INTERNATIONAL MARITIME ORGANIZATION

MARITIME KNOWLEDGE CENTRE

International Shipping and World Trade

Facts and figures

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The original sources of statistical information should always be cited and not attributed to IMO unless IMO is specifically listed as being the originator.

Contents

List of Tables

List of Figures

1. Introduction

We live in a global society which is supported by a global economy – and that economy simply could not function if it were not for ships and the shipping industry. Shipping is truly the lynchpin of the global economy: without shipping, intercontinental trade, the bulk transport of raw materials and the import/export of affordable food and manufactured goods would simply not be possible.

Shipping is perhaps the most international of all the world's great industries and one of the most dangerous. It has always been recognized that the best way of improving safety at sea is by developing international regulations that are followed by all shipping nations. Regulating the maritime industry to promote safety and security and prevention of pollution from ships worldwide has been the function of the International Maritime Organization since its inception in 1959. The work of IMO is well documented through its numerous conventions and codes and on the Organization's website.

Of all the sectors that make up the global transport infrastructure, shipping probably has the lowest public profile and the least representative public image. Its importance is not well known although not a single area of our life remains unaffected by it. The IMO Council at its 93rd session in November 2004 endorsed the proposal of Secretary-General Mr. Efthimios Mitropoulos that the theme for World Maritime Day 2005 would be "**International Shipping - Carrier of World Trade**". The theme was chosen to provide an ideal opportunity to draw attention to the vital role that shipping plays in underpinning the international economy and its significant contribution to international trade and the world economy as the most efficient, safe and environmentally friendly method of transporting goods around the globe.

IMO's response to current environmental challenges was the theme chosen for 2007 and "IMO: 60 years in the service of shipping" for 2008. The latter was chosen as an appropriate way in which to celebrate the 60th anniversary of the adoption of the IMO Convention (1948) and the 50th anniversary of its entry into force (1958). Climate change: a challenge for IMO too! is the theme chosen for 2009.

2. Globalization and international trade

It may seem obvious to say that, today, we live in a global world, and it is certainly true that international trade among all the nations and regions of the world is nothing new. From the Phoenicians, through the Egyptians, the Greeks and the Carthaginians, the Chinese, the Vikings, the Omanis, the Spaniards, the Portuguese, the Italians, the British, the French, the Dutch, the Polynesians and Celts, the history of the world is a history of exploration, conquest and trade by sea.

But there is no doubt that we have now entered a new era of global interdependence from which there can be no turning back. In today's world, national boundaries offer little impediment to multi-national corporations: cars with far-eastern brands are not only sold but also assembled in Europe, while European brands are assembled and sold in North America; "western" energy companies invest millions of dollars in Asia and the Far-East and the strategy and investment decisions they make can affect millions of people all over the world.

The high-flyers of the business world can cross oceans in just hours, communicating by e-mail and telephone as they go. In the financial markets, brokers and traders have thrown off the constraints of time zones and distance and now access the world markets via computer. In the 21st century, industries such as computer software, media and fashion have no obvious geographical dimension and recognise no physical boundaries. In today's consumer world, the same brands are recognised, understood and valued all over the world.

The process of globalization and the factors that have enabled it to evolve were recognized by the Secretary-General of the United Nations, Mr. Kofi Annan, in 2000. He observed, ***"Globalization has been made possible by the progressive dismantling of barriers to trade and capital mobility, fundamental technological advances, steadily declining costs of transport, communication and computing. Its integrative logic seems inexorable, its momentum irresistible."***

Looking back into history, we can trace the stages through which we have progressed to arrive at this new world order. There was a time when, for any given community, the most important raw materials, the most important products and the most important markets were essentially local. But, as interaction between communities grew, trade developed and regional specialities, often founded on the availability of particular raw materials or on saleable skill-sets that had been developed over time, began to emerge.

As the world became more developed, proximity to raw materials and to markets became the factors that, above all others, shaped the world's economy and, in particular, the major trade patterns and shipping routes. Eventually, the great seaborne trades became established: coal from Australia, Southern Africa and North America to Europe and the Far East; grain from North and South America to Asia, Africa and the Far East; iron ore from South America and Australia to Europe and the Far East; oil from the Middle East, West Africa, South America and the Caribbean to Europe, North America and Asia; and now we must add to this list containerized goods from the People's Republic of China, Japan and South-east Asia to the consumer markets of the western world. Global trade has permitted an enormous variety of resources to be widely accessible and thus facilitated the widespread distribution of our planet's common wealth.

Today, international trade has evolved to the point where almost no nation can be fully self-sufficient. Every country is involved, at one level or another, in the process of selling what it produces and acquiring what it lacks: none can be dependent only on its domestic resources. Global trade has fostered an interdependency and inter-connectivity between peoples who would previously have considered themselves completely unconnected. The potential benefits are clear: growth can be accelerated and prosperity more widespread; skills and technology can be more evenly dispersed, and both individuals and countries can take advantage of previously unimagined economic opportunities.

Shipping has always provided the only really cost-effective method of bulk transport over any great distance, and the development of shipping and the establishment of a global system of trade have moved forward together, hand-in-hand. Those with access to natural resources; those with the ability to convert those resources into useful products for the good of mankind; and those with a requirement and the wherewithal to utilize and consume those end products are all joined by the common thread of shipping. The eternal triangle of producers, manufacturers and markets are brought together through shipping. This has always been the case and will remain so for the foreseeable future.

2.1. Shipping and the global economy

It is generally accepted that more than 90 per cent of global trade is carried by sea. Throughout the last century the shipping industry has seen a general trend of increases in total trade volume. Increasing industrialization and the liberalization of national economies have fuelled free trade and a growing demand for consumer products. Advances in technology have also made shipping an increasingly efficient and swift method of transport.

As with all industrial sectors, however, shipping is not immune to occasional economic downturns – a notable fall in trade occurred, for example, during the worldwide economic recession of the early 1980s. However, although the growth in seaborne trade was tempered by the Asian financial crisis of the late 1990s, there was a healthy growth in maritime trade since 1993.

The shipping industry is now feeling the effects of the slowdown in world trade and the reduced demand for shipping services. The industry faces problems created by the collapse of the global debt markets and the exit of many equity investors from shipping at a time when the order-book for new ships is at an all-time high and shipyard capacity has grown to an unprecedented level.

Two years ago, global trade was booming, fuelled by the phenomenal growth taking place in several rapidly-industrializing countries, most notably the People's Republic of China and India. Shipping was gaining full benefit from an upsurge in demand for the transport of all kinds of raw materials, components, finished goods, fuel and foodstuffs needed to feed a growing world's healthy appetite. Money was relatively easy to come by and spending it was firmly in fashion. By and large, shipping was enjoying some of its most profitable results of modern times, if not of all time.

As the first decade of the 21st century draws to a close, the world now faces an uncertain and difficult future. Who, two years ago, could possibly have predicted the truly traumatic year, from an economic perspective hat 2008 turned out to be? The financial crisis that has, since the middle of 2008, beset the world has, by now, touched most people and few, if any, will be immune from its consequences in the current year. Shipping has already been bitten and markets, which saw VLCC rates drop from Worldscale W170 to W81 and the Baltic Dry Bulk Index plummet by more than 11,000 points from an all-time high of 11,793 in just a few months, have claimed their casualties and it seems unavoidable that more are bound to follow.

According to the UNCTAD´s **Trade and Development Report 2009** (TDR) the contraction now makes it virtually impossible to reach the United Nations Millennium Development Goals by 2015

2.1.1. Overview of the effect of the economic crisis on the shipping industry

The demand for seaborne trade is closely linked to the economy hence the demand for shipping is expected to be influenced by the current economic crisis. According to UNCTAD [3], an estimated 80% of the total trade volume is carried by sea which reached 8.02 billion tons in 2007 and translated into ton-miles, accounts for 32.9 billion of ton-miles. The fleet has been growing steadily over the years in number of ships and DWT enjoying a boom in shipping. Table 1 provides an overview of the development of the world fleet since 1980 in terms of number of vessels (ships of 100 gt and above), DWT, total deliveries, scrapping activities as well as seaborne trade volume. It also provides fleet activity in terms of ton-miles. As of the end of 2008, the effect of the economic crisis cannot be seen yet since the effect is lagged. The order book was still high at the end of December 2008, however there was more scrapping activities than in the previous year and as demand started to drop, an estimated 3.6% of the world fleet was laid up as a first reaction.

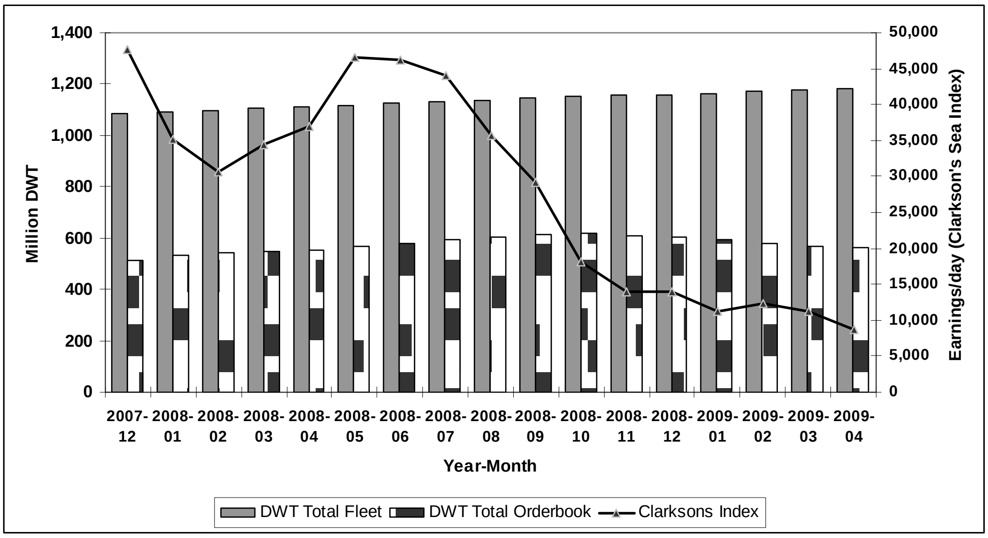
Table 1: Summary of world fleet development (1980-2008)

	1980	1990	2000	2005	2006	2007	2008*
Total Fleet (Nr)	73,832	78,336	87,546	92,105	94,936	97,504	99,741
Total Fleet (m.DWT)	619.6	658.4	808.4	960.0	1,042.3	1,117.8	1,198.3
Total active Fleet (m.DWT)	n/a	594.7	790.0	952.8	1,032.2	1,105.7	1,155.5
Total Orderbook (m.DWT)	43.22	46.03	89.86	216.32	238.83	335.79	509.71
Total Deliveries (m.DWT)	24.12	20.67	45.04	69.25	75.13	79.38	90.70
Total Scrapping (m.DWT)	13.37	4.61	22.33	5.45	6.44	4.85	10.20
Total cargo demand (m.tons)	3,704	4,156	5,918	7,259	7,616	8,022	8,270
Total ton miles (billions)	16,777	17,121	23,693	27,570	31,447	32,932	33,950
Fleet productivity (ton miles.DWT)^	27,077	28,789	29,991	28,936	30,466	29,784	29,382
Estimated laid up	n/a	63.7	18.4	7.2	10.1	12.1	42.8
% of World fleet laid up	n/a	9.7%	2.3%	0.8%	1.0%	1.1%	3.6%

*Notes: * fleet productivity is calculated based on active fleet and not total fleet in terms of DWT, 2008 figures are partly estimates . Source: compiled based on data from UNCTAD and Clarksons,*

In order to provide better insight into the current situation, Figure 1 only shows the period as of December 2007, the whole year of 2008 and up to April 2009. One can still see a relatively steady growth in the world fleet growth in terms of DWT. In comparison, a reduction in the order book can be noticed. The most dramatic indicator for the economic crisis is given by the decrease in average earnings per day (Clarkons Sea Index) which decreased sharply from a peak in May 2008 (USD 46,583) to the current value (an average of USD 8,679).

Figure 1: Fleet Develoment and earnings (Dec 07 to Apr 09)



Source: Compiled based on data from Clarkson

According to Stopford [4], ship economic cycles are determined by the continuous adjustment of demand and supply for the shipping service where demand is closely related to the world economy along other factors and supply by the supply of vessels, fleet productivity, shipbuilding and scrapping. In very simplistic terms, the freight rates will determine the equilibrium between supply and demand. This note will try to quantify the current situation and compare it to the end of December 07 and 08. Based on data from Clarksons and UNCTAD, Table 2 presents a summary of the development of the supply and demand side for shipping and presents three scenarios for 2009.

Table 2: Supply and Demand for shipping Dec 07-Apr 09

	End Dec-07	**End Dec-08**	**As of April 09 and estimated scenarios for 2009**		
Projected decrease in trade			**6%**	**5%**	**4%**
Total Fleet (m.DWT)	1,117.8	1,198.3	1,220.3	1,220.3	1,220.3
Total cargo carrying capacity (m.tons)	8,607	9,227	9,397	9,397	9,397
Total demand of seaborne trade (m.tons)	8,022	8,270	7,774	7,881	7,955
Total surplus converted into DWT (m.DWT)	76.0	124.3	210.8	196.8	187.3
% of Total Fleet	6.8%	10.4%	17.3%	16.1%	15.3%

Source: compiled based on data from UNCTAD and Clarksons

Two approaches were used – one based on projected ton miles and the other based on converting demand of seaborne trade into DWT where a conversion factor from UNCTAD [3] is used based on the year 2007 (the conversion factor is 7.7 tons carried by DWT which is kept constant for the scenarios). The total fleet represents capacity is calculated and compared to total demand for seaborne trade. The surplus is then converted into DWT surplus for the fleet and the percentage to the total world fleet is given.

For the 2009 estimates, three scenarios in terms of projected decrease in demand is given – namely 6%, 5% and 4%. The World Bank projected a decrease in trade volume by 6.1% as presented in the first part of this paper. It should be noticed that the projections in Table 2 only represent a very high level and simplistic overview of the surplus in tonnage. It gives however an indication of the situation. One can clearly see that the surplus in shipping will continue to widen and one can expect to see further cancellations of ships from the order book and a substantial amount of increase in scrapping or further tonnage being laid up in order to adjust the market and provide some recovery of freight rates.

The results confirm a recent analysis by Clarksons [5] for the dry bulk market where distress demolitions reached 7% of the fleet in 1978 and 13% in 1983. The current projection for 2010 is around 18% of the current fleet in terms of DWT. Table 3 projects 15% to 17% depending on trade development. The results are further supported by research into the ship scrapping market [6] where the probability of scrapping shows an inverse relationship with earnings for all main scrapping locations.

The expected decrease in shipping activities will ease the demand for seafarers, in particular the shortage of officers which is estimated to be 83,900 by 2012 by the 2008 Drewry Manpower Report [7] and which was one of the areas of emphasize for the IMO campaign to attract entrants to the shipping industry (November 2008). The estimate however assumes positive fleet growth which is unlikely in the current situation.

References:

[1] The World Bank, Global Economic Prospects 2009, Forecast Update, 20th March 2009

[2] OECD, OECD Economic Outlook, Interim Report, March 2009

[3] UNCTAD, Review of Maritime Transport, 2008

[4] Stopford M, Maritime Economics, 3rd Edition, Routledge, New York, 2009

[5]Stopford M, When will bulk shipping reach its breaking point, Shipping Intelligence Network, http://www.clarksons.net/markets/default.asp?

[6] Knapp S, Kumar S, Bobo-Remijn A, Econometric analysis of the ship demolition market, Marine Policy 2008, 32(6):1023-1036

[7] Precious Associates and DM Jupe Consulting, Annual Report Manning-2008, Drewry Publishing, London, 2008

2.2. Growth in world seaborne trade

World seaborne trade figures i.e. the amount of goods actually loaded aboard ships have increased considerably since the 70' s and in 2007, reached 8.02 billion tons of goods loaded, a volume increase of 4.8% over the previous year. During the past three decades, the annual growth rate was 3.1 %.

Strong demand for maritime transport services was fuelled by growth in the world economy and international merchandise trade. Despite rising energy prices and their potential implications for transport costs and trade and despite growing global risks and uncertainties from factors such as soaring non-oil commodity prices, the global credit crunch, a depreciation of the US dollar, and an unfolding food crisis, the world economy and trade have, so far, shown resilience. (Source: UNCTAD Review of Maritime Transport 2008).

