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Contributions to Keep the Atmosphere Balanced: Reflections on Implementing the Global Use of a Meb Minimizer to Abate Air Pollution from Mobile Sources Controlling Co2 Emissions

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Abstract **-** WHO states that fossil fuels burning, primary cause of air pollution is also a major contributor of Climate change affecting health; in such a way that numbers of deaths per year would increase in next decades and also global average temperature despite the Paris Agreement goals. Other authorized institutions and scientists are making similar statements. International agreements settle commitments to achieve fundamental goals, resulting in policies that should be implemented within the agreement framework, by every engaged country; through strategies, measures and actions. Although these have prevented millions of tons of pollutants from being sent to the atmosphere, they look like not having enough effectiveness, as a whole, to achieve the proposed goals, because the engaged countries implement and develop policies according to their socioeconomic conditions, resulting in a time lag between policies implementations, undermining the policies overall effectiveness. As an example, Carbon Pricing is not globally implemented. Then, proven effective actions should not be dismissed however small its impact may seem. On the other hand, scientists through authorized institutions state that air pollution and global warming cannot be treated as independent problems. Therefore, it looks better to implement global actions focused to keep natural cycles balanced, satisfying the agreements, as long as those actions be technically and economically feasible, to enough mitigate the problem. The goal of this paper is to present reflections on global implementation of a magnetic, efficient, balanced minimizer, to abate air pollution controlling CO2 emissions, supported on the fact that CO and HC emissions concentrations cannot be reduced at will, without increasing CO2 emissions beyond the limits. Design, and building and installation simplicity and results from tables 1-2, suggest technical feasibility. The estimated cost; design, building and installation, of pollutants reduction about $\frac{10.4USD}{Ton-year}$, for the analyzed test results, suggests economic feasibility.

Keywords: MEB Minimizer, ADC, Carbon Pricing, Paris Agreement, Technical-Economic Feasibility

1. Introduction

Air pollution and climate change global solution should not depend only on political and socioeconomic conditions of countries neither on speeches but also on particular proven actions.

There are not many formal proposals in the open literature on applying promptly straightforward global actions to reduce continuously and consistently Air Pollution and Climate Change. Most of proposals, that have been found, intending to help to comply with the international commitments agreed to abate air pollution and climate change, focus on policies, that so far have not been so effective, even to achieve some countries´ targets [1], others on innovations, plans, strategies, and laws , somehow connected, focus on promising solutions as global use of clean energy to power electric vehicles [2], plans to ban sale of diesel and gasoline cars [3], green vehicle strategy to tackle pollution and climate change, [4] proposed laws to set net-zero carbon target by 2050 [5] among others similar. However, we cannot stand still and waiting for until they can be worldwide implemented. Meanwhile, fossil fuels burning is being used and humans are obliged to reduce emissions of air pollutants and CO2. Every day, greater amounts of pollutants and CO2 that will last thousands of years in the atmosphere are sent to the atmosphere, increasing air pollution and the global average temperature every day. This is why these reflections, that suggest a different proposal; to implement the global use of a magnetic efficient balanced (MEB) minimizer to reduce air pollution and control the increase of CO2 emissions, are then presented orderly in this paper. No effort is needed to conclude from authorized institutions and scientists updated reports, about air pollution and climate change current

state, that is extremely urgent to take straight forward proven actions as, for instance, fuel optimization, but specially aimed to clean the air in a balanced way. The analysis of Air Pollution and Climate Change problem nature from theoretical practical considerations supported by ADC tests results and analyses from authorized institutions and scientists allows to understand the problem as a whole; emissions in excess, and so must be treated to find a rational solution of it. In this regard the accurate application of theoretical principles of physics and positive long-ago experience to optimize fossil fuels by magnetic field action reappears as a promising path to global reduction of pollutants and CO2 emissions currently sent to the atmosphere. On this path, MEB minimizer appears as a useful tool to clean the air, helping to meet the international agreements, suggesting a proposal for its global implementation. Comparisons between its ready to use unit price and those of two investments favors its global use, as it will be shown. It is up to authorized institutions to consider this type of action if they agree it is suitable to abate global air pollution from mobile sources and control global CO2 emissions or dismiss it on the contrary.

