685	77,455	5.12
Chemical Tanks	47,480	48,858	2.90
Others	25,500	25,407	-0.36
Ferries	7,992	8,109	1.46
General Cargo	76,893	76,754	-0.18
TOTAL	2,071,638	2,134,640	3.04

2021 Flag of Reg.	No of Vessels	% Share	dwt	% Share
Panama	7,980	8.0	344,200	16.1
Liberia	3,942	4.0	300,088	14.1
Marshall Islands	3,817	4.0	274,041	12.8
Hong Kong	2,718	3.0	205,052	9.6
Singapore	3,321	3.3	136,400	6.4

Fleet Ownership



TANKER –

- Europe's tanker share was 41% in 2010 but will be 27–34% in 2030. Southeast Asia's share is to grow from 11% in 2010 to 16–19% in 2030. China's share is to rise from 7.6% in 2010 to 10–13% in 2030. The traditional European countries will retain a larger share of the tanker fleet ownership and own a smaller share



LNG CARRIER –

- In 2030, the Middle East, Europe, and Japan will control the LNG carrier ownership. However, their dominance can be challenged by the African countries and China. Western Europe's LNG carrier share to decrease from 29% to 21–23% in 2030



BULK CARRIER –

- The key increase in bulk carrier ownership is to come from China. China's share to grow from 22% in 2010 to 26–31% in 2030. Europe's bulk carrier share to drop to 12–15% in 2030



CONTAINERSHIP –

- Europe's containership share to drop from 48% to 29.5–35.6% in 2030. North America's containership share to drop to 3.7–4.7% in 2030. China's containership share to rise from 20.5–27.2% in 2030. The Middle East's share to rise to 8.9–10.9% in 2030

Shipbuilding Market



SHIPBUILDING MARKET –

- According to Lloyds register report 2022, the shipbuilding market remains at the current levels in 2030. Emerging countries like China to gain in the ship newbuilding market. However, Japan and South Korea will lose their market shares. South Korea's market share will fall to 22% in 2030. The total deliveries from emerging countries are expected to increase due to the potentially large countries (by volume share), including Vietnam, Brazil, India, and the Philippines



TANKER –

- The tanker Market is expected to decline during the next 10 years. Emerging countries like China are likely to dominate the newbuilding market with 50% followed by South Korea (25–27%) in 2030. Emerging nations to experience a significant increase in their tanker deliveries



LNG CARRIER –

- The total LNG carrier deliveries to rise by 2030. China's market share (41–51%) in LNG newbuildings is to be on par with South Korea's (43–53%) by 2030. The Chinese government's stronger interest to support the LNG carrier newbuildings will lead to a larger market share in the newbuilds



BULK CARRIER –

- The total bulk carrier deliveries to increase worldwide for the next decade. Newbuildings in the bulk carrier will be dominated by emerging countries (70%) in 2030. China to have a larger market share in bulk carrier shipbuilding while emerging nations will gain significant shares



CONTAINERSHIP –

- The total deliveries of containerships are likely to increase by 2030. The shipbuilding market will be dominated by China (39–48%) and South Korea (40–44%). China's share to continue to rise, while South Korea and Japan's share will diminish



3.5 Future of Shipping



Maritime transport defied the COVID-19 disruption



This has laid the foundations for a transformation in global supply chains and new maritime trade patterns



The war in Ukraine is a human disaster, but it is also resulting in an energy and food crisis worldwide

Supply Chains



By exposing the vulnerabilities of the existing supply chains, the COVID-19 pandemic disruption has sharpened the need to build resilience



The pandemic emphasized the importance of ensuring continuity in supply chains and the need for them to become more resilient, responsive, and agile



Discussions over the future of globalization have ushered calls to take a fresher look at the configuration of the extended supply chains to reduce heavy reliance on distant suppliers



Enterprises and governments are aiming to make supply chains more robust and resilient, including by looking to diversify their business partners and suppliers



It will involve a new balance between local, regional, and global production



They are also reconsidering inventory and stock management strategies and the trade-offs between just-in-time and just-in-case supply chain models

Digitalization and Technology



Customs officials, port workers, and transport operators increasingly recognize the value of new technologies and digitalization, not only as a way of boosting efficiency but also for maintaining business continuity at times of disruptions



Technological innovations include advanced analytics, onboard sensors, communications technology, port-call optimization, blockchain, big data, and autonomous ships and vehicles



During the pandemic, these technologies helped reduce physical contact and kept the ships moving, ports open, and cross-border trade flows



Technological advancements have also stimulated consumer spending online and growth in e-commerce



These trends will continue to redefine production and consumption patterns and how ships, ports, and their hinterland connections deliver cargo and services



Technological innovation demand cooperation between the parties included technical, energy, transport, storage, and production companies

Geopolitics



The COVID-19 health crisis underscored the extent to which countries are economically and socially interdependent and integrated through global supply chains and their underlying extended maritime transport networks



The recent war in Ukraine underscores this interdependency






In the face of heightened geopolitical risks, rising trade tensions, economical sanctions, political movements, and military conflicts, many countries and enterprises are shifting their mindsets and now perceive global interdependency partly as a vulnerability







To mitigate these risks and build resilience, they are aiming to reduce their reliance on distant foreign suppliers




Shipping Market Dynamics

-  Anticipating future disruptions, carriers, shippers, ports, and inland transport operators will rethink their business and operating models to respond more flexibly to the changing market conditions
-  Having seen how the trade rebound stumbled against the logistical bottlenecks and constrained capacity following the COVID-19 pandemic, they are likely to reconsider their levels of investment in shipping and ports as well as their planning operations
-  They can also anticipate the potential greater regulation of shipping markets through national competition authorities

Decarbonization and the Energy Transition

-  Maritime transport is facing growing pressure to decarbonize and operate more sustainably, and some issues that have also come to the forefront as part of the post-pandemic recovery
-  With the ongoing International Maritime Organization's (IMO) work on greenhouse gas emission reduction in shipping providing further momentum, the shipping industry is expected to change fuel mix and use new tech and ship designs, alternative fuels, and operational adjustments to cut its carbon and environmental footprint
-  For energy, shipping is not only a large-scale user but also a major carrier, so the industry will have to respond to lower demand for oil tankers and coal carriers and more for ships transporting hydrogen, ammonia, and other alternative fuels
-  Ports can play a vital, even a pivotal role in the new energy economy, e.g., as import or export hubs of renewable energy

Climate Adaptation and Resilience

-  Maritime transport infrastructure and services came under severe stress because of the COVID-19 pandemic and the closure of the Suez Canal
-  It was in addition to the ongoing dangers of climate change. Over recent years extreme weather events, including floods, hurricanes, and cyclones, have been causing frequent and intense disruptions for both coastal infrastructure and hinterland connections
-  With current climate projections pointing to a global warming trajectory exceeding the agreed targets under the Paris Agreement, the maritime industry and governments need to invest in the adaptation and climate-proofing maritime transport infrastructure and services as well as accelerate the development of related legal, policy, and technical measures, and capacity-building



4. MARKET OUTLOOK

GLOBAL
M&A
PARTNERS



4.1 Outlook – New Waves of Developments

Tug development will witness a wave of transformation during 2022–25 due to the adaptation of ongoing environmental regulations, digitization, higher bollard-pull, manoeuvrability, and stability case studies.

These new developments will lead to a new breed of tugboats developed, which will be smart and green. The harbour towage industry is expected to show growing emergence of green and smart tugs in line with the growing environmental regulations.

The smart tugs are expected to have additional networks of sensors recording system performance and data seeing the real-time transmission back to shore for analysis. Initiatives have already begun in western Europe.

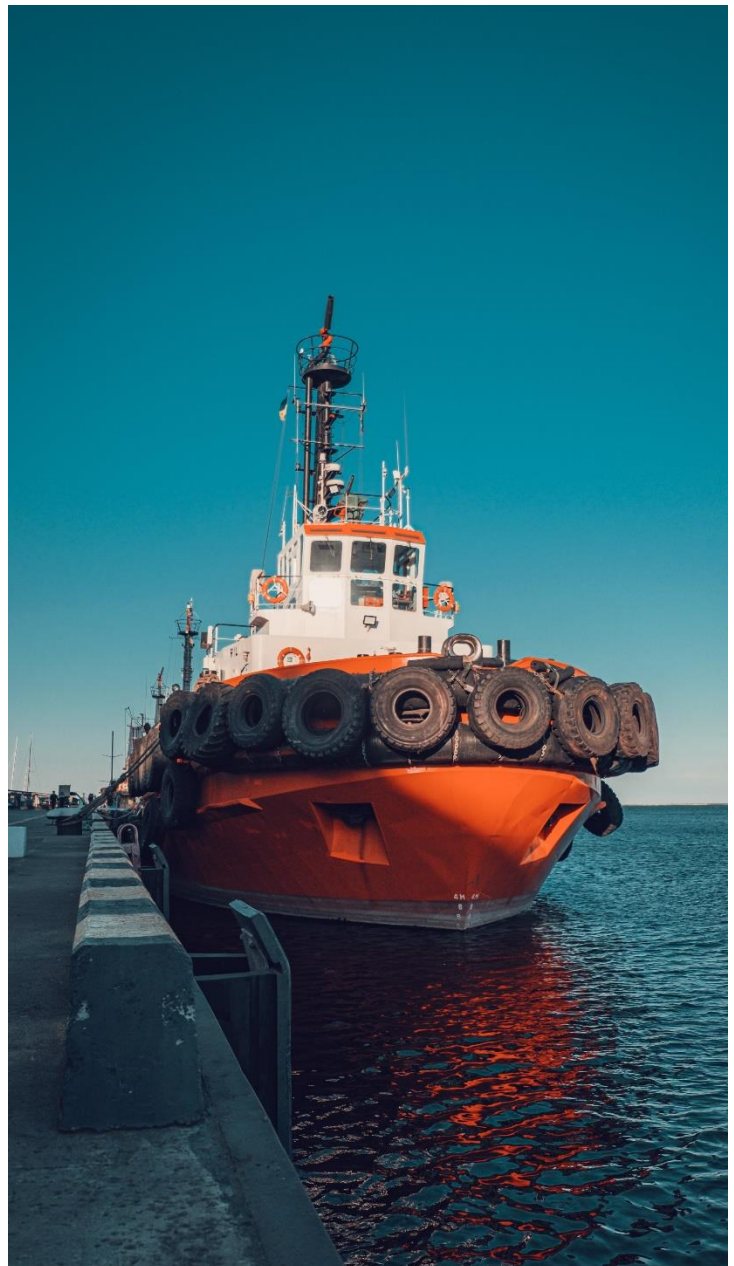
Cost Efficient and Tech Advancement

Architects are expected to design cost-effective tugs that enhance hulls for a higher bollard pull and diesel-electric propulsion, reducing emissions and increasing power. These tugs with lower emissions and more power take-off or take-in devices for exceeding regulatory requirements for either the UN’s International Maritime Organization Tier III (IMO Tier III) or the United States Environmental Protection Agency (EPA) Tier 4 emissions rules.

Technological advancements to encourage other players in tug operations to integrate smart and advanced tugs into fleets and include different towing technologies and mechanized line handling.

Hybrid Systems to Operate Vessels

Furthermore, the market participants are inclining toward the hybrid systems that enable vessels to operate across different power modes, such as direct-diesel, diesel-electric, and fully-electric, for reduced fuel consumption and exhaust emissions.



Future Proofing the Tug Designs

Additional focus for future-proof tug designs depends on

- Safety
- Economies of scale
- Sustainable operations
- Service integration
- Digitalization

Tug operators to deploy different technologies on tugs, such as IMO Tier III and EPA Tier 4-compliant propulsion, render, recovery winches, and alternative fuels.

Furthermore, with artificial intelligence (AI) and congenital thinking taking center stage, digitization will enhance tug designs.

The role of data analytics and insights monitoring to designers for reconsidering theoretical design will be embedded through 3D design software and using computational fluid dynamics calculators..

Onboard data analytics will help captains in managing towage operations while assisting the onshore managers to utilize the information to make an informed decision.

Consolidation

The market seems to be under pressure for more concentration, especially in countries with fierce competition

- The market structure might have a substantial influence on the towage landscape. The continuing pressure on tariffs, e.g. in Northwest Europe, has led to a very competitive environment
- The shipping landscape is also changing. Major shipping lines are inclined to have one supplier of towage services that can serve them in several ports, also leading to the establishment of towage subsidiaries of shipping lines themselves (e.g. Svitzer is the towage division of Maersk; DPW started with POML its own towage and offshore business; with Med Tug MSC has started a towage service, the viability of this service has yet to be proven)
- Also, the port landscape is changing. The evolution towards bigger vessels leads to the need for bigger tugs. This asks for major investments in tug fleet building
- Furthermore, ports can be playing a major role within the energy transition, with the storage of new fuels. This asks for state-of-the-art tugs
- The need for investing in digitalization of the tug goes without saying – optimization of activities, better communication with shore and vessels, monitoring engine and other critical systems aboard of the tug are just a few of the digitalized changes a tug needs
- New environmental and safety regulations will need new investment in tugs

Major investments are needed to comply with the above-named developments. Smaller players might find it hard to cope with these challenges, which make them a possible victim of these market circumstances.



