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This chapter provides a summary of important international legal and regulatory issues, as well as some related technological developments during the period under review, and presents some policy considerations.

Among the issues worth highlighting is the need to implement IMO resolution MSC.428(98) of 16 June 2017 on maritime cyberrisk management in safety management systems, which encourages Administrations to ensure that cyberrisks for shipping are appropriately addressed in safety management systems, effective 1 January 2021. Thus, in preparation for its implementation – ahead of the first inspection by the international safety management auditors after 1 January 2021 and particularly during 2020 – shipping companies need to assess their risk exposure and develop information technology policies to include in their safety management systems, in order to mitigate increasing cyberthreats. Owners who fail to do so may risk having their ships detained by port State control authorities. Strengthening cybersecurity is likely to increase in importance, given that cyberrisks have grown, with greater reliance on virtual interaction as a result of the ongoing COVID-19 crisis.

In addition, work is progressing with respect to the development, testing and operation of maritime autonomous surface ships, and their market value is growing. Industry collaboration on the use of autonomous drones is also continuing, including with regard to inspections and commercial drone delivery to vessels anchored in port. The use of electronic trade documentation has increased in importance, particularly in the context of the COVID-19 pandemic, and international organizations and industry bodies have issued calls for Governments to remove restrictions on the use and processing of electronic trade documents, and where possible, ease requirements for any documentation to be presented in hard copy.

Other important regulatory developments relate to the reduction of greenhouse gas emissions from international shipping and other ship-source pollution control and environmental protection measures. Issues covered include shipping and climate change mitigation and adaptation; air pollution, in particular sulphur emissions; ballast water management; biofouling; pollution from plastics and microplastics; safety considerations of new fuel blends and alternative marine fuels; and the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction. In addition, an important development covered in this chapter includes a decision by the European Commission to extend the liner shipping Consortia Block Exemption Regulation[25] until 25 April 2024.

LEGAL ISSUES
AND REGULATORY
DEVELOPMENTS

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[25] Commission Regulation (EC) No 906/2009 of 28 September 2009 on the application of article 81(3) of the Treaty to certain categories of agreements, decisions and concerted practices between liner shipping companies (consortia).

LEGAL ISSUES AND REGULATORY DEVELOPMENTS

Legal issues

Coordinated government and collaborative industry action, as well as commercial risk-allocation through standard form contractual clauses, will be required to address wide-ranging commercial law implications of the COVID-19 crisis and ensure that legal and administrative systems do not become overwhelmed.
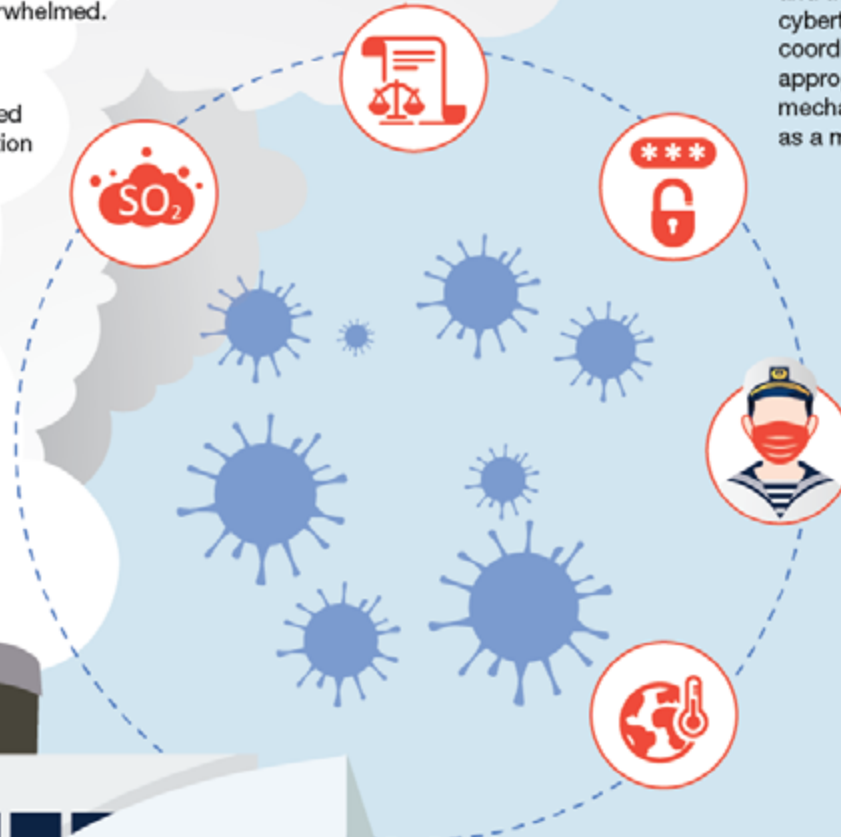
Cybersecurity

With increasing reliance on virtual interactions as a result of the ongoing COVID-19 crisis, and the related rise in cyberthreats and vulnerabilities, coordinated efforts to develop appropriate cybersecurity mechanisms should be pursued as a matter of urgency.

Sulphur limit

Despite some COVID-19-related disruptions in the implementation on **1 January 2020** of the mandatory IMO sulphur limit and the ban on the carriage on non-compliant fuel oil as of **1 March 2020**, steps should be taken to ensure that delays will not unduly impact full implementation.

Seafarers' travel restrictions

Designating seafarers and other marine personnel "key workers" will ensure that crew changes can be carried out. This calls for a comprehensive and coordinated global approach.

Climate change adaptation

Critical transport infrastructure will remain an important challenge during post-pandemic recovery, particularly for small island developing States and other vulnerable countries.

A. TECHNOLOGICAL DEVELOPMENTS AND EMERGING ISSUES IN THE MARITIME INDUSTRY

1. Ensuring maritime cybersecurity

Ship cybersecurity

Ships have become better integrated into information technology networks. Moreover, communication and operational processes have been further digitalized, and smart navigation and advanced analytics are being used to optimize ship operations and reduce fuel consumption and greenhouse gas emissions. In line with these recent trends, implementing and strengthening cybersecurity measures has become a priority for shipowners and managers. In 2019, cyberincidents were rated second among the top five risks for the maritime and shipping sector, according to a major industry survey (Allianz, 2019). While cyberrisks had already become a major concern, the COVID-19 crisis has compounded existing problems and provided a new impetus for action. The importance of cybersecurity is expected to grow further, given the increasing reliance on virtual interactions as a result of the pandemic, and the related rise in cyberthreats and vulnerabilities.

The Digital Container Shipping Association – a consortium of nine container lines[26] – recently published a cybersecurity implementation guide to ensure vessel preparedness for relevant IMO regulations, outlining best practices that would provide all shipping companies with a common language and a manageable, task-based approach for meeting the IMO implementation deadline of January 2021 (Digital Container Shipping Association, 2020a). The guide is in line with BIMCO and National Institute of Standards and Technology cyberrisk management framework guidelines, enabling shipowners to effectively incorporate cyberrisk management into their existing safety management systems. The guide aims to provide a management framework that can be used to reduce the risk of cyberincidents that could affect the safety or security of vessels, crews or cargo. It breaks down the BIMCO framework into themes and maps them to the controls that underpin the functional elements of the Institute: identify, protect, detect, respond, recover (Digital Container Shipping Association, 2020b). In January 2020, the first cybersecurity management system – that of the Nippon Yusen Kabushiki Kaisha Group – had already been certified by industry classification society Nippon Kaiji Kyokai, commonly known as ClassNK, as being compliant with the latest IMO guidelines (Nippon Yusen Kabushiki Kaisha Line, 2019).

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[26] Maersk Line, CMA CGM, Hapag-Lloyd, Mediterranean Shipping Company, Ocean Network Express, Evergreen Line, HMM, Marine Transport Corporation and Zim Integrated Shipping Services, covering 70 per cent of world trade. The consortium was first launched in November 2018.

Among the relevant IMO instruments, the above-mentioned IMO resolution on maritime cyberrisk management in safety management systems affirms that an approved safety management system should take into account cyberrisk management in accordance with the objectives and functional requirements of the International Safety Management Code[27] and encourages Administrations to ensure that cyberrisks are appropriately addressed in safety management systems no later than the first annual verification of the company's document of compliance after 1 January 2021 (IMO, 2017a).

The International Safety Management Code, in force since 1 July 1998, is now more important than ever to ensure that vessels become cyberresilient and report any identified cyberrisk, given that the underreporting of cybersecurity incidents is considered a problem in the maritime industry (Safety4Sea, 2019a). Many issues may be identified on board ships that make them more vulnerable to cyberattacks, including unsecure networks and software, lack of seafarer training and insufficient protection of data. Shipping companies will need to consider these issues and include cyberrisk into their safety management systems, so they know how to deal with and approach a cyberincident. As this will require some time, all work should be completed ahead of the first inspection by International Safety Management auditors after 1 January 2021. Owners who fail to comply may risk having their ships detained by port-State control authorities that will aim to enforce the requirement in a uniform and equitable manner. At the same time, implementing cybersecurity is important to protect shipping assets and technology from mounting cyberthreats, in particular given that cyberrisks are expected to grow, with greater reliance on virtual interaction as a result of the ongoing COVID-19 crisis.

Cybersecurity is covered under the International Ship and Port Facility Security Code, in force since 1 July 2004 (see BIMCO et al., 2018 for related guidance). Thus, as set out in part A, section 8.4 of the Code, ship security assessment shall include, inter alia, "2. the identification and evaluation of key ship board operations that it is important to protect; 3. identification of possible threats to the key ship board operations and the likelihood of their occurrence, in order to establish and prioritize security measures; and 4. the identification of any weakness, including human factors in the infrastructure, policies and procedures".

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[27] The main purpose of the International Safety Management Code is to provide an international standard for the safe management and operation of ships and for pollution prevention. It establishes safety management objectives and requires a safety management system to be established by "the Company", which is defined as the shipowner or any person, such as the manager or bareboat charterer, who has assumed responsibility for operating a ship. The company is then required to establish and implement a policy for achieving these objectives (www.imo.org/en/OurWork/HumanElement/SafetyManagement/Pages/ISMCode.aspx).

Part B, section 8.3 of the Code states that a ship security assessment should address, among others, the following elements on board or within the ship: "5. radio and telecommunications systems, including computer systems and networks, and 6. other areas that may, if damaged or used for illicit observation, pose a risk to persons, property or operations on board a ship or within a port facility".

With regard to cyberrisks, the IMO Assembly had as early as 2017 adopted a strategic plan that recognized the need to integrate new and advancing technologies into the regulatory framework for shipping (IMO, 2017b). In addition, to support effective cyberrisk management, two IMO committees, the Maritime Safety Committee and the Facilitation Committee, had adopted guidelines that provide high-level recommendations to safeguard shipping from current and emerging cyberthreats and vulnerabilities. These recommendations can be incorporated into existing risk management processes and are complementary to the safety and security management practices already established by IMO (that is to say, the International Safety Management Code and the International Ship and Port Facility Security Code) (IMO, 2017c). These guidelines present five functional elements: to identify, protect, detect, respond and recover.[28]

Other useful guidance, standards and regulations, adopted at the international, regional and national levels, are described below.

European Union Network and Information Security Directive (EU) 2016/1148 requires all Member States to protect their critical national infrastructure by implementing cybersecurity legislation by May 2018 (European Union, 2016). Inter alia, the Directive in chapter 2 lays down obligations for all Member States to adopt a national strategy on the security of network and information systems; creates a cooperation group to support and facilitate strategic cooperation and the exchange of information among Member States; establishes a computer security incident response teams network; sets security and notification requirements for operators of essential services and digital service providers; and spells out obligations for Member States to designate national competent authorities, single points of contact and computer security incident response teams. The Directive covers organizations in vital sectors that rely heavily on information networks and are referred to as "operators of essential services", including those in energy, transport, utilities, banking and finance, digital services and health care. As noted in preambular paragraph 10, in the water transport sector, security requirements for companies, ships, port facilities, ports and vessel traffic services under European Union legal acts cover all operations, including radio

and telecommunication systems, computer systems and networks.

