ISSN 2321 - 6425

Volume : 1, Issue No.2
(Jan - Dec. 2013)

STC Scholars Vision

Annual Journal of Multidisciplinary/Interdisciplinary Studies and Research

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Annual Journal of Multidisciplinary/Interdisciplinary Studies and Research

Volume 1 Issue No. 2 Jan - Dec. 2013 ISSN 2321 - 6425

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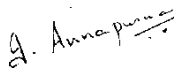
Editorial:

Research is the basis for development; because of the research and innovation the developed nations can able to establish their identity and authority on underdeveloped and developing countries. The dollar is in a position to dictate terms to all the currencies in the World except nation like Germany and few other nations because of their hard work and heavy investments on Research and Development since 200 years. So a nation with highest population density and volume with very low development, India needs to execute lots of effort in the field of research to stand on its own dignity to solve its complex problems in the fields of Defence, Growth of Energy resources, Population density, Employment to all the youth, Stability of its currency value, and also to compete at International level in the fields of Agriculture,Industrial, Education etc.

Inspite of establishment of number of National laboratories for all scientific branches India has not yet reached its aspirations, goals are far away. The bestexample of our ignorance in research is the cause of today's economic turmoil, a total failure of economic management because of lack of perception on importance of

research. So the institutions of all kinds i.e. the Universities, the National laboratories, the Administrative councils, Executive council of Physical, Biological and Applied sciences including Humanities are need to be taken seriously as the prime areas of research promotion.



Dr. Mrs. I. Annapurna
Editor - in - chief

An Input-Output Model for Energy Analysis: A Case Study of India

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**N.E.S. Ratnam

Abstract

Energy is one of the most significant strategic resources around the world. Apart from this, energy resources and air pollutants from energy are responsible for global climate change. The changes in industrial and energy structure have a strong influence on energy absorption. The input-output model is useful because it recognizes the interdependence of all sectors of the economy and their consumption to the energy embodied in the sectoral output. With regard to pollution generation, several studies have used the input-output model to analyze the pattern that explain the levels of emission and how these relate to production process Further this technique proved to be very useful for the development of energy analysis.

The main objective of this study is to examine the three air pollutants CO_2, SO_2, and NO_2 from fossil fuel combustion. This study applies Input-Output model in a commodity - by-industry approach to estimate total energy and the three air pollutants CO_2, SO_2 and NO_2 emissions from fossil fuel combustion. The Input-Output tables of 2003-04, 2006-07 are used to analyze this. These results show that, in the process of development, though energy is important, it provides healthier economy and environment because the emission in certain sector has declined when compared to the earlier period.

Keywords: Energy Analysis, Input-Output, Environment, Air pollutants

Introduction:

In recent years, the increase in the economic activity of modern societies has led to an increase in the standard of living and welfare. This development is linked to growing pressure on the environment, mainly as the result of the exploitation and use of energy and natural resources, but also as the result of an increase in population, vehicle transportation, and new techniques for making agriculture more productive or industry to probe more output. In the past decades the Input-Output analysis has been successfully applied to many energy issues, internationally by Proops, (1984) estimated energy-output ratio; Miller and Blair (1985); Machado, et al (2001) applied to the Brazilian economy to evaluate the total impacts of international trade on its energy use and CO_2 emissions.

In India, this technique was used by Murthy, etal (1997) to carry out an alternative scenarios for poverty reduction and energy efficiency; Mukhopadhyay, (2001); (2005). The environmental input-output framework integrates the economic and ecological relations that take place within the production system. In recent

decades, the input-output model has become a useful tool for calculating environmental burdens such as energy consumption and pollution generation, caused by normal activity of productive sectors (Llop, 2007).

Objective:

The main objective of this study is to examine the levels of direct emission by different sectors by using oil and gas as an input. The three air pollutants CO_2, SO_2, and NO_2 from fossil fuel combustion are analyzed with the help of Input-Output table of the Indian economy.

Methodology:

This study uses the Input-Output model in a commodity-by-industry approach to estimate total energy and the three pollutants (CO_2, SO_2, and NO_2) coefficients for the Indian economy in 2003-2004 and 2006-2007. Assuming that overall economic activity can be disaggregated into 'n' different producing sectors, input-output analysis decomposes total output of the economy into final and intermediate demands, thus explicitly dealing with inter industry trading. Mathematically, the basic equation is expressed as

$$X = Ax + Y \quad .. (1)$$

With X as the n-vector of goods required for total output. Y as the n-vector of goods that satisfies the final demand and Ax is the n-vector of intermediate demand. A is the n×n matrix of technical coefficients, on a fixed ratio (constant), that reflect the inputs required (from all sectors) for the production of each particular sector. Reorganization of expression (1) yields

$$X = (I-A)^{-1} Y \quad .. (2)$$

Where I is a unit matrix of order n and $((I-A)^{-1}$ is the Leontief inverse, which converts final demand into total output. It is well known that, the inverse $(I-A^{-1})$ of (I-A). Where A represents the structural (input coefficient) matrix of a given economy, describes the total, that is, direct and indirect effects of Rupees 1 million worth increase in the final demand for the products of any given industry on the total output of this and every other industry. The amounts of each one of the three different kinds of pollutant generated in connection with the increase in level of all outputs contributing to final users of Re1 million worth of each particular kind of good are represented accordingly by the matrix product.

As far as 2006-2007, I-O data are concerned only Input and output table of commodity-by- industry information exist. Hence by using the software MATLAB, the coefficients are obtained by the following formula

$$aij = Xij / Xj \quad (3)$$

Where Xij is the monetary input coming from sector i and used by sector j, while Xj is the total output of sector j. The input coefficient aij thus indicates in Million Rupees (mrs) of commodity i per Million Rupees (mrs) of output of commodity j. Further the (I-A), $(I-A)^{-1}$ are also calculated to arrive at direct and indirect energy consumption.

For estimation of CO_2, SO_2 and NO_2 emissions, the above conventional method of input-output framework is extended to compute CO_2, SO_2 and NO_2 emission that takes place in the production of a commodity at various levels. The fuel specific carbon, sulphur and nitrogen emission factors to the row vector of fossil fuel sector (oil and gas and converted gas into oil equivalent) of the respective Input-Output table to estimate the total CO_2, SO_2 and NO_2 emitted by the oil sector.

The next step is to calculate the CO_2, SO_2 and NO_2 emissions, from fossil fuel combustion. This has been estimated by the Intergovernmental Panel on Climate Change (IPCC) guidelines (2006). It is assumed that all the oil and natural gas are combusted whenever they are used as an intermediate input, generating CO_2, SO_2 and NO_2 emissions. This methodology is based on the study undertaken by Mukhopadhyay (2005).

The inputs of the fossil fuels oil and gas (which are assumed to be combusted) in mrs have to be converted into the generation of emissions. The conversion factors have been estimated following the guidelines of IPCC. The amounts of oil in mrs (Million rupees) are translated first to MTOE (Metric tons of oil equivalent) which are then converted into metric tons of emissions (MT).

Sources Data:

This study uses the Indian I-O tables of 2003-2004 and 2006-2007. In case of 2003-2004, the Central Statistical Organization has provided with the ready information on I-O coefficient matrix and Leontief inverse matrix.

Review of Literature:

Hoekstra and van den Bergh (2006) constructed physical input–output table (PIOT), which provided a framework in which all the physical flows associated with an economy can be recorded. This makes it a valuable tool for environmental–economic modeling and accounting. This paper elaborated these frameworks with

packaging, residuals (wastes and emissions), recycling and stock changes, in order to create a 'full' PIOT. In the case of mined fossil fuel the composition should be corrected for a 10% metal packaging layer. In the case of machines and objects there a 5% metal packaging layer and a 10% plastic packaging layer.

Mongelli and Notarnicola (2006) findings reveal that during 1990s (1991–2001) the ratio between net exports (exp–imp) with developing countries and the domestic apparent consumption decreased only for the artificial and synthetic fibers and Iron, steel and other metals manufacturing sectors, while for the other energy and carbon intensive sectors the trends are quite constant and, above all, affected by conjectural factors. In particular, for these sectors, a country specific analysis reveals that the decrease of the net exports on apparent consumption occurs basically with Russia for Iron, steel and other metals manufacturing, while with China for Artificial and synthetic fibers.

Weisz and Duchin (2006) calculated the land appropriation of exports using input-output model. Demonstrated the equivalence between basic input-output models with the variables is measured in physical units on the assumption of unique unit price for the characteristic output of each sector. They found that the direct and indirect land appropriation gained from the monetary model, and the physical model, not only for exports but also for domestic final demand.

Xue et al. (2007) developed environmental input- output models at different spatial scales for entities such as manufacturing systems, manufacturing plants, and a company. For environmental input- output models developed at large spatial scales, e.g., at national or industry-wide level, these models are highly aggregated and lack spatial resolution, and cannot be decomposed or disaggregated to acquire information about the manufacturing systems, manufacturing plants, and companies.

Liang et al (2010) proposed a methodology named Hybrid Physical Input-Output Model for Energy Analysis (HPIOMEA) to study the energy metabolism, for Suzhou in China. The results show that the CO_2 , SO_2 and NO_2 are the main sources of climate change and acid rain. The water vapour has little effect on the atmospheric environment in Suzhou. Coal dominates the primary energy consumption.

Construction of the Energy Input-Output Tables:

The original input-output table were aggregated into 60 sector tables in which 17 sectors from which most of the atmospheric pollution comes are described

in a relatively detailed way by incorporating the 3 pollutants. In this analyses a comparative study of the emission status of these industries are done by using Input-output tables from the Central Statistical Organization.

Direct Emission from Fossil Fuel Combustion:

It examines the effect of green house gases CO_2, SO_2 and NO_2 by combusting fossil fuels (oil and gas) and compared the direct emission of CO_2, SO_2 and NO_2 in 2003-04 and 2006-07.

Table 1: Direct Emission CO_2 and SO_2

		CO_2 2003 MT	SO_2 2003 MT	CO_2 2007 MT	SO_2 2007 MT
1	Coal and lignite	0.001	0.001	0.017	0.002
2	Natural Gas	0.002	0.000	0.012	0.001
3	Textile products	0.023	0.002	0.262	0.027
4	Petroleum products	15.65	15.24	18.47	19.32
5	Coal and tar products	0.026	0.003	0.299	0.031
6	Inorganic heavy chemicals	0.002	0.004	0.017	0.002
7	Organic heavy chemicals	0.002	0.002	0.018	0.002
8	Fertilizers	0.409	0.042	4.267	0.446
9	Paints, varnishes and lacquers	0.014	0.002	0.151	0.016
10	Pesticides ,drugs and chemicals	0.157	0.016	1.635	0.171
11	Cement	0.029	0.003	0.329	0.034
12	Non metallic mineral products	0.001	0.000	0.015	0.002
13	Iron and steel industry	0.234	0.024	3.178	0.332
14	Other basic metal industry	0.040	0.004	0.089	0.009
15	Other machinery	0.024	0.003	0.321	0.034
16	Electrical electronic machinery & appliances	0.001	0.001	0.163	0.017
17	Electricity	0.445	0.046	3.964	0.415
	Total	17.06	15.39	33.21	20.86

Source: Calculated by the author by using the method described above.

The Table 1 shows that the CO_2 emissions from Petroleum product sector, Electricity, Fertilizers during 2003-04 are 15.65 MT, 0.44 MT, and 0.40 MT, respectively. In this category the Petroleum product sector emits high carbon dioxide. It is evident that, fossil fuels are diminishing due to extensive and continuous use by increasing population and rising level of development. Moreover, burning of fossil fuels (oil and gas) is the principal cause of CO_2 emissions leading to air pollution and environmental degradation. Further, it reveals that almost all industrial sectors the SO_2 emission trends are higher than the previous period. It can be seen that in case of, petroleum products the SO_2 emissions are very high, 16.2 MT in 2003 and it has increased to 19.32 MT in 2006-07, and Electricity sector 0.4 MT in 2003-04 and 0.41 MT in 2006-07 .

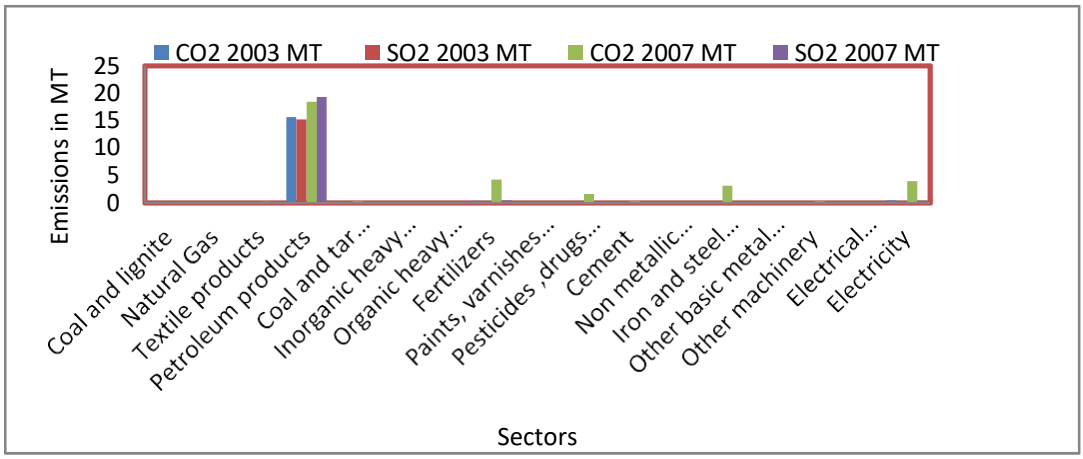

Figure 1 Direct emission of CO_2 and SO_2

The figure 1 displays that the direct emission of CO_2 and SO_2 in various sector. It shows that the Fertiliser, Iron and steel industry Pesticides and drugs, Electricity and Petroleum products emits higher CO_2 in 2007 when compared to 2003.

Findings:

a) CO_2 emission in the Petroleum products industry is very high at 91.7% in 2003-04 although in 2006-07 it has declined to 65.63%. Further the Electricity Sectors contribution to CO_2 in the environment is the second highest when compared to Fertilizer (2.39 % in 2003-04) and increased to 12.84% in 2006-07. For all the sectors, in 2006-07 there is a rise in the CO_2 emission except petroleum products. This may be because of the environmental regulations and the techniques used by petroleum product sector which may be due to pollution abatement techniques and stringency of environmental regulations.

b) Among SO_2 emission by top 5 industries, Petroleum product industries contribute more when compared to others. It is to be noticed from the data in the above figure the SO_2 in the Fertilizer sector has declined when compared to 2003 and in case of Pesticides, drugs and chemical industry the SO_2 emission has increased in 2007 when compared to 2003.

c) The NO_2 emission is very negligible in all the sectors. Even in the case of NO_2 emission the Petroleum Product sector contributes high source of emission when compared to other sectors. The petroleum product sector contributes nearly 91% of NO_2 emission, where as other top five polluting industries like Electricity sector, Fertilizer, Pesticides drugs and Chemicals and Iron and steel sectors contribute very less to the total NO_2 emission.

Conclusion:

To summarize, this study analyzed the direct emission from fossil fuel combustion. The results derived from the study lead us to conclude that in India the direct CO_2 emission from the fossil fuel combustion is very high in five industries, which are Petroleum products, Electricity, Fertilizers, Iron and Steel industry and Pesticides and Drugs. From this, it is understood that environmental impacts of energy are enormous as an imbalance is created due to the fuel combustion by oil and gas.

Thus increasing levels of energy related environmental pollution in developing countries have led to a recognition of the need for improved energy options for sustainable development and also to find less material intensive development path. These results show that, in the process of development, though energy is important, it provides healthier economy and environment because the emission in certain sector has declined when compared to the earlier period.

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Renewable Energy Markets in Developing Countries

K Lakshmi Prameela

Abstract

Renewable energy commonly refers to both traditional biomass (i.e., fuel wood, animal wastes, and crop residues burned in stoves) and modern technologies based on solar, wind, biomass, geothermal, and small hydropower. Developing countries have 80% of the world's population but consume only 30% of global commercial energy. As energy consumption rises with increases in population and living standards, awareness is growing about the environmental costs of energy and the need to expand access to energy in new ways. Increased recognition of the contribution renewable energy makes to rural development, lower health costs (linked to air pollution), energy independence, and climate change mitigation is shifting renewable energy from the fringe to the mainstream of sustainable development. Support for renewable energy has been building among those in government, multilateral organizations, industry, and nongovernmental organizations (NGOs) pursuing energy, environment, and development agendas at local, national, and global levels.

Besides traditional biomass, small hydropower in China and transport ethanol in Brazil is among the largest single contributors to renewable energy supplies in developing countries. In fact, modern biomass represents 20% of Brazil's primary energy supply, aided by significant increases in the past 20 years in the use of ethanol fuels for vehicles and sugarcane waste for power generation. The largest developing country—China—gets about 2% of its primary energy supply from renewable energy, mostly from small hydropower generation.

Renewable energy markets in developing countries:

Application: Rural residential and community lighting TV, radio, and telephony **Indicators of existing installations and markets (as of 2000):** Over 50 million households are served by small-hydro, village-scale mini-grids.10 million households get lighting have solar PV home systems or solar lanterns.

We then review the emerging lessons suggested by these experiences for six key issues ranging from rural development impacts to subsidies to enterprise development. We believe that grouping lessons by issue proves more useful than a single group of renewable energy lessons.

Key words: geothermal, gasifies, subsidies, repercussions, entrepreneurship.

Introduction:

In the 1970s and 1980s, many development assistance agencies attempted to promote small-scale renewable-energy technologies such as biogas, cooking stoves, wind turbines, and solar heaters in developing countries. From 1980 to 2000, official development assistance for renewable energy totaled about $3 billion [estimate based on donor statistics from the Organization for Economic Co-Operation and Development, which do not separate small from large hydro] most of which went for geothermal, wind, and small hydro technologies."In between 1979 and 1991, most official development assistance for renewable energy funded fixed capital assets. Much smaller amounts were used to meet such recurrent costs as maintenance, and less than 10 percent was spent imparting the technical and managerial skills needed to build national capacity." The United Nations Development Progamme (UNDP)/World Bank Energy Sector Management Assistance Program reported that a large number of the early donor programs encountered a variety of technical problems; "many programs badly underestimated problems of repair and maintenance in the mistaken belief that PV systems were virtually maintenance free and could be cared for by untrained local people." many developing countries were busy with their own renewable energy programs. Large-scale initiatives by developing-country governments included ethanol use for transport in Brazil, household biogas for lighting and cooking in China and India, grid-connected wind power in India, and small hydro power in Nepal. Some success stories, such as the market for solar home systems in Kenya, began with donor assistance in the 1980s but then graduated to private sector–led markets in the 1990s.

The ethanol vehicle fuel program in Brazil was successful partly because using ethanol required little change in consumers' attitudes or behaviors. Many early programs were not successful, however, often because the factors for sustainability and replication were missing. For example, a Philippine government program for biogas-powered water pumping in the 1980s saw only 1% of the gasifies in use after some years, while 16% went unused and 80% needed repair. Some of the reasons cited: the program agency coped with pressure to meet installation targets by circumventing technical standards and guidelines; individual farmers were not accountable for loan repayments in cooperative-based loan arrangements, which led to low repayment rates and lack of funds for program replication; the need for dual

fuel supplies—both diesel and biogas—was inconvenient and required changes in behavior; and inadequate training and poor maintenance practices resulted in engine failures.

In the late 1990s, private multinational corporations such as Shell and British Petroleum also began to commit hundreds of millions of dollars to renewable energy investments, some of which was to go to developing countries. Many domestic firms in developing countries also entered the renewable energy business in the 1990s. But companies found such investments to be more difficult than they imagined in developing countries, and progress in fulfilling these commitments has been slow.

Rural Small Industry, Agriculture, and Other Productive Uses:

Although electricity provides improvements in the quality of life through lighting, entertainment, and increased conveniences, it is the productive uses of this electricity that increase incomes and provide development benefits to rural areas. As incomes increase, rural populations are better able to afford greater levels of energy service, which can allow even greater use of renewable energy. The major emerging productive uses of renewable energy are for agriculture, small industry, commercial services, and social services like drinking water, education, and health care

Grid-Based Power Generation:

Total world electric power capacity stood at 3,400,000 MW in 2000, with about 1,500,000MW (45%) of this in developing countries. Electricity consumption in developing countries continues to grow rapidly with economic growth, which raises concerns about how these countries will expand power generation in coming decades. According to some estimates, developing countries will need to more than double their current generation capacity by 2020. Traditional options, such as coal and large hydro, have environmental and social repercussions that have increasingly taken on serious political and economic undertones.

Renewable grid-based electricity generation capacity installed as of 2000 (megawatts):

Developing Technology	Developing countries	All countries
Total world electric power capacity	**3,400,000**	**1,500,000**
Large hydropower	**680,000**	**260,000**
Small hydropower	**43,000**	**25,000**
Biomass power	**32,000**	**17,000**
Wind power	**18,000**	**1,700**
Geothermal power	**8,500**	**3,900**
Solar thermal power	**350**	**0**
Solar photovoltaic power (grid)	**250**	**0**
Total renewable power capacity	**102,000**	**48,000**

Small Hydropower:

Small hydropower harnesses small rivers and streams, typically with plants less than 10MWsize. Small hydropower has been a mainstay of rural energy development for many years in many countries. About 43,000 MW of small hydro are installed worldwide, about 60% in developing countries. China alone accounts for 21,000 MW of that capacity, driven by long-standing government rural electrification programs Governments need to foster the appropriate conditions for viable rural entrepreneurship and grid-based power investments that incorporate renewable energy. Commercial banks, multilateral organizations, and other public lenders need to provide business finance to entrepreneurs, credit to consumers, and project finance to grid-based power developers. National governments and international donors should support the creation and strengthening of innovative market facilitation organizations (MFOs).

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Eco-Friendly Energy Sources – Need Of The Hour

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Abstract

Going green, environmental protection, sustainable life style, protecting our earth and many more have become a natural phenomenon in our everyday life. Though high technology around the world made life simpler, yet it leaves a great impact on the quality of life. Because of the global pressures in every sector of life, like new technology, production, marketing and so on, and people have to face critical situation to think constructively to safeguard the environment already being ravaged by polluted weather. So utilization of eco – friendly products or sustainable products is a dire need of the hour to reduce overall impact on environment.

Key Words: eco – friendly, radiated, obsolete, Jatropha, poli pre-polin, installation.

Introduction:

Maintenance of eco balance is the chief ingredient of better health of human being. Whatever the amenity developed for the comfort of human being without health one cannot enjoy. So the basic need is whatever the development we matter should be within the purview of environmental conditions. In the name of the development and innovation today everything is disturbing the nature. Energy is the basic need for all the comforts but every work that promotes energy production is anti environmental. Leaving the most hazardous systems like atomic energy, even the solar energy collection is also one kind of anti nature because this solar panels can absorb only 25% of the energy that falls on its surface can convert only 16% to electricity. Nearly 60% of the heat is light reflected, radiated, re-radiated into atmosphere. That will definitely create atmospheric temperature to accelerate. Even the solar cell manufacturing industry is not an eco friendly industry. The poli pre-polin film which is used for organic solar cells is also a toxic industry which we follow the strict norms of eco balance.

Still these solar cells cannot work more than 20 years. Its efficiency begins to deteriorate from the date of installation with a fraction to obsolete conditions at the end of 25^{th} year. For that, the electrical energy production through gas turbines is uneconomical as well as pollutant. The coal from steam generators produces a larger amount of ash, ash dust and carbon monoxide, carbon dioxide, sulphur dioxide and many more substances into atmosphere. Today the reminiscences of atomic energy stations i.e. the storage of radioactive wastage produce at the end of the process are

very dangerous and this became a biggest problem of storing and preservation of this material. In case of earth tremors if the sailor breaks away the resultant hazard is costlier than the energy we have produced and enjoyed previously. So from the next millennium there is no way to human being without taking the rescue from developing the green energy sources.

1. The first and foremost energy development is to learn to live as nearer as possible to nature without opting for this artificial energy resources like electricity, petroleum, coal etc. There are number of designs, construction of houses to maintain best friendly temperature inside. So the construction of housing itself starts with eco- friendly action.
2. We can use vegetable oils like Jatropha and other so many varieties of natural products which can produce energy with lowest amounts of pollutants.
3. The 100% non- polluting energy resources and gadgets are wind energy and hydrogen. Wind energy can be harnessed by putting wind structural towers at a high speed wind blowing areas. As a wind mill rotates a generator can be coupled to it.
4. Hydrogen- there are many designs and methods of extractive energy from hydrogen with fuel cells, fusion reactors etc.
5. Deterium and Treterium are the isotopes of hydrogen which are useful in creating a fusion reaction where only water and energy liberates. So this is the highest energy liberating fuel needs technological development and it will become the most promising energy resource as hydrogen is available in unlimited quantities on the globe.

