CLAIMS

1. An energy consumption calculating system comprising:

an information processor that calculates an estimated value of energy consumed by a heating and cooling unit provided with an automatic control function,

the information processor comprising:

a data acquisition unit for acquiring internal and external environmental information of a building in which the heating and cooling unit is installed;

an energy consumption table in which a plurality of cells is formed into a matrix;

an energy consumption calculator that calculates cell values for the energy consumption table; and

an energy consumption integration unit that integrates the cell values of the energy consumption table and calculates an estimated value of energy consumed by the heating and cooling unit over a predetermined period,

wherein the data acquisition unit acquires, at least, an indoor temperature of an interior of a building in which the heating and cooling unit is installed, an outside air temperature outside the building in which the heating and cooling unit is installed, and a set temperature for the heating and cooling unit, as the environmental information for each predetermined time,

each cell of the energy consumption table is stored with a value that is assigned according to a value of the environmental information and is a basis for calculating energy consumption, and

each cell of the energy consumption table is stored with a repulsive energy value, in association with both the difference between the outside air temperature and the set temperature and the difference between the inside air temperature and the set temperature, wherein the repulsive energy value corresponds to the resistance of the heating and cooling unit against operation of increasing or decreasing the temperature in response to the value of environmental information of the building in which the heating and cooling unit is installed, and

the energy consumption integration unit,

by using the environmental information acquired for each predetermined time,

integrates, at each predetermined time, the cell values in the energy consumption table corresponding to the environmental information,

thereby calculating a repulsive energy integration value corresponding to a change in an environment in which the heating and cooling unit is installed and outputting the calculated repulsive energy integration value as an approximate value of energy consumption of the heating and cooling unit.

2. The energy consumption calculating system according to claim 1,

wherein the energy consumption table includes a column specified according to a value of a difference between an outside air temperature and a set temperature, and a row specified according to a value of a difference between an indoor temperature and a set temperature, and wherein the repulsive energy value is stored in a cell where the column and the row intersect.

3. The energy consumption calculating system according to claim 2,

wherein each cell of the energy consumption table stores:

as repulsive energy, the power consumption, as is, of the heating and cooling unit, as measured by a power meter, when the heating and cooling unit is able to measure power consumption for each predetermined time by using the power meter, and

repulsive energy value calculated by using a repulsive energy calculation equation in which a parameter is determined by the heating and cooling unit is set and the acquired environmental information, when the heating and cooling unit is unable to measure the power consumption by the power meter.

4. The energy consumption calculating system according to claim 3,

wherein the energy consumption calculator calculates,

as a pre-process for the energy consumption integration unit to calculate the repulsive energy integration value,

by using the repulsive energy calculation equation and the acquired environmental information,

a repulsive energy of the heating and cooling unit, and

stores the calculated value of repulsive energy in the cells of the energy consumption table assigned according to the environmental information used in the calculation.

5. The energy consumption calculating system according to claim 4,

wherein the data acquisition unit is able to acquire environmental factors that include indoor congestion condition, climate condition, and humidity as the environmental information,

the environmental factors are set as an offset value in the repulsive energy calculation equation, and

the energy consumption calculator calculates the repulsive energy by using the repulsive energy calculation equation in which the environmental factors are set as the offset value.

6. The energy consumption calculating system according to claim 4,

wherein the energy consumption calculator,

calculates power consumption for the cell referenced when a difference between the indoor temperature and the set temperature is 0, by using a temperature maintaining energy calculation equation having a parameter that forms a first graph shape where x axis represents the difference between the external air temperature and the set temperature and y axis represents repulsive energy, as the repulsive energy calculation equation, and

calculates power consumption for the cell referenced when a difference between the outside air temperature and the set temperature is not 0, by using a temperature changing energy calculation equation having a parameter forming a second graph shape where x axis represents the difference between the external air temperature and the set temperature and y axis represents repulsive energy, as the repulsive energy calculation equation.

7. The energy consumption calculating system according to claim 6,

wherein the temperature maintaining energy equation having the first graph shape is an equation that adds a minimum power consumption value of the heating and cooling unit and the offset, to a Gompertz equation that uses a maximum power

consumption value for maintaining two different variables and a set temperature different in each environment, and

the temperature changing energy calculation equation having the second graph shape is an equation formed by a solution of the temperature maintaining energy equation, a maximum power consumption value of the heating and cooling unit and two other variables that are different from the previous two variables.

8. The energy consumption calculating system according to claim 6 or 7, further comprising:

a variable relationship calculator that specifies variables for the temperature maintaining energy calculating equation and the temperature changing energy calculating equation,

wherein the variable relationship calculator,

uses, as teaching data, actual power consumption of the heating and cooling unit acquired by the power meter and environmental information acquired by the data acquisition unit, and narrows down a relationship between the variables of the temperature maintaining energy calculating equation and the temperature changing energy calculating equation, where the relationship ties the environmental information and the power consumption, and

specifies variables for each of the temperature maintaining energy calculating equation and the temperature changing energy calculating equation.

9. An automatic control system of a heating and cooling unit, wherein the automatic control system:

uses the energy consumption calculation system of any one of claims 1 to 4; and

thereby calculating a set temperature that is energy efficient for the environment in which the heating and cooling unit is installed; and

causes the set temperature to be automatically changed over time; and

whereby the internal air temperature is controlled at an appropriate level.