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## Abstract

The steel cycle, which can be produced or recycled only by melting, that of non-recyclable solid waste, which must necessarily be incinerated, the production of lime and cement are incomplete, like those of thermal power stations, but produce toxic emissions, powders and CO<sub>2</sub> in much greater quantities. Therefore, these systems, like thermal power plants, must be designed differently from the current ones. Even though today, more than sixty percent of the world steel is produced with electric ovens, and many waste is burned with the same system, which reduces toxic emissions, we can not say that electric ovens also reduce CO<sub>2</sub> emissions, being the primary source of electricity always due to fossil thermal power plants. In addition, even electric ovens for accelerated processes use fossil or biological fuels. Therefore, not only must the primary source of energy be changed, which must become hydro-electric compressed with water recycling. The current chimneys, both of the thermal power stations and of the melting furnaces and of the incinerators, must be eliminated, because no filtration in the world can neutralize the fossil or biological CO<sub>2</sub> that it is. In fact, if we want to lower the percentage of CO<sub>2</sub> in the environment we must also neutralize the biological one. In addition, even electric

ovens, although in smaller quantities, produce toxic substances such as NO<sub>x</sub>, SO<sub>x</sub>, fine powders. The undersigned has already obtained international recognition of patents that eliminate the chimneys and replace them with small and large scale greenhouses, but these have not found lenders, especially public, therefore, also proposes those underground hydroelectric, which are simpler and cheaper from the point of view of the movement of calcareous material. These greenhouses will not only neutralize CO<sub>2</sub> in a sustainable way for the environment, they can also replace the existing large and small water purifiers of existing waters, which produce acidic waters, producing lower alkaline water costs, which counteract the acidification of oceans. To carry out the same purifying and alkalizing function, without any environmental impact, rivers, lakes and artificial basins can also be added, producing the same water that circulates all the electrical energy needed to power the ovens, incinerators and the neighboring cities.

## DESCRIPTION

In the description of a new industrial invention it is normal practice to first describe the state of the art of the invention-related sector. But to describe a new interactive environmental or energy invention with the general principles of physics and organic and inorganic chemistry of water, air, minerals and biology, one can only describe the lack of development of the sector and the solutions ignored and not implemented without explanation by the world institutions of the environment and energy, although they have been filed with the institutional bodies and have been published in Italian and English on a website accessible to all. Yet the phenomena and atmospheric perturbations closely linked to global warming become increasingly serious. The calcareous greenhouses purifying air, water, neutralizing toxic oxides, powders and CO<sub>2</sub>, do not exist, but according to inventions not financed and not realized by the world centers of power, at least two

types of limestone greenhouses have already been clearly described in two international patents.

There are also virtually other plants, not even realized, cited below, which show that the world power centers the problems of global warming do not want to solve them, not out of malice, but only because they do not want a sustainable alternative development based on global scientific reasoning and impartial, that only those who have no connection with the centers of power can develop, but knowing both the industrial and environmental systems, after a way of working to build plants in these sectors without being able to design them. The underground calcareous greenhouses are the forty-first virtual patent deposit of the undersigned. The precedents were not financed by anyone because being alternative to the current purification systems, only the world public bodies could authorize them. Not having done the patents have lapsed, but have become more efficient, because the state of the art, fortunately, can advance equally even if the science itself does not cooperate. This, I do not think can be represented by anyone in the world, being divided into many sectors. The true representatives of science should, in the opinion of the undersigned, should be precisely the inventors free from the centers of power. Not having done the patents have lapsed, but have become more efficient, because the state of the art, fortunately, can advance equally even if the science itself does not cooperate. This, I do not think can be represented by anyone in the world, being divided into many sectors. The true representatives of science should, in the opinion of the undersigned, should be precisely the inventors free from the centers of power.

The alliances between the scientific principles of Newton, Pascal, Torricelli, Henry, Dalton, Hertz, Pacinotti, Tesla, without thermal and nuclear energy, until now, have not looked for neither public research bodies, nor multinationals, not even for clean the most polluting plants in the world: the

high furnaces and incinerators. The new limestone greenhouses enhance these already evident synergies in the ignored limestone greenhouses. I report the synthesis of the previous developed plants that form the basis of the virtual development of the state of the art of the sector, while the actual development is currently zero.

1) N. Patent W02014/076727 entitled VERTICAL SYNERGIC BUILDINGS (VSB) FOR CO2 AND WATER DEPURATION PLUS BIOMASS PRODUCTION, in which the calcareous greenhouses were inserted into a system that simultaneously replaced the large thermal power stations, the water and air purifiers of today, which today can not complete complete purification cycles due to the lack of interactivity of the purification processes of water and air.

2) N. Patent W02014/076726 entitled GLOBAL SYNERGY PLANTS FOR DEPURATION, BIOMASS PRODUCTION AND THERMOELECTRIC COGENERATION (GSPDPTC), in which small limestone greenhouses were added to the modified sewage system. Which currently produces more damage than benefits from the purification due to the fact that it does not separate the waters from the sludge and does not oxygenate and alkalize the wastewater directly into the sewers using vertical purifying sewers connected to the mini greenhouses that alkalize the water purifying the urban air and neutralizing CO2.

3) N. patent W02014/076724 entitled CAPTURE COOLING PURIFICATION CHIMNEYS (CCPC), in which it was foreseen the replacement of the current chimneys with new chimneys able to capture the fumes and to transport them in the subsoil so that they could be inserted in the mini limestone greenhouses or in the larger ones foreseen in the previous global plant. The new chimneys were expected to be made with a double ventilation chamber. The central one rose upwards until it reached an expansion chamber, in which the speed of the fumes that could be filtered with an electrostatic filter and recalled

downwards by a fan through the external ventilation chamber was zeroed. Since CO<sub>2</sub> is 1.5 times heavier than air in the upper expansion chamber it would have separated easily.

4) Another very useful Italian patent deposit to combat global warming is the following: EC2014A00003 filed on 13/05/2014, entitled TOWER FOR AIR FILTERING AND THERMAL EXCHANGE WITH GEOTHERMAL WELL, in which, the current air conditioning systems with outdoor units equipped with air / air heat exchangers were modified, since there are millions of air / air heat exchangers in urban cities, which transfer heat from inside homes abroad, heating the external environment even more and spreading even more the atmospheric dust emitted by heat engines and thermal boilers. The heat exchange towers, very similar to the double chamber chimneys, would have been equipped with water / water heat exchangers, connected to geothermal wells with low enthalpy heat exchangers.

All these patent deposits, which were ignored by national and international environmental authorities, obviously, would have led to more water circulation and greater energy absorption to solve serious environmental problems. But through the study of these solutions, the undersigned arrived, about three years later, to another international patent N. Patent W02017042847 entitled PUMPS AND TURBINES WITH SEPARATED DOUBLE SUPPLY UNTIL TO THE IMPELLER, in which, by modifying the pumps and hydraulic circuits, the same plants would be transformed from energy absorbers into energy producers.

Therefore, the above plants would have had to undergo an updating of the state of the art by replacing the pumps and the hydraulic circulation. But how could they be modified if they were never made?

