

DESCRIPTION

FLOATING OFFSHORE FACILITY, ELECTRIC POWER SUPPLY METHOD FOR
FLOATING OFFSHORE FACILITY

TECHNICAL FIELD

[0001]

The present invention relates to a floating offshore facility and a electric power supply method for floating offshore facility, and more specifically relates to a floating offshore facility and a electric power supply method for floating offshore facility, which can reduce a space occupied by an electric power generation facility in the production facility area on the upper deck, can increase a space for production facility as the offshore facility, and can disperse risk caused by trouble in the electric power system of the electric power generation facility.

BACKGROUND ART

[0002]

A floating offshore facility such as an FPSO (Floating Production Storage and Offloading system), an FSO (Floating Storage and Offloading system), an FSU (Floating Storage Unit), or an FLNG (floating production storage and offloading system) dealing with LNG, each of which is provided with oil or gas production facility and offloading facility, and which is used while being positioned at a specific offshore installation

place for a long time, generally performs production activities and temporary storage of a product, in a floating state while being positioned by mooring or the like on the ocean. Generally, the floating offshore facility having the production facility is provided with a cargo tank under the upper deck that temporarily stores oil and gas as the product, and the production facility on the upper deck. The area around the cargo tank and the production facility for the product which generates flammable gases, is designated as a hazardous area where the use of explosion-proof instrument is specified.

[0003]

While some of these floating offshore facilities may be constructed by conversion of an existing VLCC (Large tanker), recently, there is a case where each of the floating offshore facilities is newly constructed because of many restrictions.

[0004]

The floating offshore facility is constructed differently from an ordinary vessel due to the following circumstance. Generally, the production facility designed in accordance with characteristics of the oil well is installed after construction of a hull. Accordingly, there are many cases where details of the production facility are not fixed at the time of designing a hull part. The part relating to the production facility area is changed corresponding to the condition of the individual floating offshore facility, and thus design of this part and mounting of the instruments on the upper deck tend to be scheduled just before delivery date.

[0005]

In addition, conventionally, as shown in FIGS. 7 and 8, a floating offshore facility 1X is provided with an electric power generation facility 40X as a group constituted by approximately two to eight units of gas turbine electric power generators (FIG. 7 shows six units (three units x two rows)) in the production facility area Rp on an upper deck 3. Furthermore, the electric power generation facility 40X as the single group provided on the upper deck 3 is constituted so as to generate and supply all electric power required for the floating offshore facility 1X such as the one for the production facility, the one for the offloading facility (offloading pump device and the like) except for the production facility, and the one for the accommodation.

[0006]

Accordingly, the conventional floating offshore facility 1X requires a large-scaled electric power generation facility 40X to be installed in the production facility area Rp on the upper deck 3, and thus there has been a problem of reducing the space on which the production facility 30 is provided. There has been a problem that the trouble in an electric power system of the electric power generation facility 40X installed in the production facility area Rp on the upper deck 3 may cause interruption in electric power supply not only to the production facility 30 but also other facilities constituting the floating offshore facility 1X except for the production facility 30 (for example, an offloading device and electric power source for the

accommodation). An electric power generator for emergency offloading has been separately required to be equipped in order to supply electric power for operating the offloading facility in the emergencies above.

[0007]

That is, the electric power generation facility as the overall electric power source for the production facility and the facility including the offloading facility except for the production facility is collectively arranged in the production facility area. Accordingly, when trouble occurs in the electric power system in the production facility area, all electric power sources for the production facility, the offloading device, the accommodation and the like are lost, the entire equipment is required to be interrupted, and the electric power generator for emergency offloading purpose has to be separately equipped.

[0008]

As to the electric power generation facility, for example, Japanese Patent Laid-Open No. 2004-17805 recites an electrical propulsion ship, and discloses the electric power generation facility for the electrical propulsion ship that supplies electric power by selectively operating a plurality of electric power generator units detachably mounted and having a plurality of electric power generators and an engine for driving these electric power generators, in accordance with an electric power generation amount required for driving a motor rotating a propulsion propeller, and power-consuming equipment except for

the motor.

[0009]

When a trouble occurs in a part of the electric power generator units, the disclosed electric power generation facility allows the other electric power generator unit to supply electric power so as to be able to secure electric power supply to the respective facilities in spite of the trouble in the electric power system. However, the electric power generation facility cannot solve problems of securing the space for the production facility area on the upper deck which is specific to the offshore production facility, and problems relating to measures taken for different definition timings for the respective electric power generation facilities due to different entities designing the electric power generation facility for the production facility and the one for the other facilities.

[0010]

In addition, in a case of newly constructing the floating offshore facility instead of converting the VLCC, since the floating offshore facility is, in many cases, not provided with the propulsion unit such as propeller, and the propulsion device for driving the propulsion unit, and does not have its own transportation means, it becomes necessary to tow the floating offshore facility to the operation site, or to transport the floating offshore facility by using a heavy cargo transport ship. Accordingly, there arises a problem that an initial transport cost becomes significantly high.

[0011]

Furthermore, propulsion by the low-speed diesel may be carried out in the similar way to the conventional tanker, and in this case, there is also a problem that the low-speed diesel propulsion device used for propulsion purpose cannot be removed after the floating offshore facility has reached an operation site, and is thrown away after use.

PRIOR ART DOCUMENT

PATENT DOCUMENT

[0012]

Patent Document 1: Japanese Patent Laid-Open No.
2004-17805

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0013]

The present invention has been made in view of the above circumstances, and an object of the present invention is to provide a floating offshore facility and a electric power supply method for floating offshore facility, which can reduce a space occupied by an electric power generation facility in the production facility area on the upper deck, can increase a space for production facility as the offshore facility, and can disperse risk caused by trouble in the electric power system of the electric power generation facility.

MEANS FOR SOLVING THE PROBLEM

[0014]

The floating offshore facility for achieving the object as described above includes a production facility and facilities except for the production facility, to both of which electric power is supplied from an electric power generation facility, and that is used in a state of being positioned on the ocean, wherein the electric power generation facility includes: a first-group electric power generation facility that supplies electric power to the production facility, and that is arranged in a production facility area on an upper deck; and a second-group electric power generation facility that supplies electric power to facilities except for the production facility, and that is arranged in a safe area except for the production facility area.

[0015]

Note that the term "production facility" herein includes facility such as an oil treatment facility, a gas treatment facility, a water treatment facility, or a control system which processes crude oil or natural gas and the like.

