A METHOD AND SYSTEM FOR CONVERTING RENEWABLE ENERGY INTO RENEWABLE ENERGY CREDIT POINTS

TECHNICAL FIELD

[0001] The following is in the field of renewable energy, and discloses a method and system for converting renewable energy into renewable energy credit points.

BACKGROUND ART

[0002] In countries and cities where land is scarce and real estate is at a premium, more and more privately owned buildings are being used to house renewable energy generating equipment. The incentive for the building owner to do so would be to save on electricity costs as the renewable energy can help supplement the building's energy demands.

[0003] Sometimes the renewable energy generated may be more than what the building requires, and the excess or surplus renewable energy will then be exported into the power grid. The building owner may then be monetarily compensated by an energy utility company for the contributed energy to the power grid.

[0004] However, there is currently no mechanism to quantify the amount of contributed renewable energy. With the push in modern society to embrace all things "green" and sustainable, a mechanism that recognizes the contribution of surplus renewable energy will help incentivize the export of renewable energy to the power grid.

[0005] Therefore, there is a need for a method and system that is capable of quantifying the amount of contributed renewable energy. More particularly, there is a need for a method and system for converting exported renewable energy into renewable energy credit points.

[0006] Furthermore, other desirable features and characteristics will become apparent from the subsequent detailed description and the appended claims, taken in conjunction with the accompanying drawings and this background of the disclosure.

SUMMARY OF INVENTION

[0007] According to a first aspect of the invention, a method for converting renewable energy into renewable energy credit points is described, the method comprising the steps of installing renewable energy generating equipment in at least one building for generating renewable energy, the generated renewable energy catering to the energy requirements of the at least one building and resulting in a surplus, and exporting the surplus renewable energy to a power grid. The method further comprises the steps of obtaining an energy measurement by measuring the exported renewable energy with a energy meter device at a polling interval; storing the energy measurement obtained at each polling interval in the energy meter device; and uploading at an uploading interval, the stored energy measurements from the energy meter device to a server. The method further comprises the steps of consolidating the energy measurements uploaded in the upload interval to arrive at an accumulated energy measurement for the upload interval, and applying a conversion rate to the accumulated energy measurement for the upload interval to obtain an equivalent value in renewable energy credit points, wherein the conversion rate is a ratio between renewable energy credit points and renewable energy.

[0008] Preferably, the method further comprises the step of selling the renewable energy credit points acquired by an operating company with an equivalent value in energy based on the conversion rate to an energy consumer.

[0009] Preferably, the method further comprises the step of selling the renewable energy credit points acquired by an operating company without an equivalent value in energy based on the conversion rate to an energy consumer.

[0010] Preferably, the polling interval is any one of the following: every second, every minute, every half hour and every hour.

[0011] Preferably, the uploading interval is any one of the following: every second, every minute, every half-hour and every hour.

[0012] Preferably, the uploading interval is equivalent to the polling interval.

[0013] Preferably, the uploading of the stored energy measurements from the energy meter device to the server is done wirelessly via a communication module.

[0014] Preferably, the conversion rate is one renewable energy credit point is to every 1 kWh, or one renewable energy credit point is to every 1000 kWh.

[0015] According to a second aspect of the invention, a system for converting renewable energy into renewable energy credit points is described, the system comprising a server, and renewable energy generating equipment installed in at least one building and configured to generate renewable energy, the generated renewable energy catering to the energy requirements of the at least one building and resulting in a surplus, and export the surplus renewable energy to a power grid. The system further comprises at least one energy meter device configured to obtain an energy measurement by measuring the exported renewable energy at a polling interval, store the energy measurement obtained at each polling interval; and upload at an uploading interval, the stored energy measurements to the server. Wherein the server is configured to consolidate the energy measurements uploaded in the uploading interval to arrive at an accumulated energy measurement for the uploading interval; and apply a conversion rate to the accumulated energy measurement for the uploading interval to obtain an equivalent value in renewable energy credit points, and wherein the conversion rate is a ratio between renewable energy credit points and renewable energy.

[0016] Preferably, the renewable energy credit points acquired by an operating company with an equivalent value in energy based on the conversion rate are sold to an energy consumer.