Table 3: Development of World Seaborne Trade (selected years in million of tonnes)

Year	Oil	Main bulks[a]	Other dry cargo	Total (all cargoes)
1970	1 442	448	676	2 566
1980	1 871	796	1 037	3 704
1990	1 755	968	1 285	4 008
2000	2 163	1 288	2 533	5 984
2006	2 595	1 876	3 181	7 652
2007[b]	2 681	1 997	3 344	8 022

Source: Estimated by the UNCTAD secretariat on the basis of annex II and data supplied by reporting countries, ports and specialized sources.

[a] Iron ore, grain, coal, bauxite/alumina and phosphate.

[b] Preliminary.

Source: UNCTAD Review of Maritime Transport 2008

2.3. The world fleet and modern ships

The history of shipping is a glorious and proud one. There is no doubt, for example, that the magnificent square riggers of the era of sail or the early 20th century's prestigious ocean liners could stir the hearts of all those that beheld them. But the ships of today are just as worthy of our admiration, for shipping today is in another truly golden age. Ships have never been so technically advanced, never been so sophisticated, never been more immense, never carried so much cargo, never been safer and never been so environmentally-friendly as they are today.

Mammoth containerships nudging the 11,000 TEU barrier yet still capable of 25 knot operating speeds; huge oil tankers and bulk carriers that carry vast quantities of fuel, minerals, and grain and other commodities around our planet economically, safely and cleanly; the complex and highly specialized workhorses of the offshore industry; and the wonderful giants of the passenger ship world are all worthy of our greatest admiration.

In shipping today we can see many marvels of state-of-the-art engineering and technology that deserve to be ranked alongside the very finest achievements of our global infrastructure. We all marvel at the wonders of the modern world – skyscrapers, bridges, dams, ship canals, tunnels and so on. Although they all deserve our admiration, there should be no question that today's finest ships are also worthy of the sort of recognition usually reserved for the great icons of land-based civil engineering – with one substantial difference in favour of the former: while skyscrapers, bridges, dams *et al* are static structures designed to withstand the elements coming to them, the very essence of vessels sends them out to sea to face the elements at full force, alone in the vastness of the ocean. They should, therefore, be robust when built and maintained as such throughout their entire lifetime.

Ships are high value assets, with the larger of them costing over US $100 million to build. They are also technically sophisticated: you are more likely to find one of today's modern vessels being controlled by a single joystick and a mouse-ball in the arm of the helmsman's seat than by a horny-handed bosun grappling with a spoked wheel; the chief engineer will probably have clean hands and the calluses on his or her fingers will be from tapping a keyboard rather than wielding a spanner. The crew accommodation will be clean, light and airy with modern recreation facilities; the food will be good; and you may well find the first officer exchanging emails with his family at home via the satellite communication system. Ships today are modern, technologically advanced workplaces and the work of the **International Maritime Organization (IMO)** has played, and continues to play, an important part in shaping that environment.

3. World trading fleet

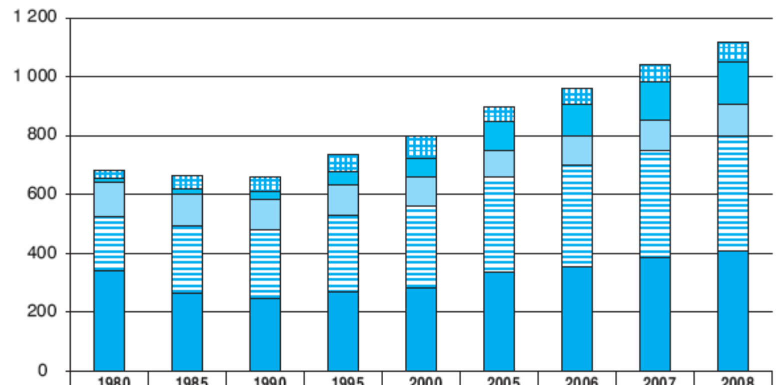
Today's world fleet of propelled sea-going merchant ships of no less than 100 GT comprises 99,741 ships of 830.7 million GT with an average age of 22 years (LRF/Fairplay World Fleet Statistics 2008); they are registered in over 150 nations and manned by over a million seafarers of virtually every nationality.

The world's cargo carrying fleet is 52,944 ships of 1,156.7 million Dwt (791.1 million GT)) and the average age is 20 years. Completions during 2008 totalled 2,260 ships of 91.6 million Dwt (66.2 million GT. *(Source: Lloyd's Register/Fairplay – World Fleet Statistics 2008).*

**Dwt: Deadweight: the weight a ship can carry when loaded to its marks, including cargo, fuel, fresh water, stores and crew*

***GT: Gross ton: internal measurement of the ship's open spaces. Now calculated from a formula set out in the IMO Tonnage Convention*

Figure 2: Development of world fleet by millions of dwt*



	1980	1985	1990	1995	2000	2005	2006	2007	2008
Other	31	45	49	58	75	49	53	63	69
Container	11	20	26	44	64	98	111	128	145
General cargo	116	106	103	104	101	92	96	101	105
Dry bulk	186	232	235	262	276	321	346	368	391
Oil Tanker	339	261	246	268	282	336	354	383	408

** cargo carrying vessels of 100 GT and above Source: UNCTAD Review of Maritime Transport 2008*

Looking at individual sectors, oil tankers and dry bulk carrier tonnage, which together account for nearly 72 per cent of the word fleet (increased by 6.5 % per cent and 6.4 per cent respectively in 2007); the containership fleet increased by 16.3 million dwt, or 12.7% and now represents 12.9 per cent of the world total fleet. General cargo ships also showed an increase, of some 4.5% in 2007.

The top five registries (Panama, Liberia, the Bahamas, Greece and the Marshall Islands) dominate the ship registration market. Their combined tonnage accounts for 49.3% of the world fleet. The largest flag of registration continues to be Panama with 252.6 million dwt (22.6% of the world), followed by Liberia (117 million dwt, 10.5%). They are followed by 5 flags with between 55 and 61 million dwt (close to 5 % of the world fleet) each, i.e: Greece, the Bahamas, the Marshall Islands, Hong Kong,China and Singapore. As regards the nationally flagged number of ships, the largest fleets belong to Japan (6,447 ships), the USA (6,419), Indonesia (4,477), The People's Republic of China (3,816), and the Russian Federation (3,461).*(Source: UNCTAD Review of Maritime Transport 2008).*

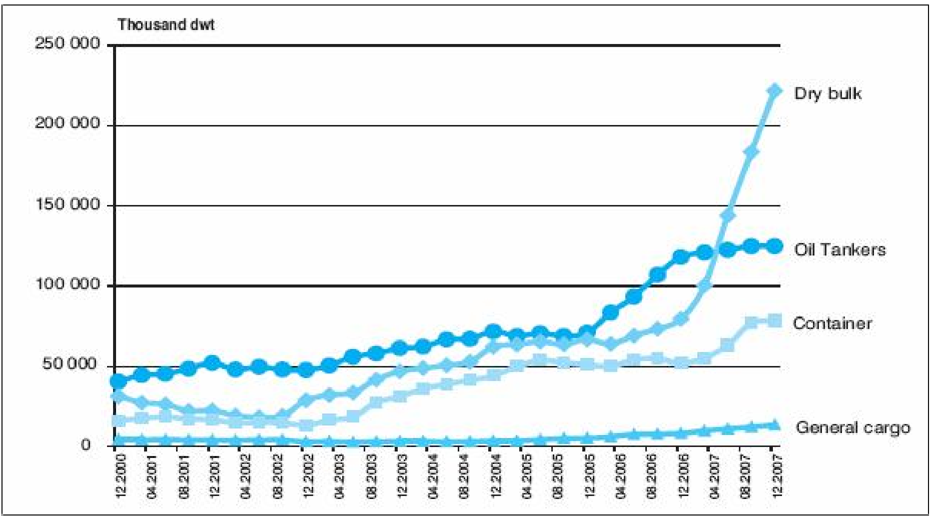
3.1. Age distribution of the world merchant fleet

The average age of the world fleet of propelled sea-going merchant ships of no less than 100 GT is 22 years and the average age of the world cargo-carrying ships 20 years. *(Source: Lloyd's Register/Fairplay - World Fleet Statistics 2008)*

3.2. Developments in shipbuilding

New building deliveries reached a record level of 81.9 million dwt in 2007. The amount of tonnage on order at the end of 2007 stood at its highest level since the beginning of the decade- 10,053 vessels with a total tonnage of 495 309 million dwt. In tonnage terms, the dry bulk sector make up the largest sector of the world orderbook, accounting for some 222 million dwt, or 44.8 % of the total world dwt on order. Oil tankers on order reached 125 million dwt, or 25.2 % of the total, general cargo vessels reached 8 million dwt (2.7%), containership tonnage on order now stands at 78 million dwt (15.8%) and other vessel types reached 57 million dwt (11.5%).

Figure 3: World Tonnage on order (2000-2007)



3.3. Prices of new-buildings

Table 4: Representative new-building prices (million of dollars, end of year figures)

Type and size of vessel [a]	1985	1990	1995	2000	2005	2006	2007	Percentage change 2007/ 2006
45,000 dwt dry bulk carrier	11	24	25	20	28	31	39	25.8
72,000 dwt dry bulk carrier	14	32	29	23	35	40	54	35.0
170,000 dwt dry bulk carrier	27	45	40	40	59	70	97	38.6
45,000 dwt tanker	18	29	34	29	43	47	52	10.6
110,000 dwt tanker	22	42	43	41	58	81	72	-11.1
300,000 dwt tanker	47	90	85	76	120	130	145	11.5
150,000 m^3 LNG	200	225	245	165	205	220	220	0.0
78,000 m^3 LPG	44	78	68	60	89	92	93	1.1
20,000 dwt general cargo	12	24	21	19	18	24	25	4.2
2,500 TEU full containership	26	52	50	35	42	46	66	43.5
4,000 TEU full containership	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	130	n.a.
8,000 TEU full containership	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	160	n.a.

Source: UNCTAD Review of Maritime Transport 2008

3.4. Transport costs

The transport cost element in the shelf price of consumer goods varies from product to product, but is ultimately marginal. For example, transport costs for a television set (typical shelf price of $700.00) amount to around $10.00 and only around $0.15 for of a kilo of coffee (typical shelf price $15.00).

The typical cost to a consumer in the United States of transporting crude oil from the Middle East, in terms of the purchase price of gasoline at the pump, is less than a US cent per litre.

The typical cost of transporting a tonne of iron ore from Australia to Europe by sea is about US $10. The typical cost of transporting a 20 foot container from Asia to Europe carrying over 20 tonnes of cargo is about the same as the economy airfare for a single passenger on the same journey.

Table 5: Overview of Transport Costs

	Unit	Shelf price	Shipping costs
TV set	1 unit	$ 700.00	$ 10.00
DVD/CD player	1 unit	$ 200.00	$ 1.50
Vacuum cleaner	1 unit	$ 150.00	$ 1.00
Scotch Whisky	Bottle	$ 50.00	$ 0.15
Coffee	1kg	$ 15.00	$ 0.15
Biscuits	Tin	$ 3.00	$ 0.05
Beer	Can	$ 1.00	$ 0.01

Source: Marisec

3.5. Leading Fleets

Top 20 merchant fleets

Figures in brackets are millions of gross tonnes of shipping registered in the countries listed. (Source: Based on Lloyd's Register Fairplay " World Fleet Statistics 2008" data as at 31 December 2008).

1. *Panama (183,503)*
2. *Liberia (82,389)*
3. *Bahamas (46,542)*
4. *Marshall Islands (42,636)*
5. *Singapore(39,885)*
6. *Hong Kong,China (39,100)*
7. *Greece (36,822)*
8. *Malta (31,633)*
9. *The People's Republic of China (26,811)*
10. *Cyprus (20,109)*
11. *Germany (15,282)*
12. *United Kingdom (15,246)*
13. *Norway NIS (15, 039)*
14. *The Republic of Korea (14,144)*
15. *Italy (13,599)*
16. *Japan (13,536)*
17. *United States (11,267)*
18. *Denmark DIS (10,094)*
19. *Bermuda (9.592)*
20. *Antigua and Barbuda (9,536)*

Top 20 controlled fleets

Based on total deadweight tonnage controlled by parent companies located in these countries and territories. Figures in brackets represent percentage of world fleet. (Source: Based on the UNCTAD Review of Maritime Transport 2008. (Data as of 1 January 2008, compiled by the UNCTAD secretariat on the basis of data supplied by Lloyd's Register – Fairplay)

1. Greece (16.81%)
2. Japan (15.58%)
3. Germany (9.07%)
4. People's Republic of China (8.18%)
5. Norway (4.51%)
6. United States (3.84%).
7. Republic of Korea (3.63%
8. Hong Kong, China (3.22%).
9. Singapore (2.76%)
10. Denmark (2.64%)
11. Taiwan, China (2.52%)
12. United Kingdom (2.50%)
13. Canada (1.81%)
14. Russian Federation (1.74%)
15. Italy (1.71%)
16. India (1.55%)
17. Turkey (1.27%
18. Saudi Arabia (1.25%)
19. Belgium (1.17%)
20. Malaysia (1.08%)

3.6. Overview of Ship Types

3.6.1. Overview world merchant fleet

The world's cargo carrying fleet is 52,944 ships of 1,156.7 million dwt (791.1 million GT) and average age of 20 years. (*Source: Lloyd's Register Fairplay - World Fleet Statistics 2008)*

Table 6: Overview of world merchant fleet- cargo carrying shiptypes

Shiptype Category	No.	*Dwt*	GT	Age
BULK DRY	6,306	394,968,275	216,749,258	15
CRUDE OIL TANKER	2,105	303,734,893	163,691,586	10
CONTAINER	4,641	161,921,733	139,563,042	10
GENERAL CARGO	17,002	80,417,587	56,433,536	24
CHEMICAL	4,212	68,891,467	42,900,705	12
OIL PRODUCTS TANKER	4,954	52,908,628	31,667,027	23
LNG TANKER	301	22,269,871	29,047,680	10
RO-RO CARGO	2,489	18,459,423	41,634,505	17
LPG TANKER	1,154	14,071,706	11,996,216	16
OTHER BULK DRY	1,165	11,744,287	8,947,465	22
REFRIGERATED CARGO	1,210	6,454,779	5,989,059	23
SELF-DISCHARGING BULK DRY	175	6,415,716	3,808,636	32
PASSENGER/RO-RO CARGO	2,868	4,408,950	16,794,304	24
BULK DRY/OIL	98	4,149,162	2,458,800	23
OTHER DRY CARGO	226	3,120,984	2,881,528	26
PASSENGER (CRUISE)	506	1,740,055	14,405,871	22
PASSENGER SHIP	3,035	598,334	1,498,867	24
PASSENGER/GENERAL CARGO	335	274,324	536,112	33
OTHER LIQUIDS	162	121,972	82,404	32
TOTAL CARGO CARRYING	**52,944**	**1,156,672,146**	**791,086,601**	**21**

Source: Lloyd's Register/Fairplay World Fleet Statistics 2008

3.6.2. General Cargo Ships

Although general cargo ships are still the largest single category, the trend among new ships is more and more in favour of specialization, although it could be argued that handy-sized, geared bulk carriers and versatile medium-sized containerships, of which some have the ability to accommodate several different box sizes as well as palletised cargo are the natural successors of the old general cargo vessels.

3.6.3. Tankers

Tankers make up the second largest category. There are many different types of tanker, ranging from those carrying crude oil, through those built to transport various refined hydrocarbon products, to highly specialized ships that carry liquefied petroleum gas and natural gas. There are even tankers designed to carry cargoes such as fresh water, wine or orange juice. In size terms, the heyday of the tanker was the early 1970s, when the so-called Ultra-Large Crude Carriers (ULCCs), capable of lifting more than half a million tonnes of cargo, sailed the oceans. After the oil crisis of the 70s, tanker owners became a little more modest in their ambitions and, since then, most large modern tankers are in the 200-300,000 tonnage range. These are still massive vessels and enormously expensive to build, but today's high price of oil means they can pay for themselves in a relatively short period of time.

