Chapter 6
Ship Recycling

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Abstract This chapter addresses the recycling of ships, otherwise known as dismantling, ship breaking, scrapping, and demolition. The size and age profile of the world fleet, the conditions that lead to ending the operating life of a ship, and the countries where the recycling of ships is concentrated are first examined. This is followed by an analysis of the economic drivers of ship recycling, which have resulted in the industry being dominated by five countries and also analyzes steelmaking as the main driving force for ship recycling. We then discuss the sale and purchase market for end-of-life ships, explain the roles of brokers and cash buyers, and provide a simplified inventory of the components that are recycled out of a ship. We outline the efforts to implement existing international legislation to ship recycling, and the development of the Hong Kong Convention, and provide a critical analysis of the development of regional legislation by the European Union. We finally discuss the combination of voluntary and legislative mechanisms that will secure the global implementation of minimum standards for safe and environmentally sound ship recycling.

Abbreviations

AFS	International Convention on the Control of Harmful Anti-fouling Systems on Ships
COP	Conference of the Parties
CSR	Corporate social responsibility
DASR	Document of Authorization to conduct Ship Recycling
EAF	Electric Arc Furnace
EC	European Commission
EU SRR	European Union Ship Recycling Regulation

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EU	European Union
GT	Gross tons
HBCDD	Brominated flame retardant
HKC	Hong Kong International Convention for the safe and environmentally sound recycling of ships, 2009
ICIHM	International Certificate on Inventory of Hazardous Materials
IGO	Inter-governmental Organization
IHM	Inventory of Hazardous Materials
ILO	International Labour Organization, or International Labour Office
IMO	International Maritime Organization
IRRC	International Ready for Recycling Certificate
LDT	Light displacement tonnage
MARPOL	The International Convention for the Prevention of Pollution from Ships
MEP	Member of European Parliament
MEPC	Marine Environment Protection Committee
MoA	Memorandum of Agreement
NGO	Non-governmental organization
OBC	Oxygen blown converter
OECD	Organisation for Economic Co-operation and Development
PFOS	Perfluorooctane sulfonic acid and its derivatives
SOC	Statement of Compliance
SOLAS	International Convention for the Safety of Life at Sea
SRFP	Ship Recycling Facility Plan
SRP	Ship Recycling Plan

1 Introduction

1.1 The World Fleet and Ship Recycling

At the end of December of 2017, the world fleet of ships in service of 100 gross tons (GT) and above comprised of 115,761 ships totaling 1,291,046,701 GT (IHS Maritime & Trade, World Fleet Statistics 2017, Table 20). The majority of ships in the world fleet are small vessels, mostly trading in domestic waters. In fact, 73% of the ships in the world fleet (84,708 ships) were less than 5000 GT. If on the other hand, we focus on the fleet above the size limit used in relevant international regulations, namely, 500 GT, at the end of 2017 there were 62,503 ships of 1,277,729,875 GT. Looking at the aging of the world fleet over 500 GT, we see that 21,817 ships of 135,325,025 GT were over 20 years old. In other words, 34.9% of the ships, but only 10.6% of the tonnage of the fleet over 500 GT was over 20 years old, reflecting a skewed size-age distribution, with smaller ships having a much larger average age than the large, ocean going ships. An additional

examination of the 2017 data shows that 55.0% of ships between 500 GT and 5000 GT were 20 years old or older, whereas only 7.9% of ships larger than 20,000 GT were of that age.

In general, while small ships used in domestic or regional trading tend to have longer lives, larger ships tend to be sent for recycling at around 25 years of age (or a few years later when demand for ships is high, or earlier, in periods of low demand). Ships retain significant economic value at the end of their life, as their steel, nonferrous metals, and machinery and equipment are sold for recycling, reconditioning, and reuse. This value can often represent 10% or more of the newbuilding value, such a figure varying with the price trends in the newbuilding market and separately in the recycling market. In general ships reach their end of life when their secondhand sale value for further trading drops below their recycling value. This may happen due to a ship's deteriorating condition with increasing age that may necessitate uneconomic repairs, due to the demand for ships being lower than the available supply, due to specific regulatory requirements (as is the case with the forthcoming requirements for the retrofit of expensive ballast water treatment systems or the "phaseout" requirements for single-hulled tankers in the early 2000s), or very occasionally due to the introduction of innovative technology (transition from steam to diesel) or abrupt changes in trading patterns (as was the case with the recent widening of the Panama Canal which devalued Panamax-sized ships).

It may just be relevant to make the point here that, for as long as end-of-life ships have economic value, there is no alternative to recycling them. If on the other hand the liabilities of end-of-life ships were to grow and become larger than residual value, we would then most probably witness abandonment of ships or deliberate scuttling on a large scale.

1.2 Countries that Recycle Ships

Figure 6.1 depicts the annual tonnage (GT) of recycled ships analyzed by country of recycling, while Fig. 6.2 expresses the same data in terms of the countries' market share. The two figures, together with Table 6.1, underline five important facts of the ship recycling industry.

Firstly, the ship recycling business is seen to be particularly cyclic, providing the recycler with no guarantees of future employment and no guarantees of a smooth depreciation of investment. This is caused by the cyclic nature of the shipping industry's supply and demand imbalance and, importantly, by the fluctuations in the price of steel internationally. The second key fact of the industry is that, for the last 20 years, ship recycling yards in the five leading ship recycling countries (Bangladesh, China, India, Pakistan, and Turkey) have been recycling 97–98% of all the tonnage that is recycled in the world. Table 6.1, detailing the worldwide ship recycling activities in 2017, illustrates this point.

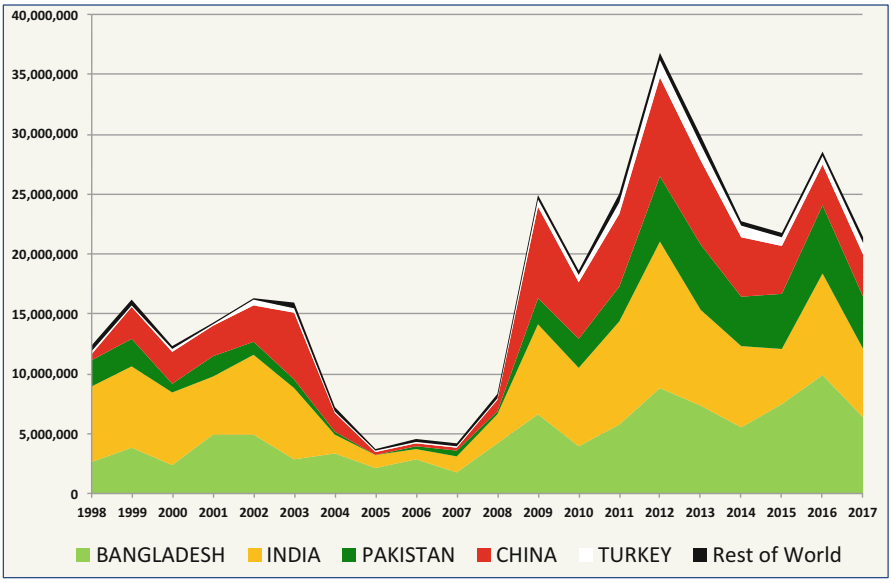
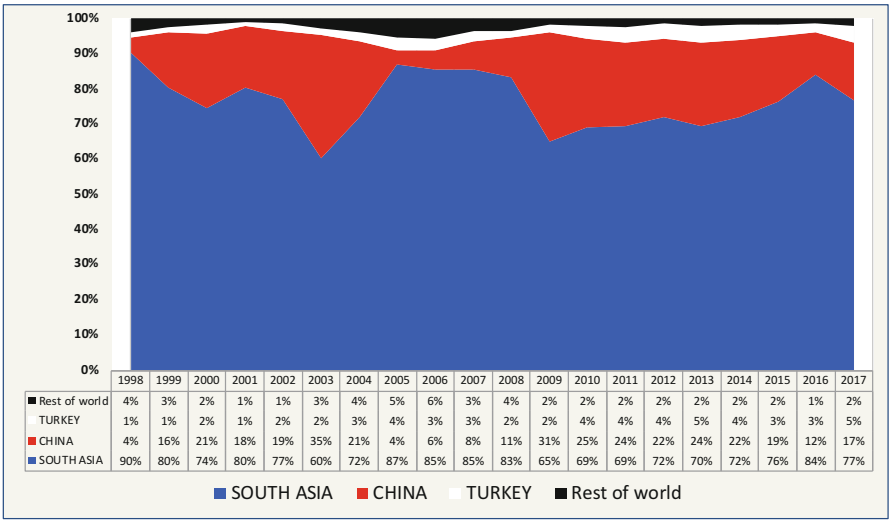


Fig. 6.1 Annual tonnage (GT) of recycled ships analyzed by country of recycling. (Adapted from IHS Global Ltd, World Casualty Statistics 2017, Table 7C; also, back issues of the same publication from 1998 to 2016)



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rest of world	4%	3%	2%	1%	1%	3%	4%	5%	6%	3%	4%	2%	2%	2%	2%	2%	2%	2%	1%	2%
TURKEY	1%	1%	2%	1%	2%	2%	3%	4%	3%	3%	2%	2%	4%	4%	4%	5%	4%	3%	3%	5%
CHINA	4%	16%	21%	18%	19%	35%	21%	4%	6%	8%	11%	31%	25%	24%	22%	24%	22%	19%	12%	17%
SOUTH ASIA	90%	80%	74%	80%	77%	60%	72%	87%	85%	85%	83%	65%	69%	69%	72%	70%	72%	76%	84%	77%

Fig. 6.2 Market share of ship recycling (expressed in % of GT). (Adapted from IHS Global Ltd, World Casualty Statistics 2017, Table 7C; also, back issues of the same publication from 1998 to 2016)

Table 6.1 Worldwide ship recycling activity in 2017

	Recycling country	No.	GT	Average GT	Average age	% of world tonnage	Cumulative % of tonnage	Cumulative % of ships
1	Bangladesh	197	6,361,485	32,292	26	29.7%	29.7%	19.3%
2	India	232	5,755,526	24,808	28	26.9%	56.6%	42.1%
3	Pakistan	119	4,302,798	36,158	26	20.1%	76.6°%	53.7%
4	China, People's Republic Of	167	3,573,932	21,401	25	16.7%	93.3°%	70.1%
5	Turkey	134	971,278	7,248	37	4.5%	97.9%	83.2%
6	Unknown	47	222,760	4,740	39	1.0%	98.9%	87.8%
7	United States of America	4	58,041	14,510	48	0.3%	99.2%	88.2%
8	Denmark	25	29,870	1,195	42	0.1%	99.3%	90.7%
9	Cuba	4	23,545	5,886	26	0.1%	99.4%	91.1%
10	Indonesia	13	22,436	1,726	30	0.1%	99.5%	92.4%
11	Canada	6	22,024	3,671	58	0.1%	99.6%	92.9%
12	Belgium	11	18,358	1,669	42	0.1%	99.7%	94.0%
13	Netherlands	6	10,711	1,785	42	0.0%	99.8%	94.6%
14	Latvia	3	10,666	3,555	29	0.0%	99.8%	94.9%
15	Japan	16	7,540	471	36	0.0%	99.8%	96.5%
16	Ecuador	3	7,173	2,391	37	0.0%	99.9%	96.8%
17	Spain	4	4,472	1,118	35	0.0%	99.9%	97.2%

(continued)

Table 6.1 (continued)

	Recycling country	No.	GT	Average GT	Average age	% of world tonnage	Cumulative % of tonnage	Cumulative % of ships
18	Korea, South	5	4,233	847	31	0.0%	99.9%	97.6%
19	Philippines	2	3,307	1,654	34	0.0%	99.9%	97.8%
20	Russia	2	3,120	1,560	40	0.0%	99.9%	98.0%
21	Ukraine	1	2,516	2,516	44	0.0%	100.0%	98.1%
22	Nigeria	3	2,040	680	45	0.0%	100.0%	98.4%
23	Norway	5	1,997	399	50	0.0%	100.0%	98.9%
24	United Kingdom	3	1,937	646	38	0.0%	100.0%	99.2%
25	Azerbaijan	2	1,295	648	35	0.0%	100.0%	99.4%
26	Vietnam	4	1,160	290	24	0.0%	100.0%	99.8%
27	Finland	1	710	710	57	0.0%	100.0%	99.9%
28	Croatia	1	130	130	40	0.0%	100.0%	100.0%
	Grand total	**1,020**	**21,425,060**					
Of which	Five leading countries	849	20,965,019	24,694		97.9%		83.2%
	South Asia (B+I+P)	548	16,419,809	29,963		76.6%		53.7%
	European Union	54	76,854	1,423		0.4%		5.3%

Adapted from IHS Global Ltd, World Casualty Statistics (2017), Table 7C

The third notable fact is the fluctuation of the volumes recycled in China, who for relatively long periods has recycled 25–30% of the world's tonnage and then for other periods has almost withdrawn from the market. Furthermore, in the Spring of 2018, China's Ministry of Ecology and Environment announced that from the end of 2018, the import of ships for recycling will be banned, thus at a stroke of a pen diminishing the market of China's ship recycling industry to just domestic tonnage (Lloyd's List 2018). The fourth striking feature of the industry, clearly depicted in both figures, is the dominant position of the three South Asian countries, namely, Bangladesh, India, and Pakistan, who, for the last 20 years, have been recycling more than two thirds of the world's recycled tonnage (their combined market share in 2016 was 84% and in 2017 77%). They achieve this dominance by being able to pay the most competitive prices for buying end-of-life ships. The fifth fact is the very limited relevance the ship recycling industry of the European Union has for the international shipping industry, as is illustrated by the 2017 data of Table 6.1 showing eight EU States having recycled small ships and boats totaling just 0.4% of the total recycled tonnage.

