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Greenwashing or sustainable environmental practices? The case of cruise tourism

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ABSTRACT

Cruise tourism is a highly environmentally damaging form of tourism, causing various environmental degradation. This study aims to characterise cruise tourism, frame it technically and legally within international legal instruments, particularly concerning environmental policies and practices, and assess if companies' sustainability measures are steps towards sustainability or greenwashing practices. These practices are operationalised to respond to the demands of public opinion and an increasingly demanding demand in these matters, the so-called green consumers. To achieve these objectives, a comprehensive range of qualitative and quantitative data was gathered and analysed. As conclusion, cruise lines have made significant changes towards the sustainability commitments established by international organisations and the public. Nevertheless, due to their distinctive characteristics, dimensions, and intricacies, there is still a dearth of technological and logistical alternatives that are commensurate with the scale of cruise ships, despite the advancement that has been made in this direction.

1 Introduction

One of the 17 goals set by the United Nations as part of the 2030 Agenda for Sustainable Development [1] is Responsible Production and Consumption. This underscores the pivotal role that these behaviours play in fostering sustainable development and holds all agents (producers and consumers) involved in the process accountable. Each agent is responsible for their own performance, but also has pedagogical responsibilities in empowering others. This virtuous cycle can be initiated by responsible consumers who force producers to adopt sustainable production models. In turn, the growing supply on the market, which is the result of this consumer pressure, encourages consumers to consume it.

In today's society, public image often outweighs reality, with companies prioritizing messaging over genuine actions. While more consumers are demanding responsible environmental, social, and economic practices, the investment in marketing strategies, sometimes leading to greenwashing, is often cheaper than making real sustainable changes.

The tourism industry faces criticism for its sustainability, with environmental impacts such as mobility and accommodation being significant. Socially, it can negatively affect local populations' quality of life, leading to resource depletion and lack of tangible benefits. Economically, a significant portion of investment is external to communities, with financial and tax gains not reinvested in destinations. In the specific context of cruise tourism, the negative consequences are intensified by the inherent characteristics of the product. It is a mass product, with all the consequences associated with overtourism [2], and whose environmental performance can compromise air and water quality, both when navigating and when docked.

As Europe is the second largest region on the planet (after the Caribbean) for cruise passenger arrivals and has five ports (Barcelona, Civitavecchia, Marseille, Genoa and Palma de Mallorca) in the international top 10 for cruise arrivals and passenger embarkation and disembarkation [3], cruise tourism generates unavoidable positive and negative impacts.

Cruise ships face stricter environmental standards, aiming for full decarbonization by 2035, which requires major investments in infrastructure. Companies have responded to rising green consumer demand, especially from eco-conscious tourists, with sustainability-focused marketing. This study seeks to determine whether these claims reflect reality or are simply strategies for competitiveness. It also addresses the need for more research on greenwashing in the cruise tourism industry.

2 Literature review

2.1 Green consumers and greenwashing: the concepts and their relationship

2.1.1 Green consumers

The Industrial Revolution spurred economic growth and improved access to goods and services, but it also had negative environmental and social impacts, threatening quality of life. In response, many individuals have adopted strategies to mitigate these effects, while governments have implemented policies promoting sustainable production, distribution, and the consumption of green products [4].

In 1988, Elkington and Hailes defined a green consumer as someone who avoids products that: 1) pose health risks; 2) cause environmental harm during production, use, or disposal; 3) overuse resources; 4) generate unnecessary waste; 5) come from endangered species or environments; 6) involve animal cruelty; or 7) negatively impact other countries [5].

Since then, numerous studies have explored the profile and motivations of green consumers across various disciplines countries [6, 7]. These consumers prefer sustainable goods and reward companies adhering to environmental, social, and economic sustainability principles. While the focus is primarily on environmental issues, green consumers also value fair trade and social responsibility, emphasizing human rights and community well-being. They are concerned with the planet's future, the welfare of future generations, and their own health and well-being [8].

There has been a notable expansion in this consumer demographic across both industrialised and developing countries [9]. A multitude of factors influence this behaviour, including environmental awareness, interpersonal influences, the intention/behaviour to buy sustainably and the concern for healthy living, and the influence of social networks, both through promoting and facilitating purchases. Factors' prevalence and influence vary based on generation, societal, and cultural contexts, leading to the creation of case studies applicable to diverse territorial and social realities [9, 10].

The growing existence of this consumer profile [11] has encouraged companies to adapt their practices to succeed in this market segment. This is a factor of innovation and differentiation that is increasingly decisive for business success and provides great competitive advantages [12]. Some companies prioritize sustainable production, while others use greenwashing, a marketing strategy that convinces the market of their sustainability policies and practices, despite their focus on environmentally friendly practices.

2.1.2 Greenwashing

The definition of greenwashing is flexible, varying across scientific domains due to its multidimensional nature [13-17]. Some, like Lyon and Maxwell [18], include a social dimension, while others focus solely on the environmental aspect. Despite growing interest, research on greenwashing remains limited, with gaps in quantitative studies, generalization, scientific rigour, and systematization [17].

From the European Commission's perspective [19] (p. 95), "the expressions 'environmental claims' and 'green claims' refer to the practice of suggesting or otherwise creating the impression (in a commercial communication, marketing or advertising) that a good or a service has a positive or no impact on the environment or is less damaging to the environment than competing goods or services". It is also stated that "when such claims are not true or cannot be verified, this practice is often called 'greenwashing'". Greenwashing can relate to all forms of business-to-consumer commercial practices concerning the environmental attributes of goods or services (information, symbols, logos, graphics, packaging, labelling, advertising, including websites).

The United Nations [20] identifies greenwashing as a major challenge to climate change because it misleads people into believing that a company is doing more to protect the environment than it actually is, using misleading messages as a communication strategy.

The concept of greenwashing emerged in the 1980s and describes the practice of promoting sustainability policies and practices in a false or exaggerated way with the aim of increasing the competitiveness of organisations [21]. It is a negative concept that implies corporate fraud [22], being a form of advertising in which green marketing is carried out in a misleading way to attract consumers. It is the act of misleading consumers about a company's environmental practices or the environmental benefits of a product or service [14].

The rise in demand for green products has led some organisations to promote their services as green. How-

ever, a significant portion of green products contain elements deemed greenwashing, potentially affecting consumer satisfaction [23]. This practice is harmful to consumers and society, and it is crucial for governments and supranational entities to enforce regulations prohibiting such practices [17].

The perception of greenwashing mechanisms has been found to undermine consumer confidence, which in turn has been linked to a decrease in green demand. When this feeling is widespread, it can have the potential to jeopardise society's awareness of environmental protection issues [24].