This means that all scientific and technological solutions develop gradually. But also that the current world authorities of the environment and energy want to fight global warming without studying truly alternative solutions to the current

energy and purification systems. Whilst being completely separate, to improve themselves, they cannot exploit the interactive principles and therefore can not greatly increase their returns. In order to improve the state of the art in all sectors, it is necessary to admit one's own mistakes and those of multinational companies, without affecting the interests of multinational companies that make energy, transport, heating and cooling systems that are not compatible with environmental protection. How can lawmakers impose environmentally-friendly installations on the private sector if the world's public facilities are not? But what is serious is the fact that the world public bodies have never made a prototype of public utilities collected by the undersigned on the website [http // www.spawhe.eu](http://www.spawhe.eu), to verify its functionality in the general interest. They are waiting for a private inventor to be filled with debts to demonstrate logical things that have escaped public and private science. It is obvious that if the inventor had not been a normal single-income family man, with children to grow up and study, the invention would have proved it alone in great secrecy, in the simplest way possible. But having other duties, even more important, towards a family to maintain, he preferred to share it with public research bodies and private companies, obviously, renouncing the industrial property that can not be allowed. But not to the intellectual and to copyright, which are an inalienable right for all works of intellect. If only for patents these rights are not recognized, it means that there is a network of complicity between the major centers of power to deny this fundamental right to those who can express their creativity only through patent deposits, being a technician with proven experience industrial and environmental, almost fifty years old, and not an artist. The inventions offered by the undersigned are not easy to understand because they are based on the synergies between different scientific principles and different technologies that only experience and the right considerations allow to put together. To these inventions cannot arrive neither researchers who always investigate in the same

direction, nor private companies that seek to improve the same family of industrial products. For these scientific and industrial specialists it is very difficult to identify the synergies that can identify who has participated in building industrial, energy, purification, distribution and water lifting plants and has also studied the organization of work to put them together correctly, in order to increase individual returns and the global one. Obviously, the current society does not allow the formation of this kind of experience. Who aspires to form it is a person, like myself, that not minding the immediate profit, has changed many working groups specialized in the autonomous industry and then has completely changed industry, to work in a company specializing in public electromechanical plant engineering, linked especially for purification and lifting and water distribution. It is obvious that the undersigned has a very different vision of designers, inventors, and researchers, who have deepened only one specialization. I do not say that they were wrong to deepen their specializations. They did very well to do the insights making advancing the single state of the art. I am the first to use the state of the art achieved in these sectors if it is also useful in the overall design of the plants. But global plants are designed differently: creating global cycles (not partial as in current plants), then creating the appropriate environment to realize such cycles (for example, open-air oxidation tanks are not conceivable if you do not want to emit CO<sub>2</sub> emissions but consume it in the plant). Even the current chimneys are not conceivable. It is conceivable that the chimneys that capture the CO<sub>2</sub>, above mentioned but not realized, or a forced ventilation that brings the fumes directly into the limestone greenhouses. Then, we choose the machines that can carry out these cycles and then establish the mechanical, hydraulic fluid-hydraulic connections with the subsequent plants, not only for the main product to be produced, but also for the purifying collateral cycles. Nothing or almost nothing must

leave the plants if it is not completely cleansed. Today, however, commercial products of high technological level leave the industrial plants, but the collateral cycles do not close them. Air purification is almost non-existent (filtration is not a purification). Water, in the best of cases, produces acidic waters, never being expected to alkalize, which can not be done, to the current state of the art without using lime milk that is produced with large CO<sub>2</sub> emissions and high costs. The only possible solution would be the introduction in all the world thermal and purification plants of calcareous greenhouses. As the modification of the chimneys was ignored, the calcareous greenhouses were also ignored. But world science is silent.

According to the scientific definition extracted from <https://www.youmath.it>, the ideal fluid is incompressible and not viscous. Therefore combustion gases can not be considered an ideal fluid for energy purposes. On the contrary, water has a very low viscosity coefficient and a very high compressibility module (it is practically incompressible). This leads us to consider water to be a fluid very close to an ideal fluid. In an ideal fluid, pressure at a point is independent of the orientation of the surface to which it refers. This means that the pressure expands in all directions.

If two layers of liquids flow in the same direction at different speeds, the frictional force will slow down the faster state and accelerate the slower one, while the pressure, being the incompressible liquid, does not influence the loss of pressure and the prevalence of the pump if it is a recycling inside the volume of accumulated water.

Also from <https://www.youmath.it> it is reported: "The unit of measurement of viscosity in the international system is given by the poiseuille  $1\text{PI} = \text{k} / \text{m} * \text{s} = 1 \text{Pa} * \text{s}$ . In terms of dimensional analysis, the viscosity corresponds to the ratio

between mass and product length by time:  $ML-1 * T-1$ . In liquids The coefficient of viscous friction decreases with increasing temperature. In water we have the following PI values at the zero, 20 and 50 degrees Celsius, respectively:  $1.388 * 10^{-3}$ ,  $1.002 * 10^{-3}$ ,  $0.5471 * 10^{-3}$  ". This means that by circulating hot water in a 50 degree circuit compared to zero degrees of cold water, we reduce the pressure drop by about one third for the same flow rate. These, more or less, are the conditions that are created in a limestone greenhouse, where the hot fumes heat the water that circulates in the autoclaves, in the artificial rains and in the sliding slides of the rocks.

To produce energy with water and compressed air, you do not need pistons and cylinders, just pressure. Since the energy produced by the flow rate of the fluid \* the density \* the pressure, it is not advisable to circulate the air or a pressurized gas but the incompressible water having a density about 830 times higher, statically and elastically pressurized by the compressed air.

The most important novelty since the advent of the industrial age from the point of view of the sustainability of environmental protection and energy production is precisely the invention of pumps with the double supply separate until to the impeller. These pumps allow to be fed with two flow rates equipped with different pressures that go in the same direction. Inside the impeller are added the flow rates, while, for the principle of Pascal and the Bernoulli equation, the greater pressure expands in the entire output section. This modification of the pumps does not violate the principles of energy conservation but allows them to be used more rationally. Obviously, it is not enough to change only the power supply of the pumps and turbines, it is also necessary to modify the hydraulic circuits that supply them. The pumps, if fed with a separate power supply that recycles the pressurized water from an autoclave, with the second power

supply can let almost half of the unpressurised flow rate from the autoclave into the autoclave itself by means of the internal recycling circuit. This leads to an incredible energy advantage never realized on planet Earth, since the autoclave, if it has an output connected to a turbine, this is fed with the compressed air pressure, which does not depend on the electric energy that feeds the circulation pump. In fact, the expulsion of the incompressible water by the cushion of air contained in the autoclave occurs due to the impenetrability of the bodies (since the incompressible water cannot occupy more space than the volume assigned to it, as happens with the compressed air). Water with a normal pump could not enter the autoclave. If it succeeds in entering it is due to the fact that an additional feeding has been created that enters directly to the center of the impeller, while the other connection with the impeller and the pump outlet balance the inlet and outlet pressures of the pump. But water can only enter if there is an exit to the atmosphere of water already present in the autoclave. It would be very stupid on the part of man not to exploit the opportunity that is created and to pass the water expelled through a turbine to produce energy. Yet, the world's ruling class is trying to ignore this simple and elementary invention, while for over a century it has been trying to do the same thing, with very high costs and serious side effects, dividing the atom through nuclear fusion.

If science reasoned in a simpler and more logical way, but with a global view of technologies, it would understand that it is much easier to divide the power of a pump than to divide the atom. It is also cheaper and has no side effects due to radioactive waste and the immense heat developed.