Conclusion:

Electrical accumulators and batteries play a major role while handling energy in mobiles i.e. all the moving machines which consume electricity. There are too many numbers of battery models and designs but the result is not yet satisfactory. With regard to recharge batteries and lead acid batteries are used universally but lead is highly toxic. Still it is the dominant battery where higher varieties of energies are to be handled in motor vehicles and phones and industries. But for electronic lower volume electrical accumulating needs are fulfilled by zinc, sodium lithium ion etc.

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Solar High Ways As An Innovative Renewable Energy Module And Ecofriendly Technology To Propel The Concept Of Sustainable Development

Sk Chand Basha

Abstract

Since the present globalization marching towards extravagant industrialization coupled with technicalization which has to be fed up with equitable energy resource, While the present Non-conventional energy resources are at the brink of their extinction alternate strong renewable energy module creation is the need of the hour. Therefore the present communication emphasizes the role of Solar high ways as an innovative energy that is Sustainable and Ecofriendly the twin objectives of it will play a promising role in upcoming future. A solar roadway is a road surface that generates electricity by solar power photovoltaics.The pilot projects of the same has already earthen in U.S which are gradually tilting towards this innovative energy source, But in case of our India which actually still under successful experimental stages, Now gradually moving towards full scale implementation level, Under which Gujarat became the inceptor in this regards. Under this crown India's major roads may double up as solar highways, The proposal is the brainchild of scientists at the Gujarat Energy Research and Management Institute (GERMI) in the state capital Gandhi nagar.The proposals embodied with four-lane 205 km-long Ahmedabad-Rajkot highway can generate 104 MW of power while the Ahmedabad-Vadodara national highway, 93 km long, can generate 61 MW of electricity. If the solar High ways project materialized at full scale level we can have two aims in one shot 1.Sustainable development 2.India as a Global leader.

Key words: Solar high ways, Photovoltaic, GERMI, Globalization.

Introduction

A solar roadway is a road surface that generates electricity by solar power photovoltaic's. One current proposal is for 12 ft x 12 ft (3.658 m x 3.658 m) panels including solar panels and LED signage, that can be driven on. The concept involves replacing highways, roads, parking lots, driveways, and sidewalks with such a system.

DOT contract-U.S Experience

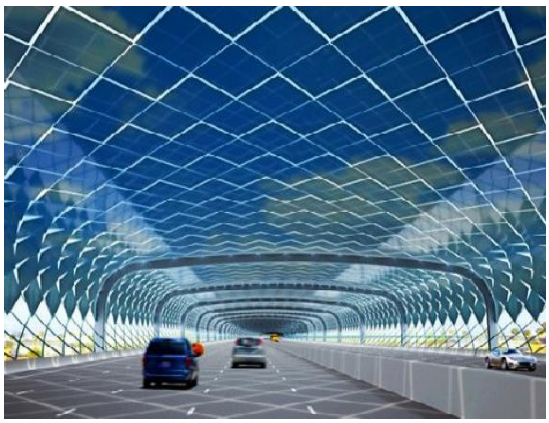
The United States Department of Transportation awarded the company Solar Roadways Incorporated a $100,000 research contract in 2009. This Small Business Innovation Research (SBIR) contract enabled Solar Roadways to prototype solar road panels. The concept has been used for lighting as well.

After successful completion of the Phase I SBIR contract, Solar Roadways Inc. announced that the Federal Highway Administration awarded it a follow-up $750,000 Phase II SBIR contract to take it to the next step: a solar parking lot. Constructed out of multiple 12' x 12' panels, this smart parking lot will also warm itself in cold weather to melt away snow and ice. A layer of embedded LEDs will be used to create traffic warnings or crosswalks, and excess electricity could be used to charge electric vehicles or routed into the power grid. The electrical components will be embedded between layers of extremely durable, textured glass.

The Principle:

A solar roadway is a series of structurally engineered solar panels that are driven upon. The idea is to replace current petroleum-based asphalt roads, parking lots, and driveways with solar road panels that collect energy to be used by homes and businesses, and ultimately to be able to store excess energy in or alongside the solar roadways. Thus renewable energy replaces the need for the current fossil fuels used for the generation of electricity, which cuts greenhouse gases.

Parking lots, driveways, and eventually highways are all targets for the panels. If the entire United States Interstate Highway system were surfaced with Solar Roadways panels, it would produce more than three times the amount of electricity currently used nationwide.



Panel construction:

Existing prototype panels consist of three layers.

1. Road surface layer - translucent and high-strength, it is rough enough to provide sufficient traction, yet still passes sunlight through to the solar collector cells embedded within, along with LEDs and a heating element. This layer needs to be capable of handling today's heaviest loads under the worst of conditions and to be weatherproof, to protect the electronics layer beneath it.
2. Electronics layer - Contains a microprocessor board with support circuitry for sensing loads on the surface and controlling a heating element with a view to reducing or eliminating snow and ice removal as well as school and business closings due to inclement weather. The microprocessor controls lighting, communications, monitoring, etc. With a communications device every 12 feet, a solar roadway can be an intelligent highway system.
3. Base plate layer - While the electronics layer collects energy from the sun, it is the base plate layer that distributes that power as well as data signals (phone, TV, internet, etc.) down the line to all homes and businesses connected to the solar roadway. It needs to be weatherproof to protect the electronics layer above it.

Advantages and disadvantages:

- **Renewability and life-span**

The main advantage of the solar roadway concept is that it utilizes a renewable source of energy to produce electricity. It has the potential to reduce dependence on conventional sources of energy such as coal, petroleum and other fossil fuels. Also, the life span of the solar panels is around 30–40 years, much greater than normal asphalt roads, which only last 7–12 years.

- **Military and rescue assistance**

In the event of an environmental disaster or military emergency, solar roadways would provide power when it is needed most. As solar power is renewable, it obviously requires no external connection to an artificial power source.

- **Roadways already in place**

Another advantage of solar roadways is that they do not require the development of unused and potentially environmentally sensitive lands. This is currently a very controversial issue with large photovoltaic installations in the

Southwestern US and other places. But since the roads are already there, this is not an issue. Also, unlike large photovoltaic installations, new transmission corridors – perhaps across environmentally sensitive land – would not be required to bring power to consumers in urban areas. Transmission lines could simply be run along already established roadways.

- **On-the-go charging**

With induction plating embedded inside these roads, electric cars can be recharged while in motion on top of these roads. This would reduce the costs and the time-inconvenience of waiting at a charging station.

Disadvantages:

In spite of these advantages, initially, the start up and maintenance costs of building such roadways and parking lots may be high, although advances in this technology should cause the costs to fall. Road surfaces also accumulate rubber, salt, etc., which block sunlight. Salt might be easy to wash off, but not rubber.

Solar high way Indian experience:

India's major roads may double up as solar highways, if an innovative proposal by some scientists gets the government's approval. The proposal is the brainchild of scientists at the Gujarat Energy Research and Management Institute (GERMI) in the state capital. In a paper just published in the International Journal of Energy, Environment and Engineering, the scientists say highways can be used to generate solar power, if a roof of solar panels was laid over them, across the length of the roads.

The photovoltaic (PV) panels that convert sunlight into electricity is normally spread out on land. "While the price of PV panels is falling day by day, the price of land and its availability are constraints in the development of solar power, especially in India," says Tirumalachetty Harinarayana, director of GERMI and one of the authors of the paper.

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Conserving Natural Resources

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Abstract

Resources are features of environment that are of value to human in one form or the other. However, the advancement of modern civilization has had a great impact on our planet's natural resources. So, conserving natural resources is very essential today. There are many ways that one can conserve natural resources. Every man-made product is composed of natural resources at its fundamental level. A natural resource may exist as a separate entity such as fresh water, and air, as well as a living organism such as a fish, or it may exist in an alternate form which must be processed to obtain the resource such as metal ores, oil, and most forms of energy. There is much debate worldwide over natural resource allocations; this is partly due to increasing scarcity (depletion of resources). Some natural resources such as sunlight and air can be found everywhere, and are known as ubiquitous resources. However, most resources only occur in small sporadic areas, and are referred to as localized resources. There are very few resources that are considered inexhaustible (will not run out in foreseeable future) – these are solar radiation, geothermal energy, and air (though access to clean air may not be). The vast majority of resources are exhaustible, which means they have a finite quantity, and can be depleted if managed improperly.

The depletion of natural resources is caused by 'direct drivers of change' such as Mining, petroleum extraction, fishing and forestry as well as 'indirect drivers of change' such as demography, economy, society, politics and technology. Habitat conservation is a land management practice that seeks to conserve, protect and restore, habitat areas for wild plants and animals, especially conservation reliant species, and prevent their extinction, fragmentation or reduction in range. Natural resource management is a discipline in the management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations.

Key words: biodiversity**,** geo-diversity, Biotic,

Introduction:

Natural resources occur naturally within environments that exist relatively undisturbed by mankind, in a natural form. A natural resource is often characterized by amounts of biodiversity and geo-diversity existent in various ecosystems. Natural

resources are derived from the environment. Some of them are essential for our survival while most are used for satisfying our wants. Natural resources may be further classified in different ways.

Classification:

There are various methods of categorizing natural resources, these include source of origin, stage of development, and by their renewability.

On the basis of origin, resources may be divided into:

*Biotic – Biotic resources are obtained from the biosphere (living and organic material), such as forests and animals, and the materials that can be obtained from them**.**

*Fossil fuels - such as coal and petroleum are also included in this category because they are formed from decayed organic matter.

*Abiotic – Abiotic resources are those that come from non-living, non-organic material. Examples of abiotic resources include land, fresh water, air and heavy metals including ores such as gold, iron, copper, silver, etc.

Considering their stage of development, natural resources may be referred to in the following ways:

Potential Resources – Potential resources are those that exist in a region and may be used in the future. For example, petroleum may exist in many parts of India, having sedimentary rocks but until the time it is actually drilled out and put into use, it remains a potential resource.

Actual Resources – Actual resources are those that have been surveyed, their quantity and quality determined and are being used in present times. The development of an actual resource, such as wood processing depends upon the technology available and the cost involved.

Reserve Resources – The part of an actual resource which can be developed profitably in the future is called a reserve resource.

Stock Resources – Stock resources are those that have been surveyed but cannot be used by organisms due to lack of technology. For example: hydrogen.

Renewability is a very popular topic and many natural resources can be categorized as either renewable or non-renewable:

Renewable resources are ones that can be replenished naturally. Some of these resources, like sunlight, air, wind, etc., are continuously available and their

quantity is not noticeably affected by human consumption. Though many renewable resources do not have such a rapid recovery rate, these resources are susceptible to depletion by over-use. Resources from a human use perspective are classified as renewable only so long as the rate of replenishment/recovery exceeds that of the rate of consumption.

Non-renewable resources are resources that form extremely slowly and those that do not naturally form in the environment. Minerals are the most common resource included in this category. By the human perspective, resources are non-renewable when their rate of consumption exceeds the rate of replenishment/recovery; a good example of this are fossil fuels, which are in this category because their rate of formation is extremely slow (potentially millions of years), meaning they are considered non-renewable. Some resources actually naturally deplete in amount without human interference, the most notable of these being radio-active elements such as uranium, which naturally decay into heavy metals. Of these, the metallic minerals can be re-used by recycling them, but coal and petroleum cannot be recycled.

For conservation of natural resources like natural gas, one can get tank less water heater as it reduces the usage of natural gas. The other way to save natural gas is the use of another energy source for instance hydro, solar or wind power are all healthy and great alternatives to conserving natural resources. In fact these energy sources are clean and healthy for environment. Moreover, these energy sources do not emit or produced harmful gases or toxin into our environment like that of the burning fossil fuels at the same time they are renewable as well as are not easy to deplete. Today, most of the people are finding many ways for conserving natural resources. One of the great option before is Hydro-power and solar power.

Power can be generated from these sources and these are the best ways for natural resources conservation like fossil fuels. There is also way to conserve natural resource like trees. It can be conserved through recycling process. Many products come from the trees like papers, cups, cardboards and envelopes. By recycling these products you can reduce the number of trees cut down a year. One should make the most use of these paper products without being wasteful and then recycle them. This is one great way for conserving natural resources. Fossil fuels on Earth will not last forever; we need to conserve these fossil fuels. To conserve fossil fuels one can choose to buy a hybrid car. Some of these cars will run on electricity combined with

using small amounts of gas. Some hybrid cars just run on electricity. Either way it is a great way for conserving natural resources when it is concern with fossil fuels.

Extraction:

Resource extraction involves any activity that withdraws resources from nature. This can range in scale from the traditional use of preindustrial societies, to global industry. Extractive industries are, along with agriculture, the basis of the primary sector of the economy. Extraction produces raw material which is then processed to add value. Examples of extractive industries are hunting and trapping, mining, oil and gas drilling, and forestry. Natural resources can add substantial's to a country's wealth, however a sudden inflow of money caused by a resource boom can create social problems including inflation harming other industries and corruption, leading to inequality and underdevelopment, this is known as the "resource curse".

Depletion:

In recent years, the depletion of natural resources has become a major focus of governments and organizations. The depletion of natural resources is of concern for sustainable development as it has the ability to degrade current environments and potential to impact the needs of future generations. The depletion of natural resources is caused by 'direct drivers of change such as Mining, petroleum extraction, fishing and forestry as well as 'indirect drivers of change' such as demography, economy, society, politics and technology. The current practice of Agriculture is another factor causing depletion of natural resources. For example the depletion of nutrients in the soil due to excessive use of nitrogen and desertification. The depletion of natural resources is a continuing concern for society.

Protection:

In 1982 the UN developed the World Charter for Nature in which it recognized the need to protect nature from further depletion due to human activity. They state the measures needed to be taken at all societal levels, from international right down to individual, to protect nature. They outline the need for sustainable use of natural resources and suggest that the protection of resources should be incorporated into the law system at state and international level. Conservation biology is the scientific study of the nature and status of Earth's biodiversity with the aim of protecting species, their habitats, and ecosystems from excessive rates of extinction. It is an interdisciplinary subject drawing on sciences, economics, and the practice of natural resource management. Habitat conservation is a land management practice

that seeks to conserve, protect and restore, habitat areas for wild plants and animals, especially conservation reliant species, and prevent their extinction, fragmentation or reduction in range.

Management:

Natural resource management is a discipline in the management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations. Management of natural resources involves identifying who has the right to use the resources and who does not for defining the boundaries of the resource. The resources are managed by the users according to the rules governing of when and how the resource is used depending on local condition.

Conclusion:

A successful management of natural resources should engage the community because of the nature of the shared resources the individuals who are affected by the rules can participate in setting or changing them. The right to resources includes land, water, fisheries and pastoral rights. The users or parties accountable to the users have to actively monitor and ensure the utilization of the resource compliance with the rules and to impose penalty on those peoples who violates the rules. These conflicts are resolved in a quick and low cost manner by the local institution according to the seriousness and context of the offence. The global science-based platform to discuss natural resources management is the World Resources Forum, based in Switzerland.

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Energy Resources and Consumption in India

***K B S Gopal,**
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Abstract

This article gives information about conventional and non conventional resources and status of sectors like petroleum, natural gas, coal, and power including thermal, hydro, nuclear, . Besides, trends in research, development; and applications of renewable energy resources like solar, wind, small hydro, biomass/ bio-fuels, waste to energy, and hydrogen etc. The data is taken from official publications and is applied for graph and analysis.

Key words: conventional, diffused, decentralised, Tidal Energy, Marine Current, Geothermal Energy, sustainability, conventional,

Introduction:

Renewable energy resources are available in the form of raw material. These are conventional as well as non conventional energy resources. Some of these commercialized resources are fossil fuels, nuclear fuel, water etc. Some of the non commercialized resources are solar; wind. Renewable energy is a natural source of energy available in large quantity and is sustainable. The various sources of renewable energy are primary or secondary Fig.1 shows the estimate percentage of various renewable energy resources globally.

The non conventional energy resources are:

(a) Solar Energy
(b) Ocean Thermal Energy
(c) Wind Energy
(d) Tidal Energy
(e) Wave Energy
(f) Marine Current
(g) Hydro Power
(h) Geothermal Energy
(i) Biomass
(j) Wood and Charcoal Energy
(k) Direct Energy Conversion Resources.

Renewable energy sources are indigenous and can contribute towards reduction in dependency on fossil fuels .Renewable energy sources assume special

significance in India when viewed in the context of the geographic diversity and size of the country,. Since renewable energy resources are diffused and decentralised. They offer numerous possibilities for meeting the basic energy needs of the rural poor. Renewable energy also provides national energy security at a time when decreasing global reserves of fossil fuels threatens the long-term sustainability of the Indian economy. The energy security is an issue not only at the national level but also at the local level.

Energy Resources Presently commercial energy resources are being utilized to a large extent. The annual energy consumption of the world increases by 10 times and reaches to over 451 EJ in current year. The figure shows that nearly 18% of the world energy supply is renewable and 72% is in the form of coal, oil, natural gas and nuclear power. As the resources of the fossil fuel are confined and if current consumption rate is maintained they will be lasting for 200 years (oil for 40 years, natural gas for 60 year) and peak value of their production will reach by 2030 and decline there after globally. Beside the decline of primary resources they will also produce the adverse effect on the society by air pollution and global warming. On the basis of sustainability and renewability these resources are classified as conventional and non conventional energy resources.

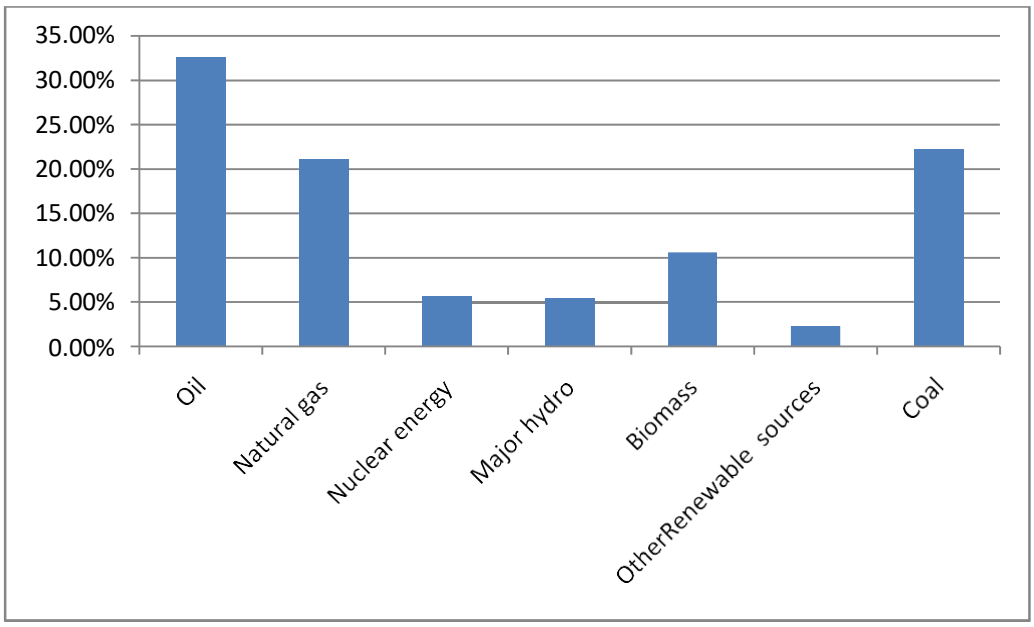

Fig1: Worldwide energy consumption from various sources.

Conventional Energy Sources:

The conventional energy resources are coal, oil, natural gas and nuclear fuel. These resources are accumulated in nature and cannot be easily replenished once exhausted. The coal deposits continuously exist in different parts of the world. The energy consumption of the world has been increasing with industrial growth. The fossil fuel is going to be exhausted in future because of limited reserves and it is estimated that by 2050 the 80% of reserve will be exhausted. Also various problems of emission of pollutant gases in environment is another issue. The other conventional resource like nuclear fuel is costly and big problem is in its safe utilization. To overcome the shortage and ecological problem we need to take over the alternative energy resources for use, known as non conventional energy .it is forced the developing countries to adopt an alternate non conventional energy technology as they get replenished again and again and are sustainable. These resources are generated continuously and are also known as renewable energy resources, like solar, wind, bio, tidal etc.

Solar energy:

India is enriched with solar energy resource. The average intensity of solar radiation received on India is 200 MW/km square (megawatt per kilometer square). With a geographical area of 3.287 million km square, this amounts to 657.4 million MW. However, 87.5% of the land is used for agriculture, forests, fallow lands, etc., 6.7% for housing, industry, etc., and 5.8% is either barren, snow bound, or generally inhabitable. Thus, only 12.5% of the land area amounting to 0.413 million km square can, in theory, be used for solar energy installations. Even if 10% of this area can be used, the available solar energy would be 8 million MW, which is equivalent to 5 909 mtoe (million tons of oil equivalent) per year.

Solar energy has large applications, they are megawatt level solar thermal power plants, at the lower end there are domestic appliances such as solar cooker, solar water heater, and PV lanterns. There are applications such as industrial process heat, desalination, refrigeration and air-conditioning, drying, large scale cooking, water pumping, domestic power systems, and passive solar architecture. Solar cookers and hot water systems based are gaining popularity in India and to a large extent

attained commercial status. Solar energy can be harnessed to supply thermal as well as electrical energy

Hydro power:

The word hydro comes from a Greek word meaning water. The energy from water has been harnessed to produce electricity since long. It is the first renewable source to be tapped essentially to produce electricity. Hydro power currently suffices one fifth of the global electricity supply, also improving the electrical system reliability and stability throughout the world. According to the power generation hydro power is classified into small, mini/micro and pico hydro. In India, it is being classified as follows;

Biomass:

Biomass has been one of the main energy sources for the mankind ever since expansion in use of oil and coal in the late 19^{th} century. It is renewable, widely available, and carbon-neutral and has the potential to provide significant productive employment in the rural areas. Biomass is also capable of providing firm energy. Estimates have indicated that 15% - 50% of the worlds primary energy use could come from biomass by the year 2050. Currently, about 11% of the worlds primary energy is estimated to be met with biomass. For India, biomass has always been an important energy source. Although the energy scenario in India today indicates a growing dependence on the conventional forms of energy, about 32% of the total primary energy use in the country is still derived from biomass and more than 70% of the country's population depends upon it for its energy needs.

India produces a huge quantity of biomass material in its agricultural, agro-industrial and forestry operations. According to some estimates, over 500 million tonnes of agricultural and agro-industrial residue alone is generated every year. This quantity, in terms of heat content, is equivalent to about 175 million tonnes of oil. A portion of these materials is used for fodder and fuel in the rural economy. However, studies have indicated that at least 150-200 million tonnes of this biomass material does not find much productive use, and can be made available for alternative uses at an economical cost. These materials include a variety of husks and straws. This quantity of biomass is sufficient to generate 15 000-25 000 MW of electrical power at typically prevalent plant

Geothermal:

Geothermal energy is the natural heat of the earth. Earth's interior heat originated from its fiery consolidation of dust and gas over 4 billion years ago. From the surface down through the crust, the normal temperature gradient - the increase of temperature with the increase of depth - in the Earth's crust is 17 ℃ -- 30 ℃ per kilometer of depth. Currently, hydrothermal energy is being commercially used for electricity generation and for meeting thermal energy requirements. The world's geothermal electricity generation capacity was 8000MW. .

In India, exploration and study of geothermal fields started by GSI (Geological Survey of India) it has identified 350 geothermal energy locations in the country. The most promising of these is in Puga valley of Ladakh. The estimated potential for geothermal energy in India is about 10000 MW.

Wind Energy:

Wind results from air in motion. Air in motion arises from a pressure gradient. It has been estimated that 2% of the solar radiation falling on the face of the earth is converted to KE in the atmosphere and 30% of the KE occurs in the lowest 1000 m elevation. The energy available in the wind over the earth surface is 1.6 x 107 MW which is of the order of magnitude of present energy consumption on the earth. In India air speed values lies between 05-20 km/hr. Wind speed increase with height. They are measured at standard height of 10m where they are found to be 20-25% greater than close to the ground surface.

Nuclear energy:

Nuclear power is the fourth-largest source of electricity in india after thermal, hydro and renewable sources of electricity. As of 2012, India has 20 nuclear reactors in operate ion in six , generating 4,780 MW.[1] While seven other reactors are under construction and are expected to generate an additional 5,300 MW. In October 2010, India drew up "an ambitious plan to reach a nuclear power capacity of 63,000 MW in 2032.