In addition, green marketing is the tool organizations use to communicate their messages, attract consumers, and promote the purchase of goods and services. It has been widely researched, with both public and private sectors recognizing its importance in promoting sustainable consumption [25]. While green marketing is often linked to greenwashing, it is not exclusively so. However, it can play a crucial role in creating a deceptive image when used to construct a fraudulent portrayal of sustainability [26].

In response to the initial question, it can be concluded that greenwashing exists. This is because there is a growing market segment that values sustainable goods and services both because of their characteristics and because they stem from production, distribution and commercialisation cycles that are guided by these same principles. This demand profile is derived from a combination of factors, including a growing awareness of sustainability and a heightened concern for individual health and well-being.

The concept of greenwashing is defined by the concept of the green consumer. While some authors limit their analysis to the environmental dimension, others consider the social and economic aspects as well. Organizations that promote social responsibility policies and practices do so because they recognize that consumers are sensitive to such issues.

2.2 Green consumers and greenwashing in the context of tourism

The concept of green consumers extends to tourism, particularly green tourism. Some authors equate green tourism with sustainable tourism, while others focus primarily on its environmental aspects [27]. However, more research is needed to fully understand how green consumer behavior translates to the travel and holiday context [6].

Green tourists are individuals who prioritize environmentally friendly and sustainable options when planning their trips. This includes: 1) choosing accommodations with sustainable practices and certified products; 2) selecting low-carbon transport options; 3) engaging in nature-based, regenerative, volunteer, cultural, or community-based tourism; and 4) interacting with local communities and supporting native offerings [6, 28]. These tourists make purchasing decisions based on ethical principles, driven by altruism, while also considering their health and well-being [29].

The tourism industry has increasingly invested in offerings that cater to the green tourist profile, recognizing that environmental and social responsibility policies can serve as a competitive advantage. Creating a brand associated with the green attributes of a destination enhances its value, boosts tourist confidence [30], and increases satisfaction and the likelihood of revisits [31].

To attract tourists, territories and organizations should focus on green marketing, focusing on environmental awareness and sustainable behavior, using strategies and practices to increase awareness and attract more visitors [32]. However, as has already been observed, green marketing is not always employed in an ethical manner and can be used to create and disseminate a false image of sustainability. The tourism sector is no exception, and the concept of greenwashing was first associated with this industry when environmentalist Jay Westervelt published a study in 1986 on the hotel industry's practices to promote the reuse of towels [15].

Several studies highlight that greenwashing is prevalent in tourism. Examples include tour operators misrepresenting volunteer tourism packages as sustainable [33], misleading promotions of tours in the Galapagos Islands [34, 35], and ecoresorts in Sri Lanka falsely marketed as ecotourism [31]. When consumers detect such greenwashing, it erodes trust in green offerings and destination brands [30, 31], reducing the likelihood of revisits, discouraging participation, and spreading negative word-of-mouth [36].

However, efforts and investments in genuine sustainability policies and practices cannot be jeopardised by the lack of ethics of some. It is therefore necessary for organisations to show their green behaviour in an unquestionable way, nurturing a relationship of trust with consumers [37], and for regulations and control mechanisms to be put in place for offenders.

In the particular case of cruise tourism, as a mass tourism product, thousands of people are concentrated on each ship, impacting the destinations they pass through at various levels. These companies have been criticised by the populations of some territories, as well as by consumers themselves. As generations Y and Z enter the ranks of potential consumers, there is greater pressure for a more sustainable approach.

3 Methodology

This article employs a triangulation approach, integrating perspectives from consumers, the cruise tourism industry, and sustainability policies and practices. In order to achieve this objective, it was essential to re-

view the relevant literature, collect and process the qualitative and quantitative information available in scientific publications (extracted from the Scopus and Sciencedirect databases), as well as reports, regulations and official documents from the international community, based on the vectors of greenwashing, green consumers, environmental sustainability and cruise tourism. The article is contextualised in the case study method, which aims to explore an individual, a group or a phenomenon [38]. Case studies are not used to test hypotheses, but hypotheses can be generated from case studies [39]. The aim of case study research is twofold: 1) to provide descriptive information and 2) to suggest theoretical relevance. A rich description allows for a deeper or clearer understanding of the case [40]. This case study method is used to achieve the aim of explanatory research, i.e. a case study whose goal is to explain how or why a particular condition arose, or why a particular sequence of events occurred or did not occur [41, 42].

4 Results and discussion: Analysing cruise tourism policies and practices from a sustainability perspective

4.1 Facts and figures on global cruise tourism

The concept of cruises originated in 1844 with the Peninsular and Oriental Steam Navigation Company (P&O). By the 1870s, the first transatlantic lines between Europe and the United States were established, making cruises a symbol of luxury and prestige. Modern maritime cruising, however, emerged in the 1960s, when air travel made cruises more accessible and affordable [2].

The International Maritime Organization (IMO) defines passenger ships as vessels carrying more than 12 passengers on international voyages, a definition applied across all relevant IMO conventions [43]. A cruise, however, refers specifically to a passenger ship used for recreational and leisure travel, where the journey, along with the onboard amenities, attractions, activities, and entertainment, form a key part of the overall experience. For several decades, cruises have constituted a significant segment of the leisure tourism industry, offering travellers the opportunity to explore a diverse range of destinations across the globe. The demand for cruises has been on the rise, with the only significant slowdown occurring during the global pandemic [44]. According to Peručić and Puh [45] (p. 214), "cruise tourism has become a mass phenomenon and increasingly more passengers worldwide are choosing this form of vacation". It is also stated that "in comparison with international tourism, the world cruise industry is showing pronounced dynamic growth".

The growth of cruise tourism "brings many benefits to home ports, ports of call, and coastal regions" [45] (p. 215), including: 1) significant economic impacts on port regions, cities, and countries; 2) positive promotion of ports and cities; 3) job creation in the cruise sector; and 4) cruises serve as a way for passengers to sample destinations, encouraging return visits for land-based holidays. However, there are also negative impacts, such as: 1) overcrowded ports and attractions, affecting land-based tourism and local quality of life; 2) environmental damage to port regions; and 3) capacity issues in European ports and surrounding areas due to growth [45].

Given the growth of the tourism industry, the issue of sustainability has become fundamental. There are more than 300 cruise ships operating worldwide [3]. The largest cruise companies in the world in 2023, by the number of cruises, are Royal Caribbean Cruises (27 boats), Carnival Cruise Line (26), and MSC Cruises (24). Royal Caribbean currently owns the two largest cruise ships, the 'Icon of the Seas', which can accommodate 7600 passengers, and the 'Wonder of the Seas' [46].

