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(71) Applicant: **CHOHOL** [FR/FR]; 49-53 avenue des Champs-Elysées, F-75008 Paris (FR).

(72) Inventors: **CHOUEIFATY, Yves**; 7 rue Alexandre Bertereau, F-92200 Neuilly-sur-Seine (FR). **CARIMALO, Fabien**; 18 rue Girouix, F-92500 Rueil-Malmaison (FR). **MAS, Valérie**; 916 chemin du Pré Seigneur, F-78670 Villennes-sur-Seine (FR).

(74) Agents: **IPSILON** et al.; Le Centralis, 63, avenue du Général Leclerc, 92340 Bourg La Reine (FR).

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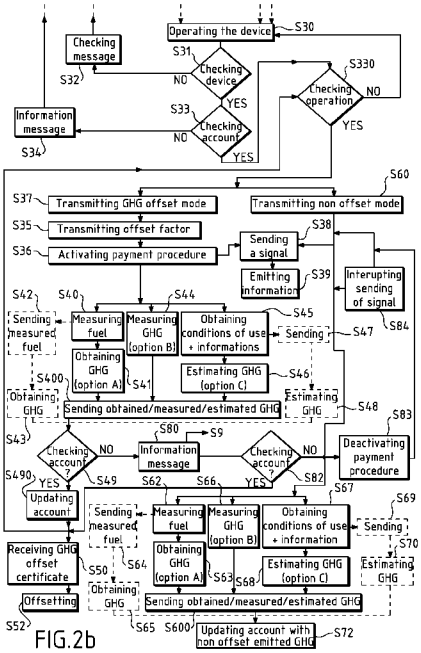

FIG.2b

(57) Abstract: The invention concerns a method for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device, characterized in that the method comprises: sending an offset status information signal to at least one information system during operation of a pollutant-emitting device, and causing said at least one information system to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

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SYSTEM AND METHOD FOR USE IN CONNECTION WITH POLLUTANT EMISSIONS

The present invention relates to systems and methods for incentivizing management and/or reduction of pollutant emissions in connection with operation of a pollution emitting device or process.

It is known that voluntary actors worldwide channeled their personal or corporate financial resources into carbon reduction projects. Such projects may reflect the full spectrum of the actor's climate footprint by supporting activities that deliver positive benefits “beyond carbon” and that are in line with their environmental impacts and vulnerabilities. Voluntary actors contracted 101 million tons of carbon offsets (Mt CO_2e) for immediate or future delivery in 2012. Suppliers predict market value could reach $1.6 - $2.3 billion in 2020 – if market actors can effectively communicate the relevance of offsetting and carbon market infrastructure to private sector actors, the international donor community, and governments seeking tools to incentivize, verify, and finance climate action.

It also is known from WO2014/046782 a method and a system for purchasing carbon emission credits at a fuel dispensing station via a portable computing device. According to this document a user buys carbon emission credits via the portable computing device when refueling his vehicle at the fuel station. No association is made between any offsetting protocol and actual operation of a vehicle.

Car manufacturers invest to improve people's awareness about climate change and greenhouse gas (GHG) emissions. These investments include efforts to reduce fuel consumption in a theoretical manner, which typically is calculated according to the New European Driving Cycle (NEDC) standard protocol. However, actual conditions of vehicle use, as well as any user efforts

to be efficient in a global and sustainable view, have not adequately been taken into account.

For instance, and despite important efforts made in Europe on g CO_2/km reductions by car manufacturers, real levels of emissions are higher than those promoted by car manufacturers according to a study made by The International Council for Clean Transportation. That study reveals that the average difference between official and actual consumption figures rose from 8% in 2001 to 31% in 2013 for all the vehicles in Europe including company and passengers cars. The NEDC standard protocol should give way in 2017 to a WLTP standard (Worldwide Harmonized Light Duty Test Procedures) that is intended to be more in line with the reality of driving every day.

Accordingly, there is a need for an improved system and method for managing the emission of CO_2 and other pollutants in connection with the actual operation of a pollution emitting device or process.

An embodiment of the invention described herein provides a system and method for incentivizing management or reduction of emission of greenhouse gases (GHG) and/or other pollutants produced by the consumption of fuel in a device or process.

Another embodiment of the invention provides a system and method for incentivizing management or reduction of one or more pollutants produced by or in connection with the operation of a pollution-emitting device or process. Still another embodiment of the invention provides a system and method for incentivizing management or reduction of emission of water pollutants by a device or process that utilizes water.

It will be understood that incentivizing management or reduction of emission of one or more pollutants encompasses any activity which causes or promotes a net-positive effect on overall pollutant emission, including but not limited to the purchase and/or implementation of a certified pollution offsetting protocol, behavior modification with regard to a user or operator of a pollution-emitting device or process, or incentivization of individuals or entities with regard to pollution-reducing activities.

In one embodiment, a system and method for incentivizing

management or reduction of emission of one or more pollutants produced by or in connection with the operation of a pollution-emitting device or process comprises:

causing at least one information system to emit information during the operation of the device, said emitted information being representative of whether a pollution-offset procedure has been implemented for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

Thus in association with the operation of the pollution-emitting device or process that utilizes a primary product, such as fuel or water, and emits pollutants, such as GHG or polluted water, the system and method of the invention causes in real time the conveyance or emission of information representative of the fact that a pollutant offset program has been funded or not. Such conveyance or emission of information may be caused to occur, without any direct human intervention. The conveyance or emission of information may be caused to occur automatically when receiving a signal (e.g. an offset status information signal).

Making it known in real time (during the operation of the pollutant-emitting device or process and optionally based on the actual or estimated amount of the emission), under various forms of media or modes of communication, whether the device is involved in a certified pollutant offset program may have a significant influence on current and/or future behavior. By way of example only, real time communication of such representative information to a user or operator of the device or process can affect that user or operator's current and/or future behavior with regard to the manner in which the device or process is operated. Communication of such representative information in a manner that is visible or perceivable by the public can similarly affect their current and/or future behavior. For example, members of the public may selectively opt to utilize services of providers for which the communicated representative information indicates that the provider is operating within a pollution offset program.

In order to enhance the awareness of any consumer or entity about his/her/its responsibility for GHG emissions, entering into/activating the offset process takes place where and in some instances when GHGs are emitted. For instance, when the device is a car the present invention may provide a user with information such as actual g CO_2/km emitted per day, per travel or per year, for instance. This also can be a tool to control GHG emissions based on driving habits and therefore to change driving habits.

In one embodiment, the payment procedure for buying offset emission is performed or activated in real time during the operation of the device or process, and linked to actual use of the device or process, the consumption of fuel or utilization of water (or more generally, the consumption or utilization of a primary product), and the emission of pollutants (GHG and/or water pollutants, and more generally pollutants) by the device or process.

In another embodiment, the system can be selectively set at any time, for example by the device user, to implement an offset of emissions from the device. Thus, a system and method as described herein may be utilized independent from fuel supply networks and specially-equipped fuel pumps.

According to another embodiment of the invention an embedded offsetting device may be located on board a vehicle or, more generally, in the pollutant-emitting device or in association therewith.

According to other possible described features of any of the above-mentioned embodiments of the invention taken either alone or in combination with each other:

- the method comprises sending an offset status information signal to at least one information system during operation of a pollutant-emitting device or process, and causing said at least one information system to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device or process; indicating whether a pollution-offset procedure has been implemented may take the form of emitting or communicating

information during operation of the pollutant-emitting device or process, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented; the offset status information signal may depend on a selected or designated offset factor which defines an offset rate for offsetting within the frame of the pollutant offset program;

- the pollutant-emitting device is an automobile or, more generally, a vehicle;

- operation of the pollutant-emitting device or process causes emission of greenhouse gases (GHG) produced by consumption of fuel;

- the method further comprises determining or estimating an actual quantity of pollutant emitted during said operation of the device or process; this makes it possible to authenticate the emission of pollutant based on the real time consumption of a primary product by the device (during operation of the device);

- determining or estimating an actual quantity of pollutant emitted during said operation of the device or process can be performed by:

    - measuring the actual consumption of fuel by the device or process and obtaining the quantity of actual pollutant emitted by the device or process based on the measured actual consumption (option A); this option is the most reliable one among the three options A to C since it guarantees the emitted net CO_2;

    - measuring the actual quantity of pollutant emitted by the device or process (option B); this option is representative of actual combustion of the fuel; or

    - estimating the actual quantity of pollutant emitted by the device or process taking into account actual conditions of use of the device or process and technical information related thereto

(option C); this option is rather based on empirical data/information; it is to be noted that the method may alternately propose the three options that can be selected depending on circumstances and/or needs, e.g. when one or two options cannot be envisaged for some reasons (e.g. a loss of communication network);

- operation of a pollutant-emitting device or process includes operation of a device or process apparatus which causes emission of one or more pollutants in water;

- the method may further comprise determining an actual quantity of polluted water or pollutant(s) emitted during operation of the device or process apparatus based on a first quantity of water measured at an input to the device or process apparatus, a second quantity of pollutants added to the water in the device or process apparatus, and a third quantity of water measured at an output of the device or process apparatus; this method is very reliable since it is based on measurements; this method further provides information in real time on the emission of pollutants by the device or process apparatus through the above at least one communication information system;

- sending an offset status information signal can be performed in response to operating the device or process or receiving data or information corresponding to selection of a pollutant offset mode for operating the device or process under a pollutant offset mode when the device or process is operated; this sending may be performed automatically, i.e. without any human intervention, once the device or process has been operated or data or information received; the automatic sending may provide security regarding the use of the device in some circumstances where the user cannot at the same time use the device and perform another action ; receiving the above data or information may take the form of receiving a signal, e.g. a pollutant

offset mode signal; this sending is performed in real time in the course of operation/use of the device;

- data or information corresponding to selection of a pollutant offset mode may comprise a selected or designated pollutant offset factor which defines an offset rate for offsetting; the indication by the at least one information system (e.g. emission or communication of information) whether a pollution-offset procedure has been implemented or not may also take into account the offset factor (for example, the emitted or communicated information may be representative of the offset factor); more generally, the offset status information signal may depend on the selected or designated offset factor;

- the at least one information system may comprise at least one of the following: a communication apparatus that is adapted to communicate information on one or more social networks through the Internet; one or more light elements adapted to be illuminated in a predetermined manner; one or more sound elements adapted to generate sound in a predetermined manner; and/or at least one display adapted to display a predetermined message;

- the method may further comprise processing, receiving and/or transmitting subscription or subscriber information in connection with a pollutant offset program; a unique link can therefore be established between the pollutant-emitting device and a pollution-offset program via a subscribing/subscriber account; this link is in place during operation of the device and emission of pollutant(s) by the latter and indication by the at least one information system (e.g. emission or communication of information) whether a pollution-offset procedure has been implemented or not; it is to be noted that unique/identified credits are bought via the subscribing/subscriber account and allocated to the device (this may be viewed as certification of the method);

the method may further comprise processing, receiving and/or transmitting data sufficient to generate a certification that a payment or engagement to pay for offsetting a quantity of GHG or other pollutant emitted by operation of the device has been implemented. Making it known during the use of the device that emission of pollutant(s) by the latter has been at least partially offset may be accompanied by the generation of a certificate based on actual data/information related to the operation/use of the device; this is not the result of a declarative approach as known in the prior art since the certificate may be generated in the course of performance of the above method in association with the phase of operation/use of the device;

Another object of the invention is a method for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device or process, characterized in that the method comprises:

causing at least one information system to emit or communicate information during the operation of the device or process, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device or process.

Another object of the invention is a method for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device or process, characterized in that the method comprises:

receiving an offset status information signal, and

indicating, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device. Indicating whether a pollution-offset procedure has been

implemented may take the form of emitting or communicating information during operation of the pollutant-emitting device or process, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented. Such a method may be implemented by at least one information system.

The above possible described features may be taken over here either alone or in combination with each other and apply to the above other two objects of the invention.

Another object of the invention is a system for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device or process, characterized in that the system comprises: at least one information system adapted to receive an offset status information signal and to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device or process. Indicating whether a pollution-offset procedure has been implemented may take the form of emitting or communicating information during operation of the pollutant-emitting device or process, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented.

