Economic growth is linked with supply of Energy: An environmental perspective

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Abstract- Over the years the population of country has increased manifolds. To sustain the growth, people have cleaned the forest & changed into the agricultural land to maintain the living standard. We need to provide infrastructures for an industrial base to run the industry. We need power to run the industries. Power is derived from two sources i.e. -renewable sources of energy, & non renewable sources of energy. We are still banking on non renewable sources of energy to a greater extent .our energy consumption pattern may be categorized in two ways i.e. commercial energy & non commercial energy. More emphasis is given on renewable sources of energy to meet our demands as the non renewable sources of energy reserves are limited. The environmental impact of the energy industry is diverse. Energy has been harnessed by humans for millennia. Initially it was with the use of fire for light, heat, cooking and for safety, and its use can be traced back at least 1.9 million years.(Bowman, D. M. J. S. (2009). "Fire in the Earth System". Science 324 (5926) □ 481– 4 In recent years there has been a trend towards the increased commercialization of various renewable energy sources.

I. INTRODUCTION

Global warming and climate change due to human activity is generally accepted as being caused by anthropogenic greenhouse gas emissions. The majority of greenhouses gas emissions are due to burning fossil fuels with most of the rest due to deforestation]

There is a highly publicized denial of climate change but the vast majority of scientists working in climatology accept that it is due to human activity. The IPCC report *Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability* predicts that climate change will cause shortages of food and water and increased risk of flooding that will affect billions of people, particularly those living in poverty. (*BBC NEWS Science/Nature. 2007-04-06. Retrieved 2011-04-22)*

Biofuel use---Biofuel is defined as solid, liquid or gaseous fuel obtained from relatively recently lifeless or living biological material and is different from fossil fuels, which are derived from long dead biological material. Also, various plants and plant-derived materials are used for biofuel manufacturing. Bio fuels are a renewable energy and can be sustainable (carbon neutral) in terms of greenhouse gas emissions since they are in the carbon cycle for the short term.**Bio-diesel**-High use of bio-diesel leads to land use changes including deforestation.

Firewood Unsustainable firewood harvesting can lead to loss of biodiversity and erosion due to loss of forest cover. An example of this is a 40 year study done by the University of Leeds of African forests, which account for a third of the world's total tropical forest which demonstrates that Africa is a significant carbon sink. A climate change expert, Lee White states that "To get an idea of the value of the sink, the removal of nearly 5 billion tonnes of carbon dioxide from the atmosphere by intact tropical forests is at issue.

According to the U.N. the continent is losing forest twice as fast as the rest of the world. "Once upon a time, Africa boasted seven million square kilometers of forest but a third of that has been lost, most of it to charcoal."(*Rabl A. et al. (August 2005).)*

Fossil fuel use Global fossil carbon emission by fuel type, 1800-2007 AD.The three fossil fuel types are coal, petroleum and natural gas. It was estimated by the Energy Information Administration that in 2006 primary sources of energy consisted of petroleum 36.8%, coal 26.6%, natural gas 22.9%, amounting to an 86% share for fossil fuels in primary energy production in the world. (*GaBE (Paul Scherrer Institut)). 2005*

The burning of fossil fuels produces around 21.3 billion tonnes (21.3 gigatonnes) of carbon dioxide per year, but it is estimated that natural processes can only absorb about half of that amount, so there is a net increase of 10.65 billion tonnes of atmospheric carbon dioxide per year (one tonne of atmospheric carbon is equivalent to 44/12 or 3.7 tonnes of carbon). Carbon dioxide is one of the greenhouse gases that enhances radiative forcing and contributes to global warming, causing the average surface temperature of the Earth to rise in response, which climate scientists agree will cause major adverse effects.

Coal-The environmental impact of coal mining and burning is diverse. Legislation passed by the U.S. Congress in 1990 required the United States Environmental Protection Agency (EPA) to issue a plan to alleviate toxic pollution from coal-fired power plants. After delay and litigation, the EPA now has a court-imposed deadline of March 16, 2011, to issue its report.in 2004 natural gas produced about 5,300 Mt/yr of CO_2 emissions, while coal and oil produced 10,600 and 10,200 respectively; but by 2030, according to an updated version of the SRES B2 emissions scenario, natural gas would be the source of 11,000 Mt/yr, with coal and oil now 8,400 and 17,200 respectively. (Total global emissions for 2004 were estimated at over 27,200 Mt.) In addition, natural gas itself is a greenhouse gas far more potent than carbon dioxide when released into the atmosphere but is released in smaller amounts.

Electricity generation-The environmental impact of electricity generation is significant because modern society uses large amounts of electrical power. This power is normally generated at power plants that convert some other kind of energy into electrical power. Each such system has advantages and disadvantages, but many of them pose environmental concerns.

