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« Ship scrapping and recycling : Prospects and outlook »

The economics of ship recycling are primarily driven by market forces and international economic cycles: oil prices, freight rates, metal markets, fleet maintenance costs, and regulatory updates (such as the ban on single-hull tankers). Until the 1970s, end-of-life vessels were predominantly dismantled in European and US shipyards and/or could be subject to deep-sea disposal (océanisation)¹. Today, this hazardous and highly polluting industry has relocated almost exclusively to South Asia and Turkey. The international community, under the aegis of the United Nations as well as regionally within the EU, attempts to regulate this activity with varying degrees of success. This section outlines the structural state of the sector.

Context and operating environment

For developing nations, the shipbreaking sector serves as a critical source of raw materials (steel, iron, aluminum, and plastics) while acting as a major provider of local employment. However, much like the wider industrial sector in these regions, it is synonymous with severe threats to workers and the environment due to the absence of safety measures, occupational health protections, and ecosystems safeguarding. A vessel inevitably contains hazardous materials and toxic substances (asbestos, PCBs, PCTs, heavy metals, operational oils, hydrocarbon sludges, and toxic gas fumes). In Chattogram (Bangladesh), Alang-Sosiya (India), and Gadani (Pakistan), ships are dismantled almost exclusively on tidal beaches, a practice known as "beaching." In the Indian subcontinent, vessels are entirely recycled, including their internal accommodations. What would be treated as ultimate hazardous waste in other countries feeds local or even international markets here, provided the salvaged items hold aesthetic or functional value.

Faced with this massive social, regulatory, and environmental differential, it is exceptionally difficult for OECD countries to maintain and develop a domestic shipbreaking industry, particularly for large ocean-going commercial vessels. Nevertheless, international and regional initiatives are attempting to bridge these regulatory gaps by promoting safe and environmentally sound ship recycling, given the impossibility of nearshoring this industry. These frameworks, targeting an enhanced integration of human rights and environmental protection, must be adopted at both the State and corporate levels, especially by shipowners anxious to safeguard their corporate brand image.

The inherently international character of maritime transport and ship recycling, coupled with the opacity of corporate contractual relationships, complicates the establishment of clear chains of liability in the event of maritime casualties. As soon as decommissioning is envisioned, vessels are typically sold to "cash buyers" (middlemen) who assume corporate ownership for highly variable periods. This ownership can last a few hours or days—the time required for the final voyage to the breaking yard—or expand to several months when freight rates rise or during periods of raw material market speculation.

The vessel is systematically registered under a flag of convenience offering attractive fiscal and regulatory frameworks, such as those of Palau, the Comoros, Gabon, or Saint Kitts and Nevis (frequently placed on the grey or black lists of the Paris MoU). In 2019, the NGO Robin des Bois estimated that 41% of vessels bound for demolition changed their flag for their final voyage. Beyond this practice of end-of-life flagging (*dépavillonnement*), optimizing the ultimate voyage or towage operations frequently introduces severe operational risks.

A stark reminder is the unprecedented configuration of the *Maersk Battler* towing the *Maersk Shipper* and *Maersk Searcher* abreast (*à couple*) during the winter season in the North Atlantic. These towed

¹ Now regulated by the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, adopted on November 13, 1972, and entering into force on August 30, 1975, with its 1996 Protocol entering into force on March 24, 2006.

vessels were unmanned, lacked propulsion, and had not undergone prior environmental remediation (retaining significant volumes of operational hydrocarbons). This convoy departed Denmark bound for Turkey, where the three units were scheduled for dismantling. Coastal States were never notified of this high-risk towage operation. Following a sequence of structural failures, the two towed vessels ultimately foundered within the French Exclusive Economic Zone (EEZ) off the coast of Brittany on December 22, 2016. According to towage professionals, "this convoy was doomed to fail from the very moment it unmoored"². This case demonstrates that critical risk-taking frequently occurs at the very first stage of a decommissioning project.

Market dynamics

Following the 2008 financial crisis, and throughout the subsequent decade characterized by chronic sectoral fleet overcapacity and a slowing of global trade growth, shipbreaking emerged as a structural necessity to remove surplus tonnage from global markets. The recycling market remains significant, even though annual volumes contracted over the decade, dropping roughly from 1,000 to 500 vessels, and from 40 million dwt to 20 million dwt, with 2019 recording exceptionally low levels. Making up the bulk of the global fleet, container ships, bulk carriers, and tankers represent the most heavily dismantled asset classes, alongside smaller volumes of aging general cargo ships, Ro-Ro vessels, and ferries.

Each maritime shipping market obeys its own distinct dynamics. High freight rates incentivize shipowners to retain their vessels in active service, as observed in the tanker sectors during 2014 and 2015. Conversely, sudden market collapses trigger massive waves of decommissioning, as seen in the dry bulk sectors in 2012, 2015, and 2016, and in the container sectors in 2015 and 2016. At the onset of the Covid-19 pandemic, it appeared that the global crisis would severely depress the shipping industry. However, in 2020, the number of bulkers sent to yards doubled, while tankers and container ships held steady. This was followed by two diametrically opposed market situations during 2021: a booming container market kept every available vessel in service, while a depressed tanker market forced the massive destruction of its tonnage. To this must be added the highly specific case of cruise ships, with around fifteen large liners sent directly to breaking yards.