The world's largest ship today is a 564,765 dwt tanker with an interesting and varied history. She was built in 1976 and having undergone some work to increase her load-carrying capacity, was finally floated two years later and named ***Seawise Giant***. At first, she operated in the Gulf of Mexico and the Caribbean Sea, but was then used for exporting oil from Iran during the Iran-Iraq War. In 1986, she was attacked but not sunk in the Strait of Hormuz and at the end of the war in 1989 she was repaired and renamed ***Happy Giant*****.** In 1991, she was renamed again, this time to ***Jahre Viking.***

In March 2004, the ship was sold and sent by its new owner to be refitted as a floating storage and offloading unit. There, she was given her current name, ***Knock Nevis*** and she is operated in the Al Shaheen oilfield in the waters of Qatar.

An increase in demand for LNG carriers reflect concern for global warming; traditionally, these vessels have been propelled by steam turbines but marine engine builders are now offering diesel-electric propulsion as an alternative for such ships: the breakthrough initially coming as a result of the evolution of the medium speed dual-fuel engine, which allows this cargo gas to be used as a part-replacement for heavy oil.

Perhaps more typical of the kind of large crude oil carrier being built today is the ***Irene SL,*** also built in Japan in 2004. Selected as one of the Naval Architect's 50 "Significant Ships" of 2004, ***Irene SL*** has a design deadweight of just under 300,000 dwt, a double-hull construction and is capable of handling three different grades of oil simultaneously in her 15 cargo tanks. Her cargo and ballast control systems, including the operation of pumps, valves and ullage measurement are all computerized. For safety, inert gas is pumped into the cargo tanks when they are empty and, to comply with the most recent requirements on emissions, the ship is fitted with a scrubber system to clean the exhaust gas.

3.6.4. Bulk carriers

Bulk carriers are often called the workhorses of the international shipping fleet. They can be thought of as simple, relatively unsophisticated but nevertheless highly efficient vessels that typically transport commodities such as grain, coal and mineral ores. If tankers provide the fuel that powers the modern economy, bulk carriers are responsible for moving the raw materials that are its lifeblood.

In terms of size, the world's bulk carrier fleet has three categories; ships of up to 50,000 dwt are known as "handy-sized"; ships of 50,000 to 80,000 dwt are known as "Panamax" (being the largest ships able to transit the Panama Canal) and ships of more than 80,000 dwt are known as "capesize". Bulk carriers embrace a number of variations – single or double hull, with or without their own cargo-handling equipment – but all are characterized by the huge hatch covers that can be rolled or lifted away to reveal to cavernous holds beneath.

	Size (deadweight tonnes)	**No. in World fleet**
Handies	10 - 49,999 dwt	3212
Panamax	50 - 79,999 dwt	1453
Capesize	80,000+ dwt	796

Source: Intercargo

Because of the nature of the cargoes they carry – often heavy, high-density commodities – accidents involving bulk carriers have sometimes resulted in considerable loss of life. For this reason IMO has, over a long period of time, undertaken a great deal of work to improve the safety of this type of vessel. There is, for example, a special chapter on bulk carrier safety in the Safety of Life at Sea Convention **(SOLAS)**, covering such topics as damage stability, structural strength, surveys and loading.

3.6.5. Passenger ships

Passenger ships come next in the world fleet league table. There are two basic categories – which can be summed up as "fun" or "function". In the latter category are those which are designed to move people and, often, vehicles on regular itineraries from one place to another as quickly and cheaply as possible (ie ferries) and, in the former, those which the passengers see as a leisure destination in their own right (ie cruise ships). In both categories, the size, sophistication and the sheer number of passengers that can be carried have reached mind-boggling proportions. Because of their individuality, as well as their resonance with the great ocean liners of a bygone era, these ships tend to be the best known and most recognized among the general public at large.

One of the finest modern examples is the *Queen Mary II* , built in France for Carnival Corp's Cunard in 2004. **QM2** is the largest, longest, tallest, widest ocean liner ever and has cost an estimated $800 million dollars. She incorporates all the very latest international standards with regard to safety, security and environmental protection, offering her passengers an unparalleled opportunity to experience the wonders of ocean travel in the finest style. The ***Independence of the Sea*** which was built in Turku (Finland) and started work in Southampton in April 2008 is bigger at 340m and able to carry 4,375 passengers and more than 1,000 crew. It will be surpassed in 2009 by the ***Project Genesis***, a £ 700 million vessel which will be able to carry 5,400 guests.

With ships such as this, it is little wonder that, over the past ten or fifteen years, the cruise and passenger sector has become one of the industry's most vibrant sectors and is now a major force within shipping, both in terms of technological development and commercial success.

3.6.6. Container ships

But the one sector which can be said to have transformed the face of shipping, certainly in the latter half of the 20th century, is that of container shipping. Unheard of before the 1960s, the container is now ubiquitous and is the standard unit of cargo for just about every form of manufactured item on the planet (there are exceptions: cars, for example, are transported in special ships designed solely for the purpose).

Today's giant containerships typically operate between purpose-built ports served by massive cranes that can load and unload containers at astonishing rates. Containership operators can offer fixed sailing schedules with tight delivery margins and these ships are now an integral part of the modern, multi-modal transport and logistics industry.

The largest containership is the **M/S Emma Maersk**, built by Odense Steel Shipyard. The ship which was delivered to Maersk in 2006 measures 397x56m and is able to carry 11,000 20-ft. containers. The **MSC Daniela** built in 2008 by Samsung Shipbuilding & Heavy Indutries Co.Ltd for the Mediterranean Shipping Company is the size of an aircraft carrier; Daniela completed its maiden run packed with 13,800 containers each big enough to contain the contents of a three-bedroom house.

STX Shipbuilding of the Republic of Korea reported in May 2008 that it had completed the design of a 22,000teu containership that at 450 metres in length would be the longest ship to ply the oceans. Two alternative versions have been designed, one with a single propeller and the other with twin propellers. Compared to Emma Maersk, the world's largest existing containership, the new design represents a 50% increase in capacity and some 50 metres extra in length.

By the beginning of 2008 there were 4,276 ships with a total capacity of 10.76 million TEUs. This represents an increase of 9.5 7% in the number of ships and an increase of 14.2% in TEU capacity over the previous year. (Source: UNCTAD Review of Maritime Transport 2008, p.32). (TEU *-Twenty-foot Equivalent Units: standardized unit for measuring container capacity on ships)*

At a time when the global economy is slowing, throughput statistics for the World Top 100 Container Ports show a very buoyant industry with an increase of over 45 million TEU in 2007. The total volume handled at those 100 top ports was just over 404.3 million TEU. Drewry Shipping Consultants' figure for total global container port throughput for 2007 is 494.4m TEUs. This means that the top 100 ports account for 82% of the world total, while the balance of 18% was handled by 500 or so smaller ports. (Source: Cargo Systems – Top 100 Container Ports 2008- August 2008). See also Global Top 15 Container Lines .

3.6.7. Fishing vessels

The world totals for fish catching vessels amounts to 22,358 ships with a GT of 9,760,738 and an average age of 27 years. Other fishing vessels (fish carriers, support vessels etc.) amount to 1,258 with a GT of 1,557,802 and an average of 24 years. *Source: Lloyds Register/Fairplay. World Fleet Statistics 2008, Table 2K p 54*

4. Maritime Safety

The sea has always been a potentially hazardous and dangerous working environment. Yet, ship operators today have new factors and new pressures to contend with. The structure of the global marketplace requires that goods and materials be delivered not only to the geographical location where they are required but also within a very precise timeframe. Today, goods in transit are carefully factored-in to the supply chain and, as a result, the transportation industry – which embraces both shipping and ports – has become a key component of a manufacturing sector which sets its store by providing a complete "door-to-door" service.

As a consequence, safety and efficiency have now, more than ever before, become two sides of the same coin: accidents are not only undesirable outcomes in themselves; they also have a negative impact on the supply chain that is at the heart of the new global economy. Seen in this light, IMO's responsibility to ensure the highest practicable, globally acceptable, standards that will improve maritime safety and security and, at the same time, help prevent marine pollution takes on a new dimension.

Shipping in the 21st century is the safest and most environmentally benign form of commercial transport. Commitment to safety has long pervaded virtually all deep sea shipping operations and shipping was amongst the very first industries to adopt widely implemented international safety standards.

From the mid-19th century onwards, a number of international maritime agreements were adopted. A treaty of 1863, for example, introduced certain common navigational procedures that ships should follow, when encountering each other at sea, so as to avoid collision, and was signed by some 30 countries. And the infamous ***Titanic*** disaster of 1912 spawned the first Safety of Life at Sea - or ***SOLAS Convention***, which, albeit completely modified and updated, and nowadays within the responsibility of IMO, is still the most important international instrument addressing maritime safety today, covering, among others, such areas as ship design, construction and equipment, subdivision and stability, fire protection, radio-communications, safety of navigation, carriage of cargoes (including dangerous cargoes), safety management and maritime security.

The overall safety record of shipping has been improving steadily for many years. In fact, relatively few ships actually sink at sea. The vast majority of so-called "losses" are actually those which are damaged and "written off" by the hull insurers as being beyond economical repair – described by underwriters as "constructive total losses".

As in all transport sectors, lives are sadly lost as a result of accidents. However, the loss of life in shipping is in fact relatively modest and the overall trend is one of reduction in the number of fatalities, which is all the more impressive in view of the growth in the number of ships in the world fleet.

Between 1966 and 1985 there were never fewer than 300 ships lost annually. The worst years, 1978 and 1979, together saw 938 losses at a ration of 6.7 ships per thousand in the world fleet. In 1959, when IMO began, the ratio of vessels lost was running at 5 per thousand vessels. The early 1980s saw total losses of over 200 a year, with a peak of 225. In 1990, the number of annual losses dipped under 200, at 2.4 per thousand vessels. By 2000 the figure had further decreased to 167 at 1.9 per thousand ships. Delegates at the annual conference of the International Union of Marine Insurance in Vancouver in 2008 were told that 2007 saw a decline in total losses bringing the total to just over 100. Total losses in 2007, by number, represented 0.2% of the world fleet of vessels of over 500 gt, and, by tonnage, approximately 0.1%.

However, the combined total of losses of and serious casualties to merchant ships continued to increase in 2007, with over 1,000 incidents, a record number as Incidents have shown a steady upward climb since 2006 when 600 were reported. According to an IUMI spokesman, the statistics suggest that the shipping industry has entered an era of safer ships – but not necessarily safer shipping operations.

The International Association of Dry Cargo Shipowners (Intercargo) reported that four bulk carriers were lost during 2008- an encouraging halving of the 2007 figure. This must be set against the ever expanding dry bulk fleet, estimated to have grown to 6,565 vessels by the end of 2008. A total of 15 lives were lost on two vessels, compared to 32 lives lost on two vessels in the previous year. The average age of bulk carriers lost in 2008 was 29.1 years against a world wide trading average age of

14.33 years. *(Source: INTERCARGO – Bulk Carrier Casualty Report-2008* quoted in IMO Document MSC86/INF.8 of 24March 2009)

The safety level of a vessel can be influenced by many factors and it is therefore not so easy to measure. Such variables could be general ship particulars (flag, classification society, ship type, age, etc.), the changes thereof, ship safety inspections and ship economic cycles. It has been demonstrated by Bijwaard and Knapp (2008)[1] and by means of survival analysis based on ship life cycles that the shipping industry is a safe industry since its hazard rate is low. The hazard rate in this concept is to be understood as the instantaneous potential per unit time for the event to occur, given that the ship has survived up to time t which can vary from zero to infinity. The baseline hazard which when based on age of the vessel varies per ship type and increases with age 20 significantly while it decreases in the first two age brackets (5-10 and 11-15 years). Another interesting relationship is the effect of ship economic cycles where an increase in earnings decreases the hazard rate for all ship types except container vessels.

4.1. Loss of ships subject to IMO Conventions

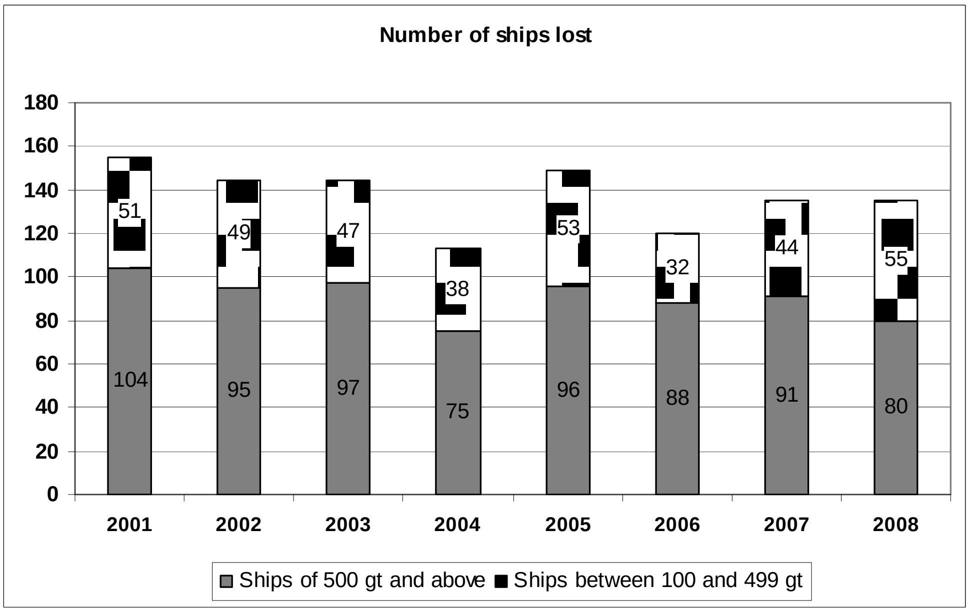
The following tables and figures are taken from the latest IMO document on performance indicators (CWGSP 10/2(a)) and are based on Lloyd's Register Fairplay World Casualty Statistics. It should be noted that these figures do not accurately reflect ships subject to IMO conventions but can only be seen as an approximation. The calculated loss rate is based on all ships of 100 and more GT.

Table 7: Number of ships subject to IMO conventions lost

	2003	2004	2005	2006	2007	2008
Ships over 500 GT	97	75	96	88	91	80
Ships between 100 and 500 GT	47	38	53	32	44	55
Total LRF	144	113	149	120	135	135
Loss rate (all ship types*	1.6	1.6	1.3	1.6	1.3	1.4

*Source: Lloyd's Register Fairplay, * by 1000 ships at risk, Note: Number of ships subject to IMO conventions lost for any safety-related[2] reason other than those declared constructive total losses for insurance purpose*

Figure 4: Number of ships lost (2001-2008)

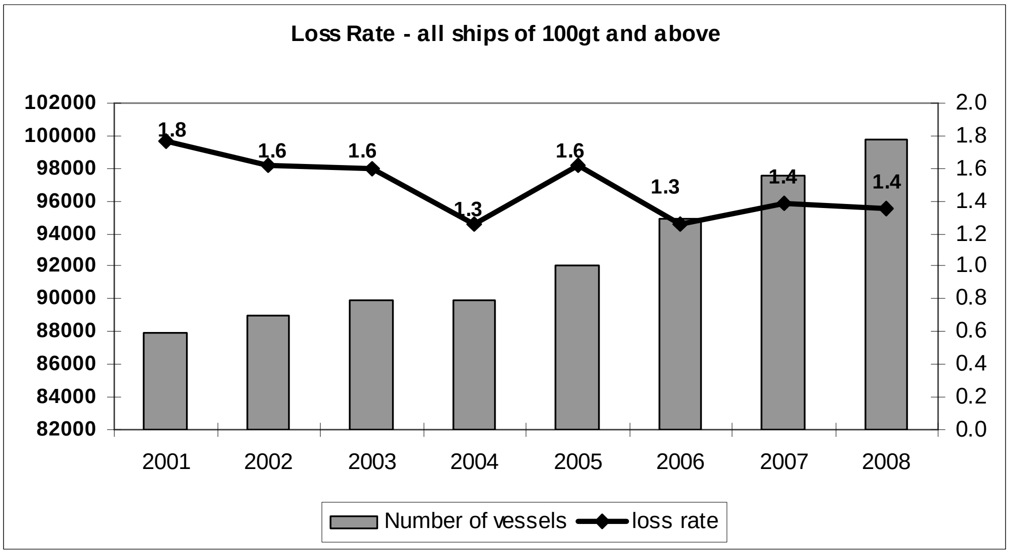


Source: Lloyd's Register Fairplay World Casualty Statistics and data extracts received from LRF

[1] Bijwaard G and Knapp S, 2008, Analysis of Ship Life Cycles –The Impact of Economic Cycles and Ship Inspections, Marine Policy 2009, volume 33, pp. 350-369.

