[12] Currently, the facilities are not designed in order to minimise construction and/or production and/or facility costs of a CO_2 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 CO_2 emissions.

[13] The aim of the present invention is to overcome the disadvantages of the prior art. In particular, embodiments of the present invention seek to provide a CO_2 capture system, said system being suitable for any type of facility, whatever its activity, and enabling CO_2 emissions and costs to be reduced, 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

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

[15] According to a first aspect of the present invention, there is provided a system for capturing CO_2 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 CO_2 with a fluid;

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 CO_2 from fumes 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 CO_2 and form a lean solvent;

said system also including at least one flue gas transport duct designed to enable the transport of fumes to the cooling module, wherein

- 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 CO_2 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 CO_2 capture by absorption.

[18] Through the claimed invention, units, pipes and other equipment constituting the CO_2 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.

[19] In addition, the CO_2 capture system according to the claimed 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 installation site.

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

[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 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,
- 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 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 absorption module is designed to enable a cross-flow absorption,
- the absorption module is designed to enable a counter-current flow absorption,
- it further comprises at least one washing module,
- when the absorption module is designed to enable cross-flow absorption, the CO_2 capture system comprises at least one internal volume of the absorption module and at least one internal volume of the washing module,
- 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 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,
- 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,
- 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.

[22] According to a second aspect of the present invention, there is provided a use of a system for capturing CO_2 defined in the first aspect in electricity production, steam production, in treatment of CO_2,

in conditioning of CO_2, in transport of CO_2, in storage of CO_2, in recovery of exhaust flue gas, in treatment of exhaust flue gas, in gas production, in oil production and/or in marine transport. The claimed invention preferably relates to the use of a CO_2 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.

[23] Hence, the use of such a system makes it possible to reduce CO_2 emissions and to optimise costs while being rapidly deployable and compatible with a plurality of facilities and platform activities which generate CO_2 emissions.

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.

[25] [Fig. 1] Figure 1 shows a diagram of an embodiment of a CO_2 capturing system according to the invention

[26] [Fig. 2] Figure 2 shows a diagram of an embodiment of a CO_2 capturing system according to the invention

[27] [Fig. 3] Figure 3 shows a diagram of an embodiment of a CO_2 capturing system according to the invention

[28] [Fig. 4] Figure 4 shows a diagram of an embodiment of a CO_2 capturing system according to the invention

CLAIMS

1. System for capturing CO_2 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 CO_2 with a fluid;

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 CO_2 from fumes 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 CO_2 and form a lean solvent;

said system also including at least one flue gas transport duct designed to enable the transport of fumes to the cooling module, wherein

- 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.

2. System for capturing CO_2 according to claim 1, wherein the at least one flue gas transport duct is at least partially formed by the hull and/or the at least one compartmentalisation bulkhead.

3. System for capturing CO_2 according to claim 1 or 2, wherein 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.

4. System for capturing CO_2 according to one of the preceding claims, wherein the hull corresponds to a single hull.

5. System for capturing CO_2 according to the preceding claim, wherein the hull comprises at least one side shell and/or at least one bottom shell.

6. System for capturing CO_2 according to one of claims 1 to 3, wherein the hull corresponds to a double hull.

7. System for capturing CO_2 according to the preceding claim, wherein the hull 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 for capturing CO_2 according to one of the preceding claims, wherein the at least one flue gas transport duct is common with the hull over at least 0.05% of the surface of the hull.

9. System for capturing CO_2 according to one of the preceding claims, wherein the at least one flue gas transport duct is common with the hull over at most 10% of the surface of the hull.

10. System for capturing CO_2 according to one of the preceding claims, wherein the internal volume of each of the modules is at least partially defined by the hull.

11. System for capturing CO_2 according to one of the preceding claims, wherein 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.

12. System for capturing CO_2 according to one of the preceding claims, wherein the hull is at least partially formed by the at least one compartmentalisation bulkhead.

13. System for capturing CO_2 according to one of the preceding claims, wherein the internal volume of each module is at least partially defined by the at least one compartmentalisation bulkhead.

14. System for capturing CO_2 according to one of the preceding claims, wherein 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. System for capturing CO_2 according to one of the preceding claims, wherein the internal volume of each module is at least partially defined by the at least one flue gas transport duct.

16. System for capturing CO_2 according to one of the preceding claims, wherein it further comprises at least one flue gas generation unit designed to generate flue gas from hydrocarbons; and in that the flue gas generation unit is designed to inject the flue gas into the at least one flue gas transport duct.

17. System for capturing CO_2 according to claim 16, wherein the at least one flue gas generation unit corresponds to a unit for generating electrical and/or mechanical and/or thermal power.

18. System for capturing CO_2 according to claim 16, wherein the flue gas generation unit (18) is configured to enable a combined cycle.

19. System for capturing CO_2 according to claim 16, wherein the flue gas generation unit includes a system for recirculating a part of the flue gas.

20. System for capturing CO_2 according to claim 16, wherein the flue gas generation unit includes a system for selective recirculation of at least a part of the flue gas.

21. System for capturing CO_2 according to one of the preceding claims, wherein the absorption module is formed by at least one column sharing a common wall with the hull.

22. System for capturing CO_2 according to one of claims 1 to 20, wherein the absorption module is formed by at least two columns, each sharing a common wall with the hull.

23. System for capturing CO_2 according to one of the preceding claims, wherein it further comprises at least one washing module.

24. System for capturing CO_2 according to one of the preceding claims, wherein the absorption module is designed to enable counter-current flow absorption.

25. System for capturing CO_2 according to one of the preceding claims, wherein the absorption module is designed to enable cross-flow absorption.

26. System for capturing CO_2 according to claim 25, wherein when the absorption module is designed to enable cross-flow absorption, the system for capturing CO_2 comprises at least one internal volume of the absorption module and at least one internal volume of the washing module.

27. System for capturing CO_2 according to claim 25, wherein 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.

28. System for capturing CO_2 according to claim 25, wherein the absorption module 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 for capturing CO_2 according to one of the preceding claims, wherein it is designed to enable a horizontal and/or vertical and/or radial fluid flow.

30. System for capturing CO_2 according to one of the preceding claims, wherein the hull is covered by a coating, preferably a polymer coating.

31. System for capturing CO_2 according to one of the preceding claims, wherein the hull is made of concrete or steel.

32. System for capturing CO_2 according to one of the preceding claims, wherein it is fixed or floating.

33. System for capturing CO_2 according to one of the preceding claims, wherein it is partially submerged.

34. System for capturing CO_2 according to one of the preceding claims, wherein it further comprises at least one solvent storage module.

35. System for capturing CO_2 according to one of the preceding claims, wherein at least a part of the cooling module is in direct or indirect contact with the fluid.

36. System for capturing CO_2 according to one of the preceding claims, wherein at least one part of the cooling module is in contact with an indirect cooling loop.

37. Use of a system for capturing CO_2 according to one of the preceding claims in electricity production, steam production, in treatment of CO_2, in conditioning of CO_2, in transport of CO_2, in storage of CO_2, in recovery of exhaust flue gas, in treatment of exhaust flue gas, in gas production, in oil production and/or in marine transport.