2. Air Pollution and Climate Change Current State. Updated Institutions Reports

Alarming reports from authorized sources have risen. Global air pollution continues worsening and global temperature continues increasing, exceeding all the highest records of the last decade. On the other hand, Climate Change adverse effects are evident by continuous deterioration caused to the different ecosystems.

Updated reports from WHO, NOOA, SCIENTIFIC AMERICAN, EPA and other authorized sources on the current global state of air pollution and climate change are summarized as follows:

Nine out of ten people breathe polluted air every day. Therefore, microscopic pollutants in the air can penetrate respiratory and circulatory systems, damaging the lungs, heart and brain, killing 7 million people prematurely every year by the combined effects of ambient (outdoor) and household air pollution, from diseases such as cancer, stroke, heart and lung disease. In 2019, air pollution has been considered by WHO as the greatest environmental risk to health. Around 90% of these deaths are in low- and middle-income countries, with high volumes of emissions from industry, transport and agriculture, as well as dirty cookstoves and fuels in homes. The primary cause of air pollution (burning fossil fuels) is also a major contributor to climate change, which impacts people's health in different ways. Between 2030 and 2050, climate change is expected to cause 250 000 additional deaths per year, from malnutrition, malaria, diarrhea and heat stress. Moreover, even if all the commitments made by countries for the Paris Agreement are achieved, the world is still on a course to warm by more than 3°C this century (WHO, 2019). Averaged as a whole, the temperature across global land and ocean surfaces for April 2018 was 0.83°C (1.49°F) above the 20th century average of 13.7°C (56.7°F). Nine of the 10 warmest Aprils have occurred since 2005. April 2018 also marks the 42nd consecutive April and the 400th consecutive month with temperatures, at least nominally, above the 20th century average. The April global land and ocean surface temperature has increased 0.07°C (0.13°F) per decade since 1880; however, the rate is more than double since 1980 [7]. December 2019 global land and ocean surface temperature was 1.05°C (1.89°F) above the 20th century average [8].The global land and ocean surface temperature for January 2020 was the highest in the 141-year record, with a temperature departure from average of 1.14°C (2.05°F) above the 20th century average [9]

The annual global cost for burning fossil fuels is extremely high, Trillions USD per year. Air pollution from burning fossil fuels is generating economic losses of $8 billion a day. That's about 3.3% of global gross domestic product, or $ 2.9 trillions. (Green Peace, 2020) In the year 2019, emissions from industrial activities and burning of fossil fuels were pumped approximately 37 billion metric tons of carbon dioxide into the atmosphere smashing a previous record set in 2018 and total carbon emissions from all human activities, including agriculture and land use, were about 43.1 billion tons. (Scientific American, 2019)

Mobile sources that use fossil fuels are the largest air pollutants and emit the highest amounts of CO2 into the atmosphere. The transportation sector generates the largest share of greenhouse gas emissions, primarily coming from burning fossil fuel of our cars, trucks, ships, trains, and planes. Over 90 percent of the fuel used for transportation is petroleum based, which includes primarily gasoline and diesel. (EPA, 2019)

Fossil fuel use is the primary source of CO2. About 65% of CO2 is emitted from carbon fossil fuel use and other processes. It can also be emitted from direct human-induced impacts on forestry and other land use, such as through deforestation, land clearing for agriculture, and degradation of soils. Likewise, land can also remove CO2 from the atmosphere through reforestation, improvement of soils. About 11% comes from deforestation and biomass decay. [13]

The goals established in the international agreements have not been globally achieved. Few countries are meeting the Paris climate goals. Only seven countries have made commitments or efforts that would achieve the goal of the Paris accord. It was found that most major polluters are making few, if any, efforts to meet their goals. (The Washington Post, 2019) Few countries are pricing carbon high enough to meet climate targets. [15] The Kyoto Protocol on climate change is a fundamentally flawed agreement that set back solutions on climate change by two decades; The Wrong Solution at the Right Time. (Rosen, 2015). The first phase of Kyoto Protocol, the only international binding treaty on emissions cuts, has failed to slow global carbon emissions. The second that ends this year is bogged down by disagreements between the high- and low-income countries. Overall, the result is that global emissions have showed no sign of slowing down, but it was unquestionably an important first step in global climate diplomacy. [17]