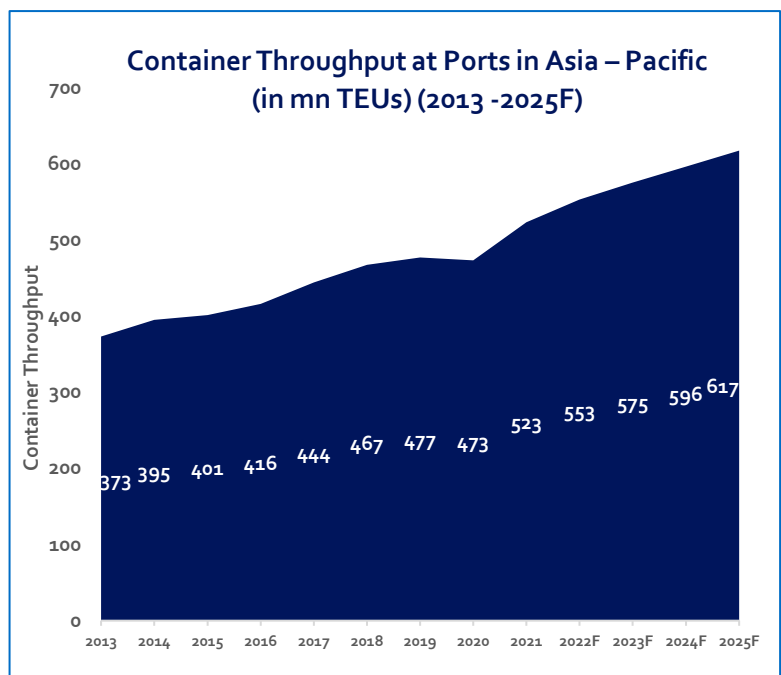
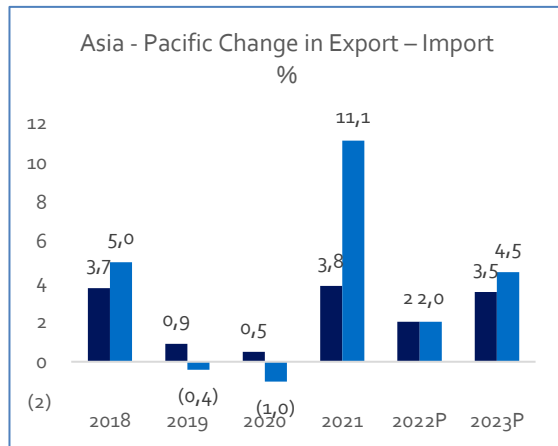
REGIONAL OUTLOOK

ASIA - Pacific

According to the *Asian Economic Integration Report (AEIR) 2022*, trade among economies in Asia and the Pacific rose to the highest level in the last three decades, bolstering the region’s economic resilience amid the COVID-19 pandemic even as mobility restrictions and supply-chain disruptions hampered the global trade.

Asia and the Pacific’s trade grew by 29.6% in the first 3Q 2021, compared to the global trade growth of 27.8%. The trade within the region rebounded to 31.2% during the same period, following a 3.1% contraction in 2020.

- Intraregional trade was 58.5% of the region’s total trade in 2020, the highest ever in the last 30 years
- With countries like Vietnam, India, Japan, and China increasing their world dominance, the trade from the Asia-Pacific region is expected to rise accordingly

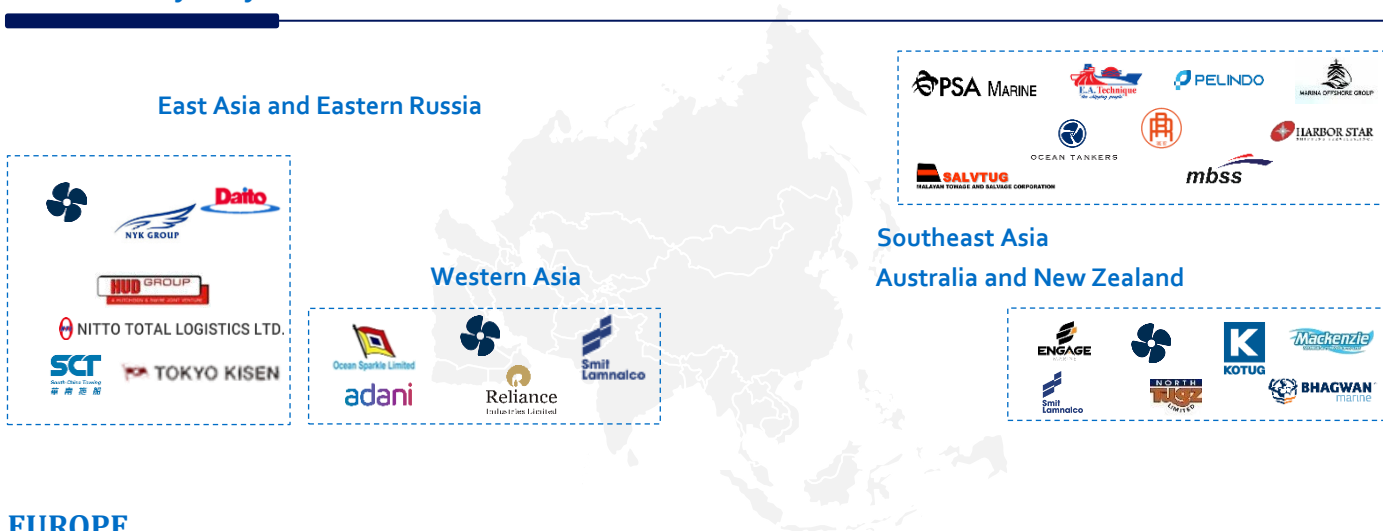


The report also suggested an integration among economies in Asia and the Pacific and continues to deepen in areas including new technology and digital connectivity, environmental cooperation, trade linkages, investment, and value chain participation.

The Asia-Pacific region is showcasing strong growth in the harbor towage market in line with the growing trade in the Asian region that translates into expansions in ports and larger ships. Additionally, container terminals are looking for greater efficiency for rapid service delivery of larger container ships that require significant adjustments in the tug fleets.

The foreign tug operators are interested in expanding their tugboat operations in the Asia-Pacific region.

Selected Key Players in Asia



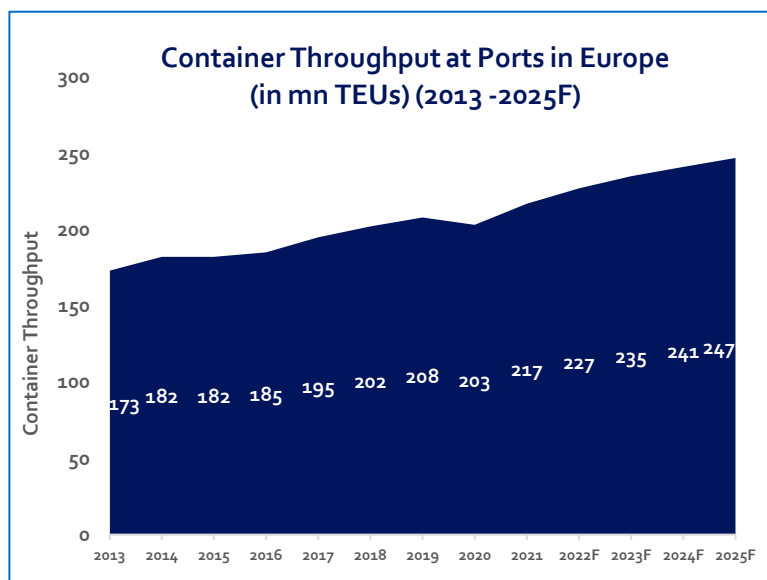
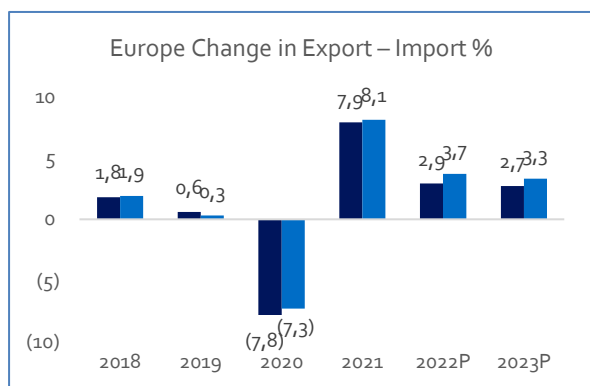
EUROPE

European harbour towage market is witnessing various developments during the recent years. Major players in towage have invested in fleets of powerful harbour tugs as they secure concession extensions and handle larger ships.

Port authorities are hiring tugs based on not only their power, but also the emission compliance as Europe moves towards Environmental Protection Agency (EPA) norms .

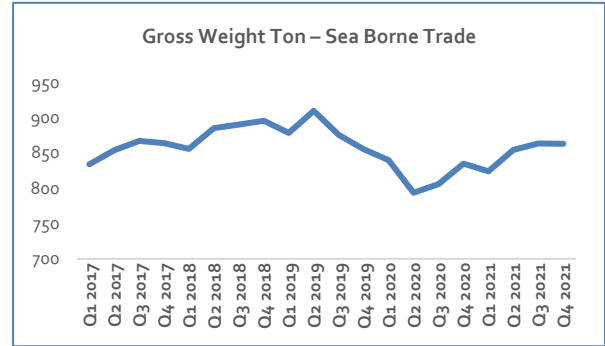
Regions such as Baltic Sea requires special ice-class tugs since significant region is frozen during part of the year.

Several domestic tugboat operators, including Boluda, Fairplay, Svitzer and Rimorchiatori Riuniti, have become the market participants in the face of mergers that created synergies by bringing huge fleets and competitive strength in managing port operations.



EUROPE – Continued

- Intra-regional trade was 67.7% of the region’s total trade in 2021, the highest in world trade
- Imports in Q1 2022 saw a 20% jump relative to the 2021 levels, while the exports saw a 13% overall increase
- As the gross weight of seaborne trade handled by European ports increases, the towage-related service requirements demand will also rise. Since Q2, 2020, the region has been seeing an increase in the gross weight of seaborne trade



Selected Key Players in Europe

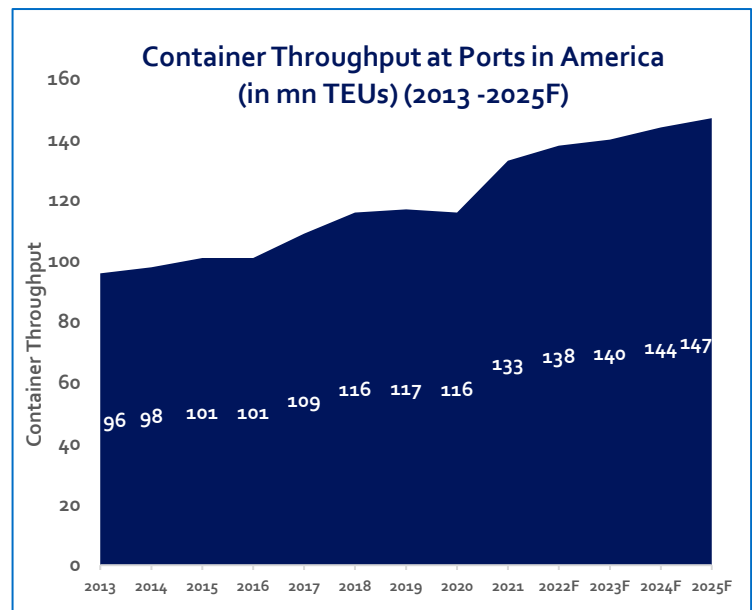
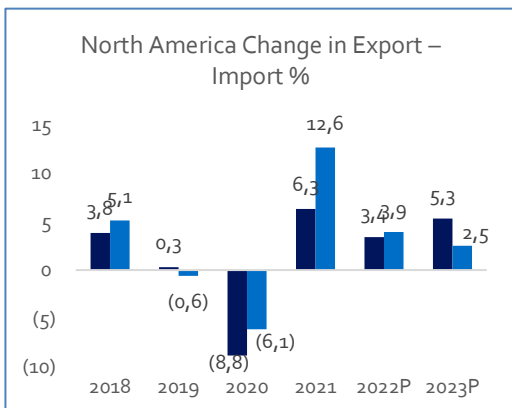
- Netherland and Belgium:** MULTRASHIP TOWAGE & SALVAGE
- UK and Ireland:** MAINPORT, SWS TOWAGE
- Baltic Sea:** FAIRPLAY TOWAGE GROUP, UK-ER & BER-LINE, ALFONS HAKANS, RAUMATA
- France – Atlantic Coast:** tsm
- Spain – Atlantic Coast:** P&O
- Portugal:** REBONAVE, P&O, TINTA
- Spain - Mediterranean:** P&O, Grupo Rebarsa
- Germany:** FAIRPLAY TOWAGE GROUP
- Greece:** TSAVLIRIS, VERNICOS, Spanopoulos, MEGATUBE
- Italy:** MSC, SCARPI, MERRI, LACAN TASH

NORTH AMERICA

According to a recent report by *Technavio*, North America will provide maximum growth opportunities in the tugboats market during 2022–25. The region will contribute 33% of the global market growth during the same period.

