CLAIMS

1. A load controlling device operably connected to an electrical power grid and at least one renewable electrical energy generator for controlling at least one of a plurality of electrical loads the load controlling device configured to reduce export of renewable electrical energy to the power grid, said plurality of electrical loads ~~being~~ supplied by at least one renewable energy generator and/or ~~an~~ the electrical ~~mains supply~~ power grid, wherein the at least one renewable electrical energy generator derives energy from a renewable energy source; said load controlling device ~~comprising~~ including:

an energy sensor for measuring an energy parameter, wherein the energy parameter is a value representative of the amount of renewable energy output by the energy sensor, the energy parameter of the energy sensor being directly proportional to the output of the at least one renewable energy generator;

a controller means for determining the amount of electrical loads that can be connected or disconnected on the basis of the measured energy parameter;

a switching device for connecting and disconnecting the at least one electrical load based on an output of the controller means; and

wherein as the energy parameter varies the output of the controller means varies to cause the switching device to connect and disconnect electrical loads such that export of renewable electrical energy to the electrical power grid is reduced.

~~2. A load controlling device as claimed in claim 1, wherein the renewable energy generator can be any one or more of the following:~~

~~a) solar photovoltaic generators;~~
~~b) wind turbine;~~
~~c) wave and tide generators; and/or~~
~~d) hydroelectric generator.~~

~~3. A load controlling device as claimed in claim 1 or claim 2 comprising at least one solar photovoltaic generator and wherein the energy sensor comprises a solar photovoltaic panel with similar characteristics as those of the at least one generator and aligned substantially with the same orientation and inclination as the at least one solar photovoltaic generator, such that the energy parameter and the amount of~~

~~energy output by the photovoltaic panel is directly proportional to the amount of energy output by the at least one solar photovoltaic generator.~~

~~4. A load controlling device as claimed in claim 3, wherein the energy parameter and the amount of energy output by the photovoltaic panel is a percentage of the amount of energy output by the at least one solar photovoltaic generator.~~

~~5~~2. A load controlling device according to ~~any one of the preceding claims comprising~~ claim 1 including at least one solar photovoltaic generator and wherein the energy sensor ~~comprises~~ includes a solar irradiance meter located using the same orientation and inclination as the at least one solar photovoltaic generator, such that the energy parameter and the amount of energy output by the solar irradiance meter is directly proportional to the amount of energy output by the at least one solar photovoltaic generator.

~~6~~3. A load controlling device ~~as claimed in claim 5~~ according to claim 2, wherein the switching device will close and open as the value of the solar irradiance meter increases and decreases thereby connecting and disconnecting electrical loads.

~~7. A load controlling device according to any one of the preceding claims comprising at least one solar photovoltaic generator wherein the energy sensor comprises a bi-directional voltage and/or current sensing device which senses the DC voltage, current and power from the at least one solar photovoltaic generator.~~

~~8~~4. A load controlling device ~~as claimed in claim 7~~ according to any one of the preceding claims, wherein the energy sensor is located in any one or more of the following locations:

a) on the DC side of the inverter;
b) at or near the DC isolation switch at the output of the photovoltaic generator; and/or
c) in parallel with one or more photovoltaic panels in the photovoltaic generator.

~~9~~5. A load controlling device according to any one of the preceding claims ~~comprising~~ including a solar photovoltaic generator and an inverter for converting the direct current (DC) from the solar photovoltaic generator to alternating current (AC)~~.~~

~~10. A load controlling device as claimed in claim 9~~, wherein the energy sensor ~~comprises~~ includes a bi-directional voltage and/or current sensing device which senses the AC voltage, current and power from the inverter.

~~11~~6. A load controlling device ~~as claimed in claim 9~~ according to any one of the preceding claims, wherein the energy sensor ~~comprises a bi-directional voltage and/or current sensing device which~~ is built in for the inverter to sense the AC voltage, current and power.

~~12~~7. A load controlling device ~~as claimed in claim 11~~ according to claim 6, wherein the inverter is programmable to recognize its output power and operable to connect or disconnect an electrical load as the output of the inverter varies with the energy parameter.

~~13~~8. A load controlling device ~~as claimed in claim 9~~ according to claim 5, wherein the energy sensor ~~comprises~~ includes a bi-directional voltage and/or current sensing device which senses the AC voltage, current and power at the electrical ~~mains supply~~ power grid.

~~14. A load controlling device as claimed in any one of claims 4 to 13, wherein the current sensing device is a whole current measuring device.~~

~~15. A load controlling device as claimed in any one of claims 4 to 13, wherein the current sensing device is a current transformer which uses a primary conductor as the primary winding and a secondary coil that is coiled around a toroidal core that is positioned around a main conductor to measure the current.~~

~~16. A load controlling device as claimed in any one of claims 4 to 13, wherein the voltage sensing device is a voltage transformer or a potential transformer such as an instrument transformer.~~

~~17~~9. A load controlling device according to any one of the preceding claims, wherein the controller means further ~~comprises~~ includes a processing means that receives a signal representing the energy parameter and determines the amount of electrical load that can be connected or disconnected to accommodate the amount of available power from reusable energy sources.