Figures 6.3, 6.4, 6.5, 6.6, and 6.7 depict recycling yards in the leading five recycling countries.

The rest of this chapter is organized as follows: Sect. 2 examines the economic drivers of ship recycling, which have resulted in the industry being dominated by five countries and also analyzes steelmaking as the main driving force for ship recycling. Section 3 discusses the sale and purchase market for end-of-life ships, explains the roles of brokers and cash buyers, and provides a simplified inventory

Fig. 6.3 View of recycling yard in Bangladesh

Fig. 6.4 View of recycling yard in China

Fig. 6.5 View of recycling yard in India

Fig. 6.6 View of recycling yards in Pakistan

Fig. 6.7 View of recycling yards in Turkey

of the components that are recycled out of a ship. Section 4 discusses the efforts to implement existing international legislation to ship recycling and the development of Hong Kong Convention, this being a new but not yet in force international Convention that was developed specifically for ship recycling. Section 5 provides a critical analysis of the development of regional legislation by the European Union and Sect. 6 discusses the combination of voluntary and legislative mechanisms

that will secure the global implementation of minimum standards for safe and environmentally sound ship recycling.

2 The Economic Drivers of Ship Recycling

2.1 The Dominance of South Asia in Ship Recycling

Compared to China and Turkey, the three South Asian countries (India, Pakistan, and Bangladesh) are currently less developed and poorer. As poverty is usually linked to lower safety, social welfare, and environmental standards, it is often claimed that the market dominance of the South Asian recycling countries is owed to their lower labor costs and lower compliance costs. This however is only one part of South Asia's competitive advantage.

The next section examines the sale and purchase process for end-of-life ships and provides an illustrative breakdown of an Indian recycler's income from selling the materials and equipment of a recycled ship. Although the data that is provided would not be applicable to a specialized ship (such as a ship with stainless steel tanks) nor would it apply to China or Turkey, the data nevertheless points to the importance of ferrous scrap to the recycler, representing more than 80% of the ship's value. The same data also points to the additional income ship recyclers in South Asia derive from selling equipment, machinery, furniture, stores, parts, etc., in the impressive secondhand markets that exist in Alang, Chittagong, and Gadani. This does not only provide additional competitiveness to South Asia' recyclers but is also a paradigm of a more environmentally friendly utilization of resources.

South Asia's ship recycling industry has a further advantage, helping it dominate the international ship recycling market. In South Asia there are large numbers of rerolling mills making steel products, such as reinforcing bars for the construction industry, by heating and reshaping semifinished steel products, such as billets or plates from recycled ships. The rerolled steel does not reach its melting point and, compared to making new steel, the process requires lower temperatures. Because the chemical composition of rerolled steel is not controlled, the quality of the products is not considered to be equal to new steel. Nevertheless, for appropriate applications rerolled steel products offer good economic alternatives. Furthermore, as the chemical composition and therefore quality of all structural steel that goes into shipbuilding is certificated by Classification Societies, steel plate from ship recycling competes with billets as the raw material for South Asia's rerolling mills. Consequently, South Asia's recyclers have the advantage of commanding better prices for flat rerollable steel compared to scrap steel destined for melting.

2.2 *Steelmaking as the Driver for Ship Recycling*

There are two main processes in modern steelmaking: (i) melting of steel scrap in electric arc furnaces (EAF), which in 2017 accounted for 28.0% of the world's production of new steel, and (ii) smelting of iron ore in oxygen blown converters (OBC), accounting for 71.5% of the steel production. The EAF is the more environmentally friendly of the two methods as the OBC requires more energy input, it requires the burning of coking coal, and also it produces more wastes. As however the price of iron ore has dropped in the last few years, the economics have somewhat shifted in favor of the OBC, as can be seen from the drop in EAF's world market share in Fig. 6.8 (see curve for "world average").

In 2017 a total of 1690 million tonnes of new steel were made worldwide using 600 million tonnes of steel scrap (note: this is more than the 28.0% share of production by EAF, as some steel scrap is also needed when smelting iron ore).

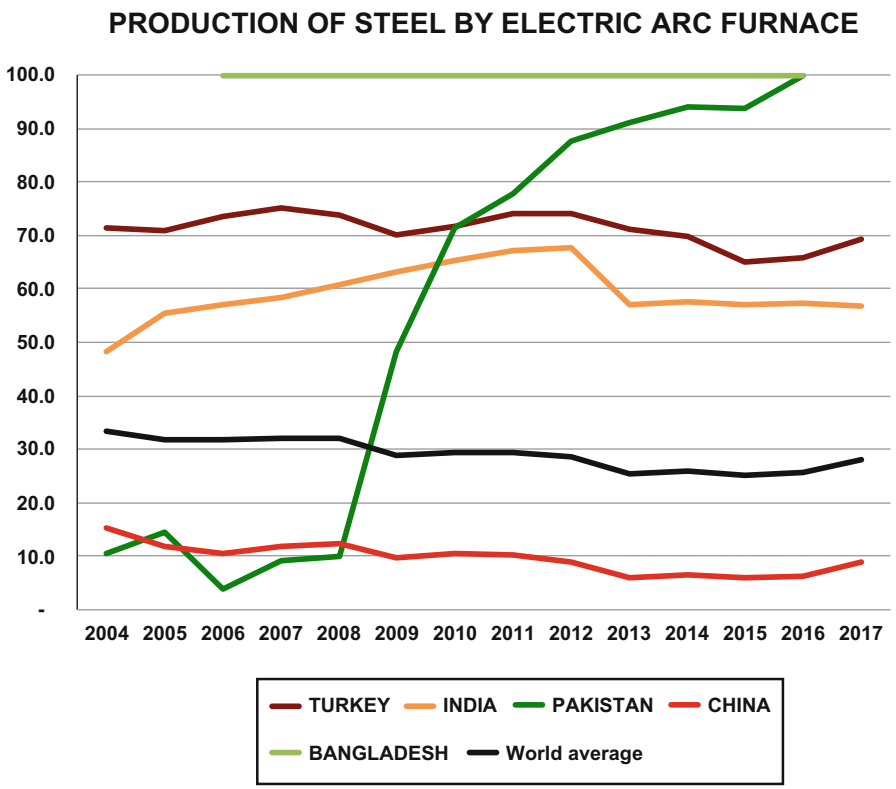


Fig. 6.8 Production of crude steel by EAF in the ship recycling countries. (Sources: For 2004–2016 from: Steel Statistical Yearbook 2017, Table 8; and from earlier issues. Preliminary data for 2017 from: World Steel in Figures 2018, page 10)

Table 6.2 World's leading steel producers together with Pakistan and Bangladesh's production (in million tonnes)

		2010	2011	2012	2013	2014	2015	2016	2017
	World total	1432.8	1538.0	1560.1	1650.4	1669.9	1620.0	1627.0	1690.0
1	**China**	**638.7**	**702.0**	**731.0**	**822.0**	**822.3**	**803.8**	**807.6**	**831.7**
2	Japan	109.6	107.6	107.2	110.6	110.6	105.1	104.8	104.7
3	**India**	**69.0**	**73.5**	**77.3**	**81.3**	**87.3**	**89.0**	**95.5**	**101.4**
4	USA	80.5	86.4	88.7	86.9	88.2	78.8	78.5	81.6
5	Russia	66.9	68.5	70.2	69.0	71.5	70.9	70.4	71.3
6	Korea Rep.	58.9	68.5	69.1	66.1	71.5	69.7	68.6	71.0
7	Germany	43.8	44.3	42.7	42.6	42.9	42.7	42.1	43.3
8	**Turkey**	**29.1**	**34.1**	**35.9**	**34.7**	**34.0**	**31.5**	**33.2**	**37.5**
9	Brazil	32.9	35.2	34.5	34.2	33.9	33.3	31.3	34.4
10	Italy	25.8	28.7	27.3	24.1	23.7	22.0	23.4	24.1
11	Taiwan	19.8	20.2	20.7	22.3	23.1	21.4	21.8	22.4
12	Ukraine	33.4	35.3	33.0	32.8	27.2	23.0	24.2	22.7
…	…								
…	**Pakistan**	**1.4**	**1.6**	**1.6**	**1.8**	**2.4**	**2.9**	**3.6**	**N/A**
	…	…	…	…	…	…	…	…	
..	**Bangladesh**	**0.05**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**N/A**

There are three sources of scrap steel for steelmaking: (1) "own arisings," which arise internally in steel mills as rejects from melting, casting, and rolling; (2) "new steel scrap" which is generated when steel is fabricated into finished products; and (3) "old steel scrap" which is scrap steel from obsolete products (including ships) sold to steel plants for remelting. This category forms around 40–44% of the total steel scrap used in steelmaking (World Steel Recycling in Figures 2012–2016).

Table 6.2[1] shows the total world production of crude steel from 2010 to 2017, in the 12 largest steel-producing countries and also in Pakistan and Bangladesh. Three of the five leading ship recycling countries feature in the top eight positions of the world's leading steel producers.

Table 6.3 shows the world's leading importers of steel scrap together with the quantities imported by Pakistan and Bangladesh from 2010 to 2017. Again, three of the five leading ship recycling countries feature in the top seven positions of the world's leading steel scrap importers.

Table 6.4 shows the world's leading exporters of steel scrap from 2010 to 2017 and also the top two net exporters (i.e., exports minus imports), these being the European Union and the USA.

[1]Source of data for Tables 6.2, 6.3, and 6.4: World Steel Recycling in Figures 2013–2017 and earlier issues; data on Pakistan and Bangladesh from Tables 6.1 and 54 of Steel Statistical Yearbook 2017).

Table 6.3 World's leading ferrous scrap importers together with Pakistan and Bangladesh's imports (in million tonnes)

		2010	2011	2012	2013	2014	2015	2016	2017
1	**Turkey**	**19.20**	**21.45**	**22.42**	**19.73**	**19.07**	**16.25**	**17.72**	**20.98**
2	Korea Rep.	8.09	8.63	10.13	9.26	8.00	5.76	5.85	6.17
3	**India**	**4.64**	**6.18**	**8.18**	**5.64**	**5.70**	**6.71**	**6.38**	**5.36**
4	USA	3.77	4.00	3.71	3.88	4.22	3.51	3.86	4.64
5	Taiwan	5.36	5.33	4.96	4.45	4.27	3.37	3.16	2.92
6	EU-28	3.65	3.71	3.20	3.19	3.14	2.85	2.74	3.14
7	**China**	**5.85**	**6.77**	**4.97**	**4.47**	**2.56**	**2.33**	**2.16**	**2.33**
	...								
	Pakistan	**0.79**	**0.96**	**0.92**	**0.87**	**1.34**	**2.12**	**2.39**	N/A
	...								
	Bangladesh	**0.24**	**0.32**	**0.20**	**0.28**	**0.46**	**0.95**	**2.01**	N/A
	...								

Table 6.4 World's leading ferrous scrap exporters and the two top NET exporters (in million tonnes)

		2010	2011	2012	2013	2014	2015	2016	2017
1	EU-28	19.03	18.81	19.58	16.81	16.95	13.74	17.77	20.05
2	USA	20.56	24.37	21.40	18.50	15.34	12.98	12.82	15.02
3	Japan	6.47	5.44	8.59	8.13	7.34	7.84	8.70	8.22
4	Russia	2.39	4.04	4.35	4.52	5.77	5.65	5.52	5.19
5	Canada	5.15	4.83	4.25	4.52	4.51	3.42	3.63	4.41
6	China	–	–	–	–	–	–	–	2.23
1	EU-28	15.38	15.10	16.38	13.62	13.81	10.89	15.03	16.91
2	USA	16.79	20.37	17.69	14.61	11.13	9.47	8.96	10.38

As pointed in the previous section, for the last 20 years, the ship recycling yards in Bangladesh, China, India, Pakistan, and Turkey have dominated the industry having recycled 97–98% of the worldwide recycled tonnage. Figure 6.9 shows the light displacement tonnage (LDT) recycled in each of the five countries. Published data on LDT are generally not available, so the author has collected annually the data presented here from the ship recyclers' associations of each of the five countries.

