US 20240067033A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2024/0067033 A1**

ISHIUJI et al. (43) **Pub. Date: Feb. 29, 2024**

(54) **MANAGEMENT SERVER, MANAGEMENT METHOD, AND NON-TRANSITORY STORAGE MEDIUM**

(71) Applicant: **NEC Corporation**, Tokyo (JP)

(72) Inventors: **Hideyuki ISHIUJI**, Tokyo (JP); **Hiromi SUZUKI**, Tokyo (JP); **Yutaka OKANO**, Tokyo (JP); **Sayaka ISHIMOTO**, Tokyo (JP); **Shoko YOKOTE**, Tokyo (JP); **Satoshi TANAKA**, Tokyo (JP); **Koji KITAHARA**, Tokyo (JP); **Megumi YAMAMOTO**, Tokyo (JP); **Chieko KURIBAYASHI**, Tokyo (JP); **Tomohide TOYODA**, Tokyo (JP)

(73) Assignee: **NEC Corporation**, Tokyo (JP)

(21) Appl. No.: **18/237,443**

(22) Filed: **Aug. 24, 2023**

(30) **Foreign Application Priority Data**

Aug. 29, 2022 (JP) 2022-135639

Publication Classification

(51) **Int. Cl.**
B60L 53/66 (2006.01)
B60L 53/63 (2006.01)

(52) **U.S. Cl.**
CPC ***B60L 53/665*** (2019.02); ***B60L 53/63*** (2019.02); *B60L 2250/00* (2013.01)

(57) **ABSTRACT**

In order to achieve a charging service using an outlet of 100 V or 200V, the present invention provides a management server **10** including an acquisition unit **11** that acquires, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet, and a control execution unit **12** that executes processing of controlling the control apparatus specified by the apparatus specifying information.

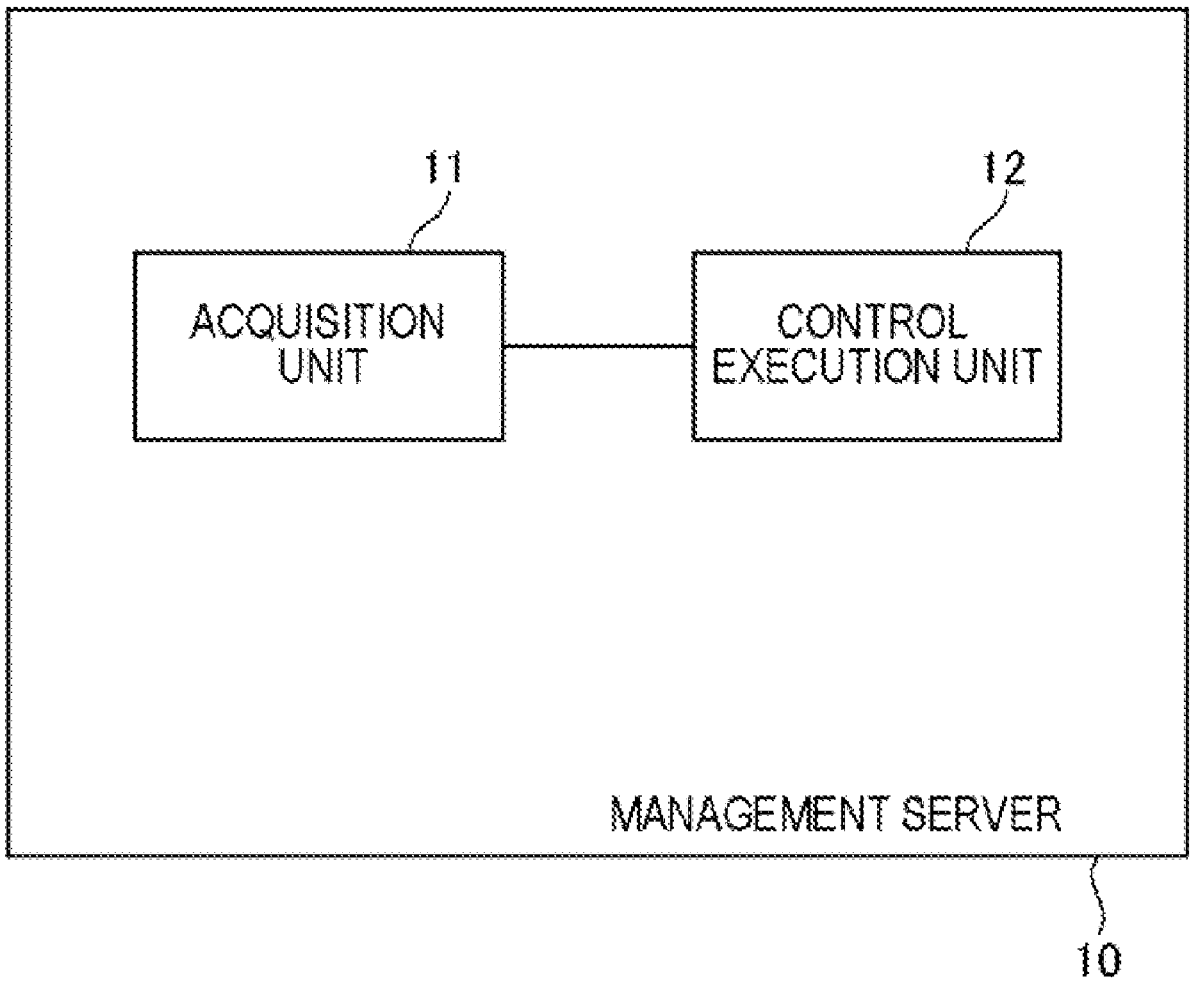


FIG. 1

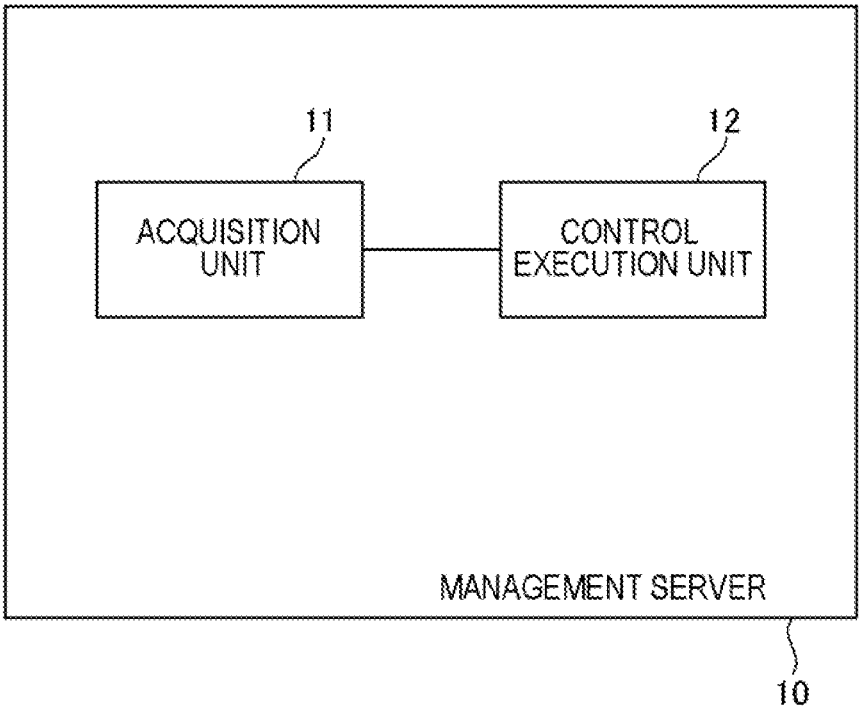
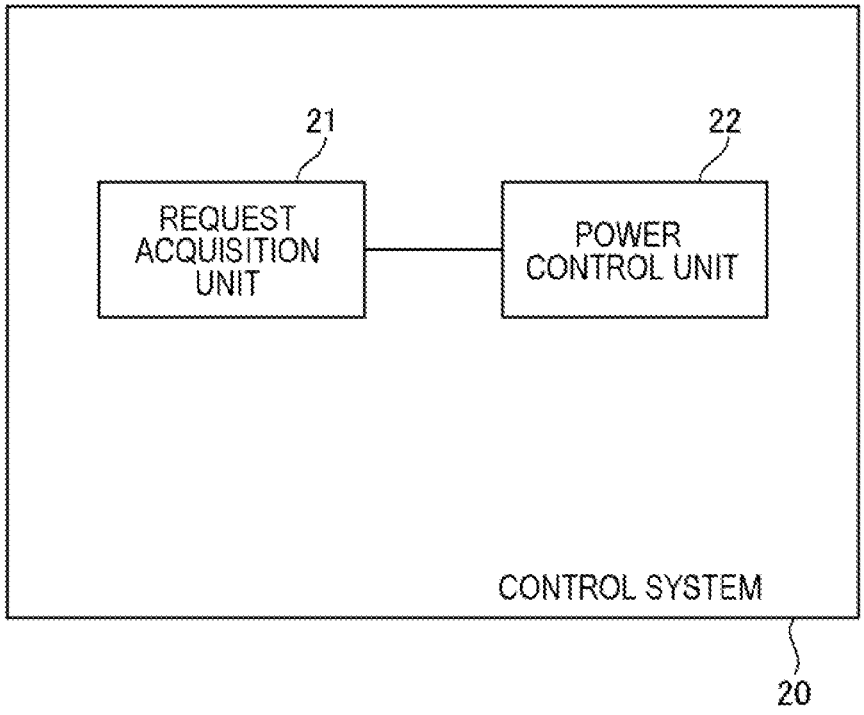

11
12
ACQUISITION UNIT
CONTROL EXECUTION UNIT
MANAGEMENT SERVER
10

FIG. 2


21
22
REQUEST ACQUISITION UNIT
POWER CONTROL UNIT
CONTROL SYSTEM
20

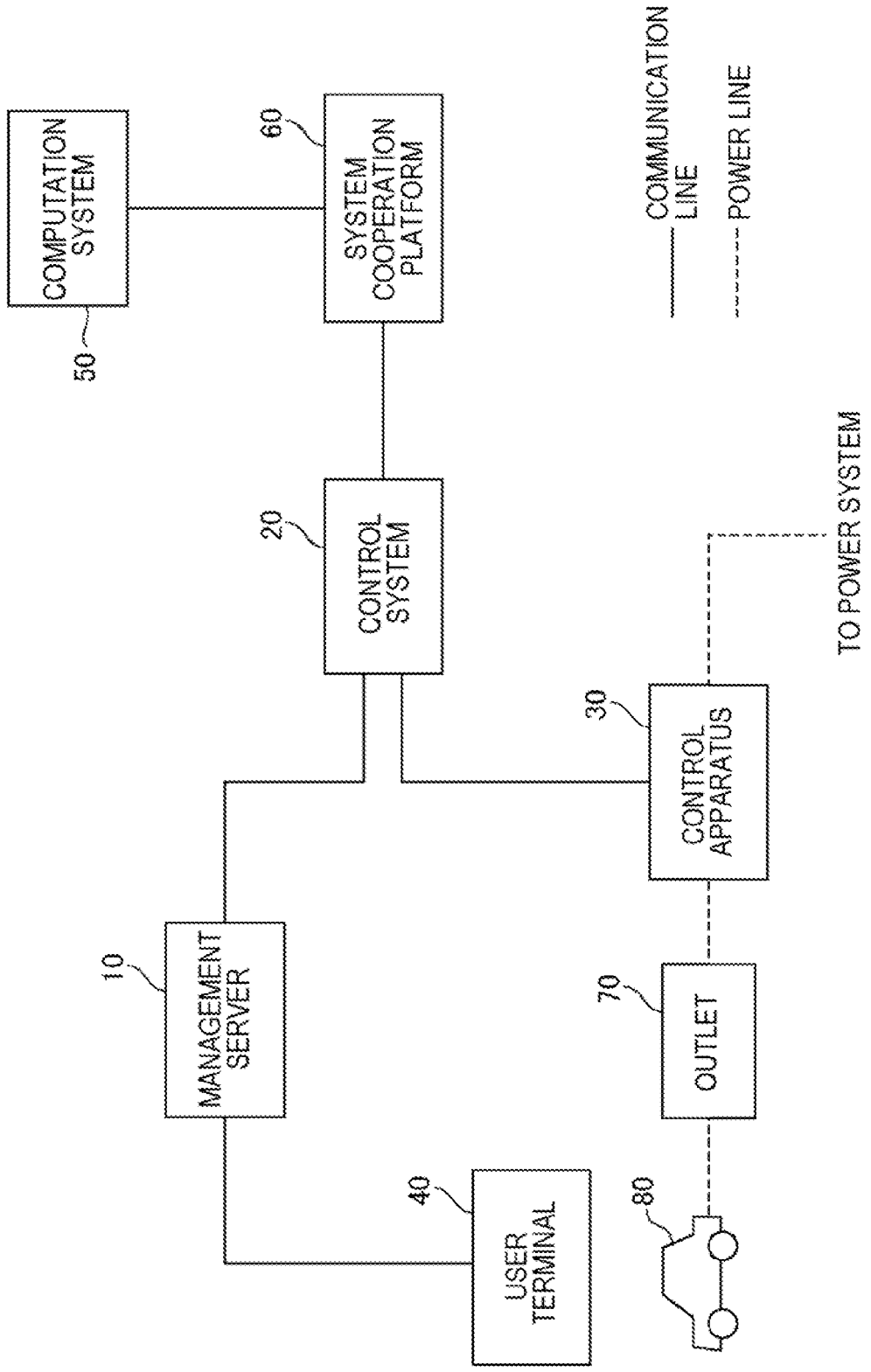

COMPUTATION SYSTEM
50
SYSTEM COOPERATION PLATFORM
60
COMMUNICATION LINE
POWER LINE
CONTROL SYSTEM
20
TO POWER SYSTEM
CONTROL APPARATUS
30
MANAGEMENT SERVER
10
OUTLET
70
USER TERMINAL
40
80