International standard 27001:2013 of the International Organization for Standardization and International Electrotechnical Commission, commonly known as ISO/IEC 27001:2013, specifies the requirements for setting up, implementing, maintaining and continually improving an information security management system within the context of an organization (International Organization for Standardization, 2013). It also includes requirements for the assessment and treatment of information security risks tailored to the needs of the organization. The requirements are generic and are intended to be applicable to all organizations, regardless of type, size or nature.

The Framework for Improving Critical Infrastructure Cybersecurity of the United States National Institute of Standards and Technology was prepared to assist companies with their risk assessments by helping them understand, manage and express potential cyberrisks internally and externally (National Institute of Standards and Technology, 2018).

The Code of Practice on Cybersecurity for Ships of the United Kingdom was drawn up to help companies develop cybersecurity assessments and plans, and mitigation measures, and to manage security breaches; it should be used along with ship security standards and other relevant IMO regulations (Institution of Engineering and Technology, 2017).

Guidelines on Cybersecurity on Board Ships offer guidance to shipowners and operators on procedures and actions to maintain the security of cybersystems in the company and on board ships (BIMCO et al., 2018).[29] Both the IMO guidelines and the United States National Institute of Standards and Technology framework have been taken into account. The guidance specifies, among others, that company plans and procedures for cyberrisk management should be incorporated into existing security and safety risk management requirements contained in the International Safety Management Code and the International Ship and Port Facility Security Code.

In the Asia-Pacific region, for instance, many countries have developed cybersecurity legislation and policy, elements of which are applicable across all industry areas; they have also set up relevant implementing bodies and entities both at the national and regional levels. However, sector-specific guidance and initiatives tailored to business needs, or the provision of methods to address unique risks or specific operations in certain sectors, including in the maritime sector, appear to be limited in the region (BSA/The Software Alliance, 2015; North Atlantic Treaty Organization Cooperative Cyberdefence Centre of Excellence, 2019).

At the national level, for instance, the China Classification Society in July 2017 issued guidelines on requirements and security assessments of ship cybersystems, offering

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[28]   For information on a platform aimed at helping shipowners and operators to better understand their vulnerabilities and improve their cybersecurity processes and systems ahead of the IMO deadline, see Safety4Sea, 2020a.

[29]   For additional industry guidelines, see also Safety4Sea, 2018.

solutions for the increasingly serious threat to ship cybersecurity (China Classification Society, 2017). In February 2020, the Republic of Korea released guidelines based on international standards for type approval of maritime cybersecurity to help inspect the cybersecurity level and functioning of cybersystems, including remote access equipment, integrated control and monitoring systems on board ships (Safety4Sea 2020a).

Port cybersecurity

Ports are important to keep supply chains moving and economies across the world functioning. While they are becoming "smart", relying more on technologies and digitalization to become more competitive and optimize operations, ports are also facing increased cybersecurity challenges and threats. A recent report on port cybersecurity identifies the following good practices for terminal operators and officials responsible for cybersecurity implementation at port authorities (European Union Agency for Cybersecurity, 2019):

- Define clear governance concerning cybersecurity at port level, involving all stakeholders involved in port operations.

- Raise awareness of cybersecurity matters at port level and foster a cybersecurity culture.

- Enforce the technical cybersecurity basics such as network segregation, updates management, password hardening and segregation of rights.

- Consider security by design in applications, especially since ports use many systems, some of which are opened to third parties for data exchange. Any vulnerability in those systems can be a gateway to compromising port systems.

- Enforce detection and response capabilities at port level to react as quickly as possible to any cyberattack before it affects port operation, safety or security (see www.sauronproject.eu/).

Prompted by the Ryuk ransomware attack on enterprise environments in December 2019[30] (National Cybersecurity Centre, 2019; United States Coast Guard, 2019a) and by concerns that the maritime network is vulnerable to cybercrime (Riviera, 2019; United States Coast Guard, 2019b), the United States Coast Guard issued new guidelines for dealing with cyberrisks at Maritime Transportation Security Act regulated facilities (United States Coast Guard, 2020). According to the guidelines, regulated facilities must assess and document risks associated with their computer systems and networks in a facility security assessment and address them in a facility security plan or alternative security programme. Following this, owners and operators must demonstrate compliance. To allow time for owners or operators of such facilities to tackle cybersecurity vulnerabilities, the initial

implementation period is 1.5 years with no further need to update a facility security assessment or an alternative security programme until 30 September 2021.

Similarly, the Department for Transport of the United Kingdom updated its 2016 cybersecurity guidance for ports and the wider maritime industry against cyberthreats. The guidance aims to help ports develop cybersecurity assessments and identify gaps in their security, while providing advice on handling security breaches and incidents and defining clear roles and responsibilities to deal with cyberattacks (Institution of Engineering and Technology, 2020).

COVID and maritime cybersecurity

Maritime digitalization has been an ongoing trend for some time both on board ships and ashore. The COVID-19 outbreak has heightened the need for digitalization and has brought maritime industry stakeholders closer through the collaborative use of digital technologies. These include video conferencing and other online platforms, as well as the sharing and remote monitoring of data to ensure that supply chains continue to function (Riviera, 2020a; Riviera, 2020b). At the same time, reports indicate an increase in shipping cyberattacks of 400 per cent between February and June 2020 (Splash, 2020a). According to cybersecurity systems provider Naval Dome, the ability of companies to sufficiently protect themselves has been reduced by travel restrictions, social distancing measures and economic recession. However, the primary reason behind this spike has been an increase in malware, ransomware and phishing emails exploiting the COVID-19 crisis (Marine Link, 2020).

With regard to ports, for instance, the COVID-19 crisis demonstrated that while some port communities had already digitalized their business processes and developed into smart ports, many others were lagging behind, relying heavily on personal interaction and paper-based transactions as the norm, for shipboard-, ship–port interface- and port–hinterland-based exchanges. As highlighted in a recent port industry policy statement, only 49 of the 174 IMO Member States have functioning port community systems (International Association of Ports and Harbours et al., 2020a). In these circumstances, the main shipping and port industry organizations have launched a call to action to accelerate the digitalization of maritime trade and logistics.[31] They have set the following priorities:

- Assess the state of implementation and find ways to enforce the already mandatory requirements defined

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[30] Encryption was used to block access to systems, devices or files until a ransom was paid.

[31] BIMCO, Federation of National Associations of Ship Brokers and Agents, International Association of Ports and Harbours, International Cargo Handling Coordination Association, International Chamber of Shipping, International Harbour Masters Association, International Marine Purchasing Association, International Port Community Systems Association, International Ship Suppliers and Services Association, and the Protect Group.

in the IMO Convention on Facilitation of International Maritime Traffic, 1965 to support the transmission, receipt and response of information required for the arrival, stay and departure of ships, persons and cargo, including notifications and declarations for customs, immigration, and port and security authorities, through electronic data exchange.

- Ensure the harmonization of data standards beyond the aforementioned Convention to facilitate the sharing of port and berth-related master data for just-in-time operation of ships and optimum resource deployment by vessel services and suppliers, logistics providers, cargo handling and clearance, thereby saving energy, improving safety and cutting costs and emissions. This can be achieved by using the supply-chain standards of the International Organization for Standardization, the standards of the International Hydrographic Organization and the *IMO Compendium on Facilitation and Electronic Business*.

- Strive for the introduction of port community systems (www.ipcsa.international/) and secure data exchange platforms in the main ports of all Member States represented in IMO.

- Review existing IMO guidance on maritime cyberrisk management with regard to its ability to address cyberrisks in ports, developing additional guidance where needed.

- Raise awareness, avoid misconceptions and promote best practices and standardization on how port communities can apply emerging Internet technologies and automation; facilitate the implementation of such emerging technologies and other innovative tools to increase health security in port environments; and develop a framework and road map to facilitate the implementation and operationalization of digital port platforms that can connect with hinterland supply chains as well, and where data can be securely shared.

- Establish a coalition of stakeholders willing to improve transparency of the supply chain through collaboration and standardization, starting with the overdue introduction of the electronic bill of lading.

- Set up a capacity-building framework to support smaller, less developed and understaffed port communities, not only by providing technical facilities but also by training personnel (International Association of Ports and Harbours et al., 2020a).[32]

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[32] For more information and a list of maritime technology initiatives that have been made available to help the industry deal with the disruption caused by the pandemic, see https://thetius.com/maritime-technology-initiatives-supporting-the-industry-covid-19-response. Also see International Association of Ports and Harbours et al., 2020b.

Given that digitalization and cyberrisks and vulnerabilities are growing during the ongoing COVID-19 crisis and its aftermath, related capacity-building will be required for many developing countries. On a more general note, in the developing world at large, the lack of reliable and affordable Internet services and a widespread digital divide continue to be a major concern, which needs to be effectively addressed (see Economic Commission for Asia and the Pacific, 2019).

2. Technological developments in shipping

Autonomous ships, navigation systems and drones

Work is advancing on the development of maritime autonomous surface ships, drones and navigation systems (see also UNCTAD, 2018; UNCTAD, 2019a). In 2019, it was announced that the Mayflower autonomous ship[33] would be attempting the world's first unmanned transatlantic crossing from Plymouth, United Kingdom, to Plymouth, Massachusetts, United States in the second half of 2020. This was described as a symbolic voyage, whereby a new Mayflower would set sail 400 years after the historic voyage, this time using artificial intelligence and other advanced technologies, providing for safer navigation and hazard avoidance (Safety4Sea, 2019b). The full-size, fully autonomous research ship was launched on 16 September 2020 and during its journey would spend six months gathering data about the state of the ocean (BBC News, 2020).

According to a report by technology and innovation consultancy Thetius, the market for maritime autonomous surface ships is worth $1.1 billion annually and will grow by 7 per cent each year to $1.5 billion by 2025. In addition, 96 per cent of almost 3,000 patents relating to autonomous shipping technology worldwide were registered in China. According to the report, this will lead other nations to develop and implement autonomous shipping within five years (Thetius, 2020). The report does not appear to include COVID-19-related considerations, however.

Global navigation satellite systems, used for the safe navigation of ships, and automatic identification system signals via satellites, tracking ships around the world, are considered critical to improve the safety of ship navigation and the reliability of data for vessel tracking and analytics, including for insurance purposes (also see chapter 3A). However, the safety of such systems can be compromised by jamming, spoofing or hacking, as evidenced by various incidents, which can be dangerous and may lead to grounding and collisions.

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[33] Partners in this project are International Business Machines, Promare and the University of Plymouth, United Kingdom.

Automatic identification system tracking of ships may be occasionally disrupted, as some vessels switch off their devices when they enter zones in which they are legally prohibited from performing fishing or other illegal activities. Therefore, it is important to strengthen both global navigation satellite systems and automatic identification system communications, which both use satellites. For instance, the European Space Agency has started developing a solution to mitigate risks for its services in this area (Digital Ship, 2020).

Industry collaboration is continuing with respect to drones as well, including for instance, the launching in Singapore of a ship-to-shore pilot project by Wilhelmsen and Airbus, which worked to deploy drone technology in real-time port conditions, delivering a variety of small, time-critical items to vessels anchored in port (Splash, 2019), as well as the first commercial drone delivery to such vessels. Drone deliveries can help save costs, time and carbon-dioxide emissions compared with traditional shipping and have reduced unnecessary human contact during the pandemic. The drones that were used in the project could only deliver a maximum of 5 kg loads over 5 km, but the company was planning to complete the development of a drone that could carry 100 kg loads over 100 km, by the second half of 2021 (Splash, 2020b). In addition, in June 2020, the industry-first inspection by an autonomous drone, of an oil tank on a floating production, storage and offloading vessel, was completed. The drone uses light detection and ranging to navigate inside the tank, where reception of satellite signals for accurate positioning is unavailable in this enclosed space, and a three-dimensional map of the tank is created. As the technology matures, drones are expected to navigate more autonomously (Riviera, 2020c).