According to CLIA – Cruise Line International Association, international demand for this product increased by 39.4% between 2013 and 2019, from 21.31 million to 29.7 million passengers. Of course, 2020 and 2021 were dark years in the history of tourism, and cruise tourism is no exception, but the recovery is truly symptomatic of its resilience, and between 2021 and 2022 the increase was 325% [47, 48].

In 2022, the available capacity permitted 664,602 passengers to travel simultaneously if all 302 cruise ships were operated at full capacity. It is anticipated that the overall capacity of accommodation will increase by approximately 19% between 2022 and 2028. This will continue to make the sector one of the fastest-growing areas of tourism [48]. The exponential growth of the industry is evidenced by the fact that in 1990, only 3.8 million individuals embarked on a cruise, while in 2019, this figure had risen to almost 30 million [49]. Figure 1 illustrates the decrease in cruise tourism due to the global pandemic, as well as the subsequent growth that has occurred since that time. The figures for the period between 2024 and 2028 are estimates, which, if confirmed, attest to the continued growth of cruise tourism. The figures are forecast to be higher than those recorded in the pre-pandemic period.

The idea that cruise tourism is a mass tourism product is supported by many authors, including Cooper et al. [50]. The large passenger capacity of cruise ships leads to a rapid increase in demand, which significantly impacts natural and cultural resources. These effects are intensified by the geographic concentration of visitors [2, 51]. The growing size and capacity of cruise ships have raised concerns about waste generation and disposal, putting pressure on fragile environments and host communities [52]. These issues are compounded by the pollution caused both while navigating and when docked.

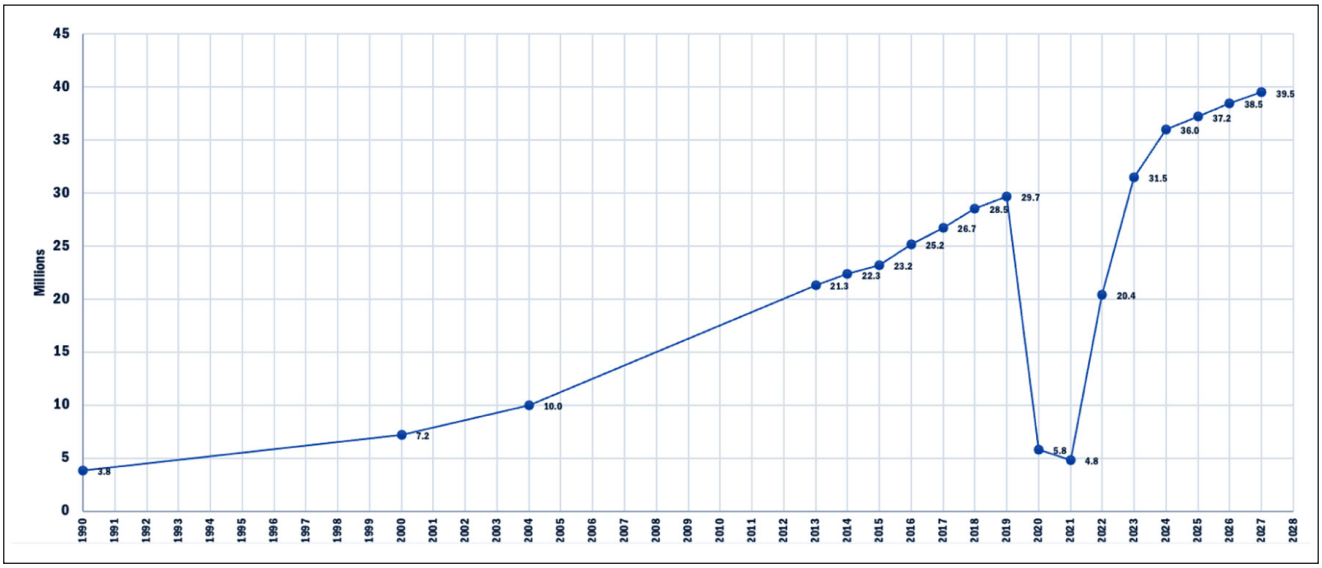

Figure 1 International demand for cruises (period 1990 – 2028*)

Source: Own elaboration based on [47, 84, 85] *Forecasts from 2023 onwards

Cruise ship tourism has been repelled by urban residents in cities like Venice, Palma de Mallorca, Barcelona, Dubrovnik, and Lisbon due to its size and negative consequences. Some ports are now electrifying their quays or moving cruise ships further away from city centres, causing practical consequences for the tourism industry. The negative impact of cruises is mainly manifested in the reduction of the quality of life of the local population [53].

Some measures have been taken to resolve these situations. For example, in 2019 a memorandum of understanding was signed between CLIA and the city of Dubrovnik – Cruise Industry and City of Dubrovnik Partner for Successful Destination Stewardship – committing both parts to working together to make Dubrovnik a model of sustainable tourism in the Adriatic region and beyond [54].

Cruise ships significantly impact the environment, and reducing its impact requires adopting circular economy principles, reducing water consumption and plastic use, and implementing wastewater and waste management systems. Companies must also preserve resources to support their operations [55].

The pollution generated by cruise ships is more scrutinised because they transport thousands of people on routes that are relatively close to the coast and to destinations that are very attractive from the point of view of nature and experiences. The biggest problem is in ports close to populated areas [56]. Researchers from Rovira i Virgili University (URV) developed an algorithm to predict the impact of cruise ship activity on air pollution in metropolitan areas. This methodology was applied to studies in Barcelona, Lisbon, and Palma de Mallorca. The findings, based on European Environment Agency (EEA) standards, suggest that cruise activity alone does not produce unhealthy air quality in these locations. However, future adoption of environmentally friendly technologies —such as cleaner fuels, increased availability of Onshore Power Supply (OPS), and energy-efficient ship designs — is expected to further reduce the environmental impact of cruise ships [57-59].

A study of the Transport & Environment [60] (p. 3) shows that cruise ship pollution at Europe's busiest ports is back to pre-pandemic levels leaving many cities exposed to air pollution. T&E states that "compared to the year 2019, the number of cruise ships, the time they spent around ports and the fuel they consumed all increased by about a quarter (23-24%). This resulted in an increase of 9% in SO_X emissions, 18% in NO_X, and 25% in $PM_{2.5}$ emissions". T&E also states that Europe's 218 cruise ships emitted more SO_X in 2022, or 4,4 times more than all the continent's cars. Older ships are the biggest problem, as they require a huge investment to adapt; the new ships are already built with technology focused on efficient environmental performance.