According to other possible described features of the above system taken either alone or in combination with each other:

- the at least one information system comprises at least one of the following: a communication apparatus that is adapted to communicate information on one or more social networks through the Internet; one or more light elements adapted to be illuminated in a predetermined manner; one or more sound elements adapted to generate sound in a predetermined manner; at least one display adapted to display a predetermined message;

- the system also may comprise at least one subscribing sub-system, wherein said at least one subscribing sub-system includes hardware and/or software specially adapted to process, receive and/or transmit subscription or subscriber information in connection with a pollutant offset program;

- the at least one subscribing sub-system may include at least one transmitting device adapted to transmit said offset status information signal to said at least one information system; this transmission may be performed either directly or through an intermediary element such as the device or an apparatus associated therewith;

- the system also may comprise at least one payment sub-system, wherein said payment sub-system includes hardware and/or software specially adapted to process, receive and/or transmit data sufficient to generate a certification that a payment or engagement to pay for offsetting a quantity of GHG or other pollutant emitted by operation of the device has been implemented;

- the at least one subscribing sub-system also may include one or more communication elements adapted to transmit and/or receive data or information to and/or from said at least one payment sub-system; transmission and/or reception of data or information may therefore be secured in a reliable manner between the above sub-systems; this may apply to personal and/or financial data or information of the subscriber and/or user;

- the system also may comprise a communication module associated with said pollutant-emitting device, wherein said communication module includes hardware and/or software specially adapted to transmit data or information corresponding to selection of a pollutant offset mode for operating the device under a pollutant offset mode when the device is operated; this information may be used for generating the offset status information signal which will control the indication by the at least one

information system (e.g. emission or communication of information) whether a pollution-offset procedure has been implemented or not accordingly;

- the system also may comprise a communication module associated with said pollutant-emitting device, said communication module being adapted to selectively transmit data or information to said at least one subscribing sub-system and/or said at least one payment sub-system, said selectively transmitted data being representative of subscription or subscriber information in connection with a pollutant offset program.

Another object of the invention is a system for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device or process, characterized in that the system comprises:

a transmitting device for transmitting an offset status information signal, and

at least one information system adapted to receive said offset status information signal and to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device or process. Indicating whether a pollution-offset procedure has been implemented may take the form of emitting or communicating information during operation of the pollutant-emitting device or process, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented.

Another object of the invention is a system comprising at least one pollutant-emitting device or process apparatus, and at least one information system associated with said at least one pollutant-emitting device, said at least one information system being adapted to receive an offset status information signal and to indicate, in response to receiving said offset status information

signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted during operation of said at least one pollutant-emitting device or process apparatus. Indicating whether a pollution-offset procedure has been implemented may take the form of emitting or communicating information during operation of the pollutant-emitting device or process apparatus, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented.

The above possible described features may be taken over here either alone or in combination with each other and apply to the above other two objects of the invention.

In one embodiment, a system is provided which comprises a vehicle/an automobile, and at least one information system associated with said vehicle/automobile, said at least one information system being adapted to receive an offset status information signal and to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted during operation of said vehicle/automobile. Indicating whether a pollution-offset procedure has been implemented may take the form of emitting or communicating information during operation of the vehicle/automobile, said emitted or communicated information being representative of whether a pollution-offset procedure has been implemented.

Other features and advantages will appear in the following description, made only by way of example in a non-limiting and non exhaustive manner, with reference to drawings in which:

-Figure 1a is a schematic diagram of a system in accordance with an embodiment of the invention;

-Figure 1b is a schematic diagram of a more detailed part of the Figure 1a system;

-Figures 2a and 2b illustrate a process diagram in accordance with an embodiment of the invention;

-Figure 2c is a schematic diagram of a system in accordance with an embodiment of the invention;

-Figure 3 is a schematic diagram of a system in accordance with another embodiment of the invention related to emission of one or more pollutant(s) in water;

-Figure 4 illustrates a process diagram in accordance with an embodiment of the invention related to emission of one or more pollutant(s) in water.

In the following description, pollutants may include GHG (Green House Gases), e.g. CO_2 and the primary product may be fuel. It is to be understood that these are only examples, and that pollutant is meant to encompass any component caused to be emitted or produced by operation of a device or process. Likewise, the primary product utilized by a device or in a process may be materials other than fuel, such as water or any other material utilized in the operation of a pollutant-emitting device or process.

Fuel can be understood as fossil fuels (e.g., hard coal, brown coal, peat, coal gases, oil products and natural gas), biofuels and waste (e.g., wood, wood waste, other solid waste, industrial and municipal waste, biogases and liquid biofuels).

It will be understood that the embodiments shown in the Figures are merely exemplary. For example, while the system shown in Figure 1a is described herein in connection with a fuel-consuming device, such as a vehicle, it is to be understood that the system is intended for use in connection with the operation of any device or process which causes emission or production of at least one pollutant.

With reference to Figure 1a, at least one device 12, optionally including several devices 12a, 12b,.., 12n, is operable to utilize a first quantity of primary product, such as fuel, and emits or produces a second quantity of pollutant(s), e.g. GHG such as CO_2.

At least one information system 14 is adapted to indicate, in response to receiving an offset status information signal, during operation of the device

12, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the second quantity of pollutant(s) emitted by the device. The offset status information signal can be generated and transmitted from or by one or more sub-systems including, for example, a subscribing system 18, a payment system 20, a certifying system 22 or an offsetting system 24. Preferably, the offset status information signal is caused to be transmitted to information system 14 by subscribing system 18. Generally speaking, transmission of data or information whatever their nature, e.g. in the form of one or more signals may be performed in an encrypted form to guarantee the security when exchanging data or information. The methods used for encrypting data or information are known *per se*.

It is to be noted that system 10 may optionally further comprise a communication apparatus 13. Such a communication apparatus may be a portable one such as a smartphone, a tablet, a connected watch, a dedicated connected communication device, or any connected apparatus that is capable of communicating data through the Internet; alternately, such a communication apparatus may be a computer that is specially programmed and adapted to communicate data through the Internet. The offset status information signal may be caused to be transmitted to information system 14 by subscribing system 18 either through device 12 or communication apparatus 13.

An optional supply unit 16 is adapted to supply the device 12 with the first quantity of primary product, e.g. fuel, to be consumed by the device.

Subscribing system 18 preferably includes hardware and/or software specially adapted to process, receive and/or transmit subscription or subscriber information in connection with a pollutant offset program. As mentioned, subscribing system 18 also preferably includes at least one transmitting device for causing an information signal to be transmitted to information system 14.

An optional payment system 20 includes hardware and/or software specially adapted to process, receive and/or transmit data sufficient to register and/or process subscriber/user bank account details and selected methods of

payment, receive payments and/or payment orders, and validate them. Preferably, subscribing system 18 includes communication elements adapted to transmit and/or receive data or information to and/or from payment system 20, such as by use of a data- or tele-communication network.

An optional certifying system 22 includes hardware and/or software specially adapted to process, receive and/or transmit data sufficient to generate a certification that a payment or engagement to pay for offsetting a quantity of GHG or other pollutant emitted by operation of the device has been implemented.

An optional offsetting system 24 includes hardware and/or software specially adapted to process, receive and/or transmit data sufficient to implement an offset of the GHG or other pollutant emission that has been paid for by the subscriber/user of the device.

One or more of payment system 20, certifying system 22 and offsetting system 24 may include at least one transmitting device for causing an information signal to be transmitted to information system 14, either in place of or in addition to the above-mentioned at least one transmitting device of subscribing system 18.

It is to be noted that the different sub-systems may each be composed of several sub-systems, in particular as regards payment system 20, certifying system 22 and offsetting system 24. Likewise, more than one sub-system may be provided in combination as a single system or multiple systems at a shared location. Thus, for example, subscribing system 18, payment system 20 and/or certifying system 22 may be provided in combination. Additionally, one or more of systems 18, 20, 22 and 24 may be communicatively connected, such as by a data- or tele-communication network.

Supply unit 16 may be provided as a network such as a gas network, with or without gas meters adapted to measure the volume of gas entering into the device.

The device 12 and/or supply unit 16 may each comprise a communication module having a sending unit and optionally a receiving unit for exchanging (sending and receiving) signals, in particular with systems 18, 20, 22 and/or information system 14.

The device 12 and/or supply unit 16 also may each comprise a computing/calculating element adapted to calculate/estimate data, a measurement unit, and/or an inputting element or unit (e.g. a keypad, tactile screen, etc.) adapted to permit inputting of information/data, including one or several selection commands (e.g. offset mode, offset factor, etc.), and/or an outputting element or unit (e.g. screen) adapted to permit visualizing of some or all inputted information/data.

Alternately, another device such as a portable communication device (e.g. a smartphone) may be provided as the communication module, the computing/calculating element or unit, and/or the inputting element or unit and/or the outputting element or unit. This other device may be communication apparatus 13.

The at least one information system 14 may comprise one or more of the following:

-a communication apparatus 14a that is adapted to communicate information on social networks through the Internet; such a communication apparatus may be a portable one such as a smartphone, a tablet, a connected watch, a dedicated connected communication device, or any connected apparatus that is capable of communicating data through the Internet; alternately, such a communication apparatus may be a computer that is specially programmed and adapted to communicate data through the Internet and that is embedded or not in the device; it is to be noted that communication apparatus 14a may be integrated in subscribing system 18 or communication apparatus 13; By way of example, when communication apparatus 13 is a smartphone or the like, the latter may receive a offset status information signal (or non offset status information signal) and then trigger API commands so as to generate one or several messages over a social network;

-at least one light element or unit 14b adapted to illuminate or produce light in a predetermined manner; e.g. colored light is emitted by a light source such as one or several of a lamp, a LED, an OLED, etc. and a color used (e.g. green) is indicative of an ongoing GHG offset program and another color (e.g. red) is indicative of no ongoing GHG offset program; other possible lighting

devices or patterns may alternately be provided such as those which are adapted to produce a lighting pattern based on one or several light sources which may flash on and off or the intensity of which may vary, an ambient light with a fixed or variable intensity, or a light message indicating the offset mode used. This manner of communicating/emitting information via information system 14 is particularly safe when implemented onboard a vehicle;

- at least one sound element or unit 14c adapted to generate a sound or audio signal in a predetermined manner, the generated sound or audio signal being indicative of an ongoing GHG offset program or of no ongoing GHG offset program; a predetermined sound being indicative of a sufficient prepaid account or insufficient prepaid account, e.g. an audio signal carrying intelligible information (audible message or music) may be emitted or just a beep or whistle;

- at least one display element or unit 14d adapted to display a predetermined message on at least one display, the displayed message being indicative of an ongoing GHG offset program or of no ongoing GHG offset program; the at least one display optionally being a screen, a LCD screen, car onboard computer screen, any touch screen, etc.

Several of the above-listed elements may be used simultaneously, such as at least one light element and at least one sound element or unit for both producing a light and a sound indicative of an ongoing GHG offset program or of no ongoing GHG offset program.

At least one of the above elements 14a-d may be associated and in communication with the communication module of device 12 or supply unit 16, and/or any of systems 18, 20, 22 and 24, so that an offset status information signal can be transmitted (e.g., via a smartphone (Iphone, Android, etc.), USB, Ipod, smartcard such as may be used for Ecall system in an embedded system in a vehicle, PIM ("Protocol Independent Multicast"), any connected device, messaging or other telecommunication unit, any existing GPS device such as TomTom, Coyote, etc..) to said at least one of these elements in order to cause the latter to emit or communicate information as described.

At least one of the above elements 14a-d may be in direct and permanent or temporary connection with the pollutant-emitting device and, for example, may be part of the device or may be an add-on module affixed thereto or plugged in. Alternately, at least one of the above elements 14a-d may be located remotely from the device, e.g. in a remote location, such as where the pollutant-emitting device is hidden inside another object or otherwise not visible, so that the signal or information emitted by the at least one element of information system 14 can be made available to the public (e.g. emitted information can be made visible through produced light or displayed message).

Figure 1b illustrates different units/components that may be used in the system when an offset status information signal (or non-offset status information signal) is received from, e.g. subscribing system 18, communication apparatus 13 or device 12 in order to cause at least one of the communication apparatuses 14b-d to emit or communicate information as described above.

These different units/components illustrated may be integrated in one of the communication apparatuses 14b-d or associated therewith as represented in Figure 1b.

These different units/components may include :

-a communication unit 30 which comprises a transmitting/receiving unit in particular for receiving an offset status information signal (or non-offset status information signal); this unit may use, e.g. Bluetooth or Wifi transmission or the like;

-a data processing unit 31 or processor associated with a flash memory unit 32 and a RAM unit 33;

-a digital input/output unit 34;

-a microcontroller unit 35;

-an analog output unit 36;

-different inputs 37 for connecting USB devices, SD cards, etc.;

-a power input 38 which receives as an input electrical power; external DC charger provides electrical power to a voltage regulator unit 39 which is connected to a battery unit 40 an output of which is directed to power input

38; optionally, both units 39 and 40 may integrated inside a module 41 including the above elements/units;

-user interface units 42, 43, e.g. buttons or the like are connected to module 41 or affixed thereto.

All the necessary internal connections between the different units/elements have not been illustrated for the sake of clarity.

It is to be noted that an offset status information signal (or non-offset status information signal) is received by unit 30 and transmitted to data processing unit 31 for processing purpose (in particular after decryption). The signal is therefore analyzed so that a triggering signal be issued by unit 30 and activates the corresponding apparatus/unit 14b, 14c, 14d for appropriate emission or communication of information.

The above-mentioned system 10 may be operated with regard to different GHG emissions such as carbon dioxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), water vapor (H_20), Ozone (O_3), ChlorofluoroCarbon (CFC), etc. The above-mentioned system 10 may find a number of applications in which the device may be of different types: a car, a boiler, a gas bottle, an airplane, a boat, a house, a building, a heating system, a cooking system, a bus, a train, a helicopter, a heavy truck, a tractor, or any other device that consumes fuel or utilizes primary product when operating it.