The data shown in Tables 6.2, 6.3, and 6.4 and in Fig. 6.8 go some way to help explain the success of the five recycling countries, all of which are importers of scrap steel:

China is by far the largest steelmaking country, currently producing 49% of the world's steel. As seen in Fig. 6.8, China relies heavily in OBC for its steel production, with the EAF's share having dropped from 15.3% in 2004 down to 5.9% in 2015 and then up to 9.0% in 2017, while in the same period its steel production more than tripled from 272 to 831.7 million tonnes. China's imports of steel scrap have been reducing from a record 13.7 million tonnes in

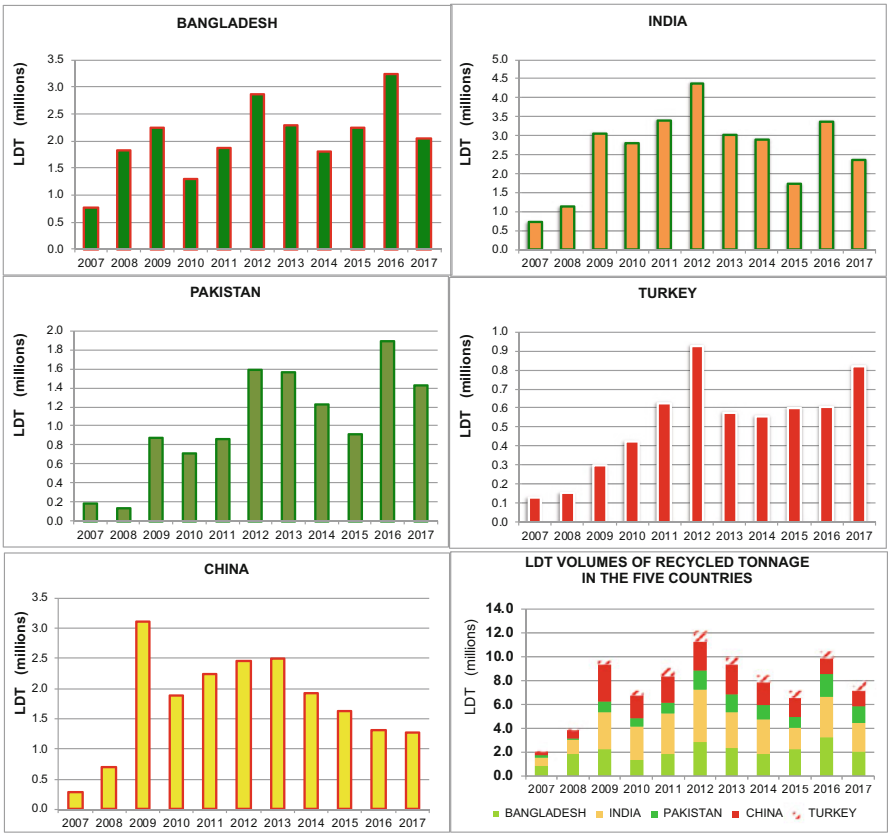


Fig. 6.9 LDT of recycled tonnage in the five-ship recycling countries

2009 (Steel Statistical Yearbook 2017) down to a net import of 0.1 million in 2017 (see Tables 6.3 and 6.4). Figure 6.2 illustrates the fortunes and problems of China's ship recycling industry: In 1998 and in the period 2004–2008, China's ship recycling market share was small, while in 2009 China was the leading ship recycling country with 31% market share. From 2010 the Chinese share declined to the fourth position in the last 2 years. Also, since 2013 Chinese ship recyclers have imported very few ships and have had to rely on a "scrappage" subsidy that the government offered to Chinese-flagged ships from 2013. The subsidy which was very generous (around US$395/LDT) was maintained until 2018. In the next few years, China is expected to increase the EAF's share of its steelmaking in order to combat its severe industrial pollution. This will result in increased imports of scrap steel and could have propelled again China to a leading position in ship recycling. Nevertheless, the recent ministerial announcement that China will ban the import of ships for recycling from the end of 2018 (Lloyd's List

2018) has placed a big question mark on the future of China's well-developed and large-capacity ship recycling industry.

India in the last 3 years has overtaken the steelmaking industry of the USA and is heading to become the world's second largest steelmaker. The majority of its steel is being made with the EAF process making India a major importer of scrap steel. Some of the imported scrap steel comes from its ship recycling industry, which has been the world's largest in terms of LDT in 7 of the last 10 years. As discussed in the next section, 90% of a ship's LDT is steel, which can be subdivided into melting steel (30% of LDT) and rerollable steel (60% of LDT). In India, as also in Bangladesh and Pakistan, ship recyclers separate flat plates, lengths of girders, beams, and angle bars from smaller irregular pieces of metal. The smaller pieces become melting scrap, while the larger items attract higher prices as they can either be used directly in construction, or road building, or can be heated and rerolled into bars and rods in rerolling mills. It therefore follows that a fraction (possibly of the order of 30%) of the annually recycled LDT serves the country's needs for new steelmaking, whereas the majority (around 60%) is rerolled.

Turkey has substantial steelmaking industry, currently being the eighth largest in the world. Its steelmaking relies to a great extent on the EAF process and is thus characterized by high demand for scrap steel. Turkey has been and continues to be the world's largest importer of scrap steel. Its ship recycling industry is the smallest of the major five-ship recycling countries but recycles more tonnage than the rest of the world put together (excepting of course the four major ship recycling countries). There is little rerolling of ship's plates in Turkey, and therefore the main outlet of ship recycling is new steelmaking.

Pakistan produces relatively little steel, although its production has increased in the last few years, mostly through the addition of EAFs. Consequently Pakistan's ship recycling industry has been growing fast, providing scrap steel for rerolling and for melting while enjoying additional economic benefits from secondhand markets for machinery, equipment, spare parts, etc., as do India and Bangladesh.

Bangladesh currently produces very little new steel, all based on EAF. Its ship recycling provides scrap steel for the rerolling market, which is very active due to the urbanization of this very densely populated country. Consequently, Bangladesh's ship recycling industry has been the world's largest in terms of LDT in 2 of the last 10 years, including 2015.

Other countries have not recycled any significant quantities of tonnage in the last 20 years. Of course, it is uneconomic for a small ship or for a damaged ship to sail thousands of miles to reach one of the main ship recycling centers, and for this reason ship recycling facilities also exist in many countries, even some that have no need for ferrous scrap (see Table 6.1). Ship recycling in such cases can be seen as a service for disposing boats and ships, rather than an industry driven by the economy of steelmaking. Although the five main ship recycling countries dominate the industry, it is certainly possible that, in the proximate future, another country might join the major league. Such a country would most probably be a developing

country with low labor costs and will be an importer of scrap steel for its steelmaking industry. Vietnam or the Philippines could be such a new entrant.

On the other hand, environmental activists and some European politicians have been promoting in recent times the development of facilities for the recycling of large ships in Europe, claiming that this will provide best practice ship recycling services to international shipping and, in so doing, create much needed jobs and economic prosperity. The reality however is that Europe is the world's largest net exporter of scrap steel, as seen in Table 6.4. The vast majority of the ferrous scrap exports from the European Union go to Turkey, with some quantities also being exported to Egypt, Pakistan, and India (World Steel Recycling in Figures 2013–2017). It makes no sense whatsoever to recycle large ships in Europe to produce scrap that will have to compete with the large quantities of other European ferrous scrap in order to be sold and transported to countries most of which already recycle ships.

3 Sale and Purchase of End-of-Life Ships

3.1 Selling of Ships for Recycling

Almost all recycling sale and purchase transactions are quoted in US$ per lightship (long) ton. The long ton is an imperial measurement unit equating to 2240 pounds (lb) or 1.016 tonnes. Lightship (or light displacement tonnage or LDT) is defined as the extreme displacement of an unloaded ship, with or without the bunkers and lubricants of the main and auxiliary engines, the hydraulic oil contained in hydraulic systems, and the water needed to fill the ship's boilers up to working level. Lightship excludes crew, passengers, stores, fuel, ballast, potable water, paints, cargo, liquids, and constants in the system and all other items not affixed to the vessel. Lightship is relevant for ship recycling transactions because it provides the basis for estimates of the weight of the ship's steel and approximate quantities of various other commercially valuable materials belonging to the vessel that can be obtained from the ship's recycling.

Often the question arises as to what the lightship content of different ship types and sizes is and what is the relation between lightship, gross tonnage, and deadweight. These quantities are related empirically, and therefore these questions can be answered using tabulated data, such as those shown in Table 6.5, which were obtained by interviewing an experienced ship broker (Mikelis 2007).

To put ship recycling prices in perspective, consider the sale of a middle-sized ocean-going ship, say a Panamax tanker of around 10,000 LDT (GMS Weekly 2006). Figure 6.10 provides historic price data for each of the five main recycling centers (data compiled from GMS Weekly, published during 2006–2018). The graph shows that the three South Asian countries compete with each other very closely on price, whereas the prices offered by China and Turkey tend to be separated further

Table 6.5 Approximate estimates of lightship content of different ship types

Ship type	Cargo carrying capacity (DWT tonnes)	Gross tonnage (GT)	Lightship (LDT)
Tanker VLCC	300,000	159,000	35,000
Tanker Suezmax	150,000	80,000	22,000
Tanker Aframax	80–120,000	45–67,000	15–18,000
Tanker Panamax	70,000	40,000	10–13,000
Tanker Handysize	35,000	22,000	7000
Capesize bulk carrier	150–170,000	78–86,000	20–21,000
Panamax bulk carrier	70,000	40,000	10–12,000
Handysize bulk carrier	35,000	22,000	7000

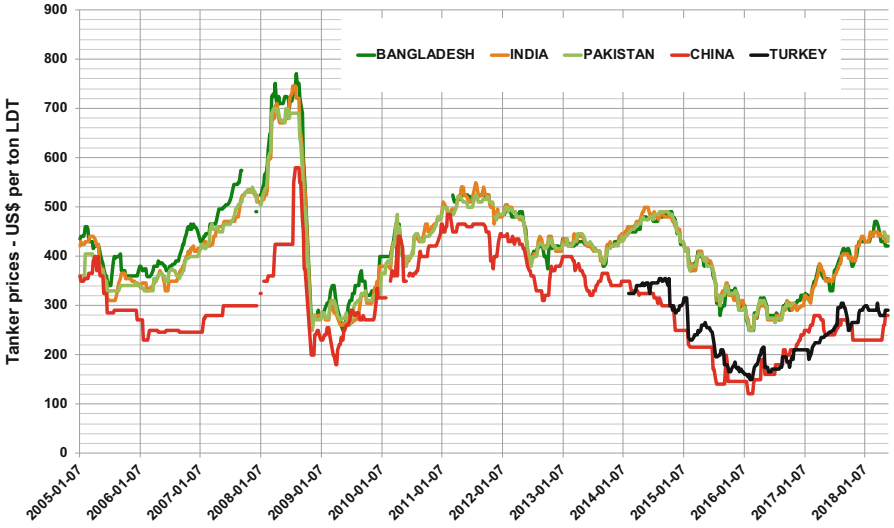


Fig. 6.10 Weekly tanker recycling prices by country of recycling. (Source: GMS Weekly, published during 2006–2018)

away on the pricing spectrum, be it lower or (rarely) higher (as has been the case with China). As an example, in May 2018, a 10,000 LDT Panamax tanker could be sold to South Asian recyclers for around US$4,400,000 but only for US$2,800,000 to Turkey or China.

A shipowner who is contemplating the sale of a ship for recycling will normally contact a ship broker that specializes in ship recycling. The broker would then market the ship to different "cash buyers" (i.e., companies that specialize in trading end-of-life ships). The broker will represent and advise his client (the seller) during the sale negotiations that lead to the drawing of the sale contract, known as the MoA, or Memorandum of Agreement. On completion of the sale, the broker receives a commission for his services from the seller, which usually is an agreed percentage

of the value of the contract (the industry standard being 1%). It is important to underline that at no time does the broker own the ship.

Nearly all merchant ships are sold for recycling via cash buyers, who purchase ships for cash (as opposed to by letter of credit) and then sell them (usually at a profit) to the recycler, who normally pays the cash buyer with a bank letter of credit. Unlike a broker, the cash buyer takes legal ownership of the vessel (albeit for a limited time). Cash buyers are an integral part of the industry because they provide indispensable services to the shipowner, namely, expertise in a specialized and a difficult market, reduction to the shipowner's risk, payment in cash of a sizeable advance on signing of the MoA, and of the balance on delivery (as opposed to payment by letter of credit).

