

VIBRATION POWER AND MICRO HYDROELECTRIC POWER, THE ENERGY FOR THE FUTURE

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Abstract

Energy is the paramount significant component for economic, educational, science & technological development for all of the various countries in the world. It is an integral part of every sphere of modern life and indispensable for almost all of the economic development activities ranging from farm irrigation to manufacturing of goods and heavy industrial activities. But the world today is confronted with two interrelated challenges closely linked with energy; these are global unusual temperature rising and vicious cycle of poverty. Due to incremental consumption of traditional energy, earth atmospheric greenhouse gases (GHG) are rising rapidly, resulting global warming, global climate changes & ecological catastrophes. This is concern with the other challenge that 1.3 billion of the world's populations, most of them are impoverished and live in rural areas in Africa and Asia, still out of the electricity supply facilities, causing economic downturn, poverty, illiteracy, unemployment, crimes and social depression. In these very conditions, changing patterns of energy, which are carbon neutral or carbon negative, reliable and affordable, only can save the world from upcoming dangers. Together with other sources of green energy our newly invented carbon neutral "Vibration Power"& "Micro Hydroelectric Power" could be a viable alternative to save the green planet from upcoming challenges.

Keywords: Fossil fuel, Global warming, Alternative sources of energy

Introduction

The continuing interest to alternative sources of energy is increasing gradually as the world today is very much concern about rising level of earth atmospheric greenhouse gases (GHG), global climate changes and growing energy demand in short order. Global warming, the increase in the

temperature of the earth's near-surface air, is the greatest challenge the world is confronting with and world grave concern for earth's all living creations. It will affect hydrology and biology of earth-everything including economy, eco-system and substances.

This is concern with the other factor that 1.3 billion of the world's total population still out of the electricity supply facilities. Non-accessibility to energy or huge shortage of energy supply in developing countries, mostly in South-East Asian and Sub-Sahara African countries, hindering financial growth, investment opportunities and employment creation and increasing socio-economic depression, poverty & illiteracy rate. The latter undermines and limits their capabilities and their opportunities to secure employments aftermath prolonging and confinement of the poverty circle.

In these circumstances, together with other sources of green energies, our newly invented carbon neutral "Vibration Power" & "Micro Hydroelectric Power" could be viable alternatives to save the green planet.

Energy & Evolution

Energy is one of the most crucial components for economic, educational, science & technological development and center for all of the development activities. For sustainable development and growth energy is generally and electricity is particularly crucial.

Energy efficiency and effective use of energy are the key components for sustainable development for all countries and all people. To alleviate the poverty & illiteracy, promote human welfare and innovation, foster innovative culture and environment in society and promote living standard, energy is an integral part [Chaurey & Kandpal 2010a].

Virtually all forms of economic activities, whether in urban, peri-urban or in rural areas, rely on energy. Without meeting the demand of reliable and affordable energy, countries will not be able to reach the Millennium development goal [Hong & Abe 2012; Narula et al., 2012].

In Johannesburg, South Africa, in 2002, at the World Summit for Sustainable Development (WSSD), leaders from around the world emphasis the acute role of energy on alleviating poverty and promoting sustainable development.

Electricity, the most useful form of energy, can extend the working hours and days, increase productivity, improve safety and working condition and draw customer's attention.

Moreover, electricity accessibility can transform commercial activities from manual labor to mechanization & automation forms and promotes quality [Lee et al.2008].

Economic theory suggests that when energy accessibility plays role to minimize the cost of products for companies, companies react with some

combination of: multiply productivity & employment, minimize the cost of products & services and investment in other financial activities. Lower input cost might also stimulate the extension of existing firms together with the emergence of new one.

On the contrary, industrial growth is hindered, cost of products & services is intensified and economic growth and employment creation are limited if energy service is not highly reliable & of sufficient quality.

But it is a matter of fact that the availability of energy for industries & commerce is not enough alone. If energy service is not highly reliable, affordable, green & of sufficient quality, the cost of industry of energy outages & the need for investment in backup systems could be substantial and limit economic growth and higher ecological damages.

Growing Demand of Energy Worldwide

Due to acute role of energy in every development activities, the world today is consuming massive conventional energy and the demand is growing in short order. According to BP's Energy Outlook 2035, global energy demand continues to grow further beyond 2030 to 2035. The consumption is expected to soar up by 41% in between 2012 and 2035. According to International Energy Outlook (IEO) Reference case, world energy consumption will enhance to 630 quadrillion Btu in 2020 and 820 quadrillion Btu in 2040 from 560 quadrillion Btu in 2014 (524 in 2010).