~~18. A load controller as claimed in claim 17, wherein the processing means is a microprocessor.~~

~~19~~10. A load controlling device ~~as claimed in claim 17 or claim 18~~ according to claim 9, wherein the processing means further ~~comprises~~ includes a switch on value and a switch off value for controlling the amount of load that is connected or disconnected as the energy parameter varies.

~~20. A load controlling device as claimed in claim 19, wherein the switch off value and the switch on value are two different values.~~

~~21~~11. A load controlling device ~~as claimed in claim 19 or claim 20~~ according to claim 10, wherein the switch on and the switch off value is a variable control which can be manually adjusted or is automatically adjusted according to computer instruction code executed in the ~~microprocessor~~ processing means.

~~22~~12. A load controlling device according to any one of the preceding claims, wherein the switching device further ~~comprises~~ includes an electrically controlled switch operable by the processing means to connect and disconnect electrical loads.

~~23~~13. A load controlling device ~~as claimed in claim 22~~ according to claim 12, wherein the electrically controlled switch ~~comprises~~ includes a switching circuit in the controller means and an electromagnetic coil and contacts located in line with the at least one electrical load to connect or disconnect the at least one electrical load.

~~24~~14. A load controlling device ~~as claimed in claim 22 or claim 23~~ according to either claim 12 or claim 13, wherein the device ~~comprises~~ includes a plurality of electrically

controlled switches that are operable by the processing means to connect and disconnect a plurality of electrical loads.

~~25. A load controlling device as claimed in claim 24, wherein the switches and associated electrical loads are connected and disconnected to control the amount of electrical power consumed as the energy parameter varies.~~

~~26. A load controlling device as claimed in claim 24, wherein the switches and associated electrical loads are operable according to the computer instruction code executed by the processing means and programmed to control the amount of load that is connected or disconnected as the energy parameter varies.~~

~~27~~15. A load controlling device according to any one of the preceding claims, wherein the plurality of electrical loads ~~comprises~~ includes at least one controlled load and at least one uncontrolled load.

~~28. A load controlling device as claimed in claim 27, wherein the plurality of loads comprises fixed and variable loads.~~

~~29. A load controlling device as claimed in claim 28, wherein at least one of the controlled loads comprises at least one variable load.~~

~~30. A load controlling device as claimed in claim 29, wherein the processing means, under the control of computer instruction code, causes supply of electrical power to the variable load with a varying amount of power to suit the variable load.~~

~~31~~16. A load controlling device according to any one of the preceding claims, further ~~comprising~~ including a data network for transferring information between the plurality of electrical loads, the renewable energy generator, the energy sensor, the controller means, the switching device and the electrical ~~mains supply~~ power grid.

~~32~~17. A method for controlling at least one of a plurality of electrical loads thereby reducing export of renewable electrical energy to an electrical power grid, said plurality of electrical loads ~~being~~ supplied by at least one renewable energy generator and/or

~~an~~ the electrical ~~mains supply~~ power grid, wherein the at least one renewable energy generator derives energy from a renewable energy source; said method ~~comprising~~ including the steps of:

a) measuring an energy parameter using an energy sensor;

b) determining the amount of electrical loads that can be connected or disconnected by a controller on the basis of the measured energy parameter;

c) connecting and/or disconnecting the electrical loads based on an output of the controller means, wherein the controller is configured to reduce export of renewable energy to the power grid; and

wherein the energy parameter equates to a value representative of the amount of renewable energy output by the energy sensor, the energy parameter of the energy sensor being proportional to the output of the at least one renewable energy generator.

~~33~~18. A method according to claim ~~32~~17 wherein the power flowing across a main switch connecting ~~a~~ the power grid to an end user premises is measured and the method further ~~comprises~~ includes the step~~s~~ of:

d) connecting non-essential electrical loads to absorb available electrical power supplied by renewable energy generators in the event that power flow from the premises to the power grid occurs.

~~34~~19. A method according to claim ~~33~~18 wherein the method further ~~comprises~~ includes the step of:

e) disconnecting non-essential electrical loads in the event that the measurement of power flowing through the main switch connecting the power grid to the premises indicates that power draw from the grid is approaching the peak demand threshold as defined by the network utility.

~~35~~20. Computer instruction code executable on a computer processor for controlling at least one of a plurality of electrical loads, said plurality of electrical loads being supplied by at least one renewable energy generator or an electrical ~~main supply~~ power grid, wherein the at least one renewable energy generator derives energy from a renewable energy source; the computer instruction code causing the measurement of an energy parameter using an energy sensor; determination of the amount of electrical loads that can be connected or disconnected by a controller according to the

measured energy parameter; causing the connecting and/or disconnecting of electrical loads based upon an output of the controller, wherein the controller is configured to reduce export of renewable energy to the power grid, and wherein the energy parameter is a value representative of the amount of renewable energy output by the energy sensor, the energy parameter of the energy sensor being proportional to the output of the at least one renewable energy generator.