II. ENERGY: CONSUMPTION & PRODUCTION

Global perspective --------- The energy demand over the years have increased manifolds. As per the data available about two billion people still banks on traditional sources of energy, such as dung , wood and agricultural residues etc. About 800 million people have an access to power grid and use regular energy. Inspite of various efforts of the government, still a chunk of population in rural areas do not have access to electricity.

Economic growth & energy use

Access to energy services is fundamental to human activities, development and economic growth. Since last couple of decades, energy has been emerged as the centre of the global debate. Energy issues are directly impacting the achievement of the development objectives outside the energy sector. The most important of them is emission of the greenhouse gases that leads to severe adverse impact on the regional as well as global environment.

Apart from air pollution and consequent human health problem, climate change due to emission of carbon dioxide is posing serious threat to the future generation. Large-scale efforts are needed to meet a wide range of social and economic needs to reconcile economic development along with strategies to mitigate carbon emissions from energy usage.

All the industries and factories need energy to run and function properly. Industries only the sources of production which not only soffise the need of our country, countries people but also exports to the foreign countries as well.

Excess energy→ excess production→ Import→Income→ Excess Economic growth, therefore we can say that energy and industries are interrelates without either of it nothing is possible if energy level is increased, the production in industries will also increased,-e.g. instead of one unit more units will function hence productions will be more, excess production will be exported to the foreign country which will fetch us excess money hence the economic condition of the country will be improved and will be secure foreign currency as well. Thereby energy and industrial development are complement to each other. We all know that the non-renewable sources of energy such as Coal, petroleum product etc, are likely to exhaust one day, banking only on non-renewable sources of energy will jeopardized our national interest.

Therefore all the countries of the world started thinking and producing renewable sources of energy such as hydyl energy, wind energy, tydle energy since renewable sources of energy are much beneficial as they do not pollute the atmosphere but are produced again& again at very short span of time.

III. POTENTIAL VS ACHIEVEMENTS.

Two major issues, namely, the ever widening gap between **energy demand and supply**, and associated greenhouse gas emissions, place the renewable energy resources in the right perspective. Technologies based on renewable energy sources (RETs) have developed rapidly in India due to a strong political support. The contribution of renewable energy technologies in India's economy and impact on Overall development can be classified into two categories: off-grid and grid-connected applications. Table 7 shows the prevalent RE technologies in the country. The cumulative subsidies spent on RET since 1980 is to the tune of 1040 Million €2

After making bad experiences with public programmes that led to a rush in building of RET plants that were quickly abandoned afterwards, the MNES now places greater reliance on developing market linkages and promoting commercialisation by involving private sector, rather than public investment, and providing more fiscal and tax incentives. However, also many of these incentives such as one-off Depreciation were not conducive to long-term maintenance of plants.

Table 1: Potential[3] and Achievements for Renewable Energy Technologies

Source/Systems	Potential according to past studies	Cumulative physical achievements (31st March 2003)
Biogas plants (nos.)	12 million	3.5 million
Improved cook stoves (numbers)	120 million	35.2 million
Biomass power / Co-generation	19500 MW	484 MW
Biomass gasifiers		53.40 MW
Solar photovoltaic systems	20 MW/sq.km	121 MWp
Solar water heating (collector area)	140 million sq. m.	0.70 million sq. m
Wind energy	45000 MW	1870 MW
Small hydro power	15000 MW	1509 MW
Waste-to-energy	1700 MWe	25.80

Source : http://mnes.nic.in/frame.htm?majorprog.htm
various SPV systems viz., Lanterns, Home & Street lighting systems & SPV power plant
* MWe - Megawatt electricity equivalent, MWp –Megawatt Peak

Only slowly policymakers have realised that incentives for long-term operation of the RETs such as low interest loans, interest subsidies, financing packages for consumers, fiscal benefits, preferential tariffs for imports and viable power purchase prices are needed. The successful penetration of renewable energy into conventional markets depends on several factors that in turn are driven by the institutional and policy environment

Issue of environmental change

Keeping in view the global environmental change and heavy energy use. A number of seminars conferences and summits have taken place .Indeed, The earth summit needs mention .

Earth Summit

The **United Nations Conference on Environment and Development**, also known as the **Earth Summit** (or, in Portuguese, **Eco '92**) was a major conference held in Rio de Janeiro from June 3 to June 14, 1992.

172 governments participated with 110 at level of heads of State or Government. Some 2,400 representatives of non-governmental organizations (NGOs) attended, with 17,000 people at the parallel NGO Forum, who had so-called Consultative Status.