Bio – Diesel:

Bio diesel is a vegetable oil processed to resemble diesel fuel .Plant and

animal oil generally considered substitute for diesel fuels are composed mainly of triglycerides which are branched molecules having approximately three times the molecular weight of typical diesel fuel components. Bio diesel is Environment friendly,. Clean burning,. Renewable fuel No Engine modification required.. Increases engine life and Easy to handle and store .Raw Materials for Bio diesel are 1. Rape seed – the major source > 80% 2. Sunflower oil 3. Soybean 4. Palm oil 5. Lin seed –oil 6. Cotton seed oil 7. Non edible oils – Jatropha and Pongamia

The following table gives the regional wise consumption of energy

Regional energy use (kWh/capita & TWh) and growth 1990–2008 (%)									
	kWh/capita			**Population (million)**			**Energy use (1,000 TWh)**		
	1990	**2008**	**Growth**	**1990**	**2008**	**Growth**	**1990**	**2008**	**Growth**
USA	**89,021**	**87,216**	**– 2%**	**250**	**305**	**22%**	**22.3**	**26.6**	**20%**
EU-27	**40,240**	**40,821**	**1%**	**473**	**499**	**5%**	**19.0**	**20.4**	**7%**
Middle East	**19,422**	**34,774**	**79%**	**132**	**199**	**51%**	**2.6**	**6.9**	**170%**
China	**8,839**	**18,608**	**111%**	**1,141**	**1,333**	**17%**	**10.1**	**24.8**	**146%**
Latin America	**11,281**	**14,421**	**28%**	**355**	**462**	**30%**	**4.0**	**6.7**	**66%**
Africa	**7,094**	**7,792**	**10%**	**634**	**984**	**55%**	**4.5**	**7.7**	**70%**
India	**4,419**	**6,280**	**42%**	**850**	**1,140**	**34%**	**3.8**	**7.2**	**91%**
Others*	**25,217**	**23,871**		**1,430**	**1,766**	**23%**	**36.1**	**42.2**	**17%**
The World	**19,422**	**21,283**	**10%**	**5,265**	**6,688**	**27%**	**102.3**	**142.3**	**39%**

Source: IEA/OECD, Population OECD/World Bank

- Energy use = kWh/capita (population) = 1000 TWh

Energy use during 1990 to 2000 increases by an amount of 15000 TWh, whereas between 2000 and 2010 increase observed is approximately 30000TWh. Clearly it indicates the consumption is almost doubled. Energy use consumption increases abruptly in the middle east, china, India followed by Africa and Latin America. At the same period USA, and EU countries maintained constant increment of below 20%. Hence it is advisable for the developing countries to use the renewable sources of energy for their needs .

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Problems and Prospects of Solar Energy Equipment

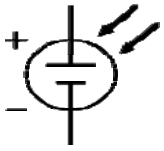
K. Elizabeth Rani

Abstract

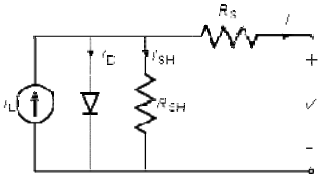
Energy can be defined as the ability to perform work, to bring about movement against resistance. Energy is a static concept, it does not have time dimension. Although various forms of energy are quite different, they are all manifestations of the same concept. One of the way it is possible to convert solar energy to electrical energy.

Introduction:

The PV(Photovoltaic) effect was discovered in 1939 by French physicist Antoine Henri Becquerel and Bell Laboratories produced first silicon solar cell in 1954. This cells was made by the planar junction single crystal silicon type.

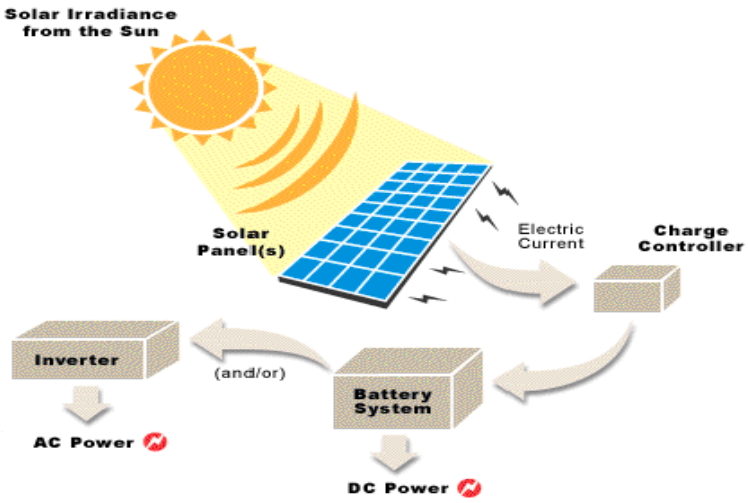


Solar cell



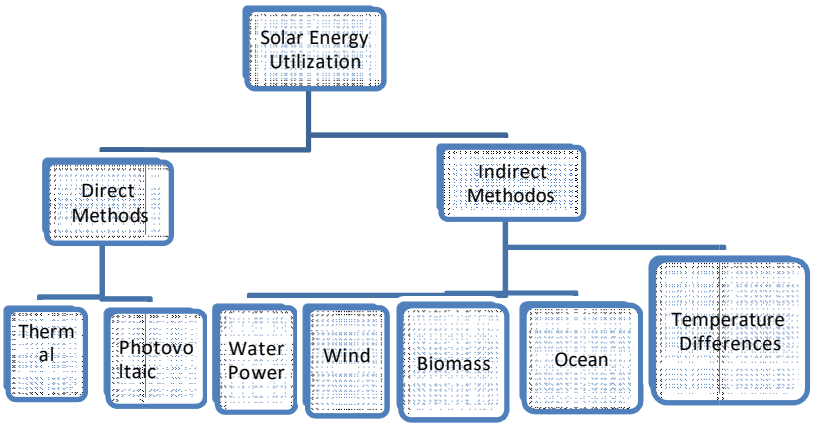
Solar cell equivalent circuit

Solar cell converts sun light into direct electricity without utilizing a chemical process, but electrochemical cells produce electricity without sun light by chemical conversion one substance into another. The amount of solar energy just outside the earth's atmosphere is about 1.4 KW/ m^2. Bright sun light on a cloudless day on earth surface contains 1.0KW/ m^2, of course some arid and desert areas receive more, but 10 to 20% added from sun light reflected and scattered by upper atmosphere.



Classification:

A broad classification of the various methods of solar energy utilization is given below. Solar energy can be used directly or indirectly. Thus today, every country draws its energy needs from various sources, which are categorized to commercial and non commercial. The commercial sources include the fossil fuels (coal, oil and natural gas), hydroelectric and nuclear power, while the noncommercial sources include wood, cow dung and agriculture waste. Solar energy is a very large, inexhaustible source of energy, it is environmental clean source of energy and available in adequate quantities in almost all parts of the world.



Characteristics:

A solar cell array is an arrangement of solar cells electrically connected into circuits that have appearance of rows and columns. Solar cell arrays are also known as solar battery, to distinguish clearly between solar cells of photovoltaic type other battery cells of the galvanic or electrochemical cells.

Solar cells available in square, rectangle shape. The sizes varies from minimum 2x1 cm, 2x2 cm, 2x4 cm, 2x6 cm and maximum 10 x10 cm have been made experimentally. Different type cells are available like Si cell, GaAs, GaA1AS, and CdS.

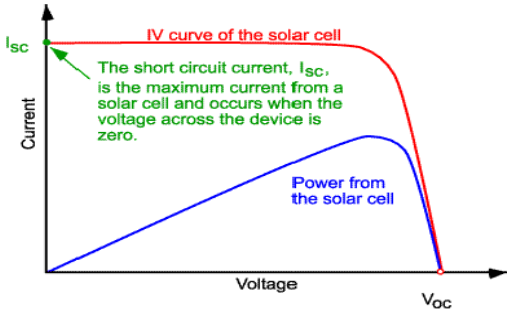


Fig: Cell characteristics in sun light

The conversion efficiency of photovoltaic cell is defined as

$$5\ (\%) = \frac{\text{Electrical Power Output}}{\text{Solar power impinging the cell}} \times 100$$

In actual use solar cells convert between 5% to 20% of incident solar energy into electrical energy, depending upon the specific solar cell construction and prevailing operating conditions.

The power produced by a solar cell is the result of its voltage and current. There is a simple equation that acts as the basic indicator of a solar module's performance:

Power (P) = current (I) x voltage (V)

P = IV

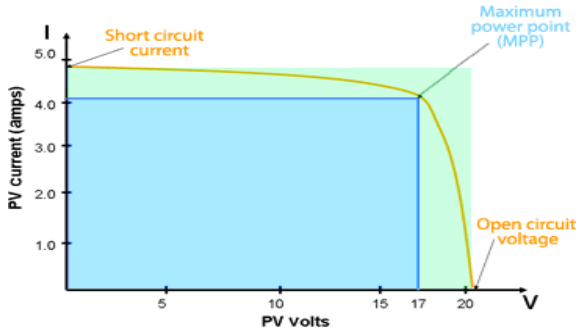
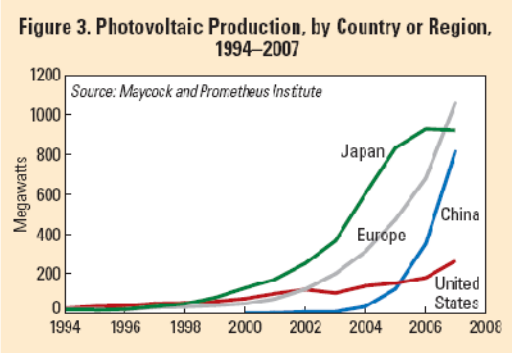


Fig: solar cell in sun light maximum power point.

A typical characteristic of a solar cell also influences its efficiency. The maximum useful power is the area of the largest rectangle that can be formed under the I-V curve, power is Vmax Imax. Typical values for Silicon cell Voc =450mv to 600mv, Isc =30 to 50mA/cm



and Fill factor= 0.65 to 0. 85. PV technology is now spreading into terrestrial applications ranging from powering remote villages around the world to feeding the power grids.

Prospects:

Energy from the sun is renewable, its keeps on coming. Solar cell typical life period is minimum 20 to 25 years. Once installed the power is free except for capital expenses. It is better compared to burning fossil fuels. It delivers clean energy without harming the earth environment. It can be extended to domestic, street lighting, thermal systems, wind electric generators, road, railway traffic signals, agriculture and horticulture, architecture and urban planning and industrial applications. Solar panels are low maintenance. It can be installed anywhere like roof top or open areas. We can save power of electricity. It does not have to be dug up from the ground like coal, oil natural gas or uranium. It produces no carbon dioxide or harmful gases.

Problems:

Listed few major roadblocks related to cost, pollution, location and reliability. It works when sun is shining. Initial cost of the equipment is extensively expensive, this is the major disadvantage. Solar cells are not completely efficient yet, its efficiency like 40%. The remaining 60% will be wasted (radiated). Solar panels are not being mass product, because of process difficulties and shortage in materials. Reliability is less because solar panels not effective during night. Current device which utilize solar energy are expensive like solar cars, cookers, thermal heaters etc.

Conclusion:

Solar energy will not be harmful byproducts or threat to the environment.

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Clean Coal Technologies With A Focus On Carbon Sequestration An Unique And Novel Concept In Evolving Into Green Carbon Arena

***SK Chand basha**
****T.Sambasiva rao**

Abstract

Coal is an extremely important fuel and will remain so. Some 23% of primary energy needs are met by coal and 39% of electricity is generated from coal. About 70% of world steel production depends on coal feedstock. Coal is the world's most abundant and widely distributed fossil fuel source. The International Energy Agency (IEA) expects a 43% increase in its use from 2000 to 2020.Burning coal without adding to global carbon dioxide levels is a major technological challenge which is being addressed. The most promising "clean coal" technology involves using the coal to make hydrogen from water, then burying the resultant carbon dioxide by-product and burning the hydrogen. The greatest challenge is bringing the cost of this down sufficiently for "clean coal" to compete with nuclear power on the basis of near-zero emissions for base-load power**.**

Sequestration refers to disposal of liquid carbon dioxide, once captured, into deep geological strata. Different clean coal technologies in practice are Coal cleaning by 'washing' has been standard practice in developed countries for some time. It reduces emissions of ash and sulfur dioxide when the coal is burned. Electrostatic precipitators and fabric filters can remove 99% of the fly ash from the flue gases - these technologies are in widespread use. At last if clean coal" technology is successful at large scale we all are nearer to the concept of green earth.

Key words: Clean coal, technology, Electrostatic precipitators, Fuel gases, Sequestration, Octagonal.

Introduction:

Clean coal technology is a collection of technologies being developed to mitigate the environmental impact of coal energy generation. When coal is used as a fuel source, the gaseous emissions generated by the thermal decomposition of the coal include sulphur dioxide, nitrogen dioxide, carbon dioxide, and other chemical byproducts that vary depending of the type of the coal being used**.**

Coal is an extremely important fuel and will remain so. Some 23% of primary energy needs are met by coal and 39% of electricity is generated from coal. About 70% of world steel production depends on coal feedstock. Coal is the world's most abundant and widely distributed fossil fuel source.

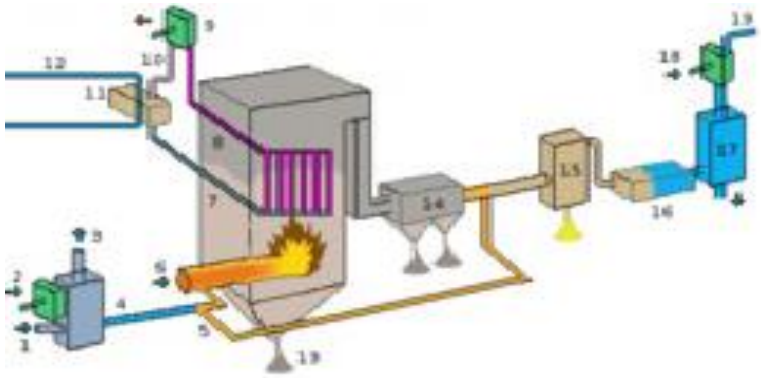
The International Energy Agency (IEA) expects a 43% increase in its use from 2000 to 2020. The world's first "clean coal" power plant went on-line in September 2008 in

Spremberg, Germany. The plant is owned by the Swedish company Vattenfall and has been built by the German firm Siemens. The plant is called Schwarze Pumped power station.

The facility captures CO_2 and acid rain producing sulfides, separates them, and compresses the CO_2 into a liquid. Plans are to inject the CO_2 into depleted natural gas fields or other geological formations. This technology is considered not to be a final solution for CO_2 reduction in the atmosphere, but provides an achievable solution in the near term while more desirable alternative solutions to power generation can be made economically practical.

Clean coal technology usually addresses atmospheric problems resulting from burning coal. Historically, the primary focus was on sulfur dioxide and particulates, since it is the most important gas in the causation of acid rain.

More recent focus has been on carbon dioxide (due to its impact on global warming) as well as other pollutants. Concerns exist regarding the economic viability of these technologies and the timeframe of delivery, potentially high hidden economic costs in terms of social and environmental damage, and the costs and viability of disposing of removed carbon and other toxic matter.



- Coal is a vital fuel in most parts of the world.
- Burning coal without adding to global carbon dioxide levels is a major technological challenge which is being addressed.
- The most promising "clean coal" technology involves using the coal to make hydrogen from water, then burying the resultant carbon dioxide by-product and burning the hydrogen.
- The greatest challenge is bringing the cost of this down sufficiently for "clean coal" to compete with nuclear power on the basis of near-zero emissions for base-load power**.**
- Sequestration refers to disposal of liquid carbon dioxide, once captured, into deep geological strata.

Different clean coal technologies in practice:

Burning coal, such as for power generation, gives rise to a variety of wastes which must be controlled or at least accounted for. So-called "clean coal" technologies are a variety of evolving responses to late 20th century environmental concerns, including that of global warming due to carbon dioxide releases to the atmosphere.

- Coal cleaning by 'washing' has been standard practice in developed countries for some time. It reduces emissions of ash and sulfur dioxide when the coal is burned.
- Electrostatic precipitators and fabric filters can remove 99% of the fly ash from the flue gases - these technologies are in widespread use.
- Flue gas desulfurization reduces the output of sulfur dioxide to the atmosphere by up to 97%, the task depending on the level of sulfur in the coal and the extent of the reduction. It is widely used where needed in developed countries.
- Low-NOx burners allow coal-fired plants to reduce nitrogen oxide emissions by up to 40%. Coupled with re-burning techniques NOx can be reduced 70% and selective catalytic reduction can clean up 90% of NOx emissions.
- Advanced technologies such as Integrated Gasification Combined Cycle (IGCC) and Pressurized Fluidised Bed Combustion (PFBC) enable higher thermal efficiencies still - up to 50% in the future.
- Gasification, including underground coal gasification (UCG) in situ, uses steam and oxygen to turn the coal into carbon monoxide and hydrogen.

Extended concept pertaining to green arena at our national level:

India's National Action Plan on Climate Change (A move towards sustainable development)

Under the crown of sustainable development our nation initiates key policy measures towards the said goal by framing National action plan on climate change-NAPCC

- **National Solar Mission**: The NAPCC aims to promote the development and use of solar energy for power generation and other uses with the ultimate objective of making solar competitive with fossil-based energy options.
- **National Mission for Enhanced Energy Efficiency**: Current initiatives are expected to yield savings of 10,000 MW by 2012. Building on the Energy Conservation Act 2001,
- **National Mission on Sustainable Habitat**: To promote energy efficiency as a core component of urban planning,

- **National Water Mission:** With water scarcity projected to worsen as a result of climate change, the plan sets a goal of a 20% improvement in water use efficiency through pricing and other measures.
- **National Mission for Sustaining the Himalayan Ecosystem**: The plan aims to conserve biodiversity, forest cover, and other ecological values in the Himalayan region, where glaciers that are a major source of India's water supply are projected to recede as a result of global warming.
- **National Mission for a "Green India":** Goals include the afforestation of 6 million hectares of degraded forest lands and expanding forest cover from 23% to 33% of India's territory.
- **National Mission for Sustainable Agriculture:** The plan aims to support climate adaptation in agriculture through the development of climate-resilient crops, expansion of weather insurance mechanisms, and agricultural practices.
- **National Mission on Strategic Knowledge for Climate Change:** To gain a better understanding of climate science, impacts and challenges, the plan envisions a new Climate Science Research Fund, improved climate modeling, and increased international collaboration. It also encourage private sector initiatives to develop adaptation and mitigation technologies through venture capital funds.

"**Finally our nation equipped with octagonal strategy towards our Cherished ambition of climate change"**

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Women And Renewable Energy

Dr. Mrs. K. Rani

Abstract

The whole world is concerned about global warming and climate change which could be contained by the use of renewable energy. We would be talking here about the technology and their importance for women, how they could help in mitigating global warming. Also how they can use them not only to reduce drudgery but also to earn steady income through the use of bio-gas, solar devices, improved chulhas etc.

Renewable energy is energy which comes from natural sources such as sunlight, wind, rain, tides, geothermal heat etc. These sources are renewable and naturally replenished. Way back in 80's the first world conference on Environment held at Nairobi was attended by the only head of state Late Mrs. Indira Gandhi. On her return realizing the importance of the use of Renewal energy, the renewable energy programs were pushed through a Dept. of the Ministry of Power, presently MNRE (Ministry of new and renewable energy).

Key words: degradation, drudgery, biogas slurry, anaerobic digesters, proactive,

Introduction:

Renewable energy is critical to our fight against climate change. Experts agree that we need a substantial reduction in Co_2 over the next 40 to 50 years and this means we need renewable energy to replace fossil fuel now.

Climate change: Climate change is a change in the statistical distribution of weather over periods of time that range from decades to millions of years. It can be a change in the average weather or a change in the distribution of weather events around an average (for example, greater or fewer extreme weather events). Climate change may be limited to a specific region, or may occur across the whole Earth.

Global Warming: It is the increase in the average temperature of Earth's near-surface air and oceans since the mid-20th century and its projected continuation. Most of the observed temperature increase since the middle of the 20th century has been caused by increasing concentrations of greenhouse gases, which result from human activity such as the burning of fossil fuel and deforestation.

Significantly decentralized RETS can complement and benefit from the goal of increasing women's role in development. As India celebrates the 66 years of Independence a third of our population lives without electricity and an additional one third face power cuts.

According to the findings at the World Renewable Energy Congress (at Florence Italy), Women are the group most affected by energy scarcity and related environmental degradation, economically in times spent on subsistence activities and in negative health impacts.

Renewables hold great potential for improved quality of life for women because they ease the time and human energy needed to meet daily needs while helping to improve indoor air quality. Women's role in energy is so important that we need women to be involved in research related to RETS and their awareness among rural folk. These programmes should be taken on a mission basis so that we can leave a better world for the children of the future. People generally have a notion that renewable energy is very expensive.

The fact is that prices of various RETS devices are coming down. Even technologies aimed specifically at reducing women's drudgery, have often not had the desired effect because women lag other resources needed to benefit from these technologies such as credit or because intervention did not take account of the realities of the cultural or economic environment.

There is a stereo type that women are not technologists and that they are not capable (even when provided with appropriate support) of building, operating and maintaining sophisticated technologies. While women do experience a number of constraints in their involvement of technology. The reality is that women's role in technology has been largely overlooked. First, women's indigenous technology innovations, often highly sophisticated, have not been considered as real "science". Evidence shows that supporting women's own innovation abilities could be a rich source of improving renewable energy technologies, while at the same time increasing women's own capabilities and confidence. This mindset has to be changed and potential of women is to be taken in to consideration. The programs need to be prepared accordingly.

How and why Renewable Energy is Important for Women?

It is the women who suffer the most because of lack of energy. Women already have a track record of functioning as effective entrepreneurs. The rural energy department of All India Women's Conference (AIWC), INFORSE (International Network For Sustainable Energy) all are striving to bring women and energy into the main stream.

The various domestic technologies available in India which directly benefit Women, amongst others are:

1. Biogas
2. Solar thermal devices: Box type solar cookers, parabolic cookers and solar storage cookers and Solar water heater and Purifier
3. Vermi Composting and nursery raising using biogas slurry,
4. Solar PV systems- solar lanterns, charging station, Home light systems etc.

Biogas:

Biogas is a methane rich flammable gas that results from the decomposition of organic waste material. This is of great use for the farmers. Women can use bio-gas not only for cooking and lighting but can have regular income by vermi-composting of bio-gas slurry. This slurry is good manure for their kitchen gardens and farms. Bio-gas is also reducing the drudgery of collecting fuel apart from providing a clean kitchen.

Biogas comes from:

1. Vegetation - When vegetation decomposes, it gives off methane gas.
2. Farm and ranch animals - cattle, chickens, pigs produce manure. When manure decomposes, it also gives off methane gas.
3. Sewage – The treatment of human waste in anaerobic digesters produces methane.
4. Landfills -- Garbage produces methane as it decomposes.

Solar Energy:

The oldest source of energy to be used on earth! Even today, this is used to dry tons of material – mostly in rural areas. India is a tropical country and has many sunny days. According to estimates, 35 MW of power could be generated from 1 sq km. With such potential, solar is going to be the future. The startup cost is the biggest limitation which has led to the low realization of the potential it has. For solar energy to become one of the front runners, it will require lot of research, cheap technology and low capital.

There are various technologies coming up around the world, which could be up scaled or replicated to use solar energy. Cooking, lighting, water heating and open air drying applications are common now-a-days, using solar energy. There are other applications like solar vehicles, desalination, agriculture, etc. which are coming up. It will take time to catch up because of the high cost involved in it.

Harish Hande – the Managing Director of Selco Solar – a social enterprise in India, which promotes the new energy technology says that the important thing is not so much to deliver energy to the poor but to provide new ways to generate income. His firm has developed a solar powered sewing machine which is being used by large number of women.

All India Women Conference recently started two pilot projects in resettlement colonies in Delhi wherein women are provided Solar lanterns and charging stations have been established. Women bring their lanterns in daytime and get them charged. In the evening they rent them to street vendors and those houses which do not have electricity or face long hours of power cut. This way they not only save money on kerosene but also generate income for themselves and also help in saving environment. Similarly, Solar powered water purifier has been installed which is run by women and the good potable water is sold to the locality at very nominal rates. This generates income and also takes care of community health.

At their Om Shanti Retreat Centre, Brahmakumaris use concentrated parabolic solar cookers in the kitchen where food is cooked for 1000 persons daily. They also run 200 KW solar powered plants which takes care of their lighting requirement during daytime. These are mainly managed by women.

Solar air dryers offer an alternative with zero-energy cost and processes fruits and condiments in clean and hygienic environment. Thus it produces value-added products for national and international markets. The SDM-50 solar drier developed by an NGO (SEED) from Hyderabad was selected after empirical study. These two action research projects were implemented through the branches of AIWC at Kerala, Tamilnadu, Andhra Pradesh and Delhi. The other project was implemented jointly by AIWC and CRT (Centre for Rural Technologies) Nepal. It was successfully proved that using this solar dryer diligently, poor women could earn decent income. This also stops wastage of the produce which are abundant in the season and without proper marketing facilities.

Awareness creation on the various Renewable energy technologies is of paramount importance. MNRE is giving subsidies on various solar technologies but most of the states don't give enough importance to this issue which is a drawback. NGO's had to be more proactive and should try to popularize it through various means. More boys and girls should be trained for installation, operation, maintenance and trouble shooting of all the RET's equipments, which is badly lacking now. AIWC is working in this field.