With regard to regulatory issues and intergovernmental meetings related to technology in shipping, the IMO Subcommittee on Navigation, Communications and Search and Rescue met in January 2020. It discussed advances in modernizing the Global Maritime Distress and Safety System – under the regulations in chapter IV of the International Convention for the Safety of Life at Sea, 1974, that is to say, performance standards for navigational and communication equipment. Interested parties were invited to give a progress report on updates to the document entitled "E-navigation strategy implementation plan: Update 1" (MSC.1/Circ.1595). The Subcommittee also reviewed issues related to the long-range identification and tracking system and testing and operating of maritime autonomous surface ships. The Subcommittee's recommendations will be reviewed by the Maritime Safety Committee at its next meeting. The Committee was scheduled to meet in May 2020, but the meeting was postponed because of the COVID-19 crisis (IMO, 2020a).

Regulatory and other issues related to maritime autonomous surface ships were on the agendas of the IMO Legal Committee (scheduled for March 2020) and the IMO Facilitation Committee (scheduled for April 2020); both meetings also had to be postponed.[34]

Paperless bills of lading

Negotiable bills of lading are used for the carriage of goods by sea, particularly in containerized transport, which carries the world's manufactured cargo. They are also used in the commodities trade in cost, insurance and freight terms (commonly known as CIF). Bills of lading must be physically presented to the carrier to obtain delivery, due to their documentary security function and their key role as a document of title in international trade (see Gaskell et al., 2000; UNCTAD, 2003). For various reasons, despite numerous attempts over the past decades, commercially viable electronic equivalents have only recently begun to emerge (UNCTAD 2003). The International Group of Protection and Indemnity Clubs provides indemnity insurance to about 90 per cent of the world's ocean-going tonnage (International Group of Protection and Indemnity Clubs, 2020). The Group has recognized six electronic bill-of-lading systems or providers to date (United Kingdom Protection and Indemnity Club, 2017; United Kingdom Protection and Indemnity Club, 2020a; United Kingdom Protection and Indemnity Club, 2020b). Against this background, and in the light of the increased need for virtual interactions resulting from the ongoing COVID-19 crisis, recent developments and efforts to enable and promote paperless bill of lading solutions, including the following, are particularly worth noting.

The Digital Container Shipping Association announced plans to promote an initiative to enable the open collaboration necessary for achieving full electronic bill of lading adoption, based on the belief that an electronic bill of lading would be beneficial for all parties in container shipping (JOC, 2019). As part of this initiative, the Association aims to develop open-source standards for necessary legal terms and conditions, as well as definitions and terminology to facilitate communication among customers, container carriers, regulators, financial institutions and other industry stakeholders. In its view, carriers could reduce costs and inefficiencies associated with the manual creation of paper documents. If successful, ports and regulatory agencies would benefit from having access to the digital data within the electronic bills of lading, and irregular shipping patterns would be easier to identify.

According to research by the Association, paper bill processing costs three times as much as electronic

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[34] IMO set a remote meeting plan for September–December 2020 (https://imo-newsroom.prgloo.com/news/imo-sets-remote-meeting-plan-for-september-december-2020).

bill of lading processing, which was determined to be an extra $4 billion annually in collective processing costs, at a 50 per cent adoption rate for the container shipping industry. With regard to the success of electronic air waybills for airfreight introduced by the International Air Transport Association in 2010, the Association suggests that a 50 per cent adoption rate may be feasible by 2030 if steps are taken now to begin standardizing electronic bills of lading (Digital Container Shipping Association, 2020c). This is an ambitious and worthwhile goal; however, air waybills, unlike negotiable bills of lading, do not serve as documents of title providing their holder with independent documentary security (UNCTAD, 2003). Therefore, there are fewer legal and regulatory problems associated with the use of electronic air waybills.

Progress is being made regarding acceptance of this technology by government authorities, banks and insurers, and this is likely to be accelerated as a result of the COVID-19 crisis. For instance, a number of Digital Container Shipping Association members had reported a sharp increase in electronic bill of lading adoption, in an effort to keep trade moving. As noted previously, the International Group of Protection and Indemnity Clubs has so far approved six electronic bill-of-lading systems or providers. As noted by the Association, in the case of negotiable bills of lading, the standard electronic bill of lading would likely have to be used in conjunction with new technologies, such as distributed ledger technology, peer-to-peer technology and blockchain technology, which offer potential solutions for eliminating the risk of a single catastrophic failure or attack that would compromise the integrity and uniqueness of an electronic bill of lading (Digital Container Shipping Association, 2020c; JOC, 2020).

Recently, Ocean Network Express, the world's sixth largest container line (see also chapter 2) became the latest shipping line to offer fully electronic bills of lading to their customers. The liner company recently announced that it had handled its first electronic negotiable bill of lading, using essDOCS's paperless document solution, CargoDocs, which is among the systems approved by the International Group of Protection and Indemnity Clubs (https://essdocs.com/). Ocean Network Express used this electronic bill of lading for a shipment of containerized synthetic rubber from the Russian Federation to China and is planning to allow customers to use electronic bills of lading on a regional and subsequently global basis commencing in the second quarter of 2020 as part of initiatives aimed at delivering an improved, digital customer experience (Ocean Network Express, 2020). Further, India is to integrate electronic bills of lading and digital documentation into the country's electronic port community system, incorporating the CargoX platform for blockchain document transfer into its infrastructure, to manage the secure exchange of data (Smart Maritime Network, 2020).

Given the number of earlier attempts to create commercially viable electronic alternatives to traditional paper-based bills of lading across the shipping industry, including, Bolero[35] and some other recent systems, such as essDOCS, the success of ongoing initiatives will remain to be seen. However, the COVID-19 crisis provides an added impetus for resolving long-standing legal and regulatory problems. The main challenge in efforts to develop electronic alternatives to the traditional paper bill of lading has been the effective replication of the document's functions in a secure electronic environment, while ensuring that the use of electronic records or data messages enjoys the same legal recognition as that of paper documents. For negotiable bills of lading, with the exclusive right to the delivery of goods traditionally linked to the physical possession of original document, this includes in particular, the replication, in an electronic environment, of the unique document of title function (UNCTAD, 2003). There are also concerns over legal enforceability, as not all Governments have legislative provisions to this effect in place.

Establishing the widespread use of a fully electronic equivalent to the traditional bill of lading will require much international cooperation and coordination to ensure that commercial parties across the world are readily accepting and using relevant electronic records, and that legal systems are adequately prepared. In addition, capacity-building may be required, particularly for small and medium-sized enterprises in developing countries that may lack access to the necessary technology or means of implementation. In this context, too, increasing cybersecurity and related capacity-building will be a matter of critical and strategic importance for the further development of international trade in an electronic environment.

The use of electronic trade documentation, including electronic bills of lading equivalents, has increased significantly in importance since the COVID-19 pandemic, and related physical distancing, teleworking and disrupted or suspended postal services have affected large parts of the world population. This matters, particularly since trade finance transactions typically require significant levels of in-person review and processing of hard-copy paper documentation. In these circumstances, international organizations and industry bodies have issued calls for Governments to remove restrictions on the use and processing of electronic trade documents and the need for any documentation to be presented in hard copy. For instance, the International Chamber of Commerce has called on all Governments to take two key actions without delay: as a temporary measure, void any legal requirements for trade documentation to be in hard copy and adopt the United Nations Commission on International Trade Law Model Law on Electronic Transferable Records (International Chamber of Commerce, 2020a; United

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[35]   See www.bolero.net and UNCTAD, 2003.

Nations Commission on International Trade Law, 2018; UNCTAD, 2017a).[36]

B. REGULATORY DEVELOPMENTS RELATING TO INTERNATIONAL SHIPPING, CLIMATE CHANGE AND OTHER ENVIRONMENTAL ISSUES

1. Developments under the auspices of the International Maritime Organization related to the reduction of greenhouse gas emissions from ships

Maritime decarbonization and the reduction of greenhouse gas emissions from ships have become a priority area for policymakers and industry to be achieved, among others, through the adoption of energy-efficient technologies, the optimization of ship operations and use of low- and zero-carbon fuels, as well as regulation. A number of measures are being adopted in these areas by Governments, often in collaboration with industry, both nationally and internationally.

The IMO Marine Environment Protection Committee has for some time been addressing greenhouse gas emissions from ships engaged in international voyages. The measures to improve the energy efficiency of international shipping were adopted under a new chapter of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL), annex VI. In force since 1 January 2013, these measures apply to ships of 400 gross tons and above that are engaged in international voyage. They make two key requirements mandatory: The energy efficiency design index for new ships and the ship energy efficiency management plan for new and existing ships.

The energy efficiency design index for new ships has become increasingly strict over time. In May 2019, the Marine Environment Protection Committee approved, for adoption at its next session (initially scheduled for April 2020, but postponed due to the COVID-19 pandemic), draft amendments to MARPOL annex VI. These aimed to significantly strengthen the phase 3 requirements of the index, bringing forward their entry into force date to 2022, from 2025, for several ship types, including container ships, gas carriers, general cargo ships and liquefied natural gas carriers.

The ship energy efficiency management plan for new and existing ships establishes a mechanism for improving the energy efficiency of ships, including by

monitoring their energy efficiency performance, new practices and technologies. For instance, it is now mandatory for ships to collect and report ship fuel oil consumption data. Since 1 January 2019, flag States collect consumption data for each type of fuel oil used by ships of 5,000 gross tons and above, which are then transferred to the IMO ship fuel oil consumption database. Reports analysing and summarizing the data collected shall periodically inform the Marine Environment Protection Committee. Information from the reports also benefits analysis on emissions by flag or vessel type as presented in chapter 3.E of the Review.

Already in April 2018, the Marine Environment Protection Committee had adopted the Initial Strategy on reduction of greenhouse gas emissions from ships (IMO, 2018a, annex 1; UNCTAD, 2019a), which envisages a reduction of the total annual greenhouse gas emissions from international shipping by at least 50 per cent by 2050 as compared with 2008, while, at the same time, pursuing efforts towards phasing them out entirely. Candidate short-term measures, to be further developed and agreed upon by member States between 2018 and 2023, include technical and operational energy efficiency measures for both new and existing ships, such as speed optimization and reduction, the development of robust life cycle greenhouse gas and carbon intensity guidelines for all types of fuels to prepare for the use of alternative low-carbon and zero-carbon fuels, port activities and incentives for first movers.

Innovative emissions-reduction mechanisms, possibly including market-based measures, to incentivize greenhouse gas emission reduction – a controversial issue for a number of years – were included among candidate midterm measures. These are to be agreed and decided upon between 2023 and 2030, along with possible long-term measures to be undertaken beyond 2030 that would ultimately lead to zero-carbon or fossil-free fuels to enable the potential decarbonization of the shipping sector in the second half of the century (for more information, see UNCTAD, 2018). In October 2018, the Marine Environment Protection Committee approved a programme of follow-up actions of the Initial Strategy on reduction of greenhouse gas emissions from ships up to 2023. It is planned that a revised strategy on reduction of greenhouse gas emissions from ships will be adopted in 2023.

The Marine Environment Protection Committee Working Group on Reduction of Greenhouse Gas Emissions from Ships met for its sixth intersessional meeting in November 2019 and made progress on several issues, leading towards achieving the levels of ambition set out in the Initial Strategy (see IMO, 2019a). These include the following:

- Development of a draft resolution on national action plans to address greenhouse gas emissions

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[36] For solutions that involve the use of electronic documents, scanned, faxed or emailed images and potential scenarios in the delivery of documents during the COVID-19 crisis, see International Chamber of Commerce, 2020b.

from international shipping. The development and update of relevant national action plans was envisaged as a candidate short-term measure in the Initial Strategy. The resolution suggests that national action plans could include, without being limited to, the following actions: improving domestic institutional and legislative arrangements for the effective implementation of existing IMO instruments; developing activities to further enhance the energy efficiency of ships; initiating research and advancing the uptake of alternative low-carbon and zero carbon fuels; accelerating port-emission reduction activities, consistent with resolution MEPC.323(74); fostering capacity-building, awareness-raising and regional cooperation; and facilitating the development of infrastructure for green shipping. Potential legal, policy and institutional arrangements to be put in place by Member States should be elaborated in accordance with national circumstances and priorities and relevant experiences shared with IMO.