3. Nature of Air Pollution and Climate Change Problem from Scientific Sources

Air Pollution and Climate Change cannot be considered as two independent problems. They are interrelated manifestations of the Earth´s response to emissions beyond the limits, that threat its natural cycles and consequently continuity of life on earth. Emissions in excess; This is the link between Air Pollution and Climate Change. Two faces of the same reality. Fuel Burning increases CO2 emissions which increase natural global warming and affects climate and also (NO and NO2), (SO2 and SO3), CO and PM major air Pollutants by EPA. It is urgent and essential to abate continuously air pollution and greenhouse gases (GHG) to innocuous and stable concentrations. They reinforce each other and threat to both people's health and the environment worldwide. Climate change mitigation actions can help to reduce air pollution, and air pollution abatement can reduce GHG emissions but, both actions must be performed carefully by experts that should know the principles of physics and chemistry ruling combustion processes and with a long experience in emissions control from mobile sources. Excessive abatement could result in an inverse effect. At this regard, several experimental results confirm what can be inferred from theory: Air Pollutants cannot be reduced at will without taking the risk of increasing Global Warming. The key is to find, for specific conditions pollution abatement using MEB with the precise magnetic induction to meet the projected pollutants reductions controlling CO2 emissions increase, helping to keep the earth carbon cycle balanced. The fact that CO and HC cannot be reduced at will without increasing CO2 emissions, suggests regulations policies for limiting maximum reductions of CO and HC emissions from transport sector, when using any minimizer device or procedure.

This content and especially former highlighted statements are supported by summarized information from UN, SCIENTIFIC AMERICAN and others scientific sources on the true nature of earth as follows:

Air pollution and climate change: two sides of the same coin

Although they may seem to be two very different issues, climate change and air pollution are closely interlinked, so by reducing air pollution we also protect the climate. [18]

The Interplay of Climate Change and Air Pollution

Climate is an important factor that influences air quality. Pollutant emission, transport, dispersion, chemical transformation and deposition can be influenced by meteorological variables such as temperature, humidity, wind characteristics and vertical mixing. In general, climate change is expected to worsen air quality. Reduced air quality will directly affect human health and will affect ecosystems in ways that also could affect human health and impact climate in a feedback loop. [19]

Air Quality and Climate Change a Delicate Balance

Climate change and air pollution are inextricably intertwined, so fighting one often produces gains managing both at the same time. Reducing emissions of pollutants to weaken Climate change may have benefits in terms of improving air quality. Abating air pollution mitigates adverse climate change effects. However, abating air pollution is as complex as the chemistry producing these agents. For instance, common air pollutant, SO2, complicates efforts to simultaneously control both global warming and air quality. [20]

Cleaning Up Air Pollution May Strengthen Global Warming

Pollution in the atmosphere is having an unexpected consequence, scientists say, it's helping to cool the climate, masking some of the global warming that's occurred so far. That means efforts worldwide to clean up the air may cause an increase in warming, as well as other climate effects, as this pollution disappears. New research is helping to quantify just how big that effect might be. A study suggests that eliminating the human emission of aerosols, could result in additional global warming of anywhere from 0.5 to $1^{o}C$. [21]

Policies That Tackle Climate and Air Pollution at the Same Time Can Raise Global Climate Ambition

The relationships between climate change and air pollutants, very important to understand, are complex highly variable, depending on local conditions. Dust, allergens, soot, water vapor, gases and other particles in the atmosphere interact constantly and form new mixtures, often with the influence of heat and ultraviolet radiation. Many direct human health effects of these airborne agents have been well characterized. Some of these agents also have greenhouse properties, contributing to the overall warming of the planet, while others impart cooling effects. Climate change and air pollution are thus inextricably intertwined. [22]

Air Pollution Experts Say Current Standards Must Be Strengthened To Protect Public Health

In October 22, 2019 the Independent Particulate Matter Review Panel issued its consensus letter on the science and policy of particulate matter. The twenty scientists, determined that today's standards, including those for PM2.5, particles smaller than 2.5 micrometers, which can enter the lungs and bloodstream, are too lenient and must be strengthened. This conclusion is based on new evidences from epidemiological and other health studies that have occurred since the last particulate matter review in 2012. [23]