The shipbreaking market is concentrated around the South Asian trio (Bangladesh, India, and Pakistan), complemented by Turkey. These stakeholders invariably recycle 93% of the total global tonnage. They capitalize on a large, low-cost labor force alongside a near-total absence of occupational health, safety, and labor rights measures (lack of mechanical lifting equipment, personal protective equipment [PPE], social security in the event of accidents or illnesses, and continuous exposure to hazardous substances). Environmental protection is equally deficient.

The selling price of scrap metal is one of the pivotal parameters governing the sector, fluctuating across both space and time. Metals, and iron ore first and foremost, are subject to intense market speculation like any other raw material. Within both the Indian subcontinent and Turkey, per-tonne prices experienced a sharp increase between 2019 and 2021, surging from \$400 to \$600 in the Indian subcontinent and from \$250 to \$300 in Turkey.

An international regulatory framework: Pioneering but ineffective

The Basel Convention or the lack of maritime scope

The Basel Convention³ aims to reduce the volume of transboundary movements of hazardous waste⁴ to protect human health and the environment by establishing a control system for export, import, and transit operations. It also governs the disposal of hazardous waste. To this end, it prescribes a global system of prior notification and consent for hazardous waste movements between nations. However, the Basel Convention is not a regulatory tool specifically tailored for end-of-life vessels. A ship can simultaneously fall under the definition of waste—which an owner intends to "dispose of"—and be

² Sinking of the vessels *Maersk Searcher* and *Maersk Shipper*, waste transfers and ship decommissioning, legal levers and technical best practices - CGEDD Report No. 010951-01, IGAM No. 2017-107, prepared by Jean-Marie Berthet (CGEDD), Rouchdy Kbaier (CGEDD), Jean-Luc Veille (IGAM), July 2017.

³ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, adopted on March 22, 1989, and entering into force in 1992, to which 187 States are Parties.

⁴ Wastes' means substances or objects which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law.

considered an active vessel, particularly if it remains fit for navigation, or a resource through the recycling value of its constituent materials.

In practice, a shipowner's intent to "dispose of" a vessel is never explicitly manifest during the final voyages. Consequently, the convention is rarely applicable. Faced with these gaps, another legal tool was carved out under the aegis of the IMO to specifically frame ship "recycling": the Hong Kong (HK) International Convention for the Safe and Environmentally Sound Recycling of Ships⁵.

The Hong Kong Convention or the consensus of recycling States

Following an IMO international diplomatic conference, the Hong Kong Convention was adopted on May 15, 2009. This text covers the entire lifecycle of vessels with a gross tonnage (GT) > 500 (excluding naval and state-owned ships). Its purpose is to bridge international law deficiencies and promote—from vessel design and construction to operation, maintenance, and ultimate dismantling—methods compatible with international mandates for health and environmental protection. States Parties will be required to ensure that vessels flying their flag or operating under their authority comply with the convention's requirements through the mandatory issuance of specific documentation:

- The International Certificate on Inventory of Hazardous Materials (IHM), certifying that the vessel possesses an active log of potentially dangerous substances on board.
- The International Ready for Recycling Certificate (IRRC), required before the vessel is taken out of service and prior to the commencement of any recycling operations.

States Parties must also ensure that ship recycling facilities falling under their jurisdiction operate in strict compliance with the convention's prescriptions:

- Facilities must implement industrial procedures and techniques that *"do not pose risks to the health of the workers concerned or the population in the vicinity of the ship recycling facility and which are designed to prevent, reduce, minimize, and/or eliminate adverse effects on the environment caused by ship recycling."* This formal authorization granted by national competent authorities is valid for a maximum of five years.
- An emergency preparedness and response plan must be drafted to handle operational casualties, alongside fire and explosion hazards.

Each vessel must be subject to a specific ship recycling plan.

- Approved facilities must ensure the complete removal of all hazardous materials present on board the vessel.
- A statement of completion must be issued.

Certain observers criticize the convention for failing to govern the entire waste treatment process down to its ultimate disposal. Furthermore, it prescribes no geographical restrictions on exports as long as the facility is authorized by the signatory State in which it is located. The practice of beaching is not addressed.

The obligations incumbent upon vessels can be verified through Port State Control by States Parties to the convention. However, only the flag State holds the legal authority to sanction a non-compliant shipowner under its domestic judicial framework.