[2] i.e **not** accidents and incidents which are due to security failures, acts of piracy and armed robbery or whose prevention is addressed by other international conventions.

Figure 5: Loss Rate (2001 to 2008)



Note: Ratio of ships subject to IMO conventions lost for any safety-related reason, other than those declared constructive total losses for insurance purposes, to total number of ships subject to IMO conventions
Source: Lloyd's Register Fairplay World Fleet Statistics and data extracts received from LRF

4.2. Loss of lives subject to IMO Conventions

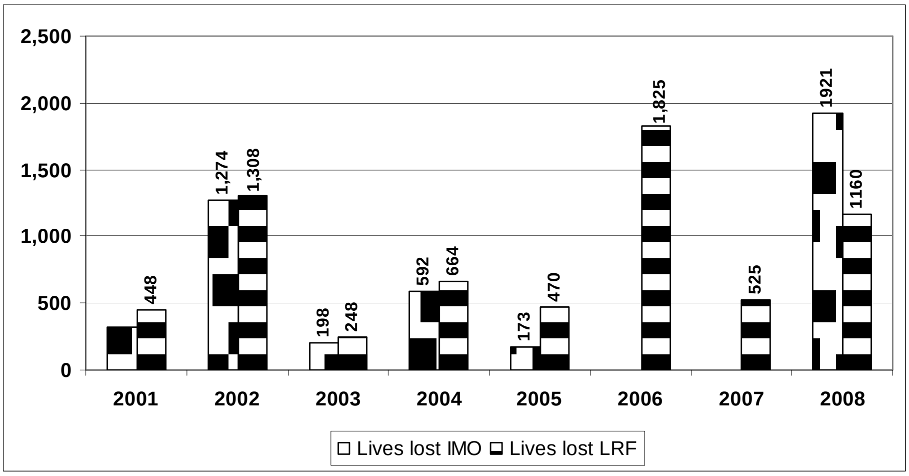
Again, the tables and figures in this section are taken from the latest IMO document on performance indicators (CWGSP 10/2(a)) With respect to loss of lives, various time series are presented where a distinction is made for data received from LRF and data compiled by the IMO Secretariat.

Table 8: Loss of lives (2001-2008)

	2001	2002	2003	2004	2005	2006	2007	2008
LRF raw data	448	1,308	248	664	470	1,825	525	1160
IMO Secretariat	317	1,274	198	592	173	n/a	n/a	1921

Note: Figures for 2008 are up to June, Number of lives lost due to safety-related[3] accidents and incidents on ships subject to IMO conventions and other instruments.

Figure 6: Loss of Lives (2001 to 2008)



Source: IMO Secretariat, Lloyd's Register Fairplay World Casualty Statistics[4] and LRF data extract (courtesy of LRF). Note: no data on fishers has yet been obtained.

[3] ie **not** accidents and incidents which are due to security failures, acts of piracy and armed robbery or whose prevention is addressed by other international conventions.
[4] The higher incidence of lives lost in 2002 and 2006 may be ascribed to three casualties (incidents), namely: the passenger ferries **Le Joola** and **Salahuddin-2**, which sank off the Gambia and Bangladesh with over 1,500 lives lost **between them; and the passenger ferry Al-Salaam Boccaccio 98, which sank in the Red Sea with close to 1,000 lives lost.**

The ratio of lives lost to lives transported are based on an estimated total amount of passengers and crew members compared to the total number of lives lost at sea (based on all ships of 100 gt and more).

Table 9: Ratio of lives lost to lives transported (2004-2008)

	2004	2005	2006	2007	2008
LRF lives lost all ships	**664**	**470**	**1,825**	**525**	**1160**
Estimated amount of seafarers		1,187,000	1,232,000	1,277,000	1,246,200
Estimated total number of ferry passengers	1,321,228,835	1,395,306,149	1,629,573,558	1,681,931,684	n/a
Estimated total number of cruise passengers	15,402,793	16,719,322	16,927,718	17,857,711	n/a
Estimated total number of passengers	1,336,631,628	1,412,025,471	1,646,501,276	1,699,789,395	1,913,962,859
Total amount of passengers and crew		**1,413,212,471**	**1,647,733,276**	**1,701,066,395**	1,915,209,059
Ratio best estimate	**4.53E-07**	**3.33E-07**	**1.11E-06**	**3.09E-07**	**6.06E-07**

Source: Lloyd's Register Fairplay for loss of lives, Statistics Shippax (Statistics & Outlook 2006, Market: 2008 Statistics) for number of passengers, BIMCO/ISF Manpower 2005 Update and Drewry 2008 Manpower report for numbers of seafarers; Note: no data on fishers has yet been obtained.

4.3. Port State Control detention and non-compliance rate

Based on the provisions in the international conventions, flag states are to be seen as the first line of defence against stub-standard vessels. They are followed by the second line of defence, the port states that perform port state control inspections (PSC).

The establishment of port state control as a legal institution to enhance enforcement of international maritime legislation followed after the loss of the *Amoco Cadiz* off the coast of Brittany in 1978 (Hare,1996)[5]. Since then, PSC evolved into an important instrument to enhance safety at sea (Kasoulides, 1993[6]) and to prevent pollution (Cuttler,1995[7]). PSC can best be described to be the right of a country to inspect a vessel coming into its port. It is not an obligation according to the IMO conventions (e.g. SOLAS, MARPOL, STCW, Load Lines, etc.) but if a country decides to exercise this right, a set of IMO resolutions, namely IMO resolutions A.787(19), A.682(17) and A.822(21) are applied which cover the basic principles on how substandard vessel should be identified and be treated

During the 1980's and from then onwards, individual countries grouped themselves into regional MoU's and worldwide, there are currently ten port state control regimes that cover most of the coastal states. These regimes are as follows and some key figures can be found in Table 9:

1. Europe and North Atlantic (Paris MoU) signed 1982
2. Asia and the Pacific (Tokyo MoU) signed 1993
3. Latin America (Acuerdo de Viña del Mar) signed 1992
4. Caribbean (Caribbean MoU) signed 1996
5. West and Central Africa (Abuja MoU) signed 1999
6. Black Sea (Black Sea MoU) signed 2000
7. Mediterranean (Mediterranean MoU) signed 1997
8. Indian Ocean (Indian Ocean MoU) signed 1998
9. Arab States of the Gulf (Riyadh MoU) signed 2004
10. United States Coast Guard (USSC)

A PSC inspection follows a set of procedures to check if a vessel complies with the standards established in the international conventions. The inspection is unannounced and carried out by inspectors who come onboard and in the first instance check the certificates of the ship and the crew. A deficiency is a deviation or violation against a measure in the international conventions which needs rectification. The deficiencies are recorded at the end of the inspection and discussed with the master along with a set of recommendations on when they should be rectified. The IMO collects yearly statistics on the PSC detention rate and non-compliance rate. The non compliance rate is the rate of inspections where deficiencies are found to the total number of inspections. Some aggregated statistics are found here.

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[5] Hare, J. (1997) Port state control: strong medicine to cure a sick industry, Georgia Journal of International and Comparative Law 26(3), 571-594

[6] Kaoulides, G.C. (1993), Port State control and jurisdiction: evolution of the port state regimes. Kluwer Academic Publishers, Dordrecht, Netherlands

[7] Cuttler, M. (1995) Incentives for reducing oil pollution from ships: the case for enhanced port state control, Georgetown International Environmental Law Review 8 (1), 175-204.

Table 10: Port State Control detention rates (2001-2008)

Detention%	Paris	Viña del Mar	Tokyo	Caribbean	Med. MoU	Indian Ocean	Abuja	Black Sea	Riyadh	USCG
2001	9.09%	3.52%	7.76%	n/a	9.25%	5.27%	n/a	n/a	n/a	1.61%
2002	7.98%	3.33%	6.67%	n/a	28.90%	5.61%	n/a	6.28%	n/a	1.69%
2003	7.05%	2.78%	8.49%	n/a	28.99%	9.27%	1.65%	4.76%	n/a	1.28%
2004	5.84%	1.87%	6.51%	n/a	14.54%	8.59%	1.54%	6.95%	n/a	1.59%
2005	4.67%	2.57%	5.21%	0.00%	21.41%	7.18%	0.45%	6.23%	n/a	1.22%
2006	5.44%	1.80%	5.40%	2.05%	17.26%	7.92%	0.71%	5.56%	n/a	1.09%
2007	5.46%	3.34%	5.62%	3.97%	15.70%	9.42%	n/a	8.16%	9.38%	1.46%
2008	4.95%	2.50%	6.90%	1.33%	n/a	9.84%	1.04%	6.37%	7.69%	1.52%

Source: Annual reports of regional PSC MoUs/Agreement and United States Coast Guard[8]

Table 11: Port State Control non-compliance rates (2001-2008)

	Paris	Viña del Mar	Tokyo	Caribbean	Mediterranean	Indian Ocean	Abuja	Black Sea	Riyadh	USCG
2001	57.59%	41.44%	69.33%	n/a	n/a	51.85%	n/a	n/a	n/a	27.33%
2002	57.20%	35.50%	70.25%	n/a	n/a	48.92%	n/a	54.79%	n/a	24.34%
2003	55.00%	38.50%	73.62%	n/a	n/a	51.78%	77.28%	56.22%	n/a	19.17%
2004	53.59%	35.80%	67.27%	n/a	n/a	54.25%	9.24%	61.88%	n/a	22.75%
2005	51.25%	36.39%	68.48%	n/a	65.13%	55.16%	10.03%	62.93%	n/a	21.81%
2006	53.55%	46.20%	68.78%	n/a	70.52%	55.35%	17.29%	69.39%	n/a	23.32%
2007	56.43%	53.34%	67.44%	n/a	n/a	54.68%	n/a	72.42%	57.29%	26.58%
2008	58.00%	58.00%	69.07%	14.93%	n/a	54.47%	11.00%	67.89%	41.76%	24.60%

Source: Annual reports of regional PSC MoUs/Agreement and United States Coast Guard.

5. Maritime security

Maritime security is an integral part of IMO's responsibilities. A comprehensive security regime for international shipping entered into force on 1 July 2004. The mandatory security measures, adopted in December 2002, include a number of amendments to the 1974 Safety of Life at Sea Convention (SOLAS), the most far-reaching of which enshrines the International Ship and Port Facility Security Code (ISPS Code)**,** which contains detailed security-related requirements for Governments, port authorities and shipping companies in a mandatory section together with a series of guidelines about how to meet these requirements in a second, non-mandatory section.

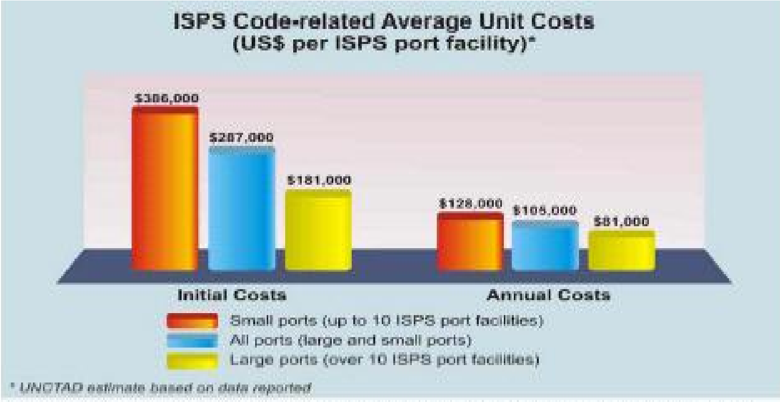
5.1. Cost of security measures

A 2007 UNCTAD global study on the cost of implementing the ISPS Code puts ISPS investment costs per port worldwide at $ 287,000 and annual running cost at $105,000.

An example of IMO's initiative is the "Co-operative mechanism", a new framework, in which the littoral States of the Straits of Malacca and Singapore (the Straits) can work together with the international maritime community to enhance navigational safety, security and environmental protection in the Straits.

8 United States Coast Guard data incorporates separate safety and security inspections.

Figure 7: Cost of ISPS compliance



The relevant sample represents respondent ports handling about 7% of the global port cargo throughput (tonnes).

(Source: Maritime security: ISPS code implementation, costs and related financing, Report by the UNCTAD secretariat (UNCTAD/SDTE/TLB/2007/))

5.2. Piracy and armed robbery against ships

The following definition of piracy is contained in article 101of the 1982 United Nations Convention on the Law of the Sea (UNCLOS): Article 101 - Definition of Piracy consists of any of the following acts:

"(a) any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship or a private aircraft, and directed-

(i) on the high seas, against another ship or aircraft, or against persons or property on board such ship or aircraft;

(ii) against a ship, aircraft, persons or property in a place outside the jurisdiction of any State;

(b) any act of voluntary participation in the operation of a ship or of an aircraft with knowledge of facts making it a pirate ship or aircraft;

(c) any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b)

Acts of piracy and armed robbery against ships are of tremendous concern to IMO and to shipping in general. The fight to prevent and suppress these acts is linked to the measures to improve security on ships and in port facilities, adopted in December 2002.

In July 2006 United Nations Secretary General Ban Ki-Moon welcomed the action taken by IMO to address the threat of piracy and armed robbery against ships off the coast of Somalia as both timely and appropriate. On 2 June 2008, the United Nations Security Council adopted a resolution authorizing a series of decisive measures to combat acts of piracy and armed robbery against vessels off the coast of Somalia.

Under the terms of resolution 1816 (2008), which was adopted unanimously, the Security Council decided that, following receipt of a letter from Somalia to the President of the UN Security Council giving the consent of Somalia's Transitional Federal Government (TFG), States co-operating with the TFG would be allowed, for a period of six months, to enter the country's territorial waters and use "all necessary means" to repress acts of piracy and armed robbery at sea, in a manner consistent with relevant provisions of international law. The Security Council further adopted, on 7 October 2008, resolution 1838 (2008), which calls upon States interested in the security of maritime activities to deploy naval vessels and military aircraft to actively fight piracy off the coast of Somalia, and expresses the Council's intention to remain seized of the matter with a view, in particular, to renewing the mandate granted in its earlier resolution 1816.[9]

The following tables and figures provide an overview of piracy and armed robbery acts for the time period 2000 to 2008 respectively based on the UNCLOS definition.