FIG. 3

FIG. 4

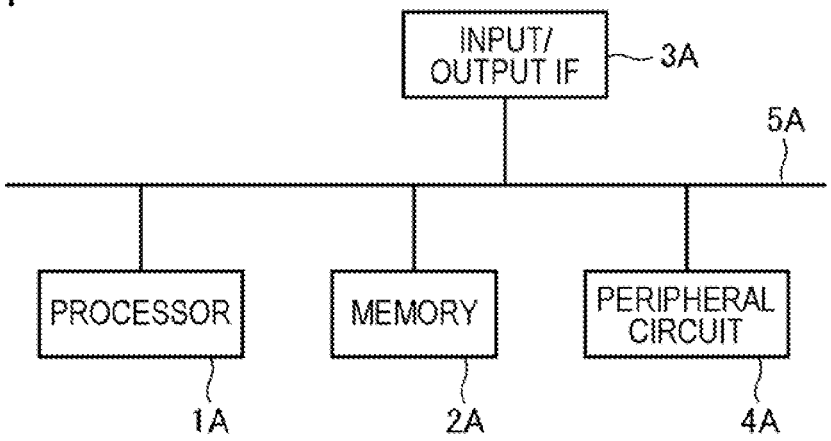

INPUT/
OUTPUT IF
3A
5A
PROCESSOR
MEMORY
PERIPHERAL
CIRCUIT
1A
2A
4A

FIG. 5

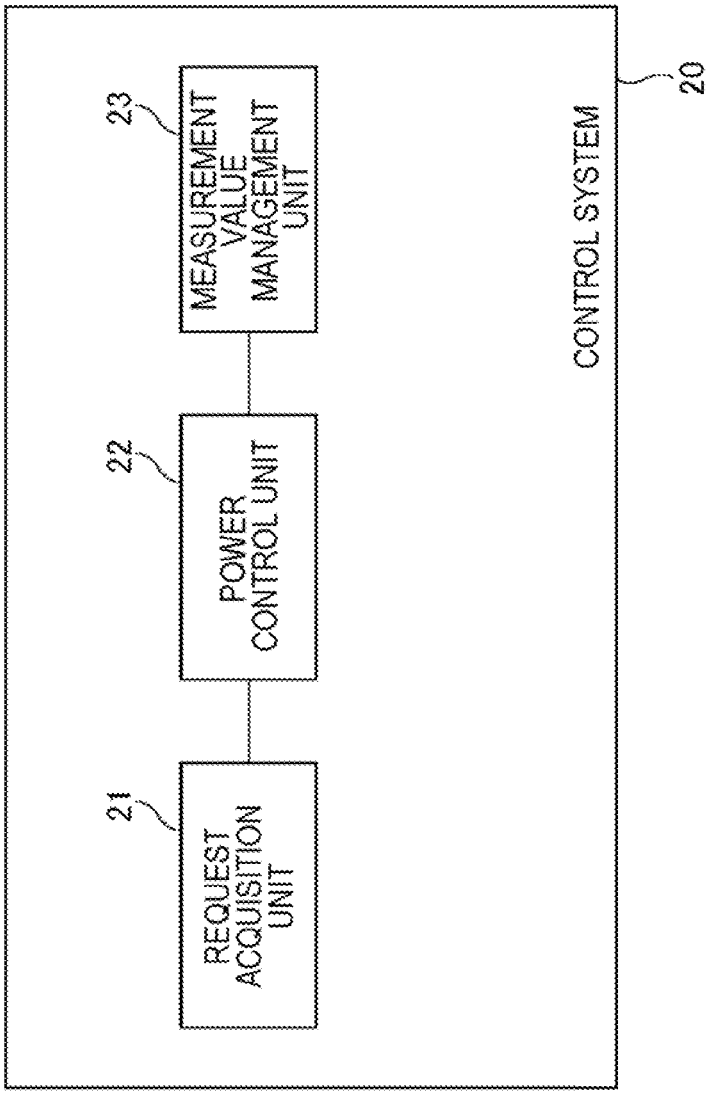

CONTROL SYSTEM
20
REQUEST ACQUISITION UNIT
21
POWER CONTROL UNIT
22
MEASUREMENT VALUE MANAGEMENT UNIT
23

FIG. 6

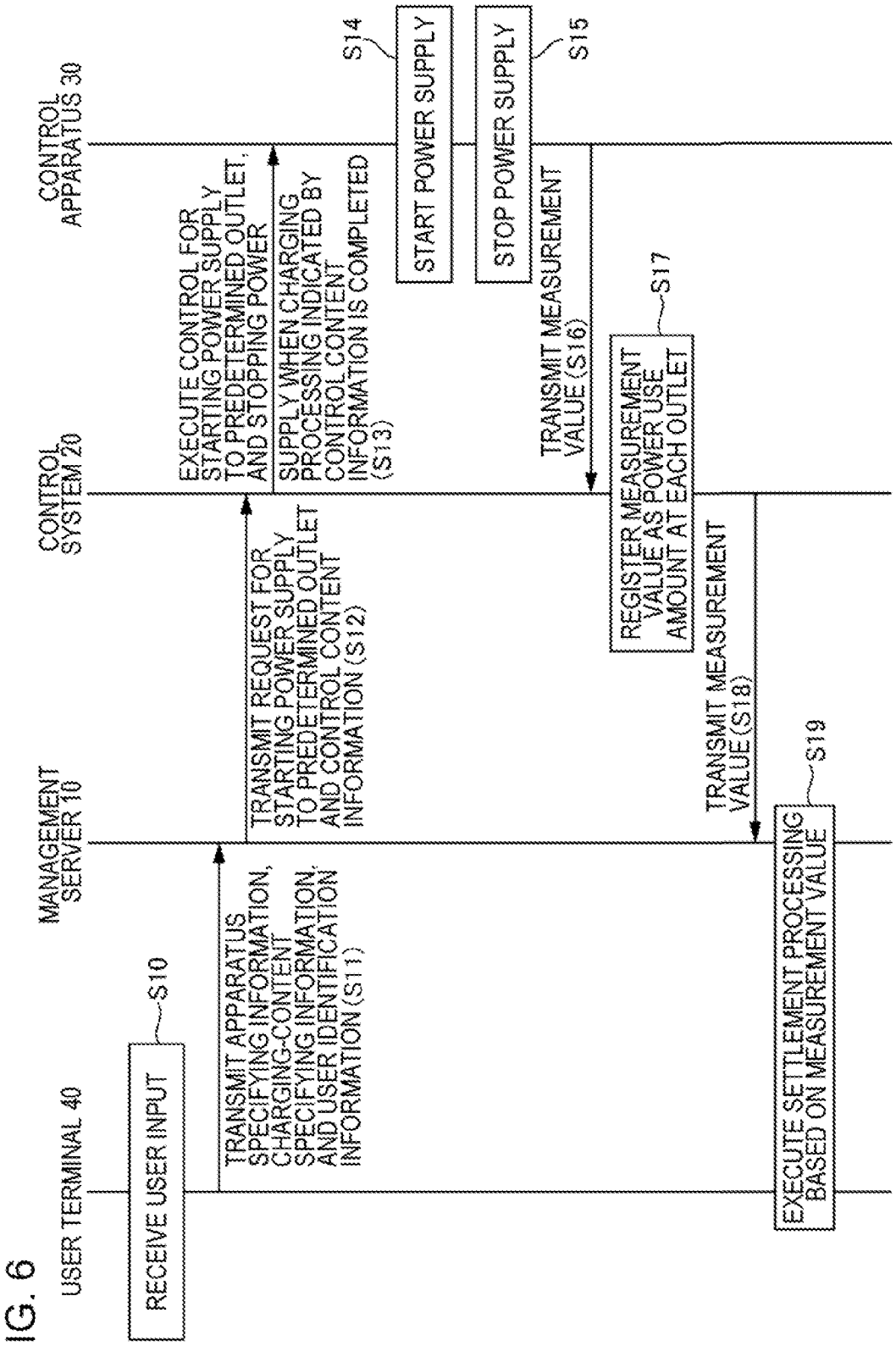

USER TERMINAL 40
MANAGEMENT SERVER 10
CONTROL SYSTEM 20
CONTROL APPARATUS 30
S10
RECEIVE USER INPUT
TRANSMIT APPARATUS SPECIFYING INFORMATION, CHARGING-CONTENT SPECIFYING INFORMATION, AND USER IDENTIFICATION INFORMATION (S11)
TRANSMIT REQUEST FOR STARTING POWER SUPPLY TO PREDETERMINED OUTLET AND CONTROL CONTENT INFORMATION (S12)
EXECUTE CONTROL FOR STARTING POWER SUPPLY TO PREDETERMINED OUTLET, AND STOPPING POWER SUPPLY WHEN CHARGING PROCESSING INDICATED BY CONTROL CONTENT INFORMATION IS COMPLETED (S13)
S14
START POWER SUPPLY
S15
STOP POWER SUPPLY
TRANSMIT MEASUREMENT VALUE (S16)
S17
REGISTER MEASUREMENT VALUE AS POWER USE AMOUNT AT EACH OUTLET
TRANSMIT MEASUREMENT VALUE (S18)
S19
EXECUTE SETTLEMENT PROCESSING BASED ON MEASUREMENT VALUE

FIG. 7

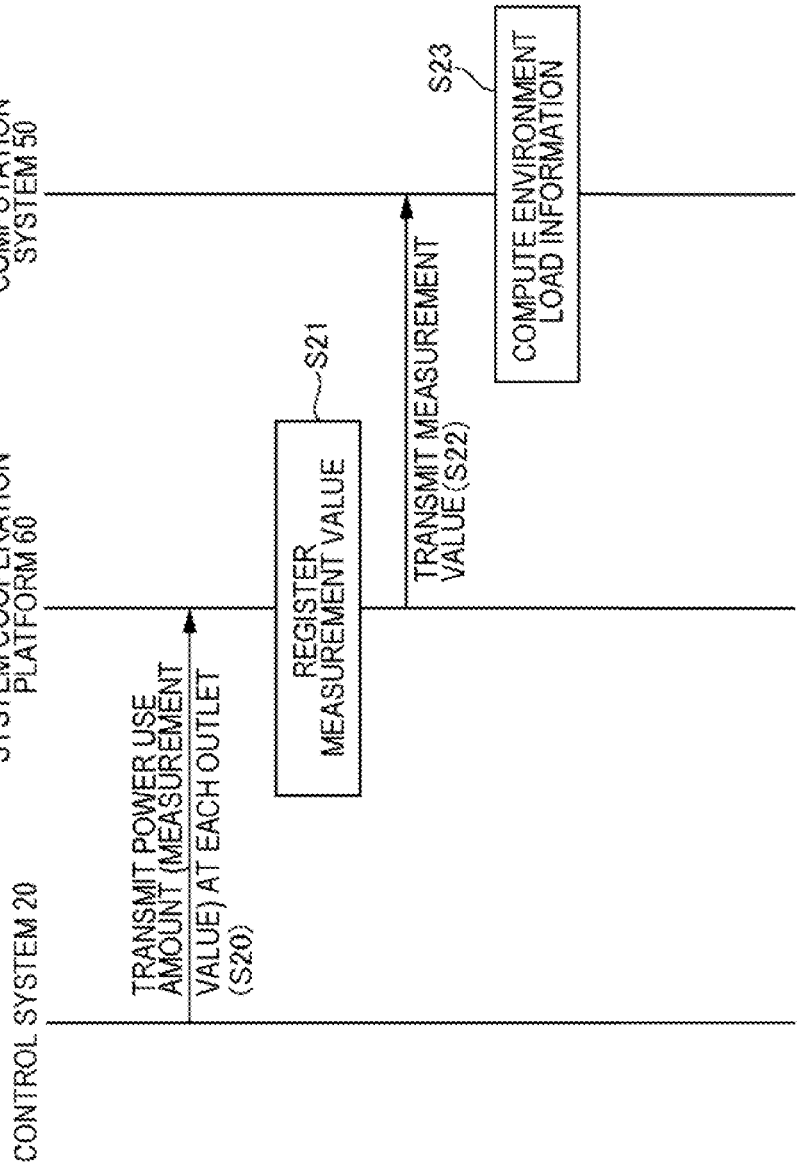

CONTROL SYSTEM 20
SYSTEM COOPERATION PLATFORM 60
COMPUTATION SYSTEM 50
TRANSMIT POWER USE AMOUNT (MEASUREMENT VALUE) AT EACH OUTLET (S20)
REGISTER MEASUREMENT VALUE
S21
TRANSMIT MEASUREMENT VALUE (S22)
S23
COMPUTE ENVIRONMENT LOAD INFORMATION