[0017] Preferably, the renewable energy credit points acquired by an operating company without an equivalent value in energy based on the conversion rate are sold to an energy consumer.

[0018] Preferably, the polling interval is any one of the following: every second, every minute, every half hour and every hour.

[0019] Preferably, the uploading interval is any one of the following: every second, every minute, every half-hour and every hour.

[0020] Preferably, the uploading interval is equivalent to the polling interval.

[0021] Preferably, the system further comprises a communication module, and wherein the renewable energy generating equipment is further configured to upload the stored energy measurements from the energy meter device wirelessly to the server via the communication module.

[0022] Preferably, the conversion rate is one renewable energy credit point is to every 1 kWh, or one renewable energy credit point is to every 1000 kWh.

BRIEF DESCRIPTION OF THE DRAWINGS

[0023] The accompanying figures, where like reference numerals refer to identical or functionally similar elements throughout the separate views and which together with the detailed description below are incorporated in and form part of the specification, serve to illustrate various embodiments, by way of example only, and to explain various principles and advantages in accordance with a present embodiment.

[0024] Figure 1 shows a schematic diagram of a system for converting exported renewable energy into renewable energy credit points in accordance with an embodiment of the invention.

[0025] Figure 2 shows a schematic diagram of an energy meter device in accordance with an embodiment of the invention.

[0026] Figure 3 shows a flowchart of a method for converting exported renewable energy into renewable energy credit points according to an embodiment of the invention.

[0027] Figure 4 shows an exemplary database.

[0028] Figure 5 shows a schematic diagram of a system for converting exported renewable energy into renewable energy credit points in accordance with another embodiment of the invention.

[0029] Skilled artisans will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been depicted to scale. For example, the dimensions of some of the elements in the block diagrams or steps in the flowcharts may be exaggerated in respect to other elements to help improve understanding of the present embodiment.

DETAILED DESCRIPTION

[0030] The following detailed description is merely exemplary in nature and is not intended to limit the invention or the application and uses of the invention. Furthermore, there is no intention to be bound by any theory presented in the preceding background of the invention or the following detailed description. It is the intent of the preferred embodiments to disclose a method and system for converting renewable energy exported to a power grid into renewable energy credit points. These renewable energy credit points (henceforth referred to as "REC") will be awarded to an operating company, the operating company owning the renewable energy generating equipment and being responsible for installing the renewable energy generating equipment in buildings. The amount of REC earned by the operating company will be directly correlated to the amount of renewable energy exported to the power grid by its renewable energy generating equipment.

[0031] The operating company can monetize its acquired REC by selling the REC to energy consumers (for example companies and businesses). Energy consumers will be incentivized to purchase the REC because the REC serves as an indicator in which the energy consumers contribute to saving the environment. The purchased REC can also help energy consumers obtain CSR (corporate social responsibility) ratings. The REC can also form part of the sustainability reports which energy consumers have to prepare for their reporting to stakeholders. Furthermore, the REC help to contribute to the concept of additionality, so as to help energy consumers convince stakeholders of their investment viability.

[0032] Figure 1 shows a schematic diagram of system 100 in accordance with an embodiment of the invention. System 100 comprises building 101 and renewable energy generating equipment 102. Building 101 can be privately owned or tenanted by a company or business. Renewable energy generating equipment 102 can non-exhaustively include solar panels, solar modules, wind turbines, wind mills and other renewable energy generating

equipment known in the art. Preferably, renewable energy generating equipment 102 is installed in the premises of building 101. For example, renewable energy generating equipment 102 such as solar panels can be installed on the rooftop of building 101. Preferably, renewable energy generating equipment 102 is owned by the operating company.

[0033] A portion of the renewable energy generated by renewable energy generating equipment 102 can be consumed by building's 101 electricity demands. The surplus or excess portion of the generated renewable energy is exported towards power grid 103 via power conduit 104. Power conduit 104 can be any power line or a series of power cables.

