Implementation of New Zero Pollution Technology for Green Energy Revolution: Air Engine and its Impact on Global Warming

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Abstract

It is known fact that the Earth is the only planet in our solar system that supports life. The complex process of evolution occurred on Earth only because of some unique environmental conditions that were present: water, an oxygen-rich atmosphere, and a suitable surface temperature. Climate Changes are happening due to impacts of Global warming and subsequent happenings like: shrinking of ice cap, melting of Arctic Ice, Rise in Sea Level are big challenge for recent technologies that is causing serious threat to: agriculture land, growing forestation, impact of temperature rise and affecting livelihood by disaster. This also need to strive for adoption of new technologies for green revolution apart from novel policies that world leader should adopt. While considering limited resources of fossil fuels availability and high rate of consumption of the hydrocarbon fuel energy for transportation, inclination of vehicle industry towards other sources of energy is inevitable. This has given birth to alternative transport technology based on air as fuel. In this paper high lights are given if such technology is adopted only on two wheeled vehicles widely that may curb the pollutant being released through tail pipe into atmosphere up to 50-60% that will ultimately add on to green energy revolution.

1. Introduction

It is on records that Earth Climate Changes are full of surprises and 52 millions year ago Antarctica which is now full of ice; was flourishing with tropical trees, vegetation etc., Sahara desert was a few thousands before blooming with large lakes, green valleys and rivers and Southern Africa was covered with glaciers. The authenticities of these happening were given as under:

- **Sahara Desert was once a blooming with large lakes:**
  At the end of the last Ice Age, the Sahara Desert was just as dry and uninviting as it is today. But sandwiched between two periods of extreme dryness were a few millennia of plentiful rainfall and lush vegetation. During these few thousand years, it was once a blooming with large lakes and established settlements around rain pools, green valleys, and rivers.

Figure 1: View of the Great Sand Sea of Egypt from the Gilf Kebir Plateau. This was a good place to live 8,000 years ago.

- **Antarctica was a tropical paradise:**
  Today the frozen Antarctic ice sheet borders the Southern Ocean. But tropical palm trees once flourished there. An intense warming phase occurred 52 million years ago, leading tropical vegetation, including palms and relatives of today's tropical trees, to grow on the continent, is now frozen coasts.
- **Southern Africa was covered in glaciers:**
  From around 150,000 to 130,000 years ago, Africa experienced colder and more arid than present conditions as shown in Fig.2.

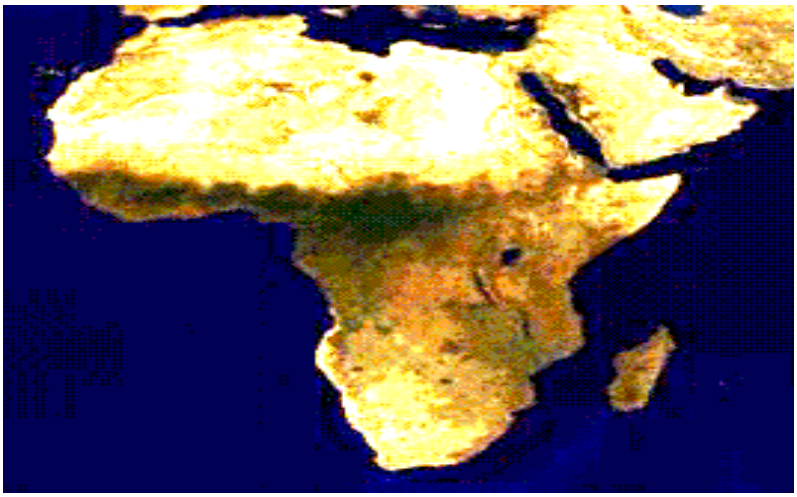

Figure 2: Africa during the last 1, 50,000 years

In the past, climate change was largely caused by subtle shifts in the Earth's angle and orbit around the sun and the location of the continents, all of which affect the amount of solar energy absorbed by Earth.

