allowed to confirm a power use state or operate each device by using the information terminal device 1C. The electric devices 1A to 1C connected to the centralized controller 2 are not limited to the above types, and devices such as a water heater, a lighting device, and a television may be connected thereto.

[0011]

In particular, the power management system 100 cooperates with an electric vehicle EV and a solar power generation panel PV, and power generated in the solar power generation panel PV is supplied to the plurality of electric devices 1A to 1C and is stored in a storage battery of the electric vehicle EV. In addition, at the time of a blackout due to a disaster or the like or at the time of a social request of power saving, the power stored in the storage battery of the electric vehicle EV is supplied to the plurality of electric devices 1A to 1C. In this case, the centralized controller 2 has a function of adjusting a power load in a household based on power generation/charge states of the solar power generation panel PV and the electric vehicle EV.

[0012]

Fig. 2 is a schematic front view showing Embodiment 1 of the refrigerator of the present invention, Fig. 3 is a schematic cross-sectional view of Embodiment 1 of the refrigerator of the present invention, and the refrigerator 1A will be described with reference to Figs. 2 and 3. The refrigerator 1A includes a refrigerating compartment 11 provided at the uppermost stage, and a plurality of storage compartments 12 to 15 provided below the refrigerating compartment 11. A door 21 is disposed at the front of the refrigerating compartment 11, and doors 22 to 25 are disposed at the front of the respective storage compartments 12 to 15. An operation panel 31, which is operated by the user, is provided at the door 21 of the refrigerating compartment 11, and the user is allowed to adjust set temperatures for the refrigerating compartment 11 and the storage compartments

12 to 15 or instruct rapid cooling or the like by operating the operation panel 31. In addition, each of the refrigerating compartment 11 and the storage compartments 12 to 15 is provided with a door switch (not shown), which detects opening/closing of the door. If opening of the door 21 at the refrigerating compartment 11 is detected, a refrigerator interior lighting device 32 in the refrigerating compartment 11 is lit up.

[0013]

The refrigerator 1A has a refrigeration cycle for cooling and circulating air and includes a compressor 33, a cooler 34, and an air-sending fan 35. The compressor 33 compresses refrigerant to be sent to the cooler 34, and the cooler 34 exchanges heat between the refrigerant compressed by the compressor 33 and air to cool air in the refrigerator. The air-sending fan 35 circulates the air cooled by the cooler 34 from an air passage to the refrigerating compartment 11 and the storage compartments 12 to 14. A damper (not shown) that is able to open and close is provided in the air passage, and is opened or closed based on a temperature detected by an indoor temperature sensor (not shown) provided at each compartment to adjust the temperature in each compartment. In addition, a heater 36 for melting frost on the cooler 34 is mounted at a lower portion of the cooler 34, and a cover is provided between the cooler 34 and the heater 36 to prevent melted water from directly pouring on the heater 36.

[0014]

The refrigerator 1A further includes a controller 40, which is provided at the back side thereof and controls operation of the refrigerator 1A, and information transmission means 50 for the controller 40 to transmit data to and receive data from the outside. The controller 40 is composed of a micro controller such as a DSP, and each actuator and each sensor in the refrigerator 1A are connected thereto. The controller 40 controls various operations of the refrigerator 1A such

Fig. 6 is a table indicating a ratio of a power consumption reduction effect and a burden on the user in each of the power reduction controls A to H, and Fig. 7 is a schematic diagram showing an example of the data structure of the control setting table 42. As shown in Figs. 6 and 7, in the control setting table 42, the power reduction controls A to H that reduce power use of the refrigerator 1A are set, and priority patterns each of which specifies an order in which the power reduction controls A to H are performed are stored to be associated with the power supply difficulty SD. Hereinafter, the contents of the respective power reduction controls A to H will be individually described.

[0021]

The power reduction control A (eco mode): eco mode is a power reduction control in which the use state of the refrigerator is determined based on an opening/closing sensor for each door and each temperature sensor, and if the frequency of use is low, the set temperature for each storage compartment is increased slightly (by about 2 K) to suppress wasted cooling to reduce the power consumption. The power reduction control A is a control in which the temperatures in the storage compartments 12 to 15 are increased, but the temperatures are increased based on the use state of the refrigerator at timing of a low frequency of use within a range where there is no influence on food storage, and thus there is almost no burden on the user.

[0022]

The power reduction control B (ice-making stop): ice-making stop is a power reduction control in which a function of automatically making ice is stopped to reduce cold air (capacity) required for making ice. The power reduction control B is a control in which it is impossible to automatically make ice, and a burden is put on the user who desires to use ice, but in a situation such as in winter where ice is not used, there is almost no burden on the user.

greater the power consumption is. When the frequency of use is high or the food load is high and when the rotation speed is not increased, the cooling capacity decreases, but it is possible to prevent an increase in the power consumption. The upper limit of the rotation speed may be changed depending on the power supply difficulty. For example, when the power supply difficulty is low, the eighth level of the ten levels of the rotation speed may be the upper limit, and when the power supply difficulty is high, the sixth level of the ten levels may be the upper limit.