The United States is a major market in North America

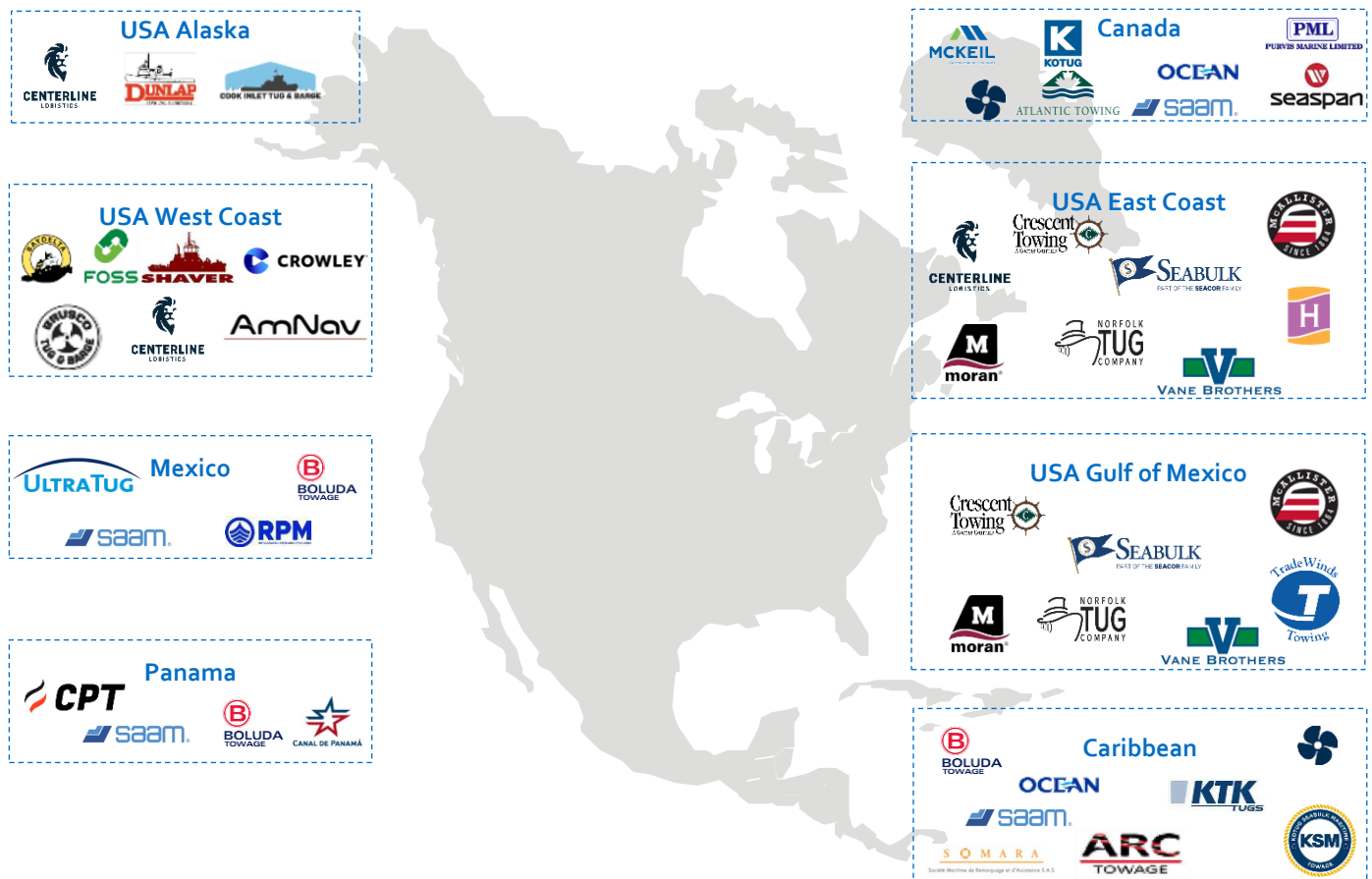
An increase in seaborne trading will drive the tugboat services market growth in North America during the forecast period,



NORTH AMERICA – Continued

- Intra-regional trade was ~30% of the region’s total trade in 2021, the third-highest in the world
- Imports in Q1 2022 saw a 21% jump relative to the Q1 2021 levels, while the exports saw a 19% overall increase
- Imports in Q1 2022 saw a 32% jump relative to the Q1 2019 levels, while the exports saw a 21% overall increase
- The overall seaborne trade is seeing a continuous rise in North America, leading to growth in maritime and offshore activities along with other auxiliary industries benefitting from it
- This leads to a positive outlook for the towage industry in the region

Selected Key Players in NORTH AMERICA



SOUTH AMERICA

In recent years, South America has accounted for about 17% of the world’s total maritime cargo.

Still, Panama was first on the list in 2021, with 16.1% of the total merchant fleet registered, followed by Liberia, Marshall Islands, and others. The Bahamas, a Caribbean island, also occupies the eighth place in rank, with 3.5% of the world’s dead-weight tonnage registered.

As the Panama Canal saves huge transport time, its effective utilization will also increase. The expansion of the canal planned for 2023–24 will shorten the time taken for transport even further,

- Intraregional trade was ~14% of the region’s total trade in 2021, which is one of the lowest in the world
- Imports in Q1 2022 saw a 25% jump relative to the Q1 2021 levels, while the exports saw a 29% overall increase
- Imports and exports in Q1 2022 saw a 34% jump relative to the Q1 2019 levels
- There is a continuous rise in the overall seaborne trade in Latin America, which will lead to an increase in maritime and offshore activities along with other auxiliary industries benefitting from it, resulting in a favorable future for the towing sector

Selected Key Players in SOUTH AMERICA



AFRICA

Increasing trade across the African continent has resulted in increase in maritime trade across the region.

Improved relationships amongst various constituents and other regions has resulted in stable increase in imports and exports throughout the region.

Intraregional trade was ~18% of the region's total trade in 2021.

African countries being rich in natural resources and metals, export it to various dependent countries. 1/3rd of the region is landlocked still maritime transport remains the main gateway to the global marketplace and is expected to be the same in 2030:

- Imports in Q1 2022, saw a 23% jump relative to the Q1 2021 levels while exports saw a huge 30% overall increase
- Imports in Q1 2022, saw a 32% jump relative to the Q1 2019 levels while exports saw a huge 34% overall increase
- Regional integration initiatives such as African Continental Free Trade Agreement will result in positive outlook for trade in the region
- Also factors such as robust economic growth, demographic dividend, growing investment and financing commitments are pushing the outlook to a positive side

Selected Key Players in AFRICA



OCEANIA

- Australia is fifth largest user of shipping services in the world, and ~80% of Oceania's imports and exports by value are carried by sea route
- With a coastline of above 60,000 kilometres in length, the region provides a huge growth opportunity for trade in natural resources
- With multiple MNC's operating in the shipping and maritime industry, the growth in Oceania region has been steady
- Intraregional trade was just 6.4% of the region's total trade in 2021
- Imports in Q1 2022, saw a 18% jump relative to the Q1 2021 levels while exports saw a 9% overall increase
- Imports in Q1 2022, saw a 34% jump relative to the Q1 2019 levels while exports saw a huge 36% overall increase
- Developing relations with Asia Pacific countries has strengthened the rise of trade between the continents providing higher port calls for multiple ports
- With rise in trade between regions, the auxiliary industries are expected to see growth accordingly

Selected Key Players in OCEANIA





5. DEVELOPMENTS IN TOWAGE INDUSTRY

GLOBAL
M&A
PARTNERS



Trends Impacting Towage



Consolidations reshape the landscape



Cutting emissions and introducing new energy sources



Smarter towage



Changing Business Models



Safety management



Manning and training



Biofuels



Alternative Fuels

5.1 Consolidations Reshape the Landscape

Major Mergers and Acquisitions



- Boluda has acquired multiple companies in the recent 2 years making it a strong global player. Some of its latest acquisitions are:
 - Caledonian, Scotland-based Towage activity and operator
 - Iskes, Netherlands-based Towage and Salvage operator
 - URAG, Germany-based Tug company



- Rimorchiatori Mediterranei with towage activities in Europe, Latin America and recently in Asia has also been recognised as a Global powerhouse
 - It recently has acquired KeppelSmit (Boskalis), with operations in Singapore and Malaysia
 - Expansion in Greece
 - Continuous expansion in tug vessels



- SAAM, a major towage company from LATAM and Northern America has exposure to 13 countries serving 80 ports
 - Acquired Saam Smit in Latin America and Canada
 - Acquired Intertug, towage operator in Colombia
 - Acquired Starnav in Brazil
 - Acquired Ian Taylor Towage in Peru
 - Acquired Standard Towing Ltd. and Davies Tugboat Ltd in West Canada



- Adani Harbour Services acquired Ocean Sparkle, India's largest towage operator. The company also acquired Gangavaram Port in the eastern side of India



- PSA (Singapore) acquired Tramarsa in Peru and now operates in Asia as well as South America

5.3 Smarter Towage

Some tug owners have invested in digitalization technologies to monitor their operations and improve fleet management remotely.

A select few have tested technologies for remote operations to improve safety and gain experience from semi-autonomous operations, which is a growing trend, within consortia, including owners, class, and automation system providers, cooperating in developing this technology

DAMEN

- Damen is testing a 35-foot-long tugboat laced with computer vision and other technologies to travel a 1,000-nautical-mile autonomous journey around Denmark



- This vessel was developed in the Netherlands in association with Sea Machines Robotics, a Boston-based developer of autonomous vessel software and systems. They will also utilize long-range computer vision and a 'sensor-to-propeller' system



- Multraship together with Novatug, Voith, and MacGregor successfully trialed remote control and autonomous vessel operations on a harbor tug in the FernSAMS joint research project in October 2021



- KOTUG International successfully demonstrated an autonomous vessel navigation system in September 2020
- Sea Machines Robotics demonstrated autonomous technology by controlling the tug Nelly Bly from Boston, U.S., while it sailed around Denmark



5.4 New Business Models

Various novel concepts are emerging and being rolled out globally



- Container liners operate their own towage companies; Svitzer already was a subsidiary of A.P. Møller–Mærsk A/S and serviced the Maersk container vessels in ports



DP World has a strategic focus on growing in the complementary sectors and strengthening its product ranges. DP World's subsidiary POML is the towage operator for its terminals and others



- Like container terminal operators Maersk and DPW, MSC has founded a towage subsidiary – Med Tug. The company operates in Europe; in Antwerp Med Tug ceased operations; viability in other ports is yet to be proven
- The new environmental legislation and the necessary up-scaling of tug specifications in ways of safety, bollard pull, stability, and maneuverability make the ports and (terminal) owners seriously consider owning a tug fleet on their account, instead of contracting established tug owners. For example, Formosa Plastics, in Taiwan, operates its own dedicated tug fleet for its plastics company, and Fortescue Metals Group (FMG) in Australia operates its state-of-the-art fleet for its mining terminals

5.5 Safety Management

Despite many towing businesses being exempt from the International Safety Management Code (ISM), putting in place a Safety Management System (SMS) is believed to be in line with best practices.

A structured and recorded system of adequate scale for the business not only enhances safety and protects the employees but also protects the owners/operators.

If there is no SMS system in place, it is challenging to adhere to the acknowledged good practice.

According to experience, accidents frequently happen during everyday operations. An SMS helps to identify the dangers, enabling crucial lessons to be learned so they would not be repeated.

Risks increase with:

- ✓ Poor planning
- ✓ Poor communication
- ✓ Poor supervision
- ✓ Failure to appreciate the dangers of an operation
- ✓ Lack of experience or knowledge
- ✓ Misuse of equipment
- ✓ Unpredictable environmental factors, such as weather, tide, or current
- ✓ Changes or unappreciated factors of the tow, such as cargo shift
- ✓ Unexpected events, such as equipment failure or unusual traffic movements

5.6 Manning and Training

Closely related to safety management is the training of the manpower. It is provided by various third parties that offer the training in 3 levels.

In some jurisdictions, particularly for non-international journeys like river passes, the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW Code) may not extend to the towing operations.

The manning of the towing vessel may be determined by an appropriate regulatory authority. However, it is the responsibility of the owner/operator to ensure that the tug is manned with adequately certified and experienced personnel for the voyage. The towing master should be aware that inexperienced personnel must not be exposed without training and supervision to conduct high-risk tasks, such as hooking up or releasing the tow.

It is also the custom and practice in many areas that personnel supplied by barge operators are often part-time, contracted in, and, therefore, possibly inexperienced and poorly trained. Their actions can therefore impact the safety of a towing operation.

The use of new energy sources and digitalization requires training in manning, to ensure that they can handle everyday routine but certainly also high-risk situations.

5.7 Biofuels to be Used to Reduce Emissions Making it a Good Short-term Alternative

Multiple steps have been taken by tug operators to reduce the emissions from tugs including retrofitting four-stroke, medium- and high-speed engines to use the biofuels

An example –

- AP Moller – Maersk converted 10 tugs supporting ships berthing and undocking at container and LNG terminals along Thames river to run on carbon-neutral hydrotreated vegetable oil (HVO) biofuel instead of marine fuel oil



5.8 Use of Alternative Fuels to Reduce Carbon Footprint by 2050

Companies are investing in and testing alternative fuels for towage operations. At this moment there is an increasing activity in new tug building projects involving LNG and other alternative fuels for delivery in 2023 and beyond

Some Initiatives –

- In Japan, NYK tested world's first ammonia-powered tugboats, with partners classification society ClassNK and IHI Power Systems
- CMB Tech and Port of Antwerp will launch Hydrotug, the world's first hydrogen powered tugboat



5.9 Electrifying the Current Fleets to Pave Way for Future Electric Powered Fleet

Instead of investing in alternative fuels or biofuels, more owners are selecting an electrical route to decarbonisation with electric motors for hybrid propulsion and batteries for energy storage.

It is expected, there will be potential 10 Electric tugboats in Q4 2022 compared to 1 in Q1 2021.

