

THE “GREEN HULL” PROJECT

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“Green Hull” is a project supported by the Interreg V-A Italy-Slovenia Cooperation Programme, funded by the European Regional Development Fund, aimed at solving the problem of environmental pollution arising from biological incrustations on hulls. The hulls are cleaned while they are still in the seawater, without any spillage of polluting or hazardous substances. In this way, the performance of ships is improved and the introduction of allochthonous species into the environment is reduced, without incurring the costs and time necessary for drydock.

The sea knows no boundaries; cross-border cooperation in the public and private sectors is necessary to define guidelines for the control, monitoring and management of water and waste from biological incrustations on hulls and to ensure more effective cross-border management.

As part of the “Green Hull” project, legislation concerning environmental protection and the quality of marine waters was investigated, at international, European and national levels, both in relation to Italian and Slovenian legislation.

The study of the legal aspects of the project area also aimed at preparing, within the existing regulations, guidelines for the development of green technologies in the sector of interest of the project, and a model of a system for the management of waste from cleaning hulls.

Keywords: *“Green Hull” project; in-water hull cleaning; biological incrustations; biofouling; antifouling; waste from biological incrustations; waste from in-water cleaning; guidelines for in-water cleaning.*

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1. FOREWORD

As part of a cross-border cooperation between Italy and Slovenia, financed by the European Union and in partnership with prestigious institutions, in March 2020 the "Green Hull" project was launched, aimed at using green technologies to clean underwater hulls from biofouling.¹ The primary aim of the project is to improve environmental protection through the development of innovative pilot green technologies for effective cross-border management of wastewater and waste from the cleaning of biological fouling from ship hulls and propellers.

From an operational standpoint, the project, which is still under development, will make it possible to carry out cleaning while a ship or vessel is in the water, with considerable cost savings and reduced downtime. The result is an overall saving of resources, including in terms of consumption, which as we know is reduced when the hull is maintained in good working order, with consequently lower CO₂ emissions and, at the same time, a smaller risk of transfer or dispersion of allochthonous species from one marine area to another is limited.

Under the project, a remotely operated underwater vehicle (ROV) will mechanically remove the fouling and, at the same time, the seawater in the vicinity of the ROV-treated hull, which contains cleaning residues, will be sucked up and conveyed to an equipped support vessel. This limits both the dispersion of harmful substances that may be present on the structures of the ship being treated, such as residues of previous (now banned) anti-fouling systems, and of biological incrustations present on the same surfaces, preventing species foreign to the treatment area from being accidentally introduced into the surrounding marine waters. The first practical experiments carried out in September 2021 in the waters around Koper using a ROV and an embryonic version of the suction system provided encouraging results in this respect. The seawater sucked in will then be analysed and treated in the laboratory of the support vessel, where it will undergo progressive purification treatments, using a system of mechanical and biological filters, with a separation of the residues from the purified water, which can then be returned to the sea. This aspect, which marks the novelty of the project compared to the use of a submarine vehicle alone, is particularly innovative as it will make it possible to significantly limit the dispersion of any residues and at the same time to quickly and safely return to the sea the water sucked up during cleaning, once it has been purged of waste and residues and of the presence of species alien to the habitat in which the cleaning is carried out.

¹ This project is supported by the Interreg V-A Italy-Slovenia Cooperation Programme funded by the European Regional Development Fund.

The aim of the project is therefore perfectly in line with the policies of the international community and of various national legislators in the field of sea protection, even if – at the moment – it is not regulated by a coherent legal system.

Against this backdrop, the authors of this paper have therefore provided a legal basis for the project, examining operational repercussions in relation to the various areas involved, identifying potential risks and examining the specific legal requirements.

With reference to this last aspect, it must be considered that hull cleaning operations with automated underwater vehicles, considered in themselves, may represent a risk for the environment, due to the potential dispersion of dangerous substances in the water. This may occur as a result of the technical limitations of the methods used, as well as accidental operational causes, also related to the weather and sea conditions in which the activity is carried out. Consideration must therefore be given to the abstract possibility that the performance of the activity, which in itself has a lawful purpose, may nevertheless result in the infringement, even if only accidental, of prohibitions and limits laid down by the applicable legislation. The project must therefore be accompanied, both in the current study and design phase, as well as in the subsequent operational stage, by a rigorous and up-to-date check of the operational details in order to contain such eventualities to the greatest extent and to provide for any corrections as soon as possible.

In this context, the legal assistance provided concerned first of all a description of the framework of the current legislation on environmental protection and seawater quality at the international, EU and national level. This includes an evaluation of good practices and international Conventions, in order to frame the objectives pursued by the project within the general regulatory context. Potential critical profiles linked to the operational phases of the project were examined and a hypothesis made of the risk factors linked to the accidental dispersion of dangerous and/or harmful and/or in any case prohibited substances under current international, Community and national legislation, pointing out the consequent sanction profiles, including criminal ones.

As a natural conclusion of this regulatory synthesis, the first guidelines were provided, consisting of a first part dealing with general principles and a second part containing operational recommendations, which will be updated and adapted in the light of the technical specifications of the project.

Lastly, the Italian waste legislation was examined in detail, from production to disposal, and legal guidelines were provided for the implementation of the project.

Given the novelty of the project, which is still work in progress, and the fact that concrete compliance with the qualitative and quantitative parameters imposed by regulations depends on the operational standards still being defined, both the guidelines and the operational model for waste management are subject to further verification and updating.

2. THE REGULATORY FRAMEWORK

2.1. The International-EU Framework

International and EU sources do not always provide operational indications, but rather lay down principles, such as those regarding prevention and “polluter’s liability”, which must be followed by national water management policy implementing and transposing these regulations. As this is a cross-border project, Italy and Slovenia have transposed these indications by adopting their respective acts of domestic law, which are part of the national legal framework in this area.

The cleaning operations of a living structure with automated ROV systems and the subsequent treatment of waste waters are not positively regulated at present within the international and EU framework. However, with reference to the “Green Hull” project, it is essential to refer to the following instruments, in relation to which the respective implementation rules are also recalled for the sake of completeness:

1. The AFS Convention (International Convention on the Control of Harmful Anti-fouling Systems on Ships), adopted in London on 5 October 2001, ratified in Italy by Law 163/2012 of 31 August 2012 and in force since April 2013², which provides for a worldwide ban on the application of TBT paints on hulls of all sizes from 1 January 2003 and which totally banned their presence from 1 January 2008. This Convention, ratified by 25 countries representing 38% of the world’s tonnage, entered into force on 17 September 2008. The Convention aims at preventing and limiting damage to the marine environment caused by the use of anti-fouling substances by prohibiting the use of organotin compounds (i.e. organic tin compounds) which were used as anti-fouling systems on ships and which are in particular contained in tributyltin (TBT) coatings with known adverse effects on the marine environment. The elimination and quantitative control of tributyl is a key concept in this area, since the damage

² *Official Gazette IT (OG IT)*, No. 227, 28 September 2012.

it causes and which is ascertained in fauna and the marine environment led it to being declared a hazardous substance or priority substance by various other acts, including Directive 2013/39/EU and, at the national level, Legislative Decree 152/2006. Pending the entry into force of the AFS-Convention, two regulations in particular have been adopted at the European level:

a. Regulation 782/2003/EC in force since 15 April 2003, mandatory and directly applicable to all Member States (prohibiting the application of TBT paints on all types of hulls since July 2003, and their presence since 1 January 2008);³

b. Regulation 536/2008/EC of 13 June 2008, implementing Article 6 paragraph 3, and Article 7 of Regulation (EC) 782/2003 and amending that Regulation;⁴ then we should consider:

c. Regulation 528/2012, mandatory since 1 September 2013 and directly applicable in all Member States, which aims in its Article 1 at harmonising the rules on marketing and use of biocidal products, inspired by the precautionary principle.⁵

2. Directive 2013/39/EU (Water Framework Directive – WFD) amending Directives 2000/60/EC and 2008/105/EC on priority substances in the field of water management policy, specifying that among the recitals of the WFD, which offer interesting ideas on the operational approach to water management policy, reference is made to the precautionary principle and preventive action that inspires EU environmental policy (Recital 2) and encouragement for the development of innovative wastewater treatment technologies (Recital 3), with the application of the “polluter pays” principle, which is the basis of Directive 2000/60/EC (Recital 6). In this regard, it should be noted that Tributyltin (TBT) is classified as a priority substance by this Directive and in Annex I the maximum permissible quantities of Tributyltin (compounds) in **inland surface waters and other surface waters** are specified with reference to the EQS-AA (annual mean) and EQS-CMA (maximum permissible concentration) expressed in mg/l.⁶

3. Directive 2000/60/EC (Water Framework Directive) established a framework for Community action in the field of water management policy and, by referring to it in its recitals, adopts the provisions of Article 174 of the Treaty,

³ *Official Journal (OJ)* L 115, 11 January 2003.