- Consideration of various concrete proposals for mandatory short-term measures to further reduce greenhouse gas emissions from existing ships. Proposals of a technical nature included, for example, an energy efficiency existing ship index, which would require ships to make technical modifications, for example, mandatory engine power limitation, to improve their energy efficiency. Proposals for an operational approach included focusing on carbon-intensity-reduction targets using appropriate carbon-intensity indicators, including by means of strengthening the ship energy efficiency management plan based on regular energy audits of the ship. This approach could include measures to limit or optimize speeds for voyages. There was general agreement that a mandatory goal-based approach for both the technical and operational approaches would provide the needed flexibility and incentive for innovation.

- Assessment of impacts of the proposals on States, with particular attention to be paid to the needs of developing countries, especially the least developed countries and small island developing States.

- Consideration of the use of alternative fuels, in particular with regard to measures in the medium and long term. This is also important to encourage the uptake of low- and zero-carbon fuels in the shipping sector. The establishment of a dedicated workstream for the development of life cycle greenhouse gas or carbon-intensity guidelines (for example, from well to wake or tank to propeller) for all relevant types of alternative fuels was suggested. This could include, for example, biofuels, (renewable)

electro- or synthetic fuels such as hydrogen or ammonia. The issue of methane slip, including enhanced understanding of the problem, how methane slip could be measured, monitored and controlled and which measures could be considered by IMO to address the matter, was discussed in relation to the uptake of methane-based fuels such as liquefied natural gas (IMO, 2019a).

Other recent IMO collaborative work to address greenhouse gas emissions from ships engaged in international voyage include the following:

- Fourth IMO greenhouse gas study. This study, published in August 2020, includes an inventory of current global emissions of greenhouse gases and relevant substances emitted between 2012 and 2018, from ships of 100 gross tons and above engaged in international voyages, as well as their carbon intensity, and projects scenarios for future international shipping emissions from 2018–2050. It builds on the third IMO greenhouse gas study, issued in 2014. The fourth study, mentioned above, indicates that the share of shipping emissions in global anthropogenic emissions increased from 2.76 per cent in 2012 to 2.89 per cent in 2018. Using a new voyage-based allocation of international shipping, the study indicates that carbon-dioxide emissions increased from 701 million tons in 2012 to 740 million tons in 2018 – a 5.6 per cent increase – but at a lower growth rate than that of total shipping emissions. Using the vessel-based allocation of international shipping taken from the third IMO greenhouse gas study, carbon-dioxide emissions grew from 848 million tons in 2012 to 919 million tonnes in 2018 – an 8.4 per cent increase. The study also notes that ship emissions are projected to rise from about 90 per cent of 2008 emissions in 2018 to 90–130 per cent of 2008 emissions by 2050. Thus, much work lies ahead to meet the IMO strategy goal of cutting greenhouse gas emissions from international shipping by at least 50 per cent from 2008 levels by 2050. Also, to phase out greenhouse gas emissions from the sector as soon as possible, regulations that encourage innovation and the widespread adoption of the cleanest, most advanced technologies are needed (International Council on Clean Transportation, 2020). Consideration and approval of the fourth IMO greenhouse gas study 2020 by the Marine Environment Protection Committee is still pending (IMO, 2020b).

- Multi-donor trust fund for reduction of greenhouse gas emissions from ships. This fund was established to provide a dedicated source of financial support to sustain IMO technical

cooperation and capacity-building activities to support the implementation of the Initial Strategy.

- Collaboration with UNCTAD on an expert review of the impact assessments submitted to the Intersessional Working Group on Reduction of Greenhouse Gas Emissions from Ships. The collaborative efforts aim to produce a review of the comprehensiveness of the impact assessments of the concrete proposals to improve the energy efficiency of existing ships submitted to the Working Group, taking into account the procedure for assessing impacts on States of candidate measures set out in MEPC.1/Circ.885 and the available data.

During the United Nations Climate Action Summit, held in New York in September 2019, many business leaders and local government representatives announced concrete actions to address climate change (United Nations, 2019). For example, the industry-led initiative "Getting to Zero Coalition", supported by UNCTAD, committed to the deployment of viable zero-emissions vessels by 2030 to further the achievement of the goals of the IMO Initial Strategy (United Nations, 2019).

With regard to the European Union and the European Economic Area, an important legal requirement is worth noting. Since 1 January 2018, large ships of over 5,000 gross tons that load or unload cargo or passengers at ports in the European Economic Area have been required to monitor and report their related carbon-dioxide emissions and other relevant information, in conformity with Regulation 2015/757, as amended by Delegated Regulation 2016/2071 (see https://ec.europa.eu/clima/policies/transport/shipping_en). As a result, since 2019, ships calling at ports in the European Economic Area must report under both the European Union regulation and the IMO data collection system. Every year, the European Commission publishes a report to keep the public abreast of trends in carbon-dioxide emissions and provides energy efficiency information concerning the monitored fleet (European Commission, 2020a; European Commission, 2020b).

2. Developments under the United Nations Framework Convention on Climate Change and related issues

The Conference of the Parties to the United Nations Framework Convention on Climate Change on its twenty-fifth session, held in Madrid, in December 2019, once again highlighted how much work lies ahead on both the domestic and international fronts with regard to climate action that is consistent with the goal of the Paris Agreement[37] of holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to

1.5°C above pre-industrial levels (article 2). In respect of greenhouse gas emissions from international shipping, the Subsidiary Body for Scientific and Technological Advice is one of two permanent subsidiary bodies to the United Nations Framework Convention on Climate Change. The body, which supports the work of the Conference of the Parties by providing information and advice, including on emissions from fuel used for international aviation and maritime transport, did not reach agreement and postponed discussions until the next session, to be held at the twenty-sixth session of the Conference of the Parties in November 2021 (United Nations, 2020).

Documents and publications launched at the twenty-fifth session of the Conference of the Parties to assist countries in their efforts to implement the Paris Agreement include the following:

- A yearbook (United Nations Climate Change Secretariat, 2019).

- An online database in which a diverse range of stakeholders have registered their climate change mitigation and/or adaptation commitments, as well as a number of climate action pathways, developed by the Marrakech Partnership for Global Climate Action (United Nations Framework Convention on Climate Change, 2020).

- The Global Climate Action portal, formerly known as the Non-State Actor Zone for Climate Action, which outlines transformational actions and milestones in some key sectoral and cross-cutting areas, such as transport and resilience.

Also launched at the twenty-fifth session of the Conference of the Parties was a declaration on climate change by the World Association for Waterborne Transport Infrastructure, also known as PIANC (World Association for Waterborne Transport Infrastructure, 2019). The declaration highlights a number of priority actions to strengthen adaptation and resilience-building. These include inspection and maintenance; monitoring systems and effective data management; and risk assessments, contingency plans and warning systems. It also provides a focus on flexible and adaptive infrastructure, systems and operations, and engineered redundancy to improve resilience.

With regard to climate change adaptation and resilience-building for seaports, the transport pathway action table of the Marrakech Partnership for Global Climate Action includes two distinct action areas with a focus on adaptation for transport systems and transport infrastructure, respectively, as well as related milestones for 2020, 2030 and 2050 (Marrakech Partnership for Global Climate Action, 2019a). Inter alia, these milestones, which have also been integrated into the cross-sectoral resilience and adaptation pathway action table, envisage that, by 2030, "All critical transport infrastructure assets, systems/networks components are [made] climate resilient to (at least) 2050"; and,

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[37] Ratified by 188 States. See https://unfccc.int/process/the-paris-agreement/status-of-ratification.

by 2050, "[A]ll critical transport infrastructure assets, systems/networks components are [made] climate resilient to (at least) 2100" (Marrakech Partnership for Global Climate Action, 2019b).[38] While this represents an important and timely ambition, a major acceleration of efforts will be required to put relevant measures in place.

Climate change adaptation and resilience-building is an increasingly important issue, in particular from the perspective of vulnerable developing countries that are at the forefront of climate change impacts, such as small island developing States.[39] Critical coastal transport infrastructure in these countries, notably ports and airports, are lifelines for external trade, food and energy security, and tourism, including in the context of disaster-risk reduction (UNCTAD, 2019b; UNCTAD and United Nations Environment Programme, 2019). These assets are projected to be at growing risk of coastal flooding, from as early as in the 2030s, unless effective adaptation action is taken (Intergovernmental Panel on Climate Change, 2018; Intergovernmental Panel on Climate Change, 2019; Monioudi et al., 2018). In the absence of timely planning and of the implementation of requisite adaptation measures, the projected impacts on critical transport infrastructure may have broad economic and trade-related repercussions and could severely compromise the sustainable development prospects of these vulnerable nations (Economic Commission for Europe, 2020; Pacific Community, 2019; UNCTAD, 2020a; UNCTAD 2020b;). However, there are still important knowledge gaps concerning vulnerabilities and the specific nature and extent of exposure that individual coastal transport facilities may be facing.[40]

A number of important issues have emerged as part of the related work of UNCTAD over the past decade. Thus, for the purposes of risk-assessment and with a view to developing effective adaptation measures, the generation and dissemination of more tailored data and information is important, as are targeted case studies and effective multi-disciplinary and multi-stakeholder collaboration. Successful adaptation strategies need to be underpinned by strong legal and regulatory frameworks that can help reduce exposure and/or

vulnerability to climate-related risks of coastal transport infrastructure (UNCTAD, 2020a). Appropriate policies and standards also have an important role to play, particularly in the context of infrastructure planning and coastal zone management. Moreover, guidance, best practices, checklists, methodologies (for example, UNCTAD, 2017b) and other tools in support of adaptation are urgently required, and targeted capacity-building is going to be critical, especially for the most vulnerable countries.[41]

3. Protection of the marine environment and conservation and sustainable use of marine biodiversity

Relevant areas where regulatory action has recently been taken or is under way for the protection of the marine environment and conservation and sustainable use of marine biodiversity, are described below.

Implementing the 2020 sulphur limit of the International Maritime Organization

Sulphur oxides are known to be harmful to human health, causing respiratory symptoms and lung disease. They can lead to acid rain, which can harm crops, forests and aquatic species, and contribute to ocean acidification. Thus, limiting sulphur-oxide emissions from ships helps improve air quality and protect human health and the environment (IMO, 2020c). An IMO regulation limiting the sulphur content in ship fuel oil to 0.50 per cent, down from 3.50 per cent, entered into force on 1 January 2020 (UNCTAD, 2019a). In designated emission control areas, the limit remained even lower, at 0.10 per cent.[42]

To support consistent implementation and compliance and provide a means for effective enforcement by States, particularly port State control, IMO in October 2018 adopted an additional MARPOL amendment, which entered into force on 1 March 2020. The amendment prohibits not just the use, but also the carriage of non-compliant fuel oil for combustion purposes for propulsion or operation on board a ship, unless the ship is fitted with an approved equivalent method, such as a scrubber or exhaust gas cleaning system. Also, a comprehensive set of guidelines to support the consistent implementation of the lower 0.50 per cent limit on sulphur in ship fuel oil and related amendments to the Convention were approved in May 2019 (IMO, 2019b, annex 14).

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[38] Key recommendations of technical experts, key industry stakeholders and international organizations participating in the ad hoc expert meeting entitled "Climate Change Adaptation for International Transport: Preparing for the Future", held by UNCTAD in 2019, are reflected in the Marrakech Partnership for Global Climate Action pathways on transport and on resilience (Marrakech Partnership for Global Climate Action, 2019a and 2019b). See https://unctad.org/en/pages/MeetingDetails.aspx?meetingid=2092.

[39] For further information and related work by UNCTAD, see https://SIDSport-ClimateAdapt.unctad.org; https://unctad.org/ttl/legal; https://unctad.org/en/pages/MeetingDetails.aspx?meetingid=2354.

[40] This is evidenced by recent port industry surveys and studies on climate change impacts and adaptation (Asariotis et al., 2018; Panahi et al., 2020).

[41] For further information on relevant practices and regulatory and policy approaches, see UNCTAD, 2020a. See also https://SIDSport-ClimateAdapt.unctad.org.

[42] The four emission control areas are as follows: the Baltic Sea area, the North Sea area, the North American area (covering designated coastal areas of Canada and the United States) and the United States Caribbean Sea area (around Puerto Rico and the United States Virgin Islands).