The convention will only enter into force 24 months after ratification by at least fifteen States, whose combined merchant fleets represent 40% of global gross tonnage, and whose own annual ship recycling volume accounts for at least 3% of their combined tonnage. Today, there are only sixteen contracting States (Belgium, Congo, Croatia, Denmark, Estonia, France, Germany, Ghana, India, Japan, Malta, Norway, Panama, the Netherlands, Serbia, and Turkey) to the convention, representing approximately 29.58% of the global merchant fleet's gross tonnage. Notably, the entry into force of an IMO standard is customarily conditioned upon a minimum number of States and a minimum fraction of world tonnage. The draconian and cumulative conditions for its entry into force depend primarily on the commitment of the world's major maritime powers and large recycling nations, who are the principal stakeholders. Without waiting for the ratification and entry into force of the Hong Kong Convention, the EU initiated reflections and consultations on the matter as early as 2007. The objective was to promote the

⁵ Ship recycling' means the activity of dismantling a ship full or in part at a ship recycling facility in order to recover components and materials for reprocessing or reuse, whilst taking care of hazardous and other materials, and includes associated operations such as storage and treatment of components and materials on site, but not their further processing or disposal in separate facilities.

ratification of the Hong Kong Convention by Member States and propose a specific European regulation designed to anticipate the entry into force of the said convention.

A proactive European stance

European companies own 40% of the global commercial fleet. However, as soon as decommissioning is envisioned, vessels systematically cease to fly the flag of a Member State and pass under the ownership of non-European corporate operators.

Within EU countries, the domestic sector is confined to a "pre-cleaning" (decontamination) framework for end-of-life vessels, alongside a shipbreaking market limited to small units or state-owned public property. The fierce competition between facilities complying with stringent technical standards and those failing to meet them in developing countries stifles any emergence of a large commercial shipbreaking industry in Europe. Coastal land-use constraints, economic trade-offs (prioritizing shipbuilding, ship repair, and offshore engineering works, which represent far more profitable segments), the lack of professional attractiveness of these trades, and public opposition linked to industrial nuisances (noise, visual impact, etc.) are all decisive factors explaining the absence of a nearshored shipbreaking industry within the EU.

Nevertheless, the EU seeks to regulate this activity, notably for vessels flying the flag of a Member State, by making their dismantling mandatory within ship recycling facilities approved by Brussels under a series of requirements related to worker safety and environmental protection⁶. This framework mirrors the prescriptions of the Hong Kong Convention, notably through the implementation of a system of surveys and the issuance of certifications and authorizations for large commercial vessels flying a Member State flag, covering their entire lifecycle from construction and operation to recycling.

European vessels must compile an Inventory of Hazardous Materials (IHM) and apply for an inventory certificate required by the flag State as soon as the vessel is operational. Inspections for non-EU vessels (statements of compliance) are performed under Port State Control, but sanctions for non-compliance are not deterrent (warnings to shipowners or logging a deficiency); vessel detention cannot be enforced by the port State for a failure to update hazardous materials logs. It is up to the flag State to compel the vessel to comply with this standard.

The European ^{***}List of ship recycling facilities^{***7} features around forty sites, thirty-five of which are located within Member States, Norway, and the United Kingdom. Seven other yards have been approved outside the EU, including eight in Turkey and one in the United States, but none in South Asia. Notably, there are no geographical restrictions, and the approved sites in Turkey (Aliaga) officially utilize the beaching method.

Given that end-of-life flagging (*dépavillonnement*) remains standard practice, the actual impact of this Regulation on global ship dismantling can be questioned. However, European legislators are fully aware of this loophole. Regulation (UE) No 1257/2013 stipulates: *"In the interest of protecting human health and the environment and having regard to the 'polluter-pays' principle, the Commission should examine the feasibility of establishing a financial mechanism applicable to all ships calling at a port or anchorage of a Member State, irrespective of the flag they fly, to generate resources that would facilitate the safe and environmentally sound recycling and treatment of ships without encouraging flagging changes."*

The Commission's Green Paper of May 22, 2007, on better ship dismantling practices already highlighted the "polluter-pays" principle at the time. Shipowners were expected to internalize the decommissioning of their end-of-life vessels through the creation of a mandatory international ship dismantling fund under the form of a levy or insurance managed by the IMO, or, if unfeasible, via a regional system. On a European scale, this fund would serve to subsidize European shipowners opting for recycling facilities implementing the strictest standards. The fund would be financed by dues levied on vessels calling at EU ports based on their tonnage. The vessel would be required to have flown a Member State flag for at least two years. Some fear that this fund would penalize the competitiveness of European ports as well as that of Member State flags. The recovery mechanism also appears complex in both its implementation and deployment.

Internalizing the cost of dismantling right from the vessel's design stage represents a valuable avenue, utilizing financial guarantees similar to those established for decommissioning offshore wind farms, or

⁶ Regulation (EU) No 1257/2013 of the European Parliament and of the Council of November 20, 2013, on ship recycling."

⁷ Commission Implementing Decision (EU) 2016/2323 of 19 December 2016 establishing the European List of ship recycling facilities pursuant to Regulation (EU) No 1257/2013 of the European Parliament and of the Council on ship recycling.

mirroring the compensation funds for oil pollution damage under the framework of the International Convention for the Prevention of Pollution from Ships (the convention of November 2, 1973, known as "MARPOL"). The Green Paper also mentioned *"the deployment of technological assistance, technology transfer, and the dissemination of best practices to developing countries active in recycling,"* alongside *"the development of European shipbreaking capacities to the extent that available means are insufficient to decommission all tankers and other large commercial vessels flying the flag of a Union Member State and belonging to a company domiciled within the Union."* Fourteen years later, force is to recognize that the situation has not evolved significantly.

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