Completion of the sale occurs with the payment of the balance of the purchase price to the shipowner and execution of the Protocol of Delivery and Acceptance (the "PoDA") between the shipowner and the cash buyer. In most cases, delivery takes place at the anchorage of the recycling yard (reflecting a sale on a "delivered basis") or, less frequently, at an agreed port or anchorage in another country (reflecting a sale on an "as-is where-is basis"). In either case, the shipowner has to deregister the ship and obtain a certificate from the flag State authorities showing that the ship has been deleted from their register and that there is no outstanding mortgage. If the ship is sold on a "delivered basis," the cash buyer does not need to reregister the ship or to obtain new statutory certificates from a flag State, as the voyage from the anchorage of the delivery location to the recycling yard at the same location is a brief one within domestic waters. On the other hand, when a ship is delivered to the cash buyer on an "as-is where-is basis," before departing on the international voyage to the recycling location, the cash buyer has to crew the ship, reregister it (with a flag State), obtain valid statutory certificates, and normally insure it for the duration of the international voyage to the place of the final delivery. A number of open registers facilitate such short-term registrations, and for this reason, statistics of ship recycling by country of registration always show a disproportionate number of recycled ships for these flags compared to their fleet of ships in service.

3.2 Purchasing of Ships for Recycling

On a delivered deal, the recycler will normally take delivery of the ship from the cash buyer at the anchorage; however, the cash buyer will have terms in the MoA with the shipowner that require the shipowner's crew to move the ship from the anchorage to the recycling yard. The ship recycler normally pays for the ship with a bank letter of credit. In addition to the purchase price, the recycler will incur financial costs, insurance costs (related to the yard and his recycling labor force), (import) taxes and duties related to the vessel, yard rental costs, investment costs (yard equipment, etc.), costs of consumables and utilities (oxygen, LPG, diesel, electricity), and labor costs. For the purpose of illustration, we can approximate these costs to around 15–

20% of the purchase price of the ship (note: this is a crude simplification, as the purchase price can vary by large amounts, as already seen in Fig. 6.10).

An approximate breakdown of a ship's LDT is as follows: 5% of LDT is assumed to be waste and losses due to corrosion and aging over time. Another 5% of the LDT is made up of equipment, machinery (excluding the main engine), cables, shafting, fittings, spares, lubricants, and nonferrous metals. The remaining 90% is steel, which can be subdivided into melting steel (30% of LDT and which includes the ship's main engine) and rerollable steel (60% of LDT). In South Asia, flat rerollable steel attracts a higher price than scrap steel (by around 10%), as plate can be utilized in rerolling mills for shaping it into long or flat steel products, without having to go through the more costly process of making new steel in a mill.

Data obtained from a recycler in India provides an illustrative analysis of income from the sale of different components of a ship. It should be stressed that the following figures are changeable as the prices of steel and of nonferrous metals are volatile: steel 82%, nonferrous metals and cables 10%, electrical panel and various machineries 1.4%, motors and winches 1.3%, shafting 1.3%, generators 1.2%, spare parts and lubricants 1%, compressors 0.8%, and other items 1%.

The recycler usually obtains from his bank a letter of credit in US dollars for a period of 180 days, although in some cases it can be for a longer period. For an average-sized ship of 10,000 LDT, it might take 100–120 days to complete the recycling work. From around the 40th day from the commencement of work and until completion, the recycler sells the ship's metals, machinery, equipment, and other materials.

The recycler has to contend two key volatilities: (a) domestic steel plate prices and (b) domestic currency exchange rate with the US dollar. The Indian recycler of our example borrows US dollars, then starts earning rupees from around the 40th day, and finally has to buy US dollars with rupees in order to pay back his loan on or before the 180th day. If in that time the price of steel in India has moved up, the recycler will receive extra income, as was the case in the last 2 months and as depicted in Fig. 6.11. Had the recycler based his budget in the beginning of April on a steel price of 29,000 rupees per tonne, 40 days later his income would be noticeably higher. However, as can be seen from Fig. 6.11, the converse situation is equally likely.

The second source of volatility and risk to the recycler is the exchange rate between his currency and the currency of his loan. Figure 6.12 shows the actual fluctuations of rupee against US dollars from December 2017 to end of May 2018. As the recycler cannot predict the movements of the exchange rate, he has to face and factor the risk of incurring higher costs (or the bonus of cheaper US dollars).

Ship recycling is an informal industry wedged between two powerful players, the steel industry and the shipping industry. When demand for shipping is healthy and charterers are paying well for the hire of ships, the volume of tonnage offered for recycling decreases. Ship recyclers may increase their offers to tempt more tonnage to come out of trading, but the prevailing price of steel forms a natural ceiling on how much recyclers can afford to pay. When recyclers cannot attract sufficient

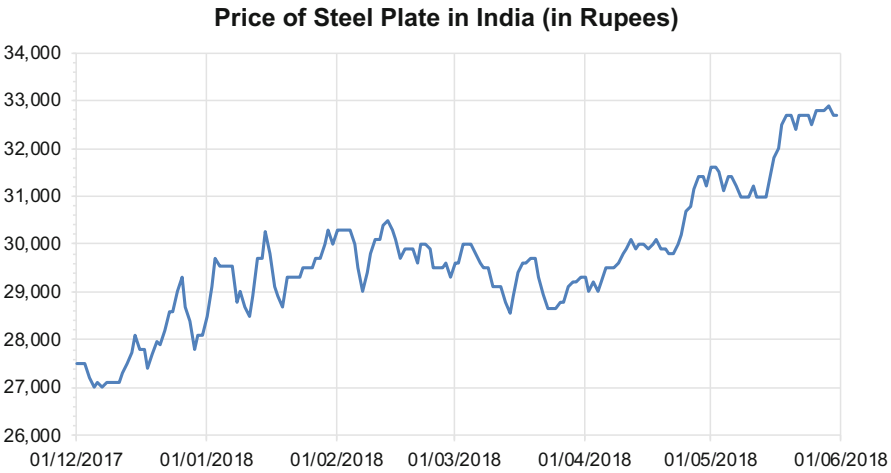


Fig. 6.11 Price of 12 mm steel plate in India. (Data compiled by GMS)

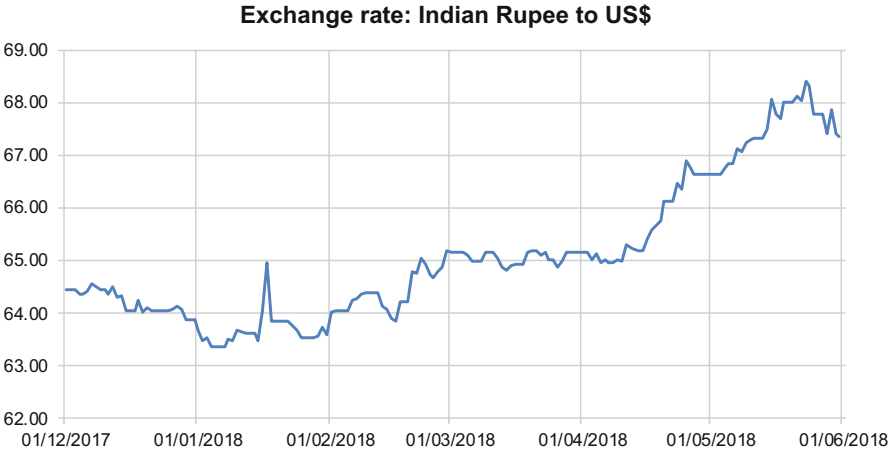


Fig. 6.12 Exchange rate fluctuations – Indian rupee to US$. (Data compiled by GMS)

tonnage at affordable prices, a number of recycling facilities face temporary (or permanent, depending on the severity) closures.

Conversely, when the shipping markets are depressed, more tonnage is offered for recycling and, consequently, recyclers can reduce the prices they pay for ships. If at such times steel prices happen to be high, ship recycling becomes more profitable, attracting more recycling capacity through the reactivation of closed yards.

4 Hong Kong Convention

In the 1990s international attention focused on the poor working conditions in ship recycling yards following reports of recurring accidents with fatalities and also of degradation of the environment through persistent pollution. At that time it was not uncommon for some yards to clean cargo holds and tanks of beached ships by drilling holes on the side shell and then pumping seawater into the cargo spaces. Often, the removal of a ship's propeller led to spilling of the tail shaft hydraulic oil onto the beach. Figure 6.13 depicts a scene from a major ship recycling yard in Bangladesh, as recently as 2008.

During the 1990s environmental activists led by Greenpeace International campaigned to bring ship recycling into the public attention. The environmental NGOs also took their campaign to the meetings of the Basel Convention that was established under the United Nations Environment Programme and which is the forum for Ministries of Environment of Member States of the UN. Around the same time, the government of Norway also led some first discussions at the International Maritime Organization (IMO) on the need to address in the future the recycling of ships with an international regulatory instrument.

Fig. 6.13 Temporary storage of waste oil in a recycling yard in Bangladesh, 2008

4.1 The Basel Convention and Its Implications

The Basel Convention (or, to give it its full title, "The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal") was adopted in March 1989 and entered into force in May 1992. To date it has been ratified by 186 countries (i.e., most of the world with the important exception of the USA). The Basel Convention provides controls for the international movement of hazardous wastes and for their environmentally sound management. These controls are implemented through the establishment of a chain of communications, aimed to reach consent for the shipment, between the authorities of the country exporting the hazardous wastes with the authorities of the importing country and with the involvement of the authorities of any transit State. The consent is based on the understanding that the hazardous waste in question will be treated in an environmentally sound manner in the importing country. In most countries the implementing authorities of the Basel Convention are Ministries of Environment.

Toward the end of the 1990s, the subject of ship recycling[2] first entered the agendas of the Conference of the Parties (COPs) of the Basel Convention. In December 1999 COP 5, in its decision V/28, instructed its technical working group to develop guidelines in collaboration with IMO for the environmentally sound management of the dismantling of ships. It also instructed its technical working group, together with its legal working group "to discuss the legal aspects under the Basel Convention relating to the issue of the full and partial dismantling of ships", this in effect being a formal request to assess whether Basel Convention could be implemented to regulate ship recycling. COP 6 in December 2002 adopted the Basel Convention's *Technical Guidelines for the Environmentally Sound Management of the Full and Partial Dismantling of Ships* and also extended the mandate of the working group on the legal aspects of ship dismantling for another intercessional period. It should be pointed out here that guidelines are voluntary standards that do not have the mandatory role of international conventions. Incidentally, the growing international interest in ship recycling also resulted in the publication by the International Labour Office (ILO)[3] of a further set of voluntary guidelines in 2004 on *Safety and Health in Shipbreaking Guidelines for Asian Countries and Turkey*.

COP 7 of the Basel Convention, in its decision VII/26 in October 2004, reached an ambivalent compromise position when addressing the question on whether Basel Convention can regulate the movement of end-of-life ships. The decision said: "Noting that a ship may become waste as defined in article 2 of the Basel Convention and at the same time it may be defined as a ship under other international rules." Importantly, the same decision VII/26 also "Invites the International Maritime Orga-

[2]Note: While IMO uses the term "ship recycling," Basel Convention refers to "ship dismantling," whereas ILO uses "ship breaking." In the shipping industry, the term "ship scrapping" still persists.

[3]The International Labour Office is the Secretariat of the International Labour Organization (ILO), which is a specialized agency of the UN for setting labor standards, developing policies, and devising programmes promoting decent work for all women and men.

nization to continue to consider the establishment in its regulations of mandatory requirements, including a reporting system for ships destined for dismantling, that ensure an equivalent level of control as established under the Basel Convention and to continue work aimed at the establishment of mandatory requirements to ensure the environmentally sound management of ship dismantling, which might include pre-decontamination within its scope." IMO responded positively to this invitation by developing a Convention specific to ship recycling, namely, the "Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009," also known as *the Hong Kong Convention* (hereafter also the *HKC*).

It is important to realize that whereas the Basel Convention may have been most successful in fighting against illegal exports of hazardous wastes to countries that are unable to process and dispose of them in an environmentally sound manner, on the other hand, the Convention is unsuitable for defining minimum standards for the recycling of ships. The author's critical view is that the attempt by the international community in the early 2000s to establish and enforce Basel Convention as the international regulatory regime for the recycling of ships was an avoidable mistake, encouraged by the persistent lobbying of environmental activists and aided by the fact that the Convention was already in force and therefore could be implemented without delay. Nevertheless, it is a fact that Basel Convention does not contain any requirements that are relevant to ships and to ship recycling facilities nor does it concern itself with issues on workers' safety. The only relevant requirement of Basel Convention to ship recycling is its generic requirement that the wastes should be managed in an environmentally sound manner. Furthermore, the mechanism for achieving the Convention's "prior informed consent" relies on the establishment of communications between the exporting and importing countries, which, when applied to end-of-life ships, means in practice the authorities of the State from where the ship departed for its last voyage and the authorities of the recycling State. This is because the Convention is not cognizant of the concept of flag State that is central to the United Nations Convention on the Law of the Sea and to all maritime Conventions and therefore leaves no option but to consider the State from where the ship departed for its last voyage as being the exporting State.