FIG. 8

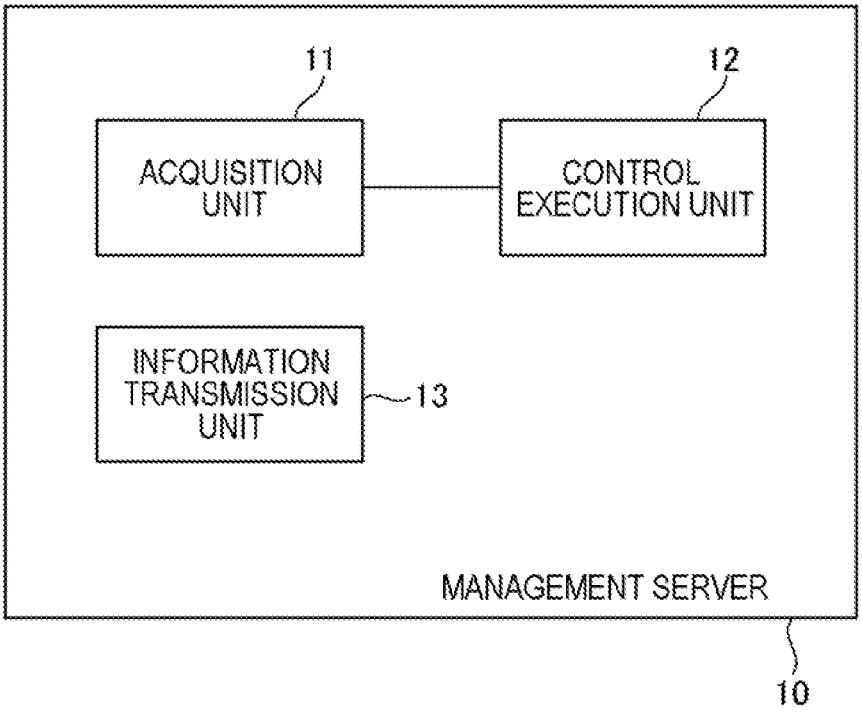

11
12
ACQUISITION UNIT
CONTROL EXECUTION UNIT
INFORMATION TRANSMISSION UNIT
13
MANAGEMENT SERVER
10

FIG. 9

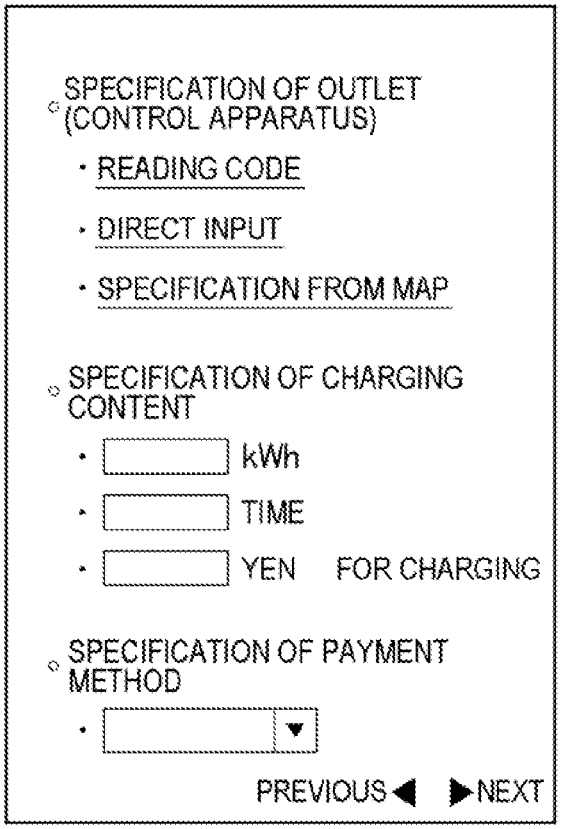

SPECIFICATION OF OUTLET (CONTROL APPARATUS)
READING CODE
DIRECT INPUT
SPECIFICATION FROM MAP
SPECIFICATION OF CHARGING CONTENT
kWh
TIME
YEN FOR CHARGING
SPECIFICATION OF PAYMENT METHOD
PREVIOUS
NEXT

FIG. 10

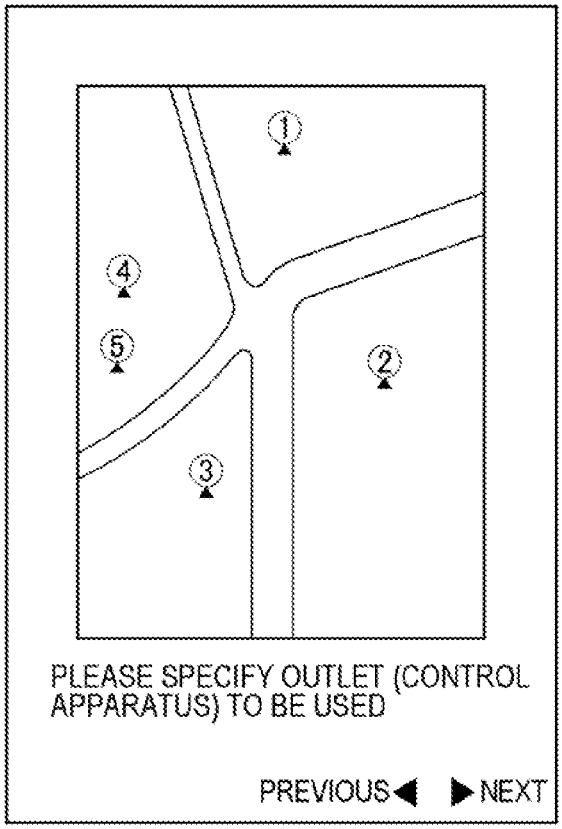

1
2
3
4
5
PLEASE SPECIFY OUTLET (CONTROL APPARATUS) TO BE USED
PREVIOUS
NEXT

FIG. 11

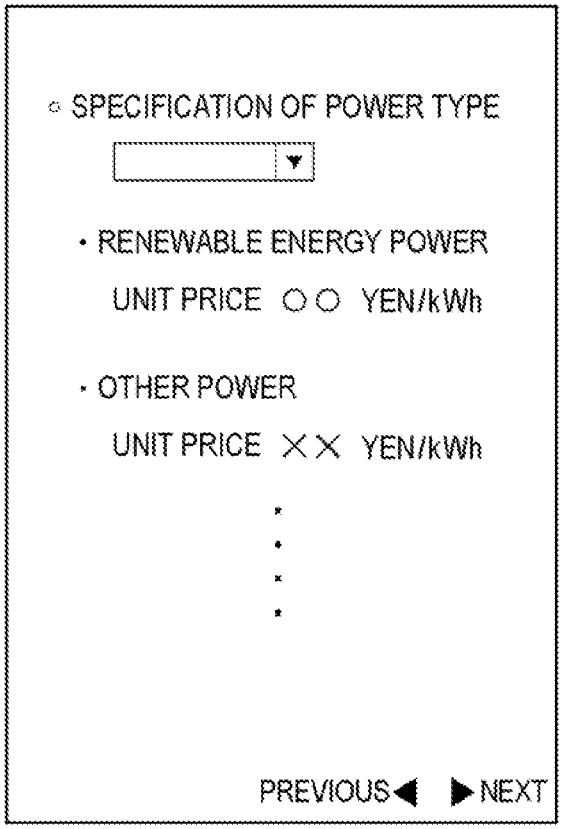
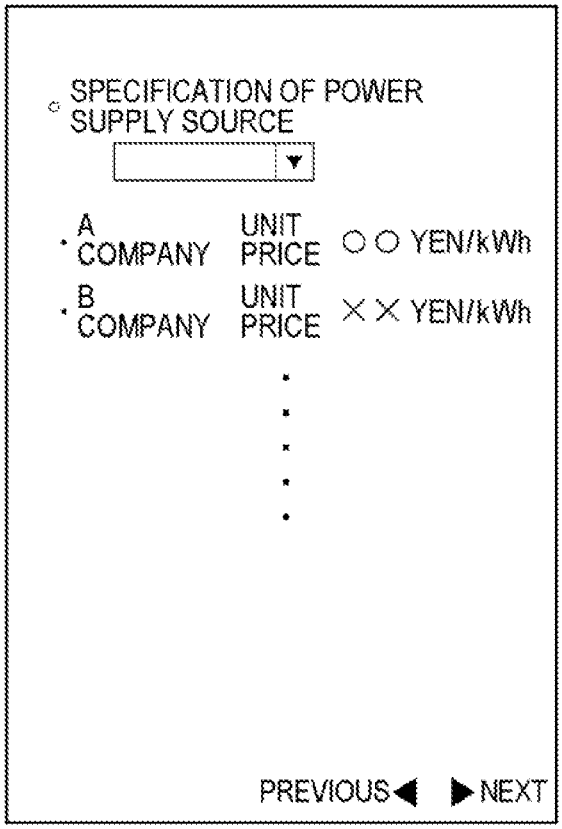

SPECIFICATION OF POWER TYPE
RENEWABLE ENERGY POWER
UNIT PRICE ○○ YEN/kWh
OTHER POWER
UNIT PRICE ×× YEN/kWh
PREVIOUS
NEXT

FIG. 12


SPECIFICATION OF POWER SUPPLY SOURCE
A COMPANY UNIT PRICE ○○ YEN/kWh
B COMPANY UNIT PRICE ××YEN/kWh
PREVIOUS
NEXT

MANAGEMENT SERVER, MANAGEMENT METHOD, AND NON-TRANSITORY STORAGE MEDIUM

[0001] This application is based upon and claims the benefit of priority from Japanese patent application No. 2022-135639, filed on Aug. 29, 2022, the disclosure of which is incorporated herein in its entirety by reference.

TECHNICAL FIELD

[0002] The present invention relates to a management server, a control system, a management method, a control method, and a program.

BACKGROUND ART

[0003] A technique relating to the present invention is disclosed in Patent Document 1 (Japanese Patent Application Publication No. 2010-110044) and Patent Document 2 (Japanese Patent Application Publication No. 2011-186875).

[0004] Patent Document 1 discloses a charging apparatus for an electric vehicle, the apparatus including a power supply means, an operation terminal, and a control unit. The power supply means includes an outlet for supplying power to an electric vehicle. The operation terminal includes an information input means for enabling input of charging instruction information, an information display means, and a charge collection means for collecting a charge from a user. The control unit stores charging instruction information input from the information input means, and computes, for each outlet opening, charging reservation information including a charging start time, a charging end time, and a charging charge, and controls, based on the charging reservation information, energization based on the power supply means. Then, the charging instruction information includes a charging time, and the control unit computes, based on the charging time, a charging start time, a charging end time, and a charging charge.