1.1 But what is happening today is entirely different?

Now, human greenhouse gas emissions are producing a warming which has not been seen for some 1, 25,000 years and moreover, carbon dioxide level, measured on polar ice cores, has never

been so high as today. Emissions from transport vehicles, factories, and burning forests are changing the Earth's atmosphere and that is the fact. It now traps more of the sun's energy, which leads to rising temperatures.

1.2 Three big questions before world to revert back to Green Revolution:

- What are the consequences?
- How will humanity be secured in the future?
- What to expect from the future life on Earth & how to restore greenery and save earth from these Happenings?

This year we have noticed that USA especially north – east coast had suffered (-) 57^0c and people were alarmed not to move out from their houses. In India also, northern region Himanchal Pradesh, Delhi, Rajasthan, Uttar-Pradesh was suffering with cold waves for the last one and half months nearly zero degree while pahal gaon faced (-) 27^0c.

In this paper, emphases is give to adopt new technology for transport to curve the global warming and evil of climate effect by adopting it vigorously and revert back to Ice melt and Glacier shrinkage very fast. The air technology is one solution and other aspects are to make people aware about these happening.

2. How Global Warming is happening and its Indicators inevitable to Check?

2.1 Major Players of Excessive Consumptions of Hydrocarbon

Globally uses of transport vehicles become a part of human life. It is therefore resulting huge release of tail pipe emissions due to rapid consumptions of fossil fuel and causing fast depletion of energy resources. The Marion King Hubbert [1] a noted geologist of US projected in 1956 that conventional crude-oil production in his country would attain Peak Oil in 1970 and thereafter it will start depleting. This will affect environment due to release of huge quantities of pollutants in the atmosphere and cause serious threat to mankind within 40 years i.e. by 1995. In 2003, another noted analysts, Aleklett K. and Campbell C.J., [2] reported that World's resources of oil and gas is depleting at very high a rate and hence oil production is set to peak and begin to decline by around 2010. These projections and apprehension enlightened the researchers to work on environment friendly alternative to fossil fuel oil, or to find some methods of conserving natural resources using non-conventional options, such as bio diesel, wind power, photo voltaic cells etc. and or some energy conversion systems like battery storage, hydrogen cell, compressed air etc to obtain shaft work for the engines of vehicles [3-9].

2.2 Does Excessive Consumptions of Hydrocarbon Harm?

About 100 years ago, the major thrust of energy shifted from recent solar to fossil fuel (hydrocarbons). Technological advances have led to a greater use of hydrocarbon fuels, making civilization vulnerable to decreases in supply. It is predicted that if the oil is consumed at

the current rates, then by 2020, 80% of the entire available resources will be consumed. This necessitates the search for alternative of oil as energy source or preserving it by tapping some other alternatives such as Non-conventional energy like battery operated vehicles, wind mills, photocells etc., and to convert their output into mechanical energy. Presently because of better developments & availability of facilities, urban population is raising use of vehicles rapidly, causing air pollution and greenhouse gases that come from vehicle emissions. This is the primary motivation behind developing alternative transportation technologies that do not rely on combustion of fossil fuels as excessive consumption of hydrocarbon releases heavy pollutant through tail pipe emission by transport sector and industrial pollutant and garbage directly to the atmosphere, causing serious threat to mankind.

Figure 3: Vehicular and Industrial Pollution

2.2 New Fuel Technologies to adopt Alternative to Reduce Consumption of Hydrocarbon

In the last few decades lot of researches have come on surface and it is noticed that compressed air has enormous potential as an alternative to these issues due to its zero pollutant capability and can run prime movers such as air turbines / engines. Guy Negre [10], a French technologist and G. Saint Hilaire [11] developed air engines and quasi turbines respectively that run on

compressed air successfully. These compressed air prime movers work on air as fluid and do not involve combustion process for producing shaft work. Since air is freely available in the atmosphere, has great advantages in terms of its use as fuel and free from emissions such as; carbon dioxide, carbon monoxide and nitrous oxides from such air motors engines. These are also found to be cost effective compared to fossil fuel driven engines. The requirement air as fuel is met from running a compressor and analysis also shows that the compressed air system is quite attractive option for light vehicle applications [12]. These attractive features of the compressed air engine attracts towards the dominant technology.