Implementing the Basel Convention to control the movements of end-of-life ships creates a number of problems: (a) it takes inordinate amount of time to arrange for the necessary communications between exporting, importing and any transit States, communications which in any case have no effect whatsoever in improving the standards under which ships are recycled; (b) the managers of the ship will most often have no connection with the country that is deemed to be the State of export; (c) a number of countries are unwilling to recognize that Basel Convention should regulate the recycling of end-of-life ships, thus making the communications between the managers of the ship, the State of export, and the other involved States even more cumbersome; and (d) the decision to recycle a ship may not be taken, or may not be finalized, or may not be admitted until after the ship has departed from the port and is in international waters, in which case there is no exporting State to lead the inter-State communications envisaged by Basel Convention. In practice the above problems make the Basel Convention unenforceable to ship recycling. The

difficulty in applying the provisions of the Basel Convention to ship recycling and the circumvention of the Convention's controls by ships destined for recycling are acknowledged in the website of the Basel Convention.[4]

Notwithstanding the above, in October 2010 following intense lobbying by environmental activists, COP 10 of the Basel Convention failed to reach conclusive consensus that Hong Kong Convention can replace Basel Convention for the recycling of ships. Instead its decision BC-10/17[5] maintains all options open:

1. Notes that while some parties believe that the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships provides an equivalent level of control and enforcement to that established under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, some parties do not believe this to be the case.
2. Encourages parties to ratify the Hong Kong Convention to enable its early entry into force.
3. Acknowledges that the Basel Convention should continue to assist countries to apply the Basel Convention as it relates to ships.

It is certainly hoped and expected that following the future entry into force of Hong Kong Convention, the Parties to Basel Convention will come to a formal decision that the recycling of ships shall fall under the scope of the former Convention.

4.2 The Ban Amendment and the European Waste Shipment Regulation

In an effort to strengthen protection to developing countries, COP 2 of the Basel Convention adopted in March 1994 its "Ban Amendment" banning the export of hazardous wastes from OECD to non-OECD countries. However, the Ban Amendment is not yet in force internationally. It will enter into force between member states that have ratified it 90 days after it has been ratified by at least three-fourths (66) of the 87 countries that were Parties to the Convention at the time the Amendment was adopted. By May 2018 the Amendment had received 93 ratifications, 63 of which from States who were Parties at the time of its adoption. The Amendment is therefore expected to enter into force relatively soon.

The Ban Amendment however has already been enforced unilaterally in the European Union, through the European Waste Shipment Regulation, which imple-

[4]See section: *Overview on Ship Dismantling* www.basel.int.

[5]http://ec.europa.eu/environment/waste/ships/pdf/COP_10%20Decision_10_17.pdf.

ments the Basel Convention and the Ban Amendment in European Union law. The European Union had implemented the Basel Convention into European law from as early as February 1993. In 2006 the Union replaced its earlier regulation by the *Waste Shipment Regulation (EC) No. 1013/2006*, which additionally implemented unilaterally the Ban Amendment, forbidding the export of hazardous wastes from member states of the European Union to any developing (i.e., non-OECD) countries.

When EU countries and the European Commission tried to enforce the Waste Shipment Regulation to end-of-life ships, they faced many difficulties and much evasion, as was seen with ships such as the *Otapan*, the *Sea Beirut*, the *Sandrien*, the *Margaret Hill*, the *Tor Anglia*, etc. This was primarily because, in enforcing the Ban Amendment, the European Waste Shipment Regulation deems illegal the recycling in Bangladesh, China, India, or Pakistan of any ship that has started its last voyage from a European Union port (i.e., exporting EU State, regardless of the flag the ship flies). The simple reality is that these four non-OECD countries consistently recycle around 95% of the world's tonnage. In fact, a study by the European Commission in 2011 reported that (at least) 91% of ships under the scope of the regulation had ignored or circumvented its requirements. This led the European Commission in 2012 to propose the development of a new European Regulation on Ship Recycling that is discussed in the next section.

For reasons that appear to have nothing to do with improving standards in the ship recycling industry, some environmental NGOs are to this day continuing to lobby for the enforcement of the Basel Convention to regulate end-of-life ships. They are particularly active in Brussels where they have managed to attain undeserved influence in the European Commission and the European Parliament.

4.3 The Mechanisms and Spirit of Hong Kong Convention

In December 2003 the 23rd session of IMO's Assembly adopted with its Resolution A.962 (23) the *IMO Guidelines on Ship Recycling*. It would have been clear by that time, however, that what was needed was international regulation rather than another set of voluntary guidelines. Therefore, 2 years later, and following the invitation to IMO by COP 7 of the Basel Convention, the 24th session of IMO's Assembly with Resolution A.981(24) agreed in December 2005 that IMO would develop a "new legally binding instrument on ship recycling that would provide regulations for:

1. 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;
2. The operation of ship recycling facilities in a safe and environmentally sound manner; and
3. The establishment of an appropriate enforcement mechanism for ship recycling (certification/reporting requirements)"

Following concentrated work for over 3.5 years, IMO's Marine Environment Protection Committee (MEPC) completed the draft text of the new international Convention, which was submitted to a Diplomatic Conference that was convened in Hong Kong and China from 11th to 15th of May 2009. The Diplomatic Conference was attended by representatives of 63 member states, two associate members, representatives from the Secretariats of the Basel Convention and of ILO, and observers from 1 IGO and 8 NGOs. The Conference unanimously adopted the final text of "Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009", also known as *the Hong Kong Convention* (or *the HKC*).

The main part of the Convention contains 21 articles that establish the Convention's main legal mechanisms. This is followed by the Annex to the Convention that contains 25 regulations divided in 4 chapters: (1) General (regulations 1–3), (2) Requirements for ships (regulations 4–14), (3) Requirements for ship recycling facilities (regulations 15–23), and (4) Reporting requirements (regulations 24–25). Lastly, HKC has seven appendices, with lists of hazardous materials, standard formats for certificates, etc. The text of the Convention also makes reference to six guidelines that were developed by IMO's MEPC in the years following the adoption of the Convention. Although guidelines are nonmandatory texts, they are considered indispensable in providing clarifications, interpretations, and uniform and effective implementation and enforcement of the relevant requirements of the Convention. It is worth noting that when the text of an international Convention requires that a certain set of guidelines are to "be taken into account," frequently this is implemented and enforced by administrations and their recognized organizations as if the guidelines are mandatory requirements. MEPC 68, in May 2015, completed the development of the sixth set of the guidelines for the Hong Kong Convention[6] listed in Table 6.6.

Table 6.6 Guidelines adopted by IMO for HKC

Development of the guidelines of the Hong Kong Convention	
Guidelines	Adoption
2015 guidelines for the development of the inventory of hazardous materials (inventory guidelines)	Revised guidelines adopted by resolution MEPC.269(68)
2011 guidelines for the development of the ship recycling plan (SRP guidelines)	Guidelines adopted by resolution MEPC.196(62)
2012 guidelines for safe and environmentally sound ship recycling (facility guidelines)	Guidelines adopted by resolution MEPC.210(63)
2012 guidelines for the authorization of ship recycling facilities (authorization guidelines)	Guidelines adopted by resolution MEPC.211(63)
2012 guidelines for the survey and certification of ships under the Hong Kong Convention	Guidelines adopted by resolution MEPC.222(64)
2012 guidelines for the inspection of ships under the Hong Kong Convention	Guidelines adopted by resolution MEPC.223(64)

[6]For the texts see: http://www.imo.org/OurWork/Environment/ShipRecycling/Pages/Default.aspx.

The key elements of the mechanisms underlying HKC are the following:

- The Convention applies to all ships,[7] except (a) ships below 500 GT, (b) government-owned noncommercial service ships, and (c) ships operated throughout their lives exclusively in waters of the State whose flag the ship is flying.
- Inventory of hazardous materials (IHM): The Convention requires that ships will be provided with an IHM detailing the locations and approximate quantities of hazardous materials listed in the Convention's Appendices 1 and 2. Note that the materials listed on Appendix 1 are already controlled by other international Conventions, such as SOLAS, AFS, Montreal Protocol, etc. For *new ships*, i.e., those built after the entry into force of the Convention, it is required that (a) materials listed in Appendix 1 must not be used and (b) any materials listed in Appendix 2 and used on the ship must be shown in the IHM. For *existing ships*, i.e., those built before HKC's entry into force, it is required that (a) any preexisting materials listed in Appendix 1 must be shown in the ship's IHM, while the same materials must not be used on the ship subsequent to the Convention's entry into force; and (b) the inclusion in the ship's IHM of any Appendix 2 materials used on the ship is encouraged but not mandated.
- International Certificate on Inventory of Hazardous Materials (ICIHM): Once HKC is in force, ships will be issued the ICIHM, after an initial or renewal survey, by their flag State, or the delegated classification society. The purpose of this certificate, whose validity will be for 5 years, is to ensure that the IHM continues to correctly reflect the hazardous materials that are on the ship.
- Ship Recycling Facility Plan (SRFP): Recycling yards located in countries that are Parties to HKC will document in their SRFP the yard's systems and processes for ensuring safety and environmental protection.
- Document of Authorization to conduct Ship Recycling (DASR): This will be issued by the competent authorities in recycling States Parties to HKC to each authorized yard within their jurisdiction. The DASR will list any limitations that are imposed to the yard, such as size or type of ship and quantities of any specific hazardous materials that the yard may not be qualified to accept. This certificate will be valid for up to 5 years.
- Ship Recycling Plan (SRP): Recycling yards in countries that are Parties to HKC, prior to commencing the recycling of a ship, will have to produce a plan based on the specific ship's IHM and other particulars. The SRP will detail how the yard will dispose of the ship's hazardous materials and what precautions will be taken against unsafe situations. The SRP will normally be approved by the competent authority of the recycling State.
- International Ready for Recycling Certificate (IRRC): Prior to the commencement of the recycling of a ship, the IRRC will be issued by the ship's flag State

[7] In HKC "ship" is defined as "a vessel of any type whatsoever operating or having operated in the marine environment and includes submersibles, floating craft, floating platforms, self-elevating platforms, floating storage units (FSUs), and floating production storage and offloading units (FPSOs), including a vessel stripped of equipment or being towed."

or by its delegated classification society, following a final survey. The survey and certificate will confirm the validity of the IHM and the suitability of the selected recycling yard (on the basis of the IHM, DASR, and SRP).

- Other elements in HKC include notification by the recycling yard to its competent authority of the commencement of recycling, notification to competent authority and flag State of completion of recycling, port State control by Party coastal States, ability of a ship flying the flag of a non-Party State to be recycled in a yard at a Party State as long as that ship meets the requirements for IHM, and inability of a ship flying the flag of a Party State to be recycled in a yard at a non-Party State.

4.4 Implications of Hong Kong Convention

Leaders from the ship recycling industry on occasions have reflected and complained that whereas the underlying requirements of HKC for recycling yards are onerous (in terms of improvements in systems, procedures, training, equipment, and infrastructure), on the other hand, the requirements on ships are very light (the costs for the provision of an IHM and for the associated surveys and certification are relatively small). Nevertheless, as discussed in more detail in Sect. 6.2, the equitability between the ship recycler and the shipowner in HKC lies in the fact that a ship flying the flag of a Party to the Convention will have to be recycled in a Party (HKC) yard, and therefore the costs of compliance to the Convention would pass this way back to the shipowner (unless of course the ship changes flag to a non-Party flag and is recycled in a non-Party yard – note: in the future, avoidance of HKC obligations through reflagging will cease to be possible after all five main recycling countries become Parties to HKC).

Hong Kong Convention has been opposed and is frequently criticized by organized civil society activists for not banning the beaching method of ship recycling. This persistent lobbying by NGO activists has led to beaching being widely associated with poor ship recycling standards and vice versa. Whereas during the development of HKC there were repeated proposals to ban beaching, the developers of the Convention realized that banning beaching through the Convention would not be viable as presently around three-quarters of the world's recycling capacity utilizes this method. Had HKC banned beaching, eventually this would have led to two distinct regimes in the world, one in accordance with the standards of the Hong Kong Convention and the second one being the unregulated (by international standards) recycling yards of the countries that continue to employ beaching. As it will always be legal for ships to be sold and to change flag (and thus avoid any flag State requirements to implement the Hong Kong Convention), shipowners would therefore have the choice under which regime to recycle their ships. By keeping the South Asian countries that employ beaching outside the influence of HKC, IMO and its Convention would in effect have turned their backs to the parts of the industry that were in most need for the improvements that are envisaged by HKC.

Furthermore, and most importantly, it would not be possible for HKC to enter into force without the recycling capacity of at least one of the three South Asian ship recycling countries.