To support the enforcement of the carriage ban and the safe and consistent sampling of fuel oil being carried for use, in February 2020, the IMO Subcommittee on Pollution Prevention and Response made progress in preparatory work and various draft amendments and guidelines to be submitted to the next session of the Marine Environment Protection Committee with a view to their later consideration and adoption. The Subcommittee finalized draft guidelines that provide a recommended method for the sampling of liquid fuel oil intended to be used or carried for use on board a ship. It also finished its revision of the 2015 guidelines on exhaust gas cleaning systems (also known as scrubbers), with a view to enhancing the uniform application of the guidelines by specifying the criteria for the testing, survey, certification and verification of such systems under MARPOL annex VI, to ensure that they provide effective equivalence to the sulphur-oxide emission requirements of regulations. In addition, the Subcommittee agreed to recommend to the Marine Environment Protection Committee that its future work should look at the evaluation and harmonization of rules and guidance on the discharge of was water from exhaust gas cleaning systems into the aquatic environment, including conditions and areas. By way of background, some IMO members have expressed concern that several more factors must be taken into account when assessing the impact of wash water discharge from scrubbers operating in ports and coastal areas. It has also been suggested that open-loop systems currently in use and compliant with the 2015 guidelines may produce harmful impacts in certain coastal areas. A number of coastal States (China, Malaysia, Norway and Singapore) have announced a ban of open-loop exhaust gas cleaning systems in certain coastal areas (Safety4Sea, 2019c), and Egypt has banned the use of such systems when transiting the Suez Canal (IMO, 2020d; Seatrade Maritime News, 2020).

The implementation of the sulphur regulation as of 1 January 2020 was initially considered to be relatively smooth, and compliant fuel oil was reported to be widely available. However, some difficulties have arisen as a result of the disruptions caused by the pandemic. In March 2020, the ban on the carriage on non-compliant fuel oil entered force to support the implementation of the sulphur limit. However, it appears that its enforcement by port State control authorities was suspended, due to measures put in place to reduce inspections and contain the risk of spreading the virus (Heavy Lift, 2020).

Ballast water management

In February 2020, the IMO Subcommittee on Pollution Prevention and Response completed its work on the revision of a guidance document on the testing of ballast water management systems, intended to

validate their installation by demonstrating that their mechanical, physical, chemical and biological processes are working properly. This guidance is expected to be adopted by the Marine Environment Protection Committee at its next session, as an amendment to regulation E-1 of the International Convention for the Control and Management of Ship's Ballast Water and Sediments, 2004, also known as the Ballast Water Management Convention, 2004.

Ballast Water Management Convention, 2004, has been in force since September 2017. By 31 July 2020, it had been ratified by 84 States, representing 91.10 per cent of the gross tonnage of the world's merchant fleet. The Convention aims to prevent the risk of the introduction and proliferation of non-native species following the discharge of untreated ballast water from ships. This is considered one of the four greatest threats to the world's oceans and a major threat to biodiversity, which, if not addressed, can have severe public health-related and environmental and economic impacts (UNCTAD, 2011; UNCTAD, 2015). From the date of the Convention's entry into force, ships have been required to manage their ballast water to meet standards D-1 and D-2; the former requires ships to exchange and release at least 95 per cent of ballast water by volume far away from a coast; the latter raises the restriction to a specified maximum amount of viable organisms allowed to be discharged, limiting the discharge of specified microbes harmful to human health. Currently, the regulatory focus continues to be on the effective and uniform implementation of the Convention.

Biofouling

While the Ballast Water Management Convention, 2004 aims to prevent the spread of potentially harmful aquatic species in ballast water, invasive species, such as marine animals, plants and algae, can attach themselves to the outside of ships (for example, ship hulls) and other marine structures. This is known as biofouling. When ships and structures move to new areas, these species can detach themselves, adapt to the new habitat, overcome local fauna and become invasive, with negative effects on the host ecosystem. Therefore, biofouling needs to be addressed as well. Biofouling has other negative effects – it increases the surface roughness of ship hulls and propellers, resulting in speed loss at constant power or power increase at constant speed and higher fuel consumption of up to 20 per cent (Riviera, 2020d; Riviera, 2020e).

Anti-fouling paints are normally used to coat the bottoms of ships to prevent sea life such as algae and molluscs attaching themselves to the hull, thereby slowing down the ship and increasing fuel consumption. The Convention for the Control of Harmful Anti-fouling Systems on Ships, 2001 defines anti-fouling systems as "a coating, paint, surface treatment, surface or device that is used on a ship to control or prevent

attachment of unwanted organisms". It aims to prohibit the use of harmful organotin compounds in anti-fouling paints used on ships and establish a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems. The Convention entered into force on 17 September 2008. As of 31 July 2020, 89 States parties, representing 96.09 per cent of the gross tonnage of the world's merchant fleet, had ratified the Convention. Annex 1 to the Convention states that as from 1 January 2003, all ships should not apply or re-apply organotin compounds, which act as biocides in anti-fouling systems, and as from 1 January 2008, ships either (a) shall not bear such compounds on their hulls or external parts or surfaces or (b) shall bear a coating that forms a barrier to such compounds leaching from the underlying non-compliant anti-fouling systems.

In July 2017, the Marine Environment Protection Committee started work on amending annex 1 to the Convention to include controls on the biocide chemical compound cybutryne, since scientific data had indicated that cybutryne causes significant adverse effects to the environment, especially to aquatic ecosystems. Work on this matter is ongoing in the Subcommittee on Pollution Prevention and Response, which in February 2020 finalized a proposed amendment to the Convention to include controls on cybutryne. The draft amendment will be presented to the Marine Environment Protection Committee at its next session for approval. The Subcommittee also began its review of the IMO Guidelines for the Control and Management Of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species, also known as the Biofouling Guidelines (IMO, 2011), which provide a globally consistent approach to the management of biofouling (IMO, 2020d).

Marine pollution from plastics and microplastics

Marine debris in general, and plastics and microplastics in particular, give rise to some of the greatest environmental concerns today, along with climate change, ocean acidification and loss of biodiversity. These directly affect the sustainable development aspirations of developing States and small island developing States in particular, which, as custodians of vast areas of oceans and seas, face an existential threat from and are disproportionately affected by the effects of pollution from plastics. The issue of marine debris, plastics and microplastics in the oceans has been receiving increasing public attention and was the topic of the seventeenth meeting of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea in 2016 (United Nations, 2016). Sustainable Development Goal 14.1, committing to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution by

2025, is particularly relevant in this context. Given the cross-cutting nature of the problem, plastics pollution is also relevant to other Sustainable Development Goals, including Goals 4 (education), 6 (clean water and sanitation), 12 (sustainable consumption and production patterns), and 15 (sustainable use of terrestrial ecosystems).

IMO is implementing an action plan to address marine plastic litter from ships, which contains measures to be completed by 2025, relating to all ships, including fishing vessels, and supports the IMO commitment to meeting the targets set in Goal 14 (IMO, 2018b). At its seventh meeting in February 2020, the Subcommittee on Pollution Prevention and Response prepared draft Marine Environment Protection Committee circulars on the provision of adequate facilities at ports and terminals for the reception of plastic waste from ships and on the sharing of results from research on marine litter and encouraging studies to better understand microplastics from ships. It also established a correspondence group to consider how to amend MARPOL annex V and the 2017 guidelines for the implementation of MARPOL annex V (resolution MEPC.295(71)) to facilitate and enhance reporting of the accidental loss or discharge of fishing gear and consider the information to be reported to Administrations and IMO, as well as reporting mechanisms and modalities (IMO, 2020d).

While the focus of this section of the Review is on developments related to plastic waste from ships, some considerations regarding plastics pollution arise in the context of the COVID-19 crisis. Various protective measures have been implemented as a priority over the past months with a view to controlling the spread of the virus. These include the wearing of surgical face masks and gloves and the frequent disinfection of hands, all of which involve the use of plastic. In addition, because of the threat of contamination, people may tend to use disposable or single-use plastic items such as food containers and utensils, rather than reusable ones. There is a risk for these items to end up as litter in the environment, including in the sea and along beaches, which in many countries are a mainstay of the local tourism industry. Short-term solutions to address an increase in plastics pollution arising from the ongoing pandemic may include imposing fines, placing labels on disposable items and making information on littering and recycling more available to the public. Public attention on plastics pollution is likely to increase, once the immediate COVID-19 health crisis is under control. In the meantime, researchers suggest recycling single-use plastic items, limiting food deliveries and ordering from grocery suppliers that offer more sustainable delivery packaging. In addition, wearing reusable face masks, disposing of single-use face masks correctly and buying hand sanitizer contained in ecologically sustainable packaging should also be considered (see https://earth. org/covid-19-surge-in-plastic-pollution/).

Safety considerations of new fuel blends and alternative marine fuels

To ensure compliance with the mandatory 0.50 per cent sulphur limit for fuel oil and meet the emission targets set out in the IMO Initial Strategy on reduction of greenhouse gas emissions, new fuels and fuel blends are being developed. At IMO, matters related to such fuels are considered by the Maritime Safety Committee in the context of discussions on the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels. The Code, which entered into force in 2017, aims to minimize the risk to ships, their crews and the environment, given the nature of the fuels involved. It has initially focused on liquefied natural gas, but work is now under way to consider other fuel types.

In preparation for the next meeting of the Committee (scheduled for May 2020 but postponed due to the COVID-19 crisis), the Subcommittee on Carriage of Cargoes and Containers, at its sixth session in September 2019 took the following action:

- Finalized draft interim guidelines for the safety of ships using methyl or ethyl alcohol as fuel, for submission to the Maritime Safety Committee for approval.

- Made progress in developing draft interim guidelines for the safety of ships using fuel cell power installations.

- Agreed to develop amendments to the International Code of Safety for Ships using Gases or other Low-flashpoint Fuels to include safety provisions for ships using low-flashpoint oil fuels and established a correspondence group to continue this work.

- Approved in principle draft amendments to the Code, relating to specific requirements for ships using natural gas as fuel.

- Agreed to develop interim guidelines on safety provisions for ships using liquefied petroleum gas fuels.

- Completed draft guidelines for the acceptance of alternative metallic materials for cryogenic service in ships carrying liquefied gases in bulk and ships using gases or other low-flashpoint fuels, for submission to the Maritime Safety Committee for approval (IMO, 2019c).

Conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction: Legally binding instrument under the United Nations Convention on the Law of the Sea, 1982

Areas beyond national jurisdiction hold unique oceanographic and biological features and play a role in climate regulation.[43] They provide seafood, raw materials and genetic and medicinal resources, which are of increasing commercial interest and hold promise for the development of new drugs to treat infectious diseases that are a major threat to human health – such as antibiotic-resistant infections and potentially, coronavirus disease. From the perspective of developing countries, access and benefit sharing, as well as the conservation of marine genetic resources, are of particular importance in this context (Premti, 2018).

The United Nations Convention on the Law of the Sea, 1982 sets forth the rights and obligations of States regarding the use of the oceans, their resources and the protection of the marine and coastal environment. However, it does not expressly refer to marine biodiversity or to the exploration and exploitation of resources within the water column in areas beyond national jurisdiction. Therefore, ongoing negotiations towards a new international legal instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction are particularly worth noting. Three sessions of the intergovernmental conference on the issue have taken place, the most recent, in August 2019 (see UNCTAD, 2019a for further information on discussions held). Discussions on a broad range of issues were expected to continue during the fourth session of the conference, scheduled to be held from 23 March to 3 April 2020, at United Nations Headquarters in New York, but were postponed due to the COVID-19 crisis.

One gap that the new international legally binding instrument aims to address is the establishment of marine protected areas. According to scientific evidence, these areas are effective tools for conserving and restoring oceans and their resources. However, under the current system of ocean management, there is no way to establish comprehensive marine protected areas for most parts of the high seas. A study was recently conducted to help determine which areas of the high seas should be protected first as ecologically or biologically significant (Visalli et al., 2020). It considered a variety of factors and conservation features and used a conservation prioritization tool to help select areas of the ocean that would include at least 30 percent of these conservation features, while minimizing overlap with areas that are already being heavily fished. This and other similar studies

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43 Maritime zones under the United Nations Convention on the Law of the Sea, 1982 include the following: the territorial sea, extending up to 12 nautical miles from the baseline (article 3); exclusive economic zones, extending from the edge of the territorial sea to 200 nautical miles from the baseline (article 57); the continental shelf, the natural prolongation of land territory to the outer edge of the continental margin, or 200 nautical miles from the baseline, whichever is greater (article 76); and areas beyond national jurisdiction, composed of "the Area" (article 1) and the high seas (article 86).

highlighting specific areas beyond national jurisdiction as high priorities for protection are expected to inform negotiations and decision-making on these issues at the United Nations.