Biofuel:

Women can generate income through growing seedlings for bio-fuel plants. India has more than 50 million Hectares of wasteland, which could be utilized for cultivating plants. Jatropha, Algae are some of the options for producing bio-fuels. It is a kind of plant which can come up on arid land.

Future in Renewable and the suggested Road map:

The overall demand-supply gap in the energy sector is expanding due to an increase in the population's standard of living. Demand-supply gap in power is currently at 10.3 percent and is one of the key drivers of renewable energy. The utilization of renewable energy sources is still relatively low in India, thus presenting excellent business potential opportunities for R&D.

India plans to double its renewable energy capacity to 55,000 MW by 2017 as part of efforts to increase efficiency of its energy use, Prime Minister Manmohan Singh said in New Delhi during 7th renewable energy India 2013 expo."It is proposed to double the renewable energy capacity in our country from 25000 MW in 2012 to 55000 MW by the year 2017," he said inaugurating the Fourth Clean Energy Ministerial conference.

Experts have come up with bottom-up way instead of waiting for top-down solutions to improve the plight of the poor. There is no need to wait for politicians or utilities to act. The technology in question, from solar panels to low energy Light Emitting Diodes (LEDs) are rapidly falling in price. This could eliminate kerosene lighting in next 10 years the way cell phones took off in about 13 years. This will greatly eliminate the indoor pollution caused by kerosene lighting which affects mostly women and Children. It will help women to have a better quality of life but also bring climate change benefits.

Women's role in energy is so important that we need women to be involved in research related to RETS and their awareness among rural folk. These programmes should be taken on a mission basis so that we can leave a better world for the children of the future.

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Beauty of the Mother Earth – Need to be Preserved

***Sr.Sunila Rani.P**,
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Abstract

Human beings are faced with limited resources and unlimited desires. The world is utilizing resources faster than nature can replace them. According to the world wild life fund, human lives consume 20% %more natural resources than the earth can produce. Biodiversity is shrinking faster than ever and over the past century the extinction of species has reached unprecedented levels. Almost a quarter of the mammals, 1/3rd of amphibians and 12% of bird species are facing extinction. With the advent of science and technology, human needs are multiplying day to day. To fulfill our unending desires, we are exploiting all the resources to the maximum extent. In order to pass on the beauty of the mother earth to our generations we have to come together and save our environment.

Key words: incalculable, indisputable, restrain, intrusions, preserve, Eco-friendly, aesthetics, stake, conserve.

Introduction:

The World we all share is given to us in trust. Every choice we make regarding the Earth, air and water around us should be made with the objective of preserving it for all generations to come.

A World without seals, orchids, cotton grass, whales and rhinoceros would be an incalculable loss to the beauty necessary for meaning and wonder. Besides, the existence of wild animals and plants is basic for assuming environment's ability to function. Many biological species have indisputable cultural significance and symbolic value. Every creation got its own purpose and significance in nature.

People living today not only have to consider their, own well being but also the well being of future generations. The essential interest of coming generations takes priority over the few pressing needs which we have today. Responsibility for future generations requires restrain from those intrusions into environment that would result in the irreversible loss of natural resources and lessen their availability for future generations. There is an old saying, If you don't like where you are going, change directions.

We are at on an important movement of human history. We stood at a very critical and challenging time in relation to the environment. We have to make the right choices in order to preserve the human race from destruction. Today's environment problems are human made. Hence human beings have the solutions to most of them. The Eco-Friendly

technologies and capabilities of human being with regard to environment can increase or decrease environmental degradation. Exploitation of nature was considered inevitable for human survival. Nature has everything for everybody's need, but not enough for one man's greed. Hence we need to avoid exploiting water, energy, minerals and biological resources.

We should think green, adopt green life style and make environment greenery for the upcoming generations to live a comfortable life. Even the microbes have so many beneficial qualities such as production of antibiotics. "Beauty and Aesthetics" are part of human existence and they influence our welfare. Continuous technological development and restoration of environmental balance are not incompatible. We know that our environment is grossly out of balance and our planet earth is at stake.

Renewable energy is people's power, Non-renewable energy is infinite power. The incentive to use 100% renewable energy has been created by global warming and other ecological as well as economic concerns. At present the main energy source used by humans is non-renewable fossil fuels and it is reminding in continual demand. The more we exploit nature the more our options are reduced, until we have only one to fight for survival. Man is in search of ways and means to open new doors to conserve and preserve the energy sources. Technology advances are opening up a huge new market for energy resources.

In all things of the nature there is something of the marvelous says- Aristotle,

"Let's keep this marvelous gift of natures and preserve its beauty for the future generations".

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An overview on Renewable Energy Harvesting and Energy Conservation

G. Bhagavannarayana*

Abstract

The article is focused on energy for efficient generation, conservation and auditing is the need of the day as the Energy is playing a key role in the modern society. In the recent decades, several important technologies like microelectronics, optoelectronics, communication, computers, photonics, lasers, information science, biochemistry, genetical engineering etc. have been reached the horizons. Though, all these technologies that involves gadgets like computers, A/Cs, TVs, cars, Mobile phones, modern medical equipments like MRI CAT Scanners etc, which changed the life style of mankind to a large extent, need considerable energy for their production as well as for their utilization. Our conventional resources of energy like diesel, petrol, coal etc. are going to be exhausted soon. Though the average per capita consumption of an Indian is less than 5% of an American, we are facing lot of power cuts leading to heavy reduction and loss in agriculture products, closing of many factories and in turn leading to unemployment in the country, particularly in the rural India. The estimates say in another 20 years we will be in a need of 400 TW power which is more than three orders lesser than the present total installed capacity of power in India i.e. ~ 0.242 TW, though it is world's fifth largest. Non Renewable Power Plants constitute 88.55% and renewable power consists of only 12.45%.

The development of conventional mega plants like thermal power plants, hydroelectric plants and nuclear power plants networked with widespread establishment of power grids is either at the saturation stage or suffering from limited or harmful raw/waste materials. Though most of our present power requirements are based on these plants, these are not wireless autonomous and posing problems in using such power at remote/rural areas and for gadgets that we use while in motion like mobiles. Another serious problem facing by these mega power plants is the transmission loss which is as high as 30%. Therefore, there is a great need of establishing technologies to generate energy by renewable sources and shall be wireless autonomous and environment friendly like hydel /hydro energy, wind energy, geothermal energy, tidal energy, bioenergy, etc., all of which are one way or the other related to solar energy. Production of hydrogen through water and its storage in solid form could be another possible alternative. Various ways of renewable energy generation are discussed with their basic principles along with the feasibility in Indian context.

These methods are mentioned below.

(i) Biofuel development for renewable energy

(ii) Micro hydroelectric power plants

(iii) Geothermal power plants

(iv) Biogas Fuel to generate heat or electricity

(v) The development of wind power

(vi) Power generation through fuel cells

(vii) Micro power generation through Piezoelectric Generators

(viii) Photo electrochemical cell through artificial photosynthesis

(ix) Photovoltaic Solar Power plants using bulk single crystal wafers and thin films and

(i) Quantum dot solar cell power generators

Conservation of energy is as good as generation of energy. There are two important ways through which energy can be conserved using advance technologies. These are:

(i) Energy conservation through advanced Light Emitting Diods (LEDs)

Electric lighting burns up to 25% of the average home energy budget. Approximately 90% of the power consumed by an incandescent light bulb is emitted as heat, rather than as visible light. Light Emitting Diode (LED) and Compact Fluorescent Lights (CFL) bulbs have revolutionized energy-efficient lighting than that of the incandescent bulbs. CFLs are simply miniature versions of full-sized fluorescents. Compared to general-service incandescent lamps giving the same amount of visible light, CFLs use one-fifth to one-third the electric power, and last eight to fifteen times longer. LEDs are small, very efficient solid bulbs. New LED bulbs are grouped in clusters with diffuser lenses which have broadened the applications for LED use in the home. LED technology is advancing rapidly. Initially more expensive than CFLs, LEDs bring more value since they last longer. Also, the price of LED bulbs is going down each year as the manufacturing technology continues to improve.

LEDs are Long-lasting; last up to 10 times as long as compact fluorescents, and far longer than typical incandescent, durable, as they are solid, do not have a filament, cool as they do not heat up and avoid power waste, mercury free, more efficient and use only 2 to 17 watts of electricity ($1/3^{rd}$ to $1/30^{th}$ of incandescent or CFL), cost effective as their cost is reducing year by year and long lasting. They are very much suitable for remote areas with portable generators because of low power requirements.

(ii) **Energy conservation through superconducting materials:**

During power transmission and distribution, one needs step up and step down transformers to minimize the power loss. However, with the conventional transformers with best possible economical windings, the total power loss including the power loss as heat in

conductors is as high as 30%. Superconducting materials in their wire and tape forms can save these heavy losses. One can also use such materials in motors to save the heat losses in their windings.

A glimpse of crystal growth activity and development of advanced solid state white light LEDs and their characterization will be addressed.

NB: Cost is a very important factor to be considered to set up any facility. Solar panels are one of the most important renewable energy generators in the generation of Solar Energy. On an average, 1 Sq. Ft. of Solar Panel generates 10.6 Watts of power which is sufficient to light a CFL bulb. The cost of 1 Sq. Ft. of Solar Panel is approximately Rs. 4,500. Therefore, to light a room you need Rs. 4,500/- which may seems to be quite costly. But this is a capital investment and you need not to pay the monthly bills and no power cuts too.

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Energy Audit-A Tool To Encounter Energy Crisis

Sri A.V.Rao, M.D.

"Energy Audit A tool to encounter Energy Crisis" encompasses the following domains

1) Energy Scenario of the state of A.P
2) Energy Conservation Act.
3) Role of B.E.E/SDA's.
4) Designated Sectors
5) PAT Scheme
6) PAT target for A.P. State
7) Areas of energy Efficiency Improvement
8) Energy Conservation Achievements for A.P .State

Energy Scenario & Energy Conservation Achievements for the State of A.P

- A.P is the third largest energy consumer in India, Consuming about 25.71 MTOE which is equivalent to 10.40% of the total energy consumption of India
- Coal is the major contributor in the energy consumption of the state and is equivalent to 65.5% of the total energy consumption.
- As per the survey conducted by GSI, A.P is having coal reserves of 16.926 Billion Tonnes as on 1.1.2005 which is equivalent to 6.83% of the total coal reserves in India.
- Agricultural sector is one of the major contributors for the consumption of electricity i.e. about 30% of the total electricity consumed in the state.
- Next biggest consumers of electricity are the Domestic Sector at 22% and Industrial Sector at 38% .

Energy Conservation Achievements in A.P. State:

Energy Conservation activities carried out by the following nine organizations who got energy conservation awards for their efforts in 2010-11 at National Level are:

- The Andhra Pradesh Paper Mills Ltd. have replaced high pressure steam ejector with medium pressure steam ejector, Modification of waste paper plant chest agitator, Installation of heat exchanger in coal fired boiler#4, rising of de-aerated water temp.

of CF fired boilers 1 to 5 etc., The unit has achieved an annual energy savings of 11.91 Mu, cost savings of Rs 85.7 lakhs with an investment of Rs 10 lakhs

- Nagarjuna Fertilizers and Chemicals Ltd. have installed VFDs for raw water pumps, stopped Ammonia-II pre-desulphurization section etc., and achieved an annual energy savings of 24.9 Mu, cost savings of Rs 119 lakhs with an investment of 5.3 lakhs.

- Mahindra & Mahindra Ltd., Zaheerabad unit have installed VFDs for circulation fans and pumps (Savings-23.44 Lakhs KWH) ,Installed LPG flux savers in ovens (Savings-63.75 MTOE)-and many other measures and achieved an annual energy savings of 6.9 Mu/annum, cost savings of 129 lakhs per annum with an investment of 56.45 lakhs.

- GMR Hyderabad International Airport Ltd.,
  Replacement of the existing condenser water pumps with suitable capacity pumps (annual savings-1.31 lakhs KWH) , For air conditioning system –cooling tower cast aluminum blades replaced with FRP blades (the annual savings -1.39 lakhs KWH)

- KCP Sugar and INDUSTRIES Corp. Ltd., Lakshmipuram.
  Replacement of star Delta starters with VFD's for several pumps.(Annual savings-0.64 lakhs KWH) Diversion of batch PAN Condensate to continuous pan condensate. (Annual savings -0.418 lakhs KWH)

- Andhra Sugars Ltd., Saggonda.
  Replacement of 7 No's of VFD's, On/Off controls to 5 No's of cooling Towers, Inter connection of pumps, Replacement of old N966WX Membranes with High performance N982WX Membranes Replacement of Denora Electrolysers with VB UHDE Cells, Recoating of elements in No2 Cell Hall etc., By these measures the unit has saved 222 Lakh KWH, Worth 7.77 crores.

Apart from these select award winning companies many other industries/plants/buildings in A.P have adopted conservation measures and the savings thus accrued to the nation are listed below:

Sl No.	Name of industry/plant/building	Energy Savings (KWH)
1	Commercial buildings about 70,500consumers	139653450
2	Distribution of CFL's under BLY programme	121484403
3	Nedcap promoting use of CFL's T-5, T-8 Systems	266490000
4	Coromandel International Vizag	11430000
5	Ultratech Ltd. Tadipatri	89071647
6	KCP Cements Macherla	6411600
7	VMC Municipality Vijayawada	4085000
8	Sagar Cements	54534628
9	NFCL Kakinada	24917470
10	Reliance Infrastructure Ltd Samarlkota	10540344
11	Rashtriya Ispat Nigam :Ltd Visakhapatnam,	617424651
12	Solar Water Heating Systems 3.5 Lakh Lpd	42000000
13	NCL India	17041814
14	TTD Tirupati	1787040

By adopting energy conservation and efficiency measures, through Energy Audits there is wide scope to reduce about 20% and more of the total electrical energy consumed as well as saving of fossil fuels such as Diesel, LDO,LSHS, F.O, and Coal Etc., in the various Industries, Organizations Plants Govt.& Commercial Buildings Etc., There is no doubt that in the future times to come Energy Audit will be the only tool to encounter energy crisis considering the vast potential of savings and avoided high cost Capacity Generation.

Vasu Consultants, The Energy Managers & Energy Auditors, Vijayawada

Centralized Planning of Energy Systems

Dr. Mrs. I. Annapurna

Abstract

The United Nations need to monopolize seismic data systems allotment of resources, planning and scaling of production of Energy resources for the whole world. Coming to the individual Nations while planning the needs of the total nation should be taken into consideration, no companies or states or part of the institutions were given powers to handle individually. The action should be taken only from national plans of national authorities. All the Governments of the nations should take first priority to the efficient production systems and research for conservative methods both Scientific and Statistical.

We all know the Earth Sensing Satellites belongs to many nations including ours already mapped the whole globe for all the beneath earth resources through Infra-Red, Magnetic resonance, Micro wave and Earth wave radars.

Key words: resonance, foliage, gadgets, conservatively, pruned, vagaries, altitudes, centralized,

Introduction:

There are a number of forms of Energy on and around earth, but today's our discussion is confined to electrical energy, fossil fuels i.e. petroleum etc, fire wood, garbage waste, and foliage waste. Conservation means we have to plan and implement the energy sector both in terms of production, transportation and consumption. In terms of Global scenario in majority countries both electricity, and petroleum industry left to the "whip and will" of private multinational companies. Naturally the private companies' motive is profits and luxury. They don't care the difficulties of the consumers and play all selfish tricks in planning, production and marketing of these products. When we discuss product by product we can evaluate the pros and cons exhibited by the proprietary institutions of energy. Let us first discuss about Global petroleum scenario.

Petroleum – Global Scenario:

The major petroleum wealth is deposited in and around Persian Gulf, Arabian Desert, Venezuela, Mexico, Parts of US, Alaska, British North Sea, Russian Siberia, In and around Black Sea, Georgia, Indonesia etc. Places in India it is in Thar Desert (Rajasthan), Assam, Bombay high, Cauvery, Krishna-Godavari, Mahanadi River basins, both off coast

and on coast. Since 1963-64 the first Israel & Palestine war when petroleum price rose from 4 ½ dollars a barrel to 12 dollars at a time, this product attracted the brains of all the Economists & Administrators on the earth about its reserves available on the Globe and its production, marketing and pricing etc.

Always its estimates were shown that the total reserves will extinct at the present rate use, of course this time scale is extended from time to time, sometimes it seems that it is a strategy by the Multinational companies to en-cash the needs and fears of consumers by threatening them. Though anything is not unlimited everything should be i.e every useful resource should be utilized conservatively.

Natural Energy Resources:

The only energy unlimited is Sun light, Wind energy and Ocean currents. As long as the sun shines in the sky these type of energies will stay forever and unlimited. The only thing man has to do is to invent viable techniques of harnessing these energies. But, at present the rate of efficiency available is not efficient and enough to the ratio of investments and profits.

Energy Sources:

At present the gadgets which consume petroleum products are not up to the mark. Day to day the researchers are improving the designs as more and more fuel efficient. Next the most important form of energy is electricity. This resource is not available directly in the nature as it is. It is a form of an energy invented to transmit to any place and to use in many types of gadgets conveniently. It is a transformed form of energy from sun light, wind energy and all other natural mechanical resources, all varieties of fuels, the petroleum, coal, wood, foliage and garbage.

Agricultural & Natural Resources:

Our agricultural system can produce millions of tones of dry and waste pruned leaves and bio-mass which can be used to produce electricity of millions of kilo-watts. Ex: Coconut and Oil palm leaves. While planning the energy needs and production the whole country has to be taken as a single unit. The main principle should be to produce highest energy with highest efficiency with available resources. Agricultural produce must also be planned in the same way with respect to water use and green production. Industry may be concentrated where wetting of lands are not possible with river water, But the

governments are not pro-active for production sectors rather than consumers sectors. The subsidies which were given to consumers sectors, if given to production sectors there will be no scarcity of energy or goods and the price rise and inflation can control itself.

Conclusion:

It is a known fact and identified by all the economic experts that the vehicle usage and purchase are becoming quite extravagant in our nation. To be very specific it is by middle class and working class. Instead of using individual vehicles if the middle class and working class uses a mass transport system we can conserve lots of petroleum products i.e more than 50% even. The electrical gadgets like fans and AC's in winter season, electrical lights in the naturally illuminated rooms becoming a fashion day by day became a mass mania , the use of micro wave ovens, induction stoves,24 hours running water heating systems can be avoided to a greater extent.

Unfortunately Government has left deaf ears for such problems. They are simply interested in the sales of these goods. And there are a lot number of vagaries in the electrical production contracts with private companies.

For higher cost of production –

a) The Government electric companies,

b) The Government turbine manufacturing companies

Which are literally discouraged to increase their production capacities and abilities? If the political will run in positive direction the electricity scarcity can easily be surpassed for the time being. For this there is real need of cooperation between people and leaders without selfish motives.

The rain water passes from high altitudes into oceans there is a lot of height difference, this high altitude water itself has got lot of static energy which can be converted into Kinetic energy and which can be converted into electricity, if utilized under a centrally powered in single governing body for the whole nation. The hydro electric projects and irrigation projects can be streamlined and constructed to give highest efficiency for every drop of water available at higher altitudes i.e the water and electricity systems must be brought under Centralized administration throughout the country and state powers must be scissor out for these products.

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Social Forestry As A People's Participatory Inclusive Strategy In Expanding The Horizons Of Green Cover

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Abstract

While the ever increasing Human population and Hyper Industrialization encroaching onto the Nature's core called the Forest, The time has come for a mass based forestry programme which aids in increasing the green cover, At this juncture the paper brings Social forestry as an effective green strategy to balance the Nature's principles. Social forestry means the management and protection of forests and afforestation on barren lands with the purpose of helping in the environmental, social and rural development. The term, social forestry, was first used in India in 1976 by The National Commission on Agriculture, Government of India. It was then that India embarked upon a social forestry project with the aim of taking the pressure off currently existing forests by planting trees on all unused and fallow land. Social forestry scheme can be categorized into groups; farm forestry, community forestry, extension forestry and forestry. The need for a social forestry scheme was felt as India has a dominant rural population that still depends largely on fuel wood and other biomass for their cooking and heating. This demand for fuel wood will not come down but the area under forest will reduce further due to the growing population and increasing human activities. Therefore the government with the help of village panchayats (village council) implemented the Social forestry scheme that enriches inclusive growth and Greenery.

Key words: Social forestry, village panchayats, Inclusive growth.

Introduction:

Social forestry means the management and protection of forests and afforestation on barren lands with the purpose of helping in the environmental, social and rural development. The term, social forestry, was first used in India in 1976 by The National Commission on Agriculture, Government of India. It was then that India embarked upon a social forestry project with the aim of taking the pressure off currently existing forests by planting trees on all unused and fallow land.

Social forestry programme:

Government forest areas that are close to human settlement and have been degraded over the years due to human activities needed to be afforested. Trees were to be planted in and around agricultural fields. Plantation of trees along railway lines and roadsides, and river and canal banks were carried out. They were planted in village common land, government wasteland, and Panchayats land.

Involvement of common people:

Social forestry also aims at raising plantations by the common man so as to meet the growing demand for timber, fuel wood, fodder, etc., thereby reducing the pressure on the traditional forest area. This concept of village forests to meet the needs of the rural people is not new. It has existed through the centuries all over the country but it was now given a new character.

With the introduction of this scheme the government formally recognised the local communities' rights to forest resources, and is now encouraging rural participation in the management of natural resources. Through the social forestry scheme, the government has involved community participation, as part of a drive towards afforestation, and rehabilitating the degraded forest and common lands.

Need of social forestry:

This need for a social forestry scheme was felt as India has a dominant rural population that still depends largely on fuel wood and other biomass for their cooking and heating. This demand for fuel wood will not come down but the area under forest will reduce further due to the growing population and increasing human activities. Yet the government managed the projects for five years then gave them over to the village panchayats (village council) to manage for themselves and generate products or revenue as they saw fit.

Types:

Social forestry scheme can be categorized into groups: farm forestry, community forestry, extension forestry and agro forestry.

Farm forestry:

At present in almost all the countries where social forestry programmes have been taken up, both commercial and non commercial farm forestry is being promoted in one form or the other. Individual farmers are being encouraged to plant trees on their own farmland to meet the domestic needs of the family. In many areas this tradition of growing trees on the farmland already exists. Non-commercial farm forestry is the main thrust of most of the social forestry projects in the country today. It is not always necessary that the farmer grows trees for fuel wood, but very often they are interested in growing trees without any economic motive. They may want it to provide shade for the agricultural crops; as wind shelters; soil conservation or to use wasteland. Farm Forestry is another name for Agroforestry; a part of Social Forestry.

Community forestry:

Another scheme taken up under the social forestry programme, is the raising of trees on community land and not on private land as in farm forestry. All these programmes aim to provide for the entire community and not for any individual. The government has the responsibility of providing seedlings, fertilizer but the community has to take responsibility of protecting the trees. Some communities manage the plantations sensibly and in a sustainable manner so that the village continues to benefit. Some others took advantage and sold the timber for a short-term individual profit. Common land being everyone's land is very easy to exploit. Over the last 20 years, large-scale planting of Eucalyptus, as a fast growing exotic, has occurred in India, making it a part of the drive to reforest the subcontinent, and create an adequate supply of timber for rural communities under the augur of 'social forestry'.

Extension forestry:

Planting of trees on the sides of roads, canals and railways, along with planting on wastelands is known as 'extension' forestry, increasing the boundaries of forests. Under this project there has been creation of wood lots in the village common lands, government wastelands and Panchayat lands.Schemes for afforesting the degraded government forests that are close to villages are being carried out all over the country.

Agro forestry:

In agro forestry, silvicultural practices are combined with agricultural crops like leguminous crop, along with orchard farming and live stock ranching on the same piece of land. In lay man language agro forestry could be understood as growing of forest tree along with agriculture crop on the same piece of land. In a more scientific way agro forestry may be defined as a sustainable land use system that maintains or increases the total yield by

combing food crop together with forest tree and live stock ranching on the same unit of land, using management practices that takes care of the social and culture characteristic of the local people and the economic and ecological condition of the local area.

Objectives of social forestry and environment wing

Social forestry, schemes that have been started all over the country have made a considerable difference in overall forest cover in a short time. Afforestation outside the conventional forest area for the benefit of rural and urban communities.

The main objective is to:-

1. Improve the environment for protecting agriculture from adverse climatic factors,
2. Increase the supply of wood fuel for domestic use, small timber for rural housing, fodder for livestock, and minor forest produce for local industries,
3. Increase the natural beauty of the landscape; create recreational forests for the benefit of rural and urban population,
4. Provide jobs for unskilled workers and
5. Land rehabilitation
6. Finally, its object is to raise the standard of living and quality of life of the rural and the urban people.

Mission:

- To carry out a need based and time bound programme of afforestation with special emphasis on fuel wood and fodder development on all degraded and denuded lands/forests.
- Afforestation of abandoned jhum lands and mined areas.
- Linear strip plantation of fast growing species on sides of public roads, rivers, streams and irrigation canals.