Ships can reduce pollution emissions while docked by using shore power, but the investment required is substantial, and only a limited number of ports and ships are equipped with this capacity. The European Directive on Alternative Fuels Infrastructure mandates shore power in major European ports, but only if it is deemed profitable. Each case must be evaluated individually to explore alternatives, as berth electrification is a good solution, but other options should also be considered to mitigate the environmental impact of cruises when docked [61].

The environmental impact of cruise tourism extends beyond operational activities, notably at the end of a cruise ship's life cycle. Historically, ships were dismantled with little regard for environmental or public health concerns, particularly in countries like India, Bangladesh, and Turkey. This practice has been criticized by NGOs such as Greenpeace. However, international regulations, such as the IMO's Hong Kong Convention, adopted in 2009 and entering into force in 2025, now govern ship dismantling and recycling processes [62]. Cruise ships, typically operating for 20 to 25 years, are increasingly dismantled and recycled in specialized shipyards, like Turkey's Aliağa Ship Breaking Yard, the fourth largest in the world for ship recycling.

4.2 The technical legal framework for cruise ships from a sustainability perspective

Maritime transport, including cruise ships, significantly contributes to greenhouse gas emissions, despite not being included in major international instruments like the Kyoto Protocol and the Paris Agreement. These ships consume large amounts of fossil fuels, causing air pollution, ship waste, and damage to marine ecosystems, coastal environments, and marine ecosystem resilience [63]. For many years, ship operations lacked environmental concerns, but this changed in the second half of the 20th century, following major hydrocarbon spills, such as the Torrey Canyon in 1967 and the Amoco Cadiz in 1978. These incidents, along with the growth of the global fleet in both number and gross tonnage, especially tankers, raised public awareness about the environmental risks posed by maritime transport. This highlighted the urgent need for stringent regulatory measures to address these threats.

In the wake of the aforementioned maritime incidents, the IMO, established in 1948, initiated the development of a universal instrument to address the environmental threat posed by such incidents. In this way, the International Convention for the Prevention of Pollution from Ships was born [64]. Nevertheless, although the issue of air pollution from ships was discussed at the time, the IMO ultimately decided not to produce regulations on the subject [64]. The timeline shown in Figure 2 systematises the main milestones along the way in terms of regulations and obligations imposed on the maritime sector.

The International Maritime Organization (IMO) is committed to reducing emissions from ship operations, in line with UN SDG 13 and the 2015 Paris Agreement. However, due to ambitious goals, the IMO must continue seeking better solutions for decarbonisation, with the cruise industry ensuring compliance with current regulations.

The responsibility for ensuring compliance with international regulations pertaining to the operation of ships falls upon the flag states, owners and shipowners, and ship masters. Furthermore, there may be instances where recognised organisations representing the maritime administrations of flag states will also become involved.

4.3 The (real) environmental policies and practices of cruise tourism

As with other sectors of the economy, the tourism industry must reduce its carbon emissions. To achieve the goal of keeping global warming between 1.5°C and 2.0°C, the international community must halve emissions by 2030 and eliminate them by 2050. In the absence of mitigation efforts, tourism is projected to contribute 40% of the carbon production limit if the 1.5°C target is pursued, making it one of the primary drivers of climate change. The operationalisation of decarbonisation measures to counteract this forecast is hindered by some barriers, including corporate, political and technical constraints. It is therefore imperative to define strategies and responsibilities that involve all stakeholders at different scales [65] (p. 155). Only systematic measures on a large scale can contribute to counteracting the established model and routines. However, there are significant obstacles to this, including the prevalence of a growth paradigm, the institutionalisation of interests, the nature of the policies formulated, the inadequacy of incremental measures, the focus on technological efficiency rather than on changing behaviours with a view to conservation, and the global distribution of tourism [66].

In the context of cruise tourism, the issue of sustainability and environmental practices is of paramount importance. Firstly, the degradation of resources poses a threat to the long-term viability of the industry. Secondly, tourists are becoming increasingly demanding of sustainable policies and practices from the organisations that support this offer. Their territorial and business success and competitiveness depend on this alignment, which is considered an integral part of the quality of the offer [67].

The cruise industry is implementing cleaner fuels, reducing emissions and creating control mechanisms, but applying these measures to existing ships is a challenge due to their assimilation capacity. For instance, there are already vessels such as the MSC Europa that utilise LNG, one of the cleanest fuels currently available, and which has a relatively moderate cost. In contrast, other fuels are not yet technologically developed to the extent that they can be used extensively on vessels of this nature and size. However, they are already being applied, in some cases experimentally, on smaller vessels. The utilisation of LNG results in a reduction of SO2 emissions by 99% and NOx emissions by 85%. Furthermore, it contributes to a reduction of CO2 emissions by 25% in comparison to the most commonly used fuels.