[0016]

Namely, the electric power generation facilities are divided into a first-group electric power generation facility serving as a large-scaled electric power generation device (for example, 100 MW class) for supplying electric power to the production facility, and a second-group electric power generation facility serving as a medium-scaled electric power

generation device (for example, 10 MW class) for supplying electric power to facilities except for the production facility. Each group of the electric power generation facilities is arranged in the production facility area and the safe area (for example, machinery room or the like).

[0017]

In other words, the first-group electric power generation facility is in a state of being provided in the production facility area on the upper deck, and the second-group electric power generation facility is in a state of being provided in the safe area except for the production facility area and the hazardous area. In a case where the first-group electric power generation facility and the second-group electric power generation facility are normally operated, a configuration is such that the first-group electric power generation facility supplies electric power to the production facility, and the second-group electric power generation facility supplies electric power to facilities except for the production facility.

[0018]

According to the configuration, a part of the first-group electric power generation facility conventionally equipped in the production facility area and constituted by the large-scaled electric power generation device is equipped in the safe area other than the production facility area, and thus this makes it possible to more widely utilize the upper deck on which the production facility is installed. Namely, the

second-group electric power generation facility for electric power supply to facilities except for the production facility does not have to be arranged in the production facility area on the upper deck, and thus this makes it possible to reduce the space for the first-group electric power generation facility, and increase the space for the production facility as the offshore facility.

[0019]

Along with this, it is possible to disperse risk caused by trouble in the electric power system of the electric power generation facilities. Namely, even when the trouble of the first-group electric power generation facility as the electric power supply system for the production facility occurs, the second-group electric power generation facility can continuously supply electric power to facilities except for the production facility, for example, the offloading facility and the one for the accommodation. That is, the electric power plant is separated in accordance with usage for electric power supply to the production facility and for electric power supply to facilities other than the production facility, and thus the electric power plant can be constructed so as to be impervious to failure and trouble of any one of them.

[0020]

In addition, in a case of newly constructing the floating offshore facility, the production facility designed in accordance with characteristics of the oil well is generally mounted after construction of the hull, and thus, in most cases,

details of the production facility are not fixed at the time of designing the hull part, and resultantly, the schedule for designing the hull does not match the schedule for designing the production facility. In this case, design and installation of the second-group electric power generation facility used on the hull part can proceed separately from design and installation of the first-group electric power generation facility. In other words, it is possible to separate the electric power plant into the one for electric power supply to the production facility and the one for electric power supply to facilities except for the production facility, and thus it is possible to eliminate an influence due to design delay of the production facility on the design of the electric power generation facility for electric power supply to facilities except for the production facility. Accordingly, modularization of the electric power plant becomes easy.

[0021]

Furthermore, at least a part of the second-group electric power generation facility is constituted by a dual fuel diesel electric power generator referred to as DFDE (Dual Fuel Diesel Electric) which can be driven by both heavy fuel oil and fuel gas. In a case of mounting a conventional diesel electric power generator, it is necessary to continuously supply heavy oil as fuel, but the dual fuel diesel electric power generator generates electric power by using heavy fuel oil before operation of the production facility, and when it becomes possible to produce crude oil or gas by operation of the

production facility, it becomes possible to generate electric power by using, as fuel, the gas produced in the production facility, resulting in being able to effectively utilize fuel gas. Additionally, the dual fuel diesel electric power generator has a higher degree of freedom in air supply and exhaust facility than a gas turbine electric power generator, and as a result, it becomes possible to significantly expand a degree of freedom in selecting an installation place of the second-group electric power generation facility, and to easily arrange the second-group electric power generation facility in the safe area except for the production facility area on the upper deck.

[0022]

Moreover, when a configuration is such that it is possible to drive the offloading facility such as the cargo oil pump (COP), and other facilities, with electric power generated by the second-group electric power generation facility, it becomes possible to carry out a performance verification (commissioning) operation to confirm required performance without being influenced by the first-group electric power generation facility for supplying electric power to the production facility. In other words, if the second-group electric power generation facility is usable without waiting for the completion of the first-group electric power generation facility, it becomes possible to carry out confirmation and verification of the required performance of the offloading facility, the facility for the accommodation, or in some cases,

a facility not directly related to the production facility such as a propulsion facility.

[0023]

In addition, when the second-group electric power generation facility is constituted so as to supply electric power for operating the offloading facility in emergencies, the second-group electric power generation facility in the safe area can also be used as the electric power generator for emergency offloading by separation of the electric power generation facility and the installation place in accordance with usage, and thus it is possible to eliminate the electric power generator for the emergency offloading.

[0024]

The floating offshore facility described above includes a connection point changing mechanism for electrically connecting the first-group electric power generation facility and the second-group electric power generation facility, and when the connection point changing mechanism is configured to switch between electric power interchange by parallel operation of the first-group electric power generation facility and the second-group electric power generation facility, and electric power supply by operation of any one of the electric power generation facilities so as to take over electric power supply of all or a part of the electric power supply by the other electric power generation facility, in other words, as emergency countermeasures, when the mechanism is constituted to be able to perform parallel operation of the first-group and

the second-group electric power generation facilities, which are arranged in the production facility area and the safe area except for the production facility area and to be able to perform feedback electric power supply, the following effects can be obtained.

[0025]

Namely, in a case of trouble of the electric power generation facility of one of the groups, in emergencies such as failure and accident in the production facility, and even in a case where an unscheduled electric power supply amount is required during maintenamce and/or inspection operation for a part of these electric power generation facilities, then it is possible to mutually supply electric power and to secure a sufficient electric power supply system. That is, even in the case of failure in a part of the electric power generation facility of any one of the groups, the electric power supply is configured to be capable of being mutually supplemented, thereby making it possible to flexibly cope with emergencies.

[0026]

More specifically, in the above floating offshore facility, an electric power generation capacity of the second-group electric power generation facility is set to be in a range from 5 MW to 30 MW.

[0027]

In the above floating offshore facility, the second-group electric power generation facility includes a plurality of electric power generation facilities, and when the plurality

of electric power generation facilities is dispersedly arranged at two or more positions, then it is possible to secure a sufficient electric power supply system, even in a case of trouble of one of the second-group electric power generation facilities, in emergencies when failure or accident occurs in an area where one of the electric power generation facilities is arranged, and even in a case where an unscheduled electric power supply amount is required during maintenance and/or inspection operation for a part of these electric power generation facilities. Namely, even in the case of failure in any one of the second-group electric power generation facilities, the electric power supply is configured to be capable of being mutually supplemented. Additionally, as to an installation location of the second-group electric power generation facility, the space for one location can be reduced.