Some Initiatives –

- Gisas Shipbuilding has started operating an all-electric harbour tug. It is designed by Navtek Naval Technologies & built by TK Tuzla Shipyard
- Tokyo Kisen will launch the e-tug Taiga in December 2022
- In New Zealand Damen has delivered the all-electric tug Sparky to Ports of Auckland


















6. SELECTED OPERATOR OVERVIEW

GLOBAL
M&A
PARTNERS



Country	Company	Fleet Size		
		2022	2021	
	SVITZER	Svitzer	391	400+
	BOLUDA CORPORACIÓN MARÍTIMA	Boluda Corporación Marítima	309	300
	SAAM	Sociedad Matriz SAAM	183	183
		Rimorchiatori Riuniti Group	169	100+
		Boskalis	139	200
		NYK	130	NA
		Fairplay Towage Group	105	105
		Moran Towing Corporation	86	NA
		Ocean Sparkle Limited*	86	86
		PSA Marine	85	85
		Wilson Sons	80	80
		Foss Maritime Company	74	~50
		SC Group	70+	70+
		Ultratug	70	71
		MBSS	69	69
		P&O Maritime Logistics	60	60
		McAllister Towing & Transportation	56	61
		Harbor Star Shipping Services	58	57
		CPT Towage	51	60
		Vane Brothers	50	50
		Kotug International	50+	50+

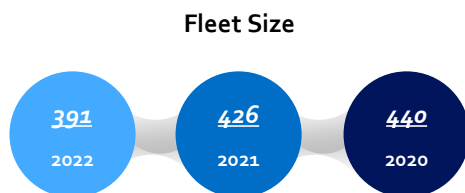
Country	Company	Fleet Size	
		2022	2021
	 PT Jasa Armada Indonesia Tbk	55	NA
	 Panama Canal Authority	46	50
	 Scafi Società di Navigazione	46	40+
	 Alfons Hakans	45	45
	 Tokyo Kisen	41	NA
	 Malayan Towage & Salvage	40	42
	 NERI Group	40	NA
	 Groupe Ocean	36	30+
	 Adani*	32	NA
	 Suez Canal Authority	31	NA
	 Seabulk Towing	28	23
	 Med Tugs	26	20
	 TSM	25	24
	 Crescent Towing	24	24
	 Sanmar Shipyard	24	24
	 Sulnorte Serviços Marítimos	24	22
	 Buksér og Berging	23	23
	 Signet Maritime Corporation	21	16
	 Adnoc	21	NA
	 Medtug	21	NA
	 SMS Towage	20	21

Country	Company	Fleet Size	
		2022	2021
	 Med Marine	19	23
	 Atlantic Towing Ltd	18	18
	 E. N. Bisso & Son	18	19
	 Safeen	18	NA
	 Pacific Tug <small>Offshore Construction Dredging</small>	17	13
	 Posh <small>Excellence Through Safety</small>	17	14
	 Crowley	15	13
	 CAMORIM <small>SERVICOS MARITIMOS</small>	15	29
	 BHAGWAN [™] marine	15	15
	 HUD GROUP <small>Offshore Towing & Salvage</small>	13	13
	 FORTH PORTS	12	NA
	 MILAHA	10	12
	 Østensjø Rederi	10	12
	 NAKILAT <small>ناقلات</small>	9	9
	 GAC	8	NA
	 SOMARA <small>Société Maritime de Remorquage et d'Assurance S.A.S.</small>	7	7
	 ECHO CARGO & SHIPPING L.L.C.	7	NA
	 ZOUROS GROUP	6	NA
	 Trans Ona S.A.M.C.I.F.	5	5
	 Petersen & Alpers	5	NA

*: In 2022 Adani acquired Ocean Sparkle; this information is not included in this overview



SVITZER



Svitzer operates in the towage and salvage industry since 1833. Headquarters are located in Denmark. The company operates worldwide, in 32 countries. Svitzer is part of the A.P. Moller – Maersk group.



Greening Initiatives – Strategy formulation reduce carbon dioxide emission by 50% by 2030; Svitzer has started working with Sanmar Shipyards and naval architects Robert Allan Ltd (RAL) to build the next-generation multipurpose tugboat by developing a carbon-neutral, methanol fuel-cell tug. Svitzer also announced to convert its whole fleet of 10 tugs in London and Medway to be powered by marine biofuel

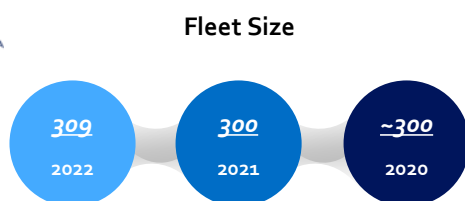


Recent Developments – In 2021 Svitzer expanded its fleet in Australia (3 tugs). Svitzer also announced that it had won the tender of the Royal Australian Navy to provide towage services for Australia’s naval fleet. In Brazil, Svitzer announced to expand its fleet and ordered 4 tugs. On the Humber, Northern England, the fleet was enforced with an eighth tug and in London a new tug also came into operation. In Scandinavia 2 icebreaking tugs came into operation. With the Suez Canal Authority (SCA), Svitzer extended its current contract and included two additional tugs. In the Philippines Svitzer signed a 10-year contract with FGEN LNG Corporation for the provision of towage and other vessel support services



Coverage – Worldwide

BOLUDA CORPORACIÓN MARÍTIMA



Boluda Corporación Marítima was founded in 1837; it is organised into two strategic divisions: Boluda Towage (towing service) and Boluda Shipping (sea/land transport and port logistics). The tugboat division was established in 1920. Headquartered in Spain. The company is owned by the Boluda family.



Greening Initiatives – Strategy to employ sustainable fuel to cut fuel consumption by 30%



Recent Developments – Recent acquisitions include Dutch company Iskes Towage and Salvage and Scottish Caledonian (both in 2021). Furthermore, the company expanded in Mauritania by providing services in Nouakchott with 4 tugs. Boluda also started towing services in the German port Rostock and deployed 4 new Tier III tugs in Zeebrugge, in which it has renewed its towing service concession

The towage division has a global reach through its subsidiaries: Boluda Spain, Boluda France, Boluda Europe, Boluda Mexico, Boluda Latam and Iskes Towage and Salvage. Services include assistance to oil rigs, towing and anchoring concrete caissons for construction and towing of floating dikes and barges.



Coverage – Europe, Africa, Caribbean, Central America and South America



Fleet Size



Greening Initiatives – Achieved 13% reduction in GHG emissions in 2021 compared to previous years. On track to reduce its carbon footprint



Recent Developments – SAAM acquired the Colombian towage operator Intertug in January 2021. In Peru it acquired the operations of Ian Taylor – the total fleet in Peru amounts to 10 tugs. SAAM also expanded its services in Ecuador with two more tugs. In Brazil SAAM acquired Starnav (17 tugs) and in Chile it acquired the Ian Taylor. Canadian operations are enforced with the acquisition of Standard Towing and Davies Tugboats. SAAM operates now 25 tugs in 7 ports on the Westcoast of Canada

Sociedad Matriz SAAM S.A. (SAAM) is a Chilean multinational company that provides trade services by means of its three business divisions: Port Terminals, Towage and Logistics. SAAM has over 50 years experience and operates in 13 countries throughout North, Central and South America. The company is the leading company providing towage services in South America and the fourth-largest towage services provider in the world. SAAM is listed at the stock exchange of Santiago. Main owner is Quiñenco (Grupo Luksic).



Coverage – Brazil, Canada, Colombia, Costa Rica, Chile, Ecuador, Guatemala, Mexico, Panama, and Uruguay



Fleet Size



Greening Initiatives – Promoting the use of Methanol; a low carbon fuel



Recent Developments – Sold the towage business in Latin America, Canada, Europe and Southeast Asia

Royal Boskalis Westminster (Boskalis) is a leading global dredging and offshore contractor and maritime services provider. The company is headquartered in Papendrecht, the Netherlands. Boskalis operates in ports, offshore energy, maritime and inland infrastructure markets in 90 countries worldwide. The total fleet consists of over 700 vessels and floating equipment. Terminal towage services are provided through Smit Lamalco. In 2019 Boskalis took the strategic decision to divest its harbor towage activities, resulting the sale of Kotug Smit (Europe) to Boluda, SAAM Smit to SAAM and Keppel Smit to Rimorchiatori Mediterranei



Coverage – Smit Lamnalco operates 58 tugs in Europe and Africa, 45 tugs in the Middle East and 36 tugs in Australia



Fleet Size



Greening Initiatives – Already in 2015, NYK gained experienced with the LNG fueled tug Sakigake in Yokohama and Kawasaki ports.

NYK is going further by using this experience to test one of the world’s first ammonia-powered tugboats, with partners classification society ClassNK and IHI Power Systems



Recent Developments – acquisition of Thoresen Vinama Tug

Nippon Yusen Kabushiki Kaisha (NYK) is a Japanese maritime conglomerate, established in 1885. The company is listed on the Tokyo Stock Exchange. The towage activities are part of the liner business unit. NYK is a major towage operator in Japan, through various affiliated companies across the country. NYK is also present in Vietnam through its acquisition of Thoresen Vinama Tug.

Through its subsidiaries Shin-Nippon Kaiyosha, Naikai Tugboat Services, Nagoya Kisen and Thoresen Vinama, NYK operates about 60 tugs. A total of ~120 tugs are deployed by NYK and affiliated firms.



Coverage – Japan & Vietnam



Fleet Size



Greening Initiatives – Ordered Tier IV tugs to comply with USA Environmental Protection Agency requirements.



Recent Developments – NA

Moran Towing Corporation (Moran) was founded in 1864. Today it is a dominant provider of towing services, bulk marine transportation, LNG support operations, and environmental recovery services. Moran operates a fleet of vessels including over 100 versatile tugboats, 9 articulated tug barges (ATBs), 3 tank barge vessels, and 6 ocean-going dry cargo vessels. With this fleet it performs over 39,000 assists per year. Headquarter is located in Connecticut, USA, and serves 17 ports mainly on the US East Coast, but also Costa Azul LNG terminal on the West Coast and 2 LNG terminals and 2 ports in the Gulf.

Moran has ordered Tier IV tugs to comply with USA Environmental Protection Agency requirements.

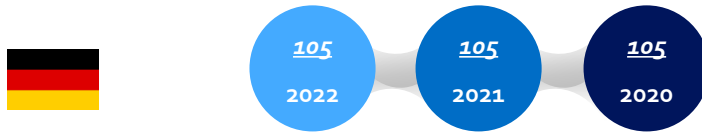


Coverage – USA



FAIRPLAY TOWAGE

Fleet Size



Greening Initiatives – NA



Recent Developments – Multraship successfully trialed remote control and autonomous vessel operations on a harbour tug in the FernSAMS joint research project. It worked with Novatug, Voith and MacGregor to remotely control 2018-built Carousel RAVE tug Multratug 32 in October 2021 in the Netherlands.

Fairplay Towage Group (Fairplay) is one of Europe’s leading tugboat operators. The company was established in 1866 and has its headquarter located in Hamburg, Germany. The Group offers harbour towage assistance through Fairplay Towage, Offshore deepsea towage, operated by Bugsier Offshore, the shipyard Theodor Buschmann and coastal protections operated by Arge Küstenschutz. The towage group includes Fairplay Towage and Fairplay Towage Polska, Bugsier and Odiel Towage and participates in Antwerp Towage and Multraship. Fairplay operates in 29 European harbours.



Coverage – Netherlands, Germany, Belgium, Poland & Spain (Odiel); through Multraship, Fairplay is also present in Bulgaria, Romania, Moldova, Nigeria and Angola



Fleet Size



Greening Initiatives – In 2022 two Italian tugs equipped with an IMO Tier III engine will be delivered in the port of Augusta.

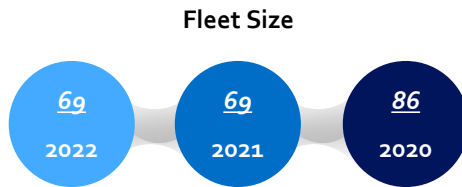


Recent Developments – Acquired Keppel Smit Towage Private Limited & Maju Maritime Pte Ltd; will add another 2 tugs by the end of the year

Rimorchiatori Mediterranei (RMED) operates in the towage and salvage industry since 1922. Headquarter is located in Genoa, Italy. In addition to harbour towage, RMED has operations in other shipping related businesses including traditional shipping (bulk carrier), offshore, salvage, and antipollution response. Rimorchiatori Riuniti owns 65% of the RMED, the other 35% is owned by DWS Infrastructure. The company operates in Italy, Greece, Malta, Norway, Colombia, Singapore and Malaysia. The company is the major towage company in Italy with a market share of over 60% and the largest operator in the Mediterranean.



Coverage – Mediterranean



Greening Initiatives – NA



Recent Developments – MBSS raised its ownership percentage from 60% to 99% in Mitra Alam Segara Sejati

PT Mitrabahtera Segara Sejati Tbk (MBSS) was established in 1994 in Jakarta, Indonesia as a shipping company. MBSS is a leading Indonesian provider of integrated maritime transportation and transshipment services which provides integrated solutions and marine transport for bulk materials, particularly coal. In order to so, MBSS operates a large fleet of tugs and barges as well as floating cranes, enabling it to provide integrated barging and transshipment solutions. The fleet consists of 69 tugboats, 57 barges, 6 floating cranes and 1 support vessel. The tugs are mainly used for transport of barges with coal from loading to unloading port.