The Hong Kong Convention addresses the systematic prevention, reduction, minimization, and, where practicable, elimination of risks to human health and safety and to the environment through mandatory requirements on worker safety and training, the protection of human health and the environment, emergency preparedness and response, and systems for monitoring, reporting, and recordkeeping. This way the Hong Kong Convention has a truly realistic chance of being ratified by all recycling countries, including the three South Asian countries, and thus of providing a single international standard for the recycling of all ships.

4.5 Entry into Force of Hong Kong Convention

The Convention will enter into force 24 months after the date on which 15 States, representing 40% of world merchant shipping by gross tonnage, have either acceded to it or have ratified it.[8] Also, the combined maximum annual ship recycling volume of those States must be no less than 3% of their combined merchant shipping tonnage.[9] As the size of the world fleet changes every year, so do the second and third of the three conditions. Table 6.7 shows the growth of the world fleet in the last 10 years.

Table 6.7 Growth of world fleet (2008–2017)

	2008	**2009**	**2010**	**2011**	**2012**
World fleet	830,704,412	882,634,804	957,982,304	1,043,081,509	1,081,204,742
40% of world Fleet	332,281,765	353,053,922	383,192,922	417,232,604	432,481,897
3% of 40%	9,968,453	10,591,618	11,495,788	12,516,978	12,974,457
	2013	**2014**	**2015**	**2016**	**2017**
World fleet	1,122,649,460	1,166,847,462	1,211,223,165	1,248,583,186	1,291,046,701
40%of world fleet	449,059,784	466,738,985	484,489,266	499,433,274	516,418,680
3% of 40%	13,471,794	14,002,170	14,534,678	14,982,998	15,492,560

Source: IHS Maritime & Trade, World Fleet Statistics (2017), and earlier years

[8]A country wishing to become a contracting Party to an international Convention can do this by accession to the Convention or by a two-stage process that involves first signing the intent to become Party and then ratifying its signature.

[9]For more information on the calculation of the recycling capacity for meeting the entry-into-force conditions of HKC, refer to *resolution* MEPC.178(59) and to document MEPC 67/INF.2/Rev.1.

During 2018[10] the requirements for entry into force of HKC are that it has to be ratified (or acceded) by at least:

1. Fifteen States
2. Whose fleets amount to at least 516,418,680 GT (i.e., 40% of the 2017 world fleet of 1,291,046,701 GT)
3. Whose recycling facilities' combined maximum annual ship recycling volume is at least 15,492,560 GT (i.e., 3% of the tonnage condition of 516,418,680 GT)

To date, six countries have ratified or acceded to Hong Kong Convention (Norway, France, Belgium, Republic of Congo, Panama, and Denmark), while Turkey has obtained parliamentary approval for ratification. Together, these seven countries currently control 20.8% of the world's fleet. A number of maritime countries are making progress toward accession or ratification, and it is expected that it will not be too difficult to fulfill the first two conditions for entry-into-force, especially if shipowners feel the need to urge some of the open registries to accede.

The third condition in 2018 requires a "combined maximum annual ship recycling volume" of at least 15,492,560 GT. The 2017 capacities of the five-ship recycling countries and of the rest of the world were as follows:

India	12,210,082 GT
Bangladesh	9,888,137 GT
China	8,167,710 GT
Pakistan	5,703,133 GT
Turkey	1,540,800 GT
Rest of the world	624,848 GT

This data shows that Turkey plus India (or Turkey plus China) do not meet the required 15.49 m GT. The key to HKC's entry into force is therefore accession by two of the four large recycling nations (ideally India and China as the hazardous waste management infrastructure and many of the yards of both countries are already well developed, in line with the requirements of HKC).

It is a reasonable expectation that within the next 4–7 years, HKC will enter into force. In the meantime, meaningful progress has been taking place as the main ship recycling countries are working toward implementing tighter safety and pollution prevention requirements. The Turkish administration has implemented most of the requirements of HKC into its rules. In India the Ministry of Shipping introduced the Shipbreaking Code 2013, which replicated the full requirements of HKC to its ship recycling industry. Furthermore, the Indian Minister of Transport, Mr. Nitin Gadkari, told IMO's 30th Assembly in November 2017: "I am confident that we will ratify the Hong Kong Convention in the not-too-distant future". In Bangladesh the

[10]In 2019 the criteria will change according to the then published figure of the total GT of the world fleet as of end of December 2018 (to be published in April or May 2019).

Ministry of Industries has been working together with the recycling industry, with IMO and the Secretariat of the Basel Convention under a Norwegian-funded project for the creation of hazardous waste management facilities and for the development of training courses for ship recycling workers and managers. China, on the other hand, while it had implemented stricter requirements for yards authorized to import foreign ships for recycling, in 2018 announced a ban to the import of ships for recycling from the end of the year (Lloyd's List 2018). Lastly, the ship recycling industry in Pakistan does not appear to have embarked yet on the necessary work to improve safety and environmental standards. Nevertheless, following the appalling explosion on a tanker which killed 28 workers on November 1, 2016, at a Gadani yard, promises have been made by the Pakistani government and also by the ship recycling industry of significant improvements in the near future.

Recyclers from South Asia have expressed their concern that once their countries are Parties to HKC, then any powerful group of opponents to beaching may introduce an amendment to HKC to ban beaching and to close down the ship recycling industries in South Asian countries after the Convention has entered into force (note: it is not possible to amend a Convention before it enters into force). However, this cannot happen as provisions in HKC's Articles 18 (*Amendments*) and 19 (*Denunciation*) afford protection to all Parties by ensuring that the introduction of amendments will have to be done in a spirit of compromise and cooperation and by making it impossible to force an amendment to any Parties that do not agree to it. For example, Article 18.4 provides that: "Any Party that has declined to accept an amendment to the Annex shall be treated as a non-Party only for the purpose of application of that amendment", and furthermore, Article 19.1 provides that: "This Convention may be denounced by any Party at any time after the expiry of two years from the date on which this Convention enters into force for that Party." Conversely, a country that is not a Party to the Convention at a time an amendment is accepted will not be in a position to enjoy the protection described above, as Article 17.4 (*Entry into force*) provides that: "After the date on which an amendment to this Convention is deemed to have been accepted under Article 18, any instrument of ratification, acceptance, approval or accession deposited shall apply to the Convention, as amended." In other words, for a country to be in a position to control any amendments proposed after the Convention's entry into force, it should be a Party to the Convention at the time the amendments are discussed and negotiated.

In the longer term, the expectation is for the establishment of HKC as the single global standard. This is a realistic and feasible target to achieve in the next 7–10 years, simply by the accession of all five-ship recycling countries to HKC. Afterward, all flag States will have no option but to also accede to the Convention, while all shipowners will also have no option but to recycle their ships in line with HKC.

5 The European Union Ship Recycling Regulation

5.1 The Mechanisms and Spirit of the New EU Regulation

The progress that has taken place with the voluntary implementation of Hong Kong Convention and the, admittedly slow, uptake of the Convention by IMO member states should probably have provided sufficient comfort to activists and to the authorities within the European Union. This was not the case. Early in 2012, the European Commission having publicly recognized[11] that the enforcement of its own Waste Shipment Regulation to the recycling of ships was not working, it embarked on the development of new legislation for the recycling of European-flagged ships.

In accordance with the political system of the European Union, the Commission is the body responsible for initiating new legislation. On March 23, 2012, the Commission published its *Proposal for a Regulation of the European Parliament and of the Council on ship recycling.*[12] The document provided the Commission's version of the proposed Regulation and also its *Explanatory Memorandum*. The following three extracts from the Explanatory Memorandum convey the Commission's thinking at that time:

> A significant recycling capacity exists outside the OECD in China, India, Pakistan and Bangladesh. It is expected that facilities located in the OECD, in China as well as some facilities located in India will be able to comply with the requirements of the Hong Kong Convention by 2015.
>
> The objective of the Ship Recycling Regulation is to reduce significantly the negative impacts linked to the recycling of EU-flagged ships, especially in South Asia without creating unnecessary economic burdens. The proposed Regulation brings into force an early implementation of the requirements of the Hong Kong Convention, therefore hastening its entry into force globally.
>
> While it is difficult to expect the current 'beaching' facilities to be able to meet these requirements, it is possible that upgraded facilities might be able to fulfil these criteria in the future.

The Draft Article on "Requirements for ship recycling facilities" in the text of the proposed Regulation virtually reproduced the text of HKC, making no attempt to ban the beaching method.

The draft Regulation then went through the formal European process of negotiations between a Working Group of the European Council (officials from the ministries of the 28 member states) and the Environment Committee of the European Parliament, which in this instance was led by an MEP of the Green Party (*the rapporteur*). Unfortunately, during these negotiations the subject became unduly politicized through the persistent efforts of the rapporteur to enact a ban on beaching. In the end, after a long process of meetings and discussions, the three

[11] https://www.youtube.com/watch?v=nxk_c0Abhos.

[12] http://ec.europa.eu/transparency/regdoc/rep/1/2012/EN/1-2012-118-EN-F1-1.Pdf.

Parties ("the trilogue" between Council, Parliament, and Commission) agreed a compromise text on June 27, 2013, which removed all mentions of banning of beaching or of exclusion of South Asia's yards. It was published on December 10, 2013 in the Official Journal of the European Union, and on the December 30, 2013 the new "European Regulation on Ship Recycling (EU) No 1257/2013" (or simply here, "the EU SRR") entered into force.

While the European Council's representatives succeeded in rejecting the Parliament's preferred text which was banning beaching and also managed to preserve the full set of mechanisms of HKC, on the other hand, in order to accommodate political sensitivities, the final negotiations introduced some imprecise and ambiguous terms in the text, such as a requirement that ship recycling facilities shall *operate from built structures*[13]. Naturally, the persons involved in these negotiations did not attempt to define the meaning of "built structures" but left its interpretation to be given at a future time by the Commission. Furthermore, elsewhere the Regulation requires that, in order to be approved, a ship recycling facility (a) shall "demonstrate control of any leakage, in particular in intertidal zones[14]" and (b) shall ensure "the handling of hazardous materials and waste generated during the ship recycling process only on impermeable floors with effective drainage systems.[15]" Whereas the new European Regulation is very similar to HKC, the above two requirements as well as the requirement for facilities to operate from "built structures" are not from HKC. While these requirements may look noncontroversial and not unreasonable, it now appears that they might be used to justify a ban to beaching, as will be discussed in Sect. 5.2.

Notwithstanding the uncertainty introduced by the ambiguous terms that were invented in the final negotiations, the European Regulation replicates well the standards and the mechanisms of HKC and even requires the implementation of the guidelines that were developed by IMO for HKC. It is relevant to quote from the preamble to the Regulation: "This Regulation is aimed at facilitating early ratification of the Hong Kong Convention both within the Union and in third countries by applying proportionate controls to ships and ship recycling facilities on the basis of that Convention."

There are two noteworthy areas where the European Regulation differs from HKC: (a) in the way yards are authorized and (b) in defining two additional hazardous materials that need to be controlled in EU-flagged ships.

For yards located in EU countries, the Regulation requires each member state to enforce the requirements of the Regulation and to authorize the operation of yards in its jurisdiction. On the other hand, as the Regulation is not an international Convention, the EU does not have the power to enforce its requirements on yards that are located outside the EU nor can it expect the administrations of non-EU countries to authorize yards within their jurisdiction in line with the European

[13] Article 13.1 (c).

[14] Article 13.1 (f).

[15] Article 13.1 (g)(i).

Regulation. For this reason, yards located outside the European Union wishing to be included in "the European List of approved facilities" are required to apply to the European Commission, providing evidence of their compliance with the requirements of the Regulation, together with certification by an "independent verifier" who has inspected the site. Additionally, yards must accept the possibility of being subject to site inspection by the Commission or its agents.

The second difference between HKC and the EU SRR is that the latter includes two additional hazardous materials, which will need to be controlled on EU-flagged ships. The first of these materials is included in Annex I[16] of the EU SRR and is already banned in European Union law (perfluorooctane sulfonic acid and its derivatives, or PFOS, the main application on board ships being in some firefighting foams). The second material is included in Annex II of EU SRR (brominated flame retardant, or HBCDD, the main application on board ships being in expanded polystyrene used for cryogenic insulation, such as for liquefied gas tanks but also for refrigerator areas). A relevant footnote in Annex I to the EU SRR states that the control on PFOS "is not applicable to ships flying the flag of a third country," while the HBCDD, being a material of Annex II, strictly speaking need only be included in IHMs of newbuildings, plus in any retrofits involving changes to structure and equipment of existing ships. As the EU SRR treats all ships flying the flag of a third country as existing ships, regardless of their date of built (see EU SRR's Article 12(1), referring to Art. 5(2)), it follows that the inclusion of information on either of these materials will not be required on IHMs of non-EU-flagged ships, unless the HBCDD has been installed during a retrofit. Conversely, IHMs compiled for EU-flagged ships after the date of application of the EU SRR will fully satisfy the requirements of HKC. Note that good descriptions of the properties and typical uses of PFOS and of HBCDD can be found in a Norwegian submission[17] to IMO, which proposed in 2008 their inclusion as controlled hazardous materials under Appendices 1 and 2, respectively, of the HKC. The Norwegian submission was rejected at that time by IMO.