[0028]

In addition, the arrangement location of the second-group electric power generation facility can be selected from any one location or the combination of locations of: a machinery room; a space on the upper deck closer to the stern side than the production facility area; a space on the upper deck closer to a bow side than the production facility area; an inside of the hull closer to the bow side than the production facility area; an inside of the hull closer to the stern side than the production facility area; an inside of the superstructure; and an upper side of the superstructure.

[0029]

The floating offshore facility described above includes a propulsion unit, a propulsion facility for driving the propulsion unit, and a navigation equipment, and when electric power for operating the propulsion facility and the navigation equipment is constituted to be supplied from the second-group electric power generation facility, namely, when the machinery room (engine room) is equipped with the propulsion motor, propeller shaft, propeller, inverter, and the like; a part of the superstructure is provided with a bridge; and the bridge is equipped with a navigation equipment, which are utilized as a self-propulsion system, then the second-group electric power generation facility can be utilized as the electric power source for the self-propulsion system.

[0030]

With the above-described configuration, when moving the floating offshore facility, in a state in which the first-group electric power generation facility is not installed, or the first-group electric power generation facility which operates by using, as fuel, gas produced by the production facility in operation cannot be operated, it becomes possible to navigate the floating offshore facility without waiting for the completion of the first-group electric power generation facility.

[0031]

In addition, when the second-group electric power generation facility for electric power supply to facilities except for the production facility is constituted to supply

electric power to both the offloading facility and the propulsion facility which will never be used simultaneously, the second-group electric power generation facility can be shared or commonly used by the offloading facility and the propulsion facility. Accordingly, it is possible to make the entire electric power generation plant compact.

[0032]

In addition, when the propulsion facility is detachably constituted in the floating offshore facility, in other words, when the propulsion facility and the navigation equipment such as an electrical propulsion device, a propulsion control device, and a navigation apparatus are used only at the time of moving the floating offshore facility, and thus they are constituted to be temporarily installed only at the time of transportation, and to be removed after the transportation so that they are available for another floating offshore facility, it is possible to reduce the entire facility expense. In addition, since they can be removed at the time except for navigation, the resultant space can be effectively utilized.

[0033]

When the floating offshore facility includes a temporary electric power generation facility arranged in the safe area except for a hazardous area, namely, when the floating offshore facility is constituted to be provided with the temporary electric power generation facility to make variable the electric power generation capacity as entire electric power generator facilities, the floating offshore facility becomes

capable of temporarily supplementing the electric power generation capacity for handling, in a case of temporary increase in the required electric power generation capacity, and in emergencies such as unexpected failure of the electric power generator. Accordingly, it becomes possible to flexibly cope with the operation that temporarily requires electric power, such as navigation to the operation site.

[0034]

More specifically, when the electric power generation capacity of the temporary electric power generation facility is constituted to be 5 MW to 25 MW, the temporary electric power generation facility can supply sufficient auxiliary electric power.

[0035]

The temporary electric power generation facility includes a connection point switching mechanism for electrically connecting any one of or both of the first-group electric power generation facility and the second-group electric power generation facility, and when the connection point switching mechanism is configured to switch between electric power supply to any one of or both of the first-group electric power generation facility and the second-group electric power generation facility by parallel operation of the temporary electric power generation facility, and electric power supply by operation of the temporary electric power generation facility so as to take over electric power supply of all or a part of the first-group electric power generation

facility and the second-group electric power generation facility, in other words, as emergency countermeasures, when the temporary electric power generation facility arranged in the safe area except for the hazardous area is constituted to be able to perform parallel operation of the first-group and the second-group electric power generation facilities and to be able to perform feedback electric power supply, the following effects can be obtained.

[0036]

Namely, in a case of trouble of the first-group or the second-group electric power generation facility, in emergencies such as failure and accident in the production facility, and even in a case where an unscheduled electric power supply amount is required during maintenance and/or inspection operation for a part of these electric power generation facilities, then it is possible to supplement electric power by the temporary electric power generation facility and to secure a sufficient electric power supply system. That is, even in the case of failure in a part of the electric power generation facility of any one of the groups, the electric power supply is constituted to be capable of being supplemented by the temporary electric power generation facility, thereby making it possible to flexibly cope with emergencies.

[0037]

The floating offshore facility described above is formed as any one of a floating production storage and offloading system (FPSO), a floating storage and offloading system (FSO),

a floating storage unit (FSU), a floating production storage and offloading system dealing with LNG (LNG-FPSO), an FLPG dealing with LPG (LPG-FPSO), and a floating storage and re-gasification unit (FSRU), and thus the resultant effects of the above configurations become great.

[0038]

An electric power supply method for floating offshore facility to achieve the above-described object is the method for floating offshore facility, that includes a production facility and facilities except for the production facility, to both of which electric power is supplied from electric power generation facilities, and that is used in a state of being positioned on the ocean, in which the electric power generation facility supplies electric power to the production facility, and the first-group electric power generation facility arranged in a production facility area on an upper deck supplies electric power to the production facility, and the second-group electric power generation facility arranged in a safe area except for the production facility area supplies electric power to facilities except for the production facility.

[0039]

According to the method, the large-scaled electric power generation facilities for the floating offshore facilities are dispersedly arranged in accordance with usage for supplying electric power correspondingly. As a result, electric power generation capacity of the electric power generation facility in the production facility area on the upper deck is made small

so as to be able to reduce the space for the electric power generation facility. This makes it possible to increase the space for the production facility, and to disperse risk caused by trouble in the electric power system of the electric power generation facilities.

EFFECTS OF THE INVENTION

[0040]

According to the floating offshore facility, and the electric power supply method for floating offshore facility of the present invention, the large-scaled electric power generation facility is separated into the first-group electric power generation facility for production facility, and the second-group electric power generation facility for electric power supply to facilities except for the production facility, in accordance with usage. Furthermore, these electric power generation facilities are dispersedly arranged in the production facility area on the upper deck, and in the safe area except for the production facility area, and thus the space for the electric power generation facility in the production facility area on the upper deck can be reduced, and the space for the production facility as the offshore facility can be increased. Furthermore, since risk caused by trouble in the electric power system in the electric power generation facility can be dispersed.

[0041]

Namely, even in a case of the trouble of the first-group

electric power generation facility as the electric power supply system for the production facility, the second-group electric power generation facility makes it possible to continuously supply electric power to the facilities and instruments except for the production facility, for example, the offloading facility and the one for the accommodation. In addition, in a case where the floating offshore facility is provided with a propeller and the propulsion device for driving the propeller, the second-group electric power generation facility can be used as the electric power generator for the propulsion device, and thus it becomes possible to reduce the facility cost in a case of self-propulsion by using the propulsion device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042]

[FIG. 1] FIG. 1 is a side cross-sectional view schematically illustrating a configuration and an arrangement of an electric power generation facility in a floating offshore facility according to a first embodiment of the present invention.