Coverage – Indonesia



Greening Initiatives – NA



Recent Developments – The company was acquired by Adani group in April '22

Ocean Sparkle Ltd (OSL) is India's leading port operations and marine services company. OSL operates India's largest fleet of harbour tugs with a presence in 23 ports across the country, including JNPT (Mumbai), Mormugao Port (Goa), Pipavav Port (Gujarat), Ennore Port (Tamil Nadu), Reliance Port and Terminals Limited (Jamnagar, Gujarat) and Cochin Port (Kerala). OSL also manages several LNG terminals established in India. OSL was established in 1995 and has its headquarter in Hyderabad, India.

Through its joint venture with Khimji Ramdas Shipping Division, Khimji's Sparkle Marine, the company operates five tugs in Oman and contracts in Sri Lanka, Saudi Arabia, Qatar, Yemen and Djibouti.

Together with PSA Marine it operated in a consortium for LNG port operations and management of Petronet Dahey LNG. OSL was acquired by Adani in April 2022.



Coverage – India & Oman



Fleet Size



Greening Initiatives – Invested approx. \$290,000 to incorporate IMO Tier III standard to reduce GHG emissions



Recent Developments – Opens a new branch in Recife, Brazil

Wilson Sons Group (Wilson Sons), founded in 1837, is one of the largest operators in port, maritime and logistics services in Brazil. The company has two business units: the Port and Logistic System including Wilson Sons Terminals and Wilson Sons Logistica and Maritime Services, including Wilson Sons’ tugboats fleet, shipyard and maritime agency services. Also, part of this is the joint venture of Wilson Sons UltraTug Offshore, whose vessels offer support to platforms of petrol and gas exploitation and production with 23 vessels. Wilson Sons is a publicly listed company traded on the Bovespa. It is controlled by Ocean Wilsons Holdings Limited, a UK based company listed on the London Stock Exchange. The company currently only has presence in Brazil.

Wilson Sons Tugs is the market leader in the port maneuver sector in Brazil: it owns 80 tugs of the total Brazilian tugboat fleet of 226 vessels.



Coverage – Brazil



Fleet Size



Greening Initiatives – Sustainable support reaches beyond environment; Ultratug focusses on poverty reduction, education, promotion of sport and culture as well



Recent Developments – is expanding its fleet with state-of-the-art tugs

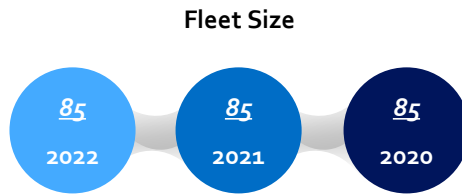
Ultratug is part of the Ultramar Group of Santiago. The headquarters are in Santiago, Chile. Ultramar was founded in 1952 and the first tugboat arrived in 1966. Presently, the tugs operate in and between all the major ports along the Pacific and the Atlantic coasts of South America. The coverage and the mix of services is expanded by offering pusher tugs and barges for river coastal trade in Uruguay and PSV for the offshore market in Brazil. The Brazilian activities by Wilson Sons UltraTug Offshore are a joint venture between Wilson Sons and Ultramar, offering support to platforms of petrol and gas exploitation and production with 23 vessels.



Coverage – Argentina, Chile, Colombia, Ecuador, México, Perú & Uruguay



PSA MARINE



Greening Initiatives – Launched Vessel Pilot Communication (a digital solution) to cut ships’ carbon footprint; PSAM operates gas-powered tugs, with PSA Aspen and PSA Oak delivered in 2019-2020, their introduction in paralleling the developing LNG bunkering facilities in Singapore.



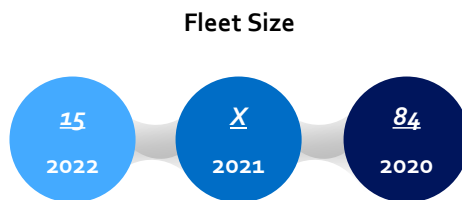
Recent Developments – Acquired the Peruvian company Tramarsa

PSA Marine is a wholly owned subsidiary of PSA International, a leading global port group. Headquartered in Singapore. PSA Corporation Ltd has grown into a premier port developer & operator. As a global marine services provider PSAM operates in 14 ports & terminals. Besides terminal operation, PSAM offers LNG terminal towage services, provides crew transfer services in the offshore wind market in Europe through Njord Offshore Ltd and Ventus Marine Limited..



Coverage – Through its subsidiaries and joint ventures presence extends from Singapore to Peru, Bangladesh, China (including Hong Kong), India, Oman and Southeast Asia

CROWLEY



Greening Initiatives – Crowley has committed to becoming a net-zero emitter of greenhouse gas emissions (GHG) across all scopes of its business by 2050.



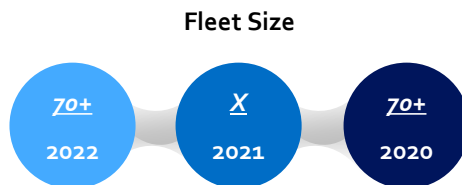
Recent Developments – Ordered an all-electric tugboat, eWolf, from Master Boat Builders’ shipyard in Coden, Alabama

Crowley is a privately-held, U.S.-owned & operated logistics, government, marine & energy solutions company. Services are provided worldwide by four primary business units – Crowley Logistics, Crowley (Government) Solutions, Crowley Shipping & Crowley Fuels. Crowley was founded in 1892. Crowley owns, operates and/or manages a fleet of more than 200 vessels, consisting of RO/RO (roll-on-roll-off) vessels, LO/LO (lift-on-lift-off) vessels, articulated tug-barges (ATBs), LNG-powered container/roll-on, roll-off ships (ConRos) and multipurpose tugboats and barges.



Coverage – USA

SC GROUP



Greening Initiatives – NA



Recent Developments – NA

The SC Group was established in 1985 and is headquartered in Bangkok, Thailand. The SC Group is one of Thailand’s leading experts in integrated logistics, with services ranging from the transportation of petroleum, natural gas (CNG/NGV), chemical products, and automobiles to general cargo both by land and sea. The Group has a comprehensive transport network, integrating freight cars, cargo ships & piers, warehouses, dockyards, & other maritime services related to shipping, such as pilot boats, tug boats, emergency rescue, oil spill cleanup, & offshore supply vessels.



Coverage – Thailand



Fleet Size



Greening Initiatives – ESG is a core pillar of strategy of DPW, the holding of POML



Recent Developments – In 2019 P&O Maritime Logistics was formed through the merger of Topaz and P&O Maritime. Martin Helweg is the ceo

P&O Maritime Logistics (POML) is a provider of marine solutions with a focus on offshore energy, port services and cargo transport. Operating worldwide, POML owns and operates approximately 400 vessels, including 60 tugboats. POML is the towage company of DPW. POML operates across commercial ports and LNG terminals. POML will grow its business in line with DP World’s expansion and other port operators’ towage requirements.



Coverage – Dubai, Mozambique, Cyprus, Spain, Equatorial Guinea, Trinidad and Tobago, Canada, Paraguay and Ukraine



Fleet Size



Greening Initiatives – NA



Recent Developments – Harbor Star recently expanded its business activities to include energy and construction

Harbor Star Shipping Services, Inc. (Harbor Star) is the leading integrated maritime service provider in the Philippines. Its service lines include harbor assistance, lighterage, towage, ship salvage, ship management, diving and underwater marine works, and other diversified services. The Company operates and manages a fleet of 58 tugboats, 7 barges and 5 other vessels throughout the Philippines and South-East Asia.



Coverage – Philippines & Malaysia



Fleet Size



Greening Initiatives – ABS to develop ESG report & set sustainability & decarbonization goals

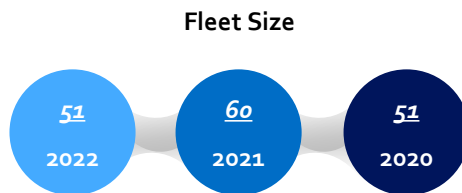


Recent Developments – New tugs will arrive in 2022 and 2023, with options for another two tugs in 2023 and 2024

McAllister Towing & Transportation (McAllister) is one of the largest port services players in the US. McAllister is a family-owned marine transportation company founded in 1864. Headquarter is in New York, USA. It operates a fleet of more than 60 tugs, barges, launches and ferries in over 13 locations along the US east coast from Portland, Maine to San Juan Puerto Rica. The tractor tug fleet exists of 39 vessels



Coverage – USA



CPT Towage. (CPT) was founded 1909. CPT offers maritime, port & logistics services. The fleet of tugs, positioned in Latin America, are operated through the companies CPT Remocladores (Chile), CPT Inmars (Peru), Sagemar (Ecuador), CPT Empresas Maritima (Panama & Venezuela), LNG Tugs (Quintero Bay, Chile) & Retoc (Tocopilla, Chile).



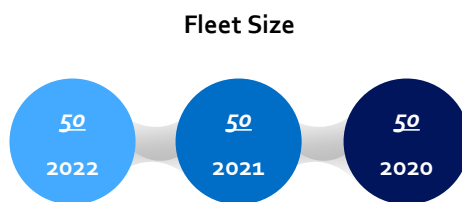
Greening Initiatives – NA



Recent Developments – the company is changing its commercial name to CPT Towage in every country it operates



Coverage – Chile, Peru, Ecuador, Panama, & Argentina



Vane Brothers (Vane) was founded in 1898. Vane offers a wide range of maritime services. Vane operates one of the most advanced tug fleets in North America, with approximately 50 model-bow tugboats, square-bow push boats, articulated tug and barge units (AT/B's), and launch/freight boats.



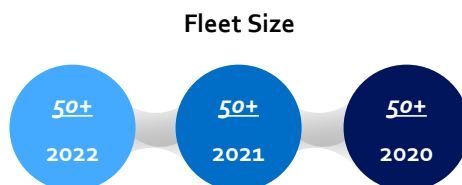
Greening Initiatives – Barge donated to become marine habitat



Recent Developments – Took delivery of fourth Salisbury Class push tug



Coverage – USA



KOTUG is an international towage and maritime company. The portfolio consists of designing, building, chartering and operating vessels, training people and providing innovative consultancy services on a worldwide scale. KOTUG was founded in 1911 and family owned. KOTUG has joint ventures with Horizon in Canada, with Petro Consult in Egypt. In Australia it cooperates with BHP



Greening Initiatives – KOTUG starts with zero-emission transportation from Amsterdam to Zaandam with the first electric E-Pusher™ Type M



Recent Developments – KOTUG has acquired Seaways International to accelerate growth in worldwide offshore floating



Coverage – Africa, Caribbean, Asia Pacific, Canada, Russia



adani



Fleet Size



Greening Initiatives – Adani Green Energy Ltd (AGEL) is developing a renewable portfolio of 25 GW by 2025 which includes wind power, solar power, and hybrid power projects.



Recent Developments – TAHSL acquired India’s largest towage operator Ocean Sparkle in 2022; furthermore, Adani acquired the lease for Haifa Port, along with Israeli chemical and logistics group Gadot

Adani Group is an Indian multinational conglomerate, headquartered in Ahmedabad. It was founded by Gautam Adani in 1988 as a commodity trading business, with the flagship company Adani Enterprises. Adani is one of major companies in India. Adani Harbour Services (TAHSL) is the Adani Ports and Special Economic Zone subsidiary which aims to become the largest port operator globally by 2030 and the largest integrated transport utility in India. In its voyage to reach this goal TAHSL acquired India’s largest towage operator Ocean Sparkle.

Coverage – India



Fleet Size



Greening Initiatives – Implemented the Green Connection Environmental Recognition Program



Recent Developments – NA

The Panama Canal Authority (ACP) is an autonomous legal entity of the Republic of Panama, established under public law, with an exclusive charge of the operation, administration, management, preservation, maintenance, & modernization of the Canal, as well as its activities & related services, so that the Canal may operate in a safe, continuous, efficient, & profitable manner.

Coverage – Panama



Fleet Size



Greening Initiatives – Foss has deployed several autonomous green tugs



Recent Developments – Foss to operate terminal at New Bedford to support offshore wind; Foss acquired towage activities of Centerline in a swap deal including the fueling business of Saltchuk

Foss Maritime Company (Foss) is owned by Saltchuk Resources. Foss is founded in 1889 & provides a complete range of maritime transportation & logistical services. Foss operates through the companies Foss Maritime, AMNAV (Tug & marine transportation company), Cook Inlet & Barge & Young Brothers, Starlight Marine Services

Coverage – USA



Fleet Size



Malayan Towing & Salvage Corporation or Salvtug was established in 1974 to provide Philippine & International customers with world-class integrated maritime solutions. Salvtug is recognized as the preeminent Philippine service provider of harbour tug assistance; marine salvage & wreck removal; coastal & inter-island towing; oil spill & pollution response & marine emergency response in the Philippine territorial waters.



Greening Initiatives – NA



Recent Developments – Opens new Hub in CDO, Philippines



Coverage – Philippines



Fleet Size



PT Jasa Armada Indonesia Tbk (IPC Marine), was established in 2013 as a spinoff of the pilotage division of PT Pelabuhan Indonesia (Persero), the largest port company in Indonesia and government owned. The company went public in 2017. IPC Marine believes that it is the largest harbour towing company in Indonesia in terms of fleet size, operating 55 harbour tugs, 30 pilot boats and 5 mooring boats. The company's area of operation covers from the island of Java, Sumatra and Kalimantan, and it will be expanded to other parts of Indonesia.