⁴ OJ L 156/10, 14 June 2008.

⁵ OJ L 167/1, 27 June 2012.

⁶ OJ L 226/1, 24 August 2013.

according to which "Community policy on the environment shall contribute to pursuit of the objectives of preserving, protecting and improving the quality of the environment, prudent and rational utilisation of natural resources, which shall be based on the principles of precaution and preventive action, primarily at the source, of environmental damage as well as the principle according to which 'the polluter pays'". This Directive has been amended several times.⁷

4. Directive 2008/105/EC of 16 December 2008 on environmental quality standards in the field of water management policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC and 86/280/EEC, and amending Directive 2000/60/EC of the European Parliament and of the Council.⁸ According to its Article 1, its purpose is to establish environmental quality standards (EQS) for priority substances and certain other pollutants as provided for in Article 16 of Directive 2000/60/EC, in order to achieve a good chemical status of surface water and in accordance with the provisions and objectives of Article 4 of that Directive. EQSs are also relevant under a number of secondary regulations, including national regulations.

5. The International Convention for the Prevention of Pollution from Ships (MARPOL), which stems from the adoption of two treaties, in 1973 (Marpol 73) and 1978 (TSPP, Tanker Safety and Prevention Pollution), respectively. This Convention concerns the prevention of marine pollution caused by ships and depending on operational or accidental causes. It consists of 20 articles, three protocols and six annexes and has been ratified by Italy with Laws No. 462 of 1980 and No. 438 of 1982 and has been in force since 2 October 1983. It aims at minimising the pollution of the sea by oil, exhaust gases and other harmful substances and makes all ships flying the flag of the member countries, irrespective of where they sail, subject to its requirements; in addition, individual countries are responsible for ships registered in their ports.

6. Directive 2008/56/EC establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive, transposed in Italy by Legislative Decree 190 of 13 October 2010).⁹ The framework Directive requires Member States to develop a marine strategy based on an initial assessment, the definition of good environmental status, the identification of environmental targets and the establishment of monitoring programmes. The good environmental status of marine waters means the ability to maintain the ecological diversity, vitality and healthiness of the seas and oceans so that

⁷ OJ L 327, 5 January 2000.

⁸ OJ L 348, 24 December 2008.

⁹ OJ L 164, 25 June 2008.

they are clean, healthy and productive while maintaining the use of the marine environment at a sustainable level and safeguarding its potential for the uses and activities of present and future generations. The objective for Member States is to achieve a good environmental status (GES) for their marine waters by 2020. In 2020, the Commission adopted a report on the first cycle of implementation of the Marine Strategy Framework Directive, which concluded that, although the Union's marine environment protection system is one of the most sophisticated in the world, it still needs to be improved to ensure a response to issues such as overfishing and unsustainable fishing practices, plastic waste, nutrient surplus, underwater noise and other types of pollution. In 2021, Italy completed the updating of the Monitoring Programme, which was approved by the Technical Committee in July 2020, after having been submitted to appropriate public consultation and subsequently communicated to the European Commission, through specific reporting, by the deadline of 15 October 2020. The new Monitoring Programme was adopted by the Decree of the Minister of Ecological Transition on 2 February 2021. The same process has been followed for the updating of the National Programme of Measures, which was revised by the end of 2021 and was to be communicated to the European Commission by 31 March 2022. By 2023, the Commission will review the Directive following an evaluation and impact analysis and, where appropriate, changes may be made. The Directive emphasises the need for Member States to cooperate with their neighbours within the four marine regions (North East Atlantic, the Baltic Sea, the Mediterranean Sea and the Black Sea), in particular in establishing and implementing their marine strategies; some of these regions are further divided into sub-regions. The Directive also recognises the importance of spatial protection measures for the marine environment, contributing to the creation of a network of marine protected areas. Each State must therefore put in place, for each marine region or sub-region, a strategy consisting of a "preparation phase" and a "programme of measures". The 11 descriptors based on which the assessments provided for in Directive 2008/56/EC are carried out are set out in Commission decision (EU) 2017/848 of 17 May 2017,¹⁰ which defines the criteria and methodological standards relating to the good environmental status of marine waters as well as the specifications and standardised methods for monitoring and assessment, and which repealed Decision 2010/477/EU. With reference to the potential of "Green Hull", we should note in particular:

– Descriptor 2: "Non-native species introduced by human activities remain at levels that do not adversely alter ecosystems" and

¹⁰ OJ L 125, 18 May 2017, pp. 43-74.

– Descriptor 8: “Contaminant concentrations are at levels that do not give rise to polluting effects”.

In implementation of Articles 9 and 10 of Legislative Decree 190/2010, transposing the Marine Framework Directive, Italy updated the requirements of good environmental status and the definition of the environmental targets of the Marine Strategy with the Decree of the Ministry of the Environment and Protection of Land and Sea of 15 February 2019¹¹ of which the two annexes (GES and Target) are an integral part, in which the criteria of good environmental status and the targets to be achieved are set.

Directive 2008/56/EC was amended by Directive 2017/845/EU of 17 May 2017¹² (implemented by Decree 15 October 2018 of the Ministry of the Environment¹³ regarding the indicative lists of elements to be taken into account for the purpose of developing marine strategies, contained in Annex III and by Decision (EU) 2017/848 of 17 May 2017 with the introduction of technical amendments and a definition of criteria and methodological standards.

2.2. The Italian National Framework

In the context of national legislation, it should be noted that there is currently no specific legislation in place for the cleaning of hulls with automated ROV systems and the subsequent treatment of wastewater, but attention should be drawn to the following relevant legislation:

– Legislative Decree No. 172 of 13 October 2015,¹⁴ implementing Directive 2013/39/EC, amending Directive 2000/60/EC on priority substances in the field of water management policy;

– Legislative Decree No. 219 of 10 December 2010,¹⁵ implementing Directive 2008/105/EC on EQS in the field of water management policy;

– Legislative Decree No. 190 of 13 October 2010,¹⁶ implementing Directive 2008/56/EC and which identifies the strategic actions concerning the marine environment to be carried out in the Mediterranean Sea region and its sub-regions, which recalls in Article 3 paragraph 1, letter b) the special regulations concerning the environmental status and the definition of coastal waters in Part III of

¹¹ *OG IT* No. 69, 22 March 2019.

¹² *OJ L* 125, 18 May 2017.

¹³ *OG IT* No. 284, 6 December 2018.

¹⁴ *OG IT* No. 250, 27 October 2015.

¹⁵ *OG IT* No. 296, 20 December 2010.

¹⁶ *OG IT* No. 270, 18 November 2010.

Legislative Decree No. 152 of 3 April 2006, (Environment Code)¹⁷, Articles 9 and 10 of which were implemented by the Ministry of the Environment Decree of 15 February 2019 (*Official Gazette IT (OG IT)*) of 22 March 2019) and Article 5 of which was implemented by Decree GAB-2001-000160 of the Ministry of the Environment of 21 October 2011, as amended, by which the Institutional Technical Committee was established;

With reference to Italian national legislation which does not depend on the transposition of international and/or Community sources, the following have been taken into account:

– Law No. 979/1982, on the Defence of the Sea, which in Articles 15 to 23 prohibits all vessels, without discrimination as to nationality, from discharging hydrocarbons or mixtures of hydrocarbons, as well as other noxious substances, in territorial waters and in inland maritime waters, with more restrictive provisions than MARPOL, providing for administrative and criminal sanctions, with greater severity for vessels flying the Italian flag, whose commanders and owners are criminally liable even if the non-compliance with the prohibition occurs outside territorial waters.¹⁸ It should be pointed out that Law 979/82 is specialised with respect to the contents of Legislative Decree 152/06 and that, since the legislation on the protection of the sea has not been repealed, it is conceivable that there will be dual protection, so that if no action is taken under the sector regulations, the entities provided for in Part VI of the Environmental Code will be competent.

– Legislative Decree 152/06 (Environment Code or Consolidated Environment Act – TUA), in which Part III – Soil and water protection, Section II, Protection of waters against pollution, Title I, Articles 73 *et seq.* – incorporates Legislative Decree 152/1999 (Water Decree). In particular, however, the following parts seem to be most relevant to the case under examination: Part IV, Rules on waste management and reclamation of polluted sites, with reference to the definition of liquid waste consisting of wastewater, and Title VI, Penalty system for the punitive case referred to in Article 192, c. 2 and Articles 255 and 256 c. 2, which provide for sanctions, including criminal sanctions, in the event of water pollution, with specific reference, depending on the case to be identified, to its annexes to the specific parts of the environment code, which also provide for limit parameters for different types of substances and the classification of substances as hazardous (including Tributyl).

¹⁷ *OG IT* No. 88, 14 April 2006, RS 96.

¹⁸ *OG IT* No. 16, 18 January 1983.