[FIG. 2] FIG. 2 is a plan view of a stern side schematically illustrating a configuration and an arrangement of the electric power generation facility in the floating offshore facility according to the first embodiment of the present invention.

[FIG. 3] FIG. 3 is a side cross-sectional view schematically illustrating a structure in which a second-group electric power generation facility is separately arranged in

a floating offshore facility according to the first embodiment of the present invention.

[FIG. 4] FIG. 4 is a side cross-sectional view schematically illustrating a configuration and an arrangement of an electric power generation facility in a floating offshore facility according to a second embodiment of the present invention.

[FIG. 5] FIG. 5 is a side cross-sectional view schematically illustrating an inside configuration of a machinery room of the floating offshore facility according to the second embodiment of the present invention.

[FIG. 6] FIG. 6 is a side cross-sectional view schematically illustrating a configuration and an arrangement of an electric power generation facility in a floating offshore facility according to a third embodiment of the present invention.

[FIG. 7] FIG. 7 is a side cross-sectional view schematically illustrating a configuration and an arrangement of an electric power generation facility in prior art floating offshore facility.

[FIG. 8] FIG. 8 is a plan view of a stern side schematically illustrating a configuration and an arrangement of the electric power generation facility in the prior art floating offshore facility.

DESCRIPTION OF EMBODIMENTS

[0043]

Hereinafter, a floating offshore facility and an electric power supply method for floating offshore facility according to the present invention will be explained while referring to the drawings. Note that the term "production facility" herein includes facilities for processing crude oil, natural gas and the like, for example, oil separation facility, gas treatment facility, water treatment facility, and the control system.

[0044]

While the floating offshore facility of this embodiment will be explained by the use of an FPSO (Floating Production Storage and Offloading system) as an example, the present invention is not necessarily limited to this FPSO and can be applied to any type of floating offshore facility.

[0045]

The present invention can also be applied to, for example, an FSO (Floating Storage and Offloading system) and an FSU (Floating Storage Unit) which do not include oil or gas production facility, an FLNG (Floating Liquefied Natural Gas: LNG-FSPO) dealing with LNG, an FLPG (LPG-FPSO) dealing with LPG, an FSRU (Floating Storage Re-gasification Unit), and the like.

[0046]

Note that, generally, in many cases, the floating offshore facility such as the FPSO has a shape substantially similar to that of a ship such as a VLCC (large tanker), and thus explanation here will be made by using names such as "hull", "stern", "upper deck" also as respective part names in accordance with the names of the ship such as the VLCC.

[0047]

As shown in FIGS. 1 and 2, a floating offshore facility 1A of the first embodiment has substantially a similar shape to that of the ship such as the VLCC, transports in tow or by self-propulsion from an operation site or a port to an offshore installation place where there are oil fields etc., and is used in a state of being positioned on the ocean, at this offshore installation place by using a mooring system or the like.

[0048]

As shown in FIGS. 1 and 2, this floating offshore facility 1A includes a hull 2, upper deck parts 3, 3a, and 3f, a stern part 4, and a bow part 8. A machinery room 5 (also referred to as an engine room when the propulsion device is provided) is provided under the upper deck 3a of the stern part 4, a superstructure 6 including an accommodation 6a is provided above the machinery room 5, and a cargo tank 7 is provided forward of the machinery room 5. In addition, the bow part 8 is provided in front of the cargo tank 7. Note that the floating offshore facility 1A according to the first embodiment is not provided with the propulsion device utilized for moving purpose, and thus the facility is constituted not to be able to be self-propelled.

[0049]

Note that the floating offshore facility 1A includes the offloading facility, a riser, a mooring facility such as a mooring rope and an anchor, a heliport, and an automatic position holding system including the propulsion device such as an azimuth thruster (all of which are not shown) as necessary,

in addition to the production facility 30, the machinery room 5, the superstructure 6 including the accommodation 6a, and the cargo tank 7 where the oil (gas) storage tank is installed.
[0050]

The floating offshore facility 1A includes the production facility 30 which receives electric power supply from each of electric power generation facilities 40 and 50, and "facilities except for the production facility" including: facility 60 for the accommodation; the offloading facility (not shown); a cargo pump (not shown); and the like, except for the production facility 30, and is used in a state of being positioned on the ocean. The production facility 30 is configured to process, for example, crude oil or natural gas, is provided with an oil separation facility, a gas treatment facility, a water treatment facility, and a control system, and is installed in the production facility area Rp on the upper deck 3 in front of the superstructure 6.

[0051]

In the floating offshore facility 1A of the present invention, the electric power generation facilities 40 and 50 are constituted by the first-group electric power generation facility 40 that supplies electric power to the production facility 30, and that is arranged in the production facility area Rp on the upper deck 3, and the second-group electric power generation facility 50 that supplies electric power to facilities except for the production facility, and that is arranged in the safe area Rs except for the production facility

area Rp. Namely, during normal operation, the first-group electric power generation facility 40 supplies electric power to the production facility 30, and the second-group electric power generation facility 50 supplies electric power to facilities except for the production facility.

[0052]

The hazardous area Rd refers to all the places having risks of normal accumulation of combustible or explosive vapor, gas, dust, or explosive substances, and specifically, the hazardous area Rd includes the production facility area Rp, and the cargo tank etc. for temporarily storing the produced oil and gas. In addition, the safe area Rs refers to the area except for the hazardous area Rd. Specifically, the safe area Rs includes the machinery room 5, the space on the upper deck 3a of the stern part 4, the space on the upper deck 3f of the bow part 8, the inside of the hull at the stern part 4, the inside of the hull at the bow part 8, the inside of the super structure 6, the upper part of the superstructure 6, and the like.

[0053]

In addition, the electric power generation facility 40 of the first group for electric power supply to the production facility 30 normally includes four to eight units (four units as shown in FIGS. 1 and 2) of electric power generators 41a, 41b, 41c, 41d and the like. Referring to FIGS. 1 and 2, they are arranged in transverse two rows between the superstructure 6 and the production facility 30. When the plurality of units of the electric power generators 41a, 41b, 41c, and 41d

constitute the first-group electric power generation facility 40, it is possible to continuously maintain electric conduction even if a part of the electric power generators (41a, for example) is subjected to maintenance and/or inspection. Accordingly, with this configuration, even if failure occurs in a part of the electric power generators (for example, 41b) it is possible to perform repair or replacement of the faulty electric power generator (for example, 41b) while maintaining electric power supply, and thus it is possible to reduce the influence of such failure on the production facility 30.