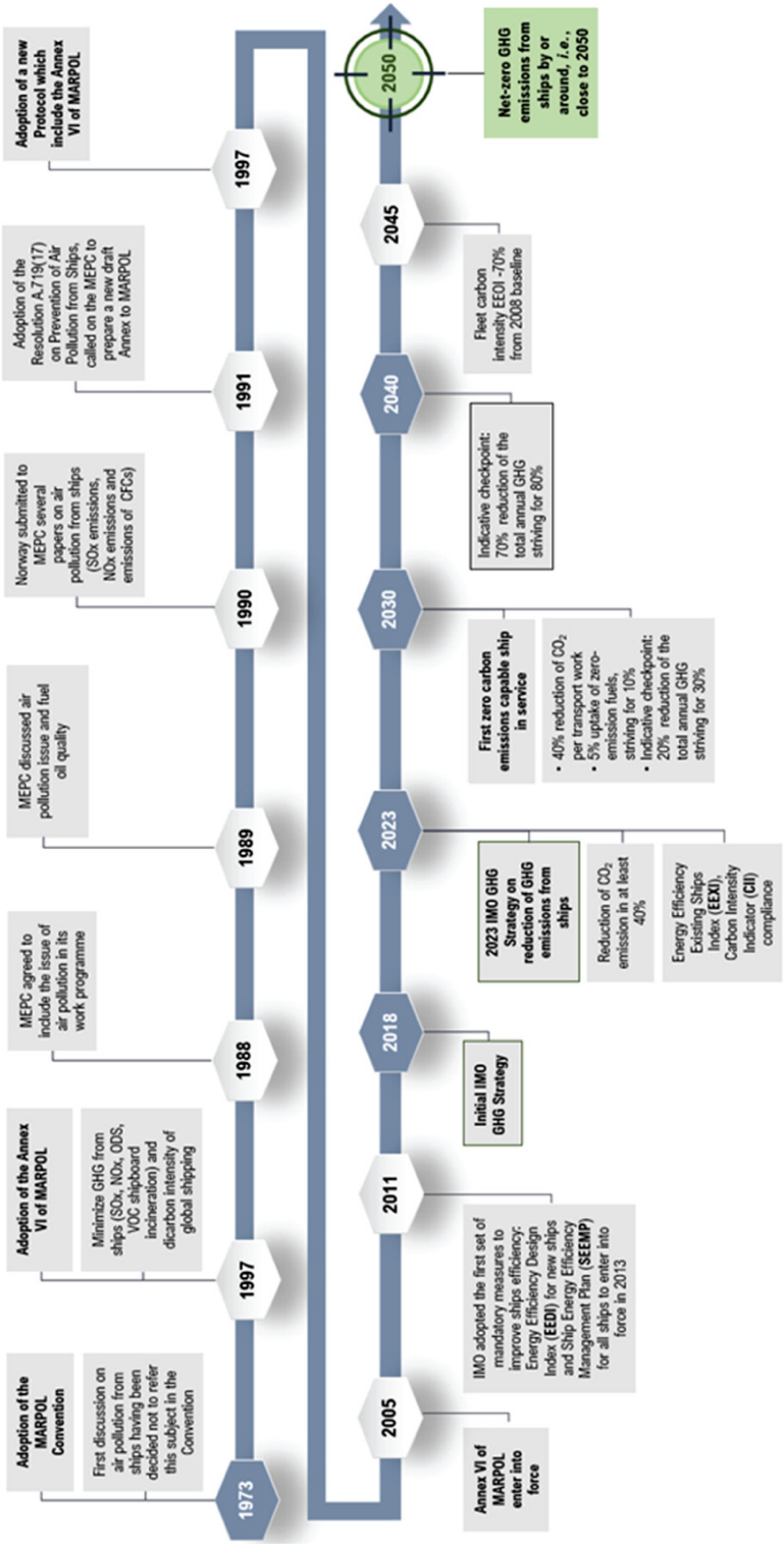

Figure 2 IMO timeline for decarbonising the maritime transport sector

Source: Own elaboration based on [64]

The shipping industry is actively working towards decarbonisation, addressing air pollution and its impacts, using scientific and technological advancements to improve infrastructure and ship operations, thereby addressing a pressing concern [68]. Furthermore, CLIA [68] indicates that 60% of ships scheduled for debut between 2023 and 2028 will utilise liquefied natural gas (LNG) as their primary source of propulsion, while 15% will feature battery storage and/or fuel cells for hybrid power generation.

It is expected that all CLIA-member ships, except for expedition vessels, built between now and 2028 will have shoreside power capabilities. Currently, 30% of ships, representing 40% of capacity, are equipped with plug-in capabilities, with another 30% scheduled for retrofitting. Globally, 29 cruise ports have at least one berth with onshore power, and 20 additional ports are planned or funded for installation by 2025. Presently, less than 2% of the world's cruise ports offer onshore power, a figure projected to rise to 3% by 2025, primarily in Europe [68].

The cruise industry must adhere to environmental safety and sustainability targets set by the International Maritime Organization (IMO) and other organisations to maintain its leading position in the maritime transport sector. Companies and stakeholders are investing in this objective, but further research, innovation, and application of existing technologies are needed [69].

It is important to emphasize the measures already implemented and those currently underway to reduce the cruise industry's impact as a significant contributor to greenhouse gas emissions. Beyond addressing the negative perceptions that have arisen in certain European cities, the industry is working to show that it can take responsibility for sustainability. These efforts reflect the industry's commitment to adapting to modern environmental demands and demonstrating its ability to contribute positively to the fight against climate change.

Figure 3, drawn up on the basis of Det Norske Veritas (DNV), shows some of the areas in which the sector is investing to improve the performance of cruises, making them more efficient and environmentally friendly.

After a bruising pandemic, global cruising is returning cleaner and greener. By 2027, CLIA projects that 26 cruise ships will be powered by liquefied natural gas, 81% of global capacity will be fitted with Advanced Wastewater Treatment Systems and 174 cruises will have shoreside power connectivity [70].

In the meantime, the world fleet, including passenger ships, must comply with the new operational measures on carbon efficiency and emissions contained in the Carbon Intensity Indicator (CII) and the Energy Efficiency Index for Existing Ships, known as EEXI. The CII started in 2023 and measures the energy efficiency of ships in grams of carbon dioxide emitted per cargo transport capacity and per nautical mile. EEXI is loosely based on a similar newbuilding design index introduced by the IMO in 2013 and calculates carbon emissions based on service speed, design speed and deadweight tonnage [70].

CLIA member cruise lines and shipping industry partners have demonstrated a commitment to the development and implementation of environmentally responsible technologies, policies, and practices. Despite comprising less than 1% of the global maritime community, the cruise industry has been one of the most acutely impacted by the last pandemic. Nevertheless, cruise lines have remained at the forefront in developing responsible environmental practices and innovative technologies, which benefit the entire shipping industry [71].

The realisation of this goal requires the adoption of measures that fall into three main areas of action: strong regulation, the application of innovative technologies for energy efficiency and public awareness of this problem, namely 1) improvements in ship design; 2) new, more environmentally friendly types of fuel and use of renewable energies to the maximum extent; 3) installation of devices on board to filter emissions (scrubbers – emission purifying filters); 4) installation of systems to treat waste produced on board; 5) adaptation to receive shore power; 6) choice of routes away from environmentally sensitive areas; 7) speed control; and 8) close monitoring of compliance with the rules.

As far as fuels are concerned, there are already several cases of new small ships using exclusively non-polluting energy sources. But their application to large tonnage ships already in operation will take time. For the time being there are a few LNG-powered ships, but there is great expectation around ammonia and green hydrogen, which are expected to revolutionise the maritime sector. The cruise sector was among the first to order LNG-powered vessels, which reduce $C0_2$ emissions by as much as 20% depending on engine type and is already operating LNG dual-fuelled smaller ferries and passenger vessels, which provided a transition pathway for these larger cruise ships [70]. Regarding electrical power, more than 15% of cruise ships entering service in the next five years will be equipped with battery storage to allow for hybrid power generation once the technology is more readily available [68].

With regard to filters, it is estimated that approximately 69% of diesel-powered ships are equipped with exhaust gas cleaning systems (EGCS) that are capable of removing 98% of the sulphur content from exhaust emissions. The technology installed on ships is designed to remove 98% of sulphur and well over 50% of particulates, with a 12% reduction in NOx [68].