[9] S/RES/1816 (2008) and S/RES/1838 (2008)

Table 12: Overview of piracy and armed robbery acts (2000-2008)

Year	Number of acts	Lives lost	Wounded crew	Missing crew	Crew hostage/ kidnapped	Crew assaulted	Ships hijacked	Ships missing
2000	492	72	99	5	69	210	2	3
2001	366	16	38	16	141	51	12	2
2002	383	6	38	99	125	86	16	5
2003	452	12	75	32	113	35	14	6
2004	330	29	60	44	147	145	8	1
2005	267	0	29	11	367	67	18	0
2006	254	17	23	0	224	225	10	0
2007	310	22	75	57	223	39	18	0
2008	329	6	21	38	773	21	47	1

Source: GISIS

Figure 8: Ships hijacked and missing (2000-2008)

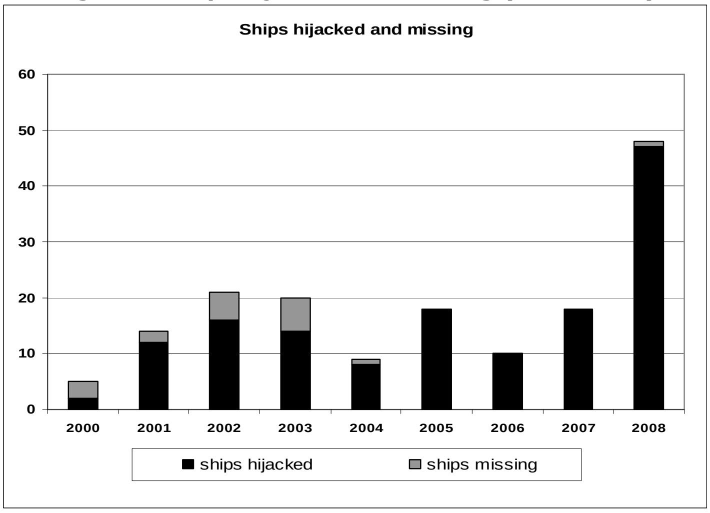
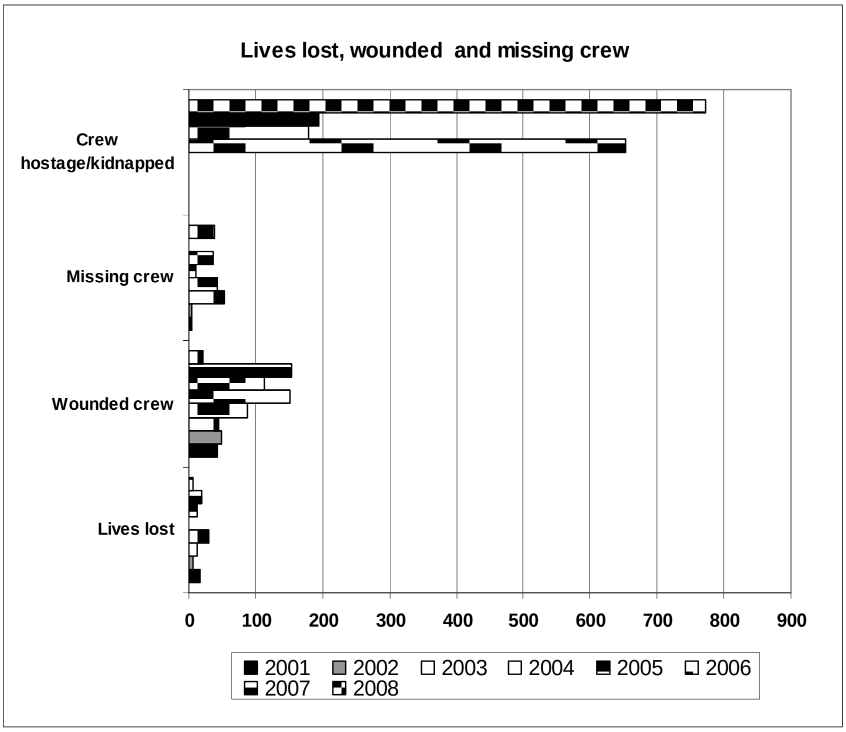


Figure 9: Lives lost, wounded and missing crew (2000-1008)



Source: International Maritime Organization: GISIS database

5.3. Stowaways

The International Ship and Port Facility Security Code (ISPS Code) provides ships with procedures to prevent stowaways from boarding ships. According to the Standard Club, nearly 50% of stowaways come from West Africa. Stowaways are likely to be found in containerships and geared multipurpose ships. A significant number are also found on bulk carriers, car carriers, general cargo and ro-ro ships. The IMO annual report on stowaway incidents reported to the Organization recorded 252 stowaway cases in 2007, involving 889 stowaways. This compared with 244 stowaway cases reported in 2006, involving 657 stowaways.

6. Shipping and the environment

"I do not wish to see the maritime community stand accused of failing in its duty towards the protection and preservation of this beautiful planet, which, it seems to me, we have neglected for too long." Efthimios E. Mitropoulos, IMO Secretary-General in his speech on World Maritime Day, 2007

IMO, as the specialized agency of the United Nations with the responsibility for creating the industry's regulatory framework governing such matters, has been both a focal point and a driving force to regulate oil pollution, the use of harmful anti-fouling paint on ships' hulls, preparedness, response and co-operation in tackling pollution from oil and from hazardous and noxious substances; It also regulates the right of States to intervene on the high seas to prevent, mitigate or eliminate danger to their coastlines from pollution following a maritime casualty. IMO has also put in place a series of measures designed to ensure that the victims of pollution incidents can be financially compensated.

The issue of ship recycling has also become a growing concern, not only from the environmental point of view but also with regard to the occupational health and safety of workers in that industry. In May 2007, IMO adopted a new Convention on the removal of Wrecks that may present either a hazard to navigation or a threat to the marine and coastal environments, or both.

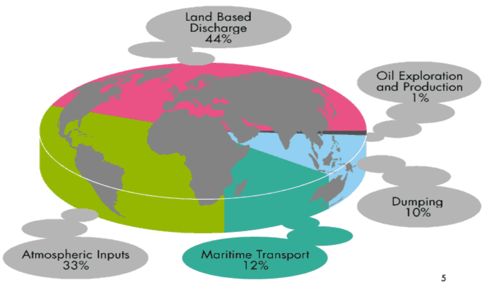
Many reductions have been achieved by addressing the technical, operational and human-element issues and are all the more noteworthy when compared with the significant growth in the world's shipping industry – both the size of the world fleet and the distances that it travels. It has also been pressing hard to ensure that shore-based facilities keep up with international regulatory requirements, so that ships are not left in the position of being unable to operate in full compliance due to a lack of shore facilities.

6.1. Pollution from land-based activities

Estimates by GESAMP (the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection) suggest that land-based discharges – such as sewage, industrial effluent and urban/river run off, together with atmospheric inputs from land industry sources – accounted, in 1990, for some 77 per cent of marine pollution generated from human activities, while maritime transport was estimated to be responsible for some 12 per cent of the total.

When drawing on a more recent estimate, in 2002, by UNEP's Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities, some 80 per cent of the pollution in the world's oceans originates from land-based activities, with the maritime sector representing just 10 per cent of human sources of marine pollution – a two per cent decrease from the aforementioned 1990 figure, which is not as negligible as it might appear when considered against the increase in shipping operations during the intervening years.

Figure 10: Overview of Total Sea-Pollution



Source: Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP)

6.2. Pollution from sea-based activities

The 2007 GESAMP study "Estimates of Oil* Entering the Marine Environment from Sea-based Activities" provides the following estimated average inputs of oil entering the marine environment, in metric tonnes per year, from ships and other sea-based activities; these are based on the most recent 10 year period of data available (1988-97): "oil" as defined in MARPOL 73/78, annex I, i.e. oil means petroleum, in any form including crude oil, fuel oil, sludge oil refuse and refined products (other than petrochemicals).

Table 13: Distribution of pollution from seabed activities

	Tonnes/year
Ships	457,000
Offshore exploration and production	20,000
Ships plus offshore	477,000
Coastal facilities	115,000
Ships plus offshore plus coastal facilities	592,000
Small craft activity	53,000
Natural seeps	600,000
Unknown (unidentified sources)	200
Grand total	**1,245,2000**

Operational discharges from ships make up 45% of input of 457,000 tonnes/year (ships), followed by shipping accidents at 36 % of the input. Fuel oil sludge from vessels is the major routine operational input (186,000 tonnes/year), or 68% of ship operational inputs.

Oil tankers, which are often identified as being major routine polluters, account for 10.3% of ship inputs as tank washings and oil in ballast waters, an operational input. However, tanker and barge accidents are a major input (158,000 tonnes/year). Ship accidents are a major input still, even with the decline of large spills from tankers in recent years

(Source: GESAMP-(IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP Joint Group of experts on the Scientific Aspects of Marine Environmental Protection) 2007. Estimates of Oil Entering the Marine Environment from Sea-based Activities. London, International Maritime Organization, 2007 Reports and Studies GESAMP No 75, 96pp) ISBN 978-92-801-4236-5

(N.B from GESAMP: Few countries and organizations have reliable databases, thus this report relies heavily on data available in the North Sea region and for North America)

6.3. Ship-generated water pollution

Measures introduced by IMO have helped ensure that the majority of oil tankers are safely built and operated and are constructed to reduce the amount of oil spilled in the event of an accident. Operational pollution, e.g. from routine tank cleaning operations, has also been cut.

The most important regulations for preventing pollution by oil from ships are contained in Annex I of the **International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (**MARPOL 73/78), The International Convention for the Safety of Life at Sea (SOLAS), 1974 also includes special requirements for tankers.

Industry figures show that in 2006 goods loaded at ports worldwide are estimated to have reached 7.4 billion tons. Crude oil accounted for 26.9 per cent of total goods loaded, while petroleum products represented 9.2 per cent. *(Source: UNCTAD Review of Maritime Transport, 2007, p 4)*

According to shipping market analyst, Fearnleys, world seaborne trade rose from around 13,856 billion tonne-miles to an estimated 30,686 billion tonne-miles between 1986 and 2006, an increase of around 121 per cent. The figure is expected to grow to almost 33,000 billion tonne-miles, by 2008. Oil and petroleum products accounted for a significant part of this increase, rising by a similar percentage. In sharp contrast, estimates of the quantity of oil spilled during the same period show a steady reduction by some 85 per cent. Figures reveal that, despite the rare major accident, which can cause a spike in the annual statistics, the overall trend demonstrates a continuing improvement, both in the number of oil spills and quantity of oil spilled each year.

6.3.1. Quantity of oil spilt

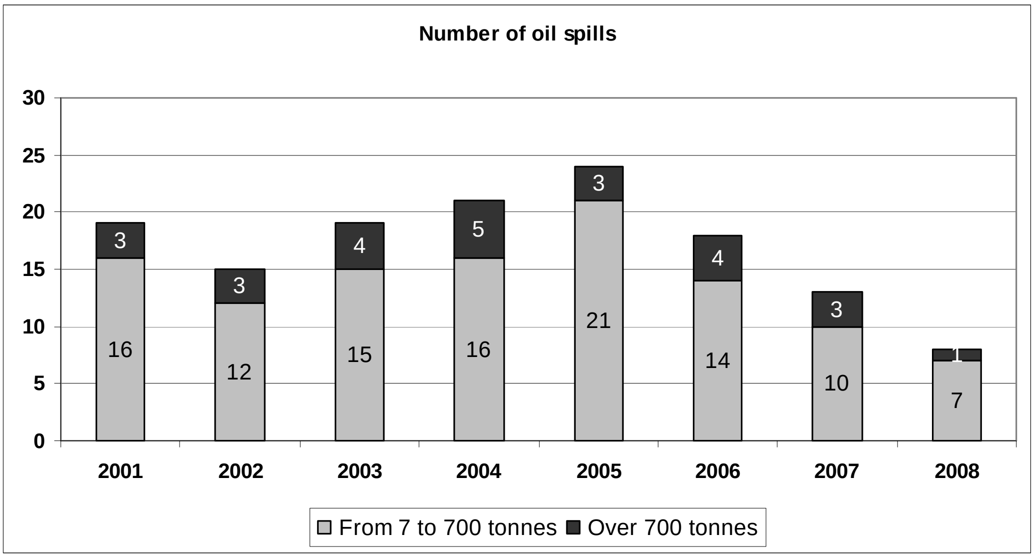
In the current decade, the average number of oil spills over 700 tonnes has shrunk from over 25 in the 1970s to just 3.7. It is interesting to note, in this context, that the biggest single "decade-to-decade" reduction was from the 1970s to the 1980s, coinciding with the adoption and entry into force of the MARPOL Convention, which is rightly credited with having had a substantial positive impact in decreasing the amount of oil that enters the sea from maritime transportation activities. One major oil company has estimated that the tankers it owns, or uses under long-term lease, spill **less than one teaspoon of oil for every million gallons transported**; while tanker owners take pride in statistics that show that **99.9996 per cent of all oil transported by sea is delivered safely and without impact on the marine environment**.

Table 14: Annual Quantity of Oil Spilt per decades

Annual Quantity of Oil Spilt	
1970's	**3,142,000 tonnes**
1980s	**1,176,000 tonnes**
1990s	**1,138,000 tonnes**

Source: ITOPF Annual Statistics

Figure 11: Number of oil spills (2001-2008)



Source: ITOPF Annual Statistics

It may be noted that the ITOPF figures above do not include operational discharges, whereas those of GESAMP and the National Research Council (NRC) do, providing a broader picture. Even so, the addition of operational discharges (based on estimates) raises the ratio of oil discharged into sea, when compared to the total quantity to an estimated 0.018%, the estimated ratio remains minimal.

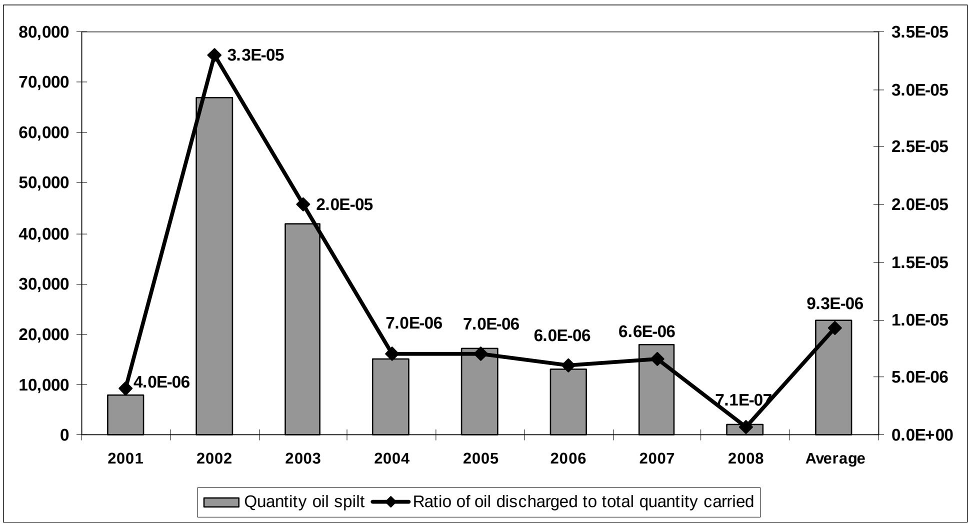
Table 15: Ratio of oil discharges into the sea to total carried by sea (2003-2008)

	2003	2004	2005	2006	2007	2008
Annual quantity of oil spilt (tonnes)	42,000	15,000	17,000	13,000	18,000	2,000
Annual quantity of oil carried by sea (million tonnes)	2,345	2,470	2,556	2,644	2,719	2,798
Ratio	2.0E-05	7.0E-06	7.0E-06	6.0E-06	6.6E-06	7.1E-07

Source: ITOPF Annual Statistics[10] and Clarkson's Shipping Intelligence Network

10 Note: the higher incidence of oil spilt in 2002 may be ascribed to one casualty, namely, the oil tanker **Prestige**, which sank off Spain spilling 63,000 tonnes.