On December 30, 2013, the European Union brought into force the "European Regulation on Ship Recycling (EU) No 1257/2013." The provisions of the Regulation did not take effect immediately, but instead the Regulation specifies a schedule of application, whereby the first version of the European list of approved yards would be published not later than December 31, 2016. Thereafter, EU-flagged ships will have to have an Inventory of Hazardous Materials, be surveyed, be certificated, and be recycled in accordance with the new Regulation, from the earlier of the following two dates (termed as "the date of application"): (a) 6 months after the European List of approved yards reaches a combined capacity of 2.5 million LDT or (b) the end of December 2018. From the date of application, European-flagged

[16]Note that with regard to new and to existing ships, Annexes I and II of EU SRR have the same functionality as Appendices 1 and 2 of HKC.

[17]See IMO document MEPC 57/3/19: http://merchantmarine.financelaw.fju.edu.tw/data/IMO/MEPC/57/.

ships will be excluded from the scope of the European Waste Shipment Regulation, whereas non-European-flagged ships departing from European Union ports and destined for recycling will continue to be subject to the Waste Shipment Regulation, which forbids their export to developing countries. Furthermore, all ships visiting European Union ports, regardless of their flag, will be required from December 2020, to be provided with inventories of hazardous materials (IHMs).

It is unclear why the European Commission delayed until the middle of 2016 its invitation of applications from ship recycling facilities located outside the European Union. Applications were received from the USA (2 yards of 72,868 LDT), China (4 yards of 1,767,215 LDT), Turkey (7 yards of 450,903 LDT), and India (initially 5 yards of 323,497 LDT and subsequently a further 4 yards) of a combined maximum annual capacity of 2.6 million LDT. Due to further delays, by the beginning of 2018, none of the non-EU applicant yards had been inspected or approved by the Commission. In the meantime, the Regulation's requirement for the publication of the first European List by or before December 2016 was satisfied, as the Commission published at the end of 2016 its first list, which included 18 yards in 10 EU member states with maximum annual recycling capacity of 303,065 LDT. On 4th of May 2018 the Commission updated its first List with its Implementing Decision (EU) 2018/684[18] thereby increasing the total number of EU-based approved yards to 21 facilities of 329,917 LDT maximum annual recycling capacity (of which 86,815 LDT correspond to three UK yards that will lose their approval on Brexit in March 2019). At the time of writing, the Commission had not approved any non-EU-based yards, and it is therefore a fair guess that the date of application of the Regulation will be the end of December 2018, and not earlier, as it is improbable that the Commission will approve yards of 2.5 million LDT capacity by the middle of 2018.

5.2 Implications of the EU Regulation

For the last 20 years, environmental activists have been campaigning against unsafe and polluting practices in ship recycling. Initially Greenpeace was the lead NGO in this campaign. In 2005 the Brussels-based *NGO Shipbreaking Platform* ("the Platform") was set up to coordinate the activities of 19 environmental, human rights, and labor rights organizations interested in ship recycling. It is indisputable that the activists have made a great contribution to the development of awareness among the public, the regulators, and the shipping industry. Without their relentless demands, it is conceivable that the HKC may not have even been developed. On the other hand, the activists, and more specifically the Platform, have shown a total lack of knowledge and interest to learn how the shipping and the ship recycling industries

[18] See the European Commission's official site for the European List of approved facilities: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0684&from=EN.

work. The result is that their campaigns are, more often than not, impractical or unworkable. Over the years, the Platform has campaigned tirelessly for the enforcement of the Basel Convention, of the Ban Amendment and of the European Regulation on Waste Shipment to ship recycling, regardless of the numerous cases that have demonstrated these regimes as impractical and unenforceable to ships. Furthermore, since its inception the Platform has campaigned for the banning of beaching and for stopping the recycling of ships in South Asia. The Platform has opposed HKC, primarily because the Convention does not ban beaching. To start with, they strenuously opposed the development of the European Regulation on Ship Recycling, as they saw this as an admission by the European Union of the failure of the Basel Convention and the related European Regulation on Waste Shipment. However, when the Green Party assumed the leadership of the Environment Committee of the European Parliament for the development of the new regulation and as the Green Party adopted all the policies and arguments of the Platform, the NGO appeared to change its view on the usefulness of the new regulation as a vehicle for banning beaching. Since the adoption of the new regulation in 2013, the Platform has been pressing the European Commission to interpret the new Regulation as banning beaching.

In parallel to the Platform's lobbying in Brussels, in the summer of 2013, after the final version of the text of the Regulation had been agreed between the Council and the Parliament, there was a highly irregular intervention by an adviser of the Green Party in the European Parliament who managed, unnoticed, to make some small changes to the agreed text in some of the EU languages, including English. The changed text in essence requires that "the handling of hazardous materials, and of waste" must be done on impermeable floors, as opposed to the agreed text, which referred to "the handling of hazardous materials and waste" (i.e., the word hazardous applying to both, materials and wastes). As in European regulatory language an "end-of-life ship" is considered "waste," but not necessarily "hazardous waste," it follows that the changed text can be interpreted as requiring that nothing from the ship must touch the beach, not any clean steel blocks, and not even a table and chairs! This point of detail obviously has been invented as an impassable obstacle to beaching. It took EU member states some time before noticing this small but potentially crucial change. When it was also realized how the changed text could be interpreted, the European Council proposed to the Parliament and the Commission a Corrigendum (i.e., a formal correction) to reinstate the agreed text. It is understood that a faction of the Parliament strenuously opposed this and consequently the issue remains unresolved to this day.

In accordance with the European system, the European Commission is the body that enforces and interprets European law, although it should be noted that the final arbiter to interpret the Regulation would be the European Court. The Commission so far has given mixed messages as to what it intends to do about the beaching method of recycling. If the Commission interprets the new European Regulation in line with the rational of Hong Kong Convention and does not invent reasons to ban beaching, then EU SRR will result in motivating and in providing commercial benefits to those yards that have invested in improvements. In doing so, the EU will be encouraging the accession to HKC of the countries in South Asia. If on

the other hand the Commission chooses to interpret the Regulation as providing a ban on beaching (and in so doing use the surreptitiously modified English version of the text, ignoring the originally agreed text which luckily survives in some of the European Union's languages), it will block European-flagged ships from using much of the world's recycling market. In that case, it is very likely that many, if not most, of these ships will change flag and go for recycling to South Asia, thus electing to ignore Brussels. This scenario has become even more likely following the Chinese government's ban to the import of ships for recycling beyond the end of 2018 (Lloyd's List 2018). But even if the European ships do not reflag but choose to comply with the Regulation, what a hollow victory the Commission will have scored! By preventing the progressive minded European market from using HKC compliant yards in South Asia, the EU Regulation would torpedo the progress that has taken place so far. Without the demand for responsible recycling that is currently filling the HKC compliant yards in South Asia, one of the major driving forces for change would be removed. All the European Commission will have achieved is to abandon the majority of the world's ship recycling workers and infrastructure to the realm of the noncompliant, which is not in line with the HKC's goal of raising standards at all yards across the world.

6 Enabling Mechanisms for the Improvement of Standards in the Ship Recycling Industry

6.1 The Responsibility of Shipowners

It is often said that shipowners are, or should be, responsible for the standards under which their ships are recycled. However, as was discussed in Sect. 3, the disposal of an end-of-life ship involves the transfer of ownership, first from the shipowner (the ship-owning company to be more precise) to the cash buyer and then from the cash buyer to the recycler. At the instant ownership is transferred, the old owner of the ship ceases to have the benefits and the responsibilities of owning the ship, regardless of whether the ship is sold for recycling or for further operation. It is therefore not realistic to expect shipowners to be legally responsible for what happens after their ship is sold, unless the seller is violating some specific law by the way he is selling his ship. It is thought that this will be the case under the new European Union Ship Recycling Regulation, which forbids European-flagged ships from being recycled in yards that are not included in the European List of approved yards. However, even in this case, as shipowners do not sell their ships directly to yards, there may be serious doubt whether a European-flagged ship sold through a cash buyer and recycled outside the scope of the European Regulation could be breaking the law. This is because as the moment ownership is transferred to the cash buyer, the ship has to be deregistered from its (European) registry and a subsequent sale to a non-approved yard would logically be taking place outside the scope of the

European Regulation. Even if European courts were to decide in the future that a seller of a European-flagged ship can be held responsible for the actions of a new owner, i.e., the cash buyer, the shipowner will still have the escape route of changing the flag of his ship prior to selling it for recycling so that the ship does not fall under the scope of the European Regulation.

The above considerations would suggest that, at least presently, no legal responsibility can be attributed to shipowners for the way they recycle their ships. Nevertheless, NGO activists operating under the umbrella organization of "NGO Shipbreaking Platform" have been pursuing "name and shame" campaigns against individual shipping companies who have recycled ships in countries whose standards are judged by the Platform as being low. Aside from the claim of the Platform that its activists are qualified and even capable to judge the standards of individual yards (normally done by the Platform on the basis of whether a yard is located in South Asia or not), the activists ignore whether legal responsibility applies or not and instead imply a moral responsibility for the shipowner. But as we know, the world of commerce does not work like that. In the main, shipowners do not decide where to build their ships, or where to repair them, or what cargoes to carry on the basis of subjective judgments of self-appointed watchdogs on safety and environmental conditions in building yards, or in repair yards, or in the mines where ores are extracted. Nevertheless, separate from legal and from moral responsibility, there is another kind of responsibility that is gaining popularity nowadays. This is the corporate social responsibility (CSR), which in fact is a business approach that relies on voluntarily taking responsibility for a company's effects on the environment and on social well-being. CSR applies to efforts that go beyond what may be required by regulation. A main benefit of incorporating CSR in a company's policies and procedures is a marketing advantage among the company's clients and the wider public. This could explain why most of the shipping companies that have embraced CSR are either publicly listed companies or companies whom, or whose clients, are directly exposed to the vagaries of public opinion.

The above discussion leads us to the conclusion that CSR is the one kind of responsibility that can motivate a shipowner to consider and select the most appropriate recycling yard for his end-of-life ship. And this is not just theory but is what has been happening in the market in the last 4 years, with a small number of well-known and influential shipping companies having managed to create a two-tier market between normal recycling and responsible (or "green") recycling. Interestingly, at least one of these companies have interpreted their CSR policy on ship recycling as meaning that their ships will not be recycled by the beaching method. The rest of CSR companies have expended considerable effort and resources to select and supervise beaching yards that have improved their infrastructure, procedures, and training of their workforce. The one company that has vowed to stay away from beaching has done so apparently by pressure applied by the NGO Platform to the local government who are shareholders of the company. If the ideal of corporate social responsibility is to strive to improve the well-being of people and the environment in the wake of the corporation, then the choice to totally abstain from recycling your ships in the very places that need your motivating influence appears to be just a poor cop-out.

6.2 The Role of Regulations

Issues of safety, prevention of pollution, and even social justice cannot be left to the industry at large in the hope that good sense will prevail nor to the small sector of the industry that may voluntarily adopt high standards. This is the reason why virtually all aspects of ship safety and pollution prevention are regulated by IMO's international conventions. Most safety issues are regulated by SOLAS (the International Convention for the Safety of Life at Sea 1974), which at the end of 2017 had 163 Contracting Parties representing 99.14% of the GT of the world fleet. Safety is also the subject of COLREG (Convention on the International Regulations for Preventing Collisions at Sea 1972), which in December 2017 had 157 Contracting Parties representing 99.13% of the GT of the world fleet. Prevention of overloading of ships is regulated by the LL Convention (the International Convention on Load Lines 1966), which at the end of 2017 had 161 Contracting Parties representing 99.13% of the GT of the world fleet. Prevention of pollution is regulated by MARPOL (the International Convention for the Prevention of Pollution from Ships 1973), which had 155 Contracting Parties at the end of 2017, representing 99.14% of the GT of the world fleet (IMO 2017). These and other Conventions are enforced by the flag States of the ships when these are Parties to the Conventions and are also policed by the port State control (PSC) officials in ports where the ships load or discharge cargo. The PSC system is enshrined in all of the above Conventions, as is also what is known as the "no more favorable treatment" that allows port States that are Parties to a Convention to demand that a ship flying the flag of a non-Party satisfies the requirements of the subject Convention. For example, a ship that flies the flag of a non-Party to MARPOL will still be expected to satisfy the requirements of MARPOL when it sails in a port of a State that is MARPOL Party. In other words, the ship receives no more favorable treatment by flying the flag of a non-Party. The combination of high percentage of the world fleet being Parties to a Convention, the policing at ports by PSC, and the provision of no more favorable treatment mean that safety and pollution prevention issues are implemented globally and to 100% of ships, and therefore a shipowner cannot gain a commercial advantage over his competitors by reducing costs through noncompliance.