Detailed study has also been carried out about multi vane expander for its various parameters such as: geometry, end friction, optimizing the efficiency [13-22] and pneumatic hybrid power system [23-26]. The work of pressure regulation of turbine, performance efficiency of Rankine cycle, multi-stage turbine compressor models, experimental investigation on rotary vane expander, three-stage expander into a CO^2 refrigeration system, end face friction of the revolving vane mechanism, and design and implementation of an air-powered motorcycle have also been reviewed [27-33].

Many other studies have also been carried out for optimizing the efficiency of various types of turbines and sound well [34-58], but still gap in study of parameters such as; vanes angles vis-à-vis injection angles remains.

3. Why to Adopt Zero Pollution Technology for Two-Wheeled Vehicles

As per the data available by Ministry of Transport, the registered vehicles in India were 14.18 crores in the year 2011 (see Table-1). Out of this figure, total populations of two wheeled vehicles were 10.20 crores that amount to 72%. It is observed that countries like: India, China, Bulgaria, Thailand, Korea, Netherland etc.; almost all Asian countries and some of European countries are using two wheeled vehicles ranging from 70% to 85% of their total population of the vehicles. This necessitates researchers to focus on adoption of new technology for two wheeled on first priority as shown in **Fig. 4**.

Table-1: India's Registered Vehicle as on Year-2010

(Year wise)						**(In Thousands)**	
S. No.	**Year**	**All Vehicles**	**Two Wheelers**	**Cars, Jeeps & Taxis**	**Buses @**	**Goods Vehicles**	**Others***
1	1951	306	27	159	34	82	4
2	1971	1865	576	582	94	343	170
3	1981	5691	2618	1160	162	554	897
4	1991	21374	14200	2954	331	1356	2533
5	2001	54991	38556	7058	634	2948	5795
6	2011	141865	101864	19230	1238	7064	12061

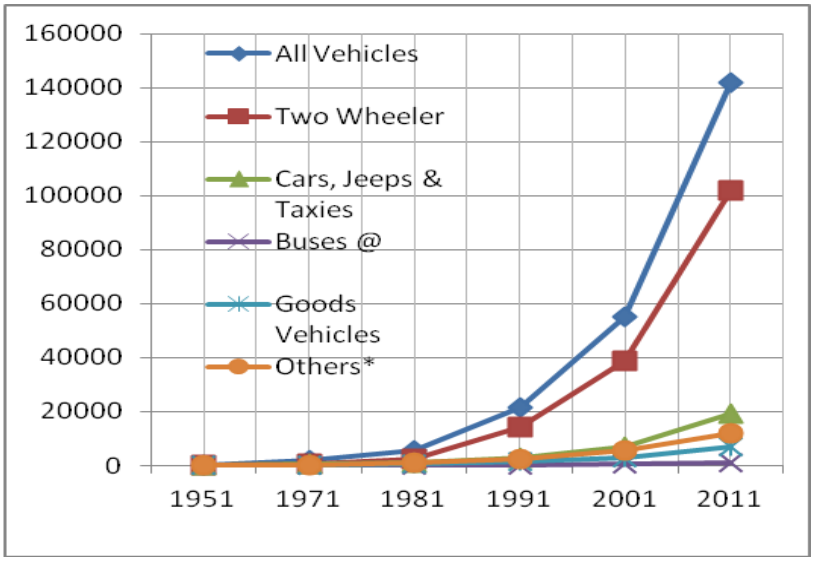

Figure 4: Year wise Different Vehicle Population

It is also seen from **Table-2** and **Fig. 5,** that countries like: China, USA, India, Russia and Japan are producing maximum pollutant (CO2) in million tonnes, where India stands at third position for producing highest CO2. The carbon footprint of USA, Austrellia, Canada, Saudi Arabia, Russia, Germany and Japan are heighest ranging from 19.22 to 10.4 Tonnes /man/year.