C. OTHER LEGAL AND REGULATORY DEVELOPMENTS AFFECTING TRANSPORTATION

Extension of the European Union Consortia Block Exemption Regulation up to 2024

Article 101(1) of the Treaty on the Functioning of the European Union prohibits agreements between undertakings that restrict competition. However, article 101(3) of that treaty allows declaring such agreements compatible with the internal market, provided they contribute to improving the production or distribution of goods or to promoting technical or economic progress, while allowing consumers a fair share of the resulting benefits. Liner shipping is a highly concentrated industry, with 91 per cent of deep-sea maritime transport services controlled by 10 global operators (see chapter 2, table 10 of this report). In the European Union, liner conferences allowing their members to fix freight rates collectively and discuss market conditions were banned as of 2008 (Council (EC) Regulation 1419/2006). However, liner shipping consortia, as a form of operational cooperation, continue to enjoy a block exemption from European Union competition rules, set to expire on 25 April 2020. Given the international nature of liner shipping services and experience gained from the earlier initiatives of the European Union in this field (Premti, 2016), the impact of the European Union decisions goes beyond Europe and has a bearing on the container shipping markets in developing countries and other European Union trading partners.

In September 2018, the European Commission conducted an evaluation of the Consortia Block Exemption Regulation (European Commission, 2009), which included a consultation of stakeholders in the maritime liner shipping supply chain (for the results, see European Commission, 2019a). The aim was to assess the impact and relevance of that regulation in view of the general policy of harmonizing competition rules and recent important developments in the liner shipping industry and to determine whether it should be left to expire or to be prolonged, and if so, under which conditions. Allowing the Regulation to expire would not mean that consortia agreements become unlawful – but only that they would be examined under the general rules on competition just as cooperation agreements in other sectors (European Commission, 2019b). The first consortia block exemption regulation was adopted

in 1995 and revised in 2009; since then, it has been prolonged every five years without modification.

The main stakeholders participating in the consultation were the carriers which apply the Regulation and their clients (shippers and freight forwarders), and port operators and their respective associations, including those in developing countries who may be affected by the freight rates and the quality and frequency of services resulting from a change in the European Union regulation.

Industry associations representing users of liner shipping services and service providers expressed their objection to the extension of the Regulation.[44] They argued that the evaluation criteria used by the European Commission were biased towards the interest of the carriers, that the 30 per cent market share threshold was difficult to monitor in practice due to missing data and that quality and choice, as well as service levels and schedule reliability, had decreased in recent years, while rate volatility had increased (Lloyd's Loading List, 2020) (see chapter 2). During the consultation, port operators expressed concerns, among others, about limited competition between individual lines that offered more or less equal service levels, and pointed out that any decrease in freight rates was a relatively small element of the total shipping costs (https://ec.europa.eu/competition/consultations/2018_consortia/index_en.html). In addition, representatives of transport workers were reluctant to prolong the Regulation, arguing that shipping companies were having a negative impact on the economic profitability of terminals and other service providers. Because of the increased size of ships, constant and significant investments from terminals were required, adversely affecting the working conditions and job security in ports.

On 24 March 2020, the European Commission announced an extension of the Consortia Block Exemption Regulation until 25 April 2024. According to the Commission, the Regulation results in efficiencies for carriers that can better use vessel capacity and offer more connections. Further, those efficiencies result in lower prices and better quality of service for consumers and a decrease in costs for carriers – in recent years, prices for customers have dropped by approximately 30 per cent (European Commission, 2020c).

D. STATUS OF CONVENTIONS

A number of international conventions in the field of maritime transport were prepared or adopted under the auspices of UNCTAD. The table below provides information on the status of ratification of each of those conventions as at 31 July 2020.

44   European Association for Forwarding, Transport, Logistic and Customs Services; European Shippers Council; Global Shippers Forum and International Union for Road–Rail Combined Transport.

Table 5.1	Contracting States Parties to selected international conventions on maritime transport, as at 31 July 2020	
Title of convention	**Date of entry into force or conditions for entry into force**	**Contracting States**
Convention on a Code of Conduct for Liner Conferences, 1974	6 October 1983	Algeria, Bangladesh, Barbados, Belgium, Benin, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chile, China, Congo, Costa Rica, Côte d'Ivoire, Cuba, Czechia, Democratic Republic of the Congo, Egypt, Ethiopia, Finland, France, Gabon, Gambia, Ghana, Guatemala, Guinea, Guyana, Honduras, India, Indonesia, Iraq, Italy, Jamaica, Jordan, Kenya, Kuwait, Lebanon, Liberia, Madagascar, Malaysia, Mali, Mauritania, Mauritius, Mexico, Montenegro, Morocco, Mozambique, Niger, Nigeria, Norway, Pakistan, Peru, Philippines, Portugal, Qatar, Republic of Korea, Romania, Russian Federation, Saudi Arabia, Senegal, Serbia, Sierra Leone, Slovakia, Somalia, Spain, Sri Lanka, Sudan, Sweden, Togo, Trinidad and Tobago, Tunisia, United Republic of Tanzania, Uruguay, Bolivarian Republic of Venezuela, Zambia **(76)**
United Nations Convention on the Carriage of Goods by Sea, 1978	1 November 1992	Albania, Austria, Barbados, Botswana, Burkina Faso, Burundi, Cameroon, Chile, Czechia, Dominican Republic, Egypt, Gambia, Georgia, Guinea, Hungary, Jordan, Kazakhstan, Kenya, Lebanon, Lesotho, Liberia, Malawi, Morocco, Nigeria, Paraguay, Romania, Saint Vincent and the Grenadines, Senegal, Sierra Leone, Syrian Arab Republic, Tunisia, Uganda, United Republic of Tanzania, Zambia **(34)**
International Convention on Maritime Liens and Mortgages, 1993	5 September 2004	Albania, Benin, Congo, Ecuador, Estonia, Honduras, Lithuania, Monaco, Nigeria, Peru, Russian Federation, Spain, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Serbia, Syrian Arab Republic, Tunisia, Ukraine, Vanuatu **(19)**
United Nations Convention on International Multimodal Transport of Goods, 1980	Not yet in force – requires 30 contracting parties	Burundi, Chile, Georgia, Lebanon, Liberia, Malawi, Mexico, Morocco, Rwanda, Senegal, Zambia **(11)**
United Nations Convention on Conditions for Registration of Ships, 1986	Not yet in force – requires 40 contracting parties, representing at least 25 per cent of the world's tonnage as per annex III to the Convention	Albania, Bulgaria, Côte d'Ivoire, Egypt, Georgia, Ghana, Haiti, Hungary, Iraq, Liberia, Libya, Mexico, Morocco, Oman, Syrian Arab Republic **(15)**
International Convention on Arrest of Ships, 1999	14 September 2011	Albania, Algeria, Benin, Bulgaria, Congo, Ecuador, Estonia, Latvia, Liberia, Spain, Syrian Arab Republic, Turkey **(12)**

Note: For additional information, see UNCTAD Trade Logistics Branch, Policy and Legislation Section at unctad.org/ttl/legal. For official status information, see the United Nations Treaty Collection, available at https://treaties.un.org.

E. COVID-19 LEGAL AND REGULATORY CHALLENGES FOR INTERNATIONAL SHIPPING AND COLLABORATIVE ACTION IN RESPONSE TO THE CRISIS

1. Maritime health preparedness and response to the COVID-19 pandemic

Key shipping stakeholders, including international bodies and Governments, issued a number of recommendations and guidance which aimed to ensure, first of all, that seafarers were protected from the coronavirus disease, were medically fit and had access to medical care and that their ships met international sanitary requirements.[45]

Together with its industry partners and other international organizations, IMO developed and issued practical advice and guidance on a variety of technical and operational matters related to the pandemic. Given that IMO does not have an enforcement authority of its own, it cannot issue general exemptions from or delay implementation of the mandatory provisions of its relevant conventions or mandatory regulations for flag and port States. However, IMO issued a number of circular letters

[45] For a list of COVID-19-related communications on measures taken by IMO Member States and Associate Members (updated weekly), see www.imo.org/en/MediaCentre/HotTopics/Pages/COVID-19-Member-States-Communications.aspx. For a detailed list of recommendations by Governments and international bodies, see Safety4Sea, 2020b.

addressed to Member States, seafarers and shipping industry stakeholders and posted a compilation of its guidance and online resources from other international organizations and maritime industry on its website.[46] Circular letters included the following items:

- Information on the impacts of the pandemic on the shipping industry, including implementation and enforcement of mandatory IMO requirements, and a call for increased cooperation among flag and port States, taking a pragmatic approach to the uncertain COVID-19 situation (Circular Letter No. 4204/Add.1).

- Guidance relevant to all stakeholders, addressing global issues relevant to the health of seafarers, seagoing vessels and offshore infrastructure by establishing and implementing COVID-19 protocols for mitigating and preventing outbreaks at sea, following guidance from the European Commission, the International Chamber of Shipping, IMO and the World Health Organization on health and shipping in the context of COVID-19 (Circular Letters No. 4204/Add.1–Add.4).

- Recommendations for Governments and relevant national authorities on the facilitation of maritime trade during the pandemic (Circular Letter No. 4204/Add.6) and on ensuring the integrity of the global supply chain during the pandemic (Circular Letter No. 4204/Add.9).

- Guidance particularly relevant to shipbuilders, equipment suppliers, shipowners, surveyors and service engineers advising on newbuilding bulk carriers and oil tankers that were scheduled for delivery before 1 July 2020 (Circular Letter No. 4204/Add.7).

- European Commission guidelines on protection of health, repatriation and travel arrangements for seafarers, passengers and other persons on board ships (Circular Letter No. 4204/Add.11).

- World Health Organization information and guidance on the safe and effective use of personal protective equipment (Circular Letters No. 4204/Add.15 and Add.16).

On 20 February 2020, the European Union issued advice for ship operators on preparedness and response to the outbreak of COVID-19, which included a dedicated chapter on maritime transport and a focus on cargo ship travel (European Union, 2020a). Guidelines on the exercise of the free movement of the workers during the COVID-19 outbreak followed (European Commission, 2020d).

Representing the global shipping industry, the International Chamber of Shipping published new guidance for the industry to help combat the spread of the coronavirus disease. The guidance offered advice on managing port entry restrictions, practical protective measures against the disease for seafarers, including an outbreak management plan (International Chamber of Shipping, 2020a). The International Bunker Industry Association also adopted protective measures against the disease. Considering that in international shipping, the contact between ship and shore personnel during the bunkering process involved a possible risk of spreading the disease, it provided advice to mitigate the risk of infection during such process (Safety4Sea, 2020b). The International Association of Ports and Harbours adopted guidance on ports' responses to the pandemic, structured along a three-layered approach to present a methodology and a range of good practices on immediate measures addressing port operations, governance and communication; measures to protect the business and financial returns; and measures to support customers and supply chain stakeholders (International Association of Ports and Harbours, 2020b).

As part of its response to the COVID-19 outbreak, UNCTAD issued a call for action to keep ships moving, ports open and cross-border trade flowing (UNCTAD, 2020c). It also published a policy brief, highlighting a 10-point action plan to strengthen international trade and transport facilitation in times of pandemic (UNCTAD, 2020d). Related technical cooperation in collaboration with the United Nations regional commissions has already begun.[47] Moreover, the Secretaries-General of UNCTAD and IMO issued a joint statement in support of keeping ships moving, ports open and cross-border trade flowing during the pandemic (IMO and UNCTAD, 2020). To assist stakeholders in obtaining an overview of the multitude of COVID-19-related measures and responses, plan and potential implications thereof, UNCTAD drafted a technical note for ports and a non-exhaustive list of links to online resources from international organizations and industry groups that provide up-to date information about the ongoing developments in various countries.[48]

2. Maritime certification

Port State control regimes around the world, expressing solidarity with the shipping industry, also developed temporary guidance for their member authorities during the COVID-19 crisis.[49] In line with IMO efforts and circular letters related to the pandemic, port State control

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[46]   All COVID-19-related IMO circulars are available at www.imo. org/en/MediaCentre/HotTopics/Pages/Coronavirus.aspx.