In one non-limiting example, system 10 may operate in the manner shown in the flowcharts of Figures 2a and 2b, now described. These flowcharts apply to a fuel-consuming device, such as a vehicle.

In Figure 2a, step S1 corresponds to the transmission of data or other information to subscribing system 18 such that a subscriber subscribes to a pollutant offset program, e.g. via a device-associated communication module or a smartphone. A subscriber may be, e.g., a user or operator of pollutant-emitting device 12. Alternately, a subscriber may be any seller of a pollutant-emitting device or any seller of a communication module intended to be connected or associated with a pollutant-emitting device, upon the sale of such device. Generally, a subscriber is contemplated as any person or Company authorized to implement a subscription. The transmission of data or other information in step S1 therefore results in the establishment and/or

registration of a subscriber account. Ordinarily, the subscriber will be a user/operator of device 12 or devices 12a-n. However, as is described below at step S5, a user who is not the subscriber also may be registered subsequently.

At step S2, subscribing system 18 processes data or information received in step S1 so as to validate the subscription to a pollutant offset program.

At step S3, data or information relating to a subscriber's bank account details and selected payment methods regarding the pollutant offset program, if any, are transmitted to payment system 20. As noted, payment system 20 may be provided separately from or in combination with any other sub-system, including subscribing system 18, certifying system 22 and/or offsetting system 24. The transmission of account or payment data or information in step S3 may be implemented via a communication module associated with a pollutant-emitting device 12 or supply unit 16, via a portable communication device, or via any other suitable apparatus or mechanism for transmitting such data or information to payment system 20.

Exemplary methods of payment include: prepayment, automatic periodic (e.g. monthly) debiting from the subscriber account on an actual basis, or periodic (e.g. monthly) debiting or payment on a predetermined basis combined with regularizing at the end of a fixed period (e.g. annually) based on actual data, payment on invoices, etc. Any other method of payment may be utilized. A given payment method may be selected by a subscriber or any other authorized individual or entity.

At step S4, the system validates the information and selections transmitted in step S3. This validation may be performed by payment system 20, such as through authentication of bank data and confirmation of the financial flow security between the subscriber system 18 and the payment system 20 corresponding to the subscriber account.

Validation at step S4 may be performed by subscribing system 18, e.g.

at or about the time of performing step S1, which validation information may subsequently be communicated from subscribing system 18 to payment system 20.

At step S5 the system may provide a mechanism by which a non-subscriber may register with subscribing system 18 in association with the subscriber account previously created.

Optionally, in a step S6 payment system 20 receives (either directly or indirectly via subscribing system 18) information or data regarding the non-subscriber's bank account details and selected methods of payment which are to be in connection with the pollutant offset program during operation of device 12 or devices 12a-n. Exemplary payment methods are as described in connection with step S3 above.

Alternatively, step S6 may be omitted and the system may process non-subscriber payments via the subscriber system 18.

At step S7, the system may process data or information so as to identify and register device 12 or devices 12a-n as authorized for use in association with the subscriber account. Such processing of data or information at step S7 may be performed by, e.g., subscribing system 18 and/or payment system 20.

At step S8 information provided and selections made at the previous steps S5 to S7 are validated. This validation may be performed, e.g., by subscribing system 18 and/or payment system 20.

At step S9 the system causes the subscriber account to be updated with the results of previous steps. Included at step S9 is, optionally, processing of a one-off prepayment corresponding to offsetting a predetermined quantity of pollutant to be emitted by the device when operated. The updating and optional prepayment processing operations at step S9 may be performed, e.g., by subscribing system 18 and/or payment system 20.

At step S10 the system may process received data or information so as to check bank account status (e.g., if the prepayment has been selected as a method of payment, it is checked whether the account has a predetermined or threshold amount of money), whether the subscription is valid, whether bank account information is valid, whether any device authorized in relation to the subscribed account has been reported stolen, etc. Step S10 may be performed by subscribing system 18 and/or payment system 20.

Following step S10, the flowchart in Figure 2a depicts an optional supply branch including steps S11 to S27 which may be performed in connection with supply of device 12 or devices 12a-n with fuel to be consumed thereby. The optional fuel supply branch includes two sub-branches:

-a right sub-branch including steps S11 to S14 which concerns a supply operation with no GHG offset, and

-a left sub-branch including steps S15 to S27 which concerns a supply operation with GHG offset.

The right sub-branch includes a first step S11 during which either a non offset mode selection signal is transmitted or no offset mode selection signal is transmitted. When transmitted such a signal is representative of a selection of a non offset mode as an input of information or data to the system. A non offset mode selection signal may be implemented via the inputting element or unit associated with the device(s) 12 or supplying unit 16, or via the previously described portable communication device such as a smartphone. A non offset mode selection signal may be transmitted to and processed by any of the previously described sub-systems, preferably subscribing system 18 or payment system 20, most preferably subscribing system 18.

In either instance, the right sub-branch proceeds with the initiation of supply of a first quantity of fuel to the device(s) (step S12), termination of the supply (step S13), and payment for the supplied quantity (step S14).

The left sub-branch includes a first step S15 during which a pollutant offset mode signal is generated. Such offset mode signal is representative of a selection of a pollutant offset mode as an input of information or data to the system. Such offset mode signal represents an instruction to the system that the subscriber account is to be updated in accordance with the data or information generated in the course of the following steps S16-S27 as described hereafter. An offset mode selection signal may be implemented via the inputting element or unit associated with the device(s) 12 or supplying unit 16, or via the previously described portable communication device such as a smartphone. An offset mode selection signal may be transmitted to and processed by any of the previously described sub-systems, preferably subscribing system 18 or payment system 20, most preferably subscribing system 18.

At step S16 the system transmits and/or receives data or information corresponding to an offset rate factor. The offset rate factor corresponds to a defined or selected offset rate. The offset rate factor may be implemented via the inputting element or unit associated with the device(s) 12 or supplying unit 16, or via the previously described portable communication device such as a smartphone. Data or information corresponding to an offset rate factor may be transmitted to and processed by any of the previously described sub-systems, preferably subscribing system 18 or payment system 20, most preferably subscribing system 18.

Exemplary offset rate factors include:

-an overcompensation factor which corresponds to the case where the second quantity of pollutant which is emitted by the pollutant-emitting device is to be overcompensated by a pollutant offset program, such as where the payment to be made in the payment procedure to be activated exceeds the payment that would be necessary for offsetting the second quantity of pollutant emitted or estimated to be emitted during operation of the device. This overcompensation factor may be chosen during the subscription, and/or may be chosen or changed at any time. Examples of overcompensation factors

are 200%, 300%, 1000%, or any other factor that is greater than 100%; and

-different other factors such as 25%, 50%, 75% and 100%.

Other factors may be envisaged and are considered within the scope of the present disclosure.

At step S17 a payment procedure in the pollutant offset program is implemented, preferably automatically, following the completion of previous steps S15 and S16.

According to a variant embodiment, in case there is no possible connection between the pollutant-emitting device, associated communication module, or portable communication device (e.g. smartphone) that permits contemporaneous transmission of data or information to one or more of the sub-systems, e.g. subscribing system 18 or payment system 20, the amount of offset corresponding to the offset rate factor is paid via a supply unit payment system (e.g. pump payment system) when the supplying operation has been completed. Subsequently or concurrently, the supply unit payment system activates a payment procedure to transfer the amount paid to the payment system 20.

It will be understood that the transmittal of information, including payment information, relating to the selection of a pollutant offset mode or offset rate factor may alternatively be directed to subscribing system 18, certifying system 22 and/or offsetting system 24.

Activating the payment procedure in the pollutant offset program launches the funding of the program for offsetting in a certified manner at least part (depending on the selected offset rate factor) of the second quantity of pollutant which is emitted or estimated to be emitted by the device when the device is operated.

At step S18 the supply of the device(s) with a first quantity of fuel is initiated.

At step S19 the first quantity of fuel that is being supplied to the device is measured. This measuring step may be performed by a measurement unit in the supply unit or associated therewith.

At step S20 the supply is terminated.

Following step S20 two different sequences of steps may be envisaged:

-either at step S21 the second quantity of pollutant expected to be emitted by the device when the device is operated is obtained by calculation based on the measured first quantity of fuel supplied to the device and this data is sent (step S22) in an encrypted form to one or more of the described sub-systems, such as the certifying system 22 or the subscribing system 20;

-or at step S23 the measured first quantity of fuel supplied to the device is transmitted in an encrypted form to one or more of the described sub-systems, such as the certifying system 22 or the subscribing system 20, which then processes the transmitted encrypted data and obtains a second quantity of pollutant expected to be emitted by the pollutant-emitting device when the device is operated by calculation based on the measured first quantity of fuel supplied to the device.

In either instance, at next step S25, the payment procedure is automatically deactivated, optionally by operation of the supply unit.

At step S26 information regarding the obtained second quantity of pollutant expected to be emitted, and the amount paid for offsetting part, all or more than this quantity, is transmitted to one or more of the described subsystems, e.g. subscribing system 18 or payment system 20. Transmission of information in step S26 may be implemented directly by the supply unit 16 or via a communication module or portable communication device associated with the subscriber or with the pollutant-emitting device.

At step S27 the subscriber account is updated corresponding to the

pollutant quantity paid for. Consequently, the system updates the subscriber account with a pre-offset payment amount which will be applied or used in determining any offset status information signal transmitted to information system 14 during operation of the device 12.

This terminates the left sub-branch of the optional fuel supply branch in Figure 2a.

The flowchart of Figure 2a continues with steps shown in Figure 2b. As shown in Figure 2b, checking step S10 or updating step S27 (if the optional supply branch steps S15-S27 are performed) or payment step S14 (if the optional supply branch steps S11-S14 are performed) is followed by the transmission of a signal or information at step S30 corresponding to operation of the device 12 or devices 12a-n. This signal or information is representative of the subscriber account.

Upon initial operation of the device(s) a test step S31 is performed by the system which checks whether the device(s) has been registered or not.

In the negative, step S31 is followed by step S32 which sends an information message, e.g. to the user or subscriber via a communication module or portable communication device associated with the pollutant-emitting device, prompting input of registration information to the system in the manner described in connection with step S7. An information message sent in step S32 may be transmitted, e.g., to a smartphone, or messaging or voice automotive instructions when the device is a car, or any other communication instrument available in the environment of the pollutant-emitting device.

In the affirmative, another test step S33 is performed whereby bank account information is checked for sufficient funds with respect to a predetermined amount of money or threshold amount, whether the subscription is still valid or the bank account still exists, whether any device associated with the subscribed account has been reported stolen, etc.

If an unsatisfactory result is obtained in step S33, step S34 is performed in which the system sends an information message e.g. to the user or subscriber via a communication module or portable communication device associated with the pollutant-emitting device, prompting input of account information to the system in the manner described in connection with step S9. An information message sent in step S34 may be transmitted, e.g., to a smartphone, or messaging or voice automotive instructions when the device is a car, or any other communication instrument available in the environment of the pollutant-emitting device.

Otherwise, step S33 is followed by a test step S330 which checks whether the device is in operation.

In the negative, the process returns to step S30 already described.

In the affirmative, step S330 is selectively followed by either of two sub-branches as depicted in Figure 2b:

a left sub-branch relating to operation of the device 12 in a pollutant offsetting mode; or

a right sub-branch relating to operation of the device 12 on a pollutant non-offsetting mode.

The left sub-branch is implemented at step S35 by transmitting a signal in response to an input of information or data to the system representing a selection of a pollutant offset mode to be used during the current operation of the device. Such offset mode selection signal may be implemented, e.g., via the inputting element or unit associated with the device(s) 12, or via the previously described portable communication device 13 such as a smartphone. An offset mode selection signal may be transmitted to and processed by any of the previously described sub-systems, preferably subscribing system 18 or payment system 20, most preferably subscribing system 18.

At step S36 the system transmits and/or receives data or information corresponding to an offset rate factor. The offset rate factor corresponds to a defined or selected offset rate. Data or information corresponding to an offset rate factor may be transmitted to and processed by any of the previously described sub-systems, preferably subscribing system 18 or payment system 20, most preferably subscribing system 18.

Exemplary offset rate factors include:

-an overcompensation factor which corresponds to the case where the second quantity of pollutant which is emitted by the pollutant-emitting device is to be overcompensated by a pollutant offset program, such as where the payment to be made in the payment procedure to be activated exceeds the payment that would be necessary for offsetting the second quantity of pollutant emitted or estimated to be emitted during operation of the device. This overcompensation factor may be chosen during the subscription, and/or may be chosen or changed at any time. Examples of overcompensation factors are 200%, 300%, 1000%, or any other factor that is greater than 100%; and

-different other factors such as 25%, 50%, 75% and 100%.

Other factors may be envisaged and are considered within the scope of the present disclosure. An offset rate factor may be obtained from input to the system at step S36, e.g. via the inputting element or unit associated with device 12, or obtained from subscription information previously provided and stored in the system.

In the course of step S37 a payment procedure in the pollutant offset program is activated, preferably automatically, following completion of previous steps S35 and S36.