- Afforestation on unutilized lands under State/Corporate, institutional or private ownership.
- Green belts in urban/industrial areas.

Joint Forest Management often abbreviated as **JFM** is the official and popular term in India for partnerships in forest management involving both the state forest departments and local communities. The policies and objectives of Joint Forest Management are detailed in the Indian comprehensive National Forest Policy of 1988 and the Joint Forest Management Guidelines of 1990 of the Government of India.

Although schemes vary from state to state and are known by different names in different Indian languages, usually a village committee known as the Forest Protection Committee (FPC) and the Forest Department enter into a JFM agreement. Villagers agree to assist in the safeguarding of forest resources through protection from fire, grazing, and illegal harvesting in exchange for which they receive non-timber forest products and a share of the revenue from the sale of timber products.

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Renewable Energy Resource Management – Production of Oil from Algae

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Abstract

The use of fossil fuels as energy is now widely accepted as unsustainable due to depleting resources and also due to the accumulation of greenhouse gases in the environment. Renewable and carbon neutral biofuels are necessary for environmental and economic sustainability. Microalgae appear to be the only source of renewable energy that is capable of meeting the global demand for transport fuels. Like plants, microalgae use sunlight to produce oils but they do so more efficiently than crop plants. The aim of the present study is to evaluate the feasibility of the water bodies of Eluru city to produce algal oil, which can be used as renewable energy. Algal cultures from Thammileru, Godavari River and Composite culture were evaluated for the oil production. The cultures were maintained in an open pond system with regular observation of growth conditions and periodic harvestation. Oils were extracted using solvent extraction method by Soxhlet apparatus. The extracted lipids were quantitatively analyzed by gravimetric method and qualitatively by Specific gravity, Density, Acid value and Iodine Value to assess their use as renewable energy. Higher oil production was observed from the composite culture which is a mixture of Thammileru, and Godavari River. The qualitative analysis of extracted lipids proved that micro algal oil is a source of renewable energy.

Key words: viability, macromolecules, lipids, triacylglycerols, diatoms, Soxhlet

Introduction

The use of fossil fuels as energy is now widely accepted as unsustainable due to depleting resources and also due to the accumulation of greenhouse gases in the environment. Renewable and carbon neutral biofuel are necessary for environmental and economic sustainability. Renewable energy demand is constantly increasing as the reservoir of fossil fuel are depleting. Unfortunately Renewable energy produced from oil crop, waste cooking oil and animal fats are not able to replace fossil fuel. The viability of the first generation biofuels production is however questionable because of the conflict with food supply.

Production of biofuel using microalgae biomass appears to be a viable alternative. The oil productivity of many microalgae exceeds the best producing oil crops. Microalgae are photosynthetic microorganisms which convert sunlight, water and CO_2 to sugars, from which macromolecules, such as lipids and triacylglycerols (TAGs) can be obtained. These TAGs are the promising and sustainable feedstock for biofuel production. Micro algal bio refinery approach can be used to reduce the cost of making micro algal biofuel. Micro algal-based carbon sequestration technologies cover the cost of carbon capture and sequestration.

Any biofuel that draws carbon from the atmosphere during the growing of biomass (by photosynthesis) can be rendered carbon negative by returning a portion of the biomass to the soil in more or less permanent form. The most straightforward means of doing so is through production of biochar setting aside a portion of the biomass and, instead of converting it into fuel, reducing it to biochar through pyrolysis. It is a strategic choice how much of the biomass to convert into biofuel and how much into biochar a choice that can be made by farmers and fuel producers.

There are many other options for carbon sequestration as demonstrated by the work currently underway in 'clean coal' technology. Here the approaches associated with 'carbon capture and storage' (CCS) can be applied not to fossil fuels but to biofuels thereby again making them carbon negative. The various geosequestration options being investigated include disposal of carbon dioxide (CO_2) down mineshafts, down oil wells, and in various kinds of geological formations. The irony is that coal technology can never be clean, in the sense of being carbon negative. In fact, it can never even achieve carbon neutrality, since this is a theoretical optimum, which could never be achieved in practice, given that fossil fuels would need to be input at various steps of the value chain. These approaches to carbon sequestration both bio sequestration and geosequestration when applied to biofuels have the potential to draw more carbon from the atmosphere than is emitted through their use as fuel.

In green algae, the light-harvesting complex bound to chlorophyll and carotenoids capture light energy as photons. This energy is used by photosystem II in the catalytic oxidation of water, forming protons, electrons, and molecular O_2.

Review of Literature:

ALGAE (Latin: algae=seaweeds) a natural order of cryptogamic or thallophytic plants, are chlorophyllous (simplest of green plants), nucleated, non vascular thallophytes. They are found for the most part in the sea and fresh water or on the surface of damp walls, rocks, the bark of the trees and similar moist situations. They vary in size from microscopic to macroscopic. They are entirely made of cellular tissue and simple reproductive structures.

Algae for Biofuel:

While a number of bio-feed stocks are currently being experimented for biofuel production, algae have emerged as one of the most promising sources for biofuel production. Though research into algae as a source for biofuel is not new, the current oil crisis and fast

depleting fossil oil reserves have made it more imperative for organizations and countries to invest more time and efforts into research on suitable renewable feedstock such as algae.

- Algae are the fastest growing plants in the world and can be grown year round, unlike seasonal crops.
- Algae farming do not require agricultural land or clean water, so it does not compete with food crops for these resources.
- While it is difficult to compare one energy crop to another, per hectare of farming of algae is around 10 to 100 times more productive than corn, soy, palm or Jatropha,
- Unlike other energy crops, the entire biomass produced from algae can be used in end products.
- Algae also act as a sink for carbon dioxide where about 2.2 tonnes of carbon dioxide is utilized as the carbon source by the algae (oilgae.com).
- Lastly the algae can be used to produce renewable biofuels needed to reduce dependence on non-renewable fuel sources such as coal, oil and natural gas.

Oil Yield from Algae:

Microalgae contain lipids and fatty acids as membrane components, storage products, metabolites and sources of energy. Algal strains, diatoms, and cyanobacteria (categorized collectively as "Microalgae") have been found to contain proportionally high levels of lipids (over 30%). These micro algal strains with high oil or lipid content are of great interest in the search for a sustainable feedstock for the production of biofuel. Algae contain anywhere between 2% and 40% lipids/oils by weight.

Lipid accumulation in algae typically occurs during periods of environmental stress, including growth under nutrient-deficient conditions. Biochemical studies have suggested that acetyl-CoA carboxylase (ACCase), a biotin-containing enzyme that catalyzes an early step in fatty acid biosynthesis, may be involved in the control of this lipid accumulation process. Therefore, it may be possible to enhance lipid production rates by increasing the activity of this enzyme via genetic engineering.

The following species listed are currently being studied for their suitability as a mass-oil producing crop, across various locations worldwide:

- Neochloris oleoabundans - Neochloris oleoabundans is a microalga belonging to the class Chlorophyceae
- Scenedesmus dimorphus - Scenedesmus dimorphus is a unicellular alga in the class Chlorophyceae

- Phaeodactylum tricornutum - Phaeodactylum tricornutum is a diatom etc.

The strains of Algae most favoured by the NREL researchers were Chlorophyceae (green algae). Green algae tend to produce starch, rather than lipids. Green algae have very high growth rates at 30^{o}C and high light in a water solution of type I at 55 mmho/cm.

The other favored algae (by NREL researchers) are Bacilliarophy (diatom algae). However, the diatom algae need silicon in the water to grow, whereas green algae require nitrogen to grow. Under nutrient deficiency the algae produced more oils per weight of algae; however the algae growths also were significantly less. Algae are the most promising renewable source for the production of biofuels. Algae can be used for the production of biodiesel, bioethanol, hydrogen and methane.

Strategies influencing algae growth:

There are some physical and chemical strategies which influence the algae growth

Physical conditions: Some physical conditions which influence the algae growth are Temperature, Light intensity,pH

Chemical conditions: Some chemical factors also influence the algae growth are Nitrogen source, Carbon dioxide, Minor nutrients and vitamins

Experimental Methodology:

Algal samples collected from different waste water bodies were repeatedly washed with distilled water. The cultures were grown in separate tubs with synthetic feed as a source of nutrient medium for their initial growth. The tubs were frequently exposed to sunlight for shorter intervals to undergo photosynthetic process for the production of organic matter by utilizing the atmospheric carbon dioxide. Later the cultures were grown in domestic waste water as the nutrient medium naturally and exposed to sunlight daily in the open atmosphere, and simultaneous p^{H} monitoring was done. The grown algae were harvested periodically. The harvested algae was air dried, powdered and kept for solvent extraction by using Soxhlet apparatus and the extracted solvent was rotovapoured and Derivatized. The oil obtained was analyzed quantitatively by gravimetric method and qualitatively by determining Specific gravity, Density, Acid value and Iodine value.

Analytical procedures:

pH,Oxidation-reduction potential (ORP), Chemical Oxygen Demand (COD),Volatile Fatty Acids (VFA), Determination of Iodine value of Micro algal Oil (ASTM D 1959-97),Determination of Acid value of Micro algal oil (ASTM D – 664), Determination of Specific gravity and Density for Micro algal oil.

Results and discussion:

Algal oil:

Cultivation of algae was performed in the lab as an open pond system under natural conditions. During cultivation different parameters were analyzed such as pH, nutrient concentration, trend of organic substrate and organic acids (VFA). The effective algal biomass production was observed when the cultures were operated between pH 7.5 to 8.9. Lipid content was also found to influence by the type of lakes or the characteristics of the lake

Oil efficiencies of the cultures selected in the present study:

Based on the amount of oil extracted, the algal culture from the composite culture of the different lakes was found to contain higher oil content (3.807%) compared to the cultures collected from other lakes of the city. The algal oil from the Thammileru (1.132%) was also found to be good compared to Godavari River (1.291%).

pH profiles of the three mixed cultures:

During the cultivation of algae in an open pond system. Regular monitoring of pH was performed. Initially the cultures were grown in domestic waste with pH 7.5.The optimum pH required for the growth of algae is 7.5 to 8.7. During the experimental run fluctuations were observed at the initial phases later the cultures were adapted to the optimum conditions in almost all the cases. When pH was observed for Thammerulu, Godavari River and Composite cultures a good correlation was noticed in pH values along with the oil efficiency. Optimum pH conditions showed good result both in biomass growth and lipid accumulation. The percentage of oil recovery was found to be maximum in composite culture followed by Thammerulu culture due to the controlled and optimized pH acquired by the buffering action of the system during the experimental

run. The cultures from Godavari River reported lower percentages of oil comparatively showing uncontrolled pH conditions.

pH profile during morning and afternoon observation of mixed culture for all the cycles:

The pH readings in the morning and afternoon were also observed for the three cycles which made a significant change that the pH readings in the morning hours was low compared to the afternoon. The daily (afternoons) pH of the culture increased rapidly from 6.6 to a maximum value of 8.5 after the introduction of the micro algal culture. This is due to the initial uptake of CO_2 by the micro algal cells during the day. The daily pH value of the culture decreased slightly and stabilized at 8.7**.** Early mornings and afternoons pH profiles were observed during the cultivation of microalgae in outdoor culture tub. After the sixth day resulting from the buffering capacity of the water and the complete adaptation of the micro algal cells to the culture environment. During the night, the pH value of the culture decreases massively as the micro algal cells do not photosynthesis but actually undergo respiration to release more CO_2 which decreases the culture suspension with pH 8.1-8.3. This phenomenon is confirmed by early mornings and afternoons quantifications of dissolved CO_2 levels during the cultivation process.

ORP values of three mixed cultures observed during the operation of first cycle:

In the period of algal cultivation of 8 days cycle in the open pond, the oxidation reduction potentials of the algal cultures were observed daily. The algae cultures were grown in the waste water with an initial ORP of -45.3mv. The oxidation and reduction potentials of the Composite culture and Godavari river culture gradually decreased from -45.3 to a least of -120mv. During the study of Thammerulu culture the decrease in ORP has been noticed from -50mv to -142.7mv.

COD profiles for the three mixed cultures during first cycle operation:

COD analysis performed to the algae cultures reveals that the algae also have the capability to purify the water. The culture was grown in the waste water for the production of oil. COD analysis was performed from the first day of the cycle to the end, which resulted in the decrease in COD concentrations. The cultures of Godavari river and Thammerulu showed maximum COD removal efficiency compared to the composite culture.

Characteristics of micro algal oil:

Oil Sample	Acid Value (ASTM D-664)	Iodine Value (ASTM D 1959-97)	Specific gravity	Density
Standard Values	**<0.5 mg KOH/gm of acid**	**<25(Efficient biodiesel)**	**0.86-0.90**	**0.88gm/cm^3**
Godavari River	**0.55 mg KOH/gm**	**21.63 gm/100 gm of oil**	**0.92**	**0.94gm/ cm^3**
Thammerulu	**0.27 mg KOH/gm**	**17.18 gm/100gm of oil**	**0.99**	**0.88gm/ cm^3**
Composite Culture	**0.55 mg KOH/gm**	**19.09 gm/100 gm of oil**	**0.96**	**0.90 gm/cm^3**

The values obtained from micro algal oil were compared with standard biodiesel values. The specific gravity of micro algal oil was 0.92 for MG culture, 0.99 for TH culture and 0.96 for composite culture which were close to the standard values of 0.86 – 0.90. The density of micro algal oil was 0.94 gm/cm^3 for MG culture, 0.90 gm/cm^3 for composite culture which were close to the standard value and 0.88 gm/cm^3 for TH culture that lies within the normal range. The acid value should be less than 0.5 mg KOH/gm of acid. The acid values for micro algal oil were 0.55 mg KOH/gm of acid for MG and composite cultures which were slightly higher than standard value. The acid value for TH culture was 0.27 mg KOH/gm of acid that lies within the normal range. The iodine value should be less than 25 gm I/100 gm of oil for its use as efficient biofuel. The iodine values were 21.63, 17.18, 19.09 gm I/100 gm of oil for Godavari River, Thammerulu and composite cultures. The values mentioned show the possibility of using micro algal oil as a source of renewable energy.

Summary and Conclusion:

On the progress of our work towards the target of producing renewable energy from algae cultures of Thammerulu, Godavari River and Composite culture, the results were found to be positive. The collected cultures were cultivated under natural growth conditions. Algae were grown in the laboratory using domestic waste water as the source of nutrients. The grown algae were collected, dried under sunlight and powdered. The powdered algae were subjected to Soxhlet extraction process.

Oil obtained was weighed by gravimetric method. Oil was later Derivatized and analyzed qualitatively by Specific gravity, Density, Acid value and Iodine Value. The oil percentage was higher in composite culture (3.807%) followed by Godavari River culture (1.291%) and Thammerulu c (1.132%). The results obtained from qualitative analysis of micro algal oil were compared with standard biodiesel values. The values obtained were within the range of standard biodiesel values. From these results, we conclude that micro algal oil is a source of renewable energy.

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Energy conservation: Various methods – A Special emphasis on Solar energy as an important alternative.

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Abstract

Electricity in the modern century is the most important infrastructure. It contributes the most for the economic activities and development of a nation. The demand for electricity is increasing day by day in order to meet several requirements like maintaining quality of life of the people, developing agriculture and industrial sectors. India has world's 17% population and 70% population of India lives in rural area where supply of electricity is a major problem. The problem occurs when there is gap between the generation and demand. Today India is facing a severe power crunch. Saving energy is the first and the most fruitful measure to address the crisis. 'Saving energy' means decreasing the amount of energy being used while achieving a similar outcome of end use. Using less energy has lots of benefits. Solar energy that we receive on earth everyday can produce 2500 times more power that we currently consume. So resorting to solar energy as an alternative source can help to address the crisis. If people use less energy there is less pressure to increase the available supply of energy.

Key words: induction, pinnacle, emission

Introduction:

Electricity is the set of physical phenomena associated with the presence and flow of electric charge. Electricity gives a wide variety of well-known effects, such as lightning, static electricity, electromagnetic induction and the flow of electrical current. The use of electricity gives a very convenient way to transfer energy, and because of this it has been adapted to a huge, and growing, number of uses. It has become crucial in many modern day pre-requisites like lighting, telecommunications, refrigeration, air conditioning, electric motors, electric vehicle and also in electronic devices in form of transistors

Energy Crisis:

There has been an enormous increase in the global demand for energy in recent years as a result of industrial development and population growth. Supply of energy is, therefore, far less than the actual demand. The economic implications of a shortage of supply-induced energy crisis are large, because energy is the resource used to exploit all other resources. Thus the problem of energy crisis evolved. This crisis had grown to the pinnacle in the present century. Shortage of fuels like crude oil, petrol, diesel, fall in economy, depletion of natural resources like coal, natural gases and sharp increase in demand due to

industrialization, societal advancement and population growth can be enlisted as the main reasons for the energy crisis in the 21st century.

This crisis is more so suffered by the electricity consumers. An electricity shortage is felt most by those who depend on electricity for heating, cooking, and water supply. The shortage of electricity hinders the normal life. Because of shortage of electricity the people experience intentionally engineered power-cuts during periods of insufficient supply or unexpected power outages, regardless of the cause. In these circumstances, a sustained energy crisis may become a humanitarian crisis.

If an energy shortage is prolonged a crisis management phase is enforced by authorities. Energy audits may be conducted to monitor usage. Various curfews with the intention of increasing energy conservation may be initiated to reduce consumption.

Energy Conservation:

Energy conservation means making an effort to reduce the consumption of natural energy sources like electricity, water and so on.We depend on energy for almost everything in our lives. We wish to make our lives comfortable, productive and enjoyable. But when we take things for granted we have started wasting energy unnecessarily. Most of us forget that energy is available in abundance but it is limited and hence to maintain the quality of life, it is important that we use our energy resources wisely. If we do not conserve energy, the energy will exhaust and we will have nothing to use. Hence it is important to conserve energy.

Why should we conserve energy?

The following are typical and most important reasons for why we should conserve energy.

1. Save money: Typical mid-income households spend Rs 150 to R s200 per month on electricity -- 500 to 800 kilowatt-hours (kWh). Most households could save 20 - 30 % of this easily.

2. Reduce 'Greenhouse Gas' emissions: Electricity in many countries is generated from burning coal which produces carbon dioxide (CO2) when burnt. This is contributing to Global Warming, which is potentially catastrophic. Fuel combustion in cars is also responsible for substantial CO2 emissions.

3. Reduce air pollution caused by burning coal to generate electricity, and from car fumes.

4. Save water: Power stations use 2 litres of water for every unit of electricity (kWh) generated.

Ways to conserve energy: There are many ways to conserve energy. It depends on the kind of choices we make to help us save our environment and also help our future generations. There are many things that will use less energy and conserve energy in a sensible way.

Many of the following steps may appear ridiculous, but truly contribute a commendable share in conserving electricity, the most important form of energy in modern era.

At Home:

- The lights and television use electrical energy, so when you leave the room, shut them off.
- During the day when it is brighter outside, open the curtains and use the sunlight instead of turning on the lights.
- Don't leave windows or doors open when the air conditioning is on. This makes the AC have to work harder to cool a room.
- When you have a sunny day, help hang the Clothes outside instead of using the dryer.

Lighting

- Turn off the lights when not in use
- Take advantage of daylight by using light-colored, loose-weave curtains on your windows to allow daylight to penetrate the room. Also, decorate with lighter colors that reflect daylight.
- De-dust lighting fixtures to maintain illumination.
- Compact Fluorescent Bulbs (CFL) are four times more energy efficient than incandescent bulbs and provide the same for lighting.
- Use electronic chokes in place of conventional copper chokes.
- Slim tube lights give better light and consume less electricity than the filament lamps.

Fans & Electric Iron

- Replace conventional regulators with electronic regulators for ceiling fans.
- Install exhaust fans at a higher elevation than ceiling fans.
- Select iron boxes with automatic temperature cutoff.
- Use appropriate regulator position for ironing.
- Do not put more water on clothes while ironing.
- Do not iron wet clothes.

Electronic Devices

- Do not switch on the power when TV and Audio Systems are not in use. Idle operation leads to an energy loss of 10 watts /device.
- Turn off your home office equipment when not in use.
- A computer that runs 24 hours a day, for instance, uses – more power than an energy-efficient refrigerator.
- If your computer must be left on, turn off the monitor; this device alone uses more than half the system's energy.
- Setting computers, monitors, and copiers to use sleep-mode when not in use helps cut energy costs by approximately 40%.
- Battery chargers, such as those for laptops, cell phones and digital cameras, draw power whenever they are plugged in and are very inefficient. Pull the plug and save.
- Screen savers save computer screens, not energy. Start-ups and shutdowns do not use any extra energy, nor are they hard on your computer components. In fact, shutting computers down when you are finished using them actually reduces system wear and saves energy.

Air Conditioner

- Prefer air conditioners having automatic temperature cut off.
- Keep regulators at “low cool” position.
- Operate the ceiling fan in conjunction with your window air conditioner to spread the cooled air more effectively throughout the room and operate the air conditioner at higher temperature.
- Seal the doors and windows properly.
- Leave enough space between your air conditioner and the walls to allow better air circulation.
- A roof garden can reduce the load on Air Conditioner
- Use windows with sun films/curtains.
- Set your thermostat as high as comfortably possible in the summer. The less difference between the indoor and outdoor temperatures, the lower will be energy consumption.

- Don't set your thermostat at a colder setting than normal when you turn on your air conditioner. It will not cool your home any faster and could result in excessive cooling.
- Don't place lamps or TV sets near your air-conditioning thermostat. The thermostat senses heat from these appliances, which can cause the air conditioner to run longer than necessary.
- Plant trees or shrubs to shade air-conditioning units but not to block the airflow. A unit operating in the shade uses as much as 10% less electricity than the same one operating in the sun.
- Keep doors to the outside closed when the heat or air conditioning is on. Every time you open a door while the heating or cooling system is operating, lots of expensive heated or cooled air escapes. That's why it helps to close them quickly when you come in or go out of the house.

Kitchen Appliances

Mixers

- Avoid dry grinding in your food processors (mixers and grinders) as it takes longer time than liquid grinding.

Microwaves ovens

- Consumes 50 % less energy than conventional electric / gas stoves.
- Do not bake large food items.
- Don't open the oven door too often to check food condition as each opening leads to a temperature drop of 25°C.

Electric stove

- Turn off electric stoves several minutes before the specified cooking time.
- Use flat-bottomed pans that make full contact with the cooking coil.

Refrigerator

- Regularly defrost manual-defrost refrigerators and freezers; frost buildup increases the amount of energy needed to keep the motor running.
- Leave enough space between your refrigerator and the walls so that air can easily circulate around the refrigerator.
- Don't keep your refrigerator or freezer too cold.
- Make sure your refrigerator door seals are airtight.

- Cover liquids and wrap foods stored in the refrigerator. Uncovered foods release moisture and make the compressor work harder.
- Do not open the doors of the refrigerators frequently.
- Don't leave the fridge door open for longer than necessary, as cold air will escape.
- Use smaller cabinets for storing frequently used items.
- Avoid putting hot or warm food straight into the fridge.
- Plan ahead what you need from the refrigerator before opening the door. This saves energy by keeping the time the door is open as short as possible.

Bathroom Geyser

- The electricity consumption by your geyser can be considerably reduced if the members of your family bathe in quick succession and switch it off as soon as it is no longer required.

Washing Machine

- Always wash only with full loads.
- Use optimal quantity of water.
- Use timer facility to save energy.
- Use the correct amount of detergent.
- Use hot water only for very dirty clothes.
- Always use cold water in the rinse cycle.
- Prefer natural drying over electric dryers.

At Shops and Business Establishments

- Avoid excessive illumination. Please keep only as many fans and lights on as you need.
- Do not use neon sign boards. Use only painted sign boards.
- Use energy saving compact fluorescent lamps for the illumination of your shops, showrooms, or hotels.
- Try to switch on your room air conditioners and coolers at least one hour late and switch off one hour early. Preferably, do not use these heavy duty appliances.
- Please close the shops and showrooms precisely by 8 p.m. at night.
- Use solar water heaters for hot water requirements of your hotels and lodges.

At Farms

- Provide shunt capacitors at terminals of your three-phase motor to help reduce current and ensure longer life to your pump set.
- Use rigid PVC pipes to get more discharge.
- Avoid sharp bends and too many joints in the suction and delivery lines.
- Use low-resistance foot valves.
- Lubricate pump sets at regular intervals.
- Choose suitable crop mix so that at least one crop in a year is grown with least water consumption.

Embracing an energy efficient lifestyle today will help you get a better life tomorrow.

Alternative sources for energy conservation:

In a general sense in contemporary society, alternative energy is that which is produced without the undesirable consequences of the burning of fossil fuels, such as high carbon dioxide emissions, which is considered to be the major contributing factor of global warming

It can also be defined as…

- "Energy fueled in ways that do not use up natural resources or harm the environment."
- "Energy derived from nontraditional sources e.g., compressed natural gas, solar, hydroelectric, wind."
- "Energy derived from sources that do not use up natural resources or harm the environment."