[0005] Further, in the technique disclosed in Patent Document 1, in order to prevent electricity stealing and mischief, an outlet is accommodated in an outlet box equipped with a door, and the door is applied with a mechanical or electric lock. When there are an unspecified large number of users, the lock is released, for example, by using a password or the like set at a time of charging reservation.

[0006] Patent Document 2 discloses an electric car charging facility that receives input of identifier (ID) information of a user, decides, based on the ID information, use permission/non-permission, and starts, when permitted, charging to a vehicle of the user.

[0007] Patent Document 3 (Japanese Patent Application Publication No. 2022-048626) discloses a technique for efficiently distributing, to a purchase-desiring person, surplus power in generated power based on a power generator.

[0008] Patent Document 4 (Japanese Patent Application Publication No. 2018-147029) discloses a technique for enabling an individual to easily purchase or sell power.

DISCLOSURE OF THE INVENTION

[0009] For prevalence of an electric car, a charging facility is expected to be consolidated. For example, a function of communicating with a vehicle and a dedicated charger including a high-speed charging function have been developed, but a problem in cost and the like is an obstacle to prevalence of the charger.

[0010] When a charging service can be provided by using an outlet of 100 V or 200 V being generally widespread, a problem in cost is reduced. Further, from a point of view of the convenience, it is expected that many business operators providing the charging service appear. However, in a charging service using such an outlet, there is a problem such as establishment of an electricity stealing prevention means and establishment of a settlement means for power use. In the technique disclosed in Patent Document 1, an outlet is accommodated in an outlet box equipped with a door and the door is applied with a mechanical or electric lock, and thereby electricity stealing prevention is achieved. Further, an advance reservation system is employed, and therefore a user using an outlet can be determined and settlement processing is made possible. However, in the technique disclosed in Patent Document 1, it is necessary to prepare, for each outlet, an outlet box equipped with a door. There is a problem in effort and an expense required for preparation and maintenance management of such an outlet box. Further, some users feel an advance reservation as being bothersome. In the technique disclosed in Patent Document 2, it is assumed that a dedicated charger is used, but it is not assumed that an outlet of 100V or 200V is used. The techniques disclosed in Patent Documents 3 and 4 do not relate to a charging service using an outlet of 100V or 200V.

[0011] In view of the problem described above, one example of an object of the present invention is to provide a management server, a control system, a management method, a control method, and a program that solve an issue for achieving a charging service using an outlet of 100V or 200V.

[0012] According to one aspect of the present invention,

[0013] provided is a management server including:

[0014] an acquisition unit that acquires, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and

[0015] a control execution unit that executes processing of controlling the control apparatus specified by the apparatus specifying information.

[0016] According to one aspect of the present invention,

[0017] provided is a control system including:

[0018] a request acquisition unit that acquires, from a management server, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time; and

[0019] a power control unit that controls a control apparatus that controls power supply to an outlet, starts power supply to the outlet according to the request, and also stops power supply to the outlet according to completion of charging processing indicated by the control content information.

[0020] According to one aspect of the present invention,

[0021] provided is a management method including,

[0022] by one or more computers:

[0023] acquiring, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and

[0024] executing processing of controlling the control apparatus specified by the apparatus specifying information.

[0025] According to one aspect of the present invention,
[0026] provided is a control method including,
[0027] by one or more computers:
[0028] acquiring, from a management server, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time; and
[0029] controlling a control apparatus that controls power supply to an outlet, starting power supply to the outlet according to the request, and also stopping power supply to the outlet according to completion of charging processing indicated by the control content information.
[0030] According to one aspect of the present invention,
[0031] provided is a program for causing a computer to function as:
[0032] an acquisition unit that acquires, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and
[0033] a control execution unit that executes processing of controlling the control apparatus specified by the apparatus specifying information.
[0034] According to one aspect of the present invention,
[0035] provided is a program for causing a computer to function as:
[0036] a request acquisition unit that acquires, from a management server, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time; and
[0037] a power control unit that controls a control apparatus that controls power supply to an outlet, starts power supply to the outlet according to the request, and also stops power supply to the outlet according to completion of charging processing indicated by the control content information.
[0038] According to one aspect of the present invention, a management server, a control system, a management method, a control method, and a program that solve an issue for achieving a charging service using an outlet of 100V or 200V are achieved.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] The above-described object, other objects, features, and advantages will become more apparent from a preferred example embodiment described below and the following accompanying drawings.
[0040] FIG. **1** is a diagram illustrating one example of a function block diagram of a management server.
[0041] FIG. **2** is a diagram illustrating one example of a function block diagram of a control system.
[0042] FIG. **3** is a diagram illustrating one example of a function block diagram of a system including the management server and the control system.
[0043] FIG. **4** is a diagram illustrating one example of a hardware configuration of the management server and the control system.
[0044] FIG. **5** is a diagram illustrating another example of a function block diagram of the control system.
[0045] FIG. **6** is a sequence diagram illustrating one example of a flow of processing of a system including the management server and the control system.
[0046] FIG. **7** is a sequence diagram illustrating another example of a flow of processing of the system including the management server and the control system.
[0047] FIG. **8** is a diagram illustrating another example of a function block diagram of the management server.
[0048] FIG. **9** is a diagram illustrating one example of a screen displayed in a user terminal.
[0049] FIG. **10** is a diagram illustrating another example of a screen displayed in the user terminal.
[0050] FIG. **11** is a diagram illustrating another example of a screen displayed in the user terminal.
[0051] FIG. **12** is a diagram illustrating another example of a screen displayed in the user terminal.

DESCRIPTION OF EMBODIMENTS

[0052] Example embodiments of the present invention will be described below by using drawings. Note that, in every drawing, a similar component is given a similar sign, and description thereof is omitted as appropriate.

First Example Embodiment

[0053] FIG. **1** is a function block diagram illustrating an outline of a management server **10** according to a first example embodiment. The management server **10** includes an acquisition unit **11**, and a control execution unit **12**. The acquisition unit **11** acquires, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet. The control execution unit **12** executes processing of controlling the control apparatus specified by the apparatus specifying information.
[0054] By using the management server **10** including such a configuration, power supply to an outlet is stopped at a normal time, and power supply to the outlet can be started according to an operation via a user terminal. As a result, electricity stealing can be effectively reduced. Further, according to an operation from a user via the user terminal, power supply to an outlet is started, and therefore a billing party (the user) of a consideration for power use can be certainly determined. As a result, settlement processing can be certainly executed. Further, a user may perform, immediately before using a certain outlet, an operation for starting power supply to the outlet. As a result, the user can avoid bothersome work being an advance reservation.
[0055] According to the management server **10** according to the first example embodiment as described above, an issue for achieving a charging service using an outlet of 100V or 200V is solved.

Second Example Embodiment

[0056] FIG. **2** is a function block diagram illustrating an outline of a control system **20** according to a second example embodiment. The control system **20** includes a request acquisition unit **21** and a power control unit **22**. The request acquisition unit **21** acquires, from a management server **10**, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time. The power control unit **22** controls a control apparatus that controls power supply to an outlet, starts power supply to the outlet according to the request, and also stopping power supply to the outlet according to completion of charging processing indicated by the control content information.
[0057] By using the control system **20** including such a configuration, power supply to an outlet is stopped at a normal time, and power supply to an outlet specified according to a predetermined request from an external apparatus

can be started. Then, according to completion of specified charging processing, power supply to the outlet can be stopped. As a result, electricity stealing can be effectively reduced.

[0058] According to the control system **20** according to the second example embodiment as described above, an issue for achieving a charging service using an outlet of 100V or 200V can be solved.

Third Example Embodiment

"Outline"

[0059] According to the present example embodiment, configurations of a management server **10** and a control system **20** are further embodied.

[0060] First, FIG. **3** illustrates a whole picture of a system including the management server **10** and the control system **20**. Note that in FIG. **3**, only components necessary for description are illustrated, and illustration of a component unnecessary for description is omitted as appropriate. According to the present example embodiment, a component being not illustrated can be added, as appropriate.

[0061] First, an outline of each of components illustrated in FIG. **3** is described. Note that, detailed description is made later.

[0062] The management server **10** is a server managed by a business operator providing a charging service using an outlet **70** of 100V or 200V. One example of the business operator is a power retail business operator. The business operator installs the outlet **70** for providing a charging service in any location such as a parking lot used by an unspecified large number of users. The business operator may install the outlet **70**, for example, in a parking lot or the like owned by him/herself. Further, the business operator may make a predetermined contract with a manager of a facility such as an amusement park, a supermarket, a coin-operated parking lot, and a month-to-month parking lot, and install the outlet **70** in a parking lot and the like of the facility.

[0063] A control apparatus **30** controls, from a power system, power supply to the outlet **70**. In other words, the control apparatus **30** stops or starts, from the power system, power supply to the outlet **70**. The control apparatus **30** is a so-called smart meter. Note that, another apparatus including a function similar to the smart meter may be usable as the control apparatus **30**. The control apparatus **30** is installed in the same area as in the outlet **70**. The control apparatus **30** is managed by a power transmission and distribution business operator.

[0064] The control system **20** is a system that manages data, an operation, a facility, and the like of the control apparatus **30**. The control system **20** is a so-called meter data management system (MDMS). Note that, another apparatus including a function similar to the MDMS may be usable as the control system **20**. The control system **20** is managed by a power transmission and distribution business operator.

[0065] The user terminal **40** is a terminal used by a user using an electric car **80**. The user terminal **40** is, for example, a smartphone, a tablet terminal, a smartwatch, a personal computer, a mobile phone, or the like.

[0066] The electric car **80** is a vehicle which travels by using a motor in which a power source is electricity. The electric car **80** may an ordinary vehicle (four-wheel vehicle), may be a two-wheel vehicle, may be a large-size vehicle, or may be a vehicle of another type.

[0067] A computation system **50** computes environment load information. The computation system **50** computes, for example, environment load information by region. The environment load information includes a greenhouse effect gas emission amount (carbon emission amount), and the like. The computation system **50** can compute at least one of so-called scopes **1** to **3**, for example, an entire emission amount. The computation system **50** is managed by any business operator.

[0068] A system cooperation platform **60** manages, by region, information required for computing environment load information. The system cooperation platform **60** is managed by any business operator.

[0069] Next, an outline of processing achieved by such a system is described. Note that, detailed description is made later.

[0070] A user using a charging service transmits, to the management server **10** via the user terminal **40**, "information specifying the control apparatus **30** that controls a predetermined outlet **70** to be used" and "charging-content specifying information specifying a power amount to be charged, a time required for executing charging processing, an amount of money to be paid in charging processing, a payment method, and the like". The management server **10** having acquired the information executes predetermined processing such as authentication processing of a user and the like, and thereafter, transmits, to the control system **20**, a request for starting power supply to the predetermined outlet **70**. Further, the management server **10** transmits, to the control system **20**, control content information indicating a charging power amount or a charging time.

[0071] The control system **20** having received the request and information controls the control apparatus **30** that controls power supply to the predetermined outlet **70** in such a way as to start power supply to the outlet **70** and also stop power supply to the outlet **70** according to completion of charging processing indicated by the control content information. The control apparatus **30** starts or stops, based on the control from the control system **20**, power supply to the outlet **70**. Further, the control apparatus **30** measures a power use amount via the outlet **70** during power supply to the outlet **70** based on the control, and transmits a measurement value to the control system **20**. The control system **20** transmits the received measurement value to the management server **10**. Further, the control system **20** can register the received measurement value in association with the outlet **70** or an installation location of the outlet **70**.

[0072] The management server **10** communicates with the user terminal **40**, and executes settlement processing based on the above-described measurement value and a payment method indicated by charging-content specifying information.

[0073] Further, the control system **20** can transmit, to the system cooperation platform **60**, the registered measurement value in association with the outlet **70** or the installation location of the outlet **70**. The system cooperation platform **60** transmits the received information to the computation system **50**. The computation system **50** computes, based on the received information, environment load information by region.

"Hardware Configuration"

[0074] Next, one example of a hardware configuration of each of the management server **10** and the control system **20** is described. Note that, at least some other components illustrated in FIG. **3** can also include a similar hardware configuration. Each function unit of the management server **10** and the control system **20** is achieved by any combination of hardware and software, mainly including a central processing unit (CPU) of any computer, a memory, a program loaded onto a memory, a storage unit (capable of storing, in addition to a program previously stored from a stage where an apparatus is shipped, a program downloaded from a storage medium such as a compact disc (CD), a server on the Internet, and the like) such as a hard disk storing the program, and a network connection interface. Then, it should be understood by those of ordinary skill in the art that, in an achievement method and an apparatus for the above, there are various modified examples.