A considerable number of studies have been conducted with the objective of improving the energy efficiency of ships. A recent study [72] proposes the use of oscillators to convert kinetic energy into electrical energy that can be used to propel ships.

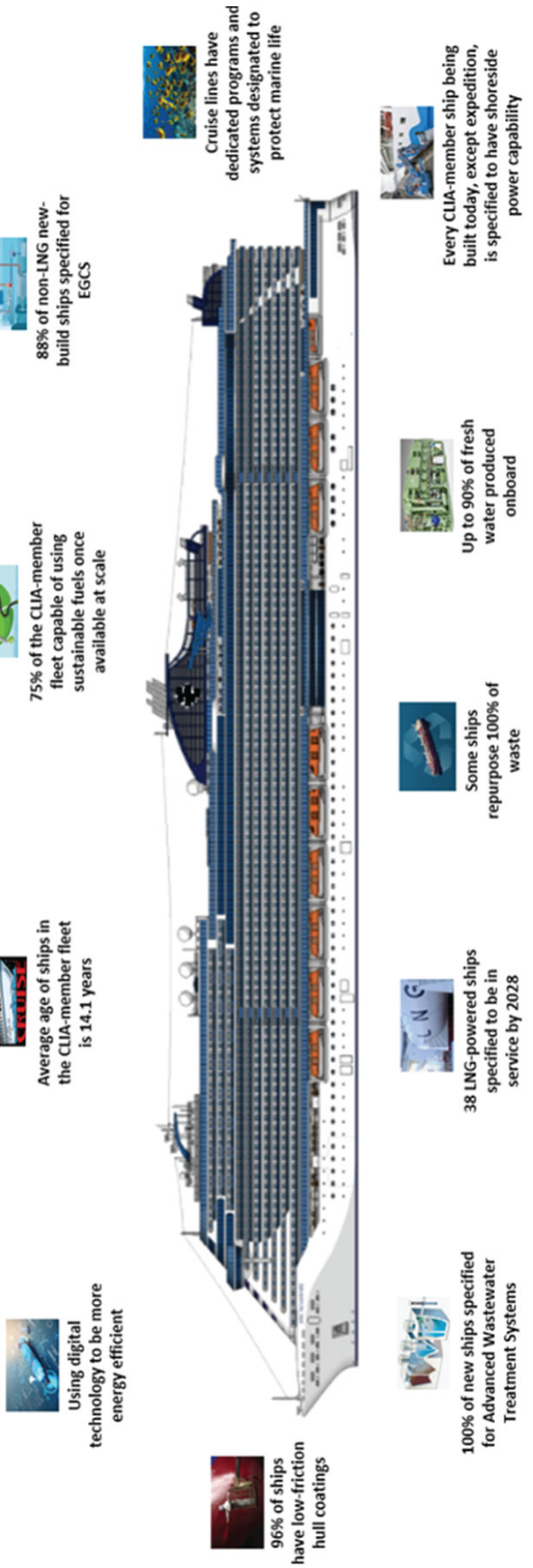

Figure 3 Pathway to reduce the environmental impact of cruises

Source: Self-elaboration based on data from [68]

It is similarly evident that surveillance, although not an easy matter to resolve, will have an important role to play. The European Maritime Safety Agency (EMSA) has already developed drones capable of surveying ships' chimneys in near-shore areas or at harbour entrances, with the objective of verifying compliance with applicable regulations. It may be the case that this method could be employed by competent authorities in coastal and port countries as a contribution to this context.

Following this preliminary examination, an analysis of the policies and practices that some major cruise companies claim to be advocating in order to fully comply with international regulations will be proceeded. This will enable to ascertain the extent to which these companies are contributing to the reduction of greenhouse gas emissions and the minimisation of their ecological footprint in general. In addition to the aforementioned case study, an analysis of the sustainability measures of a niche cruise company, namely small ships in the luxury segment, Windstar Cruises, will be presented.

4.3.1 Royal Caribbean Cruises

The Royal Caribbean Cruises strategy is based on the motto 'innovate from bow to stern' and has the following intentions: 1) to capture engine waste heat to repurpose; 2) occupancy based AC control systems to optimise energy consumption; 3) to use exhaust cleaning systems in order to remove local pollutants from engine exhaust; 4) to use LED lights to reduce energy consumption and produce more heat; 5) to use artificial intelligence in plotting energy efficient routes; 6) to use air lubrication systems to reduce drag and increase fuel efficiency; 7) to use special paint and hull designs creating smoother and more energy efficient navigation; 8) to optimise power plant management system for enhanced energy efficiency; 9) to use gallery energy management system, including demand-based ventilation, to benchmark equipment energy usage; and 10) to use as much as possible connections to the local electrical grid removing emissions while berthed [77].

Regarding the recycling of the company's ships, Royal Caribbean Cruises recognises that proper ship recycling is fundamental to the safety of personnel, protection of the environment and proper waste management policies. The Group identifies best-in-class certified maritime vessel retirement solutions worldwide for recycling retired ships, further supporting the commitment to a sustainable cruise industry. The company is committed to recycle each of its cruise ships in compliance with IMO's Hong Kong Convention for the Safe and Environmental Sound Recycling of Ships as well as with the International Labour Organization (ILO) [78].

4.3.2 Carnival Cruise Line

Carnival Cruise Line's decarbonisation strategy is based on four dimensions: 1) fleet optimisation (delivery of larger, more efficient ships as part of the ongoing new building programme, some of which may replace existing ships; 2) energy efficiency (continuing to improve the energy efficiency by investing in projects such as service power packs, air lubrication systems and expanding shore power capabilities to leverage renewable energy sources while in port; 3) route efficiency (designing more energy-efficient routes, concentrating on operational execution, and investing in port and destination projects in strategic locations); 4) new technologies and alternative fuels (investment in a first-of-its-kind lithium-ion battery storage system and evaluation of carbon capture and storage. It also supported the adaptation of alternative fuels, including biofuels such as methanol, which are being evaluated as a future low greenhouse gas emission fuel option for their ships [73] (Figure 4).