There are many reasons we are looking towards alternative energy sources. With many countries, and US cities, signing the Kyoto Treaty, efforts to reduce pollutants and greenhouse gases are a primary focus in today's culture. Alternative or renewable energy, sources show significant promise in helping to reduce the amount of toxins that are by-products of energy use. Not only do they protect against harmful by-products, but using alternative energy helps to preserve many of the natural resources that we currently use as sources of energy.

Some of the important forms of alternative sources of energy are

- Solar energy,
- Wind energy,
- Geo-thermal energy,

- Bio fuels such as ethanol,
- Nuclear energy and
- Hydrogen.

Solar Energy as an important alternative:

Solar energy is the energy received from the sun that sustains life on earth. For many decades solar energy has been considered as a huge source of energy and also an economical source of energy because it is freely available. However, it is only now after years of research that technology has made it possible to harness solar energy. Solar energy gives life to us with the help of this energy we can generate electricity.

Solar power is the conversion of sunlight into electricity, either directly using photovoltaic's (PV), or indirectly using concentrated solar power (CSP). According to British Petroleum and Royal Dutch Shell, two of the world's largest oil companies by 2050, one-third of the world's energy will need to come from solar, wind, and other renewable resources. The solar energy that we receive on earth every day can produce 2,500 times more power that we currently consume.

Solar energy is perfectly suited for India compared to many other sunlight starved countries. India is amongst top 5 destinations for solar energy world wide. The top 5 states in India for a set solar PV potential are Gujarat, Rajasthan, Maharastra, Tamil Nadu, and Andhra Pradesh. India has made considerable progress in solar project development. The capacity commissioned so far is about 186 mega watts. The country plans to build an initial capacity of 1 mega watt of solar power by 2013 enough to power close to one million homes.

In Bihar, solar energy is being used in the form of solar street, solar home lighting system, solar lanterns, and solar water heaters. Bihar government has planned to provide solar light facilities to all government secondary school of the state mostly located in rural areas.

Different ways of Solar Applications

Solar Power Generation:

Substantial efforts have been made to harness the non-conventional and renewable sources of energy during the last 3 decades. The Solar Panel is the building block of a solar power generating system. The power produced through this means is

simple, clean and abundantly available. The Department of Non-Conventional Energy resources has taken up the mission to promote the Solar Power Generation.

Solar lights:

The technology for out-door solar lighting is improving rapidly. Solar lights are looking more attractive, shining more brightly and there run time is getting longer. To give you a better sense of how these lights work and how to select a good one, here are the technology for outdoor solar lighting is more improving rapidly. To give you better sense of hope these lights work.

Solar battery:

The solar cells are wired directly to a rechargeable battery that stores the electricity generated by the cells. A diode located between the cell and the battery ensures that electricity flows only one way in to the battery. NIMH batteries are often used because they stand up better to the frequent charge and release cycles then standard NICAD batteries. NIMH batteries also have a significant environmental benefit. They can be disposed of without harm to the environment. The battery is usually the second most cost component of solar light.

Solar Powered Attic Fans:

S.P.A.F s works by collecting energy from sun light and using it to turn the blades of the fan. The fans are generally quite, and aside from the initial cost, since they run on solar they are free to operate power. There's a down side, too. Naturally, a solar "powered" any thing needs the sun in order to function. Solar attic fans will turn when there is enough sun light hitting the solar cell.

Solar fans:

Solar fans are the fans that store the energy captured from the sun and then use it further when required without any other support required. These solar fans can be of any size, from small to high, depending on the solar cells integrated in them and according to the need of the user. They help in saving energy bills on one hand and are eco friends. The solar fan create minimum noise and high speed as well as portable and light enough to be carried any where power is not available., the fairest place to buy the solar fans is on branded.

Solar telephones:

India's Ministry of New and Renewable Energy is like to come out with a mandate that would require telecom operators in the country to power their telecom no sites using solar panel instead of diesel generators. Telecom sites are quite energy

intensive as they use power nonstop without any interruption. India has more than 25,000 telecom sites which consume 3.5 kw of power.

Solar Water Heater:

Solar Water Heating (SWH) systems comprise several innovations and many mature renewable energy technologies that have been well established for many years. SWH has been widely used across the world. SWH systems are designed to deliver hot water for most of the year.

Solar Cooking:

Solar cookers use sunlight for cooking, drying and pasteurization. There is no smoke and ash in this cooking, which improve the quality of life. They can be grouped into 3 broad categories. They are Box Cookers, Panel cookers and Reflector Cookers. The simplest solar cooker is the box cooker. These cookers reach temperature of 315º c and above. But they require direct light to perform. Now a days Solar cookers are used in student hostels with solar thermal system of capacity in of two plants of 10 KW.

Solar Mobile Phone:

The Micromax X259 is a dual SIM, dual stand by mobile that comes with an inbuilt solar panel. The phone can be charged by exposure to sunlight. 3 hours of solar charging provides 1.5 hours of talk time.

Solar Power Operated Minibus:

It is a bus equipped with Solar power roof. This bus runs on the energy collected through the PV cells of solar panel. The bus emits 'zero emissions' and keeps the environment clean.

Solar energy in Farming:

Most of the important crops need to be dried as a part of the production process. For this the farmers rely on mechanical dryers, wood, propane or oil. But upgrading this drying equipment with solar power is a double-benefit process in terms of energy saving and producing the best possible finish in the food product. "Solar Wall" systems have been used for drying coffee, tea, spices, cocoa, herbs, fruits, nuts, rubber, rice, manure and many others across the world.

Disadvantages:

The main disadvantage of solar energy is the initial cost. Most types of solar cell require large areas of land to achieve average efficiency. Air pollution and weather can

also have a large effect on the efficiency of the cells. The silicon used is also very expensive and the problem of nocturnal down times means solar cells can only ever generate during the daytime. Solar energy is currently thought to cost about twice as much as traditional sources (coal, oil etc). Obviously, as fossil fuel reserves become depleted, their cost will rise until a point is reached where solar cells become an economically viable source of energy. When this occurs, massive investment will be able to further increase their efficiency and lower their cost.

Conclusion:

The World today suffers an acute energy crunch. The sharp rise in demand and depletion of natural resources are the main reasons for the crisis. Energy conservation and going for alternative resources is only solution for future needs of energy. Amongst all the renewable sources, solar energy proves to be promising and showing a silver lining in the current scenario.

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Need for Research and Extension in Nutrition

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Abstract

One of the world's greatest challenges is to secure adequate food that is healthy, safe and of high quality for all, and to do so in an environmentally sustainable manner (Pinstrup-Andersen 2009). With the growing demand of an ever-increasing human population, it remains unclear how our current global food system will sustain itself. Compounded with climate change, ecosystems and biodiversity under stress, population growth and urbanization, social conflict and extreme poverty, there has never been a more urgent time for collective action to address food and nutrition security globally.

Key words: malnutrition, micronutrient deficiencies, fortification, biodiversity, deforestation, determinants.

Introduction:

It is imperative that research and development start to think about new and sustainable approaches to improve the quality and variety of food produced and consumed around the world. The role that agriculture plays in dietary diversity and nutrition outcomes is central, and nutrition must be front and centre as a major outcome and goal of agriculture and production systems, as a potential avenue to improving dietary diversity, food quality and human health as well restoring or preserving ecosystems.

These, burdened food system impacts the most vulnerable people, as statistics clearly show. There are currently an estimated 925 million people suffering food and nutrition insecurity (FAO 2010a). In addition to those who are hungry, there are also 195 million children under five years of age who are stunted in their growth (UNICEF 2009) and of those children,90% live in just 36 countries (Black et al. 2008). Malnutrition takes its toll; it is responsible for 35% of all child deaths and 11% of the global disease burden (Black et al. 2008). Micronutrient deficiencies, known as hidden hunger, undermine the growth and development, health and productivity of over two billion people (Micronutrient Initiative 2009). At the same time, an estimated one billion people are overweight and another 300 million are obese in both the developed and developing world (WHO 2006), which contributes to the risk

of non-communicable diseases such as diabetes and heart disease. With over-nutrition, many countries and urban communities in the developing world are experiencing the nutrition transition-going from under nutrition to obesity related to insufficient exercise, sedentary lifestyles and unhealthy diets (Doak et al 2005; Popkin 2008).

The global community has responded to the malnutrition crisis by focusing on interventions that aim to impact 90% of the global population burdened by stunting and that largely address inadequate dietary intake, disease and poor childcare practices (Bhutta et al 2008). There has been a particular focus on the window of opportunity, specifically, the first 1000 days of a child's life from the nine months in utero to two years of age (Barker 2007; Golden et al 2009; Victora et al 2008). This window is critically important because nutritional setbacks during this time can result in irreversible losses to growth and cognitive potential and can reduce educational attainment and earning potential (Martorell et al 1994; Shrimpton et al 2001;Victora et al 2008). The Scaling Up Nutrition Framework for Action (SUN), recently endorsed by more than 100 global partners and policy makers, highlights the need for early childhood and maternal nutrition-specific interventions (Bhutta et al 2008), which aim to:

- Promote good child-feeding and hygiene practices;
- Provide micronutrient supplementation for young children and their mothers;
- Support the provision of micronutrients through food fortification;
- Treat acutely malnourished children with therapeutic feeding.

While highlighting core interventions, the four aims listed above has to be strengthened with a multi-sectoral approach that incorporates nutrition-sensitive interventions from other sectors, such as agriculture, education and social protection that address underlying causes of malnutrition. However, practical operational strategies for localizing and applying sensitive interventions must be further clarified and defined as to how such interventions impact nutritional outcomes. Some suggested agriculture-related nutrition-sensitive interventions include (UNSCN 2010):

– Agricultural extension services promoting better crop diversity and biodiversity for improved nutrition;

– Integrated agro-forestry systems that reduce deforestation and promote the sustainable exploitation of nutrient-rich non-timber forest products;

– Integrated farming systems exploiting the synergies of horticulture, aquaculture and small livestock rearing to reduce waste and expenses on agricultural inputs and increase food production diversity;

– Improved household food production and livelihoods (i.e. diversification of household food production for self-consumption in order to improve the nutritional quality of the family diet);

– Education and communication for development and social marketing strategies that strengthen local food systems and promote cultivation and consumption of local micronutrient-rich foods;

– Improved post-harvest management(foodstorage,transformation, handling and processing) to reduce losses in terms of quantity and nutrient content, which also contributes to nutrition security.

While the underlying determinants of malnutrition have been well understood for decades, the design, testing and scaling of more holistic multi-sectoral packages that combine child and maternal care and disease control with these nutrition sensitive, and largely agriculture-focused approaches, have been limited in their development and implementation. With the tools and knowledge that are currently at our disposal, there is a renewed global focus on interventions that address the root causes of food and nutrition security—both under and over-nutrition— as part of a wider multi-sector approach, which should include agriculture.

Redirecting the global agricultural system to ensure better nutrition is important as the supplier of the world's food. The current global agricultural system is producing enough food, in aggregate, but access for all too enough food that is affordable and nutritious has been more challenging. Agricultural systems have largely become efficient at producing a handful of staple grain crops, mainly maize, rice and wheat. In developing countries and particularly those in nutrition

transition, people obtain most of their energy from these staple grains along with processed oils and fats and sugars, resulting in diets that often lack micronutrients and other necessary dietary and health components.

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Problems and Prospects of Solar Energy Equipment

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Abstract

Solar energy is our future. Our world has too long relied on the unsustainable fossil fuel. Fossil fuels damage our environment and we have developed an unhealthy addiction to them. It's time to break the cycle. Solar energy is clean, cost-efficient, and environmentally and economically friendly. Solar equipment is easy to install with little need to dig. This form of energy just makes sense in our world. Solar energy is abundant. It's a totally renewable source of energy. The power comes from the sun. The sun is free and inexhaustible.

Key words: greenhouse, optimum, delineators, intrusions, harness, obstructions.

Introduction:

The most important aspect of solar energy is the positive effect on the environment. There is no noise, very little pollution, and no greenhouse gases. Again the sun is a renewable source of energy. Solar energy is very cost effective. The sun is free. There is no charge for sunshine. For those who cannot afford traditional energy an investment in solar equipment provides long lasting energy for generations to come. Solar panels require almost no maintenance after installation and have a long working life.

- These inverters are made using optimum quality raw materials and latest technologies, which enhance their durability and workability.
- We offer a wide range of Solar Water Heater which is suitable for all kinds of hot water applications. Solar water heaters are manufactured using premium quality raw material and are available in the markets at competitive prices.
- Solar cooker is preferred buy most people because it is the simplest and safest mode to cook food. Solar cookers are available in different size. Is is easy to install and can be easily maintained.
- The Solar Lighting is the most widely used application of Solar Energy. It is extensively used in all parts of the world. Solar lighting applications are used for both communities lighting as well as for domestic Purposes. It helps in reducing electric power consumption and is easy to operate and handle.

It consists of Solar Cells, Control Panel and Lighting Devices. It is extensively available in different models.

- The Solar Delineators offered by are based on LED technology. These can be mounted on a pole so as to provide clear visibility to the motorists in all weather conditions. The flashing light of these products is visible from 100 meters and is very receptive to eyes. This array is featured with longer service life and easy mount.
- We are instrumental in offering our clients with Solar Security Fence that are designed to perfection by our professionals. These systems capable of meeting the requirements of customers whose premises/ properties are to be protected against tress-passing / thefts / intrusions.

One of the main disadvantages is the initial cost of the equipment used to harness the suns energy. Solar energy technologies still remain a costly alternative to the use of readily available fossil fuel technologies. A solar energy installation requires a large area for the system to be efficient in providing a source of electricity. This may be a disadvantage in areas where space is short, or expensive. Pollution can be a disadvantage to solar panels. Clouds also provide the same effect, as they can reduce the energy of the sun's rays. This certain disadvantage is more of an issue with older solar components, as newer designs integrate technologies to overcome the worst of these effects. Solar energy is only useful when the sun is shining. During the night, your expensive solar equipment will be useless; however the use of solar battery chargers can help to reduce the effects of this disadvantage. The location of solar panels can affect performance, due to possible obstructions from the surrounding buildings or landscape.

Disadvantages:

- One of the main disadvantages is the initial cost of the equipment used to harness the sun energy. Solar energy technologies still remain a costly alternative to the use of readily available fossil fuel technologies. As the price of solar panels decreases, we are likely to see an increase in the use of solar cells to generate electricity.
- A solar energy installation requires a large area for the system to be efficient in providing a source of electricity. This may be a disadvantage in areas where space is short, or expensive (such as inner cities).
- Pollution can be a disadvantage to solar panels, as pollution can degrade the efficiency of photovoltaic cells. Clouds also provide the same effect, as they can

reduce the energy of the sun's rays. This certain disadvantage is more of an issue with older solar components, as newer designs integrate technologies to overcome the worst of these effects.

- Solar energy is only useful when the sun is shining. During the night, your expensive solar equipment will be useless; however the use of solar battery chargers can help to reduce the effects of this disadvantage.
- The location of solar panels can affect performance, due to possible obstructions from the surrounding buildings or landscape.

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Gender Gaps and Women's Empowerment –Issues and Strategies

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Abstract

Gender equality is considered a critical element in achieving social and institutional change that leads to sustainable development with equity and growth. Inequalities between men and women manifest themselves in all areas of development. Inequalities are most obvious in: health and education, economic development, violence against women, participation in public life and policymaking and social attitudes and gender stereotyping. Health discrimination against women in India starts early and is evident in the skewed sex ratio of 933 women to 1,000 men (world average: 990:1,000**).** Maternal mortality in India is the second highest in the world and close to 125,000 women die due to pregnancy and pregnancy-related illnesses every year**.** In rural areas, 60% of girls are married before the age of 18, and 60% of married girls bear children before they are 19. Almost one-third of babies are born with low birth weight because of poverty, early marriage, malnutrition and lack of healthcare during pregnancy. In the education sector, the inequalities observed are: Around 245 million Indian women cannot read or write and they form the world's largest number of unlettered women.

Female literacy is 54.16, and there are wide disparities within states. Enrolment and retention of girls in education is poor and the average years of schooling for girls is only 1.2 years as against 3.5 years for boys. Girls miss school because they have to look after siblings. A look at the economic development sector indicates that, official data does not reflect the amount of work that women actually do to enable their families to survive, collecting fuel, fodder or water, keeping poultry, working as unpaid labour on family farms. Women also work in home-based industries, bidi and agarbatti-rolling, bangle-making, weaving, etc. without social security benefits and are lowly paid for this informal work which forms an important part of the family's income. One-third of agricultural workers are women and many crops depend on extensive labour provided by agricultural labour, yet when it comes to wages, on an average, their wages are 30% lower than men's wages. The present study analyses the gender gaps and lists out the strategies in the Twelfth Five Year Plan of Government of India for women's empowerment. The Twelfth Plan endeavours to increase women's employability in the formal sector as well as their asset base. It aims to improve the conditions of self employed women with a focus on women's workforce participation particularly in secondary and tertiary sectors, reaching out to women in agriculture and manufacturing, financial inclusion, and extending land and property rights to women. One of the major impediments affecting women's participation in the workforce is the lack of skills.

The Twelfth Plan envisages a major scaling up of skill development to promote skill development of women from traditional skills to emerging skills, which help women break the gender stereotypes and move into employment requiring higher skill sets.

Key word: micro-entrepreneurs, Gender-related Development Index, Gender Empowerment measure, Human Development Index**,** Composite Indices, drudgery.

Introduction:

Rural women and girls have many roles and many responsibilities. They are farmers, care-givers, wage labourers and micro-entrepreneurs and they often spend many hours fetching water and collecting firewood. The empowerment of women is fundamental to reduce poverty, hunger and malnutrition. Gender equality and women's empowerment are important factors for the social and economic development of a nation. The promotion of gender equality and empowering of women is one of the eight Millennium Development Goals (MDG) to which India is a signatory.

Gender gap:

The differences between women and men, especially as reflected in social, political, intellectual, cultural, or economic attainments or attitudes. The Global Gender Gap measure was introduced by the World Economic Forum to examine four critical areas of inequality between men and women:

1. **Economic participation and opportunity** – outcomes on salaries, participation levels and access to high-skilled employment
2. **Educational attainment** – outcomes on access to basic and higher level education
3. **Political empowerment** – outcomes on representation in decision-making structures
4. **Health and survival** – outcomes on life expectancy and sex ratio

The Gender Gap Index assesses countries on how well they are dividing their resources and opportunities among their male and female populations, regardless of the overall levels of these resources and opportunities. India ranks 123 in terms of economic participation, 121 in educational attainment, 134 in health and survival and 17 in political empowerment.

India, with 1.3 million elected women representatives, has the largest number of women participating in local governance among the Asian countries, exceeding its own 33% reservation. A study of Indian local governments by Munshi and Rozenweig (2008) said that women in local government roles came out with better outcomes for

communities in budgetary decisions and were more competent in procuring resources despite significantly lower education and labour market experience, so politically empowering women is a good thing.

Examples of gender indicators - International indicators:

1.The Millennium Development Goals(MDGs)

A framework for incorporating gender equality across the MDGs: Many practitioners and policymakers agree that gender equality and women's empowerment are central to the achievement of each of the MDGs, and the achievement of Goal 3 in turn depends upon the extent to which the other goals address gender-based constraints.

Goal 3. Promote gender equality and empower women

This central goal dedicated to gender equality and women's empowerment depends on the achievement of all other goals for its success.

2. The Gender-related Development Index and Gender Empowerment Measure

The Gender-related Development Index (GDI) adjusts the Human Development Index (HDI) for gender inequalities in the three dimensions covered by the Human Development Index (HDI), i.e. life expectancy, education, and income. It is important to note that the GDI is not specifically a measure of gender inequality.

The Gender Empowerment Measure (GEM) seeks to measure relative female representation in economic and political power. It considers gender gaps in political representation, in professional and management positions in the economy, as well as gender gaps in incomes.

The GDI and GEM need to be used with **caution:** they are useful in their capacity to identify gender gaps in developing countries, rather than an overall picture of growth or education.

Composite Indices:

International composite indices to measure gender equality have been developed, partly to complement and expand on the GDI and GEM. For example, Social Watch's **Gender Equity Index** (GEI) combines indicators from both the GDI and GEM, with a separate gender equality rating estimated for three dimensions (Social Watch 2005):

- **Education**: measured by the literacy gap between men and women and by male and female enrolment rates in primary, secondary and tertiary education.
- **Participation in the economy**: measured by the percentage of women and men in paid jobs, excluding agriculture, and by the income ratio of men to women.

- **Empowerment**: measured by the percentage of women in professional, technical, managerial and administrative jobs, and by the number of seats women have in parliament and in decision-making ministerial posts.

Gender Gaps in selected sectors in India:

The gender gaps with respect to education, health and economic sector have been discussed as follows.

Educational Sector:

There is a wide gender disparity in the literacy rate in India: effective literacy rates (age 7 and above) in 2011 were 82.14% for men and 65.46% for women. The census provided a positive indication that growth in female literacy rates (11.8%) was substantially faster than in male literacy rates (6.9%) in the 2001–2011 decadal period, which means the gender gap appears to be narrowing table 1.

Children's school attendance:

- Only two-thirds of girls and three-fourths of boys' age 6-17 years are attending school. The sex ratio of children attending school is 889 girls per 1,000 boys.
- There is gender equality in school attendance in urban areas; but, in rural areas, the Female disadvantage in education is marked and increases with age.
- Age-appropriate school attendance is lower than any school attendance for both boys and girls. However, boys and girls who are in school are about equally likely to be in an age-inappropriate class.
- School dropout beyond primary school is a major problem for both girls and boys.

Literacy and educational attainment among adults

- Gender disparity in literacy is much greater in rural than in urban areas and declines sharply with household wealth.
- Forty-one percent of women and 18% of men age 15-49 have never been to school.
- Educational attainment remains very low: even among the 20-29 age group, only 27% of women and 39% of men have 10 or more years of education.

Health Sector:

Discrimination against women in India starts early and is evident in the skewed sex ratio of 943 women to 1,000 men (Census 2011) has been presented in table 2. This is attributed to the cultural bias in favour of male children, which results in the abortion of female foetuses. Other causes are the social neglect of women and girls, manifested in less access to nutrition and healthcare, and in high maternal mortality.

Maternal mortality in India is the second highest in the world, at 385-487 per 100,000 live births. Close to 125,000 women die due to pregnancy and pregnancy-related illnesses every year. In rural areas, 60% of girls are married before the age of 18, and 60% of married girls bear children before they are 19. Almost one-third of babies are born with low birth weight because of poverty, early marriage, malnutrition and lack of healthcare during pregnancy.

Key Findings

- The sex ratio (females per 1,000 males) of the population age 0-6 and in the sex ratio at birth for births in the five years preceding each survey.
- Females are under-represented among births and over-represented among births that die.
- Sex ratios at birth decline with wealth, suggesting that sex selection of births is more common among wealthier than poorer households.
- Ultrasound tests are being widely used for sex selection, with sex selection being more evident for the wealthiest women than for women in the other wealth quintiles.
- Sex ratios of all last births and last births of sterilized women show clearly that couples typically stop having children once they have the desired number of sons.
- The child mortality rate, defined as the number of deaths to children age 1-4 years per 1,000 children reaching age 1 year, is 61% higher for girls than for boys.

Economic Sector:

Women, as half of the human capital of India, will need to be more efficiently integrated into the economy in order to boost India's long term competitive potential. The census does not accurately identify many activities as work that women actually do to enable their families to survive collecting fuel, fodder or water, keeping poultry, working on family land etc. Women also work in home-based industries, bidi and agarbatti-rolling, bangle-making, weaving, etc. They do not get social security benefits and are paid very low wages for this informal work. One-third of agricultural workers are women. On an average, their wages are 30% lower than men's wages. Women find it difficult to get credit from banking institutions because they are often unable to provide collateral. They get much smaller loan amounts even though their repayment record is much better than that of men. Women's right to land and other assets is weak. Though legislation has been introduced to ensure that women share equally in ancestral property,

enforcing such rights in a patriarchal society requires resources that poor women may not have. The work participation rate& Gender gaps have been presented in table3 and 4.

Employment - Key Findings:

- Women age 15-49 are about half as likely as men in the same age group to be employed: 43% vs. 87%.
- Women in rural areas are more likely than women in urban areas to be employed; but the reverse is true for men.
- The relationship of employment and wealth for women suggests that, for many women, employment is largely a result of economic necessity.
- Marriage is negatively associated with a woman's likelihood of being employed and is positively associated with a man's likelihood of being employed.
- Most employed women work for someone else, away from home, and continuously throughout the year; about one in three women do not receive monetary compensation for their work or receive at least part of their payment in kind.
- Most employed women work in agriculture; only 7% work in professional, technical, or managerial occupations.