Greening Initiatives – NA



Recent Developments – Signed Memorandum of Understanding with HKI to synergize cooperation in logistics services and industrial estates



Coverage – Indonesia



Fleet Size



Scafi Società di Navigazione S.p.A. was founded in 1955 by Salvatore Cafiero & today is among the leading Italian companies in harbor towing. It offers specific & tailored services for ports & terminals of various kind, including containers, LNG & Oil & gas. The Italian group invested in the Greek company named Vernicos which resulted in a new company renamed Vernicos Scafi (this company participates in Med Tugs Consortium)



Greening Initiatives – NA



Recent Developments – Bought tug fleet of Greece's Karapiperis in September, 2021; in 2022 Scafi sold its 50% share in Con.Tug to MSC



Coverage – Italy, Croatia, Morocco, Greece & Saudi Arabia



Fleet Size



Founded in 1945, Alfons Håkans is one of the major towage companies in Finland and the Baltic States. The company operates in Finland since decades and started operations in Estonia in 2004 and after that in Latvia, through its subsidiary PKL Flote. Besides tugs, the company operates a fleet of barges and workboats. The services include towage, salvage, icebreaking and marine construction.



Greening Initiatives –NA



Recent Developments – Steerprop modernizes control system on one of Alfons Hakans Tug



Coverage – Finland, Estonia & Latvia



Fleet Size



Med Tugs is a joint venture of four towage operators: VernicosTugs (17 tugs), Spanopoulos Group (14 tugs), Lybousakis Towage & Salvage and Karapiperis Towage & Salvage. The company operates in the Pireaus, Lavrion, Patras & Mykonos areas, as well as in the greater Greek Market. Head offices are located at the Container Terminal (PCT) in Neo Ikonio.



Greening Initiatives – NA



Recent Developments – NA



Coverage – Mediterranean



Fleet Size



Bhagwan Marine commenced operations in 2000, with the goal to be the leading Marine Vessel Operator servicing the Oil & Gas and Resources Industries in Australia. Nowadays, the company operates a fleet of more than 150 vessels, consisting of ASD Harbour Tugs, Coastal Towage Tugs, Multi Cats, Anchor Handling Tug Supply (AHTS), Landing Craft, Dive Support Vessels, Flat Top & Materials Handling Barges, Crane Barges, Crew Transfer Vessels, Utility Vessel



Greening Initiatives – NA



Recent Developments – In 2014 Bhagwan Marine (supported by private equity firm Catalyst Investment Partners) acquired UK tugboat and marine service operator Marine Towage Services (MTS). It sold a majority share of MTS to Cable Capital Partners in 2020



Coverage – Australia & United Kingdom



Fleet Size



Greening Initiatives – In 2019 Tokyo Kisen Co., Ltd. and e5 Lab Inc. announced the development of the new concept design of “e5 Tug,” electric propulsion harbor tugboat



Recent Developments – The e5 Tug will be launched by the end of 2022

Tokyo Kisen was established in 1947, as Japan's first commercial tugboat operator. In addition to towage services in Japan the company also operates internationally through joint ventures in Hong Kong and mainland China, a.o. South China Towing Company. The company has invested in local towage companies, including: Toko Service Co, Pacific Marine Services, Bosai Tokushu Eisen, Towship, Miyagi Marine Service, Kitanhon Tug Service, Higashi Port Service Co, Fukushima Kisen and Nihon Tug-Boat. Co. Furthermore, Tokyo Kisen operates crew transfer vessels for offshore wind farms;



Coverage – Japan & China



Fleet Size



Greening Initiatives – NA



Recent Developments – NA

Buksér og Berging AS (BB) is a privately owned company providing marine services since 1913. The company aims to be market leader in providing specialized vessels for the marine environment.



Coverage – Norway, Sweden & United Kingdom



Fleet Size



Greening Initiatives – Announced carbon offset program for its ship assist operations; the new tugs will be hybrid vessels



Recent Developments – Seabulk is expanding its US fleet with new a pair of tug newbuilds, under construction at Alabama shipbuilder Master Boat Builders. These tugs are diesel-electric, hybrid vessels

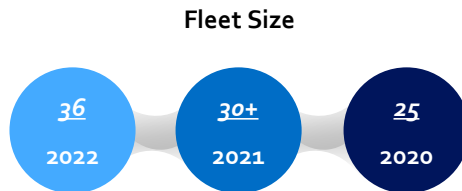
Seabulk Towing Inc (Seabulk) provides marine logistics, transportation, and infrastructure solutions, including port and terminal services, bulk ocean transportation, and vessel management. Seabulk is part of the Seacor Group. In the Bahamas Seabulk operates a joint venture with KOTUG, KOTUG SeaBulk Maritime Services (KSM) on the Buckeye Bahamas Hub Terminal on Grand Bahama island. KSM also operates a bunker barge in Grand Bahama.



Coverage – USA and Caribbean



OCEAN



The Canadian towage operator Groupe Ocean was founded in 1972 by Gordon Bain. Since then, Ocean Group's operations have diversified, offering not only harbour towing in Quebec, Canada, Jamaica and Dominican Republic, but also shipbuilding and repair, marine works, dredging, equipment rental. The fleet consists of 36 tugs of which 21 are ice-classed rated



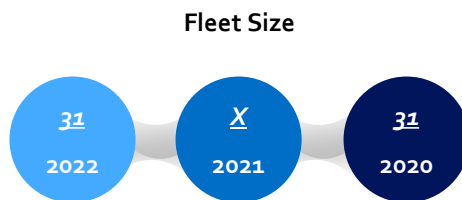
Greening Initiatives – Fundamental value is to be an environmentally sustainable company



Recent Developments – Acquisition of Samson Tugs in West Canada, by which it strengthened its position in the port of Vancouver



Coverage – Canada, Central America and the Caribbean



SCA owns a fleet of 31 multi type tugs ranging from 3200 HP to 16000 HP used for towing, salvage, firefighting and berthing of ships. The Suez Canal Authority (SCA), established on July 26th, 1956, is a public and an independent authority of a juristic personality. It manages, operates, uses, maintains and improves the Suez Canal



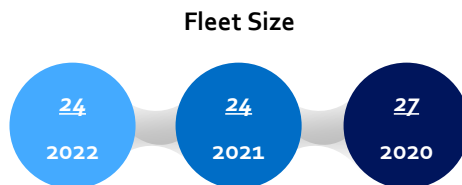
Greening Initiatives – NA



Recent Developments – Suez Canal extends tug fleet



Coverage – Egypt



Crescent Towing (Crescent) provides ship assist services in the ports of New Orleans, Louisiana; Mobile, Alabama; & Savannah, Georgia. The company was founded in 1942 & is headquartered in New Orleans, USA. It is part of the Cooper Group of Companies. Crescent operates about 24 vessels and owns about 10 tugs.



Greening Initiatives – Replaces 20 old diesel-powered engines on 10 tugboats in their fleet



Recent Developments – NA



Coverage – USA



Fleet Size



Grupo NERI has been operating in the maritime sector since 1895. NERI meets the needs of terminal and oil and gas clients by offering a wide range of services in marine coastal, offshore waters and terminal/storage onshore.



Greening Initiatives – NERI is a shareholder of Labromare, an organization engaged in waste management in Italy



Recent Developments – Grupo Neri, along with other Italian owners, has built a position in the Greek towage sector under the Fintowage joint venture



Coverage – Italy



Fleet Size



POSH has been operating globally in the salvage & offshore industry since 1951. POSH is part of the Kuok Group, and operates a diversified fleet of around 70 vessels. Its headquarters are in Singapore. POSH provides emergency support, ocean towage & disaster prevention services. It also caters services to the oil & gas industries.



Greening Initiatives – Engages in clean energy technology innovations, waste management practices & energy saving initiatives



Recent Developments – POSH Consortium won a subsea contract worth over USD 100 mn



Coverage – Singapore, Senegal, Sri Lanka, Brunei & Myanmar



Fleet Size



In May 2018 Swiss container liner Mediterranean Shipping Company (MSC) founded towage subsidiary MedTug. MSC already was active in towage business in the Italian port of Gioia Tauro through a 50-50 joint venture with Scafi-owned Con.Tug. In December 2020 MedTug established MedTug Antwerp, in the port of Antwerp, and expanded to the Netherlands and Germany. Med Tug has withdrawn in Antwerp. MSC Cruises has commissioned a tugboat, the MSC OCEAN ONE, in 2021 especially to assist the MSC cruise ships at Ocean Cay (Bahamas).



Greening Initiatives – NA



Recent Developments – MedTug acquires 100% in Con.Tug and starts operations; MedTug withdraws from Antwerp



Coverage – Europe and Bahamas



Fleet Size



Camorim Servicos Maritimos Ltda provides maritime & port services. Camorim group owns a fleet of more than 60 tugs, 20 barges and 20 speed boats currently operating in several segments in Brazil. Furthermore, it owns a fully equipped maintenance and construction Shipyard in Rio de Janeiro State. Camorim Servicos Maritimos serves customers in Brazil. Until 2022 Camorim had an operational agreement with Starnav, subsidiary of Grupo Detroit, for towage services. Camorim has already launched a combined plan due to the acquisition of the Starnav fleet by SAAM, maintaining its commercial portfolio and fulfilling the demand in the 11 ports it currently operates



Greening Initiatives – NA



Recent Developments – with the acquisition of the 17 Starnav tugs by SAAM, the operational agreement between Starnav and Camorim ended

Coverage – Brazil



Fleet Size



Med Marine is a Turkish shipbuilder & tugboat operator, providing a broad range of services in towage, pilotage & mooring in the busiest ports of Turkey for over 20 years. Med Marine's service areas are towage, pilotage, emergency response, salvage & wreck removal, pollution prevention, ship escort & chartering. Med Marine employs Eregli Shipyard, a major shipyard in Turkey - main vessels built are tug and stainless-steel IMO II type chemical/oil tankers. The fleet consists of 19 tugboats and another 15 mooring boats.



Greening Initiatives – Med Marine built a green tier III tug for Safeen Group



Recent Developments – NA

Coverage – Turkey



Fleet Size



Sanmar is a ship builder & an operator of tugboats & provider of pilotage services; Sanmar also has joint ventures for providing tugboat services overseas in Varna Port, Bulgaria, Floro Port, Norway & in Brunsbüttel, Germany.



Greening Initiatives – Sanmar Shipyards appoints three directors to drive its green agenda – Sanmar drives towards emissions-free towage sector



Recent Developments – Sanmar buys third shipyard in Turkey

Coverage – Turkey, Bulgaria, Norway and Germany



Fleet Size



Atlantic Towing specializes in the provision of diverse marine services including port tug services, coastal towing, offshore oil and gas exploration, and product support. It is part of the J.D. Irving family of companies. Headquartered in Saint John, New Brunswick, and with offices in St. John's, Newfoundland, Dartmouth, Nova Scotia, Victoria, British Columbia, and Point Fortin, Trinidad and Tobago (through joint venture ARC).



Greening Initiatives – The company is Green Marine certified



Recent Developments – Atlantic Towing is awarded funding for battery technology implementation for its offshore support vessels



Coverage – Canada and Caribbean



Fleet Size



Sulnorte Serviços Marítimos (Sulnorte) was founded in 1978. It is the harbour towage company of the H. Dantas Group. Sulnorte is present at the main ports along the Brazilian coastline, offering harbour & ocean towage services. It operates a fleet of 20 owned tugs and 4 tugs in time charter. Sulnorte has also been expanding its activities by providing offshore services with supply boats operating along the Brazilian continental platform. Sulnorte has a commercial alliance in place with Chilean CPT, that operates the west coast, south America and Panama.



Greening Initiatives – NA



Recent Developments – NA



Coverage – Brazil



Fleet Size



Østensjø Rederi is a family-owned company, established in 1974 by owner Johannes Østensjø. The company provides offshore & towage services worldwide. The Østensjø group also delivers crew services to the shipping industry. The fleet consists of 10 tugs and 8 mooring launches.



Greening Initiatives – Hydrogenious LOHC Technologies and Østensjø Group join forces to work towards safe zero-emission shipping; Østensjø is pioneer in LNG and dual fuel engines for tugs



Recent Developments – Edda Wind, jointly owned by Østensjø and Wilhelmsen Group, prepares for an initial public offering; together with DeepOcean and Solstad Offshore, Østensjø Rederi acquired Remota AS



Coverage – Norway & United Kingdom



Fleet Size



E.N. Bisso & Son Inc. was founded in 1946. Its main business activity is ship-assist services for the docking and undocking of ocean-going vessels and tug/barge units. The scope of these operations encompasses the Lower Mississippi River (LMR) spanning five port jurisdictions as well as Gulfport, Mississippi – under the name Gulfport Towing – and Port Canaveral, Florida - doing business as E.N. Bisso Canaveral Inc. E.N. BISSO also provides offshore towing services which can be handled by seven tugs in Canada, Mexico, Caribbean, Central and South America.



Greening Initiatives – NA



Recent Developments – NA



Coverage – North and Central America, Caribbean



Fleet Size



AD Ports Group created Abu Dhabi Marine Services in 2012 with a clear vision: to be an industry leader in the provision of world-class integrated marine services. The company was renamed SAFEEN in 2013. The fleet consists of 18 tugs, 7 pilot boats, 7 speedboats, 1 buoy maintenance vessel, 1 diving supply vessel and two oil spill response boats.



Greening Initiatives – the company has ordered a Tier III tug from Med Marine



Recent Developments – NA



Coverage – UAE



Fleet Size



SMS Towage (SMS) is UK's largest family-owned towage company. The company was founded in 1992 and has its headquarters in Yorkshire, UK. The activities include harbour towage, offshore towage renewable energy support and other specialist shipping project work.