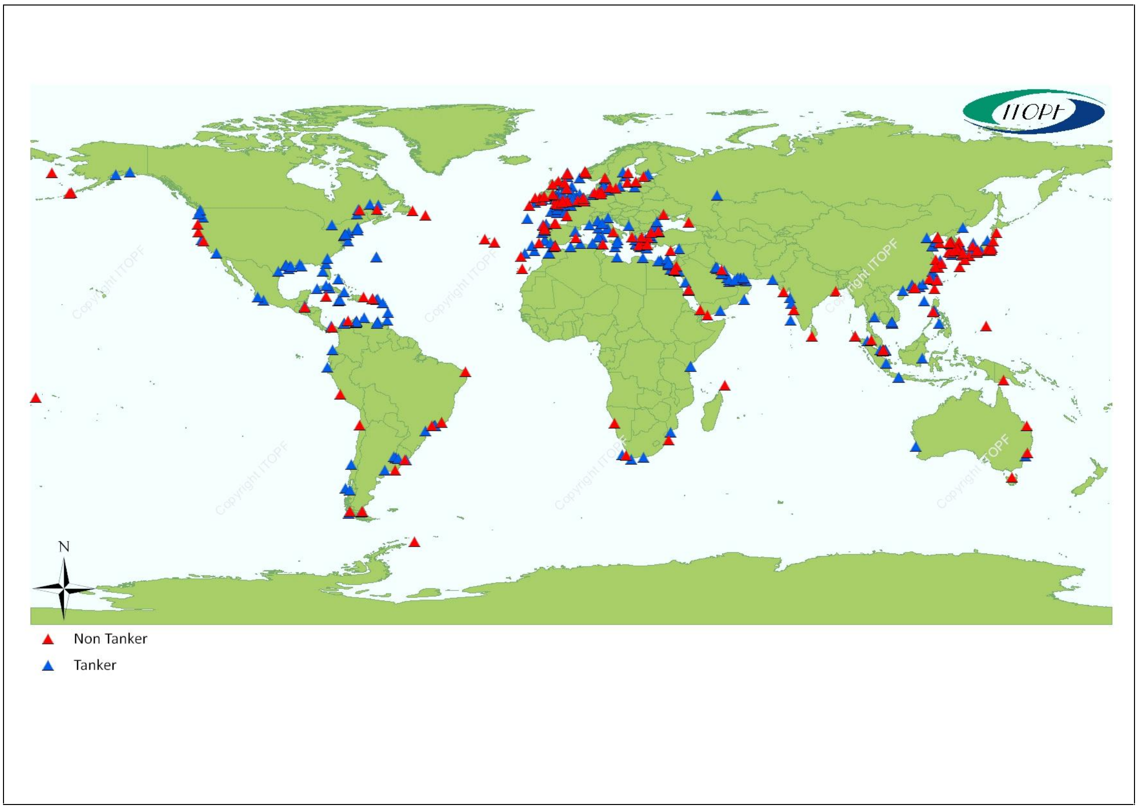
Figure 12: Comparison of Quantity Spilled with Quantity of oil carried (2001-2008)



Source: ITOPF Annual Statistics and Clarkson's Shipping Intelligence Network, Average is from 2001 to 2008

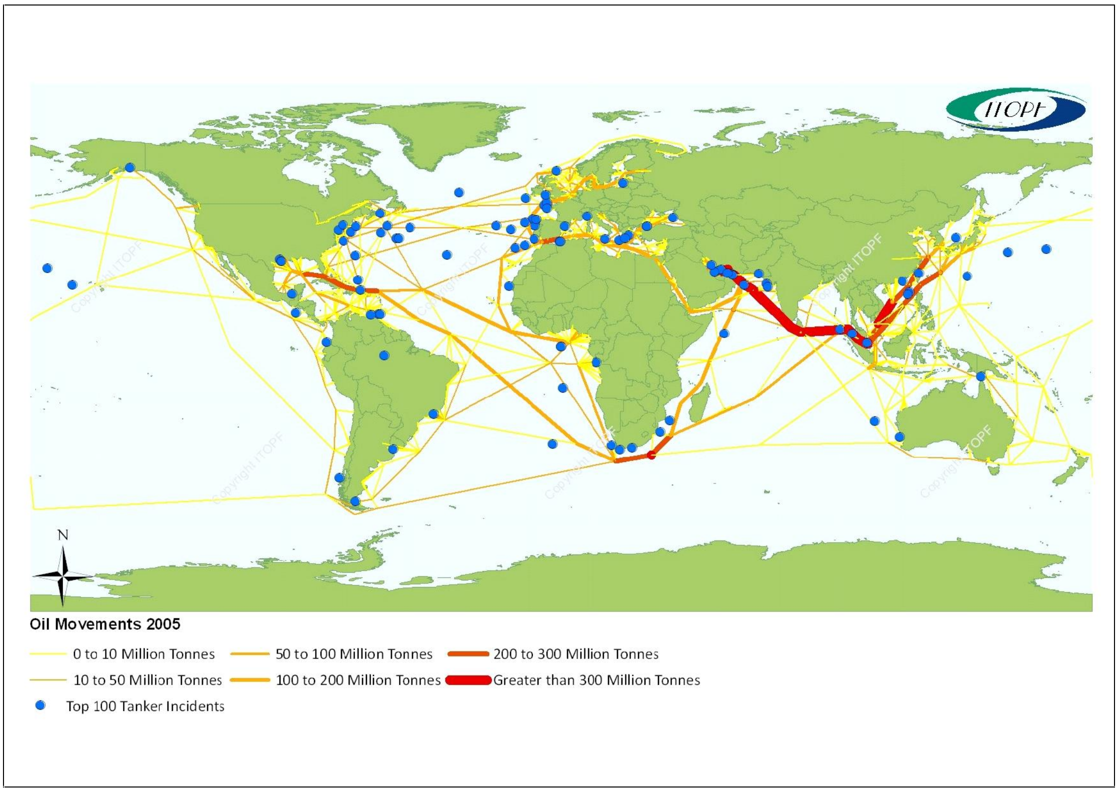
To provide better visualization, a few examples of graphs are given below based on a system developed by ITOPF which distinguishes between vessel movements and substances spilled and plots them in the areas where they were spilled. The first graph shows spills by vessel type and area. The second one combines vessel movements with the top 100 tanker accidents and the third graph divides spills into the types of substances spilled such as bunkers; cargo fuel oil; cargo crude oil; HNS cargo; non-persistent cargo; no spill; and unknown.

Figure 13: Overview of spills per ship type



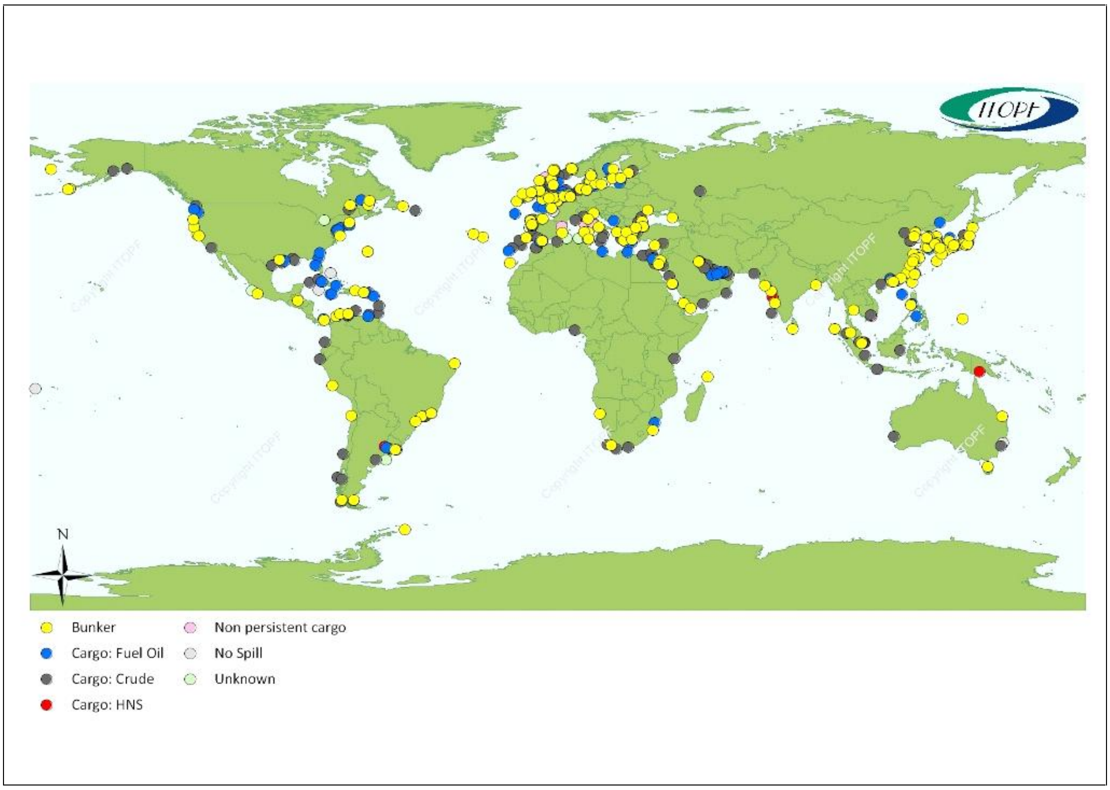
Source: Courtesy of ITOPF based on oil spill data from 1970 to 2007

Figure 14: Overview of spills per vessel movement and major incidents



Source: Courtesy of ITOPF based on oil spill data from 1970 to 2007

Figure 15: Overview of spills by substance spilled



Source: Courtesy of ITOPF based on oil spill data from 1970 to 2007

6.3.2. Causes of Spills

Most spills from tankers result from routine operations such as loading, discharging and bunkering which normally occur in ports or at oil terminals; the majority of these operational spills are small, with some 91% involving quantities of less than 7 tonnes; accidental causes such as collisions and groundings generally give rise to much larger spills, with at least 84% of incidents involving quantities in excess of 700 tonnes being attributed to such factors.

Table 16: Incidents of spills by cause (1974-2008)

	<7 Tonnes	7-700 Tonnes	>700 Tonnes	Total
OPERATIONS				
Loading / Discharging	2825	334	30	3189
Bunkering	549	26	0	575
Other Operations	1178	56	1	1235
ACCIDENTS				
Collisions	175	303	99	577
Groundings	238	226	119	583
Hull Failures	576	90	43	709
Fire & Explosions	88	16	30	134
Other/Unknown	2188	152	26	2366
TOTAL	7817	1203	348	9368

Source: ITOPF Annual Statistics[11]

6.3.3. Cost of oil spills

The cost of major oil spills varies considerably from one incident to another, depending on a number of factors: the type of oil, location of the spill and the characteristics of the affected area. Also crucial is the quality of the contingency plan and of the management and control of the actual response.

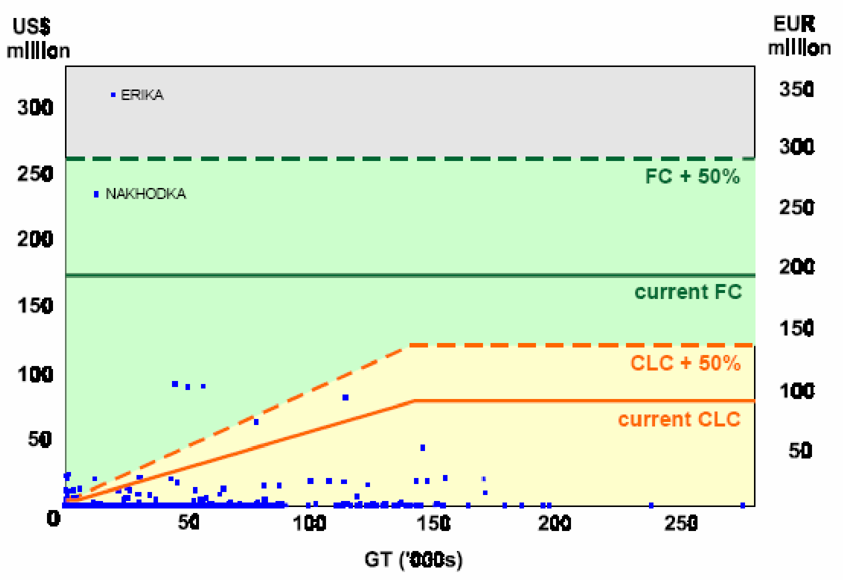
Cost data is published in the Annual Report of the International Oil Pollution Compensation Funds, but this only concerns spills in States that are party to the Fund Conventions. Because the IOPC Fund only becomes involved in paying compensation once the total value of claims has exceeded the tanker owner's limit of liability under the Civil Liability Conventions, the IOPC data set tends to concern only the larger and more expensive spills. There is also a restricted geographical spread of IOPC Fund cases, with a high proportion of the oil spills occurring in Japan and North West Europe. No spills in US waters are included in this data set, as the United States is not party to the Fund Conventions. American spill cost data is generally in the public domain and published on the internet, but such data is not representative of costs in other countries because of the uniqueness of the US response and damage assessment systems.

It is clear that there is no linear relationship between spill cost and size of tanker. ITOPF indicates that some of the most expensive spills have been caused by relatively small tankers. In these cases the most important factor has been the type of oil spilled. For example, both the **NAKHODKA** and **ERIKA** spilled heavy fuel oil, which is highly persistent and covered a large area of coastline.

The most expensive oil spill in history is the EXXON VALDEZ (Alaska, 1989). Cleanup alone cost in the region of US$2.5 billion and total costs (including fines, penalties and claims settlements) have, at times been estimated at as much as US$7 billion. The court cases continue, however, so the final costs are not yet known. The AMOCO CADIZ (France, 1978) reportedly cost about US $282 million, of which about half was for legal fees and accrued interest. The BRAER (UK, 1993) cost in the region of US$83 million. Cleanup costs in this incident were extremely low since most of the oil dispersed naturally. However, some US$61 million was paid out in fishery-related damages, mostly as a result of a fisheries closure for salmon. The cost of cleaning up after the SEA EMPRESS (UK, 1996) was US$37 million, with total costs for the incident more than US$60 million once all damage settlements were made. For the NAKHODKA (Japan, 1997) compensation was settled at approximately US$219 million. Claims are still being processed for the ERIKA (France, 1999), but are likely to considerably exceed the US$ 180 million which is available under the '92 Civil Liability and Fund Conventions. (Source: ITOPF).

[11] Note: the higher incidence of oil spilt in 2002 may be ascribed to one casualty, namely, the oil tanker ***Prestige***, which sank off Spain spilling 63,000 tonnes.

Figure 16: Distribution of cost of spills



Source: ITOPF website, White, I, Factors affecting the cost of oil spills

6.3.4. Spills Response

When a spill occurs, it is necessary to ensure that effective and co-ordinated response mechanisms are in place and an adequate liability and compensation regime is available to recompense those affected. IMO's International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC1990) provides the framework for facilitating international co-operation and mutual assistance in preparing for and responding to major oil pollution incidents.

OPRC 1990 recognizes that successful preparedness and response relies on good co-operation between government and industry. There are numerous examples of how this co-operation has served to strengthen the collective capacity for oil spill response around the world.

Some eighteen years on, with 97 contracting parties representing 67% of the world's tonnage, OPRC 1990 is widely considered to be a great success. Under the provisions of the HNS Protocol, which entered into force in June 2007, this regulatory framework has been extended to cover releases of hazardous and noxious substances.

6.3.5. Hazardous and noxious substances (HNS) spills

The wrecking of the chemical tanker the *Ievoli Sun* in the Channel in 2000 highlighted the danger involved in chemical tanker accidents. From 14 June 2007, ships flying the flag of a Party to the OPRC-HNS Protocol must carry a pollution emergency plan to deal specifically with incidents involving hazardous and noxious substances, such as chemicals.

This requirement is one of a list of measures included in the **Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS Protocol)**, of 2000, which entered into force on 14 June 2007.

The Protocol defines HNS as substances other than oil, which, if introduced into the marine environment, have the potential to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea.

States which are party to the OPRC-HNS Protocol are required to establish a national system for responding to HNS, including a designated national authority, a national operational contact point and a national contingency plan. This needs to be backstopped by a minimum level of response equipment, communications plans, regular training and exercises.

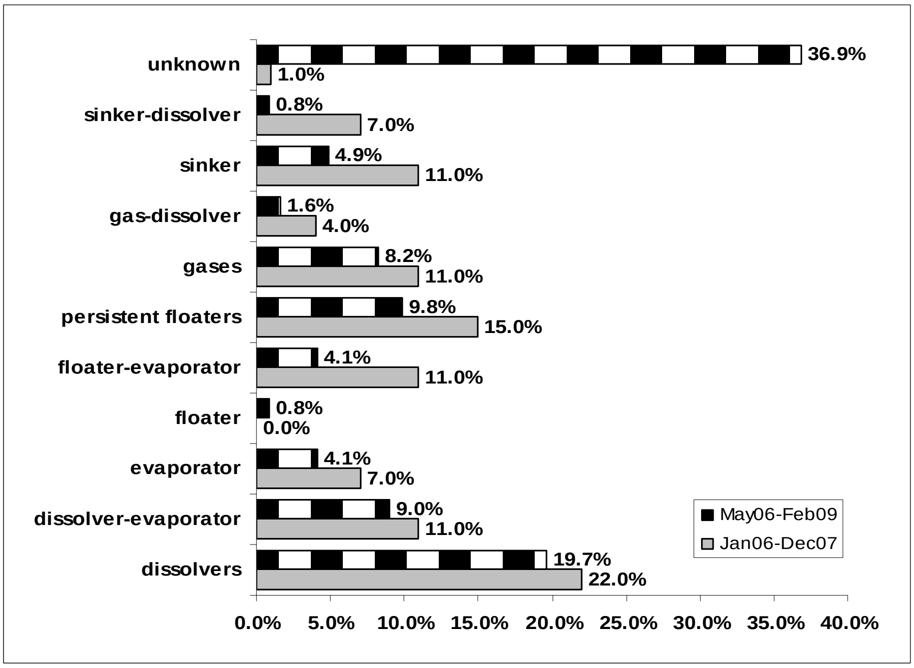
States must also provide assistance, to the extent possible and feasible, to other States in the event of a pollution emergency. There is a provision for the reimbursement of any assistance provided. States should also try to conclude bilateral or multilateral agreements on preparedness for, and response to, pollution incidents involving HNS.