[0054]

On the other hand, the second-group electric power generation facility 50 for electric power supply to facilities except for the production facility normally includes two to four units (two units of the structure as shown in FIGS. 1 and 2) of electric power generators 51a and 52b, and the like, and they are arranged in the safe area Rs including the machinery room 5, the space on the upper deck 3a of the stern part 4, the space on the upper deck 3f of the bow part 8, the inside of the hull at the stern part 4, the inside of the hull at the bow part 8, the inside of the superstructure 6, and the space on the superstructure 6. More preferably, they are arranged inside the machinery room 5, or inside the hull at the stern part 4. With the configurations in FIGS. 1 and 2, the two units of electric power generators 51a and 52b constituting the second-group electric power generation facility 50 are arranged in transverse two rows in the machinery room 5.

[0055]

Namely, the electric power generation facilities 40 and 50 are divided into a first-group electric power generation facility 40 serving as a large-scaled electric power generation device (for example, 100 MW class) for supplying electric power to the production facility 30, and a second-group electric power generation facility 50 serving as a medium-scaled electric power generation device (for example, 10 MW class) for supplying electric power to facilities except for the production facility. Each group of the electric power generation facilities is arranged in the production facility area Rp and the safe area Rs.

[0056]

In other words, the first-group electric power generation facility 40 is in a state of being provided in the production facility area Rp on the upper deck 3, and the second-group electric power generation facility 50 is in a state of being provided in the safe area Rs except for the production facility area Rp and the hazardous area Rd. In a case where the first-group electric power generation facility 40 and the second-group electric power generation facility 50 are normally operated, a configuration is such that the first-group electric power generation facility 40 supplies electric power to the production facility 30, and the second-group electric power generation facility 50 supplies electric power to facilities except for the production facility.

[0057]

According to the configuration, a part of the first-group electric power generation facility 40 conventionally equipped in the production facility area Rp and constituted by the large-scaled electric power generation device is equipped in the safe area Rs other than the production facility area Rp, and thus this makes it possible to more widely utilize the upper deck 3 on which the production facility 30 is installed. Namely, the second-group electric power generation facility 50 for electric power supply to facilities except for the production facility does not have to be arranged in the production facility area Rp on the upper deck 3, and thus this makes it possible to reduce the space for the first-group electric power generation facility 40, and increase the space for the production facility as the offshore facility.

[0058]

Along with this, it is possible to disperse risk caused by trouble in the electric power system of the electric power generation facilities 40 and 50. Namely, even when the trouble of the first-group electric power generation facility 40 as the electric power supply system for the production facility occurs, the second-group electric power generation facility 50 can continuously supply electric power to facilities except for the production facility, for example, the offloading facility and the one for the accommodation 60. That is, the electric power plant is separated in accordance with usage for electric power supply to the production facility 30 and for electric power supply to facilities other than the production facility, and

thus the electric power plant can be constructed so as to be impervious to failure and trouble of any one of them.

[0059]

In addition, in a case of newly constructing the floating offshore facility 1A, the production facility designed in accordance with characteristics of the oil well is generally mounted after construction of the hull, and thus, in most cases, details of the production facility are not fixed at the time of designing the hull part, and resultantly, the schedule for designing the hull does not match the schedule for designing the production facility. In this case, design and installation of the second-group electric power generation facility 50 used on the hull part can proceed separately from design and installation of the first-group electric power generation facility 40. In other words, it is possible to separate the electric power plant into the one for electric power supply to the production facility 30 and the one for electric power supply to facilities except for the production facility, and thus it is possible to eliminate an influence due to design delay of the production facility 30 on the second-group electric power generation facility 50 for electric power supply to facilities except for the production facility. Accordingly, modularization of the electric power plant becomes easy.

[0060]

Furthermore, when at least a part of the second-group electric power generation facility 50 is constituted by a dual fuel diesel electric power generator referred to as DFDE (Dual

Fuel Diesel Electric) which can be driven by both heavy fuel oil and fuel gas, it is necessary to continuously supply heavy oil as fuel in a case of mounting a conventional diesel electric power generator, but the dual fuel diesel electric power generator generates electric power by using heavy fuel oil before operation of the production facility 30, and when it becomes possible to produce fuel gas by operation of the production facility 30, it becomes possible to generate electric power by using fuel gas produced in the production facility 30, resulting in being able to effectively utilize the fuel gas.

[0061]

Additionally, the dual fuel diesel electric power generator has a higher degree of freedom in air supply and exhaust facility than a gas turbine electric power generator, and as a result, it becomes possible to significantly expand a degree of freedom in selecting an installation place of the second-group electric power generation facility 50, and to easily arrange the second-group electric power generation facility 50 in the safe area Rs except for the production facility area Rp on the upper deck 3.

[0062]

Moreover, when a configuration is such that it is possible to drive the offloading facility such as the cargo oil pump (COP), and other facilities, with electric power generated by the second-group electric power generation facility 50, it becomes possible to carry out a performance verification

(commissioning) operation to confirm required performance without being influenced by the first-group electric power generation facility 40 for supplying electric power to the production facility 30. In other words, if the second-group electric power generation facility 50 is usable, without waiting for the completion of the first-group electric power generation facility 40, it becomes possible to carry out confirmation and verification of the required performance of the offloading facility, the facility 60 for the accommodation, or in some cases, a facility not directly related to the production facility 30 such as a propulsion facility to be described below.

[0063]

In addition, when the second-group electric power generation facility 50 is constituted so as to supply electric power for operating the offloading facility in emergencies, the second-group electric power generation facility 50 in the safe area Rs can also be used as the electric power generator for emergency offloading by separation of the electric power generation facilities 40 and 50 and the installation place in accordance with usage, and thus it is possible to eliminate the electric power generator for the emergency offloading.

[0064]

Furthermore, the offshore facility includes a connection point changing mechanism 81 for electrically connecting the first-group electric power generation facility 40 and the second-group electric power generation facility 50. The

connection point changing mechanism 81 is configured to switch between electric power interchange by parallel operation of the first-group electric power generation facility 40 and the second-group electric power generation facility 50, and electric power supply (feedback electric power supply) by operation of any one of the electric power generation facilities 40 (or 50) while taking over all or a part of the electric power supply by the other electric power generation facility 50 (or 40).

[0065]

In other words, as emergency countermeasures, the mechanism is constituted to be able to perform parallel operation of the first-group and the second-group electric power generation facilities 40 and 50, which are arranged in the production facility area Rp and the safe area Rs except for the production facility area Rp and to be able to perform feedback electric power supply.