[0075] FIG. **4** is a block diagram illustrating a hardware configuration of the management server and the control system **20**. As illustrated in FIG. **4**, each of the management server **10** and the control system **20** includes a processor **1**A, a memory **2**A, an input/output interface **3**A, a peripheral circuit **4**A, and a bus **5**A. The peripheral circuit **4**A includes various modules. At least one of the management server **10** and the control system **20** may not necessarily include the peripheral circuit **4**A. Note that, at least one of the management server **10** and the control system **20** may be configured by using a plurality of apparatuses separated physically and/or logically. In this case, each of the plurality of apparatuses can include the hardware configuration described above.

[0076] The bus **5**A is a data transmission path in which the processor **1**A, the memory **2**A, the peripheral circuit **4**A, and the input/output interface **3**A mutually transmit/receive data. The processor **1**A is an arithmetic processing apparatus, for example, such as a CPU and a graphics processing unit (GPU). The memory **2**A is a memory, for example, such as a random access memory (RAM) and a read only memory (ROM). The input/output interface **3**A includes an interface for acquiring information from an input apparatus, an external apparatus, an external server, an external sensor, a camera, and the like, an interface for outputting information to an output apparatus, an external apparatus, an external server, and the like, and the like. The input apparatus is, for example, a keyboard, a mouse, a microphone, a physical button, a touch panel, and the like. The output apparatus is, for example, a display, a speaker, a printer, a mailer, and the like. The processor **1**A can issue an instruction to each module, and perform an arithmetic operation, based on arithmetic operation results of the modules.

"Function Configuration"

—Management Server **10**—

[0077] Next, a function configuration of the management server **10** according to the present example embodiment is described in detail. FIG. **1** illustrates one example of a function block diagram of the management server **10**. As illustrated, the management server **10** includes an acquisition unit **11** and a control execution unit **12**.

[0078] The acquisition unit **11** acquires, from the user terminal **40**, (1) apparatus specifying information, (2) charging-content specifying information, and (3) discrimination information of a user.

[0079] The "apparatus specifying information" is information specifying the control apparatus that controls power supply to the outlet **70** about to be used by a user. The apparatus specifying information may be information capable of achieving such a function. The apparatus specifying information may be, for example, discrimination information discriminating a plurality of control apparatuses **30** from each other. Further, as is clear from the description using FIG. **3**, the outlet **70** and the control apparatus **30** are previously associated with each other. Therefore, as apparatus specifying information, discrimination information discriminating a plurality of outlets **70** from each other may be usable. Further, an installation location of the outlet **70** or an installation location of the control apparatus **30** may be usable as apparatus specifying information.

[0080] A user operates the user terminal **40**, and performs an operation for inputting apparatus specifying information as described above and also transmitting the input information to the management server **10**. There are various achievement means for inputting apparatus specifying information and, for example, the following example is cited.

[0081] For example, in an installation location of the outlet **70**, code information (a bar code, a two-dimensional code, or the like) unique to each outlet **70** may be provided. Then, a user operates the user terminal **40**, reads the code information, and thereby may achieve input of apparatus specifying information.

[0082] In addition, in an installation location of the outlet **70**, discrimination information of the outlet **70** or discrimination information of the control apparatus **30** that controls power supply to each outlet **70** may be provided. These pieces of discrimination information are configured, for example, by a combination of a number, a character, a symbol, and the like. Then, a user operates the user terminal **40**, inputs these pieces of discrimination information, and thereby may achieve input of apparatus specifying information.

[0083] In addition, a user may display predetermined map information in the user terminal **40**. The map is provided from the management server **10**. Then, on the map, a label indicating an installation location of the outlet **70** is displayed. The user selects a predetermined outlet **70** on the map, and thereby, may achieve input of apparatus specifying information.

[0084] Note that, the achievement means for input of apparatus specifying information exemplified herein are one example without limitation thereto.

[0085] The "charging-content specifying information" includes information required for charging processing and settlement processing to be executed. For example, the charging-content specifying information includes information specifying how much a power amount is charged. The information may be a power amount to be charged itself, may be a duration (minute, hour, or the like) of a time required for executing charging processing, or may be an amount of money (yen or the like) to be paid based on charging processing. A power amount to be charged may be specified by a numerical value of a power amount such as "X [kWh]".

[0086] In addition, the charging-content specifying information may include information specifying a payment method. The payment method includes, as examples, but not limited to, credit card payment, electronic money payment, sending a bill by mail available in a predetermined institution (a bank, a post office, a convenience store, or the like), and the like.

[0087] The "user discrimination information" is information (so-called user ID) discriminating, from each other, a plurality of users using a charging service achieved by the management server **10**. Discrimination information of a user may be a name, an address, a phone number, a mail address, and the like of the user or a combination of these items, or may be a combination of a number, a character, a symbol, and the like issued by the management server **10**. For example, a user hoping to use a charging service previously operates the user terminal **40** or the like, and executes user registration processing. In the user registration processing, a name, an address, a phone number, a mail address, credit card information, electronic money information, and the like of the user are registered. Further, in the user registration processing, information required for user authentication may be registered. The information includes, as examples, but not limited to, a password, biological information, (face information, finger print information, iris information, voice print information, and the like), and the like.

[0088] A user operates the user terminal **40**, and accesses the management server **10** via a predetermined web page or an application. Then, the user inputs, on a screen of the web page or the application, the above-described apparatus specifying information, charging-content specifying information, discrimination information of the user, and the like, and performs an operation for transmitting the input pieces of information to the management server **10**.

[0089] The control execution unit **12** executes processing of controlling the control apparatus specified by apparatus specifying information acquired by the acquisition unit **11**. Specifically, the control execution unit **12** executes (1) processing of starting power supply to the outlet **70**, and (2) settlement processing for a charging service.

[0090] In processing of starting power supply to the outlet **70**, the control execution unit **12** transmits, to the control system **20** that controls the control apparatus **30** specified by the apparatus specifying information acquired by the acquisition unit **11**, a request for starting power supply to a predetermined outlet **70** controlled by the control apparatus **30**. Further, the control execution unit **12** transmits, to the control system **20**, control content information indicating a charging power amount or a charging time determined by the charging-content specifying information acquired by the acquisition unit **11**.

[0091] The charging power amount indicates a power amount to be charged. The power amount to be charged may be indicated by a numerical value of a power amount such as "X [kWh]". The charging time indicates a duration (minute, hour, and the like) of a time required for executing charging processing. These values are indicated by the above-described charging-content specifying information. Note that, when, in the charging-content specifying information, an amount of money (yen or the like) to be paid based on charging processing is indicated, the control execution unit **12** can compute a power amount to be charged, based on the amount of money and a power unit price. A determination means for the power unit price is not specifically limited.

[0092] In settlement processing for a charging service, the control execution unit **12** acquires, from the control apparatus **20**, a measurement value of a power use amount via the outlet **70** during a period from start of power supply to the outlet **70** to stop of power supply to the outlet **70**. Then, the control execution unit **12** executes, based on the acquired measurement value, settlement processing for a user. Specifically, the control execution unit **12** computes a billing amount, based on the acquired measurement value and a power unit price. Then, the control execution unit **12** executes settlement processing of receiving payment for the billing amount.

[0093] When a payment method is previously specified, the control execution unit **12** executes settlement processing based on the payment method. When a payment method is not previously specified, the control execution unit **12** provides a billing amount via the user terminal **40**, also receives specification of a payment method, and executes settlement processing, based on the specified payment method. Settlement processing based on various types of payment methods can be achieved by using any well-known technique

[0094] The management server **10** is preferably configured in such a way that discrimination information of a user is not transmitted to the control system **20**. Even when discrimination information of a user is not transmitted from the management server **10** to the control system **20**, the above-described processing can be executed. When a configuration is made in this manner, protection of personal information is achieved.

[0095] Note that, it is necessary for the management server **10** to associate, for settlement processing, a measurement value measured by the control apparatus **30** with a user. The association can be achieved by using, as association information, any information other than discrimination information of a user. In other words, the management server **10** manages discrimination information of a user and any association information in association with each other. Further, in transmission/reception of a measurement value among the control apparatus **30**, the control system **20**, and the management server **10**, the association information is associated with the measurement value. The association information includes, as examples, but not limited to, a transmission time of a power supply start request transmitted from the management server **10** to the control system **20**, a request number provided for the request, and the like.

—Control System **20**—

[0096] Next, a function configuration of the control system **20** according to the present example embodiment is described in detail. FIG. **5** illustrates one example of a function block diagram of the control system **20**. As illustrated, the control system **20** includes a request acquisition unit **21**, a power control unit **22**, and a measurement value management unit **23**. The request acquisition unit **21** acquires, from the management server **10**, a request for starting power supply to a predetermined outlet **70** and control content information indicating a charging power amount or a charging time. The request acquisition unit **21** acquires a request and control content information transmitted by the control execution unit **12** described above. The request includes the above-described apparatus specifying

information. Based on the apparatus specifying information, the predetermined outlet **70** is determined.

[0097] Note that, the control system **20** is preferably configured in such a way as not to acquire, from the management server **10** or the like, discrimination information of a user executing, based on the request, charging processing. When such a configuration is made, in the control system **20**, a measurement value (a measurement value of a power use amount via the outlet **70**) acquired from the control apparatus **30** and a user are not associated with each other. As a result, protection of personal information is achieved.

[0098] The power control unit **22** controls the control apparatus **30** that controls power supply to the predetermined outlet **70**, starts power supply to the predetermined outlet **70** according to the request, and also stops power supply to the outlet **70** according to completion of charging processing indicated by control content information.

[0099] Herein, one example of processing of the control apparatus **30** based on such control of the power control unit **22** is described. Note that, there is no limitation to the exemplification herein.

[0100] The control apparatus **30** controls on/off of current flowing into the outlet **70**, i.e., current flowing in an electric wire leading to the outlet **70**. The control apparatus **30** includes a switch, for example, attached to an electric wire. The switch can switch, based on electric control, on/off, and includes a function for electrically break an electric wire. Specifically, when the switch is turned on, an electric wire can cause electricity to flow. On the other hand, when the switch is turned off, the electric wire cannot cause electricity to flow.

[0101] The control apparatus **30** turns on the switch and starts power supply to the outlet **70** according to control from the control system **20**. Further, the control apparatus **30** turns off the switch according to detection of predetermined end timing, and stops power supply to the outlet **70**.

[0102] The end timing is, for example, timing at which charging of a charging power amount indicated by control content information is completed. The control apparatus **30** includes a measurement instrument that repeatedly measures at least one of current flowing in an electric wire and a current amount. As a configuration of the measurement instrument, any well-known configuration is employable. The control apparatus **30** measures a power use amount via the outlet **70** after turning on the switch according to control of the control system **20**, based on a measurement result by the measurement instrument. Then, the control apparatus **30** detects, as the end timing, timing at which the measurement value reaches a charging power amount indicated by the control content information.

[0103] In addition, the end timing is, for example, timing at which charging during a charging time indicated by control content information is completed. The control apparatus **30** monitors an elapse time from predetermined start timing, and detects, as the end timing, timing at which the elapse time becomes a charging time indicated by the control content information. The start timing may be timing at which the switch is turned on, or may be timing at which use (charging processing) of power is started.

[0104] Further, the control apparatus **30** can repeatedly transmit, to the control system **20** at every predetermined time, while the switch is turned on, at least one of a measurement result based on the measurement instrument and the measurement value. Then, the control apparatus **30** may turn off the switch and stop power supply to the outlet **70** when communication with the control system **20** is not maintained.

[0105] In order to achieve this matter, the control apparatus **30** can execute conformation processing of whether communication with the control system **20** is being maintained. The processing is processing, for example, defined in IEEE802.1ag/ITU-T Y.1731. For the confirmation processing, for example, a continuity check (CC) may be used, a loop back (LB) may be used, or a link trace (LT) may be used.

[0106] Herein, the CC indicates a matter that a hello packet is mutually transmitted in communication between two apparatuses. Further, the LB indicates a matter that a loop back message is transmitted to an opposite party and it is determined, based on presence of a reply of a loop back response, that communication is being maintained. In this case, any either of parties may transmit a loop back message. Further, the LT is a so-called link trace function. The measurement value management unit **23** acquires, from the control apparatus **30**, a measurement value of a power use amount via the outlet **70** during a period from start of power supply to the outlet **70** to stop of power supply to the outlet **70**. Then, the measurement value management unit **23** transmits the measurement value to the management server **10**. Further, the measurement value management unit **23** registers the measurement value, without association with a user, in association with the outlet **70** or an installation location of the outlet **70**.