[47]   Transport and trade connectivity in the age of pandemics (project 2023X) (www.un.org/development/desa/da/da-response-to-covid-19/).

[48]   See https://tft.unctad.org/ports-covid-19/ and https://etradeforall.org/unctad-repositories-of-measures-on-cross-border-movement-of-goods-and-persons/.

[49]   Port State control is the inspection of foreign flag ships in national ports to verify their compliance with international rules on safety, security, marine environment protection and seafarers living and working conditions.

regimes developed temporary guidance on how they intended to deal with the impact of the pandemic. These included acceptance of extended periods of service on board for seafarers; extended periods for surveys, inspections and audits; and seafarers' certification, using a pragmatic and harmonized approach (see Indian Ocean Memorandum of Understanding on Port State Control Secretariat, 2020; Paris Memorandum of Understanding on Port State Control Secretariat, 2020; Secretariat of the Memorandum of Understanding on Port State Control in the Asia–Pacific Region, 2020).

Thus, as a general principle, the guidance adopted by the port State control regimes suggests that a pragmatic and risk-based approach regarding the above-mentioned issues be taken. In such cases, the active involvement of the flag State, and if appropriate, the recognized organization for the conduct of inspections and the issue of certification was expected. This would include examination of the available information on the ship and its history, as well as the performance of the ship's company. Whether an inspection took place remained the decision of the port State. Such temporary guidance might be reviewed, as appropriate, to keep aligned with the rapidly successive developments of the coronavirus disease and future initiatives by relevant stakeholders, including the International Labour Organization and IMO. In addition, recognized organizations,[50] including the American Bureau of Shipping,[51] Bureau Veritas,[52] DNV GL,[53] Indian Register of Shipping[54] and Lloyd's Register,[55] issued guidance for shipowners on how to apply for an extension of statutory certificates, including the Safety Management Certificate under the International Safety Management Code (International Convention for the Safety of Life at Sea, chapter IX); the International Ship Security Certificate under the International Code for the Security of Ships and of Port Facilities (International Convention for the Safety of Life at Sea, chapter XI-2); and the Maritime Labour Certificate (Maritime Labour Convention, 2006), or if possible, for remote surveys. A number of flag States also provided initial instructions on possible ways forward in cases where these certificates needed to be extended beyond the three months already suggested.[56]

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[50] Those organizations responsible for carrying out surveys and inspections on behalf of Administrations.

[51] See https://ww2.eagle.org/en/news/abs-covid-19-update. html.

[52] See https://marine-offshore.bureauveritas.com/newsroom/ covid-19-update-bureau-veritas-marine-offshore.

[53] See www.dnvgl.com/news/dnv-gl-maritime-response-to-the-coronavirus-covid-19-outbreak-166449.

[54] See www.irclass.org/covid-19/.

[55] See https://info.lr.org/l/12702/2020-02-27/8ntgzw.

[56] For example, Belgium, Denmark, the Marshall Islands, the Netherlands and Norway. For updated information, see Lloyds Register, 2020.

Enabling the extension of the validity of licences and certificates leads to greater flexibility and legal certainty. These are necessary to maintain supply chains and ensure continued mobility at sea, while safeguarding safety and security. In this context, it is worth noting that in addition to the Safety Management Certificate and the International Ship Security Certificate, flag States are allowed to extend for up to three months the period of validity of the following certificates required under different mandatory IMO legal instruments (IMO, 2019d):

- Cargo Ship Safety Equipment Certificate.
- Cargo Ship Safety Construction Certificate.
- Cargo Ship Safety Radio Certificate.
- International Load Line Certificate.
- International Oil Pollution Prevention Certificate.
- International Pollution Prevention Certificate for Carriage of Noxious Liquid Substances in Bulk.
- International Sewage Pollution Prevention Certificate.
- International Air Pollution Prevention Certificate.
- International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk or the Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk.
- International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk.
- Passenger Ship Safety Certificate.
- Polar Ship Certificate.
- International Ballast Water Management Certificate.

As a general rule, according to IMO mandatory instruments, no certificate should be extended for a period longer than three months (IMO, 2019c), while according to the Maritime Labour Convention of the International Labour Organization (standard A5.1.3, paragraph 4), the flag State may extend the validity of the Maritime Labour Certificate for a period not exceeding five months. Therefore, it appears that due to the prevailing exceptional circumstances during the COVID-19 crisis, flag States should be able to extend the validity of all statutory certificates for a period of three months. If the normal operation of ports and travel of surveyors should continue to be restricted by the pandemic or eventual problems or delays created after the pandemic, alternative ways to address this would need to be found on a case-by-case basis, such as issuing short-term certificates based on remote surveys or use of alternative survey locations (Lloyds Register, 2020). On 8 April 2020, representatives of

the 10 port State control regimes[57] that cover the world's oceans and the IMO Secretariat met in an online meeting. They reported that, while the number of physical on-board ship inspections had been reduced considerably to protect both port State control officers and seafarers, the regimes continued to work to target high-risk ships that might be substandard. They reported taking a pragmatic, practical and flexible approach, recognizing that exemptions, waivers and extensions to certificates had been granted by many flag States, and expressed a general desire for such practices to be standardized and harmonized (IMO, 2020e) (Circular Letter No. 4204/Add.8).

In addition, IMO addressed the certification of seafarers and fishing vessel personnel (Circular Letter No. 4204/Add.5/Rev.1), including medical certification, ship sanitation certification (Circular Letters No. 4202/Add.10 and Add.11), and certification of ships (Circular Letter No. 4204/Add.19/Rev.2), while the Special Tripartite Committee of the Maritime Labour Convention, 2006, as amended, in a statement on COVID-19 suggested extending the validity of seafarers' certificates for at least three months and adopting a flexible approach to ship certification (International Labour Organization, 2020). In addition, temporary measures were adopted in May 2020 at the European Union level, enabling the extension of the validity of certain certificates and licences in the road, rail and waterborne transport sectors (European Union, 2020b). An amendment was adopted to the Port Services Regulation (EU) 2017/352, which relaxed the rules on charging ships for the use of port infrastructures, providing flexibility on the reduction, deferral, waiver or suspension of port infrastructure charges as a response to the COVID-19 crisis, thus contributing to the financial sustainability of ship operators in the context of the pandemic (European Union, 2020c). Further, measures could be decided on a case-by-case basis by port-managing bodies. The temporary amendment

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[57] Since the first regional port State control agreement (Paris Memorandum of Understanding on Port State Control) was signed in 1982, IMO has supported the establishment of eight other regional port State control regimes, achieving a global maritime network. The areas of responsibility cover the waters of the European coastal States and the North Atlantic basin from North America to parts of Europe and the north Atlantic (Paris Memorandum of Understanding on Port State Control); Asia and part of the Pacific Ocean (Memorandum of Understanding on Port State Control in the Asia–Pacific Region); Latin America (Latin American Agreement on Port State Control of Vessels); the Caribbean (Memorandum of Understanding on Port State Control in the Caribbean Region); West and Central Africa (West and Central Africa Memorandum of Understanding on Port State Control); the Black Sea (Memorandum of Understanding on Port State Control in the Black Sea Region); the southern part of the Mediterranean Sea (Mediterranean Memorandum of Understanding on Port State Control); the Indian Ocean (Indian Ocean Memorandum of Understanding on Port State Control); and the Persian Gulf (Riyadh Memorandum of Understanding on Port State Control). The United States Coast Guard maintains a tenth port State control regime.

could be applied for all measures taken as from 1 March 2020 until 31 October 2020 (European Union, 2020d).

Members of the International Association of Classification Societies, acting on behalf of flag States, also developed guiding principles for the provision of technical and implementation advice to such States when considering whether to permit statutory certificate extension beyond three months (Circular Letter No. 4204/Add.19). It was further clarified that the extension of the validity of certificates beyond the statutory maximum should only be considered in extraordinary circumstances and if no other alternative exists. The issuance of short-term certificates or other measures should be limited to specific situations caused by the pandemic, and relevant decisions should be made on a case-by-case basis. The guiding principles provide technical and implementation advice to flag States when considering whether to extend certificates beyond the three months allowed by the IMO treaty regime. They represent a six-step approach to an informed decision-making process that respects the existing regulatory regime and that can result in an evidence-based assessment for the justification of such an extension. Considering that port State control measures had been temporarily suspended to some degree by some port State control regimes, it is the responsibility of the flag State to issue clear statutory instructions and decisions to owners and recognized organizations regarding such extensions.

3. Crew changes and key worker status

Shipping and seafarers are vital to global supply chains and the world economy. Each month, a large number of seafarers need to be changed over to and from the ships they operate to ensure compliance with international maritime regulations for safety, crew health and welfare, and to prevent fatigue. Because of COVID-19-related restrictions, however, large numbers of seafarers had to have their service extended on board ships after many months at sea, unable to be replaced or repatriated after long tours of duty. The International Transport Workers' Federation estimated in July that approximately 300,000 seafarers were trapped working aboard ships due to the crew change crisis caused by government border and travel restrictions relating to the pandemic; the same number of unemployed seafarers, who were ashore, were waiting to join them. That makes 600,000 seafarers affected by this crisis (International Transport Workers' Federation, 2020a). This was considered unsustainable, both for the safety and well-being of seafarers and the safe operation of maritime trade (Marine Insights, 2020) (see also chapter 2 of this report).

During the implementation of border closures, lockdowns and preventative measures aiming to reduce the exposure to COVID-19 risk at ports and terminals, including the temporary suspension of crew changes and prohibition of crew disembarking at port

terminals,[58] a major issue was the need for recognition by Governments and relevant national authorities of key-worker status for those operating essential services in maritime transport, including professional seafarers and marine personnel, regardless of nationality, when in their jurisdiction. This would give them the right to transit international borders and obtain medical attention ashore.[59] Another key issue was for Governments and national authorities to allow and facilitate crew changes and repatriation upon completion of their periods of service, permitting professional seafarers and marine personnel to disembark from ships in port and transit through their territory.

In cooperation with global industry associations representing various sectors of the maritime transport industry,[60] IMO adopted a number of general measures and protocols designed to address these issues and ensure that ship crew changes could take place safely during the pandemic (Circular Letter No. 4204/Add.14). Such protocols covered the travel and movement of seafarers to and from ships for the purpose of effecting ship crew changes, which included various locations (and potential locations) throughout the process of crew change and travel and the periods of time when there might be risks that needed to be managed and controlled in the process. The circular letter contained recommendations to maritime Administrations and other relevant national authorities, such as health, customs, immigration, border control, seaport and civil aviation authorities and outlined the roles of shipping companies, agents and representatives, including crew agencies and seafarers. The information was also extended to seaports, airports and airlines involved in travel operations for ship crew changes. Despite a gradual trend towards the easing of restrictions on crew changes by authorities, such easing was subject to conditions, mainly travel history and/or nationalities of crew on board. In many cases, full prohibition or closure of borders still remained.[61] Out of more than 102 countries surveyed in July 2020, 45 countries allowed crew changes, while 57 did not.

In a joint statement issued in May 2020, the International Civil Aviation Organization, IMO and the International Labour Organization recognized that for humanitarian reasons and the need to comply with international safety and employment regulations, crew changes could not be postponed indefinitely (Circular Letter No. 4204/Add.18). They advised that from mid-June 2020, around 150,000 seafarers a month would require international flights to ensure crew changeovers could take place. To facilitate crew change, they urged Governments and local authorities to designate the following personnel as key workers: seafarers, marine personnel, fishing vessel personnel, offshore energy sector personnel, aviation personnel, air cargo supply chain personnel and service provider personnel at airports and ports, regardless of nationality. They were urged to exempt them from travel restrictions to ensure the smooth changeover of crews, their access to emergency medical treatment and if necessary, emergency repatriation. The implementation included permitting seafarers, marine personnel, fishers and offshore energy sector personnel to disembark from and embark ships in port and transit through the territory of Governments and local authorities (that is to say, to an airport) for the purpose of crew changes and repatriation and the implementation of appropriate approval and screening protocols. Gradually, more and more reports of successful crew changes were being received (Splash, 2020c).