[0066]

Accordingly, in a case of trouble of the electric power generation facility 40 (or 50) of one of the groups, in emergencies such as failure and accident in the production facility 30, and even in a case where an unscheduled electric power supply amount is required during maintenance and/or inspection operation for a part of these electric power generation facilities 40,50, then it is possible to mutually supply electric power and to secure a sufficient electric power supply system.

[0067]

That is, even in the case of failure in a part of the electric power generation facility 40 (or 50) of any one of the groups, the electric power supply is configured to be capable of being mutually supplemented, thereby making it possible to flexibly cope with emergencies. Especially, in a case of failure in the second-group electric power generation facility 50 for electric power supply to the facility 60 for the accommodation, electric power supply to the accommodation 6a can be preferentially carried out, and thus it is possible to maintain an environment for safety and health maintenance of operators engaged in operations of the production facility 30.

[0068]

In addition, more specifically, the electric power generation capacity of the first-group electric power generation facility 40 is constituted to be 50 MW to 200 MW so as to be able to satisfy electric power demanded by the production facility 30. The electric power generation capacity of the second-group electric power generation facility 50 is constituted to be 5 MW to 30 MW so as to be able to satisfy the electric power demanded by facilities except for the production facility.

[0069]

For example, in the floating offshore facility 1A having a whole length of approximately 300 m, the electric power generator capacity ranging from 1 MW to 2 MW is required for the facility 60 for the accommodation, and the electric power

generation capacity ranging from 1 MW to 2 MW is required for the offloading facility. Note that the electric power generation capacity ranging from 5 MW to 6 MW is required for the cargo oil pump. In consideration of these, the electric power generation capacity of the second-group electric power generation facility 50 is set to a value ranging from 7 MW to 10 MW + 5 MW (margin: equivalent to half the specified value ranging from 7 MW to 10 MW), or the one approximately 1.5 times higher than the electric power generation capacity demanded by facilities except for the production facility. In a case where the floating offshore facility 1A includes the electric propulsion system, more electric power generation capacity is required as described below.

[0070]

In addition, as shown in FIG. 3, when the second-group electric power generation facility 50 further includes a plurality of electric power generation facilities 50A and 50B, separately arranged at two or more locations, in emergencies when trouble occurs in one of the electric power generation facilities, or failure or accident occurs in the area where 50A (or 50B) of one of the second-group electric power generation facilities is arranged, and a part of the electric power generation facility 50A (or 50B) requires an unscheduled electric power supply amount during maintenance and/or inspection operation, then it is possible to secure a sufficient electric power supply system. Note that, in FIG. 3, the electric power generation facility 50A inside the machinery

room 5 includes two electric power generators 51a and 51b, and the electric power generation facility 50B arranged on the upper deck 3f of the bow part 8 includes two electric power generators 51c and 51d.

[0071]

Namely, even in a case of failure in either one of the electric power generation facility 50A (or 50B) of the second-group electric power generation facilities 50, the electric power interchange is constituted to be secured. Additionally, as to an arrangement location of the second-group electric power generation facility 50, it becomes possible to reduce a space per one arrangement location. Furthermore, even in a case of separate arrangement, it is preferable to electrically connect the electric power generation facilities 50A and 50B which constitute the second-group electric power generation facilities 50 for mutual electric power supply configuration.

[0072]

In addition, as to the arrangement location of the second-group electric power generation facility 50, it is possible to select any one location or the combination of several locations of: the machinery room 5; the space on the upper deck 3a closer to the stern side than the production facility area Rp; the space on the upper deck 3f closer to the bow side than the production facility area Rp; the inside of the hull closer to the bow side than the production facility area Rp; the inside of the hull closer to the stern side than

the production facility area Rp; the inside of the superstructure 6; and the space at the upper side of the superstructure 6. Specifically, for example, the electric power generators for the offloading facility and the cargo oil pump are separated from those for the accommodation and the like. The former electric power generators are arranged on the upper deck 3a of the stern part 4, and the latter electric power generators are arranged in the machinery room 5.

[0073]

Furthermore, in a case of the separate arrangement, the facility 60 for the accommodation having an electric power generation capability of 1 MW to 2 MW, the offloading facility having an electric power generation capability of 1 MW to 2 MW, and the cargo oil pump having an electric power generation capability of 5 MW to 6 MW are appropriately combined so as to be separately arranged.

[0074]

In addition, as shown in FIGS. 4 and 5, a floating offshore facility 1B according to a second embodiment includes an electric propulsion system 20 on a side of the stern part 4 of the hull 2. The electric propulsion system 20 is arranged in the machinery room (when the propulsion device is provided, it is often referred to as "engine room") 5 in the safe area Rs, and a propeller (propulsion unit) 21 is attached to a rear end of a propeller shaft 21a protruding rearward the stern part 4. An electric motor (propulsion motor) 22 for rotating the propeller shaft 21a is arranged in the engine room 5. In

addition, a rudder 23 is arranged to the rear of the propeller 21, and a steering gear 24 for driving the rudder 23 is arranged above the rudder 23. Note that, in a case where the floating offshore facility 1B is temporarily self-propelled, the bridge 6b provided with a navigation equipment 25 is permanently or temporarily arranged at the upper part of the accommodation 6a of the superstructure 6, and is utilized for transportation.

[0075]

Namely, the floating offshore facility includes the propeller 21, the electric propulsion system 20 for driving the propeller 21 and the rudder 23, and the navigation equipment 25, and allows the second-group electric power generation facility 50 to supply electric power for operating the electric propulsion system 20 and the navigation equipment 25. In other words, the propeller 21 and the rudder 23 are provided outside the stern part 4, and the propulsion motor 22 and the steering gear 24 are provided in the machinery room 5 inside the stern part 4. The bridge 6b as a part of the superstructure 6 is provided, and is equipped with the navigation equipment 25. The second-group electric power generation facility 50 is utilized as the electric power source for the electric propulsion system 20 and the navigation device 25. In a case of the floating offshore facility 1B having an entire length of approximately 300 m, electric power ranging from approximately 10 to 30 MW is necessary for electric power supply to the electric propulsion system 20 including the inboard load.

[0076]

Note that, from an aspect of power consumption, it is preferable to set an electric power generation capacity of the second-group electric power generation facility 50 to 10 to 30 MW so as to be adapted to the electric propulsion system 20.

[0077]

Therefore, in a case where the floating offshore facility 1A according to the first embodiment, for example, has no transport means of its own, the floating offshore facility 1A has to be towed or transported by a heavy cargo transport ship to an operation site. Accordingly, when long-distance transportation is necessary, an initial transport cost becomes very high in a case or the like where, for example, the floating offshore facility 1A is constructed in Asia and is installed in Brazil. However, the above-configured floating offshore facility 1B according to the second embodiment can be self-propulsion, eliminating towing and transportation by the heavy cargo transport ship, and thus it is possible to reduce the initial transport cost.

[0078]

Furthermore, when the floating offshore facility 1B is transported, it is navigated in a state of being not necessarily equipped with the first-group electric power generation facility 40, and thus the electric propulsion system 20 driven by the above-described second-group electric power generation facility 50 allows navigation without waiting for the completion of the first-group electric power generation facility 40.

[0079]

In addition, the second-group electric power generation facility 50 for electric power supply to facilities except for the production facility is configured to supply electric power to both the offloading facility and the propulsion facility, and thus the second-group electric power generation facility 50 can be shared and commonly used by the offloading facility and the propulsion facility. Furthermore, since both of the facilities are never used simultaneously, the overall power plant can be made compact.

[0080]

In addition, when the propulsion facility is detachably constituted in the floating offshore facility 1B, in other words, when the propulsion facility, the navigation equipment 25 and the like are constituted to be temporarily installed only at the time of moving the floating offshore facility 1B in a case where the floating offshore facility 1B is temporarily self-propelled to the installation place, and to be removed after the transportation to the installation place or during operation at the installation place so that they are available for another floating offshore facility 1B, it is possible to reduce the entire facility expense.

[0081]

In addition, the propulsion facility may be removed at the time except for navigation so as to effectively utilize the resultant space. In the case of the same basic structure but the different transfer path to the installation place, the

floating offshore facility 1B is allowed to change type and size (capacity) of the propulsion facility in accordance with the navigating conditions. Furthermore, in case of necessity, it is possible to easily make repair and replacement upon failure of a part of the propulsion facility.

[0082]

In accordance with the ratio between transportaion and the operation of the floating offshore facility 1B, and easiness of detachment of the detachable structure, as to which the component, the propulsion facility or the navigation equipment 25 is made detachable may be determined. For example, the propeller 21 generally made of a special material and subjected to precision machining has the costly structure. Therefore, in many cases, it is detachably attached to the propeller shaft 21a so as to be removed when the transportaion is no longer required.

[0083]

If the floating offshore facility 1B includes the propulsion device for the position holding purpose upon operation, electric power for the propulsion facility for self-propulsion may be utilized for the position holding device. This ensures to efficiently use the electric power generation facility 50 of the second group.

[0084]

As FIG. 6 illustrates, a floating offshore facility 1C according to a third embodiment includes a temporary electric power generation facility 70 installed in the safe area Rs

except for the hazardous area Rd. That is, it is configured to include the temporary electric power generation facility 70 so as to change the overall generation capacity of the electric power generation facilities 40, 50, 70.

[0085]

Specifically, the temporary electric power generation facility 70 may be installed, for example, on the upper deck 3a of the stern part 4 (structure as shown in FIG. 6), the space on the upper deck 3f of the bow part 8, and the inside of the hull at the bow part 8. Also, the temporary electric power generation facility 70 may be installed before departure of the floating offshore facility 1C, or added after the departure.

[0086]

Accordingly, in a case of temporary increase in the required electric power generation capacity, and in emergencies such as unexpected failure of the electric power generator, the floating offshore facility becomes capable of temporarily supplementing the electric power generation capacity for handling, so that it becomes possible to respond to these cases. For example, it becomes possible to flexibly cope with the operation that temporarily requires electric power, such as navigation to the operation site. In addition, it is also possible to cope with the operation, in a case of being required to enhance electric power generation capacity of the first-group electric power generation facility 40 for the purpose of increasing production output, in a case of having increased electric power required for the second-group electric

power generation facility 50 owing to expanded accommodation 6a, or the like.

[0087]

More specifically, the electric power generation capacity of the temporary electric power generation facility 70 is constituted to be 5 MW to 25 MW. Accordingly, the temporary electric power generation facility 70 makes it possible to supply sufficient auxiliary electric power.

[0088]

The temporary electric power generation facility 70 includes a connection point switching mechanism 82 for electrically connecting any one of or both of the first-group electric power generation facility 40 and the second-group electric power generation facility 50. The connection point switching mechanism 82 is configured to switch between: electric power supply to any one of or both of the first-group electric power generation facility 40 and the second-group electric power generation facility 50 by parallel operation of the first-group electric power generation facility 40, the second-group electric power generation facility 50 and the temporary electric power generation facility 70; and electric power supply (feedback electric power supply) by operation of the temporary electric power generation facility 70 so as to take over electric power supply of all or a part of the first-group electric power generation facility 40 and the second-group electric power generation facility 50.

[0089]

In other words, as emergency countermeasures, when the temporary electric power generation facility 70 arranged in the safe area Rs except for the production facility area Rp is constituted to be able to perform parallel operation of the first-group and the second-group electric power generation facilities 40 and 50 and to be able to perform feedback electric power supply, the following effects can be obtained.

[0090]

Namely, in a case of trouble of the first-group or the second-group electric power generation facility 40 or 50, in emergencies such as failure and accident in the production facility 30, and even in a case where an unscheduled electric power supply amount is required during maintenance and/or inspection operation for a part of these electric power generation facilities 40,50, then it is possible to supplement electric power by the temporary electric power generation facility 70 and to secure a sufficient electric power supply system. That is, installation of the temporary electric power generation facility 70 allows substantial change in the electric power generation capacity of the first-group electric power generation facility 40 and/or the second-group electric power generation facility 50, thereby being able to further reduce the risk.

[0091]

Accordingly, even in the case of failure in a part of the electric power generation facility 40 (or 50) of any one of the groups, the electric power supply is constituted to be capable

of being supplemented by the temporary electric power generation facility 70, thereby making it possible to flexibly cope with emergencies. Especially, in a case where the floating offshore facility 1C is self-propelled by increasing electric power, large-capacity electric power is temporarily required in some cases, thereby making it possible to flexibly cope with such circumstances even at that time.

[0092]

In addition, the configuration can also be such that the first-group electric power generation facility 40 is not electrically connected to the second-group the electric power generation facility 50 constantly, but is wired in the respective facilities so as to directly supply electric power, in emergencies. In this case, a plurality of relatively small electric power generators each as the temporary electric power generation facility 70 can be prepared, and be installed near the electric power generation facilities 40 and 50 required as necessary. In this case, because of easy wiring and detachment, it is possible to cope with emergencies rapidly.

[0093]

The large-scaled electric power generation facilities 40 and 50 for the floating offshore facilities 1A to 1C according to the first to the third embodiments are separated in accordance with usage into the first-group electric power generation facility 40 for electric power supply to the production facility 30, and the second-group electric power generation facility 50 for electric power supply to the facility

other than the production facility. Furthermore, the electric power generation facilities are dispersedly arranged in the production facility area Rp on the upper deck 3, and the safe area Rs except for the production facility area Rp, respectively so as to be able to reduce the space for the electric power generation facility in the production facility area Rp on the upper deck 3. This makes it possible to increase the space for the production facility as the offshore facility, and to disperse risk caused by trouble in the electric power system of the electric power generation facilities 40 and 50.

[0094]

Namely, even in a case of a trouble of the first-group electric power generation facility 40 as the electric power supply system to the production facility 30, it becomes possible for the second-group electric power generation facility 50 to continuously supply electric power to the facilities and instruments except for the production facility, for example, the offloading facility and the facility 60 for the accommodation. Additionally, in a case where the propeller 21 and the propulsion motor 22 for driving the propeller 21 are provided as in the floating offshore facility 1B, the second-group electric power generation facility 50 can also be used as the electric power generator for the propulsion motor 22, and thus it is possible to reduce the facility expense for self-propulsion by using the propulsion motor 22.

[0095]

Next, an electric power supply method for floating

offshore facility according to an embodiment of the present invention will be described. The electric power supply method for floating offshore facility is the method for the floating offshore facility used in a state of being positioned on the ocean in which a production facility 30 and facilities except for the production facility, to both of which electric power is supplied from the electric power generation facilities 40 and 50, respectively. With the method, in the electric power generation facilities 40 and 50, the first-group electric power generation facility 40 arranged in the production facility area Rp on the upper deck 3 supplies electric power to the production facility 30, and the second-group electric power generation facility 50 arranged in the safe area Rs except for the production facility area Rp supplies electric power to facilities except for the production facility.

[0096]

According to the electric power supply method for floating offshore facility according to the embodiment, the large-scaled electric power generation facilities 40 and 50 for the floating offshore facilities 1A to 1C are dispersedly arranged in accordance with usage for supplying electric power correspondingly. As a result, electric power generation capacity of the electric power generation facility 40 in the production facility area Rp on the upper deck 3 is made small so as to be able to reduce the space for the electric power generation facility 40. This makes it possible to increase the space for the production facility, and to disperse risk caused

by trouble in the electric power system of the electric power generation facilities 40 and 50.

INDUSTRIAL APPLICABILITY

[0097]

According to the floating offshore facility, and the electric power supply method for floating offshore facility of the present invention, the large-scaled electric power generation facility for the floating offshore facility is separated in accordance with usage so that the separated electric power generation facilities are dispersedly arranged in the production facility area on the upper deck and in the safe area except for the production facility area, respectively, and thus the space for the electric power generation facility in the production facility area on the upper deck can be reduced, and the space for the production facility as the offshore facility can be increased. Furthermore, since risk caused by trouble in the electric power system in the electric power generation facility can be dispersed, the present invention is applicable to the floating offshore facility such as: the floating production storage and offloading system (FPSO), the floating storage and offloading system (FSO), the floating storage unit (FSU), the floating production storage and offloading system (LNG-FPSO) dealing with LNG, the FLPG (LPG-FPSO) dealing with LPG, and the floating storage and re-gasification unit (FSRU); and the electric power supply method for floating offshore facility.

EXPLANATION OF REFERENCE NUMERALS

[0098]

1A - 1C	floating offshore facility
2	hull
3	upper deck
3a	upper deck of stern part
3f	upper deck of bow part
4	stern part
5	machinery room (engine room)
6	superstructure
6a	accommodation
6b	bridge
7	cargo tank
8	bow part
20	electric propulsion system (propulsion facility: facility except for production facility)
21	propeller (propulsion unit)
21a	propeller shaft
22	electric motor (propulsion motor)
23	rudder
24	steering gear
25	navigation equipment
30	production facility
40	first-group electric power generation facility
41a, 41b, 41c, 41d	electric power generator
50, 50A, 50B	second-group electric power

generation facility

51a, 51b electric power generator

60 facility for accomodation

70 temporary electric power generation

81 connection point changing mechanism

82 connection point switching mechanism

Rp production facility area

Rd hazardous area

Rs safe area

CLAIMS

1. A floating offshore facility comprising a production facility and facilities except for the production facility, to both of which electric power is supplied from an electric power generation facility, and that is used in a state of being positioned on the ocean, wherein

the electric power generation facility includes:

a first-group electric power generation facility that supplies electric power to the production facility, and that is arranged in a production facility area on an upper deck; and

a second-group electric power generation facility that supplies electric power to facilities except for the production facility, and that is arranged in a safe area except for the production facility area.

2. The floating offshore facility according to claim 1, comprising a connection point changing mechanism for electrically connecting the first-group electric power generation facility and the second-group electric power generation facility, wherein

the connection point changing mechanism is configured to switch between electric power interchange by parallel operation of the first-group electric power generation facility and the second-group electric power generation facility, and electric power supply by operation of any one of the electric power generation facilities while taking over all or a part of the

electric power supply by the other electric power generation facility.

3. The floating offshore facility according to claim 1 or 2, wherein

an electric power generation capacity of the second-group electric power generation facility is constituted to be in a range from 5 MW to 30 MW.

4. The floating offshore facility according to any one of claims 1 to 3, wherein

the second-group electric power generation facility includes a plurality of electric power generation facilities separately arranged at two or more positions.

5. The floating offshore facility according to any of claims 1 to 4, comprising a propulsion unit, a propulsion facility for driving the propulsion unit, and a navigation equipment, wherein

electric power for operating the propulsion facility and the navigation equipment is supplied from the second-group electric power generation facility.

6. The floating offshore facility according to any of claims 1 to 5, comprising a temporary electric power generation facility arranged in the safe area except a hazardous area.

7. The floating offshore facility according to any of claims 1 to 6, wherein the floating offshore facility is formed as any one of a floating production storage and offloading system, a floating storage and offloading system, a floating storage unit, a floating production storage and offloading system dealing with LNG, an FLPG dealing with LPG, and a floating storage and re-gasification unit.

8. An electric power supply method for floating offshore facility, that includes a production facility and facilities except for the production facility, to both of which electric power is supplied from electric power generation facilities, and that is used in a state of being positioned on the ocean, wherein

the electric power generation facility supplies electric power to the production facility, and the first-group electric power generation facility arranged in a production facility area on an upper deck supplies electric power to the production facility,

and the second-group electric power generation facility arranged in a safe area except for the production facility area supplies electric power to facilities except for the production facility.