[0107] Then, the measurement value management unit **23** transmits, to the computation system **50** that computes environment load information, the measurement value registered, without association with the user, in association with the outlet **70** or the installation location of the outlet **70**. The measurement value management unit **23** may transmit, to the computation system **50**, the information via the system cooperation platform **60**. In other words, the measurement value management unit **23** may transmit the information to the system cooperation platform **60**. Then, the system cooperation platform **60** may transmit the information to the computation system **50**.

[0108] The computation system **50** can compute, based on the information, an integration value of measurement values by region, and compute, based on the integration value, environment load information by region. Note that, the integration value of measurement values by region may be computed by the control system **20** or the system cooperation platform **60**, and the computation result may be transmitted to the computation system **50**.

[0109] Environment load information computed by the computation system **50** includes a greenhouse effect gas emission amount (carbon emission amount), and the like. For example, a computation method (a function or the like) of computing a greenhouse effect gas emission amount (carbon emission amount) from an integration value of measurement values is previously generated. Then, the computation system **50** computes, based on the computation method and the integration value of measurement values, a greenhouse effect gas emission amount (carbon emission amount).

[0110] Note that, the computation system **50** can compute at least one of so-called scopes **1** to **3**, for example, an entire emission amount. The computation system **50** can acquire,

by using any means, another piece of information required for the computation. According to the following example embodiment, a means for acquiring information indicating a power type of used power, a power supply source, and the like is described.

[0111] Next, by using a sequence diagram in FIGS. **6** and **7**, one example of a flow of processing of a system including the management server **10** and the control system **20** is described.

[0112] First, as illustrated in the sequence diagram in FIG. **6**, the user terminal **40** receives various types of input from a user using a charging service (S**10**). The user performs the input immediately before using a certain outlet **70**. In other words, the user positions his/her own electric car **80** near the outlet **70**, ensures a state where the outlet **70** is usable (a state where another user does not use the outlet **70**, and once power supply to the outlet **70** is started, charging to the own electric car **80** can be started at any time), and performs the input.

[0113] The user can perform input in S**10**, for example, via a user interface (UI) screen, as illustrated in FIG. **9**, displayed in the user terminal **40**. The UI screen illustrated in FIG. **9** is configured in such a way as to receive specification of the outlet **70** (control apparatus **30**) to be used, specification of a content of charging processing to be executed, and specification of a payment method.

[0114] In a case of the example illustrated in FIG. **9**, specification of the outlet **70** (control apparatus **30**) to be used can be achieved by any of "reading a code", "direct input", and "specification from a map". When "reading a code" is selected, a code read function of the user terminal **40** is started, and a display of the user terminal **40** functions, for example, as a finder of a camera to be used capturing an image of a code. Then, by using a well-known technique, reading a code via the user terminal **40** can be achieved. When "direct input" is selected, a screen including a UI component for directly inputting discrimination information of the control apparatus **30** or the outlet **70** is displayed. When "specification from a map" is selected, for example, as illustrated in FIG. **10**, a neighboring map being a map where a location of the outlet **70** is clearly indicated is displayed. A user can specify one outlet **70** on the map. Note that, in a case where many outlets **70** are installed in a certain place, when one location is specified on a relatively wide-area map as illustrated in FIG. **10**, thereafter, transition is made to a more detailed map indicating an installation location of each of a plurality of outlets **70** installed in the specified location, and one outlet **70** may be specified on the detailed map. Based on a location of the user terminal **40** determined by a GPS function or the like included in the user terminal **40**, a range of a map (a neighboring map) displayed in the user terminal **40** can be determined.

[0115] Further, in the case of the example in FIG. **9**, a charging content can be specified by any of specification of a power amount to be charged, specification of a charging time, and an amount of money to be paid. Further, in the case of the example in FIG. **9**, a payment method can be selected by a drop-down list.

[0116] Note that, the example illustrated in FIG. **9** is merely one example without limitation. Input of a user may be received based on a means different from the means illustrated in FIG. **9**.

[0117] After receiving the input of a user in S**10**, the user terminal **40** transmits, to the management server **10**, apparatus specifying information, charging-content specifying information, and discrimination information of the user according to the input (S**11**). The apparatus specifying information is information specifying the control apparatus **30** that controls power supply to the outlet **70** about to be used by the user. The charging-content specifying information is information specifying a power amount to be charged, a time required for executing charging processing, an amount of money to be paid in charging processing, a payment method, and the like.

[0118] Next the management server **10** transmits, to the control system **20**, a request for starting power supply to the predetermined outlet **70** controlled by the control apparatus **30** specified by the apparatus specifying information, and control content information (S**12**). The control content information indicates a charging power amount or a charging time.

[0119] Note that, the management server **10** may execute various pieces of processing before S**12**, and execute processing in S**12** according to the result. The management server **11** may execute, for example, user authentication processing by using discrimination information of the user. Then, the management server **10** may execute processing in S**12** when succeeding in the authentication processing. The user authentication is achieved by using any well-known technique.

[0120] Next, the control system **20** controls the predetermined control apparatus **30** according to the request from the management server **10**, starts power supply to the predetermined outlet **70**, and also stops power supply to the outlet **70** according to completion of charging processing indicated in the control content information (S**13**). The control apparatus **30** starts power supply to the predetermined outlet **70** according to the control (S**14**), and stops power supply to the outlet **70** according to detection of predetermined end timing (S**15**). The end timing is, for example, timing at which charging of a charging power amount indicated by the control content information is completed, timing at which charging during a charging time indicated by the control content information is completed, or the like.

[0121] After S**15**, the control apparatus **30** transmits, to the control system **20**, a measurement value of a power use amount via the outlet **70** during a period from the timing at which power supply is started in S**14** to the timing at which power supply is stopped in S**15** (S**16**). The control system **20** registers the measurement value, without association with the user, in association with the outlet **70** or an installation location of the outlet **70** (S**17**). Further, the control system **20** transmits the measurement value to the management server **10** (S**18**).

[0122] Next, the management server **10** communicates with the user terminal **40**, and executes, based on the acquired measurement value, settlement processing (S**19**). Specifically, the management server **10** computes a billing amount, based on the acquired measurement value and a power unit price. Then, the management server **10** executes settlement processing of receiving payment of the billing amount. When a payment method is previously specified, the management server **10** executes settlement processing based on the payment method. When a payment method is not previously specified, the management server **10** provides a billing amount via the user terminal **40**, receives specification of the payment method, and executes settlement processing based on the specified payment method. For

settlement processing based on various types of payment methods can be achieved by using any well-known technique.

[0123] Thereafter, as illustrated in the sequence diagram in FIG. **7**, the control system **20** transmits, to the system cooperation platform **60**, at any timing, the measurement value registered, without association with the user, in association with the outlet **70** or an installation location of the outlet **70** (S**20**). The control system **20** may execute processing in S**20**, for example, according to a request from the system cooperation platform **60**, may execute processing in S**20** according to coming of predetermined timing (e.g., timing of every hour, timing of every twelve hours, timing of every other day, or the like), may execute processing in S**20** according to a user operation, or may execute processing in S**20** according to at other timing.

[0124] The control system **20** may transmit, to the system cooperation platform **60**, a set of measurement values of charging processing at each time in each outlet **70**, or may transmit, to the system cooperation platform **60**, the data by being collected by region. Further, the control system **20** may compute an integration value of measurement values by region, and transmit the integration value to the system cooperation platform **60**. Further, the control system **20** may transmit a plurality of these values to the system cooperation platform **60**.

[0125] The system cooperation platform **60** registers the measurement value received from the control system **20** (S**21**). The system cooperation platform **60** may register, for example, based on an installation location of the outlet **70**, the received measurement value by region. Further, the system cooperation platform **60** may integrate measurement values by region.

[0126] Then, the system cooperation platform **60** transmits the measurement value by region to the computation system **50** (S**22**). The system cooperation platform **60**, for example, may execute processing in S**22** according to a request from the computation system **50**, may execute processing in S**22** according to coming of predetermined timing (e.g., timing of every hour, timing of every twelve hours, timing of every other day, or the like), may execute processing in S**22** according to a user operation, or may execute processing in S**22** according to other timing.

[0127] The system cooperation platform **60** may transmit, to the computation system **50**, a set of measurement values of charging processing at each time in each outlet **70**, or may transmit, to the computation system **50**, the data by being collected by region. Further, the system cooperation platform **60** may compute an integration value of measurement values by region, and transmit the integration value to the computation system **50**. Further, the system cooperation platform **60** may transmit a plurality of these values to the computation system **50**.

[0128] The computation system **50** computes, based on the received information, environment load information by region (Sa**23**). The environment load information by region computed by the computation system **50** includes a greenhouse effect gas emission amount (carbon emission amount), and the like. For example, a computation method (a function or the like) of computing a greenhouse effect gas emission amount (carbon emission amount) from an integration value of measurement values is previously generated. Then, the computation system **50** computes, based on the computation method and the integration value of measurement values, a greenhouse effect gas emission amount (carbon emission amount).

[0129] Note that, the computation system **50** can compute at least one of so-called scopes **1** to **3**, for example, an entire emission amount. The computation system **50** can acquire, by using any means, another piece of information required for the computation.

"Advantageous Effect"

[0130] According to the management server **10** of the present example embodiment, an advantageous effect (establishment of an electricity stealing prevention means, establishment of a settlement means for power use, and the like) similar to that of the first and second example embodiments is achieved.

[0131] Further, according to the present example embodiment, diffusion of discrimination information of a user can be reduced to a minimum level. In other words, according to the present example embodiment, discrimination information of a user is handled only by the user terminal **40** and the management server **10** among the components illustrated in FIG. **3**, and therefore transfer of the discrimination information of the user to other components (the control system **20**, the control apparatus **30**, the computation system **50**, and the system cooperation platform **60**) can be reduced. As a result, personal information of a user can be sufficiently protected. Further, while the protection is achieved, computation of environment information such as a greenhouse effect gas emission amount can be achieved.

[0132] Further, a business operator providing a charging service using the outlet **70** can make a predetermined contract with an administrator of a facility, for example, such as an amusement park, a supermarket, a coin-operated parking lot, and a month-to-month parking lot, and install the outlet **70** in a parking lot and the like of these facilities. An administrator of a facility can acquire a visitor and a customer for a purpose of a charging service. Further, a business operator providing a charging service can increase a profit via the charging service. In this manner, a preferable result can be achieved for both of an administrator of a facility and a business operator providing a charging service. As a result, an increase in the number of business operators providing the charging service and the number of facilities in which an installation of the outlet **70** is permitted is expected, and thereby further prevalence of a charging facility for an electric car is expected.

[0133] Further, in a case of a charging service according to the present example embodiment, communication between the control apparatus **30** (a smart meter or the like) and the electric car **80**, or determination of the electric car **80** are not required. Therefore, handling of information relating to the electric car **80** by the control apparatus **30** and the control system **20** can be avoided. As a result, protection of personal information is further achieved.

Fourth Example Embodiment

[0134] According to the present example embodiment, a user can further specify a power type to be purchased. Hereinafter, description thereof is made in detail.

[0135] An acquisition unit **11** of a management server **10** acquires, from a user terminal **40**, charging-content specifying information further specifying a power type.

[0136] The "power type" may include "renewable energy power" and "other power". The renewable energy power is power generated by natural energy such as sunlight, wind power, water power, and terrestrial heat. The other power is power generated by a fossil fuel such as petroleum, coal, and natural gas.

[0137] As another example of classification of power types, the "renewable energy power" may be further segmentalized according to a type of natural energy used for power generation such as photovoltaic power, wind force-electric power, hydroelectric power, and terrestrial heat-electric power. Further, the "other power" may be further segmentalized according to a type of fuel used for power generation such as petroleum-electric power, coal-electric power, and natural gas-electric power.

[0138] As described according the third example embodiment, a user operates the user terminal **40**, and accesses the management server **10** via a predetermined web page or an application. Then, the user inputs, on a screen of the web page or the application, apparatus specifying information, charging-content specifying information, discrimination information of a user, and the like, and performs an operation for transmitting the input pieces of information to the management server **10**. According to the present example embodiment, a power type can be included in the charging-content specifying information input and transmitted/received in this manner.