Greening Initiatives – Works closely with renewable energy providers, delivering turbines to offshore wind farms and providing other vital services



Recent Developments – In 2021 SMS received the towage license for the Port of Tyne.



Coverage – England & Northern Ireland



Fleet Size



Petersen & Alpers shipping company is the oldest family-owned and run service enterprise in the port of Hamburg. The shipping company has its headquarter in Hamburg, Germany. Petersen & Alpers owns a fleet of five tugboats. Two tugs are employed in Hamburg on the river Elbe. Three additional tugs are operated by TOWMAR BALTIC in the port of Klaipeda, Lithuania.



Greening Initiatives – NA



Recent Developments – NA



Coverage – Germany



Fleet Size



Signet Maritime Corporation (Signet) is a diverse international marine transportation and logistics services company. Since 1976, Signet has specialized in cargo handling, towing and tugboat services, ship management and vessel design, with concentration in the Americas, Africa and the Middle East. Headquarter is in Houston, USA. Signet now operates 42 owned and bare boat-chartered vessels, including ocean and harbor tugs, ocean heavy lift deck barges and inland deck barges. Signet also operates a full-service shipyard, Signet Shipbuilding & Repair.



Greening Initiatives – NA



Recent Developments – Signet along with two others pioneered the first commercial US vessel built using 3D design process



Coverage – USA



Fleet Size



HUD Group’s Towage and Salvage division (HKST) is a one-stop-shop marine solutions provider in the port of Hong Kong. With its harbour tugs and ocean-going vessels, HKST has the largest modern fleet of >5,000 BHP tugs and is the only provider of salvage operations. It designs, owns & operates a modern fleet of harbor tugs & ocean-going tugs. HKST was established in 1972 and is 100% owned by CK Hutchison Group



Greening Initiatives – Newbuilding of the first two Dual Fuel (LNG-MGO) Standby Vessels in Hong Kong



Recent Developments – CK Hutchison Group acquired 50% shares in HKST from Swire Pacific and is now 100% owner



Coverage – Hong Kong



Fleet Size



ADNOC Logistics & Services (ADNOC L&S) provides world-class shipping, offshore logistics and onshore services. The company is 100% owned by ADNOC and serves ADNOC Group and international customers. ADNOC L&S offers an extensive range of marine services, including specialized services, across the UAE’s petroleum ports of Jebel Dhanna, Ruwais, Das Island and Fujairah under a 25-year agreement. The ports fleet include 21 terminal tugs, 9 diving support vessels, 10 mooring boats and 7 pilot and crew boats.



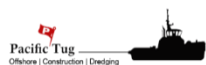
Greening Initiatives – NA



Recent Developments – ADNOC has the intention of acquiring ZMI; ADNOC acquires six line boats to enhance services across petroleum ports in Abu Dhabi



Coverage – UAE



Fleet Size



Pacific Tug (Aust) Pty Ltd was founded in 1965 by the brothers Con and George Peters. It still is a family owned and operated Australian registered company. The head office is located in Victoria Point, Queensland. Services include Sea Towage, Salvage, Harbour Towage, Dredging Support, Transhipment, Project Support, Technical Services and land-based logistics. Through Wide Bay Shipping Services (WBSS), Pacific Tug delivers Harbour Towage services in the ports of Bundaberg, Port Alma and Eden. The total fleet of 25 vessels comprises tugboats, crew transfer and support vessels and barges



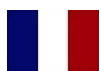
Greening Initiatives – NA



Recent Developments – Pacific Tug Group bolstered its tug repair & maintenance business & developed its marine bases in Australia



Coverage – Australia



Fleet Size



TSM was founded in 1905 by Albert Ruault. At this moment Loic Thomas is at the helm, also being the majority shareholder. TSM operates in the French ports Rouen, Dieppe and Bordeaux. In 2012 the joint venture TSM Windcat was founded, a joint venture with Windcat Workboats, with the intention to provide crew transfer services to offshore wind installations. TSM is a major player in the French port and maritime towing market, whose strategy aims to continue its development in towing activities and become a key player in renewable energies.



Greening Initiatives – TSM aims to become a key player in renewable energies



Recent Developments – Expanded its fleet by acquiring the AHTS Chambon Alizé in October, 2021



Coverage – France



Fleet Size



Greening Initiatives – NA



Recent Developments – NA

Milaha was founded in 1957 as Qatar National Navigation & Transport Company (QNNTC). In 1974 the company entered the activities of marine transport services in Doha Port, consisting of lighterage, berthing and towage. In 2011 QNNTC changed into Milaha. It also became operator of the Doha Port. Nowadays, Milaha is one of the largest and most diversified maritime and logistics companies in the Middle East. The harbour marine operations only form a small part of the total operations. The fleet for this company segment consists of 25 vessels, of which 10 tugs.



Coverage – Qatar



FORTH PORTS



Fleet Size



Greening Initiatives – NA



Recent Developments – FET acquired Targe Towing

Forth Estuary Towage (FET) is a wholly owned subsidiary of Forth Ports. The company came into being in November 1981. FET is now one of just 3 companies licensed to operate tugs on the River Forth and in its associated ports and terminals. It is also the sole provider of towage, escort, and standby services to the Braefoot terminal and the ports of Rosyth and Leith. In addition, FET serves the smaller ports of Methil, Kirkcaldy, and Burntisland, as well as Methil Energy Park. Forth Ports operates a fleet of 10 vessels, including four tugs. With the acquisition of Targe Towing the tug fleet has expanded with 8 tugs.



Coverage – UK



Fleet Size



Greening Initiatives – NA

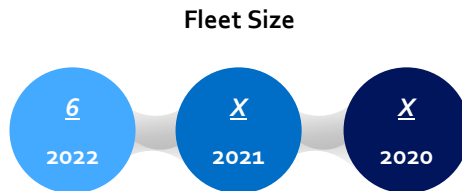


Recent Developments – NA

Echo Cargo & Shipping LLC caters services to the Oil & Gas industry with it's core focus on providing project transportation solutions in the Middle East. It has branch offices in Abu Dhabi and Singapore. Echo Cargo & Shipping LLC is a vessel owner and reliable partner in the region providing transportation solutions to their clients. Echo Cargo & Shipping LLC and its branch offices owns, operates and manages a diverse fleet of Offshore Support Vessel



Coverage – United Arab Emirates



Zouros Group was established in the early 80's of the former century. The Group is composed by a number of companies. The majority of the shares have been sold to GMC, the joint venture of the Italian companies Rimorchiatori Mediterranei, Neri and Cafimar. The fleet includes six tugboats, five anchor handling tugs and three mooring and crew boats.



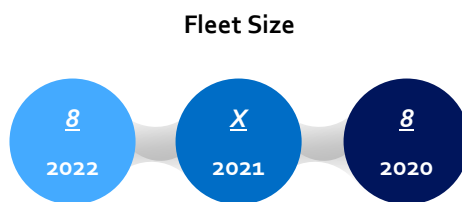
Greening Initiatives – NA



Recent Developments – Fintowage S.r.l and Zouros Group start operations of Nemeca Z, a joint venture for harbour towage in Piraeus and Kavela



Coverage – Greece



GAC is a global provider of shipping, logistics & marine services. Established in 1956, GAC employs around 8,000 people at more than 300 offices in over 50 countries worldwide. GAC operates a fleet, consisting of tugs, barges, anchor handling tugs, two anchor handling tug and supply and seven crew supply vessels in the Middle East.



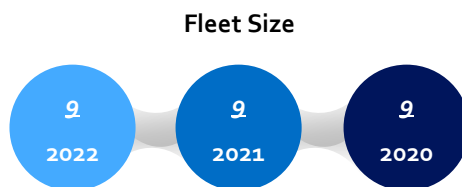
Greening Initiatives – Joined HyValue initiative to drive development of hydrogen as a fuel in maritime applications



Recent Developments – NA



Coverage – Middle East



Qatar Gas Transport Co Ltd (Nakilat) QSC is a shipping company. Nakilat's towage services are managed by Nakilat SvitzerWisjmmuller (NSW), a joint venture established in 2006 between Nakilat (30%) and Svitzer Middle East Limited (70%). NSW operates a fleet of 26 vessels, which includes 25 NSW-owned vessels. The fleet comprises of tugboats, pilot boats, line boats, crew boats and other harbor craft, based in the Port of Ras Laffan as well as operating in the offshore fields off Halul Island. NSW offers a range of services including towing, escorting, berthing, pilot support, line handling services afloat and ashore, emergency response, and marine maintenance support.



Greening Initiatives – Partnered with ABS to develop Decarbonization Strategy



Recent Developments – NA



Coverage – Qatar



Fleet Size



Trans-Ona Sociedad Anónima Marítima Comercial y Financiera is a family company founded in 1950. Its main business consists of towage operations in the Port of Buenos Aires and in Bahia Blanca.



Greening Initiatives – NA



Recent Developments – NA



Coverage – Argentina



Fleet Size



Société Maritime de Remorquage et d'Assistance (Somara) was founded in 2003. The company is based in Fort de France (Martinique) and its operational region consists of the East Caribbean islands. The activities include harbour assistance, salvage, coastal and ocean towage. The fleet consists of 7 tugs, 2 deck barges and a multicat.



Greening Initiatives – NA



Recent Developments – NA

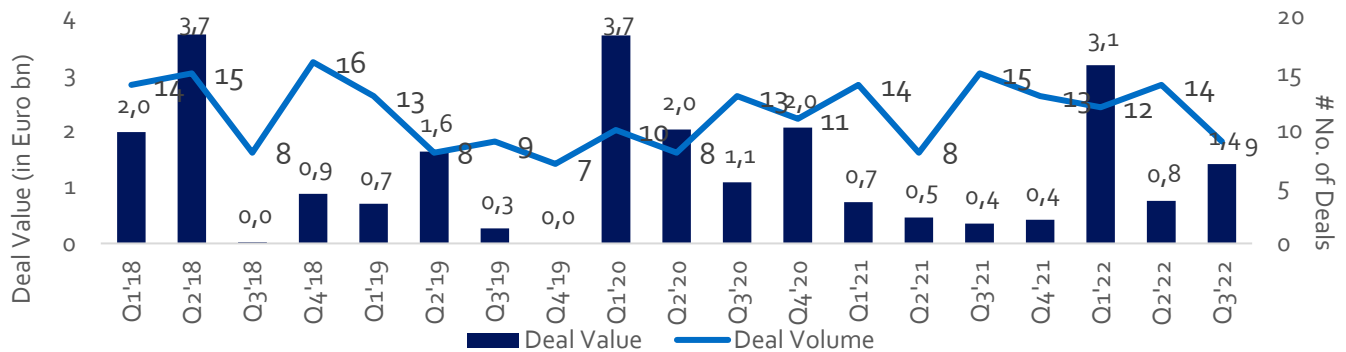


Coverage – East Caribbean islands



7. M&A ACTIVITIES IN THE TOWAGE INDUSTRY

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- Q1' 2022 witnessed a strong growth in terms of deal value an increase of 342% as compared to that of the same quarter of 2021. Q2' 2022 saw a significant drop of 74% in deal value but increase by 17% in deal volume quarter on quarter basis

Selected M&A Deals (€ mn)

Date	Target	Country	Buyers	Country	Deal Value	EV	EV/ Revenue (x)	EV/ EBITDA (x)
Jul-22	ZMI		ADNOC		-	-	-	-
Jun-22	Royal Boskalis Westminster		HAL Holding		4,100	-	-	-
Jun-22	Remota		Ostensjo		-	-	-	-
May-22	Keppel Smit Towage Private Limited		Rimorchiatori Mediterranei		166	-	-	-
May-22	Ocean Sparkle		Adani Ports and Special Economic Zone		188	-	-	-
May-22	Starnav		SAAM		150	188	-	-
Apr-22	Seaways		Kotug		-	-	-	-
Apr-22	Ian Taylor		SAAM		-	-	-	-
Apr-22	Standard Towing		SAAM		-	-	-	-

Date	Target	Country	Buyers	Country	Deal Value	EV	EV/ Revenue (x)	EV/ EBITDA (x)
Apr -22	Davies Tugboat Ltd		SAAM		-	-	-	-
Dec-21	Caledonian (UK		Boluda		-	-	-	-
Sep-21	Karapiperis (Griek		Vernicos Scafi		-	-	-	-
Sep-21	Samson Tugboats		Groupe Ocean		83	-	-	-
Aug-21	Con.Tug		MSC		-	-	-	-
Aug-21	HUD		CK Htuchison Holdings (HK)		-	-	-	-
Mar-21	Moby		Rimorchiatori Riuniti Panfido		-	-	-	-
Feb-21	Iskes Towage and Salvage		Boluda		-	-	-	-
Feb-21	TMM		RPM		-	-	-	-
Jan-21	Intertug		SAAM		-	-	-	-
Jan-21	Targe Towing		Forth Ports		-	-	-	-
Dec-20	Centerline		Saltchuk		-	-	-	-
Sep-20	Edda Wind (Noorwegen		Wilh. Wilhelmsen Holding Invest		-	-	-	-
Aug-20	Tramarsa		PSA		-	-	-	-
Jul-20	Zouros		Fintowage		-	-	-	-
Jul-20	Marine and Towage Services Group		Cable Capital Investors		-	-	-	-
Jul-20	Thoresen Vinama Tug (Vietnam)		NYK		-	-	-	-
Nov-19	Beibu Gulf Port		Shanghai China Shipping Terminal Development		103	2,205	3.7	8.8
Oct-19	Saam Smit Towage		SAAM		178	-	-	-
Jul-19	Kotug Smit Towage		Boluda		300	300	-	-

Key M&A Transactions



Rimorchiatori Mediterranei to acquire Keppel Smit Towage Private Limited; Maju Maritime

In May'22, Rimorchiatori Mediterranei acquired 100% stake of Keppel Smit Towage for a consideration of EUR 166.2mn. Post acquisition, Rimorchiatori Mediterranei Group becomes the world's third-largest harbour towage operator, with a fleet of some 170 vessels operating in three continents.