– Presidential Decree No. 209 of 27 October 2011, which established environmental protection zones, delegating the operating procedures of the regime to be applied in the protection zone pursuant to Article 2 thereof to the definition, on a case-by-case basis, by a decree of the Ministry of the Environment and Protection of Land and Sea, after consultation with the other administrations concerned.

– Without prejudice to the applicability of criminal sanctions provided for in special rules, reference is also made to Article 635 of the Criminal Code (offence of damaging public waters).

2.3. Additional Regulatory Sources

From the standpoint of the project's aims, the following were also taken into account:

– the legislation implementing the principles of the Kyoto Protocol (ratified by Italy with Law No. 120 of 1 June 2002) annexed to the United Nations Framework Convention on Climate Change (UNFCCC 1992), including the containment of CO₂ emissions and fuel consumption as a result of the efficient operational maintenance of ships resulting from the cleaning of the hull and the propeller;

– legislation on the treatment and management of waste, including sludge and any material resulting from water purification treatments, partly governed by the Environment Code;

– the 1972 London Convention on the Prevention of Marine Pollution by Dumping of Wastes, ratified by Italy, which refers in its Protocol to the management of "sewage sludge", a Protocol which Italy implemented by Law No. 87 of 13 February 2006 (Accession of the Italian Republic to the 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes – London 7 November 1996, with annexes);

– the Montego Bay Convention (also known as UNCLOS III, United Nations Convention on the Law of the Sea) of 10 December 1982, in force since 10 November 1984, ratified in Italy by Law No. 689 of 2 December 1984, signed in 2003 by the European Community, which defined the rights and responsibilities of States in the use of the seas and oceans, regulating the legal regime of marine spaces (by identifying specific areas: inland waters, territorial waters, archipelagos, contiguous zone, exclusive economic zone and continental shelf); it also defines guidelines governing negotiations, the environment and the management of natural resources, and places a general obligation on states to protect

the marine environment, without prejudice to obligations under other international conventions,¹⁹ but expressly prevailing, for Contracting States, over the 1958 Geneva Convention on the Law of the Sea.

At the national level, the absence of a specific regulatory framework governing the activity covered by the "Green Hull" project is also reflected in the identification of the bodies responsible for issuing any relevant authorisations. In fact, although the Directorate General for the Sea and Coasts (DG-MAC) is the national **focal point** for the International Convention on Antifouling Systems (AFS Convention 2001) and for the implementation of Regulation (EC) No. 782/2003 and Regulation (EC) No. 536/2008, it is not currently responsible for authorising underwater cleaning of the hulls or propulsion systems of ships, whatever the method used. As there is no reference body at the national level for granting authorisations, these will have to be verified at the local level, and it may be possible to usefully break down the various operational segments of the project to identify the relevant competences in the absence of specific legislation. For example, bearing in mind the specificity of Venice, the reference subjects in this matter appear to be the Port System Authority, the environmental department and/or the Venice Interregional Superintendency according to their respective areas of competence.

2.4. The Slovenian Legal Framework

Reference should be made to the fact that, similar to the case with Italy, there is currently no specific legislation in place for the cleaning of hulls with automated ROV systems and the subsequent treatment of wastewater in the Republic of Slovenia. This in turn means that the relevant (environmental) legislation governing single phases of the process will need to be strictly adhered to.

While discussing the national (Slovenian) and the international and EU framework relevant for the potential application of the "Green Hull" technology in the Republic of Slovenia, it is necessary to point out that the mentioned legal sources

¹⁹ Section XI – Obligations under other conventions on the protection and preservation of the marine environment. Article 237 Obligations under other conventions relating to the protection and preservation of the marine environment. The provisions of this part apply without prejudice to specific obligations assumed by States under special conventions and agreements previously concluded relating to the protection and preservation of the marine environment, and to agreements which may be concluded to facilitate the application of the general principles set forth in this Convention. Specific obligations assumed by States under special conventions relating to the protection and preservation of the marine environment should be discharged consistently with the general principles and objectives of this Convention.

are intertwined in hierarchical interdependence and that they form a coherent unity. It is therefore imperative to distinguish between the scope of application of the various legal sources and to understand the hierarchical links, having particular regard to the links between national (Slovenian), international and regional legal sources (i.e. the EU *acquis*). Reference should furthermore be made to the fact that both Slovenia and Italy are State Parties to the European Union and are accordingly bound by the same *acquis*. In addition, both States are, at least generally speaking, State Parties to the same international conventions in the field of law of the sea and (marine) environmental law, namely the UNCLOS, AFS, and MARPOL Conventions. Differences may however arise between the Slovenian and Italian national legislations. In the Republic of Italy, differently from the Republic of Slovenia, legislation on certain specific issues related to the implementation of the "Green Hull" project may be adopted also at the level of a particular constitutive region (i.e. Friuli Venezia Giulia and Veneto). Some further differences may be the result of the different transpositions of EU directives into the national legislations of both States which may for example result in a stricter regulation of a particular matter at the national level. Differently from EU regulations, EU directives are, as a general rule, not directly applicable, but need to be transposed into the national legislations of Member States. Independently of the legal sources at stake, they should be read and interpreted in the light of the basic principles of contemporary (marine) environmental law which include the "polluter pays" principle, "sustainable development" and the principle of "intergenerational equity".

In order to understand the hierarchical relation between international law and national legislation in the Republic of Slovenia, it is necessary to point to the provisions of Article 8 of the Constitution of the Republic of Slovenia.²⁰ The latter provides as follows: "Laws and other regulations must comply with generally accepted principles of international law and with treaties that are binding on Slovenia. Ratified and published treaties shall be applied directly".

This clearly points to the fact that the legal order of the Republic of Slovenia is based on the principle of "supremacy of international law", whereby ratified and published international treaties are applied directly, without the formal need for their transposition into national legislation. This in turn means that the provisions of an international convention prevail over equivalent provisions forming part of the Slovenian national legislation. Having in mind the aims of the "Green Hull" project, reference should be made also to Article 72 of the Constitution of the Republic of Slovenia which defines "the right to a healthy living environment". Based on the mentioned article:

²⁰ *Official Gazette RS (OG RS)*, Nos. 33/91-I, 42/97, 66/2000 and 24/03.

“Everyone has the right in accordance with the law to a healthy living environment.

– The state shall promote a healthy living environment. To this end, the conditions and manner in which economic and other activities are pursued shall be established by law.

– The law shall establish under which conditions and to what extent a person who has damaged the living environment is obliged to provide compensation. (...)”

2.4.1. The International Legal Framework Applicable to the Republic of Slovenia

As pointed out, cleaning operations of ship hulls with automated ROV systems and the subsequent treatment of wastewater are not positively regulated as a single operation within the international, EU or national (Italian and Slovenian) legal framework. Nonetheless, the various international conventions in the field of law of the sea and (marine) environmental law provide general rules and principles in that regard. The latter are then further elaborated within the EU *acquis* and relevant national legislations.

Slovenia is, as is the case with Italy and the EU, a State Party to the United Nations Convention on the Law of the Sea (UNCLOS) adopted in Montego Bay, Jamaica, in 1982.²¹ The said framework convention is often referred to as the Bible of modern law of the sea and in its Part XII contains general rules and principles regarding the protection and preservation of the marine environment. Based on the provisions of Article 192 of UNCLOS, States have the obligation to protect and preserve the marine environment. The latter general obligation should be read, however, in conjunction with Article 194 paragraph 3 according to which “the measures taken pursuant to this Part shall deal with all sources of pollution of the marine environment”. Furthermore, based on the provisions of Article 237, which deal with obligations under other conventions on the protection and preservations of the marine environment (sometimes also referred to as the IMO- UNCLOS clause), the provision of Part XII of UNCLOS is “...without prejudice to the specific obligations assumed by States under special conventions and agreements concluded previously which relate to the protection and preservation of the marine environment and to agreements which may be concluded in furtherance of the general principles set forth in this Convention”. One of the most notable international Conventions which has been adopted and

²¹ Resolution on Treaty Succession, *OG RS – International Treaties*, No. 22/103/94, p. 1471, *OG RS* No. 79/94.

which entered into force before the adoption of UNCLOS is the previously mentioned MARPOL Convention. The Republic of Slovenia is a State Party to the said Convention²² and accordingly the MARPOL Convention and its protocols are directly applicable in the Republic of Slovenia based on the provisions of Article 8 of its Constitution.

The Republic of Slovenia is also a State Party to the Barcelona Convention and five of its protocols. The Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona Convention) was adopted on 16 February 1976 in Barcelona and entered into force in 1978. It was amended in 1995 and renamed the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. The amendments to the Barcelona Convention entered into force in 2004. Reference should be made to the fact that the Barcelona Convention and its seven Protocols adopted in the framework of the Mediterranean Action Plan (MAP) constitute the principal regional legally binding Multilateral Environmental Agreement (MEA) in the Mediterranean. The Republic of Slovenia has so far ratified and is bound by five of its protocols which may also, at least as a matter of general rules and underlying principles, be important in the context of the "Green Hull" project. The protocols to the Barcelona Convention ratified by the Republic of Slovenia include:

- Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft (Dumping Protocol);²³
- Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-based Sources and Activities (Land-based Protocol);²⁴
- Protocol Concerning Cooperation in Preventing Pollution from Ships and, in Cases of Emergency, Combating Pollution of the Mediterranean Sea (Prevention and Emergency Protocol);²⁵
- Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean (SPA/BD Protocol);²⁶
- Protocol on Integrated Coastal Zone Management in the Mediterranean (ICZM Protocol).²⁷

²² Point D 11 of the Act on Treaty Succession, *OG RS – International Treaties*, No. 15-86/92, p. 194, OJ L 4, 9 January 2013, pp. 13-14.

²³ *OG RS – International Treaties*, No. 26/2002.

²⁴ *OG RS – International Treaties*, No. 26/2002.

²⁵ *OG RS – International Treaties*, No. 1-2004.

²⁶ *OG RS – International Treaties*, No. 1-2004.

²⁷ *OG RS – International Treaties*, No. 16/2009.

Slovenia has, however, not ratified the Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their Disposal (Hazardous Waste Protocol) which was adopted in 1996 and has been in force internationally since 2008, nor the Protocol for the Protection of the Mediterranean Sea against Pollution Resulting from the Exploration and Exploitation of the Continental Shelf and the Seabed and Its Subsoil (Offshore Protocol) adopted in 1994 and which entered into force internationally in 2011. Reference should be made to the fact that despite Slovenia and Italy not having ratified the Offshore Protocol, the EU acceded to the said protocol in 2013.²⁸

Furthermore, the Republic of Slovenia is also a State Party and as such bound by the provisions of the International Convention on the Control of Harmful Anti-fouling Systems on Ships (AFS Convention).²⁹ The provisions of the said Convention, which entered into force internationally on 17 September 2008, are directly applicable in the Republic of Slovenia based on the already mentioned Article 8 of the Slovenian Constitution. As previously stated, the aim of the AFS Convention is to prevent or reduce damage to the marine environment caused by the use of antifouling systems through the prohibition of use of organotin compounds for this purpose. As an EU Member State, Slovenia has also been bound by EU legislation in this field whereby particular reference should be made to Regulation (EC) No. 782/2003 of the European Parliament and of the Council of 14 April 2003 on the prohibition of organotin compounds on ships³⁰ and Commission Regulation (EC) No. 536/2008 of 13 June 2008 giving effect to Article 6 paragraph 3 and Article 7 of Regulation (EC) No. 782/2003 of the European Parliament and of the Council on the prohibition of organotin compounds on ships and amending that Regulation.³¹ The original purpose of the mentioned directives was to transpose the relevant provisions of the AFS Convention into the European legal order and to prepare the Member States for the international legal validity of the Convention, even before the entry into force of the AFS Convention at the international level.

²⁸ 2013/5/EU: Council Decision of 17 December 2012 on the accession of the European Union to the Protocol for the Protection of the Mediterranean Sea against pollution resulting from exploration and exploitation of the continental shelf and the seabed and its subsoil, OJ L 4, 9 January 2013, pp. 13-14.

²⁹ OG RS – *International Treaties*, No. 20/06, OG RS No. 114/2006.

³⁰ OJ L 115, 9 May 2003.

³¹ OJ L 156, 14 June 2008.

Finally, the Republic of Slovenia is also a State Party to the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter of 1972 (London Protocol).³² The said Convention is important as among the waste that may be considered for dumping, "sewage sludge" is also listed. The latter Convention is also directly applicable in the Republic of Slovenia based on the provisions of Article 8 of its Constitution. As already pointed out, the objectives of the "Green Hull" project are also relevant in the light of the requirements put forward by the United Nations Framework Convention on Climate Change (UNFCCC 1992) as amended by the Kyoto Protocol, particularly in the part relating to the reduction of CO₂ emissions and fuel consumption as a result of the operational maintenance of ships. The said Convention entered into force and became directly applicable in the Republic of Slovenia based on the provisions of the 1995 Act Ratifying the United Nations Framework Convention on Climate Change.³³

2.4.2. The EU and Slovenian National Framework

With regard to the EU legal framework in the field of water policy, the two most important directives are beyond doubt Directive 2013/39/EU of the European Parliament and of the Council of 12 August 2013 amending Directives 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy (Water Framework Directive) and Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive).

The Water Framework Directive was transposed into the Slovenian legal order through two key pieces of legislation, the Water Act (ZV-1)³⁴ and the Environmental Protection Act (ZVO-1).³⁵ These two acts have also formed the legal basis for the adoption of implementing regulations and decrees in this particular area. The Water Act (ZV-1) sets out, among other things, environmental objectives and determines the possibilities of exceptions and deviations in achieving

³² Act ratifying the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972, *OG RS – International Treaties*, No. 10/05, *Uradni list (UL) RS*.

³³ *OG RS – International Treaties*, No. 13/95, *OG RS* No. 59/1995.

³⁴ *OG RS* Nos. 67/02, 2/04 – ZZdrI-A, 41/04 – ZVO-1, 57/08, 57/12, 100/13, 40/14, 56/15 and 65/20.

³⁵ *OG RS* Nos. 39/06, 49/06 – ZMetD, 66/06 – odl. US, 33/07 – ZPNačrt, 57/08 – ZFO-1A, 70/08, 108/09, 108/09 – ZPNačrt-A, 48/12, 57/12, 92/13, 56/15, 102/15, 30/16, 61/17 – GZ, 21/18 – ZNOrg, 84/18 – ZIURKOE and 158/20).

the said objectives, while the Environmental Protection Act (ZVO-1) regulates among other things various sources of pollution, its monitoring, quality standards and reporting to the European Commission, including on water quality. Reimbursement of costs for water pollution is regulated both in the Water Act (ZV-1), which defines environmental charges for water use (water rights, concessions), and in the Environmental Protection Act (ZVO-1) which sets out environmental levies and charges related to water pollution.³⁶

Another important directive in the context of the Water Directive is Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. The latter directive is sometimes referred to as the "daughter directive" of the Water Directive and in Article 1 defines environmental quality standards (EQS) for priority substances and selected other pollutants, including TBT, all with the aim of achieving the good chemical status of surface waters including those applicable to "coastal waters".³⁷

The provisions of the Directive on environmental quality standards have also been transposed into Slovenian law primarily through the provisions of the Water Act (ZV-1) and through the Environmental Protection Act (ZVO-1) and its implementing legislation. Reference should be made in this regard to the Decree on the surface water status.³⁸ The latter lists the criteria for determining and classifying the status of surface waters and the types of monitoring to be undertaken in accordance with the Water Framework Directive. Noteworthy is the fact that Tributyltin compounds (TBT) have also been identified as priority substances based on the provisions of Annex 1 (parameters of the chemical status of surface waters) to that Regulation.³⁹

On the other hand, the legal basis for the transposition of the Marine Framework Water Directive into Slovenian law is represented by Article 59a of the Water Act (ZV-1), which sets out the key elements of the Marine Environment

³⁶ Šantej, B.; Stanič Racman, D.; Kodre, N.; Rozman, I.; Petelin, Š.; Koščak, M.; Mohorko, T.; Đurović, B.; Štravs, L., *Direktive EU s področja upravljanja voda (EU Directives in the Field of Water Management)*, Uradni list, Ljubljana, 2013, p. 63.

³⁷ "Coastal water" means surface water on the landward side of a line, every point of which is at a distance of one nautical mile on the seaward side from the nearest point of the baseline from which the breadth of territorial waters is measured, extending where appropriate up to the outer limit of transitional waters. (See Article 2/7 of Directive 2000/60/EC).

³⁸ OG RS Nos. 14/09, 98/10, 96/13 and 24/16.

³⁹ Point 30 of the Annex.

Management Plan. On the basis of the said Article, the Decree on the detailed content of the marine environment management plan was adopted.⁴⁰ Reference should additionally be made to the Nature Conservation Act (ZON), which provides a basis for determining areas for the protection of habitats or species where the conservation or improvement of water is an important factor in their protection, including NATURA 2000 sites.

National legislation in the Republic of Slovenia in the field of the management and protection of the (marine) environment is thus extensive and regulates in detail various aspects of the management and protection of waters, including marine waters. Further instruments implementing the international and Community legislation referred to above, among others, include:

- Water Act (ZV-1) (OG RS No. 67/02 as amended);
- Maritime Code of the Republic of Slovenia (OG RS No. 21/01 as amended);
- Environmental Protection Act (ZVO-1) (OG RS No. 41/04 as amended);
- Nature Conservation Act (ZON) (OG RS No. 56/99 as amended);
- Decree on the Marine Environment Management Plan (OG RS No. 41/17);
- Decree on the Detailed Content of the Marine Environment Management Plan (OG RS No. 92/10 as amended);
- Decree on the Surface Water Status (OG RS No. 14/09 as amended);
- Decree on the Emission of Substances and Heat when Discharging Waste Water into Waters and the Public Sewage System (OG RS No. 64/12 as amended);
- Decree on Special Protection Areas (Natura 2000 Areas) (OG RS No. 49/04 as amended);
- Decree on the Maritime Spatial Plan of Slovenia (OG RS No. 116/21).

3. THE FIRST GUIDELINES

In the current experimental phase, as the detailed technical specifications for the various operational phases of the project are not yet available, possible guidelines of a general and programmatic nature have been set in advance, which will provide support in this preliminary phase and are drawn from the analysis of the regulations concerning the individual segments of activity of which the project is composed.

⁴⁰ OG RS Nos. 92/10, 20/13 and 60/18.

Within the scope and limits of the regulatory framework mentioned above, two documents are important, which outline the requirements for cleaning hulls in water (including propellers and "niche areas", i.e. the areas most susceptible to **biofouling**) carried out, as in the case of the "Green Hull" project, with systems for recovering the materials removed during the process, published in January 2021 by BIMCO (Baltic and International Maritime Council). Both documents are addressed to shipowners, hull cleaning companies, independent authorities, antifouling manufacturers, ports and other local authorities. The first document concerns a set of guidelines aimed at ensuring that in-water hull cleaning can be carried out safely, efficiently and in an environmentally sustainable manner ("Industry standard on in-water cleaning with capture") while the second document provides a set of guidelines concerning the minimum requirements for hull cleaning companies to be considered safe and effective ("Approval procedure for in-water cleaning companies).

The documents published by BIMCO are based on IMO Resolution MEPC.207(62) of 15 July 2011, entitled "2011 Guidelines for the control and management of ship's biofouling to minimize the transfer of invasive aquatic species", which in turn refers, *inter alia*, to the AFS Convention, as well as the Barcelona Convention.

The IMO Resolution aims at keeping hulls free of biological fouling (biofouling) in order to minimise the transfer of invasive aquatic species from one geographical region to another, which is one of the aims pursued by the "Green Hull" project, and is also the subject of Resolution MEPC.1/Circ. 792 of 12 November 2012 entitled "Guidance for minimizing the transfer of invasive aquatic species as biofouling (hull fouling) for recreational craft" concerning recreational craft of 24 metres or less in length. The 2001 AFS Convention, which focuses on the prohibition of the use of particularly polluting products (TBT paints) and the prevention and limitation of damage to the marine environment caused by the use of antifouling paints, is relevant to the other operational aim of the "Green Hull" project, while the 1976 Barcelona Convention deals with the issues covered by the project only in relation to general principles, by promoting the protection of the marine environment of the Mediterranean, and in relation to pollution from ships, among which is also that derived from antifouling paints.

Although the documents published by BIMCO do not have regulatory value, they represent an important and specific contribution to the issue of underwater cleaning of vessels, and it can be affirmed that, due to the authoritative nature of the source, they have established minimum quality and safety standards in this sector.

In recalling the general principles of the matter, consideration has been given, *inter alia*, to the one concerning the protection of the marine environment and therefore the obligation to avoid pollution of any kind, and to the one concerning the prohibition of the dispersion of harmful substances into the sea, expressly regulated by law.

With reference to the first aspect, reference was also made to the content of the 1972 Stockholm Declaration (United Nations Environment Programme), which, although it had the legal nature of a "recommendation" and therefore was not binding, was important in drawing the international community's attention to environmental issues that were emerging at the time, including those related to restoring and maintaining biodiversity in order to preserve the diversity and vitality of seas and oceans.

As regards the second aspect, namely bans on the dumping of harmful substances at sea, the following aspects were considered:

i. The prohibition of any kind of use of "harmful anti-fouling systems" referred to in Article 4 of the AFS 2001 Convention, as described in Annex 1 to the Convention, as may be amended and/or supplemented. In this regard, the prohibition inherent in such products, although covering "application, reapplication, installation or use" (see Article 4a of the Convention), must be understood to extend implicitly also to the treatment resulting from underwater cleaning activities, because of the risks of dispersion in the sea which are of similar magnitude to those of the activities expressly mentioned in the Convention.

ii. The prohibition of the application of organotin compounds acting as biocides, as set out in Article 4 of Regulation (EC) No. 782/2003 of the European Parliament and of the Council of 14 April 2003. The prohibition inherent in such products, although it concerns "application and re-application" (see Article 4 of the Regulation), also in the light of the broader scope of Article 5 of the Regulation, must be deemed to extend implicitly also to the treatment resulting from underwater cleaning activities, because of the risks of dispersion in the sea which are of similar scope to those of the activities expressly mentioned in the Regulation.

iii. The discipline of discharges contained in Legislative Decree 152/06 (substantially equivalent to that of Legislative Decree 152/99) which provides for a dual track of requirements:

a) those referred to in Annex 5 to Part III of Legislative Decree No. 152/06 ("Water discharge emission limits"), referring in this respect to the provisions for industrial wastewater and the relevant tables, and specifying that the limits indicated therein are mandatory;

b) those identified by the Regions when drawing up the Water Protection Plan (PTA), which also indicate the maximum permissible values for discharges into the sea and which may be stricter than the limits of Legislative Decree No. 152/06. For example, the Veneto Region Water Protection Plan was adopted by Regional Council Decree No. 107 of 5 November 2009, most recently amended by Regional Council Resolution No. 1023 of 17 July 2018 on "Modification of the Water Protection Plan (PTA) of the Veneto Region on the matter of safeguard areas of water intended for human consumption, adjustment of terminology, updating of time references and adjustment of some provisions relating to discharges", while for the Autonomous Region of Friuli Venezia Giulia the Regional Water Protection Plan was approved on 20 March 2018 by Presidential Decree No. 074, following Regional Council Resolution No. 591/2018.

iv. The prohibition of the release into the sea of substances harmful to the marine environment from ships referred to in Title IV of Law No. 979 of 31 December 1982, described in Annex A, as updated by the Decree of the Minister for the Merchant Navy dated 6 July 1983, published in the *Official Journal* No. 229 of 22 August 1983.

v. The list of "polluting substances" in Annex II (noxious liquid substances carried in bulk) to MARPOL 73/78, as referred to in the list in Annex A to Law No. 979 of 31 December 1982, updated by the Decree of the Minister for the Merchant Navy of 6 July 1983, published in the *Official Journal* No. 229 of 22 August 1983. In that regard, it should be pointed out that MARPOL 73/78 and its annexes refer to intentional pollution (discharge into the sea of ballast from cargo tanks; discharge into the sea of water used to wash cargo tanks; discharge into the sea of cargo sediments; discharge into the sea of dirty bilge water from engine rooms; discharge into the sea of sewage or waste in non-permitted areas) and accidental pollution (spillage of cargo due to overfilling; failures of control equipment; accidents such as grounding, collision, explosion), and that the forecasts concerning this second category of pollution, with reference to the list of pollutants, although not expressly concerning the activities that affect the "Green Hull" project must be prudently taken into account as a guide in the underwater cleaning of the hulls.

The operational recommendations set out in the guidelines provided to support the study and experimentation phase concern both the machinery that will be used in the operation of the "Green Hull" project and the project as a whole and in its individual operational phases. Considering the "Green Hull" project as a set of activities carried out both in the water (underwater cleaning of hulls) and on land, the operational notes that have been indicated concern both the

procedures concerning the activities at sea and those concerning the activities on land, and are consequently based on a regulatory system (considering, as mentioned, only Italian legislation, but the same applies to Slovenian legislation, within its area of responsibility, which in turn transposes the relevant international and Community regulations).

Leaving aside in this paper precise reference to the administrative requirements related to the operation of machinery and plant, common to other activities, it seems useful to focus attention on the section of the guidelines that concerns the operational recommendations for the individual phases of the "Green Hull" project.

As we have already pointed out, the project as a whole is not currently regulated by a specific framework. Therefore, in view of the fact that the guidelines described in the documents published by BIMCO in January 2021 ("Industry standard on in-water cleaning with capture" and "Approval procedure for in-water cleaning companies") represent the minimum standards of quality and safety in this field, it is recommended that the operation of the "Green Hull" project take place in strict compliance with them.

Turning then to the specific recommendations, reference is made in particular to the BIMCO document "Industry standard on in-water cleaning with capture", exclusively with reference to the recommendations addressed to the subjects who carry out the cleaning operations, according to which and based on the recommendations addressed to the various operators, duly adapted, the behaviour in the operation of the cleaning activity should involve:

a) The adoption of a "Biofouling management plan" and a "Record Book", in which to describe the operational plan of the activity, and to record the individual cleaning activities carried out (with a report of the pre-cleaning situation, the intervention and the result of the intervention), the place where they were carried out, with an indication of the antifouling products that were cleaned and any incidents. For the drafting of these documents, reference may be made (also for cleaning activities involving recreational craft of 24 metres or less in length) to the annexes to IMO Resolution MEPC.207(62) of 15 July 2011 "2011 Guidelines for the control and management of ship's biofouling to minimize the transfer of invasive aquatic species"; where possible, the information reported in the Record Book should be accompanied by a photographic record.

b) The operational plan referred to in the Biofouling management plan must also describe the criteria and information based on which the decision is taken to clean or not to clean the hulls with a view to avoiding any type of pollution (in relation to the type of antifouling product to be cleaned, in relation to the area

in which the cleaning is to be carried out, to the weather conditions, including currents, and any other element that may represent an element of risk, and in relation to the degree of biological fouling present). This information may also come from a party other than the one that carries out the cleaning of the hulls.

c) Once the decision to clean the hulls has been taken, the party carrying out the cleaning must request from the owner of the vessel to be cleaned the information referred to in paragraph 7 of the BIMCO document "Industry standard on in-water cleaning with capture", or at least only the information considered relevant therein. The party carrying out the cleaning will also have to communicate to the shipowner the technical state of the installation, its CE marking, the acquisition of the relevant permits, and the conditions and information based on which it has decided to carry out the cleaning, with a warning that if the shipowner provides incomplete or erroneous information, it will be liable for any resulting damage.

d) Before proceeding with the cleaning operations, the preparatory activities described in point 8 of the above BIMCO document must be carried out in order to avoid any kind of pollution and, in particular, in order to:

- avoid any interruption of cleaning operations;
- check the perfect operation of the system in all its parts;
- prepare a check-list of specific operational activities to be carried out according to the Biofouling Management Plan;
- ensure that the engines are switched off throughout the cleaning process and that there is no chance for the propellers, rudders and other equipment such as *bow/stern-thrusters* to move.

e) Before proceeding with the cleaning operations, the party carrying out the cleaning operations must inspect the hull to be cleaned according to the list in paragraph 8.1 of the BIMCO document (excluding the points not compatible with the project), in order to guarantee the maximum safety of the persons involved in the cleaning operations; likewise, following the inspections described above, the party carrying out the cleaning operations must carry out the assessment referred to in point 8.2 of the BIMCO document (excluding those points not compatible with the project), in order to confirm the appropriateness of the hull cleaning operation.

f) The construction of the plant envisaged by the "Green Hull" project must comply with the technical requirements described in point 9 of the BIMCO document "Industry standard on in-water cleaning with capture", or in any case, if it does not comply with or deviates from such technical requirements, it should

present a degree of safety, also in relation to environmental risks, not lower than that deriving from such technical requirements. The safety standards concern not only the people involved in the use of the plant, but also the prevention of accidental pollution of seawater; in the event of repeated malfunctioning of the plant, the same must be taken out of service and tested.

g) The cleaning activities must be recorded in the Record Book (in an "Activity Log" section), indicating the name and characteristics of the unit being cleaned, the antifouling product removed and the amount of waste produced. In addition, any accidental contamination of marine waters that may occur during the cleaning activities must be recorded in the Record Book, indicating the consequent contingency measures that have been taken and the communications sent to the competent authorities.

h) After the completion of the cleaning operations, a review of the relevant result must be carried out and this should be recorded in the Record Book.

i) After the completion of the cleaning operations, a verification of the full operation and perfect functioning of the system should be carried out and the relevant information recorded in the Record Book.

j) The products removed after cleaning the hulls must be treated according to the indications given in point 11 of the BIMCO document however, these indications do not replace the prescriptions that may be imposed by law or by the authorities in relation to the treatment of waste. Information on the quality and quantity of the products removed following the cleaning of the hulls must also be reported in the Record Book, as well as any information on any releases and/or spills of polluting products and/or, in general, on any anomalies that may have occurred during the aforementioned removal and treatment operations.

k) Products removed after cleaning the hulls must be treated as waste.

4. WASTE MANAGEMENT RELATED TO THE "GREEN HULL" PROJECT

4.1. Waste Management in Italian Law

"Green Hull" is a project still in the experimental phase. However, from an examination of the initial theoretical scheme of the system for cleaning biological fouling and treating waste water, it is possible to provide a general analysis of waste management following its implementation in the light of current legislation.

In this regard, we should recall first and foremost the general prohibition of discharging polluting substances into the sea, which is forbidden by a multitude of regulatory instruments under both uniform international law and domestic law, mentioning again in this regard, in particular, the content of the 1972 Stockholm Declaration (United Nations Environment Programme), UNCLOS, which defines marine pollution and discharges into the sea and lays down a series of rules to protect the marine environment from the risks arising from ship traffic, the 2001 AFS Convention, Regulation 782/2003/EC and Directives 2013/39/EU (Water Framework Directive – WFD), 2000/60/EC (Water Framework Directive), 2008/105/EC, 2008/56/EC (Marine Strategy Framework Directive), all aiming at protecting the marine environment also with a view to the protection of human health.

For the specific prohibitions, reference is made to the regulations on discharges contained in the TUA (substantially equivalent to that of Legislative Decree 152/99) which provides for a dual track of requirements:

- those set out in Annex 5 to Part III of the TUA (“Emission limits for water discharges”), with reference to the provisions for industrial waste water and the relevant tables, and specifying that the limits set out therein are mandatory;

- those identified by the Regions when drawing up the Water Protection Plan (PTA), which also indicate the maximum permissible values for discharges into the sea and which may be stricter than the limits of the TUA. I would like to point out, insofar as it is of interest here, that for the Veneto Region the Water Protection Plan was adopted by Regional Council Decree No. 107 of 5 November 2009, most recently amended by Regional Council Resolution No. 1023 of 17 July 2018 on “Modification of the Water Protection Plan (PTA) of the Veneto Region on the subject of safeguard areas for water intended for human consumption, adjustment of terminology, updating of time references and adjustment of certain provisions relating to discharges”,⁴¹ while for the Autonomous Region of Friuli Venezia Giulia the Regional Water Protection Plan was approved on 20 March 2018 by Presidential Decree No. 074, following Regional Council Resolution No. 591/2018.⁴²

From the standpoint of waste brought into the drains, the above-mentioned prescriptions must be linked to the principle of Article 192 TUA, according to which the “abandonment and uncontrolled deposit of waste on and in the soil are prohibited”, and to the sanctions provided for by the TUA, in Article 255 *et seq.*, which are doubled in the case of the abandonment of hazardous waste.

⁴¹ *Official Bulletin of Region of Veneto*, Nos. 100/09, 81/2018.

⁴² *Official Bulletin of Autonomous Region of Friuli Venezia Giulia*, No. 22/18.

In particular, pursuant to Article 192 of TUA, whoever abandons or deposits waste or introduces it into surface or underground waters is punished with a pecuniary administrative sanction from €105 to €620; if the abandonment of waste on the ground concerns non-dangerous and non-bulky waste, a pecuniary administrative sanction from €25 to €155 is applied. Furthermore, owners of companies and managers of organisations which abandon or deposit waste in an uncontrolled manner or release it into surface or underground waters are liable to: a) imprisonment for a period of between three months and one year or a fine of between €2,600 and €26,000 in the case of non-dangerous waste; b) imprisonment for a period of between six months and two years and a fine of between €2,600 and €26,000 in the case of dangerous waste.

With reference to the seawater sucked up during cleaning operations in order to avoid the dispersion of material, and which remains after the separation of solid waste and sanitisation treatments, it will be useful, also for the purposes of issuing authorisations, to be able to indicate, in the light of the technical specifications of the project, the degree of purity abstractly attainable, without prejudice to the need of carrying out analyses of the seawater. It is considered that, in order not to modify the state of the marine environment, the reintroduction into the sea of the seawater sucked up, treated and sanitised to eliminate allochthonous species, must respect the parameters set out in the annexes to the Part III of the TUA and in the tables indicated therein (with particular reference to Table 1/A).

With regard to the specificity of the project and bearing in mind the bans just mentioned, we must focus on the innovation of the project consisting in the recovery of seawater containing the cleaning residues and its subsequent treatment, with chemical and mechanical filters, until it is sanitised before being returned to the sea. At the end of the cleaning process, there should therefore be, on the one hand, residues that can be defined as "solids" for the sake of simplicity, but which will inevitably also include residual sludge and water that cannot be purified further, and, on the other hand, seawater obtained by separation of the former, in which there should no longer be any allochthonous bioelements or prohibited substances and which should not differ, also in terms of temperature, from the characteristics of the seawater into which it should be reintroduced after treatment.

All residues from the hull cleaning process, both sucked up seawater and solid waste, will have to be subject to laboratory analysis in order to be properly classified and managed as waste and to assess the real possibility of reintroduction into the sea of the residual seawater.

In particular, the actual qualitative and quantitative composition of the physical residue that will be indicated by the laboratory analysis will depend, in concrete terms, on the material that will be removed during the cleaning, the presence of biofouling, the substances actually present in the paint applied to the hull or previous substances, if there are any traces left, and the characteristics of the water in which the cleaning is carried out and the water through which the hull has sailed before cleaning, which may contain dangerous or prohibited substances that may have been absorbed by the biofouling on the hull or propellers and be shown by the analysis.

Based on the technical specifications of the machinery used to clean and suck up the water in order to avoid the dispersion of residues, the level of purification of the water separated from the solid residues and the concrete results of the analyses, the model of the waste management system can be refined. This is outlined here only in general terms, as it depends specifically on the particular characteristics of the waste and the obligations that follow. Subject to possible changes during the implementation of the project, it is therefore possible to summarise in principle the operational steps for the management of hazardous marine waste from underwater cleaning under the "Green Hull" project, which should take place according to the following model:

a) once the separation of solid waste, even if with a muddy and/or aqueous component, from the suctioned seawater, which is then subjected to sanitisation processes (e.g. by UV rays), has been achieved through the use of mechanical and/or chemical filters, an immediate request for laboratory analysis of the solid waste and water must be made;

b) based on the substances and elements that will be evidenced by the results of the laboratory analysis and on the non-binding classification provided by the laboratory, an initial assessment of the type of waste must be made with the help of a specialised technician in order to correctly classify the waste and assign the relevant European Waste Catalogue (EWC) code or further specifications;

c) then an authorised operator must be identified, whose qualifications must be verified, to be entrusted with the management of the waste, which also includes instructions for its labelling, packaging, storage, transport, treatment and/or disposal (which may in some cases take place in the port area);

d) depending on the classification of the waste, it will be necessary to adopt a protocol for its collection, labelling, etc., according to the indications that will be provided from time to time by the operator in view of the principles summarised in these notes, including the prohibition imposed by the first paragraph of Article 187 TUA, according to which it is forbidden to mix hazardous waste

with different hazardous characteristics or hazardous waste with non-hazardous waste, even when the mixing takes place with the dilution of hazardous substances;

e) if the presence of dangerous substances is detected, also in accordance with Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) regulations, it will be necessary, where there is no quantitative exemption, to appoint a consultant in accordance with Article 11 paragraph 2 of Legislative Decree 35/2010, the omission of which is sanctioned pursuant to Article 12 of the same decree;⁴³

f) in order to assess the possibility of releasing into the sea the seawater sucked up during the cleaning operations, obtained by separation with the mechanical filtering of solid residues and subsequently subjected to sanitation treatments, the results of the laboratory analysis must exclude the presence of dangerous and/or prohibited substances, even if not deriving from the cleaning operations, but already present in the sea area from which the water was taken;

g) if the water obtained by separation and then sanitised presents values compatible with those indicated in particular in the annexes of Part III of the TUA, and other parameters, such as temperature, are not altered, it will be possible to proceed with the reintroduction of the water into the sea;

h) for the transport of hazardous waste, from the place of production to the place of disposal, the regulations relating to the transport phase, whether by sea, multimodal transport, land, air or rail, apply and such transport must be carried out in accordance with the specifications of each mode;

i) in addition to the preliminary verification of the requirements of the entities considered for the management of waste after its classification based on the laboratory analysis, it is important to emphasise that also under the recent amendments made to Article 188 TUA, the responsibility of the waste producer can be excluded only on condition that, in the case of entrusting the waste management company to authorised entities pursuant to the same code (points D13, D14, D15 of Annex B to Part IV of the Code), and in addition to the identification form, they have also received a certificate of disposal signed by the owner of the plant, the minimum elements of which are the data of the plant and the owner, the quantity of waste treated and the type of disposal operation carried out.

⁴³ OG IT No. 58, 11 March 2010.

4.2. Waste Management in Slovenian Law

As already pointed out, the framework law in the field of environmental protection, including waste management in the Republic of Slovenia, is represented by the Environmental Protection Act (ZVO-1). The said legislation includes, among others, the “polluter pays” principle and the principle according to which the polluter is responsible for eliminating excessive pollution of the environment and its consequences. The polluter also covers all costs related to the prescribed measures to prevent or eliminate pollution of the environment and its consequences. The costs of waste management should be accordingly borne by their holder (producer) or previous holders or producers of the products from which the waste originates. The principle of sustainable development, the principle of integrity, the principle of cooperation, the principle of prevention and the precautionary principle are the basis for determining waste management obligations without a negative impact on the environment and human health, taking however into account the prescribed waste hierarchy.⁴⁴

The Environmental Protection Act (ZVO-1) represents therefore the legal basis for the adoption and enforcement of regulations governing waste, and, among other things, includes provisions regulating the following:

- waste prevention;
- classification of waste;
- methods of waste management;
- conditions for entry in the register of persons holding authorisations or certificates for the performance of environmental protection activities (collector, carrier, trader, broker);
- conditions for obtaining the prescribed permits;
- design, construction and operation of waste facilities;
- qualification of waste managers;
- measures related to the decommissioning of waste facilities;
- keeping records on waste and its management and the method of reporting to the Ministry of the Environment and Spatial Planning.

Waste in this regard means any substance or object that the holder discards or intends or is required to discard.⁴⁵ Waste management, on the other hand, means the collection, transportation, recovery and disposal of waste, including

⁴⁴ *Ibid.*

⁴⁵ Article 3.4. ZVO-1.

the supervision of such procedures and activities after a waste disposal facility ceases operation, and the activities of a person trading in or brokering waste.⁴⁶ More detailed rules and other conditions for preventing or reducing the harmful effects of waste generation and management are set out in the Decree on waste.⁴⁷ The said Decree is in turn complemented by three set of regulations:

- the first group includes regulations that deal with individual types of waste (waste oil, packaging waste, batteries...);
- the second group of rules deals with waste management facilities;
- the third group of rules deals with rules related to the transboundary movement of waste, an example being the Decree on the implementation of the Regulation (EC) on shipments of waste.⁴⁸

In the field of waste assessment and waste classification, the following pieces of legislation seem relevant and should be taken into account in the Republic of Slovenia:

- Decree on Waste (*OG RS* No. 37/15 as amended);
- Decree on Waste Landfill (*OG RS* No. 10/14 as amended);
- Decree on Waste Incineration and Co-incineration Plants (*OG RS* No. 8/16 as amended);
- Rules on the characterisation of waste prior to landfill, the characterisation of hazardous waste prior to incineration and the performance of chemical analysis of waste for control purposes (*OG RS* No. 58/16);
- Commission Regulation (EU) No. 1357/2014 of 18 December 2014 replacing Annex III to Directive 2008/98/EC of the European Parliament and of the Council on waste and repealing certain Directives;⁴⁹
- Council Regulation (EU) 2017/997 of 8 June 2017 amending Annex III to Directive 2008/98/EC of the European Parliament and of the Council as regards the hazardous property HP 14 "Ecotoxic",⁵⁰
- 2014/955/EU: Commission Decision of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC of the European Parliament and of the Council.⁵¹

⁴⁶ Article 5.4. ZVO-1.

⁴⁷ *OG RS* Nos. 37/15, 69/15 and 129/20.

⁴⁸ *OG RS* Nos. 78/16 and 94/21.

⁴⁹ OJ L 365, 19 December 2014.

⁵⁰ OJ L 150, 14 June 2017.

⁵¹ OJ L 370, 30 December 201.

Waste assessment should be based on a performed chemical analysis unless the waste is a chemical (or contaminated packaging) where the information in the safety data sheets can be applied. The producer of the waste must assign a waste number to the waste in accordance with the procedure laid down in the Annexes to Commission Decision 2000/532 /EC,⁵² except where the waste is released to an authorised collector. In such a case, the number must be assigned by an authorised collector who takes over the waste.

Given the source of waste generated in the cleaning of the hull with "Green Hull" technology, and based on available data, it would seem *prima facie* reasonable to classify such waste in the main group marked "08 Waste from the production, preparation, supply and use of surface protection agents (paints), varnishes and enamels), adhesives, sealants and inks", and following the undertaken laboratory analysis, most likely, to one of its sub-groups. Appropriate waste classification is a prerequisite for appropriate follow-up, which includes the collection, transport, recovery and disposal of waste, including the eventual release of treated seawater into the marine environment.

Noteworthy is the fact that the user of the "Green Hull" technology who will also process waste (i.e. in an auxiliary vessel) in the Republic of Slovenia, will need to obtain a valid environmental permit, based on the relevant provisions of the Environmental Protection Act (ZVO-1). Based on the provisions of Article 74(2), the issued environmental permit will contain the following information:

- a specification of the limit values for emissions into the environment;
- a specification of environmental protection measures and other conditions for the operation of the installation;
- a specification of measures relating to the operation of the installation under extraordinary circumstances, i.e. during periods of start-up, leakage, malfunction or momentary stoppage;
- the obligation of the operator to immediately carry out measures to ensure that the operation of the installation is in compliance with the environmental permit in the event of non-compliance, and to notify the competent inspection body of such non-compliance;
- the obligation of the operator to halt the operation of the installation or part thereof in the event of an imminent threat to human health or a substantial

⁵² 2000/532/EC: Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste, OJ L 226, 6 September 2000, pp. 3-24.

adverse impact on the environment resulting from a breach of the environmental permit conditions;

- the obligations of the operator relating to monitoring, reporting to the Ministry on monitoring and environmental accidents, and the conditions for assessing compliance with the emission limit values;

- the specification of measures relating to the definitive cessation of the installation's operation; and

- the specification of other measures to ensure the highest possible level of protection of the environment as a whole, including the reduction of long-range or transboundary environmental pollution.

However, obtaining an environmental permit may not be necessary if the operator of the "Green Hull" technology only collects untreated wastewater in the auxiliary vessel, temporarily stores it and later hands it over to an authorised collector or directly to an authorised treatment operator.

Noteworthy is also the fact that, based on Article 64 paragraph 1 of the Water Act, (ZV-1), "the discharge of wastewater and the emission of heat into surface waters, and the capturing of heat from surface waters shall only be permitted in the manner and under the conditions determined by this Act and the regulations governing environmental protection". In the context of the "Green Hull" project, this also means that it will be necessary to carry out a chemical analysis of the treated wastewater in all cases before its eventual release into the marine environment. As already pointed out, the previously mentioned Decree on waste does not apply to wastewater. The latter is regulated by special legislation, namely the Decree on the Emission of Substances and Heat when Discharging Waste Water into Waters and the Public Sewage System.⁵³ However, none of the provisions of the said Decree will apply, *inter alia*, to the management of waste water arising from dredging operations, the operation of ships in inland waters, and the dumping of waste from ships in inland waters.

At this stage of the project, it is therefore difficult to predict with a degree of certainty whether it will be allowed for treated wastewater resulting from the application of the "Green Hull" technology to be released into the marine environment. This will primarily depend on the achieved level of chemical purification based on the results of relevant analysis and by the conditions and criteria prescribed in the environmental permit issued to a particular operator. Having said that, the necessary steps for the compliant application of the "Green Hull" technology within the territory of the Republic of Slovenia seems to be, generally speaking, as follows:

⁵³ OG RS Nos. 64/12, 64/14 and 98/15.

a) The operator of the "Green Hull" technology who will not only collect but also process wastewater in the auxiliary vessel obtains an appropriate environmental permit. This is a result of the fact that based on the relevant provisions of the Environmental Protection Act (ZVO-1), it is necessary to obtain a valid environmental permit for the operation of a waste treatment plant (device) if such a plant or device carries out activities that cause emissions to air, water or soil and for which emission limit values are prescribed. The environmental permit should be issued by the Agency of the Republic of Slovenia for the Environment (ARSO) and must exactly specify the required properties, permitted quantities and allowed procedures regarding the management of sludge and treated seawater. Obtaining the environmental permit may not be necessary if the operator only collects untreated wastewater in the auxiliary vessel, temporarily stores it on board or ashore and later hands it over to an authorised collector or authorised treatment operator.

b) If the operator of the "Green Hull" technology intends to process or dispose of waste with the help of a specific device (i.e. treatment plant on the auxiliary vessel), he must, apart from obtaining the environmental permit, report the device to ARSO, which will in turn enter the operator into the relevant register of plant operators. The device must obviously conform to all standards for sale on the Slovenian and generally EU market.

c) After hoovering the overgrowth from the hull with the ROV, chemical treatment of the removed solid waste/sludge/suspension from the polluted seawater in the auxiliary vessel will be performed, using in that regard appropriate remediation procedures (e.g. UV rays - detoxification), all in strict compliance with the requirements and procedures prescribed in the issued environmental permit. Then, an immediate request for laboratory analysis of the solid residues and polluted seawater must be lodged. The latter should be followed by a physico-chemical analysis of waste and an assessment of the waste (sludge, seawater) by an authorised institution. The waste assessment must include data on: the state of the waste at room temperature, its hazardous properties, its solubility in water and other solvents, data on the pre-treatment of waste, the possibility of landfill, the possibility of recycling, the final assignment of a classification waste number, safety measures and storage management.

d) Based on the obtained result (parameters and final classification of waste) from an authorised institution, a decision will need to be taken regarding further waste management, including a decision on whether purified water can be released in the marine environment. Further procedures in that regard may also include appropriate labelling, packaging, temporary storage, transport and

predisposal to authorised institutions. Reference should be made to the prohibition to mix hazardous waste with different hazardous properties, or hazardous waste with non-hazardous waste, even when the result of such mixing is the dilution of such hazardous substances. For the transport of hazardous waste, from the place of origin to the possible landfill or other place of disposal, it will be necessary to hire transport operators (carriers) registered in the appropriate register or, in the case of cross-border transport, carriers registered for waste transport in another EU Member State or third country if the waste is transported in accordance with Regulation 1013/2006/EC.

e) Remaining waste should ultimately be handed over to authorised collectors or processors of waste registered with the Ministry of the Environment and Spatial Planning. The holder or original producer of waste (i.e. "Green Hull" operator) will need to follow the waste from its generation, i.e. the application of the "Green Hull" technology until the final disposal of the waste, and keep the prescribed documentation in this regard.

5. CONCLUSIONS

The "Green Hull" project, due to its operational methods and aims, is fully entitled to be considered an **indirect** intervention for the protection of biodiversity, as its objective is to reduce the negative influences exerted by the factors that affect this balance by controlling the emissions of pollutants and protecting water quality, while also enabling a reduction in consumption.

As pointed out in the genesis of the project, the sector's regulations are not always in step with the times, even though in recent decades a policy paying particular attention to the protection of the sea and biodiversity has been pursued with greater vigour at the national and international level. Recently, with the Kunming Declaration of October 2021 on the occasion of the high-level segment of the UN Conference on Biodiversity, which is important even though not binding, States committed themselves to directing their choices towards greater awareness and commitment to a future in harmony with nature. The objectives to be pursued are necessarily ambitious, given the critical state of ecosystems, but unfortunately they have not yet been achieved. As we have seen, at present and at least in Italy, an activity that makes possible the simultaneous pursuit of objectives in line, among other things, with the aims of international conventions to protect the marine environment, biodiversity and harmful emissions, such as the underwater cleaning of hulls using automated modules, is not yet regulated by law, although technically possible as demonstrated by the "Green

Hull" project, which also adds the specificity of suction and treatment of seawater in the areas of intervention. It is therefore essential for **direct** measures, such as laws and regulations, with which we aim to directly conserve species and ecosystems, to be as effective and as up-to-date as possible in the light of new problems such as the spread of alien species, but also new solutions to these problems, such as the "Green Hull" project. One of the characteristics of the project is the synergy of the scientific, academic and technological skills involved, in the perspective of cross-border experience, creating the basis for a shared and constantly evolving solution for common problems, which concern, as never before, the *mare nostrum*.

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Sažetak:

PROJEKT »GREEN HULL«

»Green Hull« je projekt koji se provodi uz potporu Programa suradnje Interreg V-A, Italija-Slovenija, a financira ga Europski fond za regionalni razvoj. Usmjeren je na rješavanje problema onečišćenja okoliša uzrokovanog biološkim naslagama na trupovima brodova. Trupovi se brodova čiste dok su još u morskoj vodi, bez izlivanja zagađujućih ili opasnih tvari. Na taj se način poboljšavaju performanse brodova i smanjuje unošenje alohtonih vrsta u okoliš, bez troškova i vremena potrebnog za suhi dok.

More ne poznaje granice; nužna je prekogranična suradnja u javnom i privatnom sektoru kako bi se definirale smjernice za kontrolu, praćenje i gospodarenje vodom i otpadom od bioloških naslaga na trupovima brodova te kako bi se osiguralo učinkovitije prekogranično upravljanje tim rizikom.

U sklopu projekta »Green Hull« istraživala se zakonska regulativa koja se odnosi na zaštitu okoliša i kvalitetu morskih voda, na međunarodnoj, europskoj te nacionalnoj razini, što se tiče talijanskog i slovenskog zakonodavstva.

Studija pravnih aspekata projektnog područja također je bila usmjerena na pripremu, u okviru postojeće regulative, smjernica za razvoj zelenih tehnologija u sektoru od interesa za projekt, te model sustava za gospodarenje otpadom koji nastaje čišćenjem brodova.

Ključne riječi: projekt »Green Hull«; čišćenje brodskog trupa u vodi; biološke inkrustacije; bioobraštanje; sredstvo protiv obraštanja; otpad od bioloških inkrustacija; otpad od čišćenja brodskog trupa u vodi; smjernice za čišćenje brodskog trupa u vodi.