In fact, by modifying the pumps in the aforementioned way and connecting them to the autoclaves with a one-way flow with a low pressure and a high pressure recycling input and keeping the water and pressure levels constant, through the turbine that produces energy can only the amount of water introduced

into low pressure is released. The volume of internal water does not change and the air cushion cannot expand. Therefore, the energy produced by the compressor is not consumed. Only the energy required by the autoclave recycling pump is consumed, as if the water did not come out of the autoclave and did not cross the turbine, which instead, connected to the current generator, produces electricity, without the hydraulic system affected.

This means that the compressed air pressure is statically exploited, transmitting the entire pressure to the water circulating one-way inside. The water that comes from the outside cannot be refused because of the depression that is created in the center of the centrifugal impeller due to the centripetal force. If this depression were not created in the current centrifugal pumps, water would not enter and it could not be lifted. On the other hand, the water enters from the suction side of the first impeller of a multistage pump with fifty impellers in series and a unbalanced pressure of one hundred bar, way it should not enter the same impeller, single stage, with the balanced pressures in suction and delivery , eliminating the other forty-nine impellers, and modifying the input in the impeller, by means of the second separate power supply It is not useless to waste energy and materials, when it could be the same supply pressure supplied by a cheaper source that is compressed air statically exploited to provide the energy for lifting, balancing the pressures, by means of a special recycling in an autoclave? Therefore, the circulation pump has nothing to do with energy production, but limits itself to allowing the same amount of water entering the autoclave into the autoclave to maintain the pressure equilibrium imposed with the level controls. This should clarify the skeptics where primary external energy comes from, without batteries and without fuels. We are not in a closed system but in a more complex system. Composed of three combined systems (hydraulic, pneumatic and electromagnetic), with useful purifying side effects due to the solubility of

the air in the water.

Figure 1 shows a cross-section of the general scheme of "hydroelectric greenhouses for purifying fumes, CO<sub>2</sub> and water, with natural alkalization", comprising the following main elements:

- one concrete building, preferably underground, excluding the upper area assigned to the outlet of the purified air and to the loading of the calcareous material;
- one recycling water collection area (water);- one zone of fumes thickening (fumes);
- one covered water overflow tank (12) with adjustable sawtooth profiles, placed above the roof (14) made with double slope;
- two longitudinal water distribution tanks, with a higher protection net (15);
- one series of overflow trays with adjustable sawtooth profiles for artificial rain production (16);
- two series of water supply pipes (17) with regulation valve to the slides of the calcareous material;
- two sets of loading hoppers of the calcareous material (18) one on each side for an amount equal to the slides (20) to be fed;
- two series of crushed limestone elevator conveyors mounted on a sliding track and motorized independently (28)
- two series of chutes for the descent of the limestone material, made of polyethylene reinforced with stainless steel profiles, wrapped in spirals with several parallel principles and crossed with the chutes coming from the opposite wall (20), complete with a power guillotine valve of calcareous material (19);

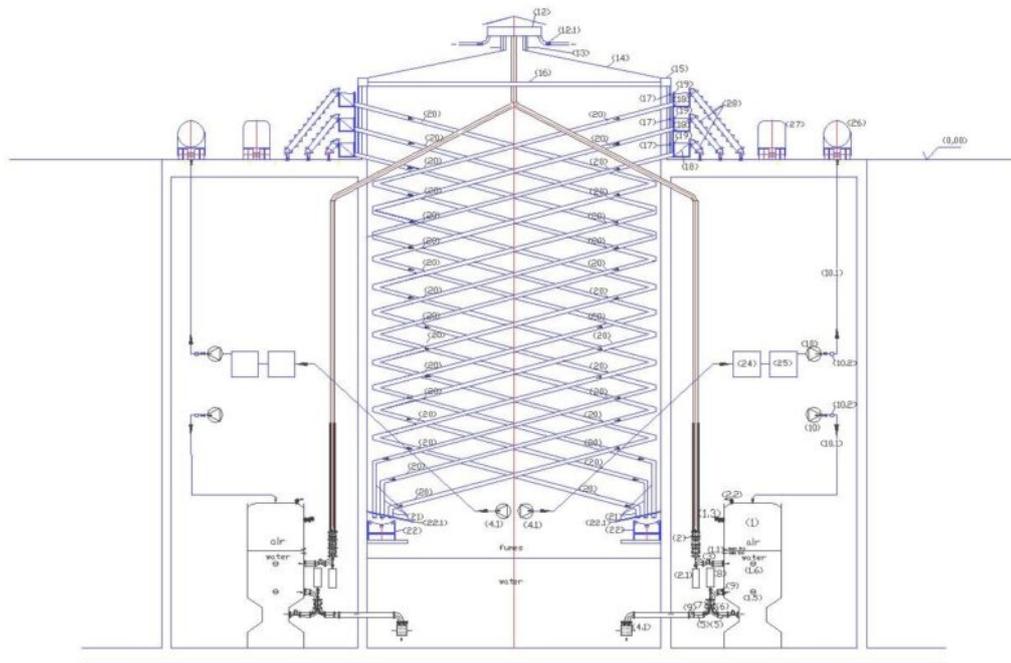
- two lifting conveyor belts outside the sludge and the residual limestone material (22);
- two series of fans (23), dryers (24), filters (25) and compressors (10) to capture compress CO<sub>2</sub>;
- two series of pressurized hydroelectric plants with autoclave, for lifting the water purification from the lower tank (water) to the main overflow tank (12).

The main features of this plant are the production of compressed hydroelectric energy, the flow of calcareous material that is consumed in gravity slides (20), also consuming the CO<sub>2</sub> contained in the greenhouse (fumes area), while using water that is recycled in the same plant until it is replenished with rainwater or other nearby aquifer sources. The recycle water collects in the tank below the limestone greenhouse (water zone) and circulates one-way in the autoclaves (1) and in the upper tanks (12, 15, 16) which feed the sliding chutes of the calcareous material and the artificial rains. The legend is shown:

(1) pressurized autoclave tank; (1.1) level regulator with capacitive probes; (1.2) safety valve; (1.3) pressure gauge with pressure transmitter and shut-off valve; (1.4) motorized valve with position transmitter flow adjustment; (1.5) predisposition connection pump with double separate power supply up to the impeller; (1.6) predisposition connection pump used as a turbine; (2) pump used as a turbine; (2.1) alternating current generator (3) motorized pump supply valve used as a turbine; (4) suction filter with built-in check valve; (5) water flow diverter valve; (6) double curve with crossed flows of water in high and low pressure (7) electric pump with double separate power supply up to the impeller; (8) variable speed pump drive motor controlled by inverter; (9) check valve; (10) electrocompressor; (10.1) compressed air distribution network, (10.2) pressure regulating pressure switch, compressed air distribution network; solenoid valve

with (10.3) check valve for compressed air; (11) water lifting pipe; (12) upper water overflow tank with cover; (13) air outlet with drop separators; (14) roof in insulated corrugated sheet with overflow water flow; (15) water distribution tanks with a higher protection network; (16) overflow trays with adjustable sawtooth profiles for artificial rain production; (17) water supply pipes to the slides of the calcareous material; (18) hoppers for calcareous material loading; (19) Motorized or manual guillotine valves for calcareous material feeding; (20) slides for the descent of the limestone material, made of polyethylene reinforced with stainless steel profiles, wrapped in spirals with several parallel principles and crossed with the slides coming from the opposite wall for optimal exploitation of the space; (21) outlet tube of residual limestone material with retaining net of uneaten materials; (22) elevator conveyor belt outside the sludge and residual limestone material; (22.1) Rain cover of the elevator conveyor belt; (23) fan for extracting fumes thickened by the greenhouse; (24) air dryer; (25) filter for air and fumes; (26) tank trucks transporting thickened and compressed fumes to other lime greenhouses; (27) crushed limestone material transport truck; (28) elevator conveyors for crushed limestone material residues.

FIG. 1



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Figure 2 shows the connection scheme to the most polluting thermal plants in the world. Where A represents a blast furnace, incinerator, cement plant, a large thermal power plant, a lime kiln. B represents the current filtration system of plants A that clearly are not sufficient to purify globally. C are the fans for the extraction of fumes and dusts. D and E, are the dust paths up to the inside of the calcareous greenhouse C, which purifies them by consuming CO<sub>2</sub> the SO<sub>x</sub> and NO<sub>x</sub> contained in the fumes while producing compressed hydropower. It can be noted that a part of the fumes thickened in the limestone greenhouse can be captured, compressed and transported with a tanker (26) to the plants of Figures 3 and 4.

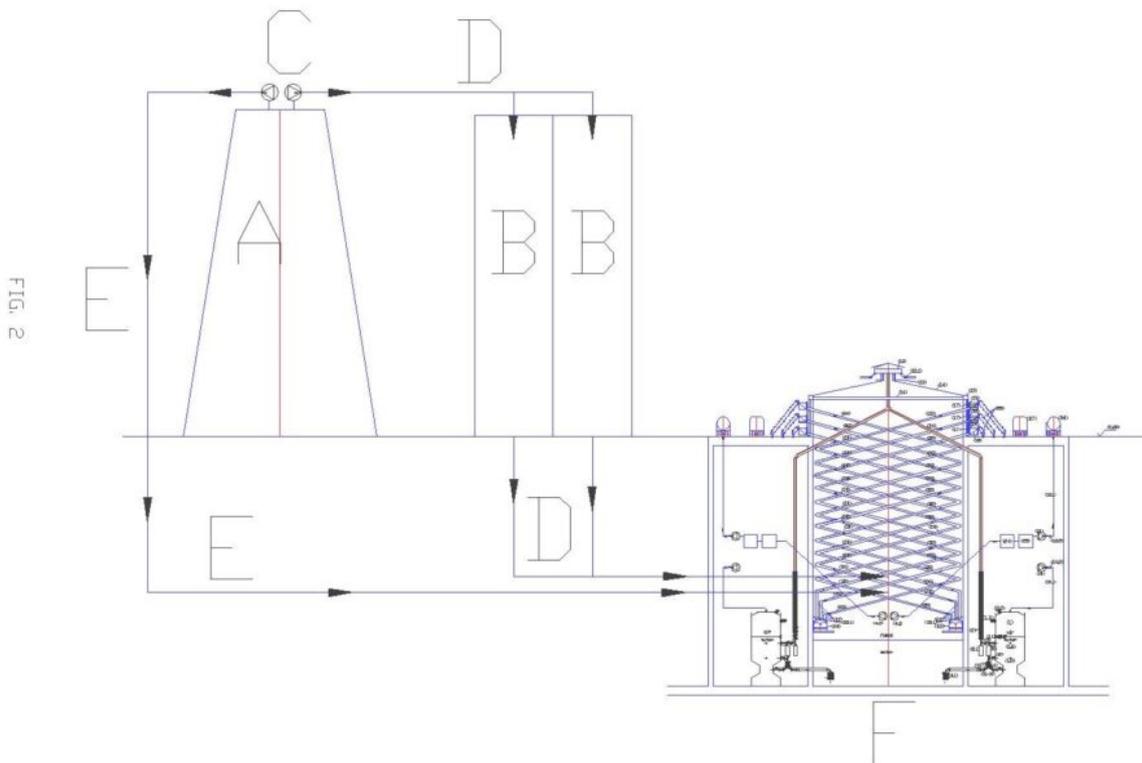


FIG. 2

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Figure 3 shows the scheme of connection to water basins "A" to be used for the production of hydroelectric energy by recycling the water; "B" is a gate that connects the basin with the hydroelectric greenhouse "D".

These plants will be the most widespread in the world, as, in addition to producing energy at a very low cost, will purify the water slightly polluted, especially rain, to combat oceanic acidification and lakes. In addition, they will protect the environment against drought and high water while compressed hydropower is produced. It can be seen that the tanker trucks (26) filled with compressed fumes at the plants Fig.2, can discharge their contents inside the twin greenhouses, which otherwise have to be satisfied only with the CO<sub>2</sub> captured by the environment, to produce carbonates in the water corroding the calcareous materials.

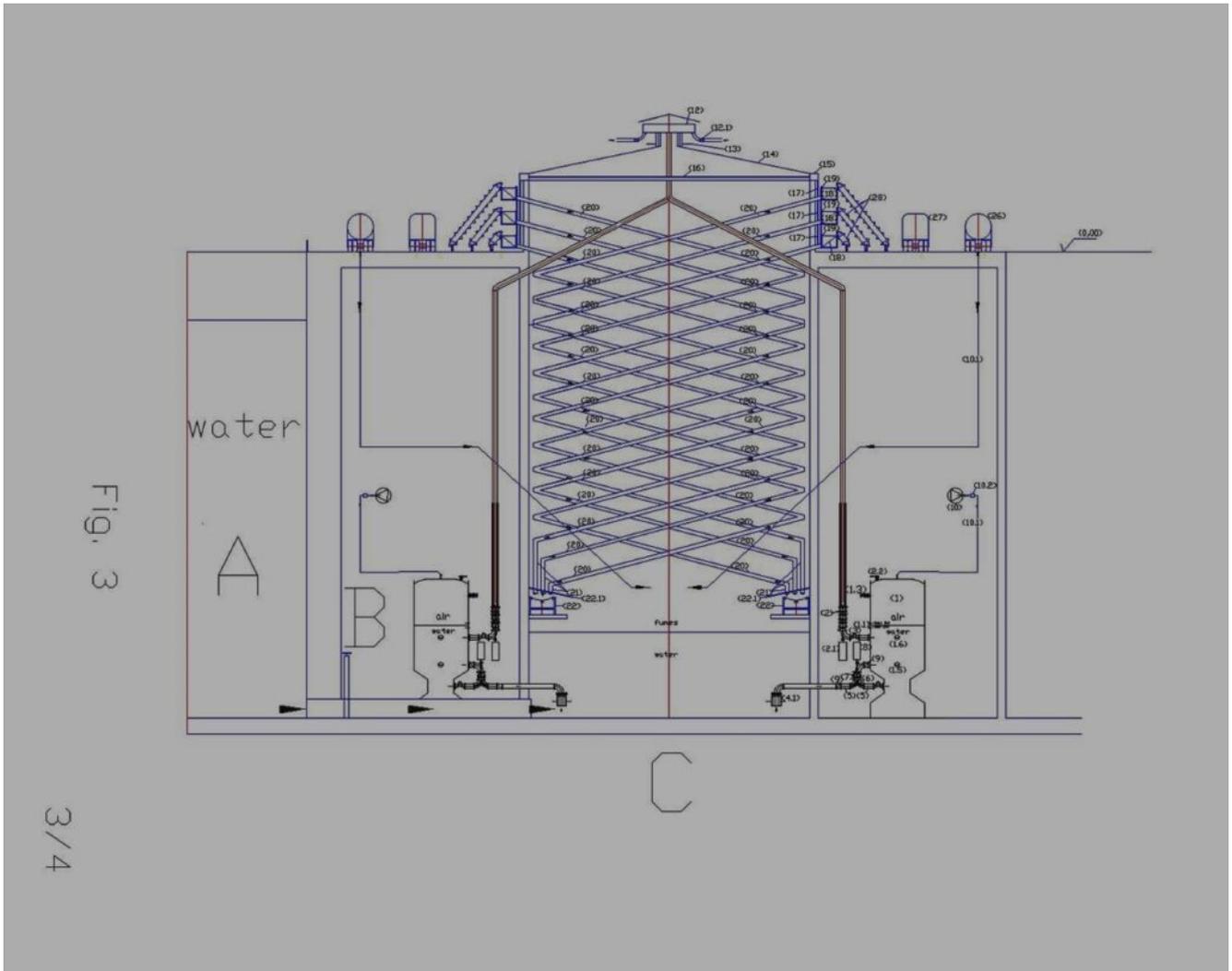
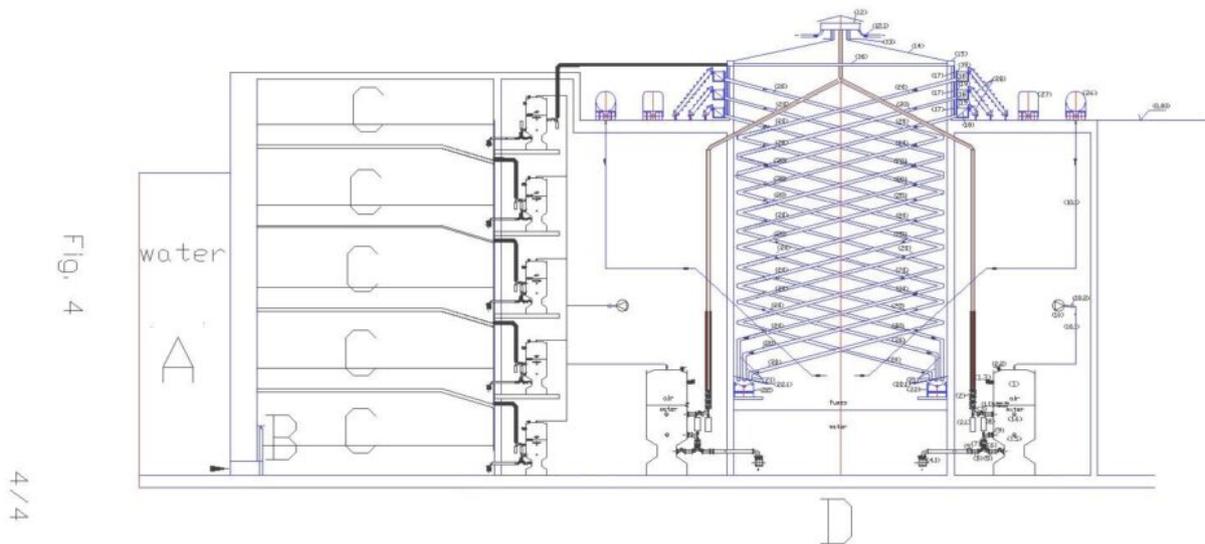


Figure 4 shows the connection scheme for "A" basins containing highly polluted waters with organic, phosphorus and nitrate loads; "B" is a motorized gate; "C" is the purifying section of the organic loads by means of the overlapping biological ponds, "D" is the hydroelectric limestone greenhouse as described in Figures 1, 2.3. But these plants can replace in every corner of the earth, the current water purifiers and at the same time also the thermal plants. With purifying and energy costs hundreds of times lower than the current ones and with higher energy and purification yields.



Public bodies and multinationals have not understood that it is more important to create synergistic plants that favor the physical and biological chemical contact between gases and minerals under pressure, than to administer chemical additives to correct water purification processes, whose alkalinity can not be corrected in a sustainable way, except through the calcareous greenhouses. While the purification of fumes on planet earth has never been done completely for the same reasons. The alkaline water cycle and the carbon neutralization of the fumes need a single environment to be sustainable. You cannot use calcium oxide to produce alkalinity because the production of each kg involves the emission of about 2 kg of  $\text{CO}_2$ , at least until the lime production will be done as indicated in FIG.2.

Figure 1 clearly shows that the water circulation system in a

hydroelectric lime greenhouse is open, because the water exits atmospheric pressure in the upper overflow tank (12) after being raised by static compressed air pressure, that imprisoned in the autoclave, without the possibility of expansion, transmits all the expulsion force to the water that enters excess of the volumetric capacity of the autoclave. If the compressed air expands, it would reduce the thrust force on the water coming out of the autoclave and at the same time the electric pump (7) should let in a greater quantity of water to balance the pressure, absorbing a greater quantity of energy. For this reason a level regulator has been provided with two capacitive probes (1.1), very close to each other and the variable speed motor (8), controlled by an inverter, so that the oscillation of the volume of water and compressed air in the autoclave is very low. When opening the valve (3) that supplies the turbine, the electric pump (7) must already be running with minimum flow. The engine (8) gradually increases the number of turns as the valve (3) opens, without ever changing the volume of water inside the autoclave. Since 50-55% of the pump capacity is recycled in the autoclave, otherwise the water from outside cannot enter, with the sole force of the circulation pump. In order to keep the hydrostatic pressures balanced and to consume little energy, the pump must provide only the flow rate that passes through the turbine. This can be done with the level control and the variable speed motor. If it passes more water must reduce the number of revolutions of the pump, or reduce the autoclave pressure to retract the oscillation of the level in the pre-established limits. If it passes more water must reduce the number of revolutions of the pump, or reduce the autoclave pressure to retract the oscillation of the level in the pre-established limits. If it passes the less you have to do, automatically, the opposing maneuvers. the flow rate and hydraulic resistance of the turbine must be calculated with precision before building the system so as to also size the circulation pump with the double separate power supply, which must have a total flow rate of about twice the flow rate that passes through the

pump used as a turbine (2). Water enters from outside through the filter with check valve (4) only this flow produces energy. If the valve (3) feeding the turbine is closed, the external water can not enter the autoclave since the circulation pump (7) has only the necessary head for internal recycling, as the system uses the balanced suction pressures and sent. When the plant is completely full, for example, at the pressure of forty bars, with the valve that feeds the turbine, open, only the amount of water that comes out through the turbine can enter. Only with this amount of water is hydroelectric energy produced, while raising the water of about 35 meters up to the overflow tank (12). This happens because in the same instant in which the water exits the overflow tank (12) at atmospheric pressure, the space is created in the autoclave to let water enter from the outside through the second separate power supply of the impeller.

Patent offices can not speak lightly of "perpetual motion" with the poor scholastic knowledge they possess on the subject, because world science is guilty of not having deepened the interactivity between the physical characteristics of water and air, as did the undersigned, both in submerged hydroelectric plants, both in those with water recycling at atmospheric pressure, and in those pressurized with compressed air. This is the real reason why in the world databases of patent deposits these applications do not exist. This does not mean that they cannot be realized by changing the way of designing the systems and above all by modifying the pumps. Much of global warming is due precisely to this trivial mistake of world science. Patent offices should only be limited to registering the filing dates of patent applications because they do not have the scientific knowledge to go further. I do not say this to be offensive to them, but I myself realized the interactive possibilities only after forty-five years of work experience. However, even for other reasons the whole patent system must be modified, completely separating industrial and intellectual property with

copyright, to which inventors aspire like the undersigned who deal with inventions of public utility, inexplicably hidden from the centers of world economic power.

The undersigned, knowing that he was proposing inconvenient inventions for the centers of power, considered it useless to bleed himself economically to experiment with his small resources the first inventions. Not only would he have to go into debt without being able to access either industrial property or simple copyrights, which strangely, only for inventions, cannot be separated. Above all, it would have wasted scarce physical resources, having started this retirement business, after having learned about the problems from an industrial and environmental point of view. I would have been very naive to expect success by developing a single patent, without communicating the global message, which can only be understood by developing more inventions rationally linked to the territory through the scientific organization of work, which is clearly unknown to those who designed the current purification and energy systems. It does not matter if they were great scientists or researchers, because I do not criticize the individual scientific principles applied, but the fact that the cycles have not been completed. To complete them you need transversal scientific and technological experiences and know how to organize work activities globally.

With the planet warming up and the oceans becoming acidic, the calcareous greenhouses that have never been built, should have already been obligatory to fight these two interconnected global phenomena, also supporting the significant energy costs that would result without the invention compressed hydroelectric energy, which miraculously, this cost would reduce to zero. The calcareous greenhouses would have been better than the C. C. S. system (carbon, capture, storage) experimented without success and with very high costs (at least fifty billion dollars) from world public science. But no one wanted the simplest and most powerful energy in the world

by making legally (so to speak) the inventions and copyrights of dozens of patents legally deposited by a simple pensioner.

If world silence continues, the French European revolution, the American war of war, the peaceful one of Gandhi in India, the cultural war and that of Tien An Men in China have been in vain.

If the United Nations can not impose complete cycles in the world's purification and energy plants, they have failed in their mission, because it does not depend on the invention of pressurized hydropower (which would make such choices only more sustainable), but on the priorities chosen by governments world, that these choices would have to be made equally, with higher costs, if they wanted to protect the environment and human health. Instead, despite the reduction of costs allowed by the hydropower compressed, they continue, unanimously, to pretend not to understand.

Some industrial cycles, such as the production of steel, cast iron, lime, cement and waste incineration, can only partially be improved with compressed hydropower. Therefore in the global plants it is necessary to understand the calcareous greenhouses, which for me are the best system to combat global warming, neutralizing the CO<sub>2</sub> in a sustainable way, but also to sustainably complete the water purification, acidified by oxidation treatments and nitrification. The denitrification treatment, which is not always carried out in purifiers, makes it possible to recover about a third of the alkalinity lost in oxidation and nitrification treatments. Also the alkalization of water in calcareous greenhouses is much more efficient and sustainable in limestone greenhouses compared to the current purifiers. Instead, there are no doubts about the oxidation and nitrification treatments, which occur respectively, as side effects of the production of compressed hydropower (Henry) and the flow of water between the rocks in the indoor environment that consumes CO<sub>2</sub> instead of emitting it in the environment, as in the current tanks of oxidation and

nitrification. Therefore, there is no reason in the world to continue to have in the entire planet the current thermal power stations, and heat engines that have warmed the planet, but not even the current water and air purifiers, which have not been able to cool and purify efficiently.

The main advantage of combining limestone greenhouses with compressed hydroelectric energy is the fact that the same water that produces energy, purifies the fumes, recovers the CO<sub>2</sub> to produce alkaline waters, and recovers much of the steam produced, which is condensed by contact with the metal wall of the roof of the cooled building, having an acid PH (5.5) it cooperates to corrode the calcareous material that reacts chemically with the CO<sub>2</sub>, equally acid (5.5), in the rains purifying the fumes.

if it will be true that the calcareous greenhouses will increase the costs of the production of steel, lime, cement and incineration of waste, it will also be true that this cost will be offset in large part by the low cost of hydropower and water purification and of global air. From the following article

<http://www.canaleenergia.com/rubriche/think-tech/il-carbone-verde-uso-delle-biomasse-in-siderurgia/> public this information for those who think that electric ovens completely zero emissions of CO<sub>2</sub>. Unfortunately it is not true:

“The merging process can be schematically divided into two phases:

The first phase is aimed at the fusion of solid scrap. The second phase is aimed at obtaining the temperature and the objective composition. In the melting phase it is common practice to use methane burners to aid the electric arc, to speed up the fusion and reduce the consumption of electricity. In the second phase, instead, coal (normally anthracite charged in bulk with the scrap or insufflated in powder) is used which, reacting with oxygen, produces CO promoting the

foaming of the layer of liquid oxides (slag) which protects the molten steel bath. The foam covers the electric arc, reducing thermal losses, increasing efficiency, and protects refractories by reducing the total cost of the process. The CO produced can also be burned with other oxygen (post-combustion).

Today a typical 100 t / h electric oven consumes between 500 and 1500 kg / h of coal and between 500 and 1000 kg / h of natural gas, with a corresponding production of 3-8 t / h of CO<sub>2</sub>. “

From what we wrote above we must take note that fossil energy can not be completely eliminated to produce steel, incinerate waste, produce lime and cement, but this would not have been an environmental problem even in the past, if the fumes purification plants were designed correctly, as proposed by myself: removing the chimneys and replacing them with limestone greenhouses both in the industrial plants mentioned above and in the urban ones. The problem would have been only economic: The calcareous greenhouses, universally applied in the world would have solved the problem of global warming with higher costs without the invention of the compressed hydroelectric.

But the question I ask myself is the following: what did it matter of the costs to the governments and to the UN. If the priority was to protect the environment and human health? I think the world's people would certainly have accepted the higher costs of cement lime and purification steel instead of the costs it pays to repair environmental damage and health costs against cancer, especially the cardio respiratory system.

The ambiguity that showed the world's ruling class on environmental energy inventions is immense, because it has not spent a single dollar to verify any of the environmental and energy solutions reported on <http://www.spawhe.eu>. It is not

just ambiguity, but also arrogance accompanied by ignorance, because the global purification systems are not yet taught in any world school. While for interactive energy the situation is even worse. I have received support from private citizens and some disagreement from those who clearly learned from memory that energy does not come from nothing, including patent offices. To these people, if science does not officially intervene, with maximum authority, it is impossible to explain the fact that compressed air is not nothing; the energetic difference between open and closed energy circuits; and how water flow and pressure develop within centrifugal pumps and systems.

But the problem is also and above all of general scientific culture, because the energy and purification plants can be designed globally only by putting them together rationally and this can not be done by those who work in watertight compartments, as we have seen, have not achieved any complete plant and sustainable worldwide, both fixed and mobile.

To understand the usefulness of calcareous greenhouses it is necessary to jump back more than four billion years in the history of the planet Earth, going up to the primeval era, when the planet was a mixture of hydrogen and carbon based water and materials inert not yet stabilized. From the following article on the net: <http://www.paleoantropo.net/paleogenerale/sedimenti.htm>, I extract: "The Earth, immediately after having originated (probably from the gravitational aggregation of matter wandering in space), was probably an almost homogeneous and relatively cold body, but the contraction caused by the progressive increase in mass produced an increase in temperature, to which undoubtedly the radioactive decay of some isotopes contributed. At a later stage, the increase in temperature gave way to a process of partial melting of the planet, causing it to differentiate into the crust, mantle and core: the silicates, lighter, tended to rise towards the

surface, forming the mantle and the crust, while the heavy elements, especially iron and nickel, sank towards the center of the earth. At the same time, by means of volcanic eruptions, the light gases were expelled incessantly from the mantle and from the crust. Some of these gases, in particular methane, ammonia, oxides of nitrogen, sulfur, carbon dioxide, formed the primordial atmosphere, while the water vapor condensed, giving rise to the first oceans "All these atmospheric gases were absorbed by the oceans and from the thickening of the rocks produced by subductions, which in substance are physical and chemical phenomena under very high pressures.

From the online publication "<http://www.chimicamo.org/tutto-chimica/pietre-calcaree>" report: "The calcareous stones come from sedimentary rocks, both of chemical origin and of organic origin. Chemical sedimentation is linked to equilibrium in a heterogeneous phase:



As can be seen from the reaction, running or stagnant waters rich in calcium ions and hydrogen carbonate ions can deposit calcium carbonate as a precipitate if, due to changed conditions of temperature and / or partial pressure of overlying CO<sub>2</sub>, they remove part of the carbon dioxide in them dissolved in the atmosphere. The reaction is reversible and, read from right to left, it interprets the phenomenon of chemical erosion which, carbonated waters, not excessively concentrated in calcium ions, called aggressive waters, carry out on the calcareous rocks.

This phenomenon is particularly evident in the stalactitic and stalagmitic formations, determined by groundwater which, by percolating under pressure, when they come into contact with the atmosphere or with air chambers, allow H<sub>2</sub>O to evaporate and become depleted of CO<sub>2</sub>, with consequent precipitation of

CaCO<sub>3</sub> which takes on the shape of a drop. The compound that clearly dominates the chemical composition of the calcareous rocks is therefore calcium carbonate. In addition to calcium carbonate, in the process of sedimentation, other carbonates precipitate, especially those of magnesium and manganese and iron hydroxides that have a significant influence on appearance and especially on color. The calcareous rocks are not stable neither to chemical agents nor to thermal agents. In fact, calcium carbonate is balanced at every temperature with calcium oxide and carbon dioxide:

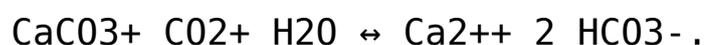


At low temperatures, the CO<sub>2</sub> concentration in the air is sufficient to shift the balance from right to left, while at high temperatures the opposite happens: CaCO<sub>3</sub> dissociates to increase the CO<sub>2</sub> concentration in the air up to the equilibrium value.

Acids, even weak, or diluted strong acids, decompose calcium carbonate, according to the reaction:  $\text{CaCO}_3 + 2 \text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O} + \text{CO}_2$

Or in ionic form:  $\text{CaCO}_3 + 2 \text{H}^+ \rightarrow \text{Ca}^{2+} + \text{H}_2\text{O} + \text{CO}_2$

This is the reaction to which we must tend in the calcareous greenhouses, which in abundance of rainwater we can write differently:



The calcareous particles go into solution in the form of ions. These ions can be originated by different mechanisms: 1) -dissolutions of salts, until reaching the solubility product of the same salt; 2) ionic exchange between a cation and the H<sub>3</sub>O<sup>+</sup> ions; 3) -Ionic exchange between an anion and OH<sup>-</sup> ions. In addition to the three mechanisms mentioned above, the ion subtracted from (positive) rocks may undergo a complexation (formation of complex ions) or hydrolysis by reaction with

water molecules. Both of these factors reduce its effective concentration. Imagine what happens at the molecular level when an ionic solid, like a salt, melts. The ions abandon the solid and disperse in the solvent, until some dissolved ions meet with the undissolved solute (solid salt) and recrystallize on its surface. But in the artificial greenhouse the flow of water will be quite continuous, dragging the salts into the water of the basin below. The saturation conditions will never occur, so the dissolution rate will always be higher than the recrystallization speed. In substance, we will not produce stalactites and stalagmites but alkaline waters. The sedimentary rocks are composed of minerals, such as alkaline and alkaline-earthly sulphates and carbonates, generally soluble in natural waters. Their dissolution rate is much higher than that of silicates, which we obviously do not take into consideration, but anyway, they will make their small contribution. An example of cold carbonation is given by calcite ( $\text{CaCO}_3$ ) which often remains dissolved in a supersaturated solution. The natural waters dissolve the alkaline-earth carbonates first. When the concentration of ions  $\text{Ca}^{++}$  and  $\text{CO}_3^-$  corresponding to saturation with respect to calcite is reached, the increase in salinity resulting from the progress of the water along the hydrogeological cycle is achieved by the solubilization of alkaline-earthly sulfates and alkaline chlorides. The five categories are therefore so divided, taking the name from the main saline component: 1) – bicarbonate waters; 2) – bicarbonate chloride waters; 3) – chloride-bicarbonate waters; 4) – chloride-sulphate waters; 5) – chloride water.  $\text{Na}^+$  and  $\text{K}^+$  are grouped among the alkalis;  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$  among the alkaline-earthly;  $\text{HCO}_3^-$  and  $\text{CO}_3^-$  between the anions on one side, and on the other  $\text{Cl}^-$  and  $\text{SO}_4^-$ . In this way the sum of the molar percentage ( $\text{Na}^+ + \text{K}^+$ ) closes at 100% with the molar percentage ( $\text{Ca}^{++} + \text{Mg}^{++}$ ) and the molar percentage ( $\text{HCO}_3^- + \text{CO}_3^-$ ) closes at 100 with the molar percentage ( $\text{Cl}^- + \text{SO}_4^-$ ). The acid carbonate, or calcium bicarbonate passes in solution in the water (solubility at 20

° C, about 1 g / liter). It is actually an equilibrium reaction and the amount of acid carbonate that can be dissolved in water is greatly influenced by the concentration of CO<sub>2</sub> in the water itself.

The phenomenon of the solubilization of gases in water is quantifiable in milligrams of gas per liter of water (nitrogen, oxygen, CO<sub>2</sub>, etc.) according to Dalton's law, which are the main formulas that explain the concept, without entering into the about the calculations:

In an ideal gas mixture contained in a volume  $V$  and at a temperature  $T$ , the molecules of each gas behave independently of the molecules of the other gases; as a consequence, the pressure exerted by the gaseous mixture on the surface of the water is given by: 
$$P = \frac{RT}{V} (n_1 + n_2 + \dots)$$
 where,  $R$  is a constant that is 0.0821;  $n_1, n_2, \dots$  represent the number of moles of each component of the mixture. This law is valid under the same conditions to which the law of ideal gas is valid: it is approximated to moderate pressures, but it becomes more and more accurate as the pressure is lowered. By defining the molar fraction as the ratio between the number of moles of the  $i$ -th component and the number total number of moles present: 
$$x_i = \frac{n_i}{n_1 + n_2 + \dots}$$
 it is obtained that in a mixture of ideal gases, the partial pressure of each component is given by the total pressure multiplied by the molar fraction of this component: 
$$P_i = P \cdot x_i$$

In substance, for each gas present in the air it is possible to calculate how much water is solubilized at the working pressure, but for practical purposes, the energy we spend to compress the air will be a small expense, since the air compressed, never exiting the volume of the tank (1) has only small oscillations of pressure, and once the saturation point is reached, no other air is solubilized. But when the polluted water enters, as mentioned above, with a very low energy cost in the tank (1), it automatically increases the self-purifying capacity due to the greater solubilization of the oxygen and when it comes out, it carries the oxygen outside, which frees

itself to oxidize other polluted water particles present in the aquatic environment of the calcareous greenhouse.

In the new solution of calcareous greenhouses presented in this publication, as a virtual advancement of the state of the art of an environmental work ever made, limestone and contained in semicircular polyethylene slides reinforced with stainless steel stirrups, where water flows lifted and recycled. In a very schematic line, the calcareous material to which the task of producing carbonates will be entrusted will be mainly calcareous rocks, bones of sterilized animals, residues of concretes.

If this is the system that used nature to normalize the primordial atmosphere, why should not urban areas close to steel mills, incinerators and thermal power stations and areas with the highest urban traffic? Why is world science silent on this solution? And why are the legislators, the judges, the trade unions, the environmental associations also silent? If it is true that they do not want social assistance, but work, why do not they fight to expand the cycles of environmental protection? Why nobody opposes the design errors of public and private facilities? All claim a cleaner environment but no one goes into the details of alternative solutions.

Everything that happens partially in the current water and air purifiers will be better in future limestone greenhouses for many reasons that do not exist in the current purifiers:

The combined effect of the passage through the pressurized autoclave and the greenhouse at atmospheric pressure, but covered, where the toxic gases and the heavier powders of the air do not disperse in the external environment. Therefore the contact times are much longer and there is a greater quantity of natural reagents to be met, above all, inorganic. Furthermore, it produces energy instead of consuming it.

The calcareous greenhouses, in addition to neutralizing CO<sub>2</sub>

and dust, and create alkalinity, could also break down all SO<sub>x</sub> and NO<sub>x</sub> in the few plants that would still produce fossil energy, for steel producers and incinerate waste. These oxides would be forced to react with calcium to produce sulphates, nitrates that are added to carbonates produced with CO<sub>2</sub>. These are reduced by the oxidation treatment due to the simple fact that the water circulates continuously on contact with the air in the chutes and when it is raised through the autoclaves, as stated above, by Henry's law.

The transformation of sulfur oxide into sulfite:  $\text{SO}_3 + \text{CaO} + \text{H}_2\text{O} \rightarrow \text{CaSO}_3 + \text{H}_2\text{O}$ , while the nitrification treatment, which consists in converting ammonia into nitrite and subsequently into nitrate by nitrosating bacteria and nitrifying bacteria, occurs both in the autoclaves and in the lime-greenhouse, requiring an aerobic environment where prokaryotic bacteria operate. During the first phase the ammonia is first oxidized hydroxylamine by the ammonia mono monooxygenase according to the reaction:  $\text{NH}_3 + \text{O}_2 + 2 \text{H}^+ + 2 \text{e}^- \rightarrow \text{NH}_2\text{OH} + \text{H}_2\text{O}$ . During the second phase the hydroxylamine is converted into nitrite by the hydroxylamine oxidoreductase according to the reaction:  $\text{NH}_2\text{OH} + \text{H}_2\text{O} \rightarrow \text{NO}_2^- + 5 \text{H}^+ + 4 \text{e}^-$ . Subsequently, the oxidation of nitrite to nitrate occurs by another type of prokaryotes known as nitrite oxidizing according to the reaction  $2 \text{NO}_2^- + \text{O}_2 \rightarrow \text{NO}_3^-$ . The same can be said for the abatement of phosphorus, deepening the cycles in an environment full of natural reagents and environmental conditions and pressures much more varied than the current purifiers.

Suppose we realize a calcareous greenhouse that raises the water and produces energy through 60 autoclaves (1) coupled to pumps used as turbine (pat), which exploit the useful height  $H_u = 350 \text{ m}$  and an electric pump with double feeding DN 150 with flow rate  $35 \text{ L / s}$ . Assuming the efficiency of the turbine is 0.75, applying the formula  $P_u = \eta * 1000 * Q * H_u / 10^2$ , we have an energy production of 90 Kw ( $0.75 * 1000 * 0.035 * 350/10^2$ ) By assigning to the circulation pump with the

double separate power supply up to the impeller a prevalence of 0.4 m and a yield of 0.6, the power absorbed by it, which carries a double flow rate of that passing in the turbine, calculated with the formula  $0,4 * 1000 * 0.070 / 102 * 0.6 = 0,457$  KW.

In this case the ratio between energy expenditure and yield is 196.9 (90/0,457). In fact, the circuit that produces energy at the autoclave outlet depends only on the compressed air pressure, which is adjustable by means of the pressure switch calibration (10.2) that feeds the network, which can be around 40 bar, considering that beyond to produce energy through the turbine that absorbs 35 bar the water must also be raised about 40 m, if the depth of the greenhouse will be such. While the circulation pump absorbs very little energy like all circulating pumps in closed circuits with the load balanced in suction and delivery and the losses on the separate impeller supply are compensated by the positive water head on the pump suction. It is no wonder this result, considering that compressed air is a very powerful, flexible and economical energy accumulator. But it must be used statically, one-way, as nature does with atmospheric pressure. Without the contemporary invention of the pump with the double separate power supply and the internal recycling of the autoclave, this energetic and purifying miracle can not be realized.

If we consider that the reasoning made on a single circulation pump and only one pump used as a turbine that circulates only 35 L / sec of water leads to the production of about 89.5 Kw and that each autoclave can mount three plants in parallel because the internal volume of water and air does not vary, in the system assumed, equipped with 60 autoclaves, we could have an energy production of about 16,110 Kw / h ( $89.5 * 60 * 3$ ), to power, not only electric ovens that produce steel, incinerators, factories that produce cement, lime, industry, agglomerations. But we can circulate continuously in the calcareous greenhouses even 6.300 L / sec of water ( $35 * 60 *$

3) to be distributed to realize artificial rain and feed the slides that corrode and move the limestone material by gravity in order to consume CO<sub>2</sub>, oxidation (apart from the oxidation produced in the autoclave by Henry's law) and produce water and alkaline.

If there is not enough space to create limestone greenhouses that purify the fumes completely, as could happen in the case of ILVA in Taranto (Italy), where the factory is located in an urban center, it is sufficient to realize the abatement of the powders with artificial rains and use the same system also to thicken the fumes that will increase the concentration of CO<sub>2</sub> in the lower part of the greenhouse, being this heavier than air. The CO<sub>2</sub> can be aspirated with one or more fans (23) and sent to one or more systems consisting of an air dryer (24), a filter (25), a compressor (10), which feed a tanker that will distribute CO<sub>2</sub> to the calcareous greenhouses that will replace the current useless and harmful water purifiers, which can not produce alkaline waters, while the entire planet is acidifying.

But these greenhouses can also replace the current useless and harmful thermal power stations and the current useless and damaging hydroelectric power plants. It makes no sense to even produce energy with solar panels and wind turbines, when with lower costs we can steal CO<sub>2</sub> from the environment, purify and prevent global acidification. The future purifiers will have to be the urban purification sewers that lighten the already mentioned organic loads, and the limestone greenhouses next to the fresh water courses, the lakes and the artificial basins. That complete the purification and alkalize the waters. These plants for the large capacity of water that will be able to lift, if you use pumps, turbines and autoclaves of larger size, can also defend against high water from floods and droughts. If we notice, the water raised to the overflow tank (12), in case of need, instead of reaching the overflow quota, if you open the exhaust valves (12.1), alternatively, they can

supply irrigation channels or defense channels from high waters. The limestone greenhouses producing energy, which are powerful purifiers may also have a significant commercial development if coupled with disinfection with ultraviolet rays of the output water, to create factories that produce mineral or thermal waters with natural processes, selecting the rocks and minerals to slide in the slides.

Best Regard

Luigi Antonio Pezone