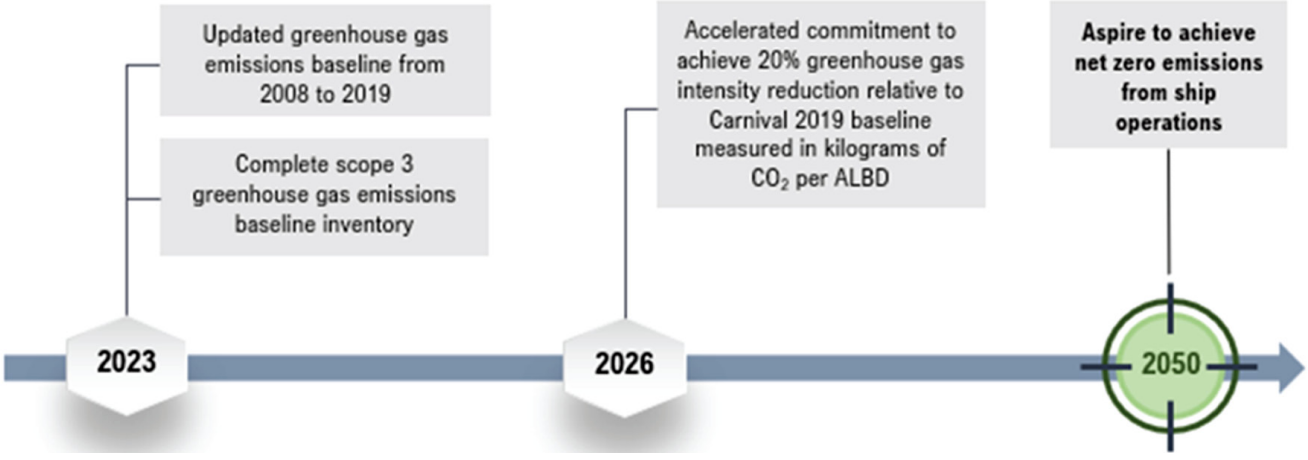

Figure 4 Carnival's latest path to decarbonisation

Source: Adopted from [73]

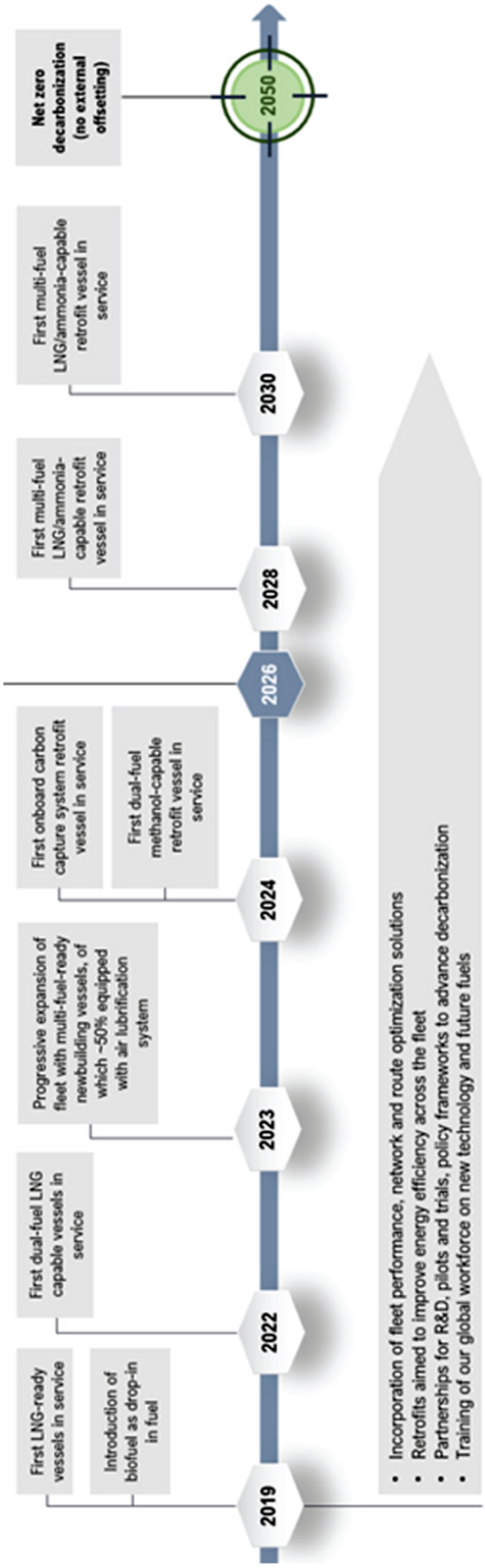

Figure 5 MSC Cruises' journey to decarbonisation

Source: Adopted from [76]

4.3.3 MSC Cruises

As for MSC Cruises, with 24 cruises in 2023, is determined to accelerate the transition to net-zero emissions by 2050, as required by the IMO. In 2022, MSC Cruises put into operation its first LNG-powered cruise ship – the MSC World Europa – in what it considered a significant milestone.

The ship, designed for sustainable adaptations, features reduced emissions, efficient resource use, and ocean protection. It uses clean marine fuel, reduces air pollution, and allows engines to be plugged in when shore power is available. High-tech paints and intelligent management systems control energy-saving lighting, and the ship supplies fresh water from seawater. Waste separation and compaction maximize recycling. The ship also treats water according to international standards, minimizes noise and vibration, and prevents invasive species transport [74].

MSC Cruises has invested heavily in making its ships more sustainable, the latest example being the MSC Euribia, built in 2023. This ship is named after the ancient goddess Eurybia, who controlled the winds, weather and constellations to dominate the seas, furthering the ship's vision to master the implementation of cutting-edge technology to minimise its impact on the marine ecosystem. Amongst other features, the company emphasises that the ship is equipped with an advanced onboard wastewater treatment system, waste recycling systems (majority of waste materials collected are sorted to segregate items for recycling), and a range of energy-saving equipment to maximise efficiency, such as smart heating, ventilation and air conditioning. It uses LNG as fuel, which reduces sulphur oxide (SOx) emissions by 99% and particulates and reduces nitrogen oxides (NOx) by 85% [75] (Figure 5).

By 2022, this company had managed to recycle almost 26% of all the waste produced on board its ships, obtaining certification under ISO Standard 21070 (Protection of the Marine Environment), in the field of managing waste that pollutes the marine environment.

MSC Cruises already has 62% of its cruise ships prepared to receive shore power when docked and has an annual target of reducing waste production by 5%. They have also set a target of 2% for waste recycling [76].

4.3.4 Windstar Cruises

Windstar Cruises operates a fleet of six small ship sailing and all-suite vessels, having visited approximately 330 ports in 2020. Windstar's fleet is the market leader in small-ship cruising, with a total of 1,242 beds for passengers calling at popular and off-the-beaten-track ports in more than 60 countries [79].

As a further example of what can be done in terms of propulsion systems, it is worth mentioning the ongoing work of this company, which recently presented new operational units with a mixed propulsion system, harnessing wind energy [79].