[0034] Energy meter device 105 is situated at a measurement location along power conduit 104. This measurement location is intermediate between renewable energy generating equipment 102 and power grid 103. Energy meter device 105 is adapted to measure the energy travelling along power conduit 104. Energy meter device 105 can upload the energy measurement readings to server 107 via communication link 106 at an uploading interval. Communication link 106 can be a wireless link or a wired link. Database 108 is then updated with the energy measurement readings.

[0035] Figure 2 shows a schematic diagram of energy meter device 105. Energy meter device 105 comprises energy meter module 201. Energy meter module 201 contains the necessary circuitry to measure the energy travelling along power conduit 104. Preferably, energy meter device 105 also comprises processing module 202 and storage module 203. Processing module 202 can store the energy measurement readings provided by energy meter module 201 into storage module 203. Storage module 203 may also store an identifier of the energy meter device 105. Preferably, energy meter device 105 also comprises communication module 204. Processing module 202 can send the energy measurement readings stored in storage module 203 to server 107 using communication module 204. Communication module 204 may include a wireless adapter for wireless communication. Alternatively, communication module 204 may not be integral with energy meter device 105 as shown in figure 2, but communication module 204 will still be operationally connected with energy meter device 105 such that processing module 202 can send the energy measurement readings stored in storage module 203 to server 107 using communication module 204.

[0036] Energy meter module 201 obtains energy measurement readings of the energy travelling along power conduit 104 at a polling interval. This polling interval may be every second, every minute, every half hour, every hour etc. Processing module 202 stores the energy measurement readings obtained at each polling interval into storage module 203. At an upload interval, processing module 202 uploads the energy measurement readings stored in storage module 203 to server 107. Preferably, energy meter device 105 uploads the energy measurements wirelessly for each polling interval in storage module 203 to server 107 via communication module 204. The upload interval may be every second, every minute, every half hour, every hour etc. Preferably, the upload interval is longer than the polling interval. Alternatively, the upload interval is the same as the polling interval.

[0037] Figure 3 illustrates a method for converting exported renewable energy into renewable energy credit points according to a preferred embodiment of the invention.

[0038] In step 301, the operating company installs renewable energy generating equipment 102 in building 101 to generate renewable energy to cater to building's 101 energy requirements. For example, renewable energy generating equipment 102 such as solar panels can be installed on the rooftop of building 101. Preferably, building 101 is neither owned nor leased by the operating company. Preferably, renewable energy generating equipment 102 belongs to the operating company. The incentive of the owner of building 101 in allowing the operating company to install renewable energy generating equipment 102 in building 101 would be to utilize the renewable energy generated by renewable energy generating equipment 102 to satisfy building's 101 energy demands.

[0039] In step 302, surplus renewable energy is exported towards power grid 103 via power conduit 104. There is a surplus in renewable energy as the renewable energy generated by renewable energy generating equipment 102 exceeds the energy demands of building 101.

[0040] In step 303, energy meter module 201 of energy meter device 105 measures the energy being exported towards power grid 103 at a polling interval and processing module 202 stores the energy measurements in storage module 203. The polling interval may be every second. Preferably, processing module 202 also records and stores the time and date of when the energy measurement readings were taken in storage module 203.

[0041] In step 304, at an upload interval, processing module 202 of energy meter device 105 uploads the energy measurements for each polling interval in storage module 203 to server 107. Preferably, energy meter device 105 uploads the energy measurements wirelessly for each polling interval in storage module 203 to server 107 via communication module 204. The uploading interval may be every half-hour. Preferably, the uploading interval is longer than the polling interval. Alternatively, the uploading interval is equivalent to the polling interval. Preferably, the identifier of the energy meter device 105 is also uploaded to server 107. Preferably, the time and date of when the energy measurement readings were taken are also uploaded to server 107.

[0042] In step 305, server 107 consolidates the energy measurements uploaded in the upload interval to arrive at an accumulated energy measurement for the upload interval.

[0043] In step 306, server 107 stores the accumulated energy measurement for the upload interval in database 108. Preferably, the identifier of the energy meter device 105 is also stored in database 108. Figure 4 provides an illustration of database 108.

[0044] In step 307, server 107 applies a conversion rate to the accumulated energy measurement for the upload interval to obtain an equivalent value in REC. The conversion rate is a ratio between REC and renewable energy. For illustration purposes, if the conversion rate is 1 REC for every 1,000 kilowatt-hour (kWh), an accumulated energy measurement of 1,000 kWh will garner 1 REC, an accumulated energy measurement of 3,000 kWh will garner 3 REC, and an accumulated energy measurement of 5,000 kWh will garner 5 REC, as shown in figure 4. Preferably, the conversion rate is a ratio of 1 REC for every 1 kWh, or a ratio of 1 REC for every 1000 kWh, but any logical and practical ratio between REC and renewable energy is envisioned. Preferably, a government linked entity will set standards, and regulate the auditors of the REC.

[0045] The more renewable energy the operating company supplies to power grid 103, the more REC the operating company earns. The renewable energy supplied to power grid 103 is scalable as the operating company can negotiate with various owners of buildings 101 for the installation of renewable energy generating equipment 102. This is depicted in figure 5, where renewable energy generating equipment 102 are installed across a plurality of buildings 101. The concept of capitalizing on property not owned by the operating company makes the

renewable energy generating process extremely scalable. The surplus renewable energy generated by each renewable energy generating equipment 102 will be exported to power grid 103 and tracked by energy meter device 105. Depending on the location of buildings 101 and the proximity of buildings 101 from each other, a single energy meter device 105 (identifier 2) can measure the exported renewable energy from multiple buildings 101 as illustrated in figure 5. These energy meter devices 105 (identifier 2) tend to measure higher amounts of energy as opposed to energy meter devices 105 (identifier 1) which measure the exported renewable energy from a single building 101 as depicted in figure 4. As shown in figure 4, the total REC attained by the operating company from the period of 12.00 to 13.30 is 39 REC.

[0046] The operating company can monetize its acquired REC by selling the REC to energy consumers (i.e. other companies). Preferably, the operating company sells the REC with an energy component. Assuming the conversion rate is a ratio of 1 REC for every 1000 kWh, say for example, the energy consumer purchases 5 REC with the energy component of 5000 kWh from the operating company. The monetary value of the 5 REC is thus linked to the selling price of 5000 kWh as set by the operating company. After the energy consumer draws 5000 kWh from power grid 103, the 5 REC which the energy consumer owns would be exhausted. However, there is no guarantee that the 5000 kWh drawn by the energy consumer from power grid 103 came from renewable sources. This is because once the renewable energy is exported to power grid 103 (step 302 of figure 3), the renewable energy will form part of an energy pool in power grid 103, mixed with energy generated from non-renewable sources (i.e. burning of fossil fuels at power stations). When the energy consumer draws 5000 kWh from power grid 103, power grid 103 will simply supply 5000 kWh worth of energy from the energy pool to the energy consumer, without distinguishing between energy that came from renewable sources or non-renewable sources. What can however be guaranteed is that by purchasing 5 REC, the energy consumer can be assured that 5000 kWh worth of renewable energy had been supplied to power grid 103 at some point in time.

[0047] Alternatively, the operating company can sell the REC without an energy component. In this embodiment, the energy consumer purchases 5 REC from the operating company, but the 5000 kWh will be purchased from another energy retailer. As the REC are being sold by the operating company without the energy component, the monetary value of the 5 REC is thus not linked to the selling price of 5000 kWh. The monetary value of the 5 REC can thus be set by the operating company, which can fluctuate based on market conditions. When the

energy consumer draws 5000 kWh from power grid 103, the 5 REC which the energy consumer owns would be exhausted.

[0048] Energy consumers will be incentivized to purchase the REC because the REC serves as an indicator in which the energy consumers contribute to saving the environment. This is because by purchasing REC, the energy consumer can be assured that an equivalent value in renewable energy had been supplied to power grid 103 at some point in time. The purchased REC can also contribute to the CSR (corporate social responsibility) agenda of these energy consumers. The REC can also form part of the sustainability reports which energy consumers have to prepare for their reporting to stakeholders. Furthermore, the REC help to contribute to the concept of additionality, so as to help energy consumers convince stakeholders of their investment viability.

[0049] In another embodiment, renewable energy generating equipment 102 is owned jointly by the operating company and by the owner of building 101. In this embodiment, when the REC are awarded, the owner of building 101 will own a portion of the REC.

[0050] It should further be appreciated that the exemplary embodiments are only examples, and are not intended to limit the scope, applicability, operation, or configuration of the invention in any way. Rather, the foregoing detailed description will provide those skilled in the art with a convenient road map for implementing an exemplary embodiment of the invention, it being understood that various changes may be made in the function and arrangement of elements and method of operation described in an exemplary embodiment without departing from the scope of the invention as set forth in the appended claims.

CLAIMS

1. A method for converting renewable energy into renewable energy credit points comprising the steps of:

installing renewable energy generating equipment in at least one building for generating renewable energy, the generated renewable energy catering to the energy requirements of the at least one building and resulting in a surplus;

exporting the surplus renewable energy to a power grid;

obtaining an energy measurement by measuring the exported renewable energy with a energy meter device at a polling interval;

storing the energy measurement obtained at each polling interval in the energy meter device;

uploading at an uploading interval, the stored energy measurements from the energy meter device to a server;

consolidating the energy measurements uploaded in the upload interval to arrive at an accumulated energy measurement for the upload interval; and

applying a conversion rate to the accumulated energy measurement for the upload interval to obtain an equivalent value in renewable energy credit points, wherein the conversion rate is a ratio between renewable energy credit points and renewable energy.

2. The method of claim 1 further comprising the step of selling the renewable energy credit points acquired by an operating company with an equivalent value in energy based on the conversion rate to an energy consumer.

3. The method of claim 1 further comprising the step of selling the renewable energy credit points acquired by an operating company without an equivalent value in energy based on the conversion rate to an energy consumer.

4. The method of any one of the preceding claims wherein the polling interval is any one of the following: every second, every minute, every half hour and every hour.

5. The method of any one of the preceding claims wherein the uploading interval is any one of the following: every second, every minute, every half-hour and every hour.

6. The method of any one of the preceding claims wherein the uploading interval is equivalent to the polling interval.

7. The method of any one of the preceding claims wherein the uploading of the stored energy measurements from the energy meter device to the server is done wirelessly via a communication module.

8. The method of any one of the preceding claims wherein the conversion rate is one renewable energy credit point is to every 1 kWh, or one renewable energy credit point is to every 1000 kWh.

9. A system for converting renewable energy into renewable energy credit points comprising:

a server,

renewable energy generating equipment installed in at least one building and configured to:

generate renewable energy, the generated renewable energy catering to the energy requirements of the at least one building and resulting in a surplus; and

export the surplus renewable energy to a power grid;

and at least one energy meter device configured to:

obtain an energy measurement by measuring the exported renewable energy at a polling interval;

store the energy measurement obtained at each polling interval; and

upload at an uploading interval, the stored energy measurements to the server;

wherein the server is configured to consolidate the energy measurements uploaded in the uploading interval to arrive at an accumulated energy measurement for the uploading interval; and apply a conversion rate to the accumulated energy measurement for the uploading interval to obtain an equivalent value in renewable energy credit points, and wherein the conversion rate is a ratio between renewable energy credit points and renewable energy.

10. The system of claim 9 wherein the renewable energy credit points acquired by an operating company with an equivalent value in energy based on the conversion rate are sold to an energy consumer.

11. The system of claim 9 wherein the renewable energy credit points acquired by an operating company without an equivalent value in energy based on the conversion rate are sold to an energy consumer.

12. The system of any one of claims 9 to 11 wherein the polling interval is any one of the following: every second, every minute, every half hour and every hour.

13. The system of any one of claims 9 to 12 wherein the uploading interval is any one of the following: every second, every minute, every half-hour and every hour.

14. The system of any one of claims 9 to 13 wherein the uploading interval is equivalent to the polling interval.

15. The system of any one of claims 9 to 14 further comprising a communication module, and wherein the renewable energy generating equipment is further configured to upload the stored energy measurements from the energy meter device wirelessly to the server via the communication module.

16. The system of any one of claims 9 to 15 wherein the conversion rate is one renewable energy credit point is to every 1 kWh, or one renewable energy credit point is to every 1000 kWh.