3.1. Understanding the Problem

Metaphor is important because to deal with, understand, and even ameliorate the fix we are now in over global change requires us to know the true nature of the Earth and imagine it as the largest living thing in the solar system, not something inanimate like that disreputable contraption 'spaceship Earth'. Until this change of heart and mind happens, we will not instinctively sense that we live on a live planet that can respond to the changes we make, either by cancelling the changes or by cancelling us. Unless we see the Earth as a planet that behaves as if it were alive, at least to the extent of regulating its climate and chemistry, we will lack the will to change our way of life and to understand that we have made it our greatest enemy [24].

It is of great importance to emphasize in this stage of the path to solve Air Pollution and Climate Change problem. The poor understanding of it delays its solution and can even prevent it from ever being solved. Climate Change is more than a complex Physics problem. There are other factors not belonging to the field of physics that somehow block the path to solution. However, is essentially a Physics problem to solve and solving problems is an art, used to say a physics professor of French origin. This declaration moves to think in the stages that must, generally, be fulfilled to solve a problem. The first stage is disposition to solve the problem; simply means to have the firm will to solve it, then get motivation, tune it and understand it. However, in the case at hand, the solution of the problem does not depend solely on those who understand Air Pollution-Climate Change Problem. They need confidence of all those people who do not understand it well or at all. Such a confidence depends on the interest and also motivation of all those people. Perhaps the most effective way to motivate that

people would be to present to them an optimistic future view of earth with clean air and without excessive global warming, instead of an apocalyptic view. *The mind does not know neither understand about results, but it understands illusion and willingness to do things, that is what moves it. Thinking about results will limit it, as it will only serve to create nervousness, tension and fear of not obtaining them. So, let's focus on the illusion and enthusiasm to do what we want ... Then, the results will come alone ".* [25] Obtaining continuously Clean Air and Global Warming reduction results focusing in optimizing combustion to keep carbon cycle balanced is the best way to present an optimistic view of earth, arousing illusion and willingness in those who need to understand the problem; Magnetic field action is the most effective way to do it. Scientist James Lovelock previous epigraph, states the importance of knowing the earth´s nature to acquire the will to change our way of life. The second stage in the solution of a problem is the understanding of it. Its completion means, generally, the problem is practically solved. In the case at hand, not complying with the first stage, have resulted in non-consensus in the problem nature understanding and then none solution. In the Third stage, the laws and equations that rule the optimization process of combustion by magnetic field action must be set and in fourth stage magnetic induction be calculated. Then, the prototype is built, installed and tested in an ADC. Finally, test results will prove if the device works.

3.2. The Successful start of Using Magnetic Action to Optimize Combustion

The use of magnetic fields to improve the performance of combustion was reported as early as the 1940s. The U.S. Air Force used a device on their Mustang aircraft that allowed a greater range and a better performance from poor quality fuels. This, proved successfully was subsequently used by the Royal Air Force on Spitfire and Hurricane aircrafts. The devices used back then were very heavy and cumbersome, as they had to use electric current to produce the required strength of magnetic field. But today, with the advent of new neodymium super magnets, even more powerful magnetic fields can be generated by units little larger than a matchbox. Bloch and Purcell, who were jointly awarded in1952 by studies on the action of magnetic fields on liquids and solids had studied the induction of nuclear spin in the atoms by the action of a magnetic field , giving a scientific fundamentals to explain the empirical evidence that the use of powerful magnetic fields optimize fuel combustion to the extent that when a very powerful magnetic field is applied directly to a fuel supply line, it conditions the fuel in such a way that it combines more readily with the oxygen in the air and thus, burns more completely when combusted. [26]

3.3. Theoretical Framework

Twelve years before Bloch and Purcell were awarded with the Nobel price of Physics in 1952, Physicists knew the changes in a fluid by magnetic field action. In fluids as gasoline, a non-polar fluid, changes cannot be explained by Classical Physics theory, because the changes belong to the reign of Quantum Physics [27] and Zeeman´s effect is one of the principal fundamentals. To quantify the changes in the fuel as energy fluctuations and then globalize them as an enhancement of the fuel combustion, concepts and methods as founded on Hamilton´s Theory must be used, as well as concepts and laws of Physics [28] and General Chemistry, and then calculate magnetic induction B of the magnetic field between two permanent Magnets.

3.4 Equations [27] [28] The MEB Design. Essence of Technical Feasibility

$$U_H = F(B) \quad (1)$$

$$U_B = N_0 U_H \quad (2)$$

$$\mu_B = \frac{U_B}{V} \quad (3)$$

$$\mu_B = \frac{B^2}{2\mu} \quad (4)$$

Equation 1 expresses hydrogen atom energy as function of magnetic induction B of the magnets.

Equation 2 expresses total energy U_B in terms of Avogadro Number N_0 and energy U_H per hydrogen atom to improve combustion. Equation 3 relates μ_B with volume V and U_B; the total energy provided by the magnetic field to optimize fuel,

within the volume V of comprised between the magnets, Equation 4 relates the magnetic field magnetic induction B with energy density μ_B, and the magnetic permeability of fuel μ.

From equations 1- 4, B can be calculated theoretically and the prototype can be built. However, this system of equations gives rise to a non-trivial equation in B that can be solved by computational methods or other adequate procedure and different values of B are obtained. The correct value of B will be the one that meet, as close as possible the projected concentrations of CO, HC and CO2 emissions. If B is maximum, then the magnetic energy density is maximum and more energy than needed could be available for a given volume of fuel between the magnets resulting in a greater pollutants reduction than projected. If B is minimum, the magnetic energy density is minimum and less energy than needed could be available for a given volume of fuel between the magnets, resulting in a lower pollutant reduction than projected. is found. A precise design of a MEB demands not only theoretical knowledge but long technological experience in this field.

Tables 1-2 show the advantage of using a minimizer without pretreatment before a minimizer with pretreatment. Final emissions of CO and HC in the 3 cars of table 2 are lower than those in table 1 but final emissions of CO2 in the 3 cars of table 2 are higher than those from table 1. Fuel used: gasoline RON 87

Table 1. Results of Single Day Tests Using
Magnetic unit (Prototype) In a Hyundai Car

Emissions	Hyundai Model 2012	
	Initial	Final
HC((PPM)	24	21
CO2(%)	14.1	14.2
CO (%)	0.19	0.06
O2(%)	0.31	0.31
Drive (Km)	0	6
Mileage Km)	70000	70006

Table 2. Results of Single Day Tests Using PP Device In 3 Different Cars [2]

Emissions	Renault Symbol 2005		Hyundai 2006		Hyundai 2001	
	Initial	Final	Initial	Final	Initial	Final
HC(PPM)	268	63	233	60	234	65
CO2(%)	13.4	13.7	14.1	14.6	13.8	14
CO((%)	0.15	0	0.5	0.18	0.41	0.2
O2(%)	0.7	0.4	0.69	0.24	0.98	0.34
Drive(km)	0	6	0	6	0	6
Mileage(km)	535261	535267	269268	269274	86536	86542

4. Economic Feasibility

The economic feasibility of using MEB minimizer depends fundamentally on the cost-benefit analysis when comparing its estimated pollutant reduction unit price $\frac{USD}{Ton-year}$ with those of other actions and investments performed. Hard work done in the last three decades to controlling air pollution and Climate change by combination of restrictive measures, plans, strategies, devices implementations, among others, has not been enough. As an example, worth to be mentioned is the case

of Mexico City, more than twelve years ago, where those combined implementation in 4 years, were able to cut only a 10% of total mass of polluting emissions. That is to say, near 5 to 4,5 million tons of pollutants with an investment of 250 million dollars. That reduction of 0.5 millions tons result in a reduction unit price of $p_1 = \frac{USD500}{Tons-Yea \times r}$ this looks a low unit price but also a slow reduction that points out that the problem cannot be solved only with strategies, plans, measures and implementing some controlling devices.