4.3.5 Other (best) practices

As with electric cars, in shipping the electric is also synonymous with the present and the future. There are already some good examples, albeit on relatively small ships such as ferries. For example, let's take Norway and the recently announced Wärtsilä, which will have built the largest electric ferry in the world. It is a ship built by Incat Tasmania, ordered by Buquebús [80]. Another example is the Norwegian adventure cruise company, Hurtigruten Norway, which recently announced its ambitious project for a fully electric cruise ship that generates zero emissions. This innovative vessel will be equipped with retractable sails adorned with solar panels, and it is scheduled to commence its maiden voyage in 2030. The Norwegian Hurtigruten recently presented the concept designs of its first zero-emission ship that will sail on the Norwegian coast in 2030. That will be the world's most energy-efficient cruise ship designed so far [81].

A fuel technology transition is already underway in the maritime industry, with half the ordered tonnage capable of using LNG, LPG, or methanol in dual-fuel engines, compared to one third of the tonnage on order last year. For ships in operation, 6.5% of tonnage can now operate on alternative fuels, compared to 5.5% last year [82].

The cases analysed lead us to conclude that there is an apparent effort to implement policies and practices that minimise the environmental impacts of cruise tourism. The information provided in the companies' management instruments, as well as on their websites and other sources, all point to this.

5 Conclusion

In order to answer the research question posed in this article, it can be concluded that an analysis of the policies and practices recommended by the cruise lines under consideration, as well as the more general information provided by entities linked to the sector, such as CLIA, leads to the conclusion that there is an apparent effort to adopt the necessary measures to minimise the environmental impacts of cruise tourism. This is a consequence of the IMO's legal requirements, but also of all the technological innovation that has taken place in the shipping sector and, consequently, in the cruise segment. It is not possible to state categorically that all the policies and practices published correspond entirely to reality. There may be instances of greenwashing. However, the relatively short space of time that separates the present from 2050, the deadline for achieving the decarbonisation goal, as well as the demands of public opinion and actual and potential consumers of this tour-

ism product, do not allow companies to dedicate themselves solely to building an image, disinvesting in the implementation of sustainable and responsible environmental measures.

The year 2023 was deemed to be an exceptional one for the cruise tourism industry, with records being broken and promising prospects for the years to come. In addition to the aforementioned regulations, cruise companies must also adhere to the principles of sustainability and responsibility, which are fundamental to their competitiveness.

Nevertheless, the environmental impact of cruise tourism is not confined to this single dimension. It is important to note that cruises, like all ships, have an ecological footprint throughout their life cycle (from the construction of the ship to the recycling process at the end of its useful life). Firstly, the construction of cruise ships requires the availability of raw materials, which are often extracted in labour conditions that do not respect human rights. Furthermore, the assembly of cruise ships on construction sites results in the generation of various forms of pollution, including air pollution, as evidenced by the protests that have occurred in towns and residential areas in close proximity to such sites. Furthermore, throughout their operational lifespan, ships generate a considerable quantity of waste, which must be recycled. Finally, at the end of their operational life, the vessels themselves become a concern for their respective companies. To address the problematic practice of ship dismantling on beaches and in other locations in countries where labour is inexpensive and health and safety standards are inadequate, the IMO adopted the Hong Kong Convention on Ship Recycling (2009).

Despite significant efforts, there is still much work to be done to transform cruises into sustainable vessels. The sector's global image will be significantly impacted by its position as a leader in cleaner, less polluting ships. Despite ambitious targets, significant investment is being made in technology and innovation. New ships are increasingly equipped with propulsion systems using liquefied natural gas (LNG), the cleanest fossil fuel, which reduces greenhouse gas emissions and has virtually zero sulphur emissions, making it an excellent alternative to diesel.

Efforts have been made to convey the idea of a sector that assumes its environmental responsibilities, doing everything possible to instil this idea in operators and those potentially interested in this type of travel. However, there is still a lot to be done to make this a reality. CLIA [68], on tourism management, suggests responsible sourcing of food and provisions; water production and conservation; sustainable and locally sourced excursions. It adds that cruise lines can have a series of programmes dedicated to protecting the oceans and marine life.

Nevertheless, the issues associated with cruise ships are likely to persist for the foreseeable future. The environmental organisation Friends of the Earth [83] asserts that cruises have a significant impact on pollution levels, which in turn affects marine life. The industry must work to become cleaner, preventing water and air pollution, and halting the destruction of marine ecosystems, including oceans, beaches, and coral reefs, through waste disposal and emissions. Furthermore, the organisation argues that the problems associated with cruise ships are extensive. From the global environmental impact of cruise ships to the effects of cruise ship pollution on marine life, the cruise industry must take action to improve its practices. In order for cruises to be clean, it is necessary for the cruise industry to cease contributing to the climate crisis.

5.1 Limitations of the study

One of the most significant limitations of this study is the methodology, which is based solely on documentary analysis. Consequently, the information analysed in terms of the policies and practices of the case study companies is derived from the organisations themselves. It is not possible to ascertain the degree of authenticity or implementation of the information in question. Nevertheless, due to their considerable size and global reach, these companies are subject to extensive scrutiny and auditing, and it is therefore unlikely that they would disseminate false information. Conversely, a significant proportion of the data analysed was provided and certified by CLIA, an association which, despite representing the sector, is highly reputable.

5.2 Recommendations for future research

In the field of research, studies have been conducted on the relationship between cruise tourism and sustainability. These studies demonstrate that this tourism product, due to its inherent characteristics, has a detrimental impact on the recipient territories, particularly in terms of social and cultural effects. However, its environmental impacts are not limited to these areas, as they are also felt when the ships are docked in host communities and even when they are at sea. Furthermore, these impacts persist throughout the entire lifespan of the vessels. The aforementioned studies, in conjunction with the companies' management documents, indicate the implementation of certain environmentally sustainable policies and practices with the objective of reducing the ecological footprint. However, they also highlight the necessity to persist along this trajectory of sustainability.

Similarly, some research has been conducted on the subject of environmentally sustainable practices from the perspective of greenwashing, although this has been

limited to other types of tourism, such as ecotourism, or components of the tourism offer, such as accommodation. To the best of our knowledge, no research has been conducted to analyse cruise tourism from a greenwashing perspective. However, it is acknowledged that, in light of the limitations identified in this study, there is a significant scope for further investigation on this topic. Further research could employ a variety of methodologies beyond the analysis of available information, fieldwork, and surveys of relevant stakeholders. This could include an examination of the supply and demand sides to enhance understanding and substantiate the accuracy of the information on policies and practices.

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