IMO has developed a wide array of tools including model training courses, manuals and guidance documents to assist countries in developing their capacity for dealing with incidents involving HNS and meeting their obligations under the Protocol. States may also request assistance from IMO, through its Integrated Technical Co-operation Programme, in meeting these obligations and in implementing the provisions of the Protocol. Statistical information on releases of HNS goods is scarce. A summary based on MEPC/OPRC-HNS/TG 9/5 is given for the period May 2006 to February 2009 which was added to information of the previous report.

Table 17: Number of HNS products involved in incidents – various time periods

Behavior category		Jan 06-Dec07 % to total	May 06-Feb09 Nr.	May 06-Feb09 % to total
dissolvers	D	22.0%	24	19.7%
dissolver-evaporator	DE	11.0%	11	9.0%
evaporator	E	7.0%	5	4.1%
floater	F	0.0%	1	0.8%
floater-evaporator	FE	11.0%	5	4.1%
persistent floaters	Fp	15.0%	12	9.8%
gases	G	11.0%	10	8.2%
gas-dissolver	GD	4.0%	2	1.6%
sinker	S	11.0%	6	4.9%
sinker-dissolver	SD	7.0%	1	0.8%
unknown		1.0%	45	36.9%
Total		**100.0%**	**122**	**100.0%**

Figure 17: Summary of HNS spills



Source :IMO Document CWGSP 10/2a August 2009

A study by the European Maritime safety Agency (EMSA) of HNS releases in European countries identified one hundred incidents from 1987 to 2006, almost half of which resulted in an HNS release.

The majority were in the Mediterranean Sea (40%), North Sea (22%) and Channel (20%) probably as a reflection of the volume of HNS trade in these areas.

Foundering and weather appear to be the principle cause of incidents resulting in HNS releases(34%), with fire or explosion in cargo areas (18%), collision (14%) and grounding (10%) being the main identified causes.

(Source: EMSA Action Plan for HNS Pollution Preparedness and Response as adopted by EMSA's Administrative Board at its 18th Meeting held in Lisbon on 12th and 13th June 2007)

6.3.6. Liability and compensation

Over the years, the IMO has put in place a comprehensive set of regulations covering liability and compensation for damage caused by oil transported by ship, through which the shipping industry (in conjunction with oil importers) provides automatic cover of up to US$1 billion for any single incident, regardless of fault.

This tiered system of compensation includes the International Convention on Civil Liability for Oil Pollution Damage (CLC) and the International Oil Pollution Compensation (IOPC) Funds, including the 2003 Supplementary Fund, which collectively provide more coverage than ever before to those affected by oil spills.

Two additional Conventions, the International Convention on Civil Liability for Bunker Oil Pollution Damage and the HNS Convention, once in force, will together serve to complete this framework by respectively establishing liability and compensation regimes for damage caused by spills of oil when carried as fuel in ships' bunkers and from spills involving hazardous and noxious substances.

6.4. Ship generated air pollution

The shipping industry is also a relatively small contributor to the total volume of atmospheric emissions compared to road vehicles and public utilities such as power stations while atmospheric pollution from ships has reduced in the last decade. There have been significant improvements in engine efficiency. Improved hull design and the use of ships with larger cargo carrying capacities have led to a reduction in emissions and an increase in fuel efficiency.

An example of this is one of the world's largest car and truck carriers (LCTC) with an 8,000-car-equivalent-unit (ceu) capacity, the Aniara built at Daewoo Shipbuilding & Marine Engineering in the Republic of Korea for Wallenius Wilhelmsen Logistics (WWL), is being flagged up as the most environmentally friendly vessel of its type. It includes a ballast-water treatment system, biodegradable oil in all hydraulic systems, tin-free anti-foulant bottom paints, as well as CFC and HCFC-free cooling agents in refrigeration plants.

Overall emissions are said to have been reduced more than 20% per transported unit compared with older designs, partly by increasing cargo capacity by using a single-pillar internal design. It is claimed that carbon-dioxide (CO_2) emissions have been cut by 15% per transported unit, as well as reductions in sulphur oxide (SOx) and particulate matters. Nitrogen-oxide (NOx) emissions are said to be 35% below current international regulations. The main engine can use bunkers with sulphur content as low as 1%.
The Aniara has been awarded a Green Passport by Lloyd's Register providing details of all potentially hazardous materials and substances on board. Wallenius Wilhelmsen Logistics (WWL) announced some time ago its Orcelle-vessel concept, a so-called "Dream Ship" for 2025 using wind, sun and wave energy.

Annex VI of the ***MARPOL Convention*** which entered into force in 2005 sets limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone depleting substances. In October 2008, the Marine Environment Protection Committee adopted amendments and the revised Annex VI will enter into force on 1 July 2010. The main changes will see a progressive reduction in sulphur oxide (SOx) emissions from ships, with the global sulphur cap reduced initially to 3.50% (from the current 4.50%), effective from 1 January 2012; then progressively to 0.50 %, effective from 1 January 2020, subject to a feasibility review to be completed no later than 2018.

The limits applicable in Sulphur Emission Control Areas (SECAs) will be reduced to 1.00%, beginning on 1 July 2010 (from the current 1.50 %); being further reduced to 0.10 %, effective from 1 January 2015.

Progressive reductions in nitrogen oxide (NOx) emissions from marine engines were also agreed, with the most stringent controls on so-called "Tier III" engines, i.e. those installed on ships constructed on or after 1 January 2016, operating in Emission Control Areas.

The revised Annex VI will allow for an Emission Control Area to be designated for SOx and particulate matter, or NOx, or all three types of emissions from ships, subject to a proposal from a Party or Parties to the Annex, which would be considered for adoption by the Organization, if supported by a demonstrated need to prevent, reduce and control one or all three of those emissions from ships.

The MEPC also adopted amendments to the associated NOx Technical Code, to give a revised NOx Technical Code 2008. The amended Code includes a new chapter based on the agreed approach for NOx regulation of existing (pre-2000) engines established in MARPOL Annex VI, and provisions for direct measurement and monitoring methods, a certification procedure for existing engines, and test cycles to be applied to Tier II and Tier III engines.

Revised Guidelines for Exhaust Gas Cleaning Systems and Guidelines for the development of a VOC management plan were also adopted.

The revised measures are expected to have a significant beneficial impact on the atmospheric environment and on human health particularly that of people living in port cities and coastal communities.

6.4.1. Overview of Greenhouse Gas Emissions from Ships

In June 2000, the IMO "Study on Greenhouse Gas Emissions from Ships"12 presented a comprehensive assessment of the contribution made by international shipping to climate change. It established that ships contributed 1.8 per cent of the world's total carbon dioxide (CO2) emissions (for 1996) and cautioned that if none of a list of measures identified as offering considerable potential for reducing CO2 emissions from ships were applied, the projected annual growth in fleet size could lead to an increase in fuel consumption of some 72 per cent between the years 2000 and 2020 – with a consequential increase in CO2 emissions.

A Second IMO GHG Study was published in 2009; this is the most comprehensive and authoritative assessment of the level of greenhouse gas emitted by ships, as well as the potential for reduction. It also evaluates the different policy options for control of GHG emissions from ships currently under consideration within IMO and other organizations. It will be submitted to appropriate bodies of the UNFCCC and may be found at: http://www.imo.org/home.asp?topic_id=1823

The Marine Environment Protection Committee (MEPC) noted that the Second IMO GHG Study 2009 came to the following main conclusions, as outlined in its executive summary:

- International shipping was estimated to have emitted 870 million tonnes, or about 2.7% of the global emissions of CO2 in 2007.
- Exhaust gases were the primary source of emissions from ships. Carbon dioxide was the most important GHG emitted by ships. Both in terms of quantity and of global warming potential, other GHG emissions from ships were less important.
- Mid-range emissions scenarios showed that, by the year 2050, in the absence of regulations, ship emissions could grow by 200% to 300% (compared to the emissions in 2007) as a result of the expected growth in world trade.
- A significant potential for reduction of GHG emissions through technical and operational measures had been identified. Together, if implemented, these measures could increase efficiency and reduce the emissions rate by 25% to 75% below the current levels. Many of these measures appeared to be cost-effective, although non-financial barriers may discourage their implementation.
- A number of policies to reduce GHG emissions from ships were possible. The report analysed options relevant to the current IMO debate. The report found that market-based measures were cost-effective policy instruments with a high environmental effectiveness. Such instruments captured the largest amount of emissions under the scope, allowed both technical and operational measures in the shipping sector to be used, and could offset emissions in other sectors. A mandatory limit on the Energy Efficiency Design Index for new ships was a cost-effective solution that could provide an incentive to improve the design efficiency of new ships. However, its environmental effect was limited because it only applied to new ships and because it only incentivized design improvements and not improvements in operations.
- Shipping had been shown, in general, to be an energy-efficient means of transportation as compared to other modes.
- The emissions of CO2 from shipping would lead to positive "radiative forcing" (a metric of climate change) and to long-lasting global warming. In the shorter term, the global mean radiative forcing from shipping was negative and implied cooling; however, regional temperature responses and other manifestations of climate change may nevertheless occur. In the longer term, emissions from shipping would result in a warming response as the long-lasting effect of CO2 would overwhelm any shorter-term cooling effects.

If the climate was to be stabilized at no more than 2°C warming over pre-industrial levels by 2100 and emissions from shipping continue as projected in the scenarios that were given in the report, then they

[12] Norwegian Marine Technology Research Institute - Study of Greenhouse Gas Emissions from ships: Final report to the International Maritime Organization. Issue No 2-31 March 2000 / Submitted by the IMO Secretariat. Norway : Norwegian Marine Technology Research Institute, 2000- (IMO DOC. MEPC 45/8)
http://unfccc.int/files/methods_and_science/emissions_from_intl_transport/application/pdf/imoghgmain.pdf

would constitute between 12% and 18% of the global total CO2 emissions in 2050 that would be required to achieve stabilization (by 2100) with a 50% probability of success.

6.4.2. Technical and operational reduction measures

MEPC 59 finalized a package of technical and operational measures to reduce GHG emissions from international shipping, aimed at improving the energy efficiency for new ships through improved design and propulsion technologies and for all ships, new and existing, primarily through improved operational practices.

The measures are intended to be used for trial purposes on a voluntary basis until MEPC 60 in March 2010, when they will be refined, as necessary, with a view to facilitating decisions on their scope of application and enactment, taking into account the outcome of the Copenhagen Conference. The measures include:

> .1 interim guidelines on the method of calculation and voluntary verification of the Energy Efficiency Design Index (EEDI) for new ships, which is intended to stimulate innovation and technical development of all elements influencing the energy efficiency of a ship from its design phase. The index would cover 87% of emissions from new ships – the reduction level is not yet agreed upon and will be considered in detail by MEPC 60, but a relative reduction of 15 to 30% is possible depending on ship type and size; and
>
> .2 guidance on the development of a Ship Energy Efficiency Management Plan (SEEMP) for new and existing ships, which incorporates best practices for fuel-efficient ship operation, as well as guidelines for voluntary use of the Energy Efficiency Operational Indicator for new and existing ships. The indicator enables operators to measure the fuel efficiency of a ship in operation and to gauge the effect of any changes in operation, e.g. improved voyage planning or more frequent propeller cleaning, or introduction of technical measures such as waste heat recovery systems or a new propeller. The Study indicates that a 20% reduction on a tonne-mile basis by mainly operational measures is possible and would be cost-effective even with the current fuel prices. The SEEMP will assist the shipping industry in achieving this potential.

The IMO Secretariat will undertake further work and assess in more detail the reduction potential of the technical and operational measures finalized by MEPC 59, both in relative (tonne-mile) and total terms. This information will assist the Committee at its next session in March 2010 when making a final decision on the reduction levels, and it will also be provided to COP 15 for information.

6.4.3. Market-based mechanisms

The Committee recognized that the technical and operational measures would not be sufficient to satisfactorily reduce the amount of GHG emissions from international shipping in view of the growth projections of human population and world trade. Therefore, market-based mechanisms have been considered in line with the GHG work plan. A market-based mechanism would serve two main purposes: off-setting of growing ship emissions and providing a fiscal incentive for the maritime industry to invest in more fuel efficient ships and technologies and to operate ships in a more energy efficient manner.

The Committee agreed by overwhelming majority that a market-based instrument was needed as part of a comprehensive package of measures for regulation of GHG emissions from international shipping. The Committee further agreed that any regulatory GHG regime applied to international shipping should be developed and enacted by IMO as the sole competent international organization with a global mandate to regulate all aspects of international shipping. As shipping is a global industry and ships are competing in a single global market, it must be regulated at the global level to be environmentally effective and to maintain a level playing field for all ships, irrespective of flag or ownership.

An in-depth discussion on market-based measures was held and the Committee agreed on a work plan culminating in 2011 for its further consideration of the topic. It was agreed to fully take into account discussions and submissions to date, as well as relevant outcomes of the United Nations Climate Change Conference (COP 15) in December 2009.

The Committee noted that there was a general preference for the greater part of any funds generated by a market-based instrument under the auspices of IMO, to be used for climate change purposes in developing countries through existing or new funding mechanisms under the UNFCCC or other international organizations.

To facilitate further progress at MEPC 60, the IMO Secretariat will undertake further work and assess the possible effects of a market-based instrument (MBI). The work will assess in detail the potential reduction levels, directly and through off-setting, resulting from a market-based instrument for shipping and the potential generation of funds that would be used for climate change purposes in developing countries as well further exploring possible distribution of revenues raised from a shipping MBI. This information will also be submitted to COP 15 and form a useful basis for future decisions in both the COP 15 meeting and the MEPC.

6.5. Ship recycling

When ships reach the end of their working lives, recycling is undoubtedly the most environmentally friendly way to dispose of them. Many of the components and much of the steel is re-used in the countries where the ships are dismantled, in new ships and in other products. However, there are concerns about environmental and working conditions in ship recycling yards and in view of this, IMO took action to develop a realistic and effective solution to some of these concerns.

The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships was adopted in May 2009 with input from IMO Member States and relevant non-governmental organizations, and in co-operation with the International Labour Organization and the Parties to the Basel Convention. It is aimed at ensuring that ships, when being recycled after reaching the end of their operational lives, do not pose any unnecessary risk to human health and safety or to the environment.

The new Convention addresses all the issues around ship recycling, including the fact that ships sold for scrapping may contain environmentally hazardous substances such as asbestos, heavy metals, hydrocarbons, ozone-depleting substances and others. It addresses concerns raised about the working and environmental conditions at many of the world's ship recycling locations.

Regulations in the new Convention cover: the design, construction, operation and preparation of ships so as to facilitate safe and environmentally sound recycling, without compromising the safety and operational efficiency of ships; the operation of ship recycling facilities in a safe and environmentally sound manner; and the establishment of an appropriate enforcement mechanism for ship recycling, incorporating certification and reporting requirements.

Ships to be sent for recycling are required to carry an inventory of hazardous materials, which are specific to each ship. An appendix to the Convention provides a list of hazardous materials the installation or use of which is prohibited or restricted in shipyards, ship repair yards, and ships of Parties to the Convention. Ships are required to have an initial survey to verify the inventory of hazardous materials, additional surveys during the life of the ship, and a final survey prior to recycling.

Ship recycling yards are required to provide a "Ship Recycling Plan", to specify the manner in which each ship will be recycled, depending on its particulars and its inventory. Parties are required to take effective measures to ensure that ship recycling facilities under their jurisdiction comply with the Convention.

A series of guidelines are being developed to assist in the Convention's implementation.

Entry into force criteria

The Convention shall be open for signature by any State at the Headquarters of the Organization from 1 September 2009 to 31 August 2010 and shall thereafter remain open for accession by any State. It will enter into force 24 months after the date on which 15 States, representing 40 per cent of world merchant shipping by gross tonnage, have either signed it without reservation as to ratification, acceptance or approval or have deposited instruments of ratification, acceptance, approval or accession with the Secretary General.

Furthermore, the combined maximum annual ship recycling volume of those States must, during the preceding 10 years, constitute not less than 3 per cent of their combined merchant shipping tonnage.

6.6. Ballast water management

Shipping transfers approximately 3 to 5 billion tonnes of ballast water internationally each year. A similar volume may also be transferred domestically within countries and regions each year.