The World Energy Outlook (WEO) 2013 projected that by 2050 the world would have to generate enough electricity for an additional 3.3 billion people as 2 billion will be multiplied between 2013 & 2050. The Exxon Mobil's outlook for Energy 2013 projected that between 2013 & 2040, global chemical energy demand will rise by 55% is an account for 35% of growth in industrial sector. The International Energy Outlook 2013 projected that fossil fuel, including oil, natural gas and coal, will supply 80% of the global energy through 2040.

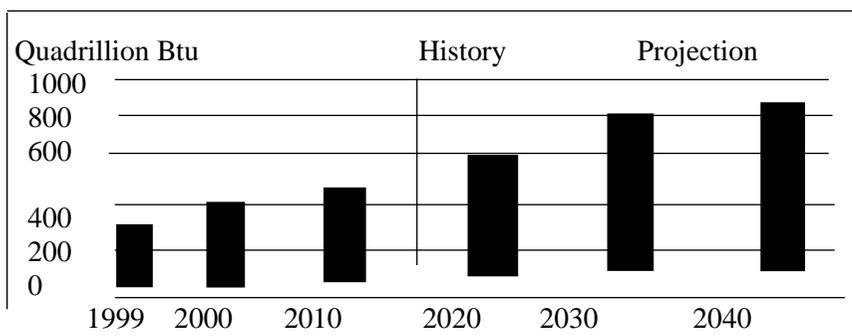


Figure 1: shows the world total energy consumption, 1990-2040 [source: IEO]

Massive Consumption of Energy & Environmental Impacts

The aftermaths of massive consumption of conventional energy would be excessive global warming & global climate changes. Global energy-related CO₂ emission will become worse than expected. According to International Energy outlook 2013 reference case, global CO₂ emission from fuel combustion continue to grow unabated, from 31.2bmt in 2010 to 45.5bmt in 2040, living the world on the track for a long-term average global temperature increase of 3.6°C or more. Scientists of National Oceanic & Atmospheric Administration said that during the 21st century the earth could warm by an additional 7.2°F if we fail to reduce greenhouse gases emission from burning fossil fuel. Fatih Birol, the chief economist of the International Energy Agency, said that despite the global agreement to stay below 2°C, the world is on the track that, without action, leads to an increase of 4°C or more by 2050.

The impacts of such an unusual global warming & global climate changes would be extremely devastating for the earth's all living beings. It will affect hydrology and biology of earth, everything including economy, ecosystem and the substances. This phenomenon (incremental temperature rising) will be causes of unusual acceleration of ecological catastrophes, such as acid precipitation, stratospheric ozone depletion, rising sea level, increasing occurrences of several weather events, more frequent of wildfire & drought, food shortage, changing patterns of diseases, severe water shortage, the loss of tropical forests and many species.

Energy Non-accessibility & Socio-economic Depression

This is another factor to be concern that 1.3 million people around the world, most of them are impoverished and live in developing African and Asian countries, still out of the electricity supply facilities. Moreover, a surprising quantity of 2.5 billion people that is around 43% of the total world population still relies on biomass. The number is reported to be multiplied to 2.6 billion by 2016 and to 2.7 billion by 2030.

The non-accessibility or insufficient supply of reliable, affordable and modern forms of energy is being causes of high rate of unemployment, crimes and socio-economic depression as well as unexpected acceleration of deforestation, household air pollution & global climate changes through greenhouse gases emission and atmospheric bromine in the form of methyl bromine lead to the chemical destruction of ozone in the stratosphere.

Alternative Renewable Sources of Energy for Safety, Prosperity and Diversity

Energy is the paramount significant component for economic, education, science & technological development but massive consumption of

traditional energy has been cause of earth atmospheric greenhouse emission, global warming and global climate changes. On the contrary, non-accessibility or insufficient supply to modern energy has been cause of mass poverty, unemployment and illiteracy in developing Asian and African countries. In these complex conditions, green renewable sources of energy could be an integral part of solution.

A study conducted by Bangladesh Climate Change Observer reported that Alternative Renewable Sources of Energy can play an intensive role to accomplish two interrelated challenges the world is currently confronted with-rapidly growing global temperature and growing demand of energy [CCOB-2010].

It has been reported that in many developing countries, renewable sources of energy (RES) projects can directly contribute to economic growth and poverty alleviation by providing energy needs to create businesses & employments.