Global CO2 Emissions Unit price for 2019

According to Green Peace information the costs of global CO2 emissions, in a year, amounts the astronomic figure of USD 2.9×10^{18} . Now, according to American Scientific information in 2019 global emissions by fossil fuels burning was approximately 37×10^{12}tons. Then the unit price for 2019 was: $\frac{\text{USD } 2.9\times10^{18}}{36.8\times10^{12}\ tons-year} = \frac{\text{USD}290\times10^{18}}{36.8\times10^{12}} = p_2 = \frac{\text{USD}78804}{ton-year}$

Estimating the Unit Price of Pollutants (CO and HC) Reduction For Specific Conditions

From Table 1: CO and HC reductions in a Single Day Test. Reference Distance Travelled: 6 Km

Reference Fuel Mass= M=1Kg [29] From Table 1. CO Volumetric Percentage without device = $0.19\% = 0.19 \times 10^4$PPM $= 1.9 \times 10^3$PPM

From Table1. CO Volumetric Percentage with device $= 0.06.\% = 0.06 \times 10^4\ PPM = 0.6 \times 10^3\ PPM$

1Mol de CO weights $28.0g$. 1 KMOL de CO weights $28.0 \times 10^3 g$

Minimum reduction per fuel Kg per day of CO = $(1.9 \times 10^{-3} - 0.6 \times 10^{-3})\ \frac{\text{KCO}}{fuelKg-day} = (18.4 \times 10^{-3})\ \frac{10^3\times28.0\text{g}}{fuelKg-day} = \frac{515.2\text{g}}{fuelKg-day}$ [29]

1Mol de Hexane C_6H_{14} (Hydrocarbon considered in tests) weights 86.0g $\frac{reduction\ HC}{fuelKg-day} = \frac{3PPM\times C_6H_{14}}{fuelKg-day} = \frac{3\times10^{-6}\times C_6H_{14}}{fuelKg-day} = \frac{3\times10^{-6}\times86.0g}{fuelKg-day} = \frac{0.00258g}{fuelKg-day}$. It can be despised if compared with CO´s

Minimum CO reduction in 365 days = $365 \times\ 525.2\text{g} =\ 191698g$

Total minimum reduction in 365 days = 191699g = 0.192 Ton

Price of magnets: 4 magnets $19mm \times\ 13mm \times\ 3mm$------- USD 1.4

Design, Carcass Assembling Magnets And installation-------- USD 0.6

TOTAL ----------USD 2.0*

* Design is covered in this price estimated in excess. It is not possible to analyzed it. Design in connected to a minimum of 12 emissions tests in an ADC for every different condition.

Estimated Unit Price of reduction is $p_0 = \frac{USD\ 2.0}{0.192Ton-year} = \frac{10.4USD}{Ton-year}$. In 5 years, the magnets´ useful life, total minimum reduction is higher. Then the real unit price is far less than calculated for comparation.

5. Conclusions

1. The goals established in the international agreements have not been globally achieved. Average global temperature continues increasing and so Air pollution. The problem nature is, essentially, the earth´s response to emissions beyond the limits, threating its natural cycles and consequently continuity of life on earth. If on road transport, from emissions, is the main contributor to air pollution and global warming, due fossil fuels combustion, the solution should be focused on optimization of the combustion process. The problem cannot be solved only with speeches. Straight forward actions are urgently needed.

2. Magnetic action has proven, for long, to be an effective way to optimize combustion. It was used in the second world until 1950, then in this century to reduce emissions with the especial purpose of saving fuel. [26] Now can be retaken with the dual purpose of tackling Air Pollution and Climate Change. However, this must be done carefully. The Air Pollution and Climate Change balance is very delicate. [20] Then, especially the design, that needs to be confronted by ADC tests

emissions results iterations, and the construction and installation of the magnetic devices must be carried out by experts in the field of science and Engineering, with a lot of theoretical and practical experience in the field of fuel emissions reductions, regulated and supervised by an authorized and competent institution.

3. MEB emissions minimizer estimated Unit Price of reduction $p_{0=\frac{10.4USD}{Ton-year}}$ is considerably lower than the other calculated prices $p_1 = \frac{USD500}{Tons-Yea\times r}$; $p_2 = \frac{\text{US78804}}{ton-year}$ $p_0 < p_1$, $p_0 << p_2$, and its magnitude order favor its global use. Then a Magnetic Efficient Balanced emissions minimizer appears like a useful tool to tackle Air Pollution and Climate Change at the same time. It only needs to be proved.

We are willing to collaborate with an authorized institution if it considers these reflections are worthy

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