The issues addressed included:

- systematic scrutiny of patterns of production — particularly the production of toxic components, such as lead in gasoline, or poisonous waste
- alternative sources of energy to replace the use of fossil fuels which are linked to global climate change
- new reliance on public transportation systems in order to reduce vehicle emissions, congestion in cities and the health problems caused by polluted air and smog
- the growing scarcity of water

IV. Suggestion

Energy conservation refers to efforts made to reduce energy consumption. Energy conservation can be achieved through increased efficient energy use, in conjunction with decreased energy consumption and/or reduced consumption from conventional energy sources.

Energy conservation can result in increased financial capital, environmental quality, national security, personal security, and human comfort. Individuals and organizations that are direct consumers of energy choose to conserve energy to reduce energy costs and promote economic security. Industrial and commercial users can increase energy use efficiency to maximize profit.

Energy policy is the manner in which a given entity (often governmental) has decided to address issues of energy development including energy production, distribution and consumption. The attributes of energy policy may include legislation, international treaties, incentives to investment, guidelines for energy conservation, taxation and other public policy techniques.

Sustainable energy is the provision of energy that meets the needs of the present without compromising the ability of future

generations to meet their needs. Sustainable energy sources are most often regarded as including all renewable energy sources, such as hydroelectricity, solar energy, wind energy, wave power, geothermal energy, bioenergy, and tidal power. It usually also includes technologies that improve energy efficiency.

V. Economic instruments

Various economic instruments can be used to steer society toward sustainable energy. Some of these methods include eco taxes and emissions trading. Green consumerism is enhanced on free energy markets. In Europe environmental NGOs have developed EKOenergy label to help consumers to choose more sustainable electricity products.

Ecological economics aims to address some of the interdependence and co evolution of human economies and natural ecosystems over time and space.[33] Environmental economics, is the mainstream economic analysis of the environment, which views the economy as a subsystem of the ecosystem, while ecological economics emphasis is upon preserving natural capital.(*Robert Nadeau (Lead Author);Cutler Cleveland (Topic Editor) (2008-08-26). , Jeroen, C.J.M.; Bergh, van den (2000)).*

Biophysical economics sometimes referred to as thermo economics is discussed in the field of ecological economics and relates directly to energy conversion, which itself is related to the fields of sustainability and sustainable development especially in the area of carbon burning. *National Council for Science and the Environment. Retrieved 2011-04-21)*

VI. Conclusion

Adopting clean technologies will help limit emissions growth and India is the only country with a renewable energy ministry. The government says the aim is to generate at least 10 percent of energy from renewable or more environment-friendly sources such as water, wind, biomass and natural gas.

In an effort to clean its air, the government has introduced stringent emission standards for vehicles and introduced greener fuels such as compressed natural gas in some cities.

India's Ministry for Non-conventional Energy Sources has estimated that India has the potential to generate 80,000 megawatts of power from renewable sources but produces only 5,000, half of it from windmills. But the government is firm that it will not agree to any targets even after 2012, the Kyoto pact's second phase when signatories are supposed to back deeper emissions cuts.

"In developing countries where the objective is to eradicate poverty and where we're on such a growth trajectory, we can't agree to any binding commitments," said a senior government official.

"Emissions in India will not rise because of economic development because the economy is dominated by the services sector. Of course, we will welcome any technology to help emit less, but we are in no position to forego our economic targets," the official said.

Regarding the earth summit India is now trying to use the energy sources like wind, thermal and solar etc to avoid the global situation of climatic change. These renewable energy sources deserves global attention and accelerated promotion due to its triple benefits of enhancing sustainable development, augmenting energy security and abating GHG emissions.

There are various reasons for India to push renewable energy such as.:

_ The inability of conventional systems to meet growing **energy demand** in an equitable and Sustainable manner.

_ The large scale negative impact of conventional energy production and consumption on the Physical and human environment.

_ The need for meeting energy needs of an unserved population in rural and remote areas as well as those residing on islands.

_ The need for maintaining a properly diversified energy mix. Such a diversified portfolio would also help in minimizing the socio-economic impact if the supply of a particular fuel were to break down.

However, maintaining a back-up infrastructure for periods when renewable energy

Supply is scarce (e.g. no wind is blowing) can be very costly. This becomes the more important, the higher the renewables penetration. Due to these benefits, Indian policymakers have decided to allocate different kinds of subsidies1 to the RE Sector. Over the past decade, the country has witnessed a rapid growth in this sector and several RE Technologies have attained technological maturity. They are biomass power, solar energy (photovoltaic and thermal), small hydro and wind energy with a cumulative installed capacity of around 4000 MW (MNES 2003). India is the only country in the world which has a dedicated ministry for promoting RE viz., Ministry of Non-conventional Energy Sources (MNES) and an exclusive public sector financial institution, viz., Indian Renewable Energy Development Agency (IREDA).

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