Table-2: World Population - 7174.69 Millions

S. No.	Name of Major Countries	Population (In Millions)	Yearly Released CO2 (In Million Tonnes)	CO2 per man/per year (in Tonnes)
1	China	1360.55	6244.92	4.59
2	USA	317.55	6103.31	19.22
3	Russia	136.41	1544.16	11.32
4	India	1243.26	1603.81	1.29
5	Japan	125.47	1304.89	10.4
6	Germany	81.28	869.7	10.7
7	Canada	34.11	566.23	16.6
8	Iran	81.11	543.44	6.7
9	Italy	57.38	481.99	8.4
10	South Korea	49.17	480.39	9.77
11	Mexico	119.56	463.89	3.88
12	South Africa	49.66	419.13	8.44
13	France	65.47	415.08	6.34
14	Australia	22.03	399.84	18.15
15	Saudi Arabia	27.52	408.12	14.83
Source: www.Breathingearth.net as on Oct. 31, 2013				

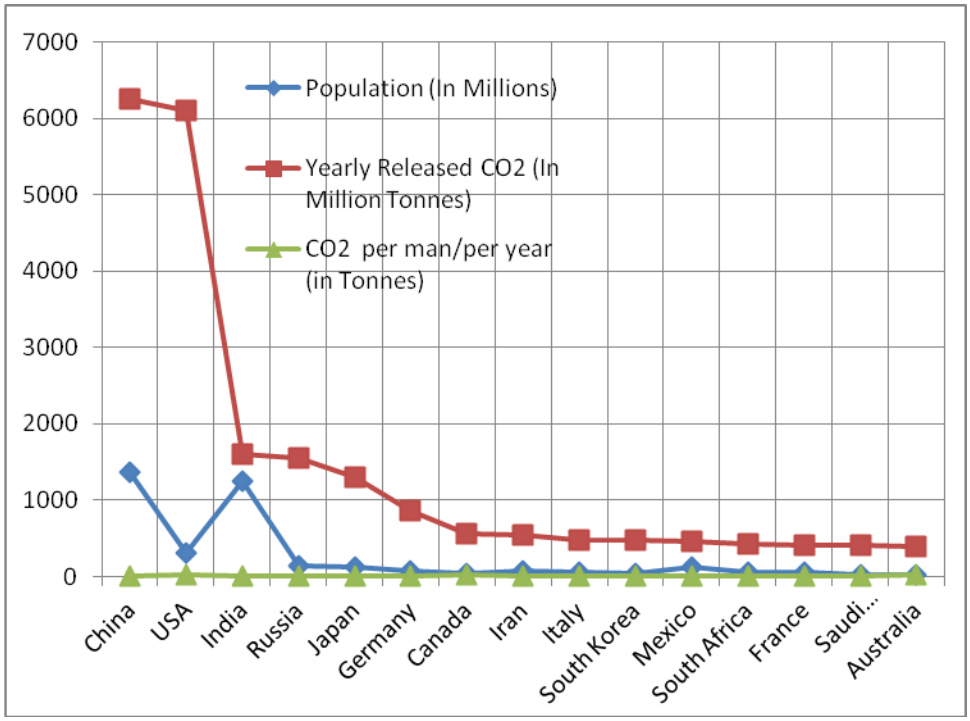

Figure 5: Yearly Release of CO2 (in Millions Tonnes) vurses Country

3. Air-O-Bike Design and Working

Based on above investigations of the influence of vane angle on shaft output of a multivane turbine for the optimization of power output with different options of casing *(D)* and rotor *(d)* diameters, rotor length (*L*= 45mm, 40 mm, 35mm), vane numbers (vane angles θ = 30°, 36°, 45°,60°, 90° between two consequent vanes), injection angles (φ = 30°, 45 °, 60°, 75° and 90°), injection pressure ($P_{1=}$*90 psi*) and speed of rotation (*N* =2500 rpm), following critical results are obtained. The investigations shows that the optimum shaft power outputs of a novel vane type air turbine are could be found at injection angles φ = *60° to 75°*, when vane angles θ = *30°, 36°, 45°* in all cases *1, 2* and *3* under investigations as shown in **Fig. 5**.

Figure 5: Air-O-Bike Design and Implementation

4. Recorded Happening in the World

Currently every country is facing severe climatic change; Japan faced with Tsunami, US with Hurricane, India with Phailene Storm and the amount damage is not only heavy but casualty levels were also high and took a long time to restore everything.