In today's world, People are moving from rural areas to urban areas either in search for better employments, better income, better living standard or for better education. In 2014, approximately 3 billion people that are nearly about half of the global population lived in urban areas. This figure is expected to be expanded to about 75% of the world total population by the year 2025, with the most rapid changes happening in the developing world. The trend is on one hand increasing the slums in the cities, polluting the city environment, accelerating the poverty and crime rate and on the other hand hindering the rural development. Easy accessible, reliable, affordable and green sources of off grid energy in rural areas, where transmission & distribution of grid energy generated by fossil fuels is difficult, only can change the circumstance through enhancing productivity and income generation activities, better communication facilities, better education and better infrastructure [Energy for Development p, 3].

Education is widely recognized as one the most essential components for poverty reduction, according to current discourses of development studies.

But hardcore poor households send their children to work to earn money to support their poor families. Sometime children are dropped out of school to work due to school expenditure and households insolvency; most of the cases they work for three meals for a day. Such low level attainment of education causes a lack of employment opportunities for poor households.

In developing countries, women and children are mainly responsible for drudgery such as collecting fuel wood and fetching water and they spend more than an hour per day on average for this. Energy accessibility reduces this drudgery for women to involve in financially important sectors and

allow children to expand their opportunities for school attendance and other educational activities.

Easy accessible renewable sources of energy can increase the income generation activities and employment and bring disposable income of poor households to bring socio-economic sustainability. Due to these factors the number of school going children is increased and school dropout rate is reduced [IEA 2007, UNDP 2004].

**Vibration Power (Proposed)
Generation of Electricity**

When rotor of an electric motor, a tight coil of copper wire wrapped around an iron core, rotates at high speed between the poles inside a powerful, permanent magnet, mechanical energy turn into electric energy. When electricity is fed into the copper coil, it becomes a temporary, electrically powered magnet, in other words, an electromagnet, and generates a magnetic field all around it. This temporary magnetic field pushes against the magnetic field that the permanent magnet creates and forces the coil to rotate. The magnet field is called exciter and the pole is called stator.

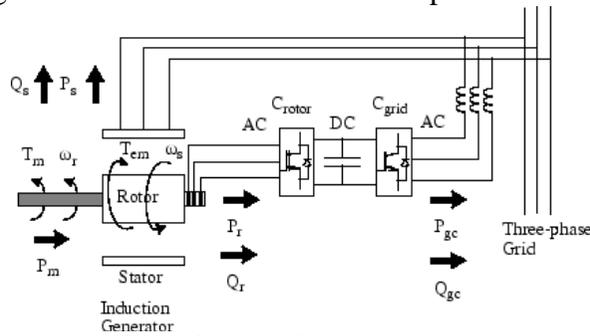


Figure 2: an ideal power generator

There are numbers of procedures existences to spin the motor to generate electricity, such as wind power, water stream, ocean tide, hot wave etc.

Over the vibration (power) technology, vibration of roads, created by velocity and pressure of vehicles run through the roads would be used to spin the motor of a specially designed generator to generate electricity.

Size & Shape of the Generator

The generator will be consists of a 3.5"*3.5"*0.5" diameter magnetic field, 2.7" diameter rotor and 2.5" diameter motor and will be fixed in a round shaped steel enclosure. Unlike the traditional square shaped round generator it would be round shaped generator to get the maximum output.

Materials

Magnet: Neodymium n-50

Wire: copper wire ($R=1.7 \times 10^{-8} \Omega \text{ m}$)

Others: Screws bring boll, steel enclosure etc.

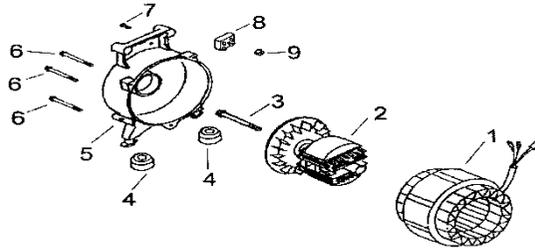


Figure 3: shows the equipment of generator

Design of Generator

To generate 5kw/c electricity other functions will be following, according to the faraday's law:

Number of poles: $n = 2 * 60 * f / (rpm) = 2 * 60 * 10 / 300 = 4$ [where, f =frequency, rpm =rotation/ minute]

Tones of wire of motor $N=11$ tons/pole

$P=5kw$

$N=4$

$D=2mm$

$N(dt)=11kv$

$I=2.5/11 Amp$

$I=V/R$

$R=Pl/A$

$P = I^2 R = P = VI$

$V=11kv$

$N1/N2=I1/I2$

$I=P/V=1.25/11 Amp$

$\Phi=1.25kw/N$ (where $\Phi=I$)

$N=1.25/1.25/11=11tons$, [Where, D =diameter, l =length, R =resistance, p =resistivity, N =number of pole, Φ =magnetic flux, t =frequency, P =power, V =voltage]

To get the efficiency,

Required frequency=10Hz

Speed=5mm/c

Installation

The generator, inside a 3.7 square inch iron frame, will be installed inside a 3.7 square inch hole under a 4" high speed breaker of busy road. A thin iron rod with highly flexible spring on top of it, like an antenna, would

be attached with the motor. When vehicles passed through the speed breaker, vibration is created. By the vibration spring is fluctuate and motor spin to generated electricity. Speed breaker is a perfect place to get the maximum vibration through the velocity and pressure of vehicles.