4. Commercial law implications of the COVID-19 crisis

As highlighted in an UNCTAD policy brief (UNCTAD, 2020d), the unprecedented disruptions associated with the pandemic and its massive socioeconomic consequences are giving rise to a plethora of legal issues affecting traders across the globe (for example, delays and performance failure, liability for breach of contract, frustration and force majeure). The effects of such issues may lead to large-scale economic losses and bankruptcies, in particular for small and medium-sized enterprises, including in developing countries, and in turn overwhelm courts and legal systems. Collaborative approaches by Governments and industry, policy coherence and synergy will be required to minimize adverse effects. Industry and traders need to be encouraged to waive some of their legal rights and agree on moratoriums for payments, performance and the like where appropriate, and Governments should consider where intervention or financial assistance may be necessary.

In all cases where performance is disrupted, delayed or becomes impossible, legal consequences arise, leading to the need for dispute resolution and potential litigation involving complex jurisdictional issues in a globalized context. Unless common approaches are found to reducing the incidence of disputes and facilitate their

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58   For COVID-19-related port restrictions on vessels and crew and an interactive map of ports around the world, see Wilhelmsen, 2020.

59   For a draft template of letters of authorization from the International Chamber of Shipping and the International Transport Workers' Federation to help seafarers and authorities recognize key worker status, see International Chamber of Shipping and International Transport Workers' Federation, 2020.

60   BIMCO, Cruise Lines International Association, Federation of National Associations of Ship Brokers and Agents, Intercargo, Interferry, InterManager, International Air Transport Association, International Association of Ports and Harbours, International Chamber of Shipping, International Federation of Shipmasters Associations, International Marine Contractors Association, International Parcel Tankers Association, International Transport Workers' Federation, Intertanko, Protection and Indemnity Clubs and World Shipping Council. See also International Transport Workers' Federation (2020b, 2020c and 2020d).

61   For a list of countries that allow disembarkation for the purpose of crew change and related information on relevant restrictions, see BIMCO, 2020; S5 Agency World, 2020; and Waterfront Maritime Services, 2020.

resolution, for example by agreement on contractual extensions, restraint in terms of pursuing rights and legal claims, and efforts at mediation and informal dispute resolution, this could be on a scale overwhelming legal and administration of justice systems, with implications for global governance and the rule of law.[62] Coordinated government and collective industry action is required, as well as commercial risk-allocation through standard contractual clauses drafted to address contractual rights and obligations in the light of the circumstances associated with the pandemic. As part of its response to the COVID-19 crisis, UNCTAD has already begun lending technical assistance to provide related technical advice and guidance to small and medium-sized traders and policymakers, in particular in developing countries;[63] two related briefing notes are under preparation.

5.   Need for systemic and coordinated policy responses at the global level

The urgent need for systemic and coordinated policy responses at the global level has prompted the United Nations Global Compact to issue a call to action that identifies recommendations for urgent political action to keep global ocean-related supply chains moving (United Nations Global Compact, 2020a). The recommendations were a consolidation of the work of the COVID-19 Task Force on Geopolitical Risks and Responses initiated by the Action Platform for Sustainable Ocean Business of the Global Compact (United Nations Global Compact, 2020b). The Task Force consists of representatives from leading international companies, industry associations, financial institutions, United Nations specialized agencies and academic institutions. The call to action recognizes that:

> The scale, complexity and urgency of the problem call for a comprehensive, systemic and coordinated approach at the global level. These issues cannot be effectively dealt with on a case-by-case basis, bilaterally or between a limited number of countries. An absence of decisive policy responses at the global level will likely trigger ripple effects which will reverberate through national economies and impede cross-border supplies of critical goods.

The call to action includes the following recommendations:

- Recognize the fundamental role robust international ocean-related supply chains play in the COVID-19 pandemic response.

- Pursue holistic and harmonized global cooperation and coordination to ensure the safety and integrity of ocean-related global supply chains.

- Ensure the continued cross-border flow of goods by sea to avoid disruptions to the integrity of ocean-related global supply chains.

- Adopt an internationally recognized key worker status system enabling unhindered movement, regardless of nationality, across international borders of personnel key to the safety and integrity of ocean-related supply chains.

- Implement measures to facilitate the safe and efficient cross-border movement of key personnel and flow of goods by sea.

- Adopt a uniform, evidenced-based and globally consistent approach to certification and classification procedures to ensure the safety and integrity of ocean-related global supply chains.

- Establish a system of metrics to gauge disruptions in the global ocean-related supply chains. (United Nations Global Compact, 2020a).

Detailed elaborations on the recommendations, along with suggestions for concrete actions to be taken, can be found in the annex to the aforementioned call to action.

F. SUMMARY AND POLICY CONSIDERATIONS

Technological advances, the COVID-19 pandemic and changes in the regulatory and legal environment provide a challenging environment for policymakers, who need to respond to these developments. Key issues presented and discussed above include the following.

1.   Ensuring cybersecurity

The maritime industry is increasingly embracing automation, and ships and ports are becoming better connected and further integrated into information technology networks. Other trends affecting the industry are a growing shift towards digitalization and the development of smart navigation and advanced analytics. As a result, the implementation and strengthening of cybersecurity measures is becoming an essential priority for shipowners, managers and port operators. For ships, this becomes even more important regarding the need to implement IMO Resolution MSC.428(98), on Maritime Cyberrisk Management in Safety Management Systems, which encourages Administrations to ensure that cyberrisks are appropriately addressed in safety management systems, starting from 1 January 2021. Thus, in preparation for the implementation of the IMO resolution during 2020 – ahead of the first inspection by the International Safety Management auditors after 1 January 2021 – shipping companies need to assess their risk exposure and develop information technology policies for inclusion in their safety management systems. Owners who fail to do so are not only exposed

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[62]   Note in this context Sustainable Development Goal 16 on peace, justice and strong institutions and Goal 17 on the Global Partnership for Sustainable Development.

[63]   Transport and trade connectivity in the age of pandemics (project 2023X), www.un.org/development/desa/da/da-response-to-covid-19/.

to cyberrisks but may have their ships detained by port State control authorities that would need to enforce this requirement.

The COVID-19 outbreak has brought maritime industry stakeholders closer in their efforts to ensure supply chains continue to function. Virtual platforms have played an important role in facilitating communication and operations during this time. However, an increase in shipping cyberattacks of 400 per cent was reported between February and June 2020, exacerbated by the reduced ability of companies to sufficiently protect themselves, in particular as a result of travel restrictions, social distancing measures and economic recession.

Cyberrisks are likely to continue to grow significantly, as a result of greater reliance on electronic trading and an increasing shift to virtual interactions at all levels; this heightens vulnerabilities across the globe, with a potential for crippling effects on critical supply-chains and services. Coordinated efforts towards developing appropriate protection mechanisms against cybercrime and attacks should therefore be pursued as a matter of urgency; this may require significant scaling up of investment and capacity-building for developing countries, including with respect to skilled human resources.

2. Using electronic trade documents

In the context of the pandemic, international organizations and industry have issued calls for Governments to remove restrictions on the use and processing of electronic trade documents and the need for documentation to be presented in hard copy. Governments have made significant efforts to keep their ports operational and speed up the use of new technologies, including digitalization. In addition, industry associations have been working to promote the use of electronic equivalents to the negotiable bill of lading and their acceptance by more government authorities, banks and insurers.

3. Reducing greenhouse gas emissions from international shipping and adapting transport infrastructure to the impacts of climate change

With regard to the reduction of greenhouse gas emissions from international shipping, progress was made at IMO towards achieving the levels of ambition set out in the Initial Strategy on reduction of greenhouse gas emissions from ships, including on ship energy efficiency, alternative fuels and the development of national action plans to address greenhouse gas emissions from international shipping. This includes the publication in 2020 of the fourth IMO greenhouse gas study. UNCTAD collaborates with IMO in a review of the impact assessments submitted to the Intersessional

Working Group on Reduction of Greenhouse Gas Emissions from Ships. From the perspective of developing countries, many of which are particularly vulnerable to the growing risks of climate-change impacts, it is important that their legitimate interests be taken into account in the quest to reduce emissions from international shipping.

The twenty-fifth session of the United Nations Framework Convention on Climate Change, held in Madrid in December 2019, highlighted that much remains to be done on both the domestic and international fronts if climate action is to be achieved that is consistent with the long-term goal of the Paris Agreement under the Convention.[64]

In the context of climate-change adaptation and resilience-building for seaports – an issue of particular relevance to the developing world – the transport action table prepared by the Marrakech Partnership for Global Climate Action includes two distinct areas with a focus on adaptation, for transport systems and transport infrastructure, respectively, as well as related milestones for 2020, 2030 and 2050 (Marrakech Partnership for Global Climate Action, 2019a). These envisage, among others, that by 2030, all critical transport infrastructure will be climate-resilient to at least 2050. Relevant key actions and milestones for transport have also been integrated into the cross-sectoral resilience and adaptation action table, which highlights key actions and milestones for climate resilience-building (Marrakech Partnership for Global Climate Action, 2019b). UNCTAD actively contributed to the preparation of these documents. In the light of scientific projections, climate-change impacts and adaptation for critical transport infrastructure will remain key challenges, including during post-pandemic recovery.

4. Reducing pollution from shipping

There are several important areas where regulatory action has recently been taken or is under way for the protection of the marine environment and conservation and sustainable use of marine biodiversity. These are as follows: implementation of the IMO 2020 sulphur limit; ballast water management; action to address biofouling; reduction of pollution from plastics and microplastics; safety considerations of new fuel blends and alternative marine fuels; and the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction.

The implementation as of 1 January 2020 of the mandatory IMO limit of 0.5 per cent on sulphur content in ship fuel oil was considered to be relatively smooth at the outset; however, some difficulties have arisen as a result of the disruptions caused by the COVID-19

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[64] Paris Agreement, article 2.1(a): "Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels…".

crisis. In March 2020, the ban on the carriage of non-compliant fuel oil entered into force to support the implementation of the sulphur cap. However, it appears that its enforcement by port State control authorities has been suspended, owing to measures put in place to reduce inspections and contain the risk of spreading the coronavirus disease. It will be important to ensure that any delay will not adversely affect the implementation of the sulphur cap regulation in the long term.

5.   Responding to the COVID-19 pandemic

The spread of the coronavirus placed the entire world – and thus the international maritime industry – in an unprecedented situation. To slow the spread of the disease and mitigate its impacts, key shipping stakeholders, including international bodies and Governments, issued a number of recommendations and guidance that aimed to ensure, first of all, that port workers and seafarers were protected from the coronavirus disease, were medically fit and had access to medical care, and that ships met international sanitary requirements.

Seafarers in particular face major challenges stemming from the pandemic. Owing to COVID-19 restrictions, many seafarers had to have their service extended on board ships after many months at sea, unable to be replaced or repatriated after long tours of duty. This is a problematic state of affairs, both in terms of their safety and well-being and the safe operation of maritime trade. Therefore, calls have been issued to designate seafarers and other marine personnel as key workers, regardless of nationality, and to exempt them from travel restrictions, to enable crew changes. In addition, temporary guidance was developed for flag States, enabling the extension of the validity of seafarers and ship licences and certificates under mandatory instruments of the International Labour Organization and IMO. It has become more and more clear that due to the scale, complexity and urgency of the COVID-19 crisis, addressing these issues effectively calls for a comprehensive and coordinated approach at the global level.

In respect of the important and wide-ranging commercial law implications of the COVID-19 crisis and its aftermath, coordinated government and collective industry action will be required. Further, commercial risk-allocation through standard contractual clauses drafted to address legal rights and obligations will be necessary in light of the circumstances associated with the pandemic and to ensure that legal and administrative systems are not overwhelmed. In this regard, capacity-building and legal technical advice and guidance will be needed to support small and medium-sized enterprises, as well as policymakers in developing countries.

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