Adani Ports and Special Economic Zone announced 100% acquisition in Ocean Sparkle

In May'22, Adani Ports and Special Economic Zone through its subsidiary, The Adani Harbour Services acquired 100% stake in Ocean Sparkle for a deal value EUR 188.5 mn. Along with providing a significant share of India's marine services market, this acquisition also provides APSEZ a platform for building presence in other countries.



Boskalis renounces towage operations

Boskalis is in the process of divesting its towage activities. In Europe it sold KotugSmit. Boluda acquired the activities. In Latin America and Canada SAAM acquired the activities of SAAM Smit; and in 2022 Rimorchiatori Mediterranei acquired the 100% of Keppel Smit Towage. Smit Lamnalco is the remaining part of the towage activities of Boskalis.



HAL Holding to own 100% stake in Royal Boskalis Westminster

In March'22, Hal Trust acquired a 53.8% of Koninklijke Boskalis Westminster for a consideration of EUR 2.3bn. HAL Holding previously had a stake of 46.2% stake in the company and now owns 100% of Boskalis on a fully diluted basis of EUR 4.2bn.



In Q2 '22 SAAM agreed to purchase tugs operated by Starnav in Brazil. This transaction involves 17 operational tugs for US\$150 million and 4 under construction for US\$48 million. It also agreed to acquire towage business from Ian Taylor in Peru, adding five tugs at the ports of Callao and Paita. In British Columbia, Canada it purchased the towage operations from Standard Towing and Davies Tugboats. In , which provide services with three tugs in British Columbia, Canada; In 2021 it acquired Intertug in Colombia.



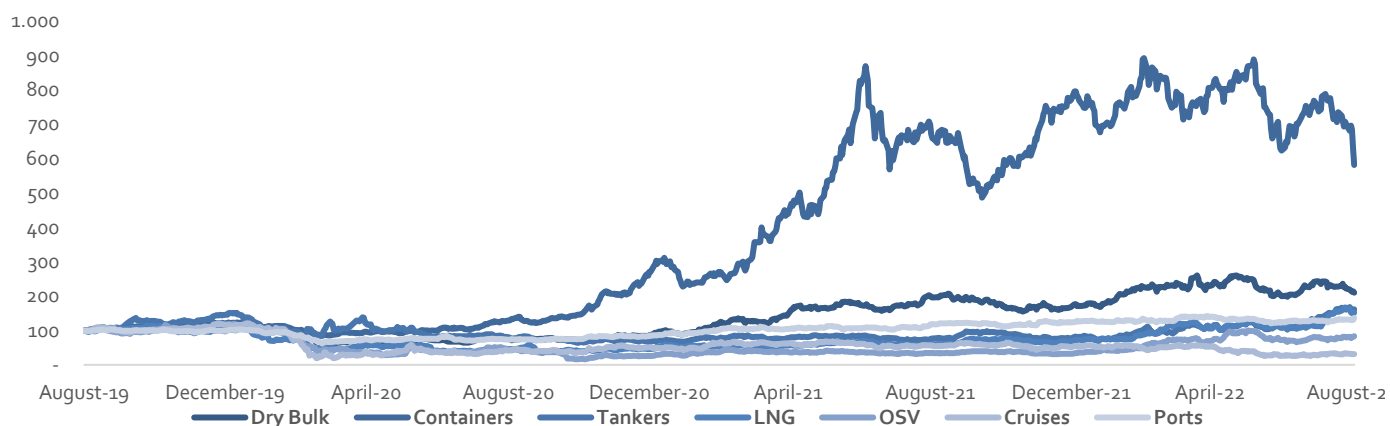
8. SHARE PRICE PERFORMANCE

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Share Price Performance

(% Change)	Dry Bulk	Containers	Tankers	LNG	OSV	Cruises	Ports
3Y	107.2%	481.5%	61.9%	51.4%	(14.2%)	(68.5%)	37.2%
1Y	7.3%	(11.7%)	109.3%	152.2%	137.7%	(44.6%)	14.9%
6m	(8.2%)	(30.5%)	65.1%	73.2%	67.7%	(37.8%)	5.0%



Source: FactSet as of 02 Sept. 2022

Notes:

1. **Dry Bulk** Includes Pacific Basin Shipping, Star Bulk Carriers and Great Eastern Shipping
2. **Containers** Includes A.P. Moller – Maersk, Evergreen Marine, Cosco Shipping and Orient Overseas
3. **Tankers** Includes Frontline, Euronav and Tsakos Energy Navigation
4. **LNG** Includes GasLog, Exmar NV and Golar LNG
5. **Offshore Supply Vessels (OSVs)** Includes SEACOR Holdings, Tidewater and Solstad Offshore
6. **Cruises** Includes Royal Caribbean Cruises, Carnival Corp and Norwegian Cruise Line Holdings
7. **Ports** Includes China Merchants Port Holdings, Adani Ports & SEZ, Dalian Port, International Container Terminal Services and Shanghai International Port

Stock Performance

The overall maritime segment witnessed a growth spike post February 2021 owing to the relaxation in lockdown restrictions paving the way for free movement of goods.

The Container industry has been the best performer in the whole market in the past year. While other industries have grown in an organic manner the container industry has seen meteoric rise with ~8 times the increase from August 2019. It has now come down to ~5.6 times the 2019 levels

The LNG stocks experienced a sharp rise post April 2021 due to the rise in the supply of LNG during Q1 to Q3 2021 predominantly from US and Australia. In terms of demand, China continued to dominate growth in imports with an increase of 22% between Q1 to Q3 2021 compared to the same period in 2020. This increase in supply and demand gave a sharp uptick in the performance of LNG stocks

9. PEER ANALYSIS

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Company Names	Country	Share Price (€)	% of 52 Week High	Market Cap (€m)	EV (€m)	LTM/ Rev(x)	LTM/ EBITDA (x)	Net Debt/ EBITDA (x)	
Dry bulk									
Star Bulk Carriers	Greece	GR	19.88	63.1	2,041	2,974	2.2x	3.4x	1.1x
Pacific Basin Shipping	Hong Kong	HK	0.34	60.5	1,783	1,920	0.6x	1.9x	0.0x
Great Eastern Shipping	India	IN	7.26	100.0	1,036	1,117	2.3x	5.1x	0.4x
Mean							1.7x	3.4x	0.5x
Median							2.2x	3.4x	0.4x
Containers									
A.P. Moller - Maersk A/S	Denmark	DK	2,279.04	73.3	41,505	49,295	0.7x	1.6x	0.2x
COSCO SHIPPING Holdings	China	CN	1.42	70.9	22,905	21,821	0.5x	1.2x	Net Cash
Evergreen Marine	Taiwan	TW	2.84	54.1	15,036	7,685	0.4x	0.5x	Net Cash
Orient Overseas	Hong Kong	HK	20.52	59.1	13,549	5,495	0.3x	0.6x	Net Cash
Mean							0.5x	1.0x	0.2x
Median							0.4x	0.9x	0.2x
Tankers									
Euronav	Belgium	BE	16.13	95.4	3,255	4,932	11.9x	nm	24.1x
Frontline	Bermuda	BM	11.74	94.3	2,388	4,366	5.5x	23.5x	10.5x
Tsakos Energy Navigation	Greece	GR	14.86	92.9	418	1,603	3.3x	15.4x	11.7x
Mean							6.9x	19.4x	15.4x
Median							5.5x	19.4x	11.7x
LNG									
Golar LNG	Bermuda	BM	26.20	87.3	2,829	3,979	12.6x	20.4x	nm
EXMAR NV	Belgium	BE	8.60	90.1	492	735	5.9x	16.5x	5.4x
GasLog	Greece	GR	5.86	86.6	306	1,205	4.1x	5.7x	4.2x
Mean							7.5x	14.2x	4.8x
Median							5.9x	16.5x	4.8x
OSV									
Tidewater	United States	US	22.45	86.8	1,026	1,015	2.4x	17.8x	1.3x
Solstad Offshore	Norway	NO	2.83	60.8	218	2,169	4.0x	20.0x	18.0x
SEACOR Marine Holdings	United States	US	6.84	76.0	183	508	3.0x	nm	nm
Mean							3.1x	18.9x	9.7x
Median							3.0x	18.9x	9.7x
Cruises									
Carnival Corporation	United States	US	9.41	41.7	11,697	37,971	7.4x	nm	nm
Royal Caribbean Cruises	United States	US	41.18	49.2	10,504	31,299	7.5x	nm	nm
Norwegian Cruise Line Holdings	United States	US	13.09	52.3	5,518	17,013	8.2x	nm	nm
Mean							7.7x	nm	nm
Median							7.5x	nm	nm
Ports									
Adani Ports & SEZ	India	IN	10.60	95.0	22,387	26,865	14.2x	22.2x	3.6x
Shanghai International Port (Group)	China	CN	0.78	84.7	18,019	21,254	4.3x	11.8x	1.2x
International Container Terminal	Philippines	PH	3.26	80.4	6,640	11,172	5.9x	9.9x	3.9x
China Merchants Port Holdings	Hong Kong	HK	1.48	81.2	5,828	12,109	8.4x	16.8x	5.7x
Dalian Port	China	CN	0.09	92.4	2,031	3,689	2.2x	5.6x	1.6x
Mean							7.0x	13.3x	3.2x
Median							5.9x	11.8x	3.6x
Overall Mean							4.9x	10.5x	5.8x
Overall Median							4.0x	9.9x	3.8x



10. GLOBAL M&A PARTNERS – M&O TEAM

GLOBAL M&A PARTNERS



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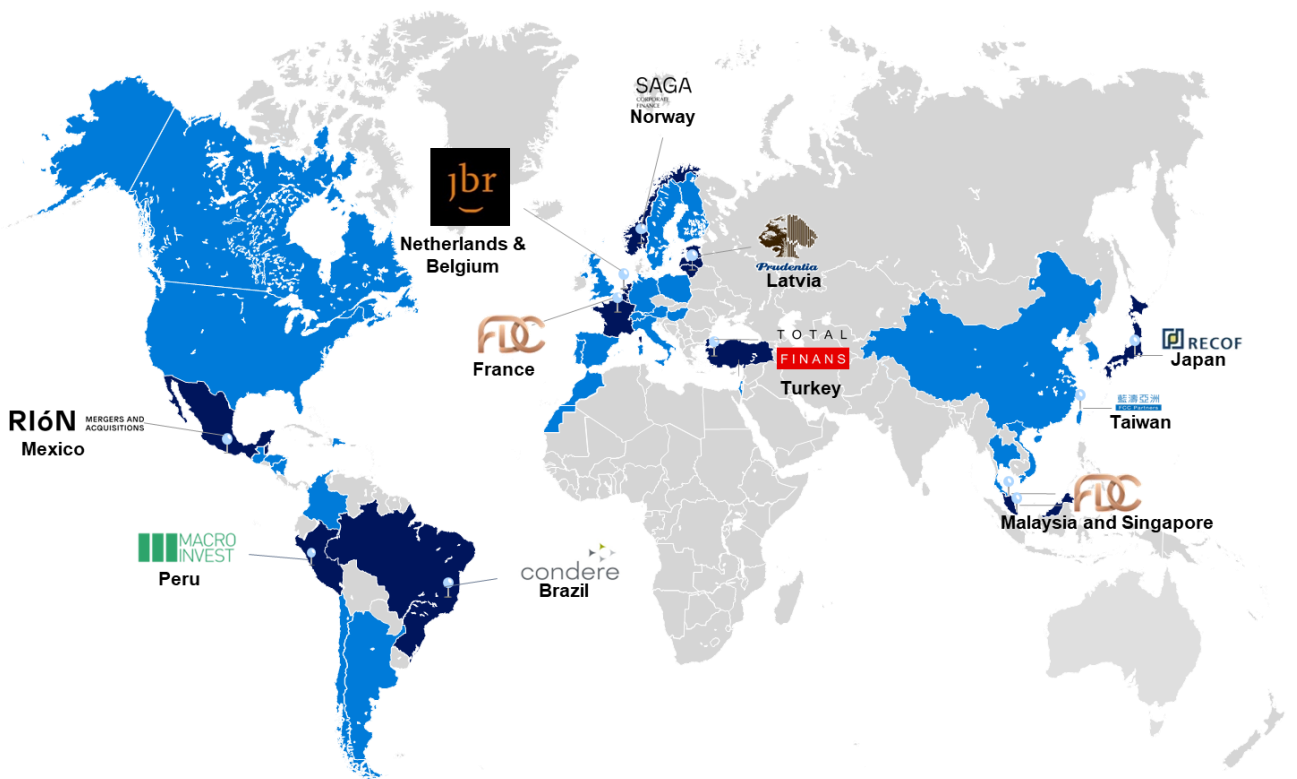
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Within the GMAP M&O Sector members work together to achieve premium results. Each transaction requires specific cooperation between members to combine in-depth knowledge with the specialist's network within the maritime and offshore sector.





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