The majority of IMO's Conventions apply exclusively to ships. Hong Kong Convention is one of a handful of IMO Conventions whose scope extends beyond the ship, in also regulating safety and environmental protection on land-based facilities. Incidentally, this simple fact makes it more complicated and time consuming for a government to ratify or accede to HKC, as the concurrence of a number of ministries becomes necessary. The process will usually involve the Ministry of Transport (or shipping) being the IMO focal point and the responsible ministry for shipping matters; the Ministry of Labor being responsible for issues relating to the health and safety of workers in the recycling facilities; the Ministry of Environment being responsible for the treatment, storage, and disposal of hazardous materials; plus

other ministries or government departments providing input on matters such as law, customs and excise, testing for explosive conditions, etc.

This dual nature of the regulatory regime for ship recycling (i.e., the need to have jurisdiction on ships and also on land facilities) creates profound difficulties for the strict enforcement of the Convention (or for that matter for the strict enforcement of the regional European Union Ship Recycling Regulation). It is instructive to explain these difficulties here, as this will provide the reader with a much clearer understanding of ship recycling.

It has been said that Hong Kong Convention imposes high costs to ship recycling facilities, while it requires very little expenditure from the shipowner. At first, this may appear to be a valid claim, as the owner of a recycling facility would invariably have to spend considerable resources on infrastructural improvements, on training of the workforce, and on developing and implementing working procedures which would inevitably extend the time it takes to recycle each ship, thereby increasing ship recycling costs. On the other hand, the shipowner only needs to procure an Inventory of Hazardous Materials for his ship, perform some surveys, and obtain certification, all of which do not amount to a significant cost. This seemingly unequal distribution of costs appears even more unfair when considering that the great majority of ship recycling facilities are located in less developed countries, while the push for improvements of ship recycling standards has come from the most developed countries in the northern hemisphere. However, the justification for what may appear to be an unfair allocation of investment costs for compliance with the Convention is relatively simple. In the first place, it is only natural that the owner of the recycling facility and the shipowner will each invest on their properties. But more importantly, if the shipowner has no option but to send his ship for recycling only to facilities that fulfill the standards of the Convention, then the market forces of supply and demand will adjust the purchase price of ships to cover the cost of the investments made by the owner of the recycling facility. Simply expressed, the shipping industry will have no option but to pay all the costs for the improvements demanded by Hong Kong Convention. Furthermore, in the longer term, the shipping industry will also recoup its costs of compliance with the Convention from its clients, the world's consumers.

The above rationalization relies on one simple but vital assumption, namely, that owners of ships flying the flags of Parties to the Convention will send their ships for recycling only to Hong Kong Convention compliant yards. As discussed in Sect. 1.2, presently five countries recycle around 98% of the tonnage recycled worldwide. It follows that if all five recycling countries are Parties to the Convention when this enters into force, then shipowners will truly have no option but to recycle their ships in compliant yards. If, on the other hand, one or more of these five countries are not Parties to the Convention when this enters into force, their recycling yards at that time would be operating at a lower-cost basis compared to compliant yards in Party countries and would therefore be in a position to pay higher prices for purchasing ships. This is the situation that gives rise to the profound difficulties mentioned above for enforcing a strict regulatory regime to ship recycling.

As Hong Kong Convention make provisions for port State control in its Article 8 and for "no more favorable treatment" in its Article 3.4, it should follow that the requirements of the Convention that apply to ships in service (i.e., provision of IHM, survey, certification, and restrictions on installation of hazardous materials) will be implemented and enforced on all ships, including those that fly the flag of non-Parties by virtue of the provision for "no more favorable treatment". However, while one or more of the main ship recycling countries remain non-Parties, the uniform and strict enforcement of the Convention's provisions for the recycling of ships flying the flag of Party States cannot be guaranteed. Whereas a ship will be able to demonstrate to PSC inspections throughout its operating life that it fulfills the requirements of the Convention, on the other hand, at the time the ship is sent for recycling, it will be possible (and certainly not illegal) for the shipowner to take advantage of any better prices that may be offered by non-Convention yards, either by selling the ship to a cash buyer on an as-is-where-is basis or by reregistering the ship to a non-Party flag. The cost of changing flag for an average-sized ship is of the order of US$1 per LDT, which is quite insignificant if a non-Convention yard pays, say US$30 to US$50 per LDT, more than a Convention yard.

The above discussion must not be taken as suggesting that yards in non-Convention countries would be having a clear-cut marketing advantage, as it is quite probable that Convention yards would profit from having unhindered access to end-of-life ships of compliant shipowners. Nevertheless, the conclusion and the plain truth is that unlike most Conventions that regulate the shipping industry, the dual nature of Hong Kong Convention will allow shipowners to avoid their obligations for as long as there are ship recycling countries that are not Parties to the Convention. Conversely, when all five main ship recycling countries are Parties to the Convention, then its requirements will become the universal standard for all ships and all recycling yards. This is one additional reason why IMO, during the development of the Convention, turned down proposals to ban beaching.

The dynamics discussed in this subsection also apply to the enforcement of the European Regulation on Ship Recycling. If the European Commission approves South Asian facilities for the recycling of European-flagged ships, it will motivate the progressive uptake of the Regulation's standards, which are almost the same as those of Hong Kong Convention. If on the other hand the Commission ignores the improvements that are taking place in South Asia, then the intelligent reader should be able to predict easily the outcome of Europe's involvement with ship recycling.

6.3 Steps Toward a Global Regulatory Regime for Ship Recycling

The above discussion should have demonstrated that, for the global establishment and strict enforcement of minimum standards in ship recycling, there is no alternative to a universally implemented international Convention. This is the intended

role and the future of Hong Kong Convention, as long as it is not derailed by the efforts of an overzealous Europe. However, as we are approaching the 10-year anniversary since the adoption of the Convention, it is fair to ask what is keeping all the counties who unanimously adopted the Convention in 2009 from acceding to it. Looking at other IMO Conventions, it would appear that long delays between the adoption and the entry into force of Conventions are quite normal. Furthermore, as already discussed, the nature of Hong Kong Convention, combining regulations for ships and for land facilities, increases the complexity of accession. Another contributory factor that could be delaying accessions is a perceived conflict between the second and third conditions for entry into force, requiring that countries who have ratified/acceded to the Convention control (a) no less than 40% of the world's fleet and (b) a proportionate (3%) ship recycling capacity. It is presently understood that this may be holding back some large open registries from acceding because of a fear that too much tonnage under the second condition could make it very difficult to satisfy the third condition. However, on closer examination of the fleet and ship recycling data presented in Sect. 4.5 on entry into force of Hong Kong Convention, it would appear that the risk of too much tonnage jeopardizing the satisfaction of the third condition is far too remote: as the ideal minimum, the third condition would require accession by India and China. The recycling capacities of these two countries correspond (according to the 3% formula of the third condition) to 52.6% of the world fleet in 2018. Furthermore, if the recycling capacity of Turkey, which is due to complete its ratification of the Convention, is added to those of India and China, the capacity of the three countries corresponds to 56.6% of the world fleet, providing ample cushioning against the perceived risk of conflict between the two conditions.

The Diplomatic Conference that adopted Hong Kong Convention in May 2009 also adopted six Conference Resolutions, including one on "Early Implementation of the Technical Standards of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009." The Resolution, which has no binding power, in apparent anticipation of the delay in the Convention's entry into force, invites member states of the Organization to consider applying the technical standards contained in the Convention on a voluntary basis to ship recycling facilities under their jurisdiction and also invites the industry to apply the technical standards contained in the Convention to ships and to ship recycling facilities. The government of India adopted its "Shipbreaking Code, 2013," which replicated substantial parts of the technical standards of Hong Kong Convention and applied these to India's recycling industry. At the end of 2017, the government of India commenced pre-legislative consultations with stakeholders on its draft "Safe and Environmentally Sound Recycling of Ships Bill, 2017," to give effect to the provisions of Hong Kong Convention. The government of Bangladesh also commenced the process of aligning its regulations with Hong Kong Convention with the adoption of "The Ship Breaking and Recycling Rules, 2011." On January 23, 2018, the country's Parliament adopted the "Bangladesh Ship Recycling Act 2018," which aims to create the necessary capacity and infrastructure for Bangladesh to meet the requirements of HKC within the next 5 years. In Europe, the "Proposal

Fig. 6.14 Yard in Alang with HKC SOC by ClassNK

for a Regulation of the European Parliament and of the Council on ship recycling," which led to the development of the European Regulation on Ship Recycling, had the stated aim to "bring into force the requirements of Hong Kong Convention, therefore hastening its entry into force globally."

The delays of governments to accede/ratify Hong Kong Convention, concerns over a ban to beaching by the European Regulation, the propaganda of the NGO Platform, and the decline of the Chinese ship recycling market led a number of quality shipping companies, first from Japan and then from Europe, to work closely with selected recycling yards in India who agreed to upgrade their infrastructure, training, and procedures so as to comply with Hong Kong Convention. Initially four recycling yards decided to invest in improvements, on the expectation that they would benefit financially from the custom of quality shipping companies who needed the availability of yards that can recycle ships in compliance to Hong Kong Convention. Following more than 1 year's work, toward the end of 2015, the four yards were awarded Statements of Compliance (SOCs) with Hong Kong Convention by Japan's ClassNK. Figures 6.14 and 6.15 were taken at two of these yards. What followed can be described as a virtuous cycle at work. With growing demand for responsible recycling from shipowners, a two-tier market developed with a price differential between normal recycling and responsible (or green) recycling. The four compliant yards enjoyed demand for their services, which was reflected in profitable

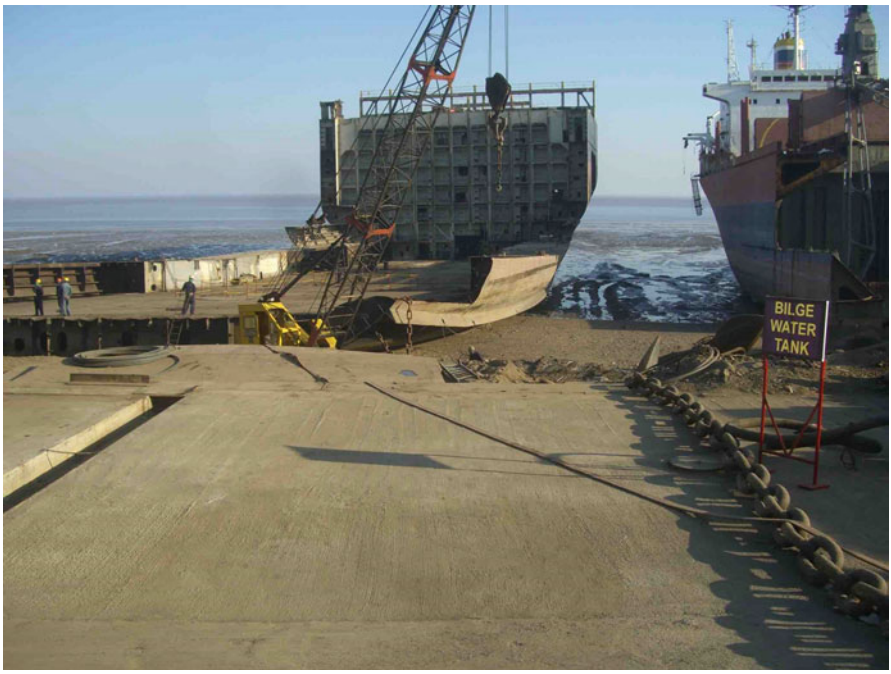


Fig. 6.15 Yard in Alang with HKC SOC by ClassNK

contracts. Profiting from compliance with Hong Kong Convention incentivized numerous other recyclers in Alang to start upgrading and to seek Statements of Compliance for their yards. Whereas in 2015 the majority of the recycling industry in Alang was openly hostile toward Hong Kong Convention, attitudes changed and as of April of 2018, 61 of Alang's 120 recycling yards had obtained Statements of Compliance with HKC from IACS classification societies, while a further seven yards were working toward their certification.

Following the voluntary initiatives taken by the shipping and the ship recycling industries, the European Commission is now in a position to further motivate the virtuous cycle of improved standards for improved rewards, by approving the leading yards in India and, in this way, helping increase the number of ships that are seeking responsible recycling in the traditional recycling centers.

Whereas so far limited progress has taken place in Bangladesh (and even more limited in Pakistan), one of the largest yards in Bangladesh has taken notice of the growing international expectations for improved ship recycling standards and has responded with startling improvements to its infrastructure and working procedures, as can be seen in Fig. 6.16.

Until governments finally bring Hong Kong Convention into force, the shipping industry will need to continue to support and to channel its business to those yards that are investing in improved standards.

Fig. 6.16 PHP Shipbreaking and Recycling Industries Ltd. in Chittagong Bangladesh with HKC SOC by RINa

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