[0139] A power type which can be sold (handled) by a business operator providing a charging service is previously determined. In the web page or the application described above, power types which can be sold by a business operator providing a charging service are displayed, and user input for specifying one of the power types can be received.

[0140] Note that, a unit price may be different with respect to each power type. Further, contents of a service to be received for each power type may be different from each other. A user purchasing, for example, renewable energy power may be given an eco-point, or may be provided with an eco-coupon (a discount coupon or the like).

[0141] A user can perform input for specifying a power type, for example, via a UI screen as illustrated in FIG. **11** displayed in the user terminal **40**. On the UI screen illustrated in FIG. **11**, a unit price of each power type is displayed, and thereby selection by a user is assisted. Note that, another piece of information other than a unit price may be displayed.

[0142] A control execution unit **12** execute, based on a specified power type, settlement processing. When, for example, a unit price is different with respect to each power type, the control execution unit **12** computes a billing amount, based on a unit price of a specified power type and a measurement value acquired from a control system **20**. Further, when an eco-point is given to or an eco-coupon (a discount coupon or the like) is provide for a user purchasing renewable energy power, the control execution unit **12** gives a point, issues a coupon, or do such a thing. These pieces of processing can be achieved by using a well-known technique.

[0143] Further, the control execution unit **12** transmits, to the control system **20**, information indicating a power type to be purchased, in addition to a request for starting power supply to a predetermined outlet **70**, and charging-content specifying information.

[0144] The control system **20** registers a measurement value received from a control apparatus in association with information indicating a purchased power type. Further, the control system **20** transmits the measurement value received from the control apparatus **30** to a system cooperation platform **60**, in association with information indicating the purchased power type.

[0145] The control system **20** may integrate measurement values for each power type, and transmit the result to the system cooperation platform **60**. The control system **20** may integrate measurement values by region and for each power type, and transmit the results to the system cooperation platform **60**.

[0146] In this manner, a request acquisition unit **21** of the control system **20** can acquire control content information further indicating a power type of power to be charged. Then, a measurement value management unit **23** can transmit, to the system cooperation platform **60**, information indicating a power type

[0147] The system cooperation platform **60** transmits, to a computation system **50**, the received information. The system cooperation platform **60** may integrate measurement values for each power type, and transmit the result to the computation system **50**. The system cooperation platform **60** may integrate measurement values by region and for each power type, and transmit the results to the computation system **50**.

[0148] Based on the information, the computation system **50** can recognize how much power of each power type is purchased in each region. Then, the computation system **50** can compute, based on the content, environment load information by region. For example, a computation method (a function or the like) of computing, for each power type, a greenhouse effect gas emission amount (carbon emission amount) from an integration value of measurement values is previously generated. Then, the computation system **50** computes, based on the computation method for each power type and the integration value of measurement values for each power type, a greenhouse effect gas emission amount (carbon emission amount) with respect to each power type.

[0149] Other configurations of the management server **10**, the control system **20**, the control apparatus **30**, the user terminal **40**, the computation system **50**, the system cooperation platform **60**, the outlet **70**, and an electric car **80** according to the present example embodiment are similar to those of the first to third example embodiments.

[0150] According to the present example embodiment, an advantageous effect similar to that of the first to third example embodiments is achieved. Further, according to the present example embodiment, a user can select, at a time of charging using the outlet **70**, power to be purchased among a plurality of types of power. Based on such a user-friendly function, an increase in the number of users using the charging service is expected.

[0151] Further, according to the present example embodiment, a power type purchased by a user is managed, and thereby the managed power type can be used for computing environment load information. As a result, higher accurate and useful environment load information can be computed.

Fifth Example Embodiment

[0152] According to the present example embodiment, a user can further specify a power supply source. Hereinafter, description thereof is made in detail.

[0153] An acquisition unit **11** of a management server **10** acquires, from s user terminal **40**, charging-content specifying information further specifying a power supply source.

[0154] The "power supply source" is a power retailing business operator. According to the present example embodiment, a user can select, when receiving a charging service by using a certain outlet **70**, from what power retailing business operator power is purchased.

[0155] While there are various configurations for the acquisition unit **11** according to the present example embodiment, the following one example is described.

[0156] First, a user receiving a charging service using the outlet **70** installed by a first business operator operates his/her own user terminal **40**, and accesses, via a predetermined web page or an application provided by the first business operator, the management server **10** managed by the first business operator. Then, the user specifies a power supply source on a screen of the web page or the application. In other words, the user selects from what power retailing business operator power is purchased.

[0157] A power retailing business operator (power supply source) which can sell power via the outlet **70** installed by the first business operator is previously determined. The power retailing business operator is determined, for example, based on a contract or the like between the first business operator and another power retailing business operator. In the web page or the application, selectable power retailing business operators are displayed, and user input for specifying one of the power retailing business operators can be received.

[0158] A user can perform input for specifying a power supply source via a UI screen as illustrated in FIG. **12** displayed in the user terminal **40**. On the UI screen illustrated in FIG. **12**, a unit price of each power supply source is displayed, and thereby selection by the user is assisted. Note that, another piece of information other than the unit price may be displayed.

[0159] When the first business operator is specified by the user input, the user inputs, on the web page or the application, charging-content specifying information. On the other hand, when another power retailing business operator is selected, transition is made to a predetermined web page or an application provided by the selected power retailing business operator. In the predetermined web page or the application provided by the first business operator, for example, a link for transition to the predetermined web page or the application provided by the another power retailing business operator is set up. Then, the user inputs charging-content specifying information on the predetermined web page or the application provided by the another power retailing business operator. The user terminal **40** accesses, via the predetermined web page or the application provided by the another power retailing business operator, a management server managed by the another power retailing business operator.

[0160] Both of the management server **10** managed by the first business operator and the management server **10** managed by another power retailing business operator include the function described according to the first to fourth example embodiments, and execute processing described according to the first to fourth example embodiments.

[0161] Further, a control execution unit **12** transmits, to a control system **20**, information indicating a power supply source, in addition to a request for starting power supply to a predetermined outlet **70** and charging-content specifying information.

[0162] The control system **20** registers a measurement value received from a control apparatus in association with information indicating a power supply source. Further, the control system **20** transmits, to a system cooperation platform **60**, the measurement value received from the control apparatus **30** in association with the information indicating a power supply source. The control system **20** may integrate measurement values for each power supply source, and transmit the result to the system cooperation platform **60**. The control system **20** may integrate measurement values by region and for each power supply source, and transmit the results to the system cooperation platform **60**.

[0163] In this manner, a request acquisition unit **21** of the control system **20** can acquire control content information further indicating a power supply source of power to be charged. Then, a measurement value management unit **23** can transmit information indicating a power supply source to the system cooperation platform **60**.

[0164] The system cooperation platform **60** transmits, to a computation system **50**, the received information. The system cooperation platform **60** may integrate measurement values for each power supply source, and transmit the result to the computation system **50**. The system cooperation platform **60** may integrate measurement values by region and for each power supply source, and transmit the results to the computation system **50**.

[0165] Based on the information, the computation system **50** can recognize how much power of each power supply source is purchased in each region. Then, the computation system **50** can compute, based on the content, environment load information by region. For example, a computation method (a function or the like) of computing, for each power supply source, a greenhouse effect gas emission amount (carbon emission amount) from an integration value of measurement values is previously generated. Then, the computation system **50** computes, based on the computation method for each power supply source and the integration value of measurement values for each power supply source, a greenhouse effect gas emission amount (carbon emission amount) with respect to each power supply source.

[0166] Other configurations of the management server **10**, the control system **20**, the control apparatus **30**, the user terminal **40**, the computation system **50**, the system cooperation platform **60**, the outlet **70**, and an electric car **80** according to the present example embodiment are similar to those of the first to fourth example embodiments.

[0167] According to the present example embodiment, an advantageous effect similar to that of the first to fourth example embodiments is achieved. Further, according to the present example embodiment, a user can select, at a time of charging using the outlet **70**, power to be purchased from any power retailing business operator among a plurality of power retailing business operators. Based on such a user-friendly function, an increase in the number of users using the charging service is expected.

[0168] Note that, according to the present example embodiment, even in charging using the same outlet **70**, a power retailing business operator selling power to a user via the outlet **70** may be different in each user or in charging of each time. Such a pattern can be achieved, for example, by using a smart contract.

[0169] Further, according to the present example embodiment, a user can manage a power supply source in which power is purchased in each outlet **70**, and use this matter in order to compute environment load information. As a result, higher accurate and useful environment load information can be computed.

Sixth Example Embodiment

[0170] According to the present example embodiment, a user can further specify at least one of a power type and a power supply source. In other words, an acquisition unit **11** of a management server **10** acquires charging-content specifying information further specifying at last one of a power type and a power supply source. Then, a request acquisition unit **21** of a control system **20** acquires control content information further indicating at least one of a power type and a power supply source of power to be charged. A measurement value management unit **23** transmits, via a system cooperation platform **60** to a computation system **50**, the information indicating at least one of a power type and a power supply source. The computation system **50** computes, based on at least one of the power type and the power supply source, environment load information. Details thereof are as described according to the fourth and fifth example embodiments.

[0171] Other configurations of the management server **10**, the control system **20**, a control apparatus **30**, a user terminal **40**, the computation system **50**, the system cooperation platform **60**, an outlet **70**, and an electric car **80** according to the present example embodiment are similar to those of the first to fifth example embodiments. According to the present example embodiment, an advantageous effect similar to that of the first to fifth example embodiment is achieved.

Seventh Example Embodiment

[0172] According to the present example embodiment, a business operator providing a charging service sells renewable energy power via an outlet **70**. The business operator may sell, for example, photovoltaic power generated by sunlight. In renewable energy power and photovoltaic power, a power generation amount is affected by nature. Therefore, a power price unit is also dynamically changed.

[0173] Then, as illustrated in FIG. **8**, a management server **10** includes an information transmission unit **13**. The information transmission unit **13** determines, based on supply and demand balance information indicating a temporal change of supply and demand balance of power, a time period for recommending charging of power of a first type, and transmits, to a user, advice information recommending charging in the time period.

[0174] Power of the first type is renewable energy power or photovoltaic power.

[0175] First, the information transmission unit **13** acquires (1) information indicating a temporal change of a generation amount of power of the first type on a certain day, (2) information indicating a temporal change of a power demand amount on a certain day, and (3) information indicating a temporal change of a power supply amount on a certain day. The temporal change of a power supply amount indicates a temporal change of a power supply amount in not only power of the first type but also entire power of a plurality of types. The information transmission unit **13** may generate these pieces of information, or may acquire the information from an external apparatus generating these pieces of information. Generation of these pieces of information is achieved by using any well-known technique.

[0176] The "time period for recommending charging of power of a first type" is a time period where the three pieces of information described above satisfy a predetermined condition. In such a time period, a power unit price of power of the first type is expected to be relatively inexpensive.

[0177] There are various predetermined conditions, and, for example, a condition in that "a power supply amount exceeds a power demand amount by a reference value (e.g., predetermined percent) or more, and also a power generation amount of power of the first type is equal to or more than a threshold value", or the like is exemplified.

[0178] The information transmission unit **13** can transmit, to a user, advice information by using any means. The information transmission unit **13**, for example, may use a push notification function of an application, or may achieve by transmission to a previously-registered mail address.

[0179] Other configurations of the management server **10**, a control system **20**, a control apparatus **30**, a user terminal **40**, a computation system **50**, a system cooperation platform **60**, the outlet **70**, and an electric car **80** according to the present example embodiment are similar to those of the first to sixth example embodiments.

[0180] According to the present example embodiment, an advantageous effect similar to that of the first to sixth example embodiments is achieved. Further, according to the present example embodiment, a time period where a unit price of renewable energy power or photovoltaic power is relatively inexpensive can be computed, and advice information recommending charging in the time period can be provided for a user. Based on such a user-friendly function, an increase in the number of users using the charging service is expected.

[0181] Further, renewable energy power is likely to be in over surplus in a day time. Then, in a day time in which power is in over surplus, a power unit price tends to decrease. When advice information is provided for a user as described according to the present example embodiment, the user can charge power relatively inexpensively. Further, when an outlet of 100V or 200V is used, several hours are required for charging. When many outlets **70** are installed in a facility such as an amusement park and a supermarket, the facility can attract a customer for a charging purpose. Then, for several hours in which charging processing is executed, a facility is used, and thereby a sufficient profit can be made. Note that, power charged for the electric car **80** can be used for a purpose other than drive of the electric car **80**. When advice information is provided for a user as described according to the present example embodiment, the user can charge power in the electric car **80** relatively inexpensively, and thereby, bring the power back to a home or the like and use the brought power for another purpose. As a result, a reduction effect at a power peak is expected.

Modified Example

[0182] Hereinafter, a modified example applicable to the first to seventh example embodiments is described. According to the modified example, also, an advantageous effect similar to that of the example embodiments described above is achieved.

First Modified Example

[0183] According to the fifth example embodiment, a user was able to select, when receiving a charging service by using a certain outlet **70**, from what power retailing business operator power was purchased. Then, according to the fifth example embodiment, a user receiving a charging service using the outlet **70** installed by a first business operator selected from what power retailing business operator power was purchased, via a predetermined web page or an application provided by the first business operator.

[0184] According to a first modified example, a user selects from what power retailing business operator power is purchased, via a predetermined web page or an application provided by another business operator coordinating a plurality of power retailing business operators.

[0185] Specifically, a user receiving a charging service using the outlet **70** installed by the first business operator first operates a user terminal **40**, opens a predetermined web page or an application provided by the another business operator, and thereon, selects from what power retailing business operator power is purchased. In the web page or the application, a link for transition to a web page or an application of the selected power retailing business operator is set up. Therefore, according to the selection by the user, transition is made to the web page or the application of the selected power retailing business operator. Thereafter, the user inputs charging-content specifying information on the web page or the application of the selected power retailing business operator.

Second Modified Example

[0186] According to the example embodiments described above, the control system **20** transmitted, via the system cooperation platform **60**, a measurement value to the computation system **50**. According to a second modified example, a control system **20** transmits, without via a system cooperation platform **60**, a measurement value to a computation system **50**.

Third Modified Example

[0187] According to the third example embodiment, a configuration in which the computation system **50** or the system cooperation platform **60** is not included can be made.

[0188] While example embodiments of the present invention have been described with reference to the drawings, these example embodiments are exemplification of the present invention, and various configurations other than the above-described configurations are employable. The configurations according to the above-described example embodiments may be combined with each other, or some configurations may be replaced with other configurations. Further, the configurations of the above-described example embodiments may be added with various modifications without departing from the spirit. Further, configurations and processing disclosed according to the above-described example embodiments and modified examples may be combined with each other.

[0189] Further, in the sequence diagrams used in the above-described description, a plurality of steps (pieces of processing) are described in order, but an execution order of steps to be executed according to each example embodiment is not limited to the described order. According to each example embodiment, an order of illustrated steps can be modified within an extent that there is no harm in context. Further, the above-described example embodiments can be combined within an extent that there is no conflict in content.

[0190] The whole or part of the example embodiments disclosed above can be described as, but not limited to, the following supplementary notes.

[0191] 1. A management server including:

[0192] an acquisition unit that acquires, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and

[0193] a control execution unit that executes processing of controlling the control apparatus specified by the apparatus specifying information.

[0194] 2. The management server according to supplementary note 1, wherein the control execution unit transmits a request for starting power supply to the outlet to a control system that controls the control apparatus specified by the apparatus specifying information.

[0195] 3. The management server according to supplementary note 1 or 2, wherein

[0196] the acquisition unit acquires charging-content specifying information specifying a power amount to be charged, a time required for executing charging processing, or an amount of money to be paid in charging processing, and

[0197] the control execution unit transmits, to the control system, control content information indicating a charging power amount or a charging time determined by the charging-content specifying information.

[0198] 4. The management server according to supplementary note 3 dependent on supplementary note 2, wherein

[0199] the control system that controls the control apparatus

[0200] starts power supply to the outlet according to the request, and

[0201] stops power supply to the outlet according to completion of charging processing indicated by the control content information,

[0202] the acquisition unit acquires discrimination information of a user, and

[0203] the control execution unit

[0204] acquires, from the control system, a measurement value of a power use amount via the outlet during a period from start of power supply to the outlet to stop of power supply to the outlet, and

[0205] executes, based on the acquired measurement value, settlement processing for the user.

[0206] 5. The management server according to any one of supplementary notes 1 to 4, wherein the control execution unit does not transmit, to the control system, discrimination information of the user.

[0207] 6. The management server according to any one of supplementary notes 1 to 5, wherein the acquisition unit acquires the charging-content specifying information further specifying at least one of a power type and a power supply source.

[0208] 7. The management server according to any one of supplementary notes 1 to 6, further including

[0209] an information transmission unit that determines, based on supply and demand balance information indicating a temporal change of supply and demand balance of power, a time period for recommending charging of power of a first type, and transmits, to a user, advice information recommending charging in the time period.

[0210] 8. A control system including:

[0211] a request acquisition unit that acquires, from a management server, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time; and

[0212] a power control unit that controls a control apparatus that controls power supply to an outlet, starts power supply to the outlet according to the request, and also stops power supply to the outlet according to completion of charging processing indicated by the control content information.

[0213] 9. The control system according to supplementary note 8, wherein

[0214] the control system does not acquire discrimination information of a user executing, based on the request, charging processing.

[0215] 10. The control system according to supplementary note 9, further including

[0216] a measurement value management unit that registers, without association with the user, a measurement value of a power use amount via the outlet during a period from start of power supply to the outlet to stop of power supply to the outlet in association with the outlet or an installation location of the outlet.

[0217] 11. The control system according to supplementary note 10, wherein

[0218] the measurement value management unit

[0219] transmits, to a computation system that computes environment load information, the measurement value registered, without association with the user, in association with the outlet or an installation location of the outlet.

[0220] 12. The control system according to supplementary note 11, wherein

[0221] the computation system computes, based on an integration value of the measurement value by region, the environment load information by region.

[0222] 13. The control system according to supplementary note 11 or 12, wherein

[0223] the request acquisition unit acquires the control content information further indicating at least one of a power type of power to be charged and a power supply source,

[0224] the measurement value management unit transmits, to the computation system, information indicating at least one of the power type and the power supply source, and

[0225] the computation system computes, based on at least one of the power type and the power supply source, the environment load information.

[0226] 14. The control system according to any one of supplementary notes 11 to 13, wherein

[0227] the environment load information includes a carbon emission amount.

[0228] 15. The control system according to any one of supplementary notes 11 to 14, wherein

[0229] the measurement value management unit transmits, to the computation system, the measurement value via a system cooperation platform that manages, by region, information required for computing the environment load information.

[0230] 16. A management method including,

[0231] by one or more computers:

[0232] acquiring, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and

[0233] executing processing of controlling the control apparatus specified by the apparatus specifying information.

[0234] 17. A program for causing a computer to function as:

[0235] an acquisition unit that acquires, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and

[0236] a control execution unit that executes processing of controlling the control apparatus specified by the apparatus specifying information.

[0237] 18. A control method including,

[0238] by one or more computers:

[0239] acquiring, from a management server, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time; and

[0240] controlling a control apparatus that controls power supply to an outlet, starting power supply to the outlet according to the request, and also stopping power supply to the outlet according to completion of charging processing indicated by the control content information.

[0241] 19. A program for causing a computer to function as:

[0242] a request acquisition unit that acquires, from a management server, a request for starting power supply to a predetermined outlet and control content information indicating a charging power amount or a charging time; and

[0243] a power control unit that controls a control apparatus that controls power supply to an outlet, starts power supply to the outlet according to the request, and also stops power supply to the outlet according to completion of charging processing indicated by the control content information.

[0244] **10** Management server

[0245] **11** Acquisition unit

[0246] **12** Control execution unit

[0247] **13** Information transmission unit

[0248] **20** Control system

[0249] **21** Request acquisition unit

[0250] **22** Power control unit

[0251] **23** Measurement value management unit

[0252] **30** Control apparatus

[0253] **40** User terminal

[0254] **50** Computation system

[0255] **60** System cooperation platform

[0256] **70** Outlet
[0257] **80** Electric car
[0258] **1**A Processor
[0259] **2**A Memory
[0260] **3**A Input/output I/F
[0261] **4**A Peripheral circuit
[0262] **5**A Bus

1. A management server comprising:
at least one memory configured to store one or more instructions; and
at least one processor configured to execute the one or more instructions to:
acquire, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and
execute processing of controlling the control apparatus specified by the apparatus specifying information.

2. The management server according to claim **1**, wherein
the processor is further configured to execute the one or more instructions to transmit a request for starting power supply to the outlet to a control system that controls the control apparatus specified by the apparatus specifying information.

3. The management server according to claim **2**, wherein the processor is further configured to execute the one or more instructions to
acquire charging-content specifying information specifying a power amount to be charged, a time required for executing charging processing, or an amount of money to be paid in charging processing, and
transmit, to the control system, control content information indicating a charging power amount or a charging time determined by the charging-content specifying information.

4. The management server according to claim **3**, wherein the processor is further configured to execute the one or more instructions to
start power supply to the outlet according to the request,
stop power supply to the outlet according to completion of charging processing indicated by the control content information,
acquire discrimination information of a user,
acquire, from the control system, a measurement value of a power use amount via the outlet during a period from start of power supply to the outlet to stop of power supply to the outlet, and
execute, based on the acquired measurement value, settlement processing for the user.

5. The management server according to claim **4**, wherein
the processor is further configured to execute the one or more instructions not to transmit, to the control system, discrimination information of the user.

6. The management server according to claim **4**, wherein
the processor is further configured to execute the one or more instructions to acquire the charging-content specifying information further specifying at least one of a power type and a power supply source.

7. The management server according to claim **1**, wherein the processor is further configured to execute the one or more instructions to
determine, based on supply and demand balance information indicating a temporal change of supply and demand balance of power, a time period for recommending charging of power of a first type, and
transmit, to a user, advice information recommending charging in the time period.

8. A management method comprising,
by one or more computers:
acquiring, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and
executing processing of controlling the control apparatus specified by the apparatus specifying information.

9. The management method according to claim **8**, wherein
the one or more computers transmit a request for starting power supply to the outlet to a control system that controls the control apparatus specified by the apparatus specifying information.

10. The management method according to claim **9**, wherein the one or more computers
acquire charging-content specifying information specifying a power amount to be charged, a time required for executing charging processing, or an amount of money to be paid in charging processing, and
transmit, to the control system, control content information indicating a charging power amount or a charging time determined by the charging-content specifying information.

11. The management method according to claim **10**, wherein the one or more computers
start power supply to the outlet according to the request,
stop power supply to the outlet according to completion of charging processing indicated by the control content information,
acquire discrimination information of a user,
acquire, from the control system, a measurement value of a power use amount via the outlet during a period from start of power supply to the outlet to stop of power supply to the outlet, and
execute, based on the acquired measurement value, settlement processing for the user.

12. The management method according to claim **11**, wherein
the one or more computers do not transmit, to the control system, discrimination information of the user.

13. The management method according to claim **11**, wherein
the one or more computers acquire the charging-content specifying information further specifying at least one of a power type and a power supply source.

14. The management method according to claim **8**, wherein the one or more computers
determine, based on supply and demand balance information indicating a temporal change of supply and demand balance of power, a time period for recommending charging of power of a first type, and
transmit, to a user, advice information recommending charging in the time period.

15. A non-transitory storage medium storing a program for causing a computer to:
acquire, from a user terminal, apparatus specifying information specifying a control apparatus that controls power supply to an outlet; and
execute processing of controlling the control apparatus specified by the apparatus specifying information.

16. The non-transitory storage medium according to claim **15**, wherein

the program causing the computer to transmit a request for starting power supply to the outlet to a control system that controls the control apparatus specified by the apparatus specifying information.

17. The non-transitory storage medium according to claim **16**, wherein the program causing the computer to

acquire charging-content specifying information specifying a power amount to be charged, a time required for executing charging processing, or an amount of money to be paid in charging processing, and

transmit, to the control system, control content information indicating a charging power amount or a charging time determined by the charging-content specifying information.

18. The non-transitory storage medium according to claim **17**, wherein the program causing the computer to

start power supply to the outlet according to the request,

stop power supply to the outlet according to completion of charging processing indicated by the control content information,

acquire discrimination information of a user,

acquire, from the control system, a measurement value of a power use amount via the outlet during a period from start of power supply to the outlet to stop of power supply to the outlet, and

execute, based on the acquired measurement value, settlement processing for the user.

19. The non-transitory storage medium according to claim **18**, wherein

the program causing the computer not to transmit, to the control system, discrimination information of the user.

20. The non-transitory storage medium according to claim **18**, wherein

the program causing the computer to acquire the charging-content specifying information further specifying at least one of a power type and a power supply source.

* * * * *