Gender Pay Gap in India:

Various Articles of the Constitution of India attempt to ensure that there is no prevalence of gender pay gap. Specific legislations also address gender pay gap. These articles of the Constitution are as follows:

- ***Article 14:*** Men & women to have equal rights & opportunities in the political, economic & social spheres.
- ***Article 15(1):*** Prohibits discrimination against any citizen on the grounds of religion, race, caste, sex etc.
- ***Article 15(3):*** Special provision enabling the State to make affirmative discriminations in favour of women.
- ***Article 16:*** Equality of opportunities in matter of public appointments for all citizens.
- ***Article 39(a):*** The State shall direct its policy towards securing all citizens men and women, equally, the right to means of livelihood.
- ***Article 39(d):*** Equal pay for equal work for both men and women
- ***Article 42:*** The State to make provision for ensuring just and humane conditions of work and maternity relief.

The analysis of gender pay gap in India based on a voluntary online Salary Survey conducted by Paycheck India with 16,500 online observations (13,729 males and 2771 females) indicated that a wide gender pay gap exists in India. The average

gender pay gap is approximately 54% for years 2006 to 2011. The data also revealed that gender pay gap has narrowed over the years. It was above 70% before 2008 and has come down to almost 40% in 2011. Gender pay gap changes with increase in wages, for wages below Rs1 Lakh and above Rs 50 Lakhs, the gender pay gap is negligible. However, for the wage group between Rs 1 Lakh to Rs 50 Lakhs the gender pay gap is above 40%. The pay gap increases with age, the gender pay gap is highest for the age group 50-60 years at 157% and lowest for the age group 20-30 years at 38 It was observed that as the education level increases, the gender pay gap increases in most of the cases. The gender pay gap is lowest for Plus 2 or equivalent education level at 11.54% and is highest for Post Doctoral Education level at an alarming 180. Data reveals that men and women with same work experience are not paid equally. Gender pay gap is low at junior level and high at senior levels. The extent of gender pay gap also depends on the occupation data shows that the gender pay gap is highest for health professionals at more than 65%. It is lowest for cleaners and helpers under elementary occupations at just a little above 1%. It is also worthy to note that the gender pay gap is remarkably low for information and communication technicians at only 4.37%.

Marital status is also one of the factors for gender pay gap. For women who were single, the gender pay gap is the lowest at 27%. It increases for married women and divorced women at a little above 40%. It is highest for widowed women at more than 60. The gender wages gap varies across Indian States. The gender wage gap is highest in the state of Assam and Rajasthan at 64% and 59% respectively. The gap is relatively low in the southern part of India. The gender wage gap is lowest for New Delhi at 20%.

Programs, Mission and Strategies for Empowerment of Women:

A few of the Programs, Missions and special provision for women's empowerment being adopted by the Government of India have been discussed below**.**

National Mission for Empowerment of Women:

The National Mission for Empowerment of Women (NMEW) was launched by the Government of India (GOI) on International Women's Day in 2010 with a view to empower women socially, economically and educationally. The Mission aims to achieve empowerment of women on all these fronts by securing convergence of schemes/programmes of different Ministries/Departments of Government of India as well as State Governments. The Mission utilises existing structural arrangements of

participating Ministries wherever available and partners with Panchayati Raj Institution (PRIs) in implementation of activities. In light with its mandate, the Mission has been named Mission Poorna Shakti, implying a vision for holistic empowerment of women.

Focus areas of the Mission:

- Access to health, drinking water, sanitation and hygiene facilities for women
- Coverage of all girls especially those belonging to vulnerable groups in schools from primary to class 12
- Higher and Professional education for girls/women
- Skill development, Micro credit, Vocational Training, Entrepreneurship, SHG development
- Gender sensitization and dissemination of information
- Taking steps to prevent crime against women and taking steps for a safe environment for women

National Policy for the Empowerment of Women (2001) – Goal and Objectives:

The goal of this Policy is to bring about the advancement, development and empowerment of women. The Policy will be widely disseminated so as to encourage active participation of all stakeholders for achieving its goals.

Specifically, the objectives of this Policy include:

- Creating an environment through positive economic and social policies for full development of women to enable them to realize their full potential
- The *de-jure* and *de-facto* enjoyment of all human rights and fundamental freedom by women on equal basis with men in all sphere-political, economic, social, cultural & civil
- Equal access to participation and decision making of women in social, political and economic life of the nation
- Equal access to women to health care, quality education at all levels, career and vocational guidance, employment, equal remuneration, occupational health and safety, social security and public office etc.
- Strengthening legal systems aimed at elimination of all forms of discrimination against women

- Changing societal attitudes and community practices by active participation and involvement of both men and women.
- Mainstreaming a gender perspective in the development process.
- Elimination of discrimination and all forms of violence against women and the girl child; and
- Building and strengthening partnerships with civil society, particularly women's organizations.

Provisions under twelfth Five Year Plan of India:

Economic empowerment:

The Twelfth Plan endeavours to increase women's employability in the formal sector as well as their asset base. It will improve the conditions of self employed women. Focus will be on women's workforce participation particularly in secondary and tertiary sectors, ensuring decent work for them, reaching out to women in agriculture and manufacturing, financial inclusion, and extending land and property rights to women.

Skill development:

One of the major impediments affecting women's participation in the workforce, particularly in secondary and tertiary sectors, is the lack of skills. The Twelfth Plan envisages a major scaling up of skill development from traditional skills to emerging skills, which help women break the gender stereotypes and move into employment requiring higher skill sets. Training of women as BPO employees, electronic technicians, electricians, plumbers, sales persons, auto drivers, taxi drivers, masons, and so on will be incorporated in the skill development programmes. Skill development would be seen as a vehicle to improve lives and not just livelihoods of women.

Strategies: A three-pronged approach :

Women can be powerful change agents. Empowering poor rural women involves three critical and interrelated dimensions: expanding access to assets such as capital, land, knowledge and technologies; strengthening decision-making and their representation in community affairs; and improving women's well-being and lessening their workloads.

The lack of basic amenities affects women more than men, as women are often responsible for a larger share of time-consuming household activities. Better electricity

and access to water and sanitation may reduce the burden of women in providing essential household inputs for their families, and allow for more time to be directed toward entrepreneurial activities.

According to National Statistical Commission Chairman Pronab Sen, rural women are shifting towards self-help groups and self-employment, which is clear from the percentage of women taking up self-employment rising to 59 per cent in 2011-12 from 56 per cent in 2009-10. Also, it could also be that a large segment of rural women are not being categorised in the employable workforce in the WPR, as their activity may be designated as family household chores(Ashok Gupta 2013).

John Coonrod (2013) has suggested the following ways in which programs need to be designed to help and empower women.

1. **Gender analysis.**

Too often, gender is an afterthought in project design. Often, mid-project it is discovered that women are not participating and then steps are taken to empower women to participate in a program that simply does not work for them, only adding further burden and anxiety.

2. **Reducing drudgery.**

Working on an average twice the hours of men, women don't have time for development. They are the first to rise and the last to go to bed, often with the most backbreaking work: hauling water and firewood, pounding grain, weeding farms using short-handed hoes and with children on their back, head-carrying produce to market and working as labourers.

3. **Rights awareness.**

Many of the women are confined to their households and lack mobility and freedom of association and have no opportunity to learn their rights and take action to improve their lives and those of their family members. Even if they are aware they are not culturally tuned to assert themselves.

4. **Equal leadership.**

Women are denied a voice in the decisions that affect their lives. Leadership among women can be greatly accelerated by mentoring, building an organized constituency among the women of the community, leadership training and building federations with other women leaders.

5. **Organize.**

Investments in building strong grassroots women's organizations, federations and cooperatives provide women sustainable platforms for advocacy and mutual empowerment.

6. **Functional Literacy**.

Eliminating gender differences in access to education and educational attainment are key elements on the path to attaining gender equality and reducing the disempowerment of women. Around 245 million Indian women cannot read or write the world's largest number of unlettered women. Female literacy is 54.16, and there are wide disparities within states.

7. Financial services.

Women need credit not only for starting or supporting small enterprises, but also for coping with great seasonal fluctuations in family income. Several studies have shown that women spend money, on the health, nutrition and education of children than when men control the money.

8. Health services.

Access to affordable health services is a fundamental human right for women and their children.

Table: 1 Literacy rate and Gender gap in India-1951 to 2011

Census year	Males	Females	Male-female gap in literacy rate
1951	27.16	8.86	18.30
1961	40.40	15.35	25.05
1971	45.96	21.97	23.98
1981	56.38	29.76	26.62
1991	64.13	39.29	24.84
2001	75.26	53.67	21.59
2011	82.14	65.46	16.68

Table: 2 Sex Ratio of Population in India: 2001, 2011

Residence	2001	2011	Change
Total	933	943	+10
Rural	946	949	+3
Urban	900	929	+29

Table: 3Work Participation Rate and Gender Gap India: 2001, 2011

Residence	Sex	2001(%)	Gender gap	2011 (%)	Gender gap	Change
Total	Persons	39.1	26.1	39.8	27.8	+0.7
	Males	51.7		53.3		+1.6
	Females	25.6		25.5		-0.1

Table: 4 Type of Workers and Gender Gap India: 2001, 2011

Residence	Sex	2001	Gender gap	2011	Gender gap	Change
Main Workers	Persons	77.8	30.0	75.2	22.7	-2.6
	Males	87.3		82.3		-5.0
	Females	57.3		59.6		2.3
Marginal Workers	Persons	22.2	-30.0	24.8	-22.7	2.6
	Males	12.7		17.7		5.0
	Females	42.7		40.4		2.3

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Education for Life, Learning and Work

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Abstract

Very recently a young graduate committed suicide on the road in Jaipur city by suddenly taking out a bottle of acid and consumed it. The reason? He was unemployed for three years. A distraught father in Bihar killed his two daughters in a fit of rage and depression because they were unable to secure a job after their studies.

These above mentioned incidents show the horrifying scenario of the situation prevalent in our country in urban and rural India. These incidents are the basic resultant of cultural invasion by Western system of education and copying the black American culture. As the World famous singers and athletes came from black Americans, whereas the Indian youth indiscriminately following the indiscipline path of the Western culture leaving good aspects. The unemployment rate in India has increased and keeps increasing steadily every year. As on January 1st 2010 the number of unemployed was 9.8 million in our country. By January 1st 2012 it has increased to 10.8 million. In rural India the unemployment rate for both male and female is almost at the same level of 20%. But shockingly in the urban areas younger graduates and women are more unemployed than men. These are some of the findings brought out by eminent research articles based on collection of data by census reports of Government of India and scientific research carried out by expertise, professionals and research scholars during 2008-2012.

If these dismal figures show the depressing scenario in our country perhaps one of the major reasons for unemployment in India is due to the fact that every year universities and educational institutions in our country churn out thousands of unemployable students. This is the unavoidable and unacceptable problem but hard facts that stern us in the present scenario of Global economy.

Key words: distraught, depression, cultural invasion, expertise dismal, churn out, stern, quality education, learner-centred, credentials,

Introduction:

The need of the hour is "***Education for employability***" every year. India produces thousands of graduates from institutions of higher learning. The country stands third only after USA followed by China in producing lakhs of educated manpower.

However the unfortunate fact is that we in India are still suffering and lagging behind in promoting quality and quantity in production of goods and employable efficient services due to lack in management of skilled manpower. "Quantity education" is on the rise, but there is decrease in "***Quality education***" Employability depends on scientific knowledge, technical skills and the abilities they posses. Employers are always on the look out to absorb the best experienced work force that they can use successfully in their organizations. Therefore, our educated graduates should be capable of knowing how to utilize and present those assets which they acquired to their prospective employers.

Based on recent survey conducted at national level by the Labour Bureau of the Government of India on employment – unemployment and they have come out with an authentic report that 40million are unemployed with an unemployment rate of 9.4%. It is estimated that out of 63.5% of the productive age group (i.e.15-58 years) everyone is not interested in joining the work force.

According to the same survey, Goa is the state with the highest unemployment rate in our country followed by Pondicherry which are considered to be highest progressive than other states. Chandigarh is the state which produces highest rate of employable graduates. It is therefore necessary, those in present situation we need to introspect and find out how to bring out a comprehensive program in our existing educational institutions, so that we may succeed in producing the best able work force that can be employed. A few strategies and approaches are brought out, so as to design a perfect system that can produce and exploit the strengths of youth force and can be employed meaningfully. The present academic syllabus in institutions of higher learning must be redesigned so as to promote a "***Learner*-Centred approach".** The employers and its stake holders (the students) should explore relevant employability issues. The entire young generation should work hard and try to develop their personal qualities like the highly advanced technical and scientific technical skills for a particular dignified job, knowledge, understanding, aptitude and attitudes that will give them a strong foundation for their better standard of living and lifelong learning and work culture. These are necessary for every individual whether they want to take-up work or to opt for higher education.

In most of the recent research studies which are conducted to find out the overall state of labour market and how it is changing. Brown and Hesketh define employability as the "relative chances of getting and maintaining different kinds of employment". People generally view employment in relative terms such as how to

obtain credentials, knowledge and social status. In present scenario schools and colleges define employability as the move to a more knowledge based economy. The main drawback in existing education system there is more stress on theoretical knowledge and not relevant practicality. There is an increasing demand for high caliber managerial experience with good talents. So it is evident that there is a glaring mismatch between individual expectations of employability and the realities posed by the labour market. What is thus taught in institutions of higher learning has thus no bearing on the nature of job of the employee.

There are certain skills that are necessary for employment. It is the responsibility of the institutions needs to build and to design courses that effectively engage younger generation without any gender bias especially women in particular in all the activities that helps them in developing their confidence levels and self esteem like tasks that build up team building, problem solving etc. This raises not only their confidence but also self assurance and personal effectiveness. Students need to improve their personal and vocational skills.

Every employer would like to recruit employees who have the necessary skills for the job on hand. Apprenticeship for younger generation should be made mandatory. Best practices should be designed at par with global standard, so that students can communicate effectively in oral, visual, written, mathematical and ICT formats at par with International standards. By exploring different career options and range of courses, should learn to use mathematics and ICT learning wherever and whenever appropriate. They need to think critically, solve problems and make appropriate decisions.

Today, institutions of higher learning are not learning centric but more theoretical knowledge based. The curriculum designers and academicians should be able to give clear information and guidance to students on employability. At present, educational institutions need to take up very seriously to see that the curriculum should meet the needs of the students so as to develop their own skills. It is the moral responsibility of all the academic institutions at all levels right from school upto university level should investigate how technology effects their life and work and also environmental consideration and check at every stage not to get misused but should be utilized for constructive ideology.

Only when the above criteria are adhered to their positive contributions will

be given back to the communities and society at large. Students will also understand the fulfillment in the work. Creativity and enterprise and personality development should be encouraged at all levels. The attitude to learning and work are influenced by the family in particular and community values through educational system in general. When such a meaningful education is developed the academic community will be able to teach and encourage an education for life and for work that will benefit the greater good of the greater community.

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Empowerment of Women – Different Dimensions

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Abstract

Empowerment of women has become a subject of growing importance around the world in the contemporary times. The concern is seen at different levels and circles which include governments, bureaucracy, nongovernmental organizations, researchers, women groups and all those who are interested in women's empowerment. The concept of women's empowerment is the outcome of several important critiques, debates and demands generated by the women's movements throughout the world and particularly by the third world feminists since 1980s. Empowerment literally means **'giving power to',** creating power within and enabling. It is a multidimensional process, which enables individuals and groups to realize their full identity and power in all spheres of life, such as social, cultural, legal, economic and political.

Empowerment is the process of identifying and removing the conditions which cause powerlessness while increasing the feeling of self-efficiency. Women's empowerment implies redistribution of power, qualitative and quantitative presence of women in social, economic and political institutions and processes. The process should also include reforms in existing laws, gender focused policies, elimination of gap between promise and performance, restructuring of institutions, facilitating participation of women at all levels and attitudinal as well as behavioral change among policy makers in particular and male dominated society in general. Further culture- believes, values, morals and perceptions have to be changed but should not act as a constraint.

Women's empowerment, as a concept, has introduced at the International Women's Conference in 1985 at Nirobi. Empowerment is defined here as the distribution of social power and control of resources in favour of women for a qualitative change. The term 'Women's Empowerment' has come to be associated with women's struggle for social justice and equality. According to Pramila kapur, women's empowerment could be considered as a process in which women gain greater share of control over resources - material, human, intellectual knowledge, information, ideas, financial resources and participation in decision making process at the levels of family, community, society and nation. Empowerment of women means, equipping to be economically independent, self reliant having a positive self esteem to enable and to face any difficult situation. They should be able to participate in political and formal decision making structures and developmental activities. Empowerment in its simplest form means the manifestation or redistribution of power that challenges patriarchal ale dominance. It is both a process and the product of the process.

Key words: Legislative, patriarchal, pronged strategy, gender, disempowerment, self esteem, Seclusion, curtailments,

Introduction:

Women's empowerment, as a concept, has introduced at the International Women's Conference in 1985 at Nairobi. Empowerment is defined here as the distribution of social power and control of resources in favour of women for a qualitative change. The term 'Women's Empowerment' has come to be associated with women's struggle for social justice and equality. According to Pramila kapur, women's empowerment could be considered as a process in which women gain greater share of control over resources - material, human, intellectual knowledge, information, ideas, financial resources and participation in decision making process at the levels of family, community, society and nation. Empowerment in its simplest form means the manifestation or redistribution of power that challenges patriarchal ideology and the male dominance. It is both a process and the product of the process.

Empowerment of women means, equipping to be economically independent, self reliant having a positive self esteem to enable and to face any difficult situation. They should be able to participate in political and formal decision making structures and developmental activities. Women play a key role in development both at the context of the family and the society at large including its economy and social system.

Human development has been one of the major thrust areas since the Eighth Five year plan. Consequently all the developmental efforts are being directed towards accomplishing this objective. Specifically the focus is on empowering both women and children, besides mainstreaming them into the national development on equal footing along with their counterparts. The Ninth Five plan too was expected to create an enabling environment with requisite policies and programmes, Legislative support, exclusive institutional mechanisms at various levels and adequate financial and manpower resources to achieve this objective. The Tenth Five year plan called for three pronged strategy of social empowerment economic empowerment and providing gender justice to create an enabling environment of positive economic and social policies for women and eliminating all forms of discrimination against them and thus advanced gender equality goals.

Human Development Report (2004) views that the indicators of empowerment includes access and rights to resources and economic opportunities and information (land, jobs, education , knowledge, skill training, health services etc), the division of

labour and work load , access to services and institutions to support them, involvement in household decision making, political awareness and interest in voting, decisions about voting and representation in public decision making bodies at community, State and National levels.

Gender: The Concept

The term 'gender' is used to describe a set of qualities and behaviors expected from men and women by their societies. A person's social identity is formed by these expectations. These expectations stem from the idea that certain qualities, behaviors, characteristics, needs and roles are 'natural' for men, while certain other qualities and roles are 'natural' for women. These 'gendered' masculine and feminine identities are constructed through the process of socialization, which prepares them for the social roles they are expected to play.

Gender relations in India are patriarchal - that is, they reflect and perpetuate a hierarchy where women are subordinate to men. Patriarchy makes women powerless in many ways by convincing them of their own inferiority to men by demanding that they conform to certain stereotyped 'appropriated' roles and behaviors: by denying them control over their own bodies, lives and labour by limiting their access to resources and by restricting their opportunities to participate in decisions which affect their own lives. These different forms of control have resulted in the exclusion and marginalization of women from social, economic and political processes. Women's subordination is reflected both in women's socio economic conditions like their levels of health, income, education and in their position, autonomy and control over their own lives. Gender equality cannot come about only through changes in women's conditions. It requires transformation of the structures and systems which lie at the root of women's subordination and gender inequality. This transformation cannot be induced by external interventions. Women must themselves become active agents of change.

Gender equality, therefore, demands women's empowerment, a process that leads to greater participation in social and political processes, greater decision making power and to conscious action for social transformation. The process of empowerment is not sectoral – it encompasses women's multiple roles and interests and addresses the inter relationships between them leading to women gaining greater control over their own lives.

Empowerment - dimensions:

* Making a critical understanding of the causes and processes of disempowerment
* Enhancing self esteem and altering self-image
* Gaining increased access to natural, financial and intellectual resources
* Acquiring the confidence, knowledge, information and skills to understand and intervene in social, economic and political structures and process
* Increasing participation in and control of decision making processes within and outside the family and community.
* Moving into new roles and spaces, which have hitherto been seen as exclusively male domains.
* Coming together to question, challenge and change unjust and iniquitous beliefs, practices, structures and institutions, which perpetuate gender inequality.

Causes for gender inequality

The ideology of gender inequality is inculcated in both men and women from birth, before they can think for themselves religion, social, cultural and superstitious behavioral training, seclusion, curtailments of physical mobility distribution of work, dietary discrimination, rewards and punishments all are used to socialize girls to accept and participate in their own oppression (Batliwala 1993). Gender disparity could be seen in terms of historical advantages. Waldron (1983) says that even in the womb, the male fetuses have a lower rate of miscarriage than their female counter part. Ex: According to 2011 population censes 0-6 years of age group sex ratio is per 1000 boys 914 girls. It varies State to State and District to District. The sex ratio in Hyderabad and Ranga Reddy districts of Andhra Pradesh is 910. There is a decrease in the sex ratio in some of the districts, e.g.: the sex ratio in Warangal district is 550. The quality and quantity of women's work is governed by a host of social, religious and traditional factors. It constrains women from taking up occupation and education and there by gender discrimination has been raised (Yadav 2001). Backer (1981) views that gender division of labour is the root cause of gender discrimination.

Gender discrimination caused by cultural and traditional reserves the best food for men or feeding men first or devoting more time to the care of boys than to the girls. Shortage of food in the household offers poorer nutritional status to the girls than to the boys. Although women usually bear primary responsibility for safe guarding family members' health they may have difficulty in obtaining health care for themselves.

Patriarchy is the main reason for gender discrimination in the family (Jyothi rani 1991; Nandini Azad 1998) further more female infanticide, child marriage; dowry deaths and so on continue to be a part of the Indian women's life.

Means of Empowerment:

Education and employment are the two sides of a coin, which empower women. Education is a dynamic process of learning in which women gain access to meaningful information. Engage in critical reflection and act as a collective to transform the material and social condition of their existence. Education, literacy enables people to become more active participants. Education has the potential of empowering women in several different ways: by empowering those with the awareness and knowledge required to make beneficial life choices by increasing their ability to access to the resources and services. Education enhances women's economic independence by equipping them with skills necessary to avail of paid employment opportunities.

Employment and Control over Resources

Employment has given women an opportunity to shoulder responsibility, play new roles, react with new people, face new situation etc. (Lalitha Devi 1982) Many studies reveal that female earnings in the house by employment status would increase the power of financial management and decision making (Kalpagum 1991, Dixon Muller 1993, Rowlands 2000). Employment can be a source of economic independence. Therefore, education and employment are the entitlements of women, which augment their bargaining power.

Political system and empowerment

Liberal democracy as a system of government evolved through several phases. As a part of the evolution of liberal democracy the question of women's rights and their participation were also raised. In the modern period the French Revolution, American War of Independence, Feminist movement and Socialist revolution in Soviet Union and China have raised women's questions and sought to ensure equal political rights. However, these efforts were largely confined to political domain and precluded the socio - economic factors and their interrelation to political process. They seem to have failed to recognize the inter dependence as well as interrelation between political roles Vis-a-vis the socio economic variables.

Political equality among the sexes is a later part of twentieth century phenomenon. Before First World War there were a few isolated cases where women had been given the right to vote, New Zealand (1893) Finland (1906) and Norway (1913). The war also brought the franchise to women in Denmark, Netherlands and Britain. Political equality among the sexes has been formally achieved in most countries and women also with men have the right to vote for and became members of the legislatures without constitutional discrimination after World War II (Naga Saila 1990).

There have always been individual women who wielded vast political power. These include Indira Gandhi, Sonia Gandhi, Sushma Swaraj, Mamatha Benergy, Mayavathi, Jayalalitha etc. But success of these stalwarts should not blind us to the near absence of other women from the political field. Studies of women in political elite have established women's under representation in national legislatures (Walter S G Kohn1980).

The enrollment of women into various political parties is very much discouraging. Both at the State and National level the membership of women in political parties ranges between 5 to 10 per cent to the total membership of the parties concerned. Women's representation both in Parliament and Assemblies reached only 10.82 per cent. It means that they did not get any better treatment even during the regimes of powerful female leaders.

In the recent past all major political parties the left, the right, the centrist and regional parties promised 33 per cent of seats to women in all elections. But unfortunately no political party did comply with its own promise when it actually came to distributing tickets. Then, why do political parties keep promising reservations for women, when they have no intention of fulfilling them, are anybody's guess. They promise because they want to project a progressive image but do not comply with promise because though they have women's wings there is no organized women's lobby in any political party that can question the violation of the promise.

Most of the women have no economic resources of their own. They can enter the field only if fully backed by a political party, which no party is in a position to do so. They prefer to back males instead of females for the best reasons known to us.

The educational policies should provide space in educational curriculum so as the coming generations will have a positive mindset with required attitudes towards gender equality. All structures and institutions have to be restructured to provide opportunities to women to participate in decision making process.