[0029]

The power reduction controls F and G are controls in which the cooling capacity is decreased. Even if the storage compartment is desired to be cooled, it may be impossible to cool the storage compartment to a target set temperature due to insufficient cooling capacity. Thus, a large burden is put on the user, for example, the storage life of food is shortened, and, in the worst case, frozen food is melted.

[0030]

The power reduction control H (storage compartment temperature control): storage compartment temperature shift-up is a power reduction control in which a set temperature for each of the storage compartments 12 to 15 is made higher than a normally set temperature. Since the power reduction control H is a control in which the set temperature for each of the storage compartments 12 to 15 is made higher than the normally set temperature, the power reduction control H is a control in which the burden on the user is very great, for example, the storage life of food is shortened and frozen food is melted. Normally, operation is performed at a set temperature corresponding to food stored in each compartment, such as a freezing compartment: about -18 degrees C and the refrigerating compartment: about 3 degrees C. By increasing the set

temperature, the required cooling capacity is reduced, and thus it is possible to reduce the power consumption. The amount by which the set temperature is increased may be variable depending on the power supply difficulty SD. The set temperature may be changed, for example, when the power supply difficulty SD is low, the freezing compartment may be set at about -15 degrees C, and when the power supply difficulty SD is high, the freezing compartment may be set at about -12 degrees C. In addition, if the power supply is really tight, normally, the temperature in each of the storage compartments 12 and 13 (such as an ice making compartment and the freezing compartment) in which food is stored in a frozen state may be in a refrigerating temperature range (0 degrees C or higher), or a state where it is possible to store food without decaying the food, although the food cannot be stored in a frozen state, may be enabled to continue for a long period of time. Moreover, the storage compartment for which the temperature shift-up is performed may be changed depending on the power supply difficulty SD, for example, when the power supply is low, the temperature shift-up may be performed only for the refrigerating compartment 11, and when the power supply difficulty SD is high, the temperature shift-up may be performed for all the storage compartments 12 to 15.

[0031]

As described above, of the power reduction controls A to H, for the control in which the power consumption reduction effect is smaller, the burden on the user is lower, and for the control in which the power consumption reduction effect is greater, the burden on the user is higher. In the control setting table 42, the priorities are set such that when the power supply difficulty SD is low, the degree of reducing the power consumption is reduced to decrease the burden on the user. On the other hand, the priorities are set such that when the power supply difficulty SD is high, the burden on the user increases but the power consumption

Specifically, the reduction control setting means 141 sets an executable control of the plurality of power reduction controls A to H by using the power supply difficulty SD and the control setting table 142, and the device controller 43 executes the power reduction control set by the reduction control setting means 41. Here, Fig. 11 is a schematic diagram showing an example of the control setting table 142 in Fig. 10. In the control setting table 142 in Fig. 11, the contents of executable controls of the plurality of power reduction controls A to H are set for each power supply difficulty SD. In the control setting table 142, setting is made such that the number of executable controls of the power reduction controls A to H increases as the power supply difficulty SD increases.

[0042]

Fig. 12 is a flowchart showing an operation example of the refrigerator 1A in Fig. 10, and the operation example of the refrigerator 1A will be described with reference to Figs. 10 to 12. If the power supply difficulty SD is less than "1" (step ST1), it is determined that it is during normal use, and the executable power reduction controls are set as the "power reduction controls A and B" (step ST11). In addition, if the power supply difficulty SD is equal to or higher than "1" and less than "3" (step ST2), the executable power reduction controls are set as the "power reduction controls A, B, C, and D" (step ST12). If the power supply difficulty SD is equal to or higher than "3" and less than "5" (step ST3), the executable power reduction controls are set as the "power reduction controls A, B, C, D, E, and F" (step ST13). If the power supply difficulty SD is equal to or higher than "5", all the power reduction controls A to H are set as being executable (step ST14).

[0043]

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Specifically, the reduction control setting means 141 sets an executable control of the plurality of power reduction controls A to H by using the power supply difficulty SD and the control setting table 142, and the device controller 43 executes the power reduction control set by the reduction control setting means 141. Here, Fig. 11 is a schematic diagram showing an example of the control setting table 142 in Fig. 10. In the control setting table 142 in Fig. 11, the contents of executable controls of the plurality of power reduction controls A to H are set for each power supply difficulty SD. In the control setting table 142, setting is made such that the number of executable controls of the power reduction controls A to H increases as the power supply difficulty SD increases.

[0042]

Fig. 12 is a flowchart showing an operation example of the refrigerator 1A in Fig. 10, and the operation example of the refrigerator 1A will be described with reference to Figs. 10 to 12. If the power supply difficulty SD is less than "1" (step ST1), it is determined that it is during normal use, and the executable power reduction controls are set as the "power reduction controls A and B" (step ST11). In addition, if the power supply difficulty SD is equal to or higher than "1" and less than "3" (step ST2), the executable power reduction controls are set as the "power reduction controls A, B, C, and D" (step ST12). If the power supply difficulty SD is equal to or higher than "3" and less than "5" (step ST3), the executable power reduction controls are set as the "power reduction controls A, B, C, D, E, and F" (step ST13). If the power supply difficulty SD is equal to or higher than "5", all the power reduction controls A to H are set as being executable (step ST14).

[0043]

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