All ships need to carry ballast water to keep them stable in the water. Taking on ballast water and discharging it must be carefully controlled to ensure the safety of the vessel and the seafarers on board. But there is another challenge – the taking up of ballast water from one part of the world and discharging it elsewhere can introduce invasive aquatic species, such as zebra mussels, into an environment where they can overrun natural local species. It is estimated that at least 7,000 different species are being carried in ships' ballast tanks around the world. (Source: IMO Globallast Management Programme)

IMO has developed and adopted the **International Convention for the Control and Management of Ships' Ballast Water and Sediments** which, when in force, will require all ships to carry out ballast water management procedures to a given standard. It is important to ensure that the procedures will not have an adverse effect on the safety of the vessel, and will not solve one environmental problem by creating another. The Marine Environment Protection Committee at its 58th session in October 2008 adopted *Guidelines for ballast water sampling* and *Revised guidelines for approval of ballast water management systems*, intended to assist in the effective implementation of the Convention), bringing to 14 the package of finalized guidelines required by the Convention.

The Committee also approved the Guidance document on arrangements for responding to emergency situations involving ballast water. It gave final approval to two ballast water management systems that make use of active substances, bringing to four the total number of systems having received final approval to date.

To date, 16 States have ratified the BWM Convention, adopted in February 2004, representing about 14.24% of the world's merchant shipping. In accordance with article 18 of the Convention, the treaty will enter into force twelve months after the date on which not less than thirty States, the combined merchant fleets of which constitute not less than thirty-five percent of the gross tonnage of the world's merchant shipping, have become Parties to it.

6.6. Garbage and Marine litter

In the past few decades, the enforcement of when and where to dispose of all types of wastes produced on a ship's voyage has become better regulated through MARPOL Annex V (Garbage). The requirements are much stricter in a number of "Special Areas" (see below) but perhaps the most important feature of the Annex is the complete ban imposed on the dumping into the sea of all forms of plastic. However, although the Annex obliges Governments to ensure adequate provision of facilities at all ports and terminals for the reception of garbage, more work needs to be done to ensure availability in every port. IMO has also embarked on a process to review Annex V and the associated guidelines for its implementation, bringing in new technological developments made by the shipping industry.

Marine litter poses a vast and growing threat to the marine and coastal environment. It is estimated that about 6.4 million tons of marine litter are disposed in the oceans and seas each year. According to other estimates and calculations, some 8 million items of marine litter are dumped in oceans and seas every day, approximately 5 million of which (solid waste) are thrown overboard or lost from ships. Furthermore, it has been estimated that over 13,000 pieces of plastic litter are floating on every square kilometre of ocean today. *(Source: UNEP 2005: Marine Litter, an analytical overview, p.4.)*

6.7. Control of harmful anti-fouling systems

Ships' hulls need to be kept smooth from marine growth to ensure maximum performance and full efficiency. In the past, many of the coatings that were used were themselves harmful to the marine environment and more benign coatings needed to be developed to replace them.

IMO's International Convention on the Control of Harmful Anti-fouling Systems on Ships, when in force, in September 2008, will prohibit the use of harmful organotins in anti-fouling paints used on ships and will establish a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems.

In the meantime, most paint manufacturers and most shipbuilders and ship repair yards already ban the damaging tributyltin (TBT) paints and many responsible ship owners have already been abiding by the Convention's requirements since 2003.

6.8. Geographical areas needing special attention (PSSAs)

While always advocating a global approach, the IMO nevertheless recognizes that some areas need additional protection. To this end, the MARPOL Convention defines certain sea areas as "Special Areas"in which the adoption of enhanced special mandatory measures for the prevention of pollution is required.

Outside the MARPOL regulations, the IMO Assembly has adopted Guidelines for the designation of Particularly Sensitive Sea Areas (PSSAs), which are deemed to require a higher degree of protection because of their particular significance for ecological, socio-economic or scientific reasons, and because they may be vulnerable to damage by international maritime activities. To date, eleven PSSAs have been declared by IMO.

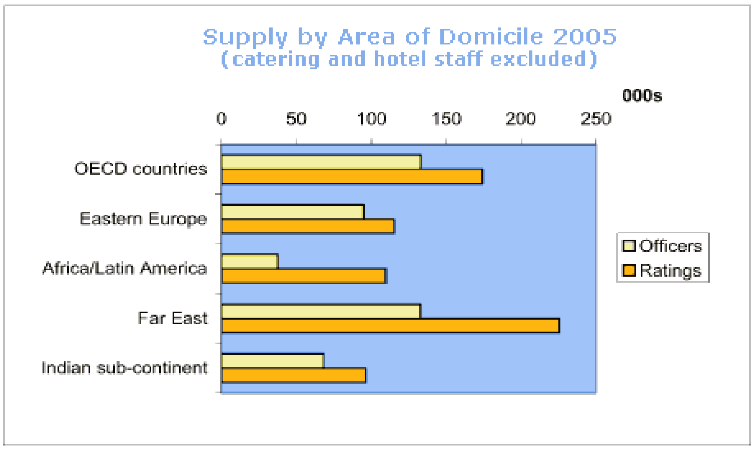
7. Seafarers today

It is important to celebrate not only the vital contribution that ships and shipping make to the prosperity and well-being of us all but also the men and women who take on the onerous task of operating them.

The worldwide population of seafarers serving on internationally trading merchant ships today was estimated in the BIMCO/ISF Manpower update 2005 to be in the order of 466,000 officers and 721,000 ratings. Worldwide demand was estimated at 476,000 officers and 586,000 ratings[13*]. The study assessed the officer shortage in 2005 at 10,000.
However, in a report on Manning 2008[14], Drewry Shipping Consultants indicates that the officer shortage may be as high as 34,000, a figure that could reach 83,900 officers by 2012. In the period 2008 to 2012, an extra 97,032 officers will be required: 26,160 for the dry-bulk fleet, 15,793 for containerships, 9,735 for chemical tankers, 8,088 for oil tankers; 2,284 for gas carriers; 34,972 for other ship types.

The report identifies a current officer supply requirement of 498,800 in 2008. This represents a 23.8% increase in officer availability since 1990 and – a 7% increase from 2005. Broken down by main supply regions, the report assesses 2008 sourcing as: Western Europe 16%; Eastern Europe 20%, Far Eastern bloc 36% and rest of world 28%. The top five leading officer supply countries in 2008 are: People's Republic of China 51,800, Philippines 50,400, Ukraine 35,400, Turkey 32,400 and India 31,200.

Table 18: Supply of seafarers by country of domicile



Source: BIMCO/ISF estimates.

Source: BIMCO/ISF 2005 Manpower Update

Given the enormous responsibility those in command have both for the lives of those they carry on passenger ships, and those who serve with them and for the environment, not to mention the commercial success of the enterprise in which they are engaged, it requires a very special kind of person to take up the challenge of a seafaring career – especially these days when ships, because of their capacity to carry passengers in their thousands and cargoes in hundreds of thousands of tons, have the potential to cause enormous loss of life or environmental catastrophes of unimaginable dimensions.

The sea can be an unforgiving environment and, over the centuries, its rigours have encouraged seafarers to build a tradition of selfless endeavour and of high regard for others, particularly those who find themselves in difficulty or distress. It is a tradition that persists today – indeed, IMO has established the IMO Bravery Award to recognize those who, at the risk of losing their own life, commit acts of extreme bravery to rescue persons in distress at sea or to prevent catastrophic pollution of the

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[13] BIMCO/ISF Manpower 2005 update- The worldwide demand for and supply of seafarers. Main report. BIMCO/ISF/Warwick Institute for Employment Research, December 2005. executive summary at http://mackinnonmaritime.info/downloads/BIMCO%202005%20Executive%20Summary.pdf

[14] Drewry Shipping Consultants Limited. Manning 2008. Annual report. Produced in conjunction with Precious Associates Limited. May 2008

environment thus exhibiting virtues of self sacrifice in line with the highest traditions at sea and the humanitarian aspect of shipping.

The International Labour Organization's Maritime Labour Convention, 2006 provides comprehensive rights and protection at work for the world's more than 1.2 million seafarers. The new labour standard (1996) consolidates and updates more than 65 international labour standards related to seafarers adopted over the last 80 years. The Convention sets out seafarers' rights to decent conditions of work on a wide range of subjects, and aims to be globally applicable, easily understandable, readily updatable and uniformly enforced. It has been designed to become a global instrument known as the "fourth pillar" of the international regulatory regime for quality shipping, complementing the key Conventions of IMO.

IMO has established 2 joint working groups with ILO on seafarer issues namely the IMO/ILO WG on fair treatment of seafarers and the IMO/ILO WG Liability, compensation for death, abandonment

7.1. IMO Go to Sea! Campaign

In November 2008, senior figures from the International Labour Organization, from the "Round Table" of shipping NGOs – BIMCO, ICS/ISF, INTERCARGO and INTERTANKO – and from the International Transport Workers Federation joined IMO Secretary-General Efthimios Mitropoulos in launching a major new campaign to address the problem.

8. The work of IMO

Shipping is perhaps the most international of all the world's great industries. The ownership and management chain surrounding any particular vessel can embrace many different countries; it is not unusual to find that the owners, operators, shippers, charterers, insurers and the classification society, not to mention the officers and crew, are all of different nationalities and that none of these is from the country whose flag flies at the ship's stern.

There is, therefore, an over-arching logic in favour of a framework of international standards to regulate shipping – standards which can be adopted, accepted, implemented and enforced by all. Without internationally recognized and accepted standards, you might have the ludicrous situation that a ship leaves country A bound with cargo for country B, fully compliant with country A's requirements for ship design, construction, equipment, manning and operation, only to find that country B has its own, different requirements. Clearly there has to be a common approach, so that ships can ply their trade around the world and that countries receiving foreign ships can be confident that, in accepting them, they do not place their safety, security and environmental integrity at an unreasonable risk.

The first attempts at such a common approach date back to well beyond the formation of IMO. But it was not until the establishment of the Organization after World War II that there was a recognized, international body to address such concerns. Since its formation, IMO's main task has been to develop and maintain a comprehensive regulatory framework for international shipping. Its mandate was originally limited to safety-related issues, but subsequently its remit has expanded to embrace environmental considerations, legal matters, technical co-operation, issues that affect the overall efficiency of shipping – such as how to deal with stowaways or how a cargo manifest should be transmitted to the authorities ashore; piracy and armed robbery against ships and, most recently, maritime security.

The direct output of IMO's regulatory work is a comprehensive body of international conventions, supported by literally hundreds of guidelines and recommendations that, between them, govern just about every facet of the shipping industry.

It is impossible to generalize with complete accuracy but, broadly speaking, IMO measures fall into three categories:

- Measures aimed primarily at the prevention of accidents, casualties and environmental damage from ships in the first place. This group comprises conventions setting standards for ship design, construction, equipment, operation and manning.
- Measures which recognize that accidents do happen, despite the best efforts of all concerned and which, therefore, try to mitigate their negative effects. Rules concerning distress and safety communications, the provision of search and rescue facilities and oil spill clean-up and response mechanisms, all fall into this category
- Measures concerned with the aftermath of accidents and, in particular, with establishing a mechanism for ensuring that those who suffer the consequences of an accident – and this

refers, in particular, although not exclusively, to pollution victims – can be adequately compensated.

Although IMO does not have a massive field presence, the Organization as a whole does recognize that not all of its Members have an equal ability to implement the measures they agree to at IMO. Some lack resources, some lack expertise, some both. To this end, IMO has established an extensive technical co-operation programme, in which it tries to identify particular needs among the resource-shy Member countries and match them to offers of help and assistance from those that are better off. Typically, this might involve arranging training, workshops and seminars on particular subjects at national, sub-regional or regional level. IMO has also founded three high-level educational establishments in Sweden, Malta and Italy, specializing in maritime subjects, which are designed principally to offer advanced level education to students from less developed countries.

The list of shipping-related topics that fall under the aegis of IMO is huge. But there are, of course, some things that the Organization is not. It is not, for example, a police force; it does not have the mandate or the capacity to put teams of inspectors aboard ships and check their compliance with international standards. It is not "operational" in the sense that it does not follow incidents and accidents at sea, such as groundings, collisions, explosions etc. on a 24-hour basis, and it is not a court; there is an International Tribunal for the Law of the Sea, in Hamburg, but this is established under the **United Nations Convention on the Law of the Sea (UNCLOS)** which is not an IMO Convention. IMO does not get involved with issues such as territorial waters, EEZs or fishing rights. Again, these are regulated by UNCLOS and fall within the remit of other international organizations.

To a considerable extent, this success story of shipping in terms of its improving safety and environmental record can be attributed to the comprehensive framework of rules, regulations and standards developed over many years by IMO, through international collaboration among its Members and with full industry participation. It is thanks in no small measure to the Organization's outcomes that all those millions of trouble-free tonne-miles referred to earlier are possible. Just about every technical aspect of shipping is covered by an IMO measure, from the drawing board to scrap yard. Every single piece of this all-embracing regulatory structure makes a contribution towards the overall sustainability of shipping and is a testimony to the highly responsible attitude that pervades the activity of shipping and the industry of shipping at all levels.

8.1. IMO Conventions

IMO's conventions are regularly amended and revised while new instruments/protocols are adopted. For dates of entry into force of amendments/instruments already adopted - see Status of Conventions - Summary

8.1.1. Maritime safety

- International Convention for the Safety of Life at Sea (SOLAS), 1974
- International Convention on Load Lines (LL), 1966
- Special Trade Passenger Ships Agreement (STP), 1971
- Protocol on Space Requirements for Special Trade Passenger Ships, 1973
- Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972
- International Convention for Safe Containers (CSC), 1972
- Convention on the International Maritime Satellite Organization (INMARSAT), 1976
- The Torremolinos International Convention for the Safety of Fishing Vessels (SFV), 1977
- International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978
- International Convention on Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel (STCW-F), 1995
- International Convention on Maritime Search and Rescue (SAR), 1979

8.1.2. Marine pollution

- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)
- International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION), 1969
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (LDC), 1972
- International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), 1990
- Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, 2000 (HNS Protocol)
- International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS), 2001

- International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004
- The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009

8.1.3. Liability and compensation

- International Convention on Civil Liability for Oil Pollution Damage (CLC), 1969
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (FUND), 1971
- Convention relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (NUCLEAR), 1971
- Athens Convention relating to the Carriage of Passengers and their Luggage by Sea (PAL), 1974
- Convention on Limitation of Liability for Maritime Claims (LLMC), 1976
- International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS), 1996
- International Convention on Civil Liability for Bunker Oil Pollution Damage, 2001

8.1.4. Other subjects

- Convention on Facilitation of International Maritime Traffic (FAL), 1965
- International Convention on Tonnage Measurement of Ships (TONNAGE), 1969
- Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (SUA), 1988 and 2005 Protocol
- Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf, 1988 and 2005 Protocol
- International Convention on Salvage (SALVAGE), 1989
- International Convention on the Removal of Wrecks, 2007

9. Other Regional and Global Conventions and Agreements

9.1. United Nations Convention on the Law of the Seas (UNCLOS)

United Nations Convention on the Law of the Sea (UNCLOS)
Implications of UNCLOS for IMO

9.2. Other Maritime Transport Conventions

There are many other Conventions regulating maritime transport, the main ones being the:

- United Convention on a Code of Conduct for Liner Conferences, 1974
- United Convention on the Carriage of Goods by Sea, 1978 (Hamburg Rules)
- International Convention on Maritime Liens and Mortgages, 1993
- United Nations Convention on International Multimodal Transport of Goods, 1980
- United Nations Convention on Conditions for Registration of Ships, 1986
- International Convention on Arrest of Ships, 1999

10. Information Sources on Shipping Facts and Figures

These references constitute additional information which may be useful for researchers. It does not constitute a bibliography or a recommended list.

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STOPFORD, Martin. Maritime economics- 3rd edition. London/New York, Routledge, 2009
UNCTAD- Review of Maritime Transport published annually since 1968. It reports on the worldwide evolution of shipping, fleet, ports and multimodal transport related to the major traffics of liquid bulk, dry bulk and containers.
Sea Vision UK Over 190 organizations from across the wider maritime sector, at sea and ashore, have joined together in Sea Vision UK.
The Maritime Industry Foundation
ShippingFacts - published by the Round Table of International Shipping Association (BIMCO/INTERCARGO/INTERNATIONAL CHAMBER OF SHIPPING (ICS)/INTERNATIONAL SHIPPING FEDERATION (ISF), INTERTANKO and in their 6 page brochure 2005 entitled International Shipping - Carrier of World Trade.
UN Atlas of the Oceans Transport and Telecommunications section

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This document is downloadable from the IMO website in the Information Resources Section