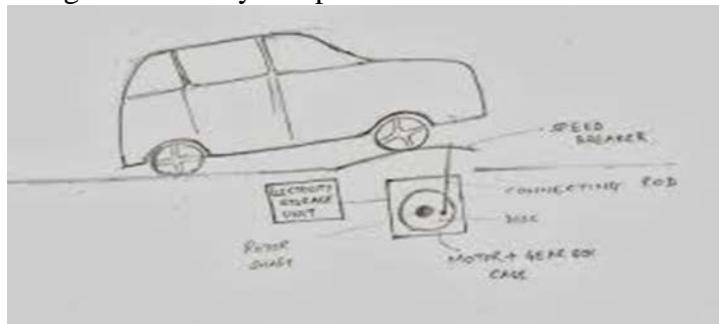


Figure 4: shows the functions and installation of vibration power generator

Amount of electricity

In pick hours, between the time 8am and 8pm, when roads are with heavy vehicles, full capacity will be got but the rest of the hours the efficiency will be almost half.

So, the amount of electricity would be

$$5kw * 60 * 60 = 18 MW/h \text{ (pick hours)}$$

$$5kw * 60 * 60 * 50\% = 9MW/h \text{ (non-pick hours)}$$

$$\text{Daily generation} = 324 MW \text{ electricity}$$

5 generators can be installed in 3 meters wide busy road and then daily generation of electricity would be 1620MW.

Generated electricity will be transmitted through transmitter and can be distributed to remote rural areas using national grid.

Micro-hydroelectric power

This is the other factor that for householder purposes, for example to light the lame, to run the electric fan and to operate other households' substances, we use electricity. We can generate the electricity that we use every day by micro hydroelectric power at home.

Over the Micro-hydroelectric power technology waste water of basins passed through the basin's tunnel is used to turn the turbine to generate electricity.

Micro hydro-electric power turbine

Micro hydro-electric power turbine consists of two parts.

These are: 1) generator and 2) turbine.

The generator module will be 75"*75"*20" by the size to generate up to 35 watt/c of sustainable output. Turbine will be 1"*1" spoons shaped

blades made up of sustainable light plastic. The number of blades of the turbine will be ten to get the maximum output.

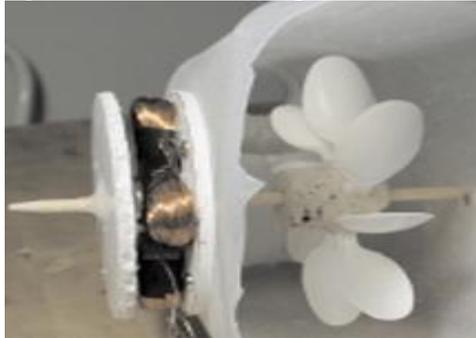


Figure 5: shows the image for a micro hydroelectric power turbine

Installation

The generator will be attested out surface of a tunnel of a basin and the turbine will be set up inside the tunnel of a basins. When waste water falls on the basins and passed through the tunnel where turbine is installed, the turbine will be turning and electricity will be generated.

The technology is highly effective in mosques, in restaurant and supermarket where water is used heavily almost around the day.

Amount of electricity

- 5wat/c
- $5\text{wat} \times 60 \times 60 = 18\text{kw/h}$

Worldwide implementation of these technologies will meet the rapidly growing energy demand and minimize the energy related greenhouse gases emission in the earth atmosphere.

Conclusion

Carbon neutral or carbon negative Alternative Renewable Sources of Energy is the demand of time when energy is indispensible for economic, educational, science and technological development but massive consumption of conventional energy is being causes of global warming, global climate changes and environmental damage and at the same time non-accessibility or insufficient supply of modern energy is being causes of massive economic downturn, poverty, illiteracy, unemployment, crimes and social depression in developing countries. Alternative renewable sources of energy only can save the world from the upcoming challenges the world going to confronting with the rising global temperature, rapidly growing energy demand and vicious cycle of poverty poverty. Together with other sources of green energy our newly invented "Vibration Power" and "Micro

Hydroelectric Power" will bring a potential breakthrough. Worldwide appliance of these technologists can save the green planet from the upcoming danger.

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