These happening were already notified in Two Books:
i).**Global Warming: Impacts and Future Perspective** which was published by InTech, Croatia, in Sep2012. The book's page 104, Section: 3.7.2, is titled as: **Major Storm Could Submerge New York City in Next Decade**
It is known facts that with divesting effect of Sandy Hurricane in USA took place on 31st Oct' 2012 came first time in New York City, USA, there were 15 days power cut and all the flights were ground and life in the New York City was totally smashed.
ii). **Climate Change: Realities, Impacts over ice cap, sea level and Risks** published by InTech, Croatia, in Jan'2013
The book pages 42- 49 details about Climate Change happening and focused that Arctic Sea spread over 45 lacs sq km had been found shrinked to around 32 lacs sq km in Sep' 2012 as per the NASA satellite data on 12Sep 2012. The focuses that in next 2-3 decade, there will hardly be polar Ice remained on Arctic Sea.

These books were edited by **School of Management Sciences, Lucknow a**nd about **7- pages** of **Climate Change** book was given space by **Cengage Learning Publication** in the Environmental Science Text Book is published in Feb' 2014 that became part of the curriculum of Under Graduate students in USA.

6. Conclusions and Future Work

Keeping in view of the above study following conclusions are drawn:

i) Due to heavy consumptions of hydrocarbon, millions tonnes of pollutants are released in the atmosphere on one side and hydrocarbon fuel is depleting on other side producing oil wells to dry soon.

ii) Global warming is predominant worldwide.

iii) Climate Changes are happening due to impacts of Global warming and subsequent happenings like: shrinking of ice cap, melting of Arctic Ice, Rise in Sea Level are big challenge for recent technologies that is causing serious threat to: agriculture land, growing forestation, impact of temperature rise and affecting livelihood by disaster.

iv) It is inevitable to adopt new technology like zero pollution air driven engine which will curb the pollutant in the atmosphere 50%--60%, if it is even widely implemented on two wheeled vehicles.

v) To save the beautiful mother land EARTH it is desired to change living habits and become a important person of the society by adopting any or part of the Global Campaign **SAVE THE EARTH & SAVE LIFE** such as: change of light-mostly CFL, drive less-walk, bike and carpool, recycled more and buy old or recycled, check the tyre, use less hot water, avoid products with packaging, adjust thermostat, plant tree, turn off electronic devices not in use and make awareness about the green revolution stated above.

There is every reason, to happen any natural phenomenon in future, when axis of earth may get shifted even by ½ degree or more; than the existing one of 23.5 degree at which earth is rotating, the entire lively hood or existing creature on EARTH may vanish without any further alarm. Since time is very short, every person on earth has to think and do help to stop climate change and join hand for green energy revolution.

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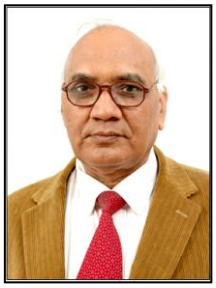
Author's Biography:



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- **Shiksha Gaurav Award** for exceptional contribution in Technical field in 2012
- **Life Time Achievement Award**-2012 by ICAM, USA at IIT-BHU, Varanasi in 2012
- **Merit of Excellence Awards**- by IIT, Bombay in 2012 & 2013
- **Limca Book of Records**-2014 for world recognition of Air-O-Bike invention in 2014
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Dr. Singh published about 80-papers in leading International, National Journals and proceedings of Conferences. Also published 4- books and 6-book chapters on; Air Engine, Stir Welding, Global Warming and Climate Change of International repute and published from Germany, Croatia and USA. His one chapter has space in the **Text Book** on Environment in USA; ***Can Glacier and Ice Melt Be Reversed***? launched on Feb 21, 2014.

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ii). Reviewer of many Journals such as: IMechE, UK, Elsevier, Journal of Mechanical Engineering, Korea; Academic Journals, Africa; World Academics of Science, Engineering and Technology, Turkey; ASME, USA, etc. and reviewed about 105- papers and

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