Women reservations both in parliament and Assemblies have to be enacted and implemented. It gives women's perspectives on their problems and issues. Thus, ultimately women's participation in decision making process, sharing of political power, establishing equality between men and women - all leads to women's empowerment and ultimately national development.

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Language Acquisition in Engineering Colleges - Bridging the Gap between Industries and Academics
(A Study of English Curriculum affiliated to Osmania University, A.P.)

Ms. Sujatha Gopal

Abstract

21st Century has witnessed an unprecedented rise in technology and its usage, creating continuous opportunities for engineering graduates, despite the economic downturn. However, according to NASSCOM only 10% to 25 % undergraduates acquire qualifications and specific skill sets that prospective employers are looking for to employ them. Life Skills such as critical thinking, communication, collaboration, and creativity (the 4 Cs) have to be incorporated into the curriculum content apart from imparting knowledge of the global scenario of business, industry, health, culture etc. if the student has to be 'Career Ready' and 'Internationally Competent'. In the light of these observations, the role of English teacher assumes a great importance in the 'Student Centric Learning' mode. This paper aims to analyze the English Curriculum prescribed for Engineering students under Osmania University, A.P. and make suitable suggestions that can be adopted by the English Language teachers to help students compete efficiently in the challenging environment.

Keeping in view the above mentioned points, the paper seeks to deliberate on the following points through a set of observations, questions, propositions, perhaps even insights, into possible courses of action to align engineering education with parallel social, economic and political need:

1. How does the Osmania University Curriculum for English Language help the students develop the skills mentioned above?
2. The problem of limited access of English language to different groups of people viz. geographical, social, educational, economic, and lingual.
3. The role of English Language teacher.
4. The support from the colleges, institutions and University.
5. Inclusion of subjects to bridge the gap.
6. Suggested Action Plans for Students, Teachers and Colleges.

Key Words: Language Acquisition, Life Skills, International Competence, Student Centric, Teaching and Learning, Assessment, Learning Environment.

Introduction:

21st Century is witnessing the effects of globalization in every walk of life. It has transformed the ways in how people live, work, get educated, do business, engage in exchange of political and economic policies– locally, nationally,

internationally, globally. Greengard (1995) defined 'globalization as the system of interaction among the countries of the world in order to develop the global economy. Globalization refers to the integration of economics and societies all over the world. Globalization involves technological, economic, political and cultural exchanges made possible largely by advances in communication, transportation, and infrastructure. This has brought a huge impact on the educational system in India. The prospective clientele for globalization to thrive on is through individuals, institutions, systems and societies. Education sector in India is a very strong area which provides the necessary human resources in the form of professional graduates for businesses to flourish. One such section of professionals is produced in the Engineering colleges. They not only build the economy of the country by taking up various jobs available in the field of engineering, but also of other countries, when they chose to migrate to other countries for further education and job opportunities. Given the fact that India produces a large number of engineering undergraduates every year, it becomes very important for the universities, especially the department of English to groom them to meet the challenges of the industries.

According to statistics available from the Hindu Education Plus, there are about 938 Engineering colleges in A.P. under three areas – OU, AU and SVU. Under OU there are about 436 colleges under JNTU and under Osmania University, there are ten affiliated engineering colleges apart from the constituent colleges. Given the fact that A.P. is the second state to have maximum number of engineering graduates, only 12 per cent engineering students from Andhra Pradesh were selected in campus recruitment in the previous academic year and the figure declined further in the current year, a recent study by National Association of Software and Services Companies (Nasscom). According to the report given by Damodar Raja Narasimha, State Minister for Technical Education, said for the last two years as many as 3.2 lakh engineering graduates remained unemployed. Another 1.3 lakh students may be added to the backlog this year despite the fact that jobs are available in various sectors. This focuses on the fact there is wide gap between the academics and Industry requirements. Employers seek students with certain basic skills to work smart and grow on the job. These skills include Communication, Problem solving and Technical skills. This brings to light the fact that Life Skills such as critical thinking, communication, collaboration, and creativity (the 4 Cs) have to be incorporated into

the curriculum content apart from imparting knowledge of the global scenario of business, industry, health, culture etc.

Osmania University Curriculum for English Language:

English is prescribed in the first year of the study in Osmania University affiliated Engineering colleges. The prescribed sessions are 75 for theory and about 50 sessions of practical work. The theory is divided into five units:

1. **Introduction to English Language**: deals with Importance of Communication, Types of Communication, Barriers to Communication and Strategies to develop Listening skills.
2. **Oral Communication**: deals with Seminar Skills, Types of Speeches, and Relationship models for Interpersonal Communication, Persuasion Techniques and Team Building.
3. **Written Communication**: deals with Paragraph Writing, Report Writing, Types of letters, Resume, Cover letter and Statement of Purpose.
4. **Remedial English**: deals with grammar and correction of sentences.
5. **Prose:** A reading of the lives of Barack Obama, R. Madhavan, Indra Nooyi and Muthyala Raju Revu.

The practical sessions include introducing the students to Phonetics, Group Discussion, Debates, Presentation Skills, Interview Skills and Role Plays.

The curriculum is aimed to cover the four learning skills namely, Reading, Writing, Speaking and Listening. However, in terms of demand and supply, the demand and expectation of Language Acquisition is very huge and the supply provision through the sessions allocated, only in first year is very meager.

The Challenges of Language Acquisition from the point of Students:

1. The students come from various geographical, social, educational, economic, and lingual backgrounds.
2. There is huge disparity in the language skills of the students due to the above mentioned reasons.
3. Technical subjects are given more importance than language.
4. A mismatch between what is learned and what is applied in the professional world.

5. A popular myth that Communication skills can be developed through the CRT (Campus Recruitment & Training) programmes usually conducted by companies (with absolutely no or little knowledge of language Acquisition) in the colleges.
6. The lack of usage of these skills in the class room environment other than during the teaching hours, where the student has a very passive role many a time.
7. Interaction of most students with teachers is usually in regional language. The students get used to this from their intermediate days and continue to do the same in the professional colleges.

The Role of English Language Teacher and Challenges:

1. Heterogeneous classroom in terms of language acquisition and huge numbers.
2. Motivation of the teacher to adapt new forms of teaching to keep pace with the rapid changes in the fields of technology.
3. Change from Teacher centered teaching to Student centered teaching.
4. Efforts to disseminate knowledge in all four forms of Language Acquisition, namely Reading, Writing, Speaking and listening.
5. Willingness to acquire Continuous Professional Development through seminars, conferences, refresher courses, orientation programmes etc.
6. Skill acquisition by students to be the main thrust of teaching. The teaching should be more practical based.
7. The interests and motivation factors of students also form a part of teaching.
8. Task based activities should be encouraged rather than conducting a few JAM or group discussion sessions.
9. Collaboration with other teachers for better dissemination of language, for example, the teacher who teaches technical subjects can be made to understand how the language of a student can be assessed as a part of a project or presentation through various activities.
10. All teachers of the college are responsible for managing and monitoring student learning. It just cannot be the responsibility of English Language teacher.

Support from the Colleges, Institutions and University

1. Colleges must provide adequate infrastructure for classes and well equipped language labs with facilities like language software, CDs.

2. They must also ensure that the teachers are provided with adequate teaching aids such as OHP, LCD and equipments to use audio visual aids.
3. Students should be provided with library facilities to read books (not only technical subject related but also fiction, poetry) newspapers and other journals.
4. Institutions should tie up with industries and the teachers should be made to understand the recruitment processes and the employment needs.
5. The university should hold regular meetings to evaluate the situation and seminars to equip the teachers with further skills.
6. What is needed is the network of the institutions, colleges and the university to benefit the students.
7. Most colleges do have additional course work that benefits the students. That shared knowledge and willingness to have it in the respective colleges will improve teaching and the students will be the direct beneficiaries.

Inclusion of Subjects to bridge the Gap:

Colleges can encourage courses like Business English or Technical English as an elective paper in the second and third year. Students can also be trained in English Language Proficiency exams as IELTS, TOEFL, SAT etc. Students should also be exposed to varied subjects like politics, economics, culture, science, humanities to help a wider spectrum of knowledge.

Suggested Action Plans:

1. Inclusion of English with emphasis on task based activities as a subject for all the years.
2. Adopt additional English Language Proficiency exam patterns for evaluation and assessment of students.
3. Conduct industry - academic interface often.
4. Evaluate and revise syllabus periodically.
5. Recruitment of qualified and efficient teachers.
6. Conduct task based projects regularly
7. Establish professional clubs like Reading clubs, Academic Club, GD Club, and Debating Club.
8. Monitor activities with equal participation from all students.
9. Use of technology like internet to make classroom experience more vibrant.

10. Take constant professional support from established institutes and organizations that promote English Language Teacher Training.

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Status and Empowerment of Women in the Society

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Abstract

Empowerment is a multi-faceted, multi-dimensional and multi-layered concept. Women's empowerment is a process in which women gain greater share of control over resources- material, human and intellectual like knowledge, information, ideas and financial resources like money- and access to money and control over decision- making in the home, community, society and nation, and to gain 'power'. According to the Country Report of Government of India, "Empowerment means moving from a position of enforced powerlessness to one of power".

With the growing globalization and liberalization of the economy as well as increased privatization of services, women as a whole have been left behind and not been able to partake of the fruits of success. So, mainstreaming of women into the new and emerging areas of growth is imperative. This will require training and skill upgradation in emerging trades, encouraging more women to take up vocational training and employment in the boom sector. This will also require women to migrate to cities and metros for work. Provision of safe housing, and other gender friendly facilities at work will need to be provided. The main objective of this paper is to analyse the status of women in the society and economy. The issues facing women in India have their distinctive features as compared to the rest of the world. A confluence of history, mores and religion has kept the women subjugated by the patriarchal system for Hit: past many centuries. The key issues facing women in India have been described in detail below.

Key words: indigenous, conventions, foeticide, insurgency, trafficking, Pornography,

Introduction:

A large proportion of the Indian population continues to live in poverty. Women, especially those from indigenous or minority culture suffer most from this abject poverty. This happens due to added responsibility, apart from the family and household functions, on the women to earn a living and the skewed patriarchal system that denies access to ancestral wealth. Around the world, and more so in India, while women work nearly 67 per cent of working hours they earn only 10 per cent of the income and own less than 1 per cent of the land. Poverty often leads to economic exploitation and sexual abuse of the women. The most debilitating effect it has is in the fact that if the woman is unable to come out of poverty the cycle is perpetuated through her children, especially the girl child.

Another aspect of this feminisation of poverty is the inequality in access to and participation in economic activities as compared to men. Most of the work that women do, especially that at home or in the family fields, is not classified as an economic activity. Gender differences in the work place especially in the nature of work and the compensation continue to be widely prevalent.

Inequitable, access to power and decision making, inequities in the women's share of decision making in the public domain as well as in their private lives are evident in most societies. It is in this regard that international standards and conventions such as CEDAW, Conventions on the Rights of the Child etc. can be used as a powerful strategy of persuasion of governments. While women have enjoyed the right to vote for many years, they occupy only a small fraction of the seats in the legislature or parliament.

In a region which saw the first women head of state, women's exclusion from most decision making bodies is indeed ironical. The situation is slowly changing with the 73rd and 74th constitutional amendments that have provided for reservation of 33 per cent of the seats in Panchayats and Municipalities for women. This has yet to translate or be reflected at the national and state level.

The incidence of physical, sexual and psychological abuse of women, even in her own home, is increasing day by day. Female foeticide and infanticide are still prevalent in some societies. Another form of abuse is trafficking in women, which is sometimes across international borders. Women often bear the brunt of riots, conflicts and insurgency. Violence against women, both domestic and societal, is also demonstrating an ever increasing trend. Cases of dowry deaths, rape and sexual molestation are regularly imported in spite of legislation and policies that specifically prohibit the same. Another horrifying violation of human rights that some women have to face at a very early age is being dragged into prostitution.

Child Prostitution has increased dramatically over the years. Due to abject poverty, children especially girls, are exposed systematically to sexual abuse for the pleasure and profit of adults. Pornography and child prostitution are all pervasive evils. Parents are prone to sell their girls to agents who take them to brothels and condemn them to a life of squalor and misery. Violence against women needs to be understood, recognized and addressed as a cross cutting issue of support, at individual and community level. This issue needs committed efforts and cannot be an appendage or an automatic offshoot of micro-credit programmes or even the ICDS programmes.

While maternal mortality rates have improved over the last fifty years the female illiteracy rates are still alarming. This lack of education denies the women their right to productive employment as also their legal rights. Illiteracy amongst women is mainly caused by preference to the boys as compared to the girl in matters of education, text books and teaching styles that perpetuate gender type casting, poor infrastructure for the girls (especially those from religious minorities) and a host of other similar reasons. While maternal mortality rates have decreased over the years much remains to be done in order to achieve parity with the development nations on this social indicator. This is mainly due to poor awareness on reproductive rights, poor nutrition, excessive workload and multiple children bearing.

Generally polices and schemes for women are formulated as if they are comprised of one composite and homogenous group. In reality there are many layers of heterogonous groups and depending on their socio economic, geo political background the degrees of vulnerabilities also differ. Therefore specific strategies and programmes need to be developed which will address the unique problems of specific groups.

Amongst vulnerable groups, the women belonging to socially backward communities such as SC, ST or OBC face double discrimination of being a woman and also from a backward community. Similarly women with disabilities have very specific problems even when compare to men with disability. There are women who are victims of violence or sexual abuse such as trafficked women, rape victims who need a very different but specialized rehabilitation package etc.

Adolescent girls are a highly vulnerable group as they are subject to a number of atrocities like trafficking, rape, child marriage and etc. The following information table illustrates a list of categories of women who are in difficult circumstances.

Legal Provisions for Women in India:

India has elaborate laws to protect the rights of women, including the Prevention of Immoral Traffic, the Sati (widow burning) Act, and the Dowry Prevention Act. Women and children have figured prominently in the government's agenda of social reforms and initiatives. The following acts are shown about legal aspects of women in the society and economy of India.

Table No. 1
Various Acts Protection for Women in India

• Indian Penal Code, 1860 • The Divorce Act, 1869 (4 of 1869) • Indian Evidence Act, 1872 • The Indian Minority Act, 1875 • Guardians and Wards Act, 1890 • Child Marriage Restraint Act, 1929 (XIX OF 1929) • Punjab Amendment in Section 2, (Punjab Ordinance, 23 of 1971) • Punjab Amendment: In section 9 • The Parsi Marriage and Divorce Act, 1936 • The Muslim Personal Law (Shariat) Application Act, 1937 • The Arya Marriage Validation Act, 1937 (XIX of 1937) [14th April 1937] • The Dissolution of Muslim Marriages Act, 1939 • Special Hindu Marriage Act 1954 • Immoral Traffic (Prevention) Act, 1956, Bill No. 58 of 1954 • The Hindu Marriage Act, 1955 (25 OF 1955) (18tn May, 1955) • The Hindu Succession Act, 1956 (30 of 1956) (17th June, 1956)	• The Hindu Adoptions and Maintenance Act, 1956 • Dowry Prohibition Act, 1961 • Medical Termination of Pregnancy Act, 1971 • Criminal Procedure Code, 1973 (of 1974) • Family Courts Act, 1984 (Act No. 66 of 1984) [14th September 1984] • Indecent Representation of Women (Prohibition) Act, 1986 • Muslim Women's (Protection of Rights on Divorce), Act 1986 • Commission of Sati (Prevention) Act, 1987 (No. 3 of 1988) (No. 3 of 1988) • Workmen's Compensation Act, 1923 • Minimum Wages Act, 1948 • Factories Act, 1948 • Maternity Benefits Act, 1961 • Contract Labour (Regulation and Abolition) Act, 1970 • Equal Remuneration Act, 1976

Another facet of globalization is related to the fact that many persons especially women will be severely affected with the advent of setting up of industrial parks, national highways, SEZ etc. as huge tracts of farm land are likely to be acquired for this purpose. This would require massive resettlement of the displaced persons and their families. It is therefore essential that a viable resettlement policy and strategy is to be formulated and put in place immediately which clearly reflects the needs of women impacted by globalization/ displacement.

Then the focus is layed to build the capacity of SHGs realizing the fact that these are in a more advantageous position to combine their resources and talents for enabling viable income generating activities, as compared to a loan.

In recent decades, economic and social inequalities have increased alongside high growth rates, stemming from the nature of the growth process, embedded pre-existing structural inequalities, and as an offshoot of globalization. This has exacerbated regional inequalities depending upon their initial resource endowments and social structures. It has also exacerbated the inequalities between men and women growth needs to be more equitable, and more broad-based in its employment generating aspects. Greater attention to the promotion of livelihoods, the enhancement of productive assets such as land in women's hands, the expansion of economic and social security, of education and health care and increased women's participation in democratic decision-making at all levels can build a more equitable growth path. Such social inclusion, and attention to human development would enhance growth itself. The status of women, proves that women are deprived of their human right and facilities. Inequalities still prevail, oppression, harassment and ill-treatment is still precarious, despite many constitutional and legal provisions are provided in favour of them. If the women are educated and trained to understand those constitutional and legal provisions, then there would be a nation with gender equalities and equal rights and provisions will be provided to the women on par with the men.

Conclusion:

The status of women in India, the issues and problems being faced by them have their distinctive features as compared to the rest of the world, since large proportion of the Indian population, in poverty. Women, especially those from indigenous or minority culture suffer most from this abject poverty. Poverty often leads to economic exploitation and sexual abuse of women. The most debilitating effect it has is in the fact that if woman is unable to come out of poverty the cycle is perpetuated through her children, especially the girl child. Another aspect of this feminization of poverty is the inequality in access to and participation in economic activities as compared to men. Most of the work that women do, especially that at home or in the family fields, is not classified as an economic activity. Gender differences in the work place especially in the nature of work and the compensation continue to be widely prevalent.

Inequitable, access to power and decision making, inequalities in the women's share of decision making in the public domain as well as in their private lives are

evident. The incidence of physical, sexual and psychological abuse of women, even in her own home, is increasing day by day. Female foeticide and infanticide are still prevalent. Violence against women, both domestic and societal, is also demonstrating are ever increasing trend. This violence against women need to be understood, recognized and addressed as a cross cutting issue of support, at individual and community level. This issue needs committed efforts and cannot be an appendage or an automatic off short of micro-credit programmes or even the ICDS programmes.

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Gender Inequality: Concern and Challenges

Mrs. I. Balamma

Abstract

Gender equality is not an unknown concept in today's society .since the few decades this concept has been widely propagated and efforts have been made to assert this gender equality. still, it might come to one's mind whether our society practices gender equality? Gender equality refers to equal treatment towards people irrespective of their sexes in all walks of life. In India where the roots of patriarchy are deeply embedded in past, men are treated very differently from women. Right from the birth onwards a girl/women is subjected to worse forms of treatment and discrimination as compared to a man, thereby making her life miserable.

Still today, birth of a girl child is perceived as ominous in India families .although, superficially considered as lakshmi, she is treated as a burden to the family. Therefore, even now in remote villages of Gujarat, Rajasthan, Bihar, Tamilnadu there are incidents of female feticides and or female infanticides. Even if a girl child survives through her infancy, she has to go through ill-treatment in the rest of her life.

Key words: socialization, parayadhan, transcended, harassment, conventional, battering, self reliance, oppression, suppression.

Introduction:

In India the socialization process is so patriarchal in nature that very subtly it indicates the boys when grow up are supposed to be the earning and supporting members of the family, therefore boys need nutritious food, higher education, good medical facility so that he grows up to be a strong man capable of supporting his family. Whereas in socialization process a girl is perceived as a "paraya dhan"; a person destined to get married, have her house, go and serve her husband and his family since earning is not the girl's job she need not have good food, medication, education, playful childhood. It is the socialization process that teaches a girl to give away the first share of the food to all the male members of the family, no matter if she has food left for herself or not .this indicates that a man has his right to meet his basic needs first than a woman. The worst part is that it is always a woman who plays the key role in socialization process which means it is the woman again who generates this unequal treatment towards girls.

It has been documented that overall female illiteracy is more than male illiteracy and girl dropout rates are higher than boys and in most cases girls are forced to drop out of education. Though in the time span woman have transcended from the four walls to work place (which is predominantly men's domain of work) but here too woman do not get her dues. Woman do to two thirds of the work but earn only one third of

incomes showing that women are paid less than men for the same kind of work that both does .it can be analyzed from a different perspective :men has always learnt to see woman playing the subordinate role in the house who is passive and carries out all the orders of the male members of the family. Now when woman have broken the traditional roles and have taken responsible position at decision making level, men cannot accept it because they are not used to carry out orders of women or follow the decisions of woman as this itself question the force of power, control and dominance of men over women. No wonder women encounter problems in their work place in the form of verbal abuse, physical abuse, sexual harassments' etc. Report shows that violence against women is increasing and minor girls constitute 30% of all victims of sexual assaults. Incidents of dowry death ,rape, sexual abuse of girl child are increasing day by day which shows that a man has all control over a woman and therefore he can do whatever h feels like to a woman, whereas woman do not have any protection now any democratic stand.

The loop holes traditional conventional gender roles have been widely recognized in the interest of overall development of society. Several statutory provisions are made to curtail gender discrimination. The barrier of subscribing to traditional values and sentiments attached to made superiority is the only concern in attaining gender equality.

Domestic violence:

The problem of domestic violence is one of the most common problems faced by Indian women. it is important to launch campaigns against such violence which could be physical, sexual, verbal, mental or economic .awareness has to be generated by debates on issues' like wife battering., male child preference, dowry harassments, exploitation and the different types of harassment a woman is subjected in her family, social work intervention can be crucial to the resolution of domestic violence problem.

Women & health:

According to report of world health organization WHO about half an million women die annually around the worlds due to pregnancy related cause and 99% of these death occurring in developing countries the sex ratio is also declining, the causes of the problem may be the low age of marriage of girls, low nutrition status of women in families in reproductive age group illiteracy ignorance etc.,

Political parties, planners has given for the recommendation on gender equity of promotion and health status of women the policy was formulated but still remains a gap between the perception and practices followed by the community, this needs to be bridged which may be by mass education, awareness community group discussion allocation of more skilled person more qualitative and quantitative research.

Welfare to empowerment-approaches to gender equality and justice:

There is a shift in policy approach towards woman from welfare to equality to antipoverty as characterized by Buvinic (1983) there are two other approaches namely "efficiency" and "empowerment"

The welfare approach tends to create dependency rather than promoting women's independence. According to this approach women were perceived as persons in need of "welfare doles" instead of threatening than as active agents participating in the development process. The equity approach is concerned with fundamental issues of equality as enunciated in the Indian constitution. The anti-poverty approach aims at reducing income inequalities between man and woman In focuses mainly on their productivity role. According the efficiency approach women is equally capable as workers. As community managers they have shown more commitment than men. The empowerment approach intends to increase women's power; self reliance and internal strength. Women can also influence the direction of change.

In the village Showripuram in West Godavari district discrimination against women still exists in the domain of literacy, education and employment, access to health care and medical service. Gradual declining trend of sex ratio is also observed the practice of gambling women battering and drinking alcohol is prevailing rural Showripuram. Men inherit the property and women inherit the obligation of labor. Their day long services are neither recognized by their family members nor by the society and even in the decision making process they play only a subordinate role indicating low status .this is the outcome of continuous neglect to women community and gradual ,marginalization of women society.

The extent of age old oppression, suppression deprivation and discrimination against women has gradual been decreasing since the intervention of paper setters in the field .The paper setters being the professionals have been playing their outstanding role to organize rural women into several self help[p groups ,in which women are attending regular meetings deciding over there common problems and issues ,practicing small

savings and gathering knowledge and experiences to deal with various issues of women development

Social work agenda for 21st century:

Globalization has recast gender relations and altered the status and life condition of woman, more woman work outside the home in the wage labor force. while this has undetermined traditional patriarchy, it has burden women with a double load of work, exposed them to harshly exploitative conditions in the paid work place and scarcely improved their material wellbeing. Women have suffered disproportionately room globalization, while seeing few of its benefits.

"Just because women experience pregnancy and child birth does not mean that their lives must be limited to housework and child care, and just because men cannot give birth does not mean that they are unable to perform a nurturing role. With the growth of women's movement in the 1960s, 1970s new types of families emerged in which parents played less traditional role."

The authors of this quote are Susan golombok and Robyn five's who psychologists are. This quote is talking about males and females all over the world today. It means that wives and husbands should share house work and nurturing roles with each other so that wives may enter the work force. This information is important because it is unbelievable that until the 1960s only woman played the roles of housekeepers and child caretaker at home. Things have changed, however gender inequality is still remaining. Gender inequality is that women are regarded as inferior by men. Men, usually think that women should stay at home and it is the men who should work outside the home. To eliminate this kind of attitude, what can we do?

First of all, it is necessary to change and eliminate the traditional sex roles. Men's roles and women's roles should be equal. Husband should help with housework so that wives can work outside the home. The traditