

Description

SYSTEM FOR CO₂ CAPTURE

Technical field

5 [1] The invention relates to the field of reducing greenhouse gas emissions and in particular to CO₂ capture. In particular, the invention relates to a CO₂ capture system.

Prior art

10 [2] Below, the known prior art from which the invention has been developed is described.

[3] Carbon dioxide (CO₂) is considered to be responsible for 81% of greenhouse gas or "GHG" emissions in Europe according to the data published by the *Commissariat Général au Développement Durable* [General Commission for Sustainable Development] of the French government in "*Chiffres clés du climat France, Europe et Monde*" [Key Climate Figures in France, Europe and the World], 2022 edition. The main greenhouse gas, and partly responsible for global warming, carbon dioxide is, for example, rejected through gaseous effluents such as industrial gaseous effluents, in particular when fossil fuels are burned in order to supply electricity and heat. These industrial processes include, for example, plants for producing energy from fossil energy, natural gas processing plants, refineries, petrochemical production plants, cement works and hydrogen production plants based on fossil fuels. Methane is another greenhouse gas which is also rejected by many of these industrial processes and has a global warming potential 30 times greater than that of the CO₂. The increase in the atmospheric concentration of GHG through anthropogenic emissions increases the emission of energy towards the ground, leading to an imbalance in the

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energy balance of the Earth and causing the rise in its surface temperature. Hence, prevention of the emission of GHG such as CO₂ or methane is an essential issue for society.

5 [4] Offshore and/or onshore oil and/or gas facilities are among the greenhouse gas emitting industrial processes. Indeed, in operation, these facilities can emit methane and/or generate carbon dioxide (CO₂), in particular during activities related to hydrocarbon exploitation.

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[5] Several routes have been explored to reduce CO₂ emissions, such as more effective use of energy, favouring the use of alternative fuels and energy sources, and carbon capture and storage (CCS). The developed CO₂ capture technologies include
15 post-combustion capture, pre-combustion capture, capture following oxy-fuel combustion and capture following chemical looping combustion. Various carbon dioxide separation technologies can be used with these options, such as chemical absorption, physical absorption, membrane absorption and
20 separation. Among these, chemical absorption technique has been the subject of the greatest number of developments and implementations, thus making it a solution of choice for CO₂ capture.

25 [6] However, not all the technologies are suitable for implementation on offshore and/or onshore facilities and, in particular, on oil and/or gas facilities the particular features of these facilities must be taken into account when designing a GHG capture system. A fixed, mobile or floating
30 facility that is offshore or onshore generally supports a plurality of equipment necessary for carrying out the activity of the facility. A facility may be designed, for example, for drilling, fluid production, pumping, storage and/or transport.

[7] In general, these facilities comprise two parts, a first topside part, which comprises the equipment required for carrying out the activity of the facility, and a second carrier part, which supports the facility (at sea or on land) and which can also participate in the activity of the facility, in particular in the case of a storage platform where this carrier part comprises storage capacities.

10 [8] In order to capture and/or process and/or store these gases, and more particularly CO₂, it is generally necessary to modify the existing facility and/or to erect at least one additional structure on which is deployed the facility for capture and treatment of gas/CO₂ coming, for example, from
15 flue gas produced by facilities for generating mechanical and/or electrical and/or thermal power. However, this solution is tedious, long and expensive and, depending on the installation site of the facility, not always achievable. Furthermore, this solution requires a large number of
20 materials necessary for the construction of the facility, its deployment, its connection and/or the execution of its activity. This makes it a particularly expensive solution. In addition, the large size and weight of this equipment has a direct impact on the design and cost of the fixed, mobile or
25 floating support structure, which acts as a brake on the implementation of an ancillary facility.

[9] It is therefore being proposed to construct equipment dedicated to the capture and treatment of gas/CO₂, such as a
30 column for cooling, absorption and regeneration, and numerous pipes on existing facilities. However, this equipment requires a significant height and space in order to be combined with an existing facility and must be installed at the surface or

housed close to the flue gas generated by the activity of the facility. Again, depending on the installation site of the facility and the constraints that the facility may be subject to, such constructions can prove too expensive, difficult to
5 implement or quite simply not constructible. Indeed, depending on the activity of the facility and its installation site, its design must meet many constraints (for example swell, depth, seismic risk, etc.). This increases the difficulty of modifying an existing facility.

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[10] Furthermore, a facility generally has a so-called long service life of between 20 and 30 years, which implies that it is difficult to modify and/or replace. In addition, the original construction of the facility is not necessarily
15 intended to receive equipment other than that envisaged for carrying out its activity, nor for its activity to be coupled to a second platform.

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[11] Hence, in the scientific article entitled "Offshore power generation with carbon capture and storage to decarbonise mainland electricity and offshore oil and gas facilities: A techno-economic analysis» (Roussanaly et al - Applied Energy, 2019) a new platform design was proposed comprising, for example, an electricity power plant and gas turbines on the
25 surface part of the platform. The CO₂ capture elements are arranged at the centre of a second part under the gas turbines and a space dedicated to heavy elements is provided at depth, in order to stabilise the platform. The rest of the second part is then left empty and unoccupied. The large dimensions
30 and weight of this equipment, as well as their construction, generally from steel, lead to very high costs in addition to the loss of space.

[12] Currently, the facilities are not designed in order to minimise construction and/or production and/or facility costs of a CO₂ capture system . Hence, there is a need for solutions enabling costly construction or large and expensive equipment to be overcome. Similarly, it becomes important to benefit from novel solutions which can be easily and rapidly deployed. In addition, faced with the climate emergency, it is essential to be able to reduce CO₂ emissions.

10 [13] The object of the invention is to overcome the disadvantages of the prior art. In particular, an object of the invention is to provide a CO₂ capture system , said system being suitable for any type of facility, whatever its activity, and enabling CO₂ emissions and costs to be reduced, 15 and which is in addition easily and rapidly deployable, in particular in the context of existing facilities or in the context of the placement of a new facility.

Summary of the invention

20 [14] The invention aims to overcome these disadvantages. The following presents a simplified summary of selected aspects, embodiments and examples of the present invention with the aim of providing a basic understanding of the invention. Therefore, this summary does not constitute an exhaustive 25 overview of all the aspects, embodiments and examples of the invention. Its sole aim is to present selected aspects, embodiments and examples of the invention in a concise form as an introduction to the more detailed description of the aspects, embodiments and examples of the invention which 30 follows the summary.

[15] The invention targets, in particular, a system for capturing CO₂ from flue gas, including at least one cooling

module, at least one absorption module and at least one solvent regeneration module, each of said modules being designed so as to define an internal volume;

the internal volume of the cooling module is designed to enable cooling of flue gas comprising CO₂ with a fluid, so as to cool the flue gas;

the internal volume of the absorption module is designed to enable the cooled flue gas to come into contact with a lean solvent capable of absorbing CO₂ from flue gas in order to generate an enriched solvent;

the internal volume of the solvent regeneration module is designed to enable the treatment of the enriched solvent so as to release the absorbed CO₂ and form a lean solvent;

said system also including at least one flue gas transport duct designed to enable the transport of flue gas to the cooling module, said system being characterised in that:

- it includes a marine structure, said marine structure having a hull and at least one compartmentalisation bulkhead,
- the internal volume of at least one of the modules is at least partially defined by the hull and/or the at least one compartmentalisation bulkhead.

[16] The applicant has developed a system capable reducing CO₂ emissions from any type of facility having a reduction in the duration and costs of construction or deployment.

[17] Indeed, through the system developed by the applicant, the marine structure is completely optimised and makes it possible to incorporate all or part of a facility for CO₂ capture by absorption.

[18] Through the invention, units, pipes and other equipment constituting the CO₂ capture system is directly incorporated

in the marine structure and directly compartmentalised through the marine structure, which greatly optimises the unoccupied space and enables a reduction in the materials used and therefore a reduction in costs.

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[19] In addition, the CO₂ capture system according to the invention makes it possible to respect the activity of facilities without disturbing their operation, their activity or their parameters, such as the ability to float or their
10 installation site.

[20] In addition, such a system according to the invention is particularly robust and can be deployed rapidly.

15 [21] According to other optional features of the system, said system can optionally include one or more of the following features, alone or in any one of their combinations:

- the at least one flue gas transport duct is at least partially formed by the hull and/or the at least one
20 compartmentalisation bulkhead,
- the at least one compartmentalisation bulkhead corresponds to at least one transverse bulkhead, at least one transverse partial bulkhead, at least one longitudinal bulkhead and/or at least one longitudinal partial bulkhead connecting the hull,
- 25 - the hull is a single hull,
- the hull comprises at least one side shell and/or at least one bottom shell,
- the hull is a double hull,
- the hull comprises at least one side shell, at least one
30 bottom shell, at least one transverse inner hull, at least one longitudinal inner hull and/or an inner bottom,
- the at least one flue gas transport duct is common with the hull over at least 0.05% of the surface of the hull,

- the at least one flue gas transport duct is common with the hull over at most 10% of the surface of the hull,
- the internal volume of each of the modules is at least partially defined by the hull,
- 5 - the at least one flue gas transport duct is common with the at least one compartmentalisation bulkhead over at least 5% of the surface of the at least one compartmentalisation bulkhead,
- the hull is at least partially formed by the at least one compartmentalisation bulkhead,
- 10 - the internal volume of each module is at least partially defined by the at least one compartmentalisation bulkhead,
- the internal volume of at least one of the modules is at least partially defined by the at least one flue gas transport duct,
- 15 - the internal volume of each module is at least partially defined by the at least one flue gas transport duct,
- it further comprises at least one flue gas generation unit designed for generating flue gas from hydrocarbons,
- the flue gas generation unit is designed to inject the flue
- 20 gas into the at least one flue gas transport duct,
- the at least one flue gas generation unit corresponds to a unit for generating electrical and/or mechanical and/or thermal power.
- the flue gas generation unit is configured to enable a
- 25 combined cycle,
- the flue gas generation unit includes a system for recirculating a part of the flue gas,
- the flue gas generation unit includes a system for selective recirculation of a part of the flue gas,
- 30 - the absorption module is formed by at least one column sharing a common wall with the hull,
- the absorption module is formed by at least two columns, each sharing a common wall with the hull,

- the absorption module is designed to enable a cross-flow absorption,
- the absorption module is designed to enable a counter-current flow absorption,
- 5 - it further comprises at least one washing module,
 - when the absorption module is designed to enable cross-flow absorption, the CO₂ capture system comprises at least one internal volume of the absorption module and at least one internal volume of the washing module,
- 10 - the absorption module designed to enable cross-flow absorption comprises at least one internal volume of the absorption module and at least one internal volume of the washing module within a same absorption module,
 - the absorption module designed to enable cross-flow
- 15 absorption may include at least one absorption stage or a plurality of absorption stages, each stage being able to be delimited by partial bulkheads,
 - it is designed so as to enable a horizontal and/or vertical and/or radial fluid flow,
- 20 - the hull is covered by a coating, preferably a polymer coating,
 - the hull is made of concrete or steel,
 - it is fixed or floating,
 - it is partially submerged,
- 25 - it further comprises at least one solvent storage module,
 - at least one part of the cooling module is in direct or indirect contact with the fluid,
 - at least one part of the cooling module is in contact with an indirect cooling loop.

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[22] According to a second object, the invention relates to a use of a CO₂ capture system according to the invention in electricity production, steam production, in treatment of CO₂,

in conditioning of CO₂, in transport of CO₂, in storage of CO₂,
in recovery of exhaust flue gas, in treatment of exhaust flue
gas, in gas production, in oil production and/or in marine
transport. The invention preferably relates to the use of a
5 CO₂ capture system in the production of natural gas, in other
words natural gas which can also be liquefied, but also
synthesis gas (coming, for example, from coal gasification) or
even, but less preferably, biogas from biomass methanation.

10 [23] Hence, the use of such a system makes it possible to
reduce CO₂ emissions and to optimise costs while being rapidly
deployable and compatible with a plurality of facilities and
platform activities which generate CO₂ emissions.

15 **Brief description of the figures**

[24] Other features and advantages of the invention will be
better understood on reading the following description with
reference to the attached drawings, given for illustrative
purposes and in no way limiting.

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[25] [Fig. 1] Figure 1 shows a diagram of an embodiment of a
CO₂ capturing system according to the invention

[26] [Fig. 2] Figure 2 shows a diagram of an embodiment of a
25 CO₂ capturing system according to the invention

[27] [Fig. 3] Figure 3 shows a diagram of an embodiment of a
CO₂ capturing system according to the invention

30 [28] [Fig. 4] Figure 4 shows a diagram of an embodiment of a
CO₂ capturing system according to the invention

[29] [Fig.5] Figure 5 shows a diagram of an embodiment of a single hull.

[30] [Fig.6] Figure 6 shows a diagram of an embodiment of a double hull.

[31] For the purposes of illustration, the figures do not necessarily reflect the scales, in particular in terms of thickness.

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Description of the embodiments

[32] Below, a summary of the invention and the associated vocabulary is described, before presenting the disadvantages of the prior art, and finally showing in more detail how the invention overcomes these.

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[33] In the rest of the description, the expression "**marine structure**" may correspond to a fixed or floating structure and also may or may not be mobile. A marine structure can be at sea, close to the coast or even on a stretch of water such as a lake. A marine structure may correspond to an offshore facility.

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[34] The expression "**offshore facility**" may correspond, within the meaning of the invention, to fixed or floating, platform, barge or gravity structures. The structure can be a platform.

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[35] The term "**hull**" may correspond, within the meaning of the invention, to a shell delimiting the outer part of a marine structure.

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[36] The expression "**compartmentalisation bulkhead**", within the meaning of the invention, may correspond to a wall or a

separation which crosses the marine structure from one side to the other, for example from top to bottom, from left to right (or from right to left) or even in the diameter or radius. A compartmentalisation bulkhead can be transverse or
5 longitudinal, for example. In addition, a compartmentalisation bulkhead can be in one piece, in other words uninterrupted or continuous, or be discontinuous, in other words it can be a set of walls separated from one another, preferably along a given axis. A compartmentalisation bulkhead can be total or
10 partial.

[37] The expression "**partially submerged**", within the meaning of the invention, may correspond to submerging of a part. Said part can have a greater or lesser volume without representing
15 the whole.

[38] The expression "**at least in part**" may correspond, within the meaning of the invention, to the expression incompletely, partially or totally. The expression can represent the whole
20 or a part of the whole. It can for example concern two elements which contribute to a common whole. For example, a first element formed in part by a second element, the first and second element having at least one element, surface and/or volume in common.

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39] The expression "**direct contact**" within the meaning of the invention may correspond to a contact without an intermediary between two elements.

30 [40] The expression "**indirect contact**" within the meaning of the invention may correspond to a contact between two elements via one or more intermediate elements.

[41] The expression "**to be common**" within the meaning of the invention may correspond to at least two usually distinct elements which are joined together or which are one. For example, a volume can be common with a surface and/or a bulkhead and/or a duct; this may correspond to the fact that the surface and/or bulkhead and/or duct participate in delimiting the volume.

[42] The term "**duct**" within the meaning of the invention may correspond to a conduit, a channel or a pipe enabling the flow of a fluid (liquid or gas), and/or the transport of a fluid.

[43] The term "**defined**" or "**formed**" within the meaning of the invention may correspond, for example, to constituting or participating in the constitution of something. For example, a volume can be defined by a wall ,so the wall participates in the formation and delimitation of the internal volume. Similarly, for example, a bulkhead can be formed by a wall, so the wall participates in the formation and delimitation of the bulkhead.

[44] The term "**compartment**" can be understood within the meaning of the invention as a dry dock or ballast or even storage.

[45] In the remainder of the description, when ranges or spreads are used, the limits are included.

[46] The invention proposes to take into consideration CO₂ emissions and the costs connected to the construction and deployment of additional structures or to the modification of existing structures or to the incorporation of a CO₂ capture system requiring the use of numerous pieces of equipment and

materials. In particular, the invention proposes to optimise the structures without affecting the constraints connected to the installation site and performance of their activity, while minimising the necessary work and the use of bulky and expensive materials. To do this, the invention proposes modifying the layout of the structures and in particular their bulkheading while proposing a reduction in CO₂ emissions.

[47] Hence, the invention relates to a system for capturing CO₂ from flue gas. A CO₂ capture system can be illustrated in the examples of figures 1 to 4.

[48] A system 10 for capturing CO₂ according to the invention can comprise at least one cooling module 11, at least one absorption module 12 and at least one solvent regeneration module 13, at least one flue gas transport duct 14 and at least one marine structure 15.

[49] The flue gas can be produced, for example, by one or more flue gas generation units 18. A flue gas generation unit 18 can, for example, be a unit for generating electrical, mechanical or thermal power (which may, in particular, comprise steam power), of the turbine and/or engine and/or boiler type, or connected to the activity of oil and/or gas production, for example. These units 18 can be coupled to one or more heat recovery units 17. These flue gases are generally loaded with CO₂, but also comprise other components such as nitrogen, oxygen, water, argon, sulfur oxides and nitrogen oxides. In addition, the CO₂ is very diluted, for example in a volume of flue gas, the CO₂ may represent only 3% to 9% without recirculation of flue gas and up to 20% with recirculation of flue gas. The recovery of a significant volume of CO₂ therefore requires the management and treatment

of very large volumes of flue gas. It is therefore difficult to recover this CO₂.

[50] Hence, a system 10 for capturing CO₂ according to an embodiment of the invention may comprise a gas turbine designed to generate electricity and flue gas from hydrocarbons; such that the flue gases are injected into the at least one flue gas transport duct 14. For example, the at least one flue gas transport duct can be in direct or indirect contact with a chimney of a flue gas generation unit. Optionally, a gas turbine can be configured to enable a combined cycle gas turbine (CCGT). Hence, a gas turbine can also be coupled to a heat recovery and/or steam generation unit. In addition, this makes it possible to increase the electricity and/or steam production efficiencies.

[51] Optionally, a gas turbine can comprise a duct for recirculation of flue gas, arranged at the gas turbine inlet, preferably from a cooling module 11 to the air inlet of the turbine. It may, for example, be a turbine equipped with an exhaust gas recirculation (EGR) device or a selective exhaust gas recirculation (SEGR) device.

[52] Furthermore, in an alternative or complementary embodiment, the flue gas can be generated or produced, for example, by one or more engines, preferably ship engines. The exhaust flue gas produced or generated can then be injected into the at least one flue gas transport duct.

[53] The flue gases produced are then transported to various modules via the at least one flue gas transport duct 14 in order to be able to treat the gas of interest and to enable the capture of CO₂.

[54] The at least one flue gas transport duct 14 therefore makes it possible to transport flue gas loaded with gas/CO₂, and preferably to transport the flue gas to at least one module of the CO₂ capture system 10 and preferably to the cooling module 11.

[55] In the example of figure 1 or figure 2 or figure 3 or even figure 4, the system 10 for capturing CO₂ from flue gas includes at least one cooling module 11, at least one absorption module 12 and at least one solvent regeneration module 13. The CO₂ capture system 10 according to the invention can also comprise at least one washing module 16 and at least one solvent storage module 22. Each module is preferably designed to define an internal volume. The internal volume preferably corresponds to a volume in which the actions necessary for the purpose of the module take place. For example, in a preferred manner, the internal volume of a cooling module corresponds to the volume in which the flue gases containing CO₂ are placed in contact with a fluid.

[56] The internal volume of the cooling module 11 is designed to enable cooling of flue gas comprising CO₂ with a fluid. Cooling can, for example, correspond to placing the flue gas and the fluid in contact. Placing in contact can be by direct contact or by indirect contact. Furthermore, such a fluid can be water, for example. For example, it can be seawater or, alternatively, demineralised water. For example, in a non-limiting embodiment of the invention, the cooling module can be in contact with an indirect cooling loop. The flue gases are then placed in contact with the demineralised water which is cooled using a cooling loop filled with seawater coupled to at least one recovery unit. Alternatively, a cooling module

can be coupled to a direct cooling loop. Alternatively, the flue gas can be in direct contact with the water. This enables the flue gas to be cooled. Advantageously, the cooling module can also enable an at least partial reduction in the concentration of other compounds present in the flue gas, in particular the oxides of sulfur and nitrogen.

[57] The internal volume of the absorption module 12 is designed to enable the cooled flue gas to come into contact with a lean solvent capable of absorbing CO₂ from flue gas in order to generate an enriched solvent; By way of example, a solvent may for example be an amine-based solvent.

[58] The internal volume of the solvent regeneration module 13 is designed to enable the treatment of the enriched solvent so as to release the absorbed CO₂ and form a lean solvent.

[59] The internal volume of the washing module 16 is designed to enable placing CO₂-depleted flue gas in contact with water, preferably demineralised water, in order to reduce the potential entrainment of solvent present in the flue gas.

[60] The internal volume of the storage module 22 is designed to enable storage of solvent.

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[61] Advantageously, a module can comprise one or more internal volumes or at least two modules can have a same internal volume. In these embodiments, the internal volume or volumes correspond to a volume in which the actions necessary for the purpose of the module take place. For example, the internal volume of the washing module 16 and the internal volume of the absorption module 11 can be combined within the same volume.

[62] Advantageously, the CO₂ capture system 10 according to the invention includes pipes for transport of the solvent designed to enable the transport of the enriched solvent from the absorption module 11 to the solvent regeneration module 13 or of the lean solvent from the solvent regeneration module 13 to the absorption module 11. These solvent transport pipe, whether enriched or lean, can be of the type known per se by a person skilled in the art, such as conventional piping in the field.

[63] The CO₂ can then be extracted in parallel with any activity (electrical, mechanical, thermal, storage, gas and/or oil). Hence, the captured CO₂ can be reinjected into the ground from which it comes, which reduces the CO₂ emissions by sequestering it. The CO₂ can also be stored temporarily, preferably in liquid form, for subsequent use, which also enables the reduction of CO₂ emissions. This is particularly advantageous, because the CO₂ is captured, which on the one hand reduces CO₂ emissions and on the other hand is complementary to any activity.

[64] Advantageously, the CO₂ capture system 10 according to the invention includes a marine structure 15. A marine structure 15 can be illustrated in connection with the figures. In addition, the CO₂ capture system 10 according to the invention can be fixed or floating, preferably floating. Hence, a marine structure 15 can be a barge, a gravity structure made of concrete (GBS for gravity based structure) or a gravity structure made of concrete (CBS for concrete base structure), or a gravity structure made of concrete (CGBS for Concrete Gravity Based Structure) or a gravity structure made of steel (SGBS for Steel Gravity Based Structure) or a gravity

structure made of steel (SGS for Steel Gravity Structure). A marine structure 15 may correspond, for example, to a floating production, storage and offloading unit (FPSO), a floating production unit (FPU), a floating liquefied natural gas unit (FLNG), a floating storage and offloading unit (FSO), a floating power generation unit (FPGU), a floating storage and regasification unit (FSRU) for liquefied natural gas, a floating storage and regasification of liquefied natural gas barge with power generation (FSRP), or any other semi-submersible floating unit, a single-point anchor reservoir (SPAR) structure or tension leg platform (TLP).

[65] A marine structure 15 can have any geometry. In other words, a marine structure 15 is not limited by its shape. Hence, a marine structure 15 can have a shape that is circular, rectangular or substantially rectangular or any other polygonal shape. Similarly and particularly advantageously, the marine structure 15 is not limited in size. Hence, a marine structure 15 can have any length, any width, any height or any diameter.

[66] In addition, a CO₂ capture system 10 according to the invention comprises a marine structure 15 which can be partially submerged. The marine structure 15 can, for example, have a part of its structure in contact with water, preferably seawater. For example, "partially submerged" may correspond to at least 10% below sea level, preferably at least 20% and more preferably at least 30% of the structure in contact with water, preferably seawater. This can also correspond to an immersion of at most 90% below sea level, preferably at most 85% below sea level and more preferably at most 80% below sea level. Hence, partially submerged may correspond to an immersion ranging from 10% to 90% below sea level, preferably

from 20% to 85% and more preferably ranging from 30% to 85% below sea level.

[67] In the particular embodiments of the invention, each
5 module can be arranged either at the surface of the marine structure 15 or inside the marine structure 15 or outside the marine structure. For example, it does not depart from the scope of the invention if a cooling module 11 is present at the surface of the marine structure 15 in a first embodiment
10 and/or if it is present inside the marine structure 15 in another embodiment.

[68] Furthermore, a marine structure 15 comprises a hull. An illustration of a hull can be represented in connection with
15 figures 5 or 6. Preferably, the hull delimits the marine structure 15. A hull can be single or double. A single hull as illustrated in connection with figure 5 can comprise a side shell 19.1 and a bottom shell 19.2 (or hull bottom). A double hull as illustrated in connection with figure 6 can comprise a
20 side shell 19.1, a bottom shell 19.2 (or hull bottom), a transverse inner hull 19.3 (or transverse inner shell), a longitudinal inner hull 19.4, inner bottom 19.5 (or inner bottom shell). In a particular but non-limiting embodiment, the hull can be a double hull as illustrated in connection
25 with figure 6. All of the shells, double hull and wall bulkheads are part of the double hull within the meaning of the invention. In addition, a hull has an inner surface and an outer surface, the outer surface being, for example, the surface which may be in contact with seawater and the inner
30 surface delimiting the overall internal volume of the marine structure and able to form an inner volume. A hull 19 can be made of steel or concrete. In addition, advantageously, a hull 19 can comprise a coating, preferably a polymer coating. A

hull 19 made of concrete may preferably comprise a coating, preferably a polymer coating.

[69] The marine structure 15 may comprise at least one compartmentalising bulkhead 20.

[70] A compartmentalising bulkhead 20 may correspond to a wall. A compartmentalising bulkhead 20 is designed to be connected to or to support the hull, preferably the inner surface of the hull 19 and, yet more preferably, the inner surface of the single or double hull. Hence, a compartmentalising bulkhead 20 can be connected to the single or double hull, preferably to the inner surface of the single or double hull 19 in the direction of its length and/or its width and/or its diameter and/or its radius. For example, a compartmentalising bulkhead 20 can be arranged from top to bottom of the inner surface of the hull 19, and/or from left to right of the inner surface of the hull 19 and/or along one of the diagonals of the inner surface of the hull 19. A compartmentalising bulkhead 20 can comprise an outer surface and an inner surface. A compartmentalising bulkhead 20 can, for example, correspond to a transverse bulkhead 20.1, to a partial transverse bulkhead 20.2, to a longitudinal bulkhead 20.3 or to a partial longitudinal bulkhead 20.4. In addition, a compartmentalisation bulkhead 20, whether it is total or partial, can be continuous or discontinuous. Furthermore, a compartmentalisation bulkhead 20 can be made of concrete or steel. Preferably, a compartmentalising bulkhead 20 can also comprise a coating, preferably in the case of a compartmentalising bulkhead 20 made of concrete.

[71] Advantageously, the CO₂ capture system 10 according to the invention also includes at least one flue gas transport

duct 14 designed to enable the transport of flue gas to the cooling module 11, preferably from the flue gas generation unit 18 to the cooling module 11. The flue gas transport duct 14 can also be designed to enable the transport of flue gas from the cooling module 11 to the absorption module 12. Optionally, the flue gas transport duct 14 can also be designed to enable the transport of flue gas from the absorption module 12 to the washing module 16. Indeed, in a particular and non-limiting example of the invention, comprising a horizontal cross-flow absorber, the flue gas transport duct 14 designed to enable the transport of flue gas from the absorption module 12 to the washing module 16 can be absent.

[72] A flue gas transport duct 14 can comprise an outer surface and an inner surface. A flue gas transport duct 14 can be made of steel or made of concrete. Advantageously, a flue gas transport duct 14 can comprise a coating, preferably a polymer coating, preferably in the case of a duct made of concrete. Particularly advantageously, a flue gas transport duct 14 is not limited by its shape or by its size. A flue gas transport duct 14 according to the invention can also be coupled to at least one fan in order to promote the progress of the flue gas.

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[73] Particularly advantageously, the at least one flue gas transport duct 14 can be at least partially formed by the hull 19, preferably by the inner surface of the hull 19 and/or by a compartmentalising bulkhead 20. "Hull" shall mean at least one longitudinal inner hull, at least one transverse inner hull, at least one inner bottom, at least one bottom shell and/or at least one side shell. Compartmentalising bulkhead 20 shall mean at least one transverse bulkhead, at least one partial

transverse bulkhead, at least one longitudinal bulkhead and/or at least one partial longitudinal bulkhead. Preferably, the inner surface of the hull can participate in the formation of the outer surface of the flue gas transport duct. Hence, the at least one flue gas transport duct 14 can be common with the hull 19 over at least 0.05% of the surface, preferably of the entire surface, preferably of the entire surface of the inner surface, of the hull 19, preferably at least 0.10% of the surface of the hull 19, more preferably at least 0.50% of the surface of the hull 19 and still more preferably at least 1.00% of the surface of the hull 19.

[74] The at least one flue gas transport duct 14 can be common with the hull 19 over at most 10.00% of the surface, preferably of the entire surface, more preferably of the entire surface of the inner surface of the hull 19, preferably at most 8.00% of the surface of the hull 19, more preferably at most 6.00% of the surface of the hull 19 and still more preferably at most 5.00% of the surface of the hull 19.

[75] The at least one flue gas transport duct 14 can be common with between 0.05% and 10.00% of the surface of the hull 19, preferably of the entire surface of the hull 19, more preferably of the entire surface of the inner surface of the hull 19, preferably between 0.01% and 8.00%, preferably between 0.50% and 6.00% and more preferably between 1.00% and 5.00%.

[76] Hence, at least one part of the flue gas transport duct 14 and preferably the outer and/or inner surface of the flue gas transport duct 14 can be common with the surface of the hull, preferably the entire surface, preferably the entire surface of the inner surface of the hull 19. This is

particularly advantageous, because it makes it possible to optimise the space of the marine structure. In addition, this makes it possible to reduce the number of materials and facilities necessary for CO₂ capture. Indeed, due to this layout, a saving in construction and production time and in robustness is enabled for the installation of a system for capture and treatment of gas/CO₂ consisting of bulky and expensive equipment on the surface.

[77] Equally advantageously, the at least one flue gas transport duct 14 can be at least partially formed by the at least one compartmentalising bulkhead 20. Preferably, the outer surface of the flue gas transport duct 14 can be formed by the outer surface of the at least one compartmentalising bulkhead 20. Hence, the at least one flue gas transport duct 14 can be common with the at least one compartmentalising bulkhead 20 over at least 5% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface of the at least one compartmentalisation bulkhead 20, preferably at least 10% of the surface of the at least one compartmentalising bulkhead 20, more preferably at least 15% of the surface of the at least one compartmentalising bulkhead 20 and still more preferably at least 20% of the surface of the at least one compartmentalising bulkhead 20.

25

[78] The at least one flue gas transport duct 14 can be common with the at least one compartmentalising bulkhead 20 over at most 99% of the surface, preferably of the entire surface, more preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at most 90% of the surface of the at least one compartmentalising bulkhead 20 more preferably at most 85% of the surface of the at least one compartmentalising bulkhead 20 and still more

preferably at most 80% of the surface of the at least one compartmentalising bulkhead 20.

[79] The at least one flue gas transport duct 14 can be common
 5 with between 5% and 99% of the surface, preferably of the entire surface, more preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably between 10% and 90% preferably between 15% and 85% and more preferably between 20% and 80%.

10

[80] In addition, the hull 19, preferably the inner surface of the hull 19, can be at least partially formed by the at least one compartmentalising bulkhead 20. As a reminder, hull shall mean at least one side shell, at least one bottom shell, at
 15 least one transverse inner hull, at least one longitudinal inner hull and/or at least one inner bottom, and compartmentalising bulkhead 20 shall mean at least one transverse bulkhead, at least one partial transverse bulkhead, at least one longitudinal bulkhead and/or at least one partial
 20 longitudinal bulkhead. Preferably, the inner surface of the hull 19 is formed by the outer surface of the at least one compartmentalising bulkhead 20. The at least one hull 19 can be common with the at least one compartmentalising bulkhead 20 over 0.5% of the surface, preferably of the entire surface,
 25 more preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at least 1.0% of the surface of the at least one compartmentalising bulkhead 20 more preferably at least 1.5% of the surface of the at least one compartmentalising bulkhead
 30 20 and still more preferably at least 2.0% of the surface of the at least one compartmentalising bulkhead 20.

[81] The at least one hull 19 can be common with the at least one compartmentalising bulkhead 20 over at most 10.0% of the surface, preferably of the entire surface, and more preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at most 8.0% of the surface of the at least one compartmentalising bulkhead 20, more preferably at most 6.0% of the surface of the at least one compartmentalising bulkhead 20 and still more preferably at most 5.0% of the surface of the at least one compartmentalising bulkhead 20.

[82] The at least one hull 19 can be common with the between 0.5% and 10.0% of the surface, preferably of the entire surface, and preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably between 1.0% and 8.0% preferably between 1.5% and 6.0% and more preferably between 2.0% and 5.0% of the surface of the at least one compartmentalising bulkhead 20.

[83] Particularly advantageously, the internal volume of at least one of the modules can be at least partially formed by the hull 19, as illustrated in the figures 1 to 4. Preferably, the internal volume of at least one of the modules can be at least partially formed by the inner surface of the hull 19.

The internal volume of at least one of the modules can be common with at least the hull 19 over at least 0.5% of the surface, preferably of the entire surface, preferably of the entire surface of the inner surface of the hull 19, preferably at least 1% of the surface of the hull 19 more preferably at least 5% of the surface of the hull 19 and still more preferably at least 10% of the surface of the hull 19.

Preferably, the at least one absorption module 12, more preferably the absorption module 12 and the solvent

regeneration module 13, still more preferably the absorption module 12 and the solvent regeneration module 13 and the cooling module 11, and much more preferably the absorption module 12 and the solvent regeneration module 13, of the
5 cooling module 11 and of the solvent storage module (i.e. volume) 22 and/or of the washing module 16.

[84] The internal volume of at least one of the modules can be common with the hull 19 over at most 99% of the surface,
10 preferably of the entire surface, preferably of the entire surface of the inner surface of the hull 19, preferably at most 90% of the surface of the hull 19 more preferably at most 85% of the surface of the hull 19 and still more preferably at most 80% of the surface of the hull 19.

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[85] The internal volume of at least one of the modules can be common with between 0.5% and 99% of the surface, preferably of the entire surface, preferably of the entire surface of the inner surface of the hull 19, preferably between 1% and 90%,
20 preferably between 5% and 85% and more preferably between 10% and 80%.

[86] In a particular embodiment, the internal volume of each module can be at least partially formed by the hull 19.
25 Preferably, the internal volume of each module can be at least partially formed by the inner surface of the hull 19. The internal volume of each module can be common with the hull 19 over at least 0.5% of the surface, preferably of the entire surface, preferably of the entire surface of the inner surface
30 of the hull 19, preferably at least 1% of the surface of the hull 19 more preferably at least 5% of the surface of the hull 19 and still more preferably at least 10% of the surface of the hull 19.

[87] The internal volume of each module can be common with the hull 19 over at most 99% of the surface, preferably of the entire surface, preferably of the entire surface of the inner surface of the hull 19, preferably at most 90% of the surface of the hull 19 more preferably at most 85% of the surface of the hull 19 and still more preferably at most 80% of the surface of the hull 19.

10 [88] The internal volume of each module can be common with between 0.5% and 99% of the surface, preferably of the entire surface, more preferably of the entire surface of the inner surface of the hull 19, preferably between 1% and 90%, preferably between 5% and 85% and more preferably between 10% and 80%.

[89] Furthermore, the internal volume of at least one of the modules can be at least partially formed by the at least one compartmentalising bulkhead 20. Preferably, the internal volume of at least one of the modules can be at least partially formed by the outer surface of the at least one bulkhead 20. The internal volume of at least one of the modules can be common with the at least one compartmentalising bulkhead 20 over at least 5% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at least 10% of the surface of the at least one compartmentalising bulkhead 20, more preferably at least 15% of the surface of the at least one compartmentalising bulkhead 20 and still more preferably at least 20% of the surface of the at least one compartmentalising bulkhead 20, preferably of the at least one absorption module 12, more preferably of the absorption module 12 and of the solvent regeneration module

13, still more preferably of the absorption module 12 and of the solvent regeneration module 13 and of the cooling module 11 and particularly more preferably of the absorption module 12 and of the solvent regeneration module 13, of the cooling module 11 and of the solvent storage module 22 and/or of the washing module 16.

[90] The internal volume of at least one of the modules can be common with the at least one compartmentalising bulkhead 20 over at most 99% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at most 90% of the surface of the at least one compartmentalising bulkhead 20, more preferably at most 85% of the surface of the at least one compartmentalising bulkhead 20 and still more preferably at most 80% of the surface of the at least one compartmentalising bulkhead 20.

[91] The internal volume of at least one of the modules can be common with between 5% and 99% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably between 10% and 90%, preferably between 15% and 85% and more preferably between 20% and 80%.

25

[92] In a particular embodiment, the internal volume of each module can be at least partially formed (i.e. delimited) by the at least one compartmentalising bulkhead 20. Preferably, the internal volume of each module can be at least partially formed by the outer surface of the at least one compartmentalising bulkhead 20. The internal volume of each module can be common with the at least one compartmentalising bulkhead 20 over at least 5% of the surface, preferably of the

entire surface, preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at least 10% of the surface of the at least one compartmentalising bulkhead 20, more preferably at least 15%
 5 of the surface of the at least one compartmentalising bulkhead 20 and still more preferably at least 20% of the surface of the at least one compartmentalising bulkhead 20.

[93] The internal volume of each module can be common with the
 10 at least one compartmentalising bulkhead 20 over at most 99% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably at most 90% of the surface of the at least one compartmentalising bulkhead
 15 20, more preferably at most 85% of the surface of the at least one compartmentalising bulkhead 20 and still more preferably at most 80% of the surface of the at least one compartmentalising bulkhead 20.

20 [94] The internal volume of each module can be common with between 5% and 99% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one compartmentalising bulkhead 20, preferably between 10% and 90% preferably between 15% and 85%
 25 and more preferably between 20% and 80%.

[95] Moreover, the internal volume of at least one of the modules can be at least partially formed by the at least one flue gas transport duct 14. Preferably, the internal volume of
 30 at least one of the modules can be at least partially formed by the outer surface of the at least one flue gas transport duct 14. The internal volume of at least one of the modules can be common with the at least one flue gas transport duct 14

over at least 5% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one flue gas transport duct 14, preferably at least 10% of the surface of the at least one
5 flue gas transport duct 14, more preferably at least 15% of the surface of the at least one flue gas transport duct 14 and still more preferably at least 20% of the surface of the at least one flue gas transport duct 14. Preferably, of the at least one absorption module 12, more preferably of the
10 absorption module 12 and of the solvent regeneration module 13, still more preferably of the absorption module 12 and of the solvent regeneration module 13 and of the cooling module 11, and much more preferably of the absorption module 12 and of the solvent regeneration module 13, of the cooling module
15 11 and of the solvent storage module 22 and/or of the washing module 16.

[96] The internal volume of at least one of the modules can be common with the at least one flue gas transport duct 14 over
20 at most 99% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one flue gas transport duct 14, preferably at most 90% of the surface of the at least one flue gas transport duct 14, more preferably at most 85% of the surface of the at least
25 one flue gas transport duct 14 and still more preferably at most 80% of the surface of the at least one flue gas transport duct 14.

[97] The internal volume of at least one of the modules can be
30 common with between 5% and 99% of the surface, preferably of the entire surface, preferably of the entire surface of the outer surface, of the at least one flue gas transport duct 14,

preferably between 10% and 90% preferably between 15% and 85% and more preferably between 20% and 80%.

[98] In a particular embodiment, the internal volume of each
5 module can be at least partially formed by the at least one
flue gas transport duct 14. Preferably, the internal volume of
each module can be at least partially formed by the outer
surface of the at least one flue gas transport duct 14. The
internal volume of each module can be common with the at least
10 one flue gas transport duct 14 over at least 5% of the
surface, preferably of the entire surface, preferably of the
entire surface of the outer surface, of the at least one flue
gas transport duct, preferably at least 10% of the surface of
the at least one flue gas transport duct 14, more preferably
15 at least 15% of the surface of the at least one flue gas
transport duct 14 and still more preferably at least 20% of
the surface the at least one flue gas transport duct 14.

[99] The internal volume of each module can be common with the
20 at least one flue gas transport duct 14 over at most 99% of
the surface, preferably of the entire surface, preferably of
the entire surface of the outer surface, of the at least one
flue gas transport duct 14, preferably at most 90% of the
surface of the at least one flue gas transport duct 14 more
25 preferably at most 85% of the surface of the at least one flue
gas transport duct 14 and still more preferably at most 80% of
the surface of the at least one flue gas transport duct 14.

[100] The internal volume of each module can be common with
30 between 5% and 99% of the surface, preferably of the entire
surface, preferably of the outer surface, of the at least one
flue gas transport duct 14, preferably between 10% and 90%,

preferably between 15% and 85% and more preferably between 20% and 80%.

[101] Hence, the CO₂ capture system 10 uses the marine structure 15 and makes it possible to incorporate all or part of the modules of the CO₂ capture system 10. The CO₂ capture system 10 according to the invention enables the at least one compartmentalising bulkhead 20, with at least one of the modules, preferably with each module and/or with the at least one flue gas transport duct 14 to be incorporated in the marine structure 15. Such a layout can improve the compactness of the system.

[102] In addition, such a layout can improve the production and construction time and facilitate the deployment of the system according to the invention. Indeed, the system according to the invention, due to its layout, can reduce the use of numerous materials, dispense with the construction of additional structures comprising a multitude of expensive materials, reduce the length of connections via pipes between, for example, turbines and modules or other equipment. This therefore makes it possible to reduce the costs and duration of the implementation.

[103] In addition, the CO₂ capture system 10 according to the invention enables the available space to be optimised in the hull, preferably in the marine structure 15, without affecting its activity or its parameters such as its ability to float, for example.

30

[104] The CO₂ capture system 10 according to the invention also makes it possible to minimise the quantity of materials, the work necessary for manufacture and then the deployment and

therefore the overall cost of implementing such a CO₂ capture system 10.

5 [105] Finally, it is clearly advantageous that the CO₂ capture system 10 makes it possible to reduce CO₂ emissions developed by the activity of electrical and/or mechanical and/or heat generation of marine structures.

10 [106] The CO₂ capture system 10 thus directly uses the marine structure for bulkheading and/or compartmentalising the various modules, duct(s) and bulkhead(s).

15 [107] This also makes it possible to modulate the internal volume of each module, which further optimises the space of the marine structure 15.

20 [108] For example, in a particular embodiment of the invention, the absorption module 12 can be formed by (i.e. can comprise) at least one column, or at least two columns each sharing at least one part in common with a surface of the hull 19, preferably of the inner surface of the hull 19. It should be noted that a column can be horizontal or vertical.

25 [109] In a particular embodiment of the invention, the absorption module 12 can be designed to enable a counter-current flow absorption, preferably in the case of "barge" and/or "gravity" type marine structures.

30 [110] The absorption module 12 can also be designed to enable a cross-flow absorption, preferably in the case of a "barge" type marine structure.

[111] Advantageously, the use of cross-flow absorption can limit the effects of motion and/or tilting constraints, due for example to the swell on the floating structure and which can impact the performance of chemical absorption of CO₂ by a solvent. Indeed, the motion of the marine structure can disturb the homogeneity of the dispensing of the solvent by one or more dispensers, especially since the height of the counter-current flow absorption module is large and the number of solvent dispensers is low, which reduces the performance of the CO₂ capture system. Further, due to a cross-flow absorption module, the phenomenon described above is reduced, which preserves the performance of the CO₂ capture system despite the motion undergone. Such a layout is therefore particularly advantageous in a system according to the invention.

[112] In a particular but non-limiting embodiment of the cross-flow embodiment, the CO₂ capture system can comprise at least one absorption module comprising at least one absorption internal volume, and at least one washing module 16 comprising at least one washing internal volume or at least one internal volume of the absorption module 12 and at least one internal volume of the washing module 16 within the same absorption module 12.

[113] Furthermore, the one or more absorption modules 12 can include at least one absorption stage or a plurality of absorption stages. Each stage can be delimited by partial bulkheads. These bulkheads can optimise the distribution of fluids and the recovery of solvent so as to reduce the required flow of solvent

[114] Furthermore, the one or more washing modules 16 can include at least one washing stage or a plurality of washing stages so as to reduce the entrainment and/or loss of solvent. Each stage can be delimited by partial bulkheads.

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[115] In a particular embodiment where the marine structure corresponds to a GBS, the height of the hull can make it possible to vertically incorporate a counter-current flow absorption or washing column in a single block without
10 dividing it up.

[116] Cross-flow absorption is particularly advantageous in the case of a limited marine structure height. For example, the CO₂ capture system 10 according to the invention can
15 horizontally incorporate one or more absorption columns and/or one or more cross-flow washing columns in a given module, for example.

[117] Hence, the use of cross-flow absorption makes it
20 possible to dispense with height-limitation constraints of the hull of a floating marine structure, for example of the barge type. Furthermore, cross-flow technology enables an operation with low flue gas flow compared with a counter-current absorber requiring a higher minimum flow. Finally, the
25 pressure drop is also lower through a cross-flow absorber than in a counter-current absorber, which can minimise the electrical power consumed by the CO₂ capture system.

[118] Furthermore, in addition to being able to modulate the
30 internal volume of each module, the CO₂ capture system 10 according to the invention can also be designed in order to allow a horizontal and/or vertical and/or radial fluid flow.

[119] The CO₂ capture system 10 according to the invention therefore makes it possible to minimise the quantity of materials required in order to ensure CO₂ capture and therefore also reduces the costs.

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[120] In a particular non-limiting exemplary embodiment of the invention comprising for example a floating barge, the CO₂ capture system can incorporate an electrical power generating unit arranged at the surface of the floating marine structure and supplied with fuel gas by undersea pipeline which is partly flexible or by gas stored in the liquid state in the hull. The electricity produced is transported to other facilities via an undersea cable. The flue gas from gas turbines circulates in the marine structure via at least one flue gas transport duct, preferably with polygonal (e.g. rectangular) cross-section and made of concrete and/or made of steel. This flue gas is then directed to a cooling module 11, an absorption module 12 and a washing module 16. All of the ducts and modules constituting the CO₂ capture system (as well as solvent storage) are then incorporated in the marine structure by compartmentalising via at least one compartmentalisation bulkhead, and provided with a coating (e.g. a polymer in the case of a structure made of concrete).

25 [121] Another particular non-limiting exemplary embodiment of the invention can comprise a CO₂ capture system comprising a marine gravity structure. A gravity structure enables the recovery and capture of CO₂ from flue gas coming from an existing facility (e.g. a platform on which an electrical power generating unit is installed). The structure being fixed, can be connected to the existing facility via a bridge transporting the pipes and electrical cables. The incorporation of the CO₂ capture system in the structure is

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carried out in a vertical manner in this case. In addition, the CO₂ capture system according to the invention can reduce the length of the ducts and pipes and the complexity of the facility and therefore participate in the reduction of costs
5 and of the number of materials required.

[122] The hull 19, as well as the at least one compartmentalising bulkhead 20, enable compartmentalising of the CO₂ capture system 10, but also ensure the roles of
10 piping, flue gas duct and modules required for capture of CO₂ and thus allow the CO₂ emissions and the costs to be reduced.

[123] According to a second aspect, the invention relates to the use of a CO₂ capture system according to the invention in
15 electricity production, steam production, in the treatment of CO₂, in the conditioning of CO₂, in the transport of CO₂, in the storage of CO₂, in the recovery of exhaust flue gas, in the treatment of exhaust flue gas, in gas production, in oil production and/or in marine transport. Indeed, a CO₂ capture
20 system according to the invention can be incorporated in any activity and therefore enables CO₂ capture in order to reduce CO₂ emissions. Treatment of CO₂ can involve, for example, dehydration, deoxygenation, purification, compression, liquefaction and/or pumping.

25

[124] The invention may include numerous alternatives and applications other than those described above. In particular, unless indicated otherwise, the various structural and functional features of each of the implementations described
30 above should not be considered as combined and/or as closely and/or inextricably linked to one another, but by contrast as simple juxtapositions. In addition, the structural and/or functional features of the various embodiments described above

may be the subject, in whole or in part, of any different juxtaposition or any different combination.

CLAIMS

1. System (10) for capturing CO₂ from flue gas, including at least one cooling module (11), at least one
5 absorption module (12) and at least one solvent regeneration module (13), each of said modules being designed so as to define an internal volume;

the internal volume of the cooling module (11) is designed to enable cooling of flue gas comprising CO₂ with a
10 fluid;

the internal volume of the absorption module (12) is designed to enable the cooled flue gas to come into contact with a lean solvent capable of absorbing CO₂ from fumes in order to generate an enriched solvent;

15 the internal volume of the solvent regeneration module (13) is designed to enable the treatment of the enriched solvent so as to release the absorbed CO₂ and form a lean solvent;

said system (10) also including at least one flue gas
20 transport duct (14) designed to enable the transport of fumes to the cooling module (11), said system (10) being characterised in that:

- it includes a marine structure (15), said marine structure (15) having a hull (19) and at least one
25 compartmentalisation bulkhead (20),

- the internal volume of at least one of the modules is at least partially defined by the hull (19) and/or the at least one compartmentalisation bulkhead (20).

30 2. System (10) for capturing CO₂ according to claim 1, characterised in that the at least one flue gas transport duct (14) is at least partially formed by the hull (19) and/or the at least one compartmentalisation bulkhead (20).

3. System (10) for capturing CO₂ according to claim 1 or 2, characterised in that the at least one compartmentalisation bulkhead (20) corresponds to at least one transverse bulkhead, at least one transverse partial bulkhead, at least one longitudinal bulkhead and/or at least one longitudinal partial bulkhead connecting the hull (19).

4. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the hull corresponds to a single hull.

5. System (10) for capturing CO₂ according to the preceding claim, characterised in that the hull comprises at least one side shell and/or at least one bottom shell.

6. System (10) for capturing CO₂ according to one of claims 1 to 3, characterised in that the hull (19) corresponds to a double hull.

7. System (10) for capturing CO₂ according to the preceding claim, characterised in that the hull (19) comprises at least one side shell, at least one bottom shell, at least one transverse inner hull, at least one longitudinal inner hull and/or an inner bottom.

8. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the at least one flue gas transport duct (14) is common with the hull (19) over at least 0.05% of the surface of the hull (19).

9. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the at least one flue

gas transport duct (14) is common with the hull (19) over at most 10% of the surface of the hull (19).

10. System (10) for capturing CO₂ according to one of the
5 preceding claims, characterised in that the internal volume of each of the modules is at least partially defined by the hull (19).

11. System (10) for capturing CO₂ according to one of the
10 preceding claims, characterised in that the at least one flue gas transport duct (14) is common with the at least one compartmentalisation bulkhead (20) over at least 5% of the surface of the at least one compartmentalisation bulkhead (20).

15 12. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the hull (19) is at least partially formed by the at least one compartmentalisation bulkhead (20).

20 13. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the internal volume of each module is at least partially defined by the at least one compartmentalisation bulkhead (20).

25 14. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the internal volume of at least one of the modules is at least partially defined by the at least one flue gas transport duct (14).

30 15. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the internal volume of

each module is at least partially defined by the at least one flue gas transport duct (14).

16. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that it further comprises at least one flue gas generation unit (18) designed to generate flue gas from hydrocarbons; and in that the flue gas generation unit (18) is designed to inject the flue gas into the at least one flue gas transport duct (14).

10

17. System (10) for capturing CO₂ according to claim 16, characterised in that the at least one flue gas generation unit (18) corresponds to a unit for generating electrical and/or mechanical and/or thermal power.

15

18. System (10) for capturing CO₂ according to claim 16, characterised in that the flue gas generation unit (18) is configured to enable a combined cycle.

19. System (10) for capturing CO₂ according to claim 16, characterised in that the flue gas generation unit (18) includes a system for recirculating a part of the flue gas.

20. System (10) for capturing CO₂ according to claim 16, characterised in that the flue gas generation unit (18) includes a system for selective recirculation of at least a part of the flue gas.

21. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the absorption module (12) is formed by at least one column sharing a common wall with the hull (19).

30

22. System (10) for capturing CO₂ according to one of claims 1 to 20, characterised in that the absorption module (12) is formed by at least two columns, each sharing a common wall with the hull (19).

5

23. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that it further comprises at least one washing module (16).

10 24. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the absorption module (12) is designed to enable counter-current flow absorption.

15 25. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that the absorption module (12) is designed to enable cross-flow absorption.

20 26. System (10) for capturing CO₂ according to claim 25, characterised in that when the absorption module is designed to enable cross-flow absorption, the system (10) for capturing CO₂ comprises at least one internal volume of the absorption module (12) and at least one internal volume of the washing module (16).

25 27. System (10) for capturing CO₂ according to claim 25, characterised in that the absorption module designed to enable cross-flow absorption comprises at least one internal volume of the absorption module and at least one internal volume of the washing module (16) within a same absorption module (12).

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28. System (10) for capturing CO₂ according to claim 25, characterised in that the absorption module (12) designed to enable cross-flow absorption comprises at least one absorption

stage or a plurality of absorption stages, each stage being delimited by partial bulkheads.

29. System (10) for capturing CO₂ according to one of the
5 preceding claims, characterised in that it is designed to enable a horizontal and/or vertical and/or radial fluid flow.

30. System (10) for capturing CO₂ according to one of the
preceding claims, characterised in that the hull (19) is
10 covered by a coating, preferably a polymer coating.

31. System (10) for capturing CO₂ according to one of the
preceding claims, characterised in that the hull (19) is made
of concrete or steel.

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32. System (10) for capturing CO₂ according to one of the
preceding claims, characterised in that it is fixed or
floating.

20 33. System (10) for capturing CO₂ according to one of the
preceding claims, characterised in that it is partially
submerged.

34. System (10) for capturing CO₂ according to one of the
25 preceding claims, characterised in that it further comprises
at least one solvent storage module (22).

35. System (10) for capturing CO₂ according to one of the
preceding claims, characterised in that at least a part of the
30 cooling module (11) is in direct or indirect contact with the
fluid.

36. System (10) for capturing CO₂ according to one of the preceding claims, characterised in that at least one part of the cooling module (11) is in contact with an indirect cooling loop.

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37. Use of a system (10) for capturing CO₂ according to one of the preceding claims in electricity production, steam production, in treatment of CO₂, in conditioning of CO₂, in transport of CO₂, in storage of CO₂, in recovery of exhaust
10 flue gas, in treatment of exhaust flue gas, in gas production, in oil production and/or in marine transport.