Activating the payment procedure at step S37 automatically causes, at step S38, the sending of an offset status information signal to information system 14 during operation of the device 12. As previously described, the offset status information signal is chosen to be representative of whether a

pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the second quantity of pollutant(s) emitted by the device. The offset status information signal depends on steps S35 and S36 (or S60 in case no offset mode has been selected as will be seen later) and therefore takes into account the offset factor at step S36. In a variant embodiment, the offset status information signal may only depend on step S35 (or S60 in case no offset mode has been selected as will be seen later). The offset status information signal may be transmitted from or by one or more sub-systems including, for example, subscribing system 18, payment system 20, certifying system 22 or offsetting system 24. Preferably, the offset status information signal is caused to be transmitted to information system 14 by subscribing system 18.

This causes emission or communication of information (step S39) by information system 14 as described above with reference to Figure 1a while the device is operating. This is a safe manner to communicate/emit information when using the device, in particular when the attention of the user is drawn by the use of the device (e.g. a car or any other device or vehicle that requires concentration from the user or operator).

Thus it can be considered that the offset status information signal activates/controls information system 14.

The information emitted or communicated by information system 14 thereby makes it known, e.g. to the user/operator and/or to the public, either in the street or on the Internet, that part or all of the pollutants being emitted due to operation of the device(s) while the device is operating is being offset or in the process of being offset.

In parallel to steps S38 and S39, step S37 is followed by several possible steps or sequences of steps aimed at determining or estimating the actual second quantity of pollutant emitted during operation of the device(s) 12.

In a first alternative, at step S40, the amount or rate of utilization of primary product by operation of the device 12, e.g., the amount or rate of consumption of fuel is measured. The following may apply where device 12 is an automobile. It is well-known that European standards drastically help to decrease NOx and CO emissions (less than 1%). This means that control combustion systems have been integrated to ensure efficient conditions of fuel combustion. As a consequence, it is also known that advanced combustion engines are an important issue of actual engineering improvement made by car manufacturers for new fuel (diesel and gasoline) vehicles.

For instance, the company Daimler produces four cylinder engines with direct injection that help to obtain homogeneous direct injection. More particularly, fuel arrives at the injectors via a high pressure line, which leads directly into the combustion chamber, at pressures of up to 140 bars. The accurate quantity of fuel that is required for a particular driving mode is sprayed into the cylinders, where it is almost completely burnt.

As a consequence, the flow rate of fuel that is injected per time gives the volume of fuel consumed during a predetermined period. This actual measurement is obtained in the car and therefore available.

The above can be used to calculate actual fuel consumption via an On Board Diagnostic (OBD) system onboard a car.

It is also known that actual fuel consumption by a car can then be obtained by connecting a car dedicated device which is able to establish a direct link with the OBD system, like Xee or Scangauge or via a smartphone with a dedicated application and a cable such as OBD Link System.

At step S41, the second quantity of pollutant, e.g. GHG, emitted by the device is obtained based on the measured actual consumption e.g. by calculation/estimation based on the combustion stochiometric equations depending on fuel components.

A variant to step S41 may envisage to firstly send (step S42) the measured actual consumption of the first quantity of primary product by the device 12 to at least one sub-system, such as subscribing system 18, payment system 20, certifying system 22 and/or offsetting system 24, which sub-system then

processes the transmitted consumption information (step S43) to obtain or estimate the second quantity of actual pollutant emitted due to operation of the device 12 in the manner described above. Measured consumption information may be transmitted, e.g., by a communication module dedicated to or associated with the device 12 or via an intermediary communication element in the chain of transmission such as a smartphone.

Another alternative for determining or estimating the actual second quantity of pollutant emitted during operation of the device(s) 12 is provided in Figure 2b at step S44, at which the actual second quantity of pollutant emitted by the device 12 is measured. For example, it is known that data relating to CO_2 concentration, measurement time and location, temperature, humidity, and atmospheric pressure can be recorded onto a Secure Digital (SD) memory card. This is made by some car manufacturers to control any vehicle CO_2 emissions.

A carbon dioxide sensor or CO_2 sensor is an instrument for the measurement of carbon dioxide gas. The most common physical principles for CO_2 sensors are infrared gas sensors (NDIR) and chemical gas sensors. Measuring carbon dioxide is important when monitoring indoor air quality and also in many industrial processes. Chemical CO_2 gas sensors with sensitive layers based on polymer- or heteropolysiloxane provide the main advantage of having a very low energy consumption and can be reduced in size to fit into microelectronic-based systems. On the downside, short- and long term drift effects as well as a rather low overall lifetime are major obstacles when compared with the NDIR measurement principle.

It is also known that collecting CO_2 concentration data from many points during a limited measurement period requires use of a multi-point observation method using as many fixed stations or observation vehicles as possible. For multi-mobile observation, many CO_2 sensors should be prepared and, therefore, low-cost but accurate CO_2 sensors are required. If bicycles or

electric bikes are to be used for the observations, small and lightweight sensors are preferable.

In recent years, CO_2 sensors made of semiconductors, solid electrolytes , optic fibers , laser diodes , and non-dispersive infrared (NDIR) detectors have been developed for monitoring CO_2 concentration. For atmospheric CO_2 concentration measurements, NDIR sensors are widely employed since they are stable and very robust against interference by other air components, including pollutants. The NDIR sensor also has excellent durability, and therefore, seems to be the most reliable sensor for atmospheric CO_2 measurement.

The output of NDIR sensors is affected by temperature, atmospheric pressure, and length of use. To enhance the precision and accuracy of NDIR sensors, it is important to correct the sensors' outputs for these factors. So far, there have been several studies on the calibration of high-cost NDIR analyzers. Only a few studies focused on the performance and calibration methods of small commercial CO_2 sensors . There is no report on the recently developed low-cost CO_2 sensors produced by several manufacturers.

In a recent study entitled "Comparison of the characteristics of small commercial NDIR CO_2 sensor Models and Development of a portable Measurement device" [Yasuda T[1], Yonemura S, Tani A. ; March 13, 2012 ; Multidisciplinary Digital Publishing Institute (MDPI), Basel, Switzerland], to improve the precision and accuracy of recently developed low-cost CO_2 sensors, a calibration method combining offset-correction and linear correction was examined. On the basis of the results of these performance tests, this study selected the most suitable CO_2 sensor for a multi-mobile measurement device. Using this sensor, the authors developed a portable CO_2 measurement device that can measure and record temperature, humidity, air pressure, and GPS data as well as CO_2 concentration. The authors evaluated the accuracy of this device by measuring the CO_2 concentration in a school lecture room and by comparing it with the CO2 concentration measured

by a highly accurate CO_2 analyzer, denoted LI-6262. The CO_2 data, when corrected for simultaneously measured temperature, water vapor partial pressure, and atmospheric pressure, showed a good correspondence with the data measured by the above highly accurate CO_2 analyzer. The study indicates that acceptable accuracy can be realized using the calibration method developed by the authors. In fact, the authors consider that this can be made via a portable device that allows measurements to be made while walking and cycling. The above can be used to measure the actual second quantity of pollutant emitted by the device 12.

A further alternative for determining or estimating the actual second quantity of pollutant emitted during operation of the device(s) 12 is provided at steps S45 and S46 in Figure 2b. Step S45 involves obtaining/determining the actual conditions of use of the device and technical information related thereto so as to obtain fuel consumption. The following again applies where device 12 is an automobile. It is well-known that at a time-independent speed, the speed dependence of fuel consumption in a vehicle attains a minimum at speeds about 50–70 km/h. Therefore, an average speed is a usual attribute for a reliable assessment of fuel consumption in vehicles from measurements of GPS probe vehicle traces. However, it is also well-known that fuel consumption of a vehicle depends crucially on vehicle acceleration: Usually, at a given speed, the higher the vehicle acceleration, the higher the fuel consumption of the vehicle. There are many methods in which fuel consumption has been calculated as a function of speed and acceleration (deceleration) through the use of measurements of engine characteristics together with simulations of driver behavior.

Recently, based on a large number of measurements of fuel consumption in floating car data (FCD), Kerner et al. (Boris S. Kerner, Physik von Transport und Verkehr, Universitat Duisburg-Essen, 47048 Duisburg, *Submitted on 26 Oct 2014*,Germany) have found a “pure” empirical microscopic matrix: The matrix has been derived with the use of measured data only, i.e., without any models and simulations. This empirical matrix presents microscopic empirical

fuel consumption as a function of microscopic (single-vehicle) speed and acceleration (deceleration). This matrix can be used for many ITS (Intelligent Transportation Systems) applications.

However, due to an error (such as a loss of signal) in the determination of the vehicle location in GPS probe vehicle traces, it is difficult to determine real vehicle acceleration as a time-function with measurements of the GPS traces. Therefore, in addition to the attribute "average vehicle speed", for an assessment of vehicle fuel consumption on a link of a traffic network researches have suggested several attributes. These attributes should be found with the use of the GPS traces, like the number of vehicle stops on a link of a traffic network, kinetic energy of vehicles, etc.

In the above paper written by Kerner et al., the authors introduce an attribute of GPS probe vehicle data that they call "cumulated vehicle acceleration". "Cumulated vehicle acceleration" together with the well-known attribute of GPS probe vehicle data called "average vehicle speed" should allow to perform a reliable assessment of vehicle fuel consumption on a link of a traffic network.

This cumulated vehicle acceleration can be obtained via devices like those provided by the TomTom Company. The field of application of this method is the reduction of vehicle consumption in traffic and transportation networks and could also be considered for the present invention to measure fuel consumption.

Step S46 involves estimating the actual second quantity of pollutant emitted by the device taking into account the above obtained actual conditions of use of the device and technical information related thereto (fuel consumption data based on GPS information and vehicle characteristics) by considering perfect fuel combustion conditions based on the obtained fuel consumption.

A variant to step S46 may envisage to firstly send (step S47) the obtained actual conditions of use of the device and technical information related thereto (consumption information) to at least one sub-system, such as

subscribing system 18, payment system 20, certifying system 22 and/or offsetting system 24, which sub-system then processes the transmitted consumption information (step S48) to obtain or estimate the second quantity of actual pollutant emitted due to operation of the device 12 in the manner described above. Obtained consumption information may be transmitted, e.g., by a communication module dedicated to or associated with the device 12 or via an intermediary communication element in the chain of transmission such as a smartphone.

Step S41, S44 or S46 is followed by step S400 at which the obtained/measured/estimated actual second quantity of pollutant emitted due to operation of the device is transmitted to at least one sub-system, such as subscribing system 18, payment system 20, certifying system 22 and/or offsetting system 24. This transmission may be accomplished, e.g., by a communication module dedicated to or associated with the device 12 or via an intermediary communication element in the chain of transmission such as a smartphone or other portable communication device.

It will be understood that the foregoing steps described in connection with determining or estimating the actual second quantity of pollutant emitted during operation of the device(s) 12 may be performed on a continuous, periodic or occasional basis during operation of device 12. Thus, for example, the sequence of steps S40, S41 and S400 may be performed on a continuous, periodic or occasional basis during operation of device 12. Similarly, the sequence S40, S42 and S43; the sequence S44, S400; the sequence S44, S46, S400; the sequence S45, S46, S400; or the sequence S44, S47, S48 may be performed on a continuous, periodic or occasional basis during operation of device 12.

Each of steps S43, S400 and S48 optionally is followed by a checking step S49 at which the system performs a checking procedure, optionally at a predetermined frequency, to check various account information such as whether the bank account is sufficiently supplied with respect to a predetermined amount of money or threshold, whether the subscription is still

valid, whether the bank account still exists, or whether any device associated with the subscribed account has been reported stolen, etc. This checking step may be performed by one or more of subscribing system 18, payment system 20, certifying system 22 and offsetting system 24, preferably by subscribing system 18. The checking procedure may be based in part on the method of payment selected and the threshold in case of prepayment. Checking step S49 may be performed on a continuous, periodic or occasional basis during operation of device 12, which basis may be the same as or different than the frequency at which the immediately previous steps are performed in connection with determining or estimating the actual second quantity of pollutant emitted during operation of the device(s) 12.

If checking step S49 is favorable, the process goes to next step S490 at which the system processes information so as to update the subscriber account corresponding to the quantity of emitted pollutant which has been obtained/measured/estimated during operation of the device 12.

The process depicted in Figure 2b then returns to step S330 already described. In parallel, step S490 is followed by step S50 during which a GHG offset certificate may be generated and transmitted, e.g. by the certifying system. Such certificate may be transmitted to the command module associated with the device, to the previously described portable communication device, or to any other destination adapted to receive the transmitted certificate. At step S52, implementation of an offset for offsetting part or all of the quantity of pollutant emitted due to operation of the device 12 is undertaken. The quantity or value of offset undertaken will be based upon the details of the subscription and mode of operation, e.g. the selected offset factor and amount paid.

Reverting to step S330, a right sub-branch relating to operation of the device 12 on a pollutant non-offsetting mode is implemented at step S60 by transmitting a signal in response to an input of information or data to the system representing a selection of a pollutant non-offset mode to be used during the current operation of the device. Such non-offset mode selection

signal may be implemented, e.g., via the inputting element or unit associated with the device(s) 12, or via the previously described portable communication device such as a smartphone. A non-offset mode selection signal may be transmitted to and processed by any of the previously described sub-systems, preferably subscribing system 18 or payment system 20, most preferably subscribing system 18. Alternately, step S60 is implemented as a default based upon a lack of any input of information or data corresponding to selection of either an offset or non-offset mode.

Optionally, step S60 may automatically cause the sending of a non-offset status information signal (step S38) to information system 14 during operation of the device 12. As previously described, a non-offset status information signal may be chosen to indicate that a pollution-offset procedure has not been implemented, e.g, in the form of an illuminated red light. In that instance, information system 14 will make it known that the pollutants emitted due to the current operation of device 12 are not offset. Such information also may help to change the habits and behavior of other people in the short, mid or long term.

Step S60 optionally is followed by steps S62 to S600 which may be performed even though no pollutant offset program has been activated. These steps are essentially identical to steps S40 to S400 already described above and therefore will not be repeated here.

Step S65, S600 or S70 is followed by step S72 at which the system processes the information obtained at the preceding step so as to update the subscriber account corresponding to the quantity of emitted pollutant which has been obtained/measured/estimated during operation of the device 12.

In the event that a result of performing step S49 is unfavorable, such as in the event of an insufficiently supplied account, the process in Figure 2b proceeds to step S80 at which the system sends an information message e.g. to the user or subscriber via a communication module or portable communication device associated with the pollutant-emitting device 12,

prompting input of account information to the system in the manner described in connection with step S34. Based upon any such inputted information, the account is updated in a manner as already explained in connection with step S9 above, e.g. by crediting account from one of possible payment methods or providing the necessary authorizations for being debited subsequently from a predetermined amount.

In parallel, steps S490, S50 and S52 optionally are carried out again for the pollutant quantity paid for in order to generate and transmit a certificate and offset for this quantity.

Step S80 also may be followed by a test step S82 which is carried out on the account in the manner as explained above at step S49.

If the account has been sufficiently funded, then the process returns to step S330 already described.

In the event that steps S80 and/or S82 are omitted or result in an unfavorable account status, step S83 is performed at which a payment deactivation signal is generated such that the payment procedure is deactivated. The process then proceeds either to the right sub-branch (non offset mode) after step S60 or is followed by a step S84 at which an interrupt command is generated which interrupts the transmission of the offset status signal to information system 14.

The other steps S62 to S72 in the right sub-branch are then repeated in the manner explained above.

It is to be noted that the steps S15, S35 (optionally S16, S36) and S11, S60 corresponding to the transmission of an offset mode signal or non offset mode signal (activating or deactivating an offset mode) may be performed at a first predetermined frequency.

The steps corresponding to sending of data or information relating to consumption (S22, S23, S42, S47, S400, S64, S69 and S600) may be

performed at a second predetermined frequency.

The above-described process may take place several times during operation of device 12 and terminate when the operation of the device is stopped. The described method and system according to this embodiment of the invention provide several advantages, including:

-a simple command has to be activated/selected in order to initiate the offsetting program in real time and anywhere (when operating the device); this is done in a safe and simple manner, e.g. through one human machine interaction only (ex: one button/key to press or touch);

-the method allows to certify that authenticated pollutants emissions are automatically offset once a user of a device decides to offset his carbon footprint when using his/her device; this is not a declarative process;

-the method allows to activate/enter into/implement a pollutant offset program in exchange for payment or pre-payment and make it known in the course of use/operation of a pollutant-emitting device; such a program aims at offsetting in a certified or certifiable manner at least part of the quantity of the pollutant(s) emitted by the device;

-when subscribing to the offset program a choice is possible as to the type and location of the offset program; choosing the location for offsetting means for example that the offset project is funded near the place where GHG (pollutants) are emitted;

-the automatic emission or communication of information through information system 14 increases the awareness of people about the link existing between the habits of use of a device and the associated GHG (pollutants) emission;

-the system and method according to the invention make it possible for achieving a neutral carbon footprint, which will not be reachable only via car engine improvements; further, the implementation of the system and method according to the invention is dramatically much more affordable for car

manufacturers compared to the investments required to improve car engines in order to reach the next European standard of 95g CO_2/km (current estimation by Alix Partners of 2,000€/vehicle);

-the device (e.g. a car) may get an increased value since it can be seen as a negative GHG (ex CO_2) emitter and therefore be considered as a useful tool to fight against climate changes instead of only being considered as a pollutant emitter;

-using the above method will help the user enter into a low GHG (ex CO_2) economy with a new value chain and new services such as granting advantages to a driver when driving in a net offset mode (price reductions at tolls on highways and in parking areas, fiscal advantages accorded by the government, etc.).

It is to be understood that in an alternative embodiment the Figures 2a-b flowcharts may also apply to other devices or processes that consume a primary product and emit pollutant(s).

In such an alternative embodiment steps S1 to S10 can be taken over as such and steps S11 to S27 omitted. Steps S30 to S600 can be taken over subject to some changes in the content of some steps in order for them to be adapted to another device or process that consumes a primary product other than fuel and emit pollutant(s).

The same advantages as those laid out in connection with Figures 2a-b flowcharts also apply to this alternative embodiment except when such advantages are specific to a fuel-consuming device or process.

Figure 2c illustrates an embodiment of a system 50 in accordance with the described invention for use in connection with an automobile.

The system of Figure 2c comprises:

-the same sub-systems 18 to 24 as described above in connection with Figure 1a;

-an automobile 52 corresponding to device 12 in Figure 1a;

-information system 14 as described in connection with Figure 1a, e.g. information system 14b based on light emission (although other systems 14a, 14c and 14d may be envisaged alternately or in addition to system 14b) which may be located in or associated with the automobile so as to be visible from inside or outside the automobile when driving (for example, information system 14b which may include a light button may be placed at a location which does not disturb the driver);

-optional fuel supply unit 54 corresponding to supply unit 16 as described in Figure 1a, such as a pump station.

The automobile 52 may include various units/modules or elements which are configured to implement and/or perform at least some of the different operations/steps illustrated in Figures 2a and 2b, such as:

-a communication module comprising a sending unit 52a and a receiving unit 52b (e.g. a SIM card embedded in the car electronic system),

-a measurement unit 52c for measuring the quantity of fuel consumed by the car,

-a determination/measurement unit 52d for determining/measuring the quantity of GHG, e.g. CO_2 emitted by the car,

-a calculator 52e for performing the necessary calculations required by the operations/steps illustrated in Figures 2a and 2b and, in particular, the determination of the emitted GHG,

-one or more selectors 52f, e.g. a button or tactile key on the car dashboard as, e.g., the “Ecodrive button” on some car models (BMW, etc.), in order for the driver to input a selection command corresponding to a GHG offset program mode and possibly an offset factor.

The system 50 may also include a smartphone 56 or other portable

communication device which is configured to communicate with the car, e.g. via Bluetooth, for example to implement a recognition process for identifying the identity of the user/operator (if the user/operator is not the associated subscriber).

As a variant, the communication module comprising units 52a and 52b may be replaced by a dongle OBD II (plugged into the vehicle) in communication with smartphone 56.

The above-mentioned system 10 in Figure 1a may also be applied to pollutants contained in waste water emitted by devices that utilize water and produce water pollutants. Such devices may lie in the domestic field such as sanitary devices (e.g. toilets, bathtubs, wash basins, etc.) and household appliances (e.g. washing machines, dishwashers, etc.) or may be other devices as tractors, etc.

Such devices may also lie in the industrial field and transform water by adding therein pollutants.

Water pollutants may be organic or non organic.

By way of example, organic and non organic water pollutants are listed as follows:

Organic : Detergents, Disinfection by-products found in chemically disinfected drinking water, such as chloroform, Food processing waste, which can include oxygen-demanding substances, fats and grease, Insecticides and herbicides, a huge range of organohalides and other chemical compounds, Petroleum hydrocarbons, including fuels (gasoline, diesel fuel, jet fuels, and fuel oil) and lubricants (motor oil), and fuel combustion byproducts, from storm water runoff, tree and bush debris from logging operations, volatile organic compounds (VOCs), such as industrial solvents, from improper storage, chlorinated solvents, which are dense non-aqueous phase liquids (DNAPLs), may fall to the bottom of reservoirs, since they do not mix well with water and have a greater density , than water, polychlorinated biphenyl (PCBs), trichloroethylene, perchlorate,

various chemical compounds found in personal hygiene and cosmetic products, drug pollution involving pharmaceutical drugs and their metabolites.

Non organic : Acidity caused by industrial discharges (especially sulfur dioxide from power plants), ammonia from food processing waste, chemical waste as industrial by-products, fertilizers containing nutrients-nitrates and phosphates-which are found in storm water runoff from agriculture, as well as commercial and residential use, heavy metals from motor vehicles (via urban storm water runoff) and acid mine drainage, silt (sediment) in runoff from construction sites, logging, slash and burn practices or land clearing sites.

Figure 3 is a diagrammatic view of a system adapted to the management of water pollutants according to an embodiment of the invention.

The system 100 comprises a device 102 which receives at one of its inputs water supplied through a supply line 104 from a source 106 (e.g. water supply network, reservoir, etc.).

A water meter 108 is mounted on the supply line 104 in order to measure the volume of water flowing through the line 104 and that is injected into the device 102.

At one of the device's outputs polluted water is evacuated through an evacuation line 110.

The system 100 comprises all the other elements or components illustrated in Figure 1a, including: information system 14, subscribing system 18, payment system 20, certifying system 22 and offsetting system 24.

It is to be noted that the device 102 may comprise a plurality of devices analogous to devices 12a-n in Figure 1a and/or units/modules or elements as 52a-f in Figure 2c, and information system 14 in Figure 3 may comprise one or more of the information systems 14a-d as described in connection with Figure 1a.

The device 102 represents any device that consumes or otherwise utilizes water for its functioning/operation and that is capable of injecting/adding/generating pollutants into the supplied water in particular, due to its functioning process. Such a device (e.g. tractor, individual house, chemical unit, etc..) generates polluted water which is emitted in its environment: water network, landscape (rivers, soils, etc.).

System 100 may function according to a method for managing water pollutants that is illustrated on the flowchart of Figure 4 now described.

The steps S100 to S118 are analogous to steps S1 to S10 of Figure 2a and enable the setting up of the first steps of a polluted water offset program (creation of a subscriber/user account and funding of the account and registering the device(s) 102).

The following steps S120 to S1240 are analogous to steps S30 to S330 of Figure 2b, except that steps S32 and S34 are respectively included in steps S122 and S124 of Figure 4.

Once test step S1240 has been performed, two branches may be envisaged depending on the user's decision to use the device with or without offsetting the pollutants emitted due to operation of the device.

In case the user decides to enter into an offsetting strategy steps S126 to S130 are carried out analogously to steps S35 to S37 of Figure 2b.

Likewise steps S132 and S134 (analogous to steps S38 and S39 in Figure 2b) are automatically performed to communicate through information system 14 on the fact the device 104 entered in an active process leading to offsetting in part or in whole the pollutants rejected by the device.

Subsequent to step S130 corresponding to activation of the payment procedure, several following steps are performed:

-step S136 is a measuring step that measures the volume of water injected into the device 102 through supply line 104; water meter 108 measures a first quantity of water entering at the input of device 102;

-step S138 is a measuring step that measures a second quantity of pollutants that are added to the water due to operation of the device; this quantity of pollutants introduced in the device may be known;

-step S140 is a measuring step that measures the volume of water exiting the device 102 through evacuation line 110; this measurement may be performed by an additional water meter (not represented) located on the evacuation line 110 close to the device output;

-step S142 is a determination step that determines a quantity of polluted water at the output of the device based on the previous values obtained at steps S136, S138 and S140; in particular, this step is roughly based on the volume of water exiting the device and the measured amount or quantity of pollutants; in case the resulting measured/calculated values fall within quality ranges that define acceptable values for the measured parameters, then the pollutants need not be offset; if the resulting measured/calculated values fall outside the quality ranges, then step S142 determines an amount of waste water polluted that needs to be offset.

Next step S144 sends this amount to one or more of subscribing system 18; payment system 20; certifying system 22 or offsetting system 24.

The following steps S146 and S148 are analogous to steps S49 and S490 in Figure 2b: after testing the subscriber account is updated with the offset water polluted the quantity of which has been obtained. The account is therefore deducted from the offset amount.

Next the flowchart returns to step S130 already described and, in parallel, steps S150 and S152 (similar to steps S50 and S52 of Figure 2b) are carried out to send (and optionally receive by the user, e.g. through the device or his/her smartphone) a polluted water offset certificate and offset the

amount of polluted water the user has paid for.

Reverting to the right branch following step S124, step S154 is performed analogously to step S60 in Figure 2b, steps S132 and S134 are automatically performed to make it known publicly that the device 102 is being used without offsetting as explained in steps S38 and S39.

Next the steps S156, S158, S160, S162 and S164 analogous to steps S136 to S144 described above are performed even though the non offset mode has been selected.

Step S166 updates the account with the non offset amount obtained at the previous steps.

Step S146 (analogous to step S49 in Figure 2b) is followed by successive steps S168 (followed by steps S116 and S170), S170, S172 and S174 which are analogous to steps S80 (followed by steps S9 and S82), S82, S83 and S84 in Figure 2b, the description of which will not be repeated here.

This terminates the flowchart of Figure 4.

The above-described process may take place several times and terminate when the operation of the device 102 is stopped.

Regarding the measurements made with reference to above steps S138, S140 and S142, the following may be applied.

Common physical tests on water include temperature, solids concentrations (e.g., total suspended solids (TSS)) and turbidity. Water samples may be examined using the principles of analytical chemistry. Many published test methods are available today for both organic and inorganic compounds. Frequently used methods include the measurement of Turbidity (TU), Oxidation Reduction Potential, (ORP), Electrical Conductivity (EC), pH, biochemical oxygen demand (BOD), Chemical Oxygen Demand (COD), nutrients (nitrate and phosphorus compounds), metals (including copper, zinc, cadmium, lead and mercury), oil and grease, total petroleum

hydrocarbons (TPH), and pesticides.

It is known from the document entitled "Embedded based real-time monitoring and contamination detection in drinking water distribution system" (J.Ramprabua nd C.Paramesh, Volume 3, Issue 5, September-October 2014Department of EEE, Kumaraguru College of Technology, Coimbatore, International Journal of Emerging Trends & Technology in Computer Science) a proposed system consisting of several in-pipe water quality sensors with flat measuring probes and on-line analyzers. Such a system is low cost, lightweight and capable of processing, logging and provide or display data at a remote location. Such implementation is suitable for large deployments enabling a sensor network approach for providing spatiotemporally rich data to water consumers, water companies and authorities.

The document entitled " AWARE - Reducing pesticide-related water pollution by improving crop protection Practices : the use of embedded ICT technologies" (Douchin M., de Rudnicki V., Ruelle B., Bellon-Maurel V., Pasi, International Conference: September 15-17, 2008 Ragusa – Italy, Cemagref – UMR ITAP) highlights a project in which has been developed a prototype embedded pesticide geo- referenced data recorder for tractors and sprayers used by wine growers.

That monitoring device records precisely the amount and type of chemical substances used during the spraying season. The project also constructed an environmentally friendly pesticide filling station and fitted all tractors used with rinsing tanks. The data recorder and data processing software were tested on 21 French- and Spanish-owned sprayers. It is estimated that the monitoring device could reduce pesticide use by 50% at the early vegetation stage and 30% with grown vegetation, thereby allowing a 30% reduction in pesticide lost in the ground. For instance the quality ranges used at step S142 described above may be applied to the following parameters with the corresponding quality range:

Turbidity : 0-5 NTU

ORP : 650-800 mV

Nitrates : < 10 mg/l

Free residual chlorine : 0;2 – 2 mg/l

pH : 6.5 – 8.5

Electrical Conductivity : 500-1000 µS/cm.

The method and associated system for managing the emission of water pollutants rejected by a device provide the same advantages as those indicated above for the management of GHG emission and, more generally, for the management of pollutant(s) emission.

CLAIMS

1. A method for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device, characterized in that the method comprises:

sending an offset status information signal to at least one information system during operation of a pollutant-emitting device, and

causing said at least one information system to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

2. The method of claim 1, characterized in that said pollutant-emitting device is an automobile.

3. The method of claim 1 or 2, characterized in that operation of said pollutant-emitting device causes emission of greenhouse gases (GHG) produced by consumption of fuel.

4. The method of any of claims 1 to 3, characterized in that it further comprises determining or estimating an actual quantity of pollutant emitted during said operation of the device.

5. The method of claims 3 and 4, characterized in that determining or estimating the actual quantity of pollutant comprises one of the following options:

-measuring the actual consumption of fuel by the device and obtaining the quantity of actual pollutant emitted by the device based on the measured actual consumption (option A);

-measuring the actual quantity of pollutant emitted by the device (option B);

-estimating the actual quantity of pollutant emitted by the device taking into account actual conditions of use of the device and technical information related thereto (option C).

6. The method of claim 1, characterized in that operation of said pollutant-emitting device causes emission of one or more pollutants in water.

7. The method of claim 6, characterized in that it further comprises determining an actual quantity of polluted water or pollutant(s) emitted during operation of the device based on a first quantity of water measured at an input to the device, a second quantity of pollutants added to the water in the device, and a third quantity of water measured at an output of the device.

8. The method of any of claims 1 to 7, characterized in that sending an offset status information signal is performed in response to one of the following: operating the device or receiving data or information corresponding to selection of a pollutant offset mode for operating the device under a pollutant offset mode when the device is operated.

9. The method of claim 8, characterized in that said data or information corresponding to selection of a pollutant offset mode comprises a selected or designated pollutant offset factor which defines an offset rate for offsetting.

10. The method of any of claims 1 to 9, characterized in that said at least one information system comprises at least one of the following: a communication apparatus that is adapted to communicate information on one or more social networks through the Internet; one or more light elements adapted to be illuminated in a predetermined manner; one or more sound elements adapted to generate sound in a predetermined manner; at least one display adapted to display a predetermined message.

11. The method of any of claims 1 to 10, characterized in that it comprises processing, receiving and/or transmitting subscription or subscriber information in connection with a pollutant offset program.

12. The method of any of claims 1 to 11, characterized in that it comprises processing, receiving and/or transmitting data sufficient to generate a certification that a payment or engagement to pay for offsetting a quantity of GHG or other pollutant emitted by operation of the device has been implemented.

13. A method for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device, characterized in that the method comprises:

causing at least one information system to emit information during the operation of the device, said emitted information being representative of whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

14. A method for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device, characterized in that the method comprises:

receiving an offset status information signal, and

indicating, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

15. A system for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device, characterized in that the system comprises :

at least one information system adapted to receive an offset status information signal and to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been

implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

16. The system of claim 15, characterized in that said at least one information system comprises at least one of the following: a communication apparatus that is adapted to communicate information on one or more social networks through the Internet; one or more light elements adapted to be illuminated in a predetermined manner; one or more sound elements adapted to generate sound in a predetermined manner; at least one display adapted to display a predetermined message.

17. The system of claim 15 or 16, characterized in that it further comprises at least one subscribing sub-system, said at least one subscribing sub-system including hardware and/or software specially adapted to process, receive and/or transmit subscription or subscriber information in connection with a pollutant offset program.

18. The system of claim 17, characterized in that said at least one subscribing sub-system includes at least one transmitting device adapted to transmit said offset status information signal to said at least one information system.

19. The system of claim 17 or 18, characterized in that it further comprises at least one payment sub-system, said at least one payment sub-system including hardware and/or software specially adapted to process, receive and/or transmit data sufficient to generate a certification that a payment or engagement to pay for offsetting a quantity of GHG or other pollutant emitted by operation of the device has been implemented.

20. The system of claim 19, characterized in that said at least one subscribing sub-system further includes communication elements adapted to transmit and/or receive data or information to and/or from said at least one payment sub-system.

21. The system of claim 17 or 19, characterized in that it further comprises a communication module associated with said pollutant-emitting device, said communication module being adapted to selectively transmit data or information to said at least one subscribing sub-system and/or said at least one payment sub-system, said selectively transmitted data being representative of subscription or subscriber information in connection with a pollutant offset program.

22. The system of any of claims 15 to 21, characterized in that it further comprises a communication module associated with said pollutant-emitting device, wherein said communication module includes hardware and/or software specially adapted to transmit data or information corresponding to selection of a pollutant offset mode for operating the device under a pollutant offset mode when the device is operated.

23. A system for incentivizing management or reduction of emission of one or more pollutants in connection with operation of a pollutant-emitting device, characterized in that the system comprises :

a transmitting device for transmitting an offset status information signal, and

at least one information system adapted to receive said offset status information signal and to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or certifiable manner at least part of the quantity of pollutant(s) emitted by the device.

24. A system comprising at least one pollutant-emitting device, and at least one information system associated with said at least one pollutant-emitting device, said at least one information system being adapted to receive an offset status information signal and to indicate, in response to receiving said offset status information signal, whether a pollution-offset procedure has been implemented in a pollutant offset program for offsetting in a certified or

certifiable manner at least part of the quantity of pollutant(s) emitted during operation of said at least one pollutant-emitting device.

25. The system of claim 24, characterized in that the at least one pollutant-emitting device is an automobile.

5

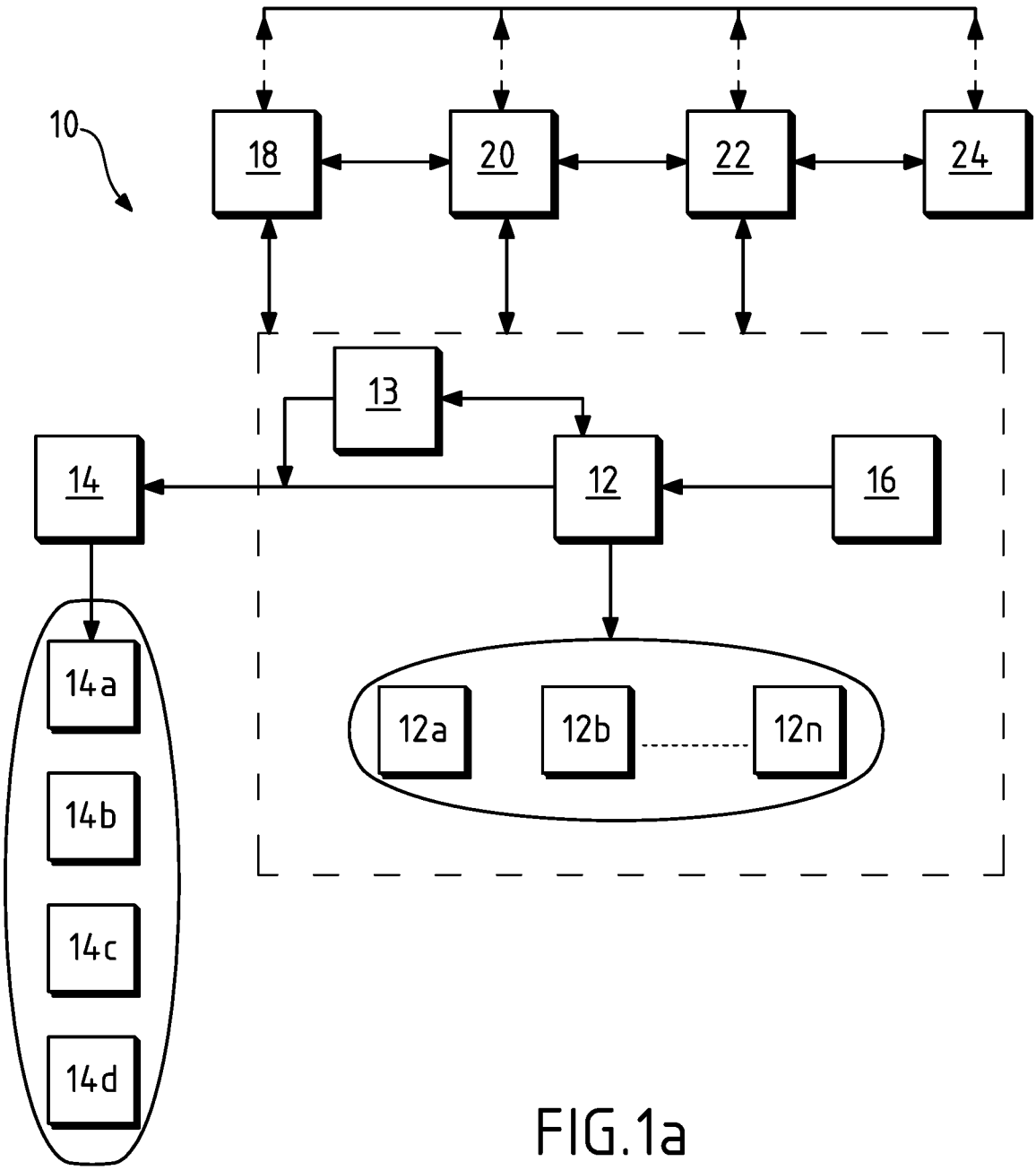

FIG.1a

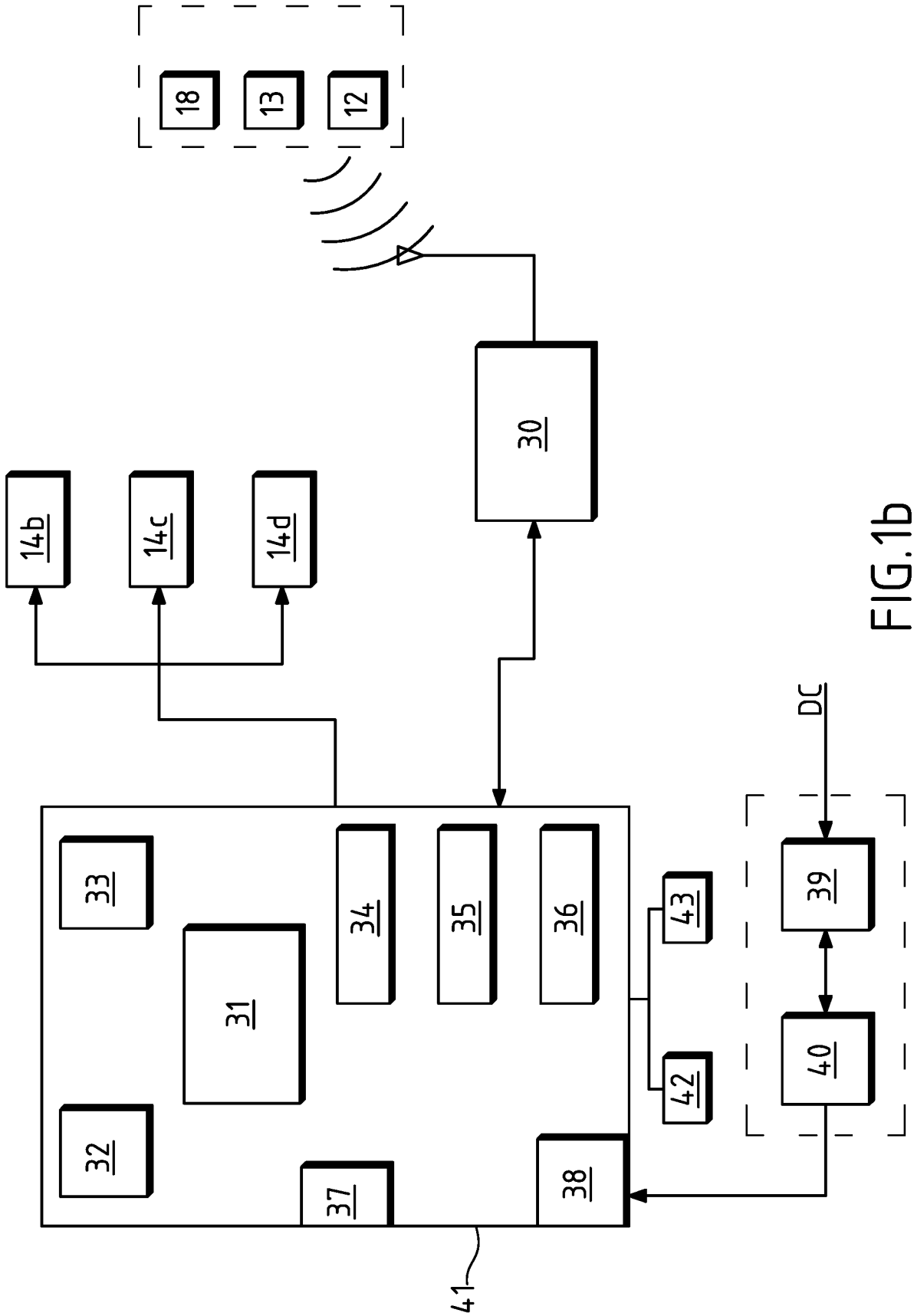

FIG.1b

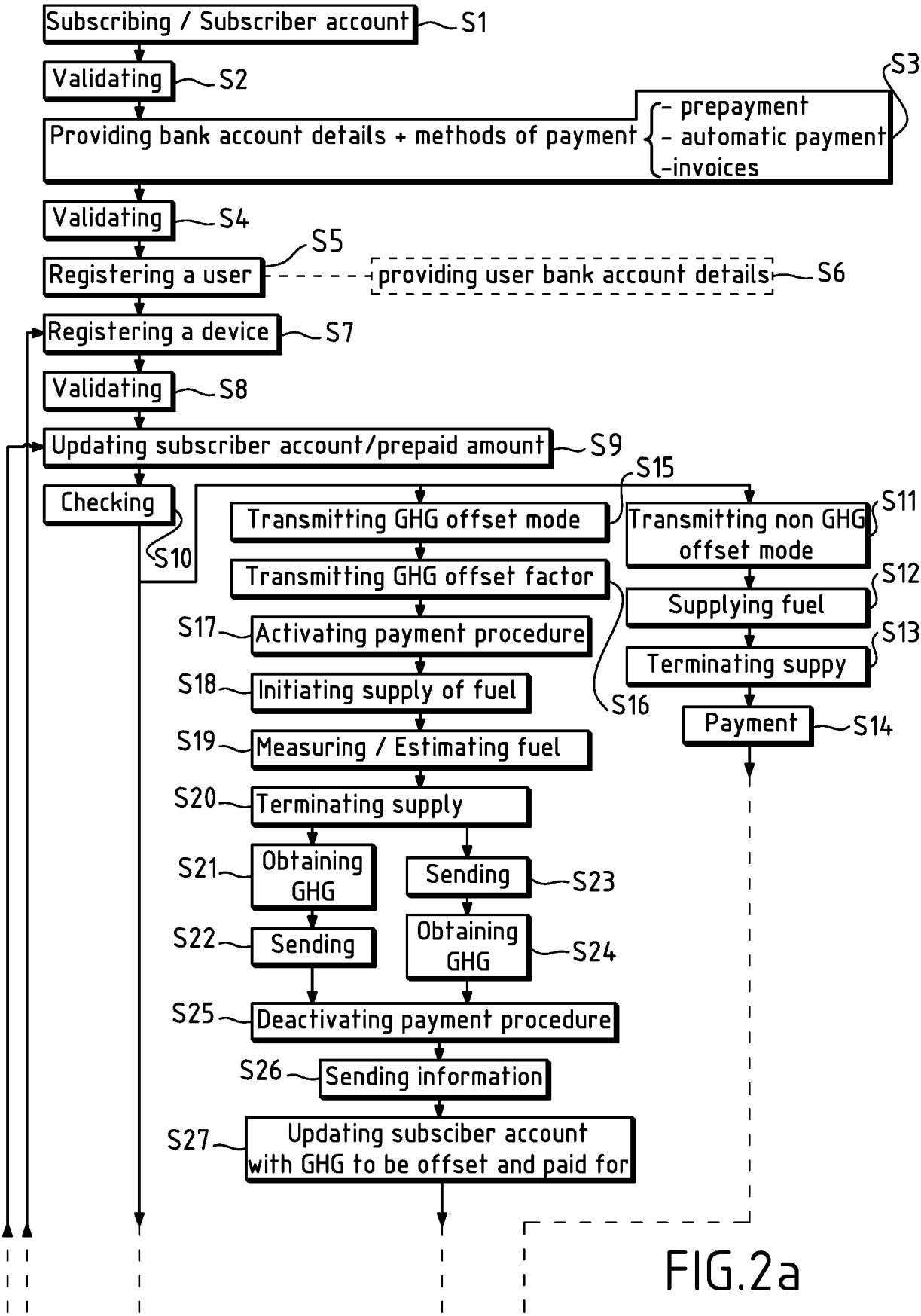
Subscribing / Subscriber account
S1
Validating
S2
S3
Providing bank account details + methods of payment
- prepayment
- automatic payment
-invoices
Validating
S4
S5
Registering a user
providing user bank account details
S6
Registering a device
S7
Validating
S8
Updating subscriber account/prepaid amount
S9
Checking
S10
S15
Transmitting GHG offset mode
Transmitting GHG offset factor
S11
Transmitting non GHG offset mode
S12
Supplying fuel
S13
Terminating suppy
S14
Payment
S16
S17
Activating payment procedure
S18
Initiating supply of fuel
S19
Measuring / Estimating fuel
S20
Terminating supply
S21
Obtaining GHG
S22
Sending
S23
Sending
S24
Obtaining GHG
S25
Deactivating payment procedure
S26
Sending information
S27
Updating subsciber account with GHG to be offset and paid for

FIG.2a

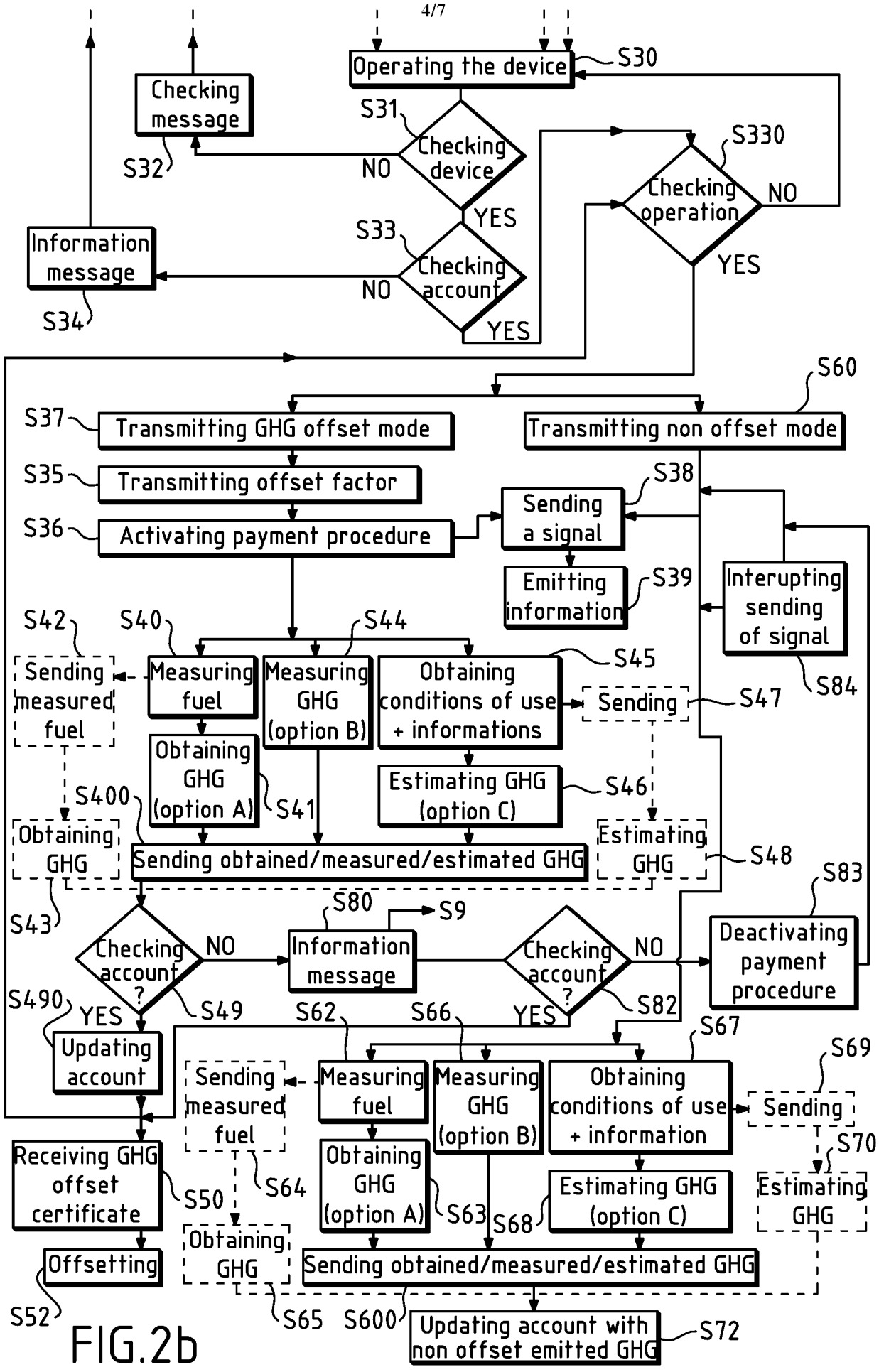
Operating the device
S30
Checking message
S31
Checking device
S32
NO
YES
S330
Checking operation
NO
YES
S33
Checking account
NO
YES
Information message
S34
S60
S37
Transmitting GHG offset mode
Transmitting non offset mode
S35
Transmitting offset factor
S36
Activating payment procedure
S38
Sending a signal
Emitting information
S39
Interupting sending of signal
S84
S42
S40
S44
S45
Sending measured fuel
Measuring fuel
Measuring GHG (option B)
Obtaining conditions of use + informations
Sending
S47
Obtaining GHG (option A)
S41
Estimating GHG (option C)
S46
S400
Obtaining GHG
Sending obtained/measured/estimated GHG
Estimating GHG
S48
S83
S43
S80
S9
Checking account ?
NO
Information message
Checking account ?
NO
Deactivating payment procedure
S490
YES
S49
S62
S66
YES
S82
S67
Updating account
Sending measured fuel
Measuring fuel
Measuring GHG (option B)
Obtaining conditions of use + information
Sending
S69
Receiving GHG offset certificate
S50
S64
Obtaining GHG (option A)
S63
S68
Estimating GHG (option C)
S70
Estimating GHG
Obtaining GHG
Offsetting
S52
S65
S600
Sending obtained/measured/estimated GHG
Updating account with non offset emitted GHG
S72

FIG.2b

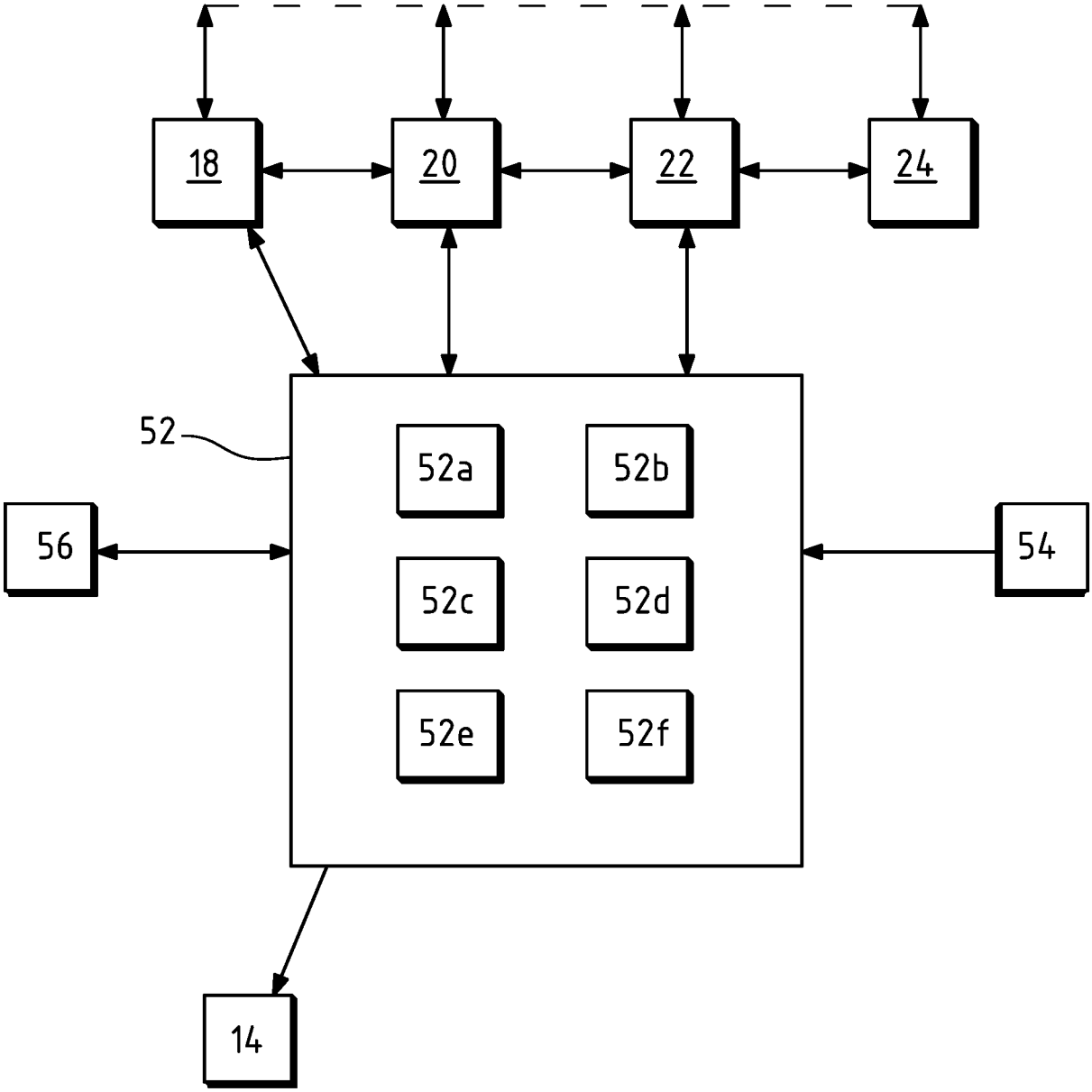

FIG.2c

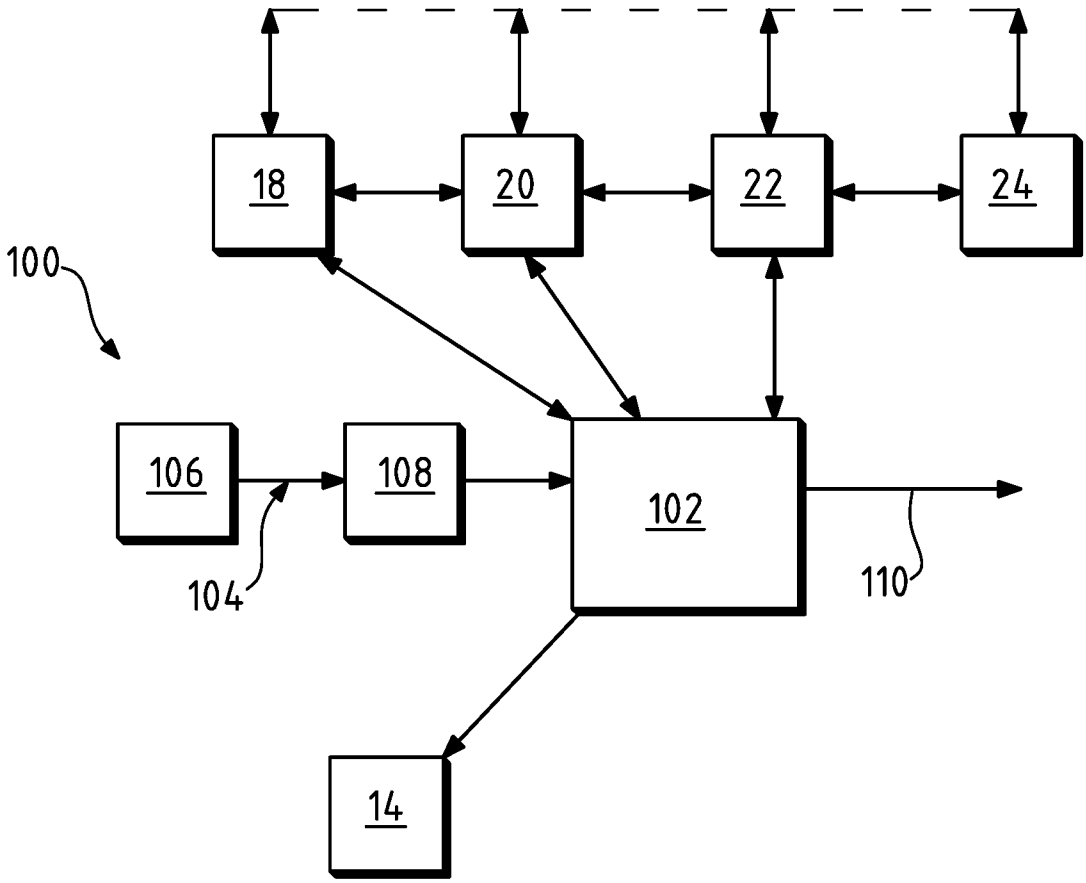

FIG.3

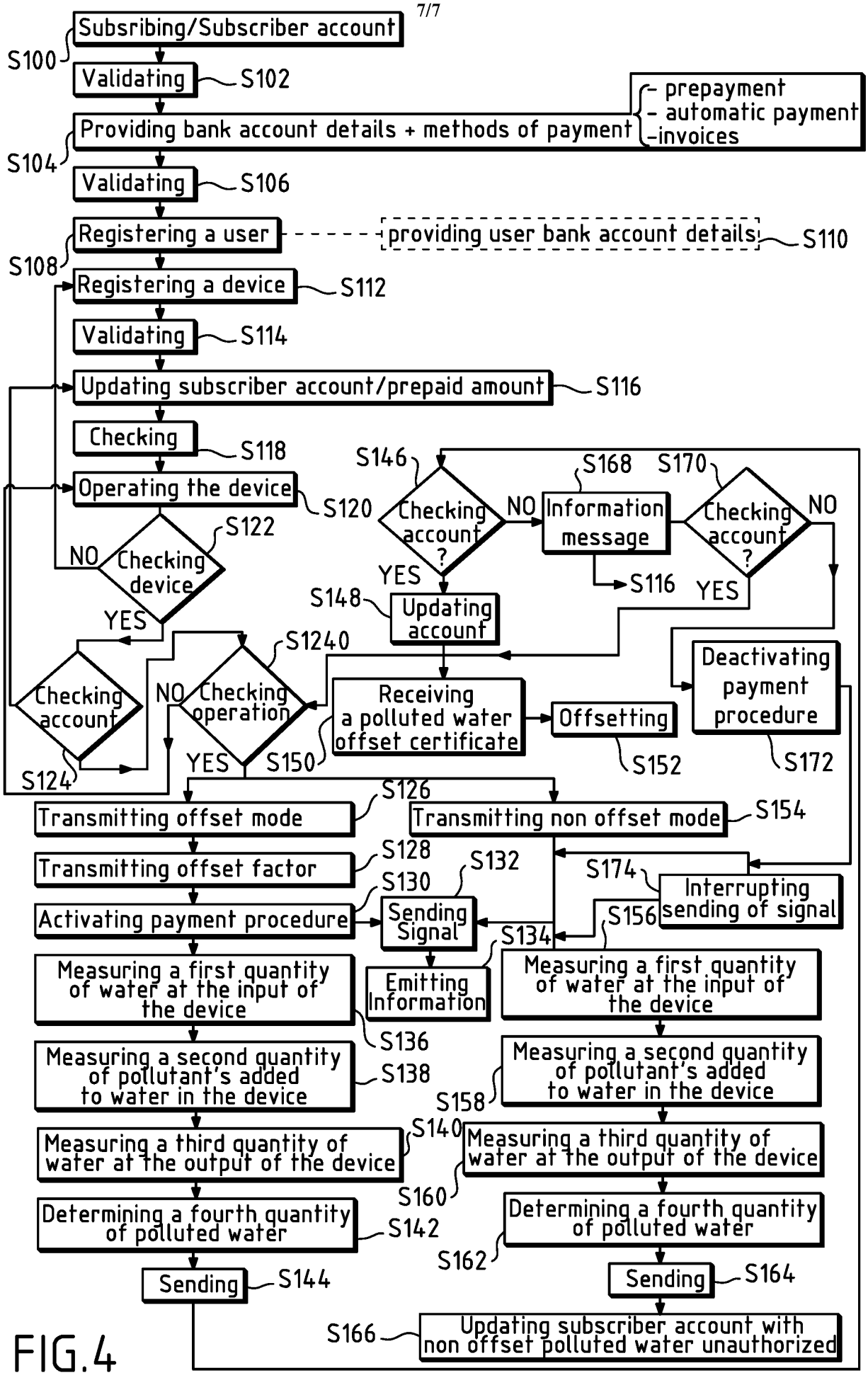
Subsribing/Subscriber account
S100
Validating
S102
Providing bank account details + methods of payment
- prepayment
- automatic payment
-invoices
S104
Validating
S106
Registering a user
providing user bank account details
S110
S108
Registering a device
S112
Validating
S114
Updating subscriber account/prepaid amount
S116
Checking
S118
Operating the device
S120
S122
NO
Checking device
YES
Checking account
S124
S1240
NO
Checking operation
YES
S150
Receiving a polluted water offset certificate
S146
Checking account ?
NO
YES
S148
Updating account
S168
Information message
S116
S170
Checking account ?
NO
YES
Offsetting
S152
Deactivating payment procedure
S172
S126
Transmitting offset mode
Transmitting non offset mode
S154
Transmitting offset factor
S128
S130
Activating payment procedure
Sending Signal
S132
S134
Emitting Information
S174
Interrupting sending of signal
S156
Measuring a first quantity of water at the input of the device
S136
Measuring a first quantity of water at the input of the device
Measuring a second quantity of pollutant's added to water in the device
S138
Measuring a second quantity of pollutant's added to water in the device
S158
Measuring a third quantity of water at the output of the device
S140
Measuring a third quantity of water at the output of the device
S160
Determining a fourth quantity of polluted water
S142
Determining a fourth quantity of polluted water
S162
Sending
S144
Sending
S164
S166
Updating subscriber account with non offset polluted water unauthorized

FIG.4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2015/000532

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06Q10/06 G06Q10/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2013/218446 A1 (BRADLEY DAVID L [US] ET AL) 22 August 2013 (2013-08-22) paragraph [0006] - paragraph [0009] paragraph [0023] - paragraph [0033] paragraph [0051] - paragraph [0061] -----	1-25
X	US 6 601 033 B1 (SOWINSKI RICHARD F [US]) 29 July 2003 (2003-07-29) columns 4,5 column 12 - column 18 -----	1-25
X	US 2010/070316 A1 (LIEBERMAN EREZ [US] ET AL) 18 March 2010 (2010-03-18) paragraph [0006] - paragraph [0009] -----	1-25

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 September 2015	16/09/2015

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Breidenich, Markus

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2015/000532

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2013218446 A1	22-08-2013	CA 2863315 A1	22-08-2013
		CN 104334415 A	04-02-2015
		EP 2776989 A1	17-09-2014
		US 2013218446 A1	22-08-2013
		WO 2013122632 A1	22-08-2013
US 6601033 B1	29-07-2003	NONE	
US 2010070316 A1	18-03-2010	NONE	