in an attempt to provide an air-conditioning management device and the like each of which can appropriately level off power consumption.

[MEANS FOR SOLVING THE PROBLEM]

[0008a]

According to a first aspect of the present invention, there is provided an air-conditioning management device, comprising: a weather forecast acquisition unit that is configured to acquire a weather forecast containing a forecast temperature and a forecast humidity; a heat load estimation unit that is configured to estimate a heat load inside a facility which is air-conditioned by an air conditioner, the air conditioner including a refrigerator and a cooling tower which stores therein cold heat generated by the refrigerator, based on the weather forecast acquired by the weather forecast acquisition unit; an energy consumption estimation unit that is configured to estimate an energy consumption of the air conditioner in a case where the refrigerator supplies the facility with cold heat, based on the heat load estimated by the heat load estimation unit; a power consumption estimation unit that is configured to estimate a power consumption of a loading device which includes the air conditioner, based on the energy consumption estimated by the energy consumption estimation unit; a schedule setting unit that is configured to set an operation schedule of the air conditioner, based on the power consumption estimated by the power consumption estimation unit; an actual measured value acquisition unit that is configured to acquire actual measured values including a temperature and a humidity near the facility; a heat load calculation unit that is configured to calculate a heat load inside the facility, based on the actual measured values acquired by the actual measured value acquisition unit; an energy consumption calculation unit that is configured to calculate an energy consumption of the air conditioner in the case where the refrigerator supplies the facility with cold heat, based on the heat load calculated by the heat load calculation unit; a power consumption calculation unit that is configured to calculate a power consumption of the loading device, based on the energy consumption calculated by the energy consumption calculation unit; an instruction signal generation unit that is configured to generate an instruction signal on whether or not a heat release operation is to be performed, the heat release operation being an operation of supplying the inside of the facility with the cold heat stored in the cooling tower; and an instruction signal transmission unit that is configured to transmit the instruction signal generated by the instruction signal generation unit, to a management terminal of the air conditioner, wherein the instruction signal generation unit generates an instruction signal indicating that a start time of the heat release operation is to be advanced, if, before a scheduled

start time of the heat release operation in the operation schedule, the power consumption calculated by the power consumption calculation unit becomes larger than a prescribed threshold value, the prescribed threshold value being a reference value for determining whether or not the heat release operation is to be performed, and generates an instruction signal indicating that the start time of the heat release operation is to be delayed, if, after the scheduled start time of the heat release operation in the operation schedule, the power consumption calculated by the power consumption calculation unit becomes equal to or smaller than the prescribed threshold value.

[0008b]

According to a second aspect of the present invention, there is provided an air-conditioning management device, comprising: a weather forecast acquisition unit that is configured to acquire a weather forecast containing a forecast temperature and a forecast humidity; a heat load estimation unit that is configured to estimate a heat load inside a facility which is air-conditioned by an air conditioner, the air conditioner including a refrigerator and a cooling tower which stores therein cold heat generated by the refrigerator, based on the weather forecast acquired by the weather forecast acquisition unit; an energy consumption estimation unit that is configured to estimate an energy consumption of the air conditioner in a case where the refrigerator supplies the facility with cold heat, based on the heat load estimated by the heat load estimation unit; a power consumption estimation unit that is configured to estimate a power consumption of a loading device which includes the air conditioner, based on the energy consumption estimated by the energy consumption estimation unit; a schedule setting unit that is configured to set an operation schedule of the air conditioner, based on the power consumption estimated by the power consumption estimation unit; a power consumption acquisition unit that is configured to acquire an actual measured value of a power consumption of the loading device; an instruction signal generation unit that is configured to generate an instruction signal on whether or not a heat release operation is to be performed, the heat release operation being an operation of supplying an inside of the facility with the cold heat stored in the cooling tower; and an instruction signal transmission unit that is configured to transmit the instruction signal generated by the instruction signal generation unit, to a management terminal of the air conditioner; wherein the instruction signal generation unit generates an instruction signal indicating that a start time of the heat release operation is to be advanced, if, before a scheduled start time of the heat release operation in the operation schedule, the power consumption calculated by the power consumption calculation unit

becomes larger than a prescribed threshold value, the prescribed threshold value being a reference value for determining whether or not the heat release operation is to be performed, and generates an instruction signal indicating that the start time of the heat release operation is to be delayed, if, after the scheduled start time of the heat release operation in the operation schedule, the power consumption calculated by the power consumption calculation unit becomes equal to or smaller than the prescribed threshold value.

[0008c]

According to a third aspect of the present invention, there is provided an air-conditioning management method, comprising: a weather forecast acquisition step of acquiring a weather forecast containing a forecast temperature and a forecast humidity; a heat load estimation step of estimating a heat load inside a facility which is air-conditioned by an air conditioner, the air conditioner including a refrigerator and a cooling tower which stores therein cold heat generated by the refrigerator, based on the weather forecast acquired in the weather forecast acquisition step; an energy consumption estimation step of estimating an energy consumption of the air conditioner in a case where the refrigerator supplies the facility with cold heat, based on the heat load estimated in the heat load estimation step; a power consumption estimation step of estimating a power consumption of a loading device which includes the air conditioner, based on the energy consumption estimated in the energy consumption estimation step; a schedule setting step of setting an operation schedule of the air conditioner, based on the power consumption estimated in the power consumption estimation step; an actual measured value acquisition step of acquiring actual measured values including a temperature and a humidity near the facility; a heat load calculation step of calculating a heat load inside the facility, based on the actual measured values acquired in the actual measured value acquisition step; an energy consumption calculation step of calculating an energy consumption of the air conditioner in the case where the refrigerator supplies the facility with cold heat, based on the heat load calculated in the heat load calculation step; a power consumption calculation step of calculating a power consumption of the loading device, based on the energy consumption calculated in the energy consumption calculation step; an instruction signal generation step of generating an instruction signal on whether or not a heat release operation is to be performed, the heat release operation being an operation of supplying the inside of the facility with the cold heat stored in the cooling tower; and an instruction signal transmission step of transmitting the instruction signal generated in the instruction signal generation step, to a management terminal of the

air conditioner, wherein, in the instruction signal generation step, an instruction signal is generated indicating that a start time of the heat release operation is to be advanced, if, before a scheduled start time of the heat release operation in the operation schedule, the power consumption calculated in the power consumption calculation step becomes larger than a prescribed threshold value, the prescribed threshold value being a reference value for determining whether or not the heat release operation is to be performed, and an instruction signal is generated indicating that the start time of the heat release operation is to be delayed, if, after the scheduled start time of the heat release operation in the operation schedule, the power consumption calculated in the power consumption calculation step becomes equal to or smaller than the prescribed threshold value.

[0008d]

According to a fourth aspect of the present invention, there is provided an air-conditioning management method, comprising: a weather forecast acquisition step of acquiring a weather forecast containing a forecast temperature and a forecast humidity; a heat load estimation step of estimating a heat load inside a facility which is air-conditioned by an air conditioner, the air conditioner including a refrigerator and a cooling tower which stores therein cold heat generated by the refrigerator, based on the weather forecast acquired in the weather forecast acquisition step; an energy consumption estimation step of estimating an energy consumption of the air conditioner in a case where the refrigerator supplies the facility with cold heat, based on the heat load estimated by the heat load estimation unit; a power consumption estimation step of estimating a power consumption of a loading device which includes the air conditioner, based on the energy consumption estimated in the energy consumption estimation step; a schedule setting step of setting an operation schedule of the air conditioner, based on the power consumption estimated in the power consumption estimation step; a power consumption acquisition step of acquiring an actual measured value of a power consumption of the loading device; an instruction signal generation step of generating an instruction signal on whether or not a heat release operation is to be performed, the heat release operation being an operation of supplying an inside of the facility with the cold heat stored in the cooling tower; and an instruction signal transmission step of transmitting the instruction signal generated in the instruction signal generation step, to a management terminal of the air conditioner, wherein, in the instruction signal generation step, an instruction signal is generated indicating that a start time of the heat release operation is to be advanced, if, before a scheduled start time of the heat release operation in the operation schedule, the

power consumption calculated in the power consumption calculation step becomes larger than a prescribed threshold value, the prescribed threshold value being a reference value for determining whether or not the heat release operation is to be performed, and an instruction signal is generated indicating that the start time of the heat release operation is to be delayed, if, after the scheduled start time of the heat release operation in the operation schedule, the power consumption calculated in the power consumption calculation step becomes equal to or smaller than the prescribed threshold value.

[0009]

In order to solve the problem described above, an air-conditioning management device of the present invention: generates an instruction signal indicating that a start time of the heat release operation is to be advanced, if, before a scheduled start time of the heat release operation in the operation schedule, the power consumption calculated by the power consumption calculation unit becomes larger than a prescribed threshold value, the prescribed threshold value being a reference value for determining whether or not the heat release operation is to be performed; and generates an instruction signal indicating that the start time of the heat release operation is to be delayed, if, after the scheduled start time of the heat release operation in the operation schedule, the power consumption calculated by the power consumption calculation unit becomes equal to or smaller than the prescribed threshold value.

Details are described in embodiments for carrying out the invention.

[ADVANTAGEOUS EFFECTS OF THE INVENTION]

[0010]

The present invention can provide an air-conditioning management device and the like each of which appropriately levels off power consumption.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0011]

[FIG. 1] A diagram illustrating a structure of an air-conditioning system including an air-conditioning management server according to a first embodiment of the present invention.

[FIG. 2] A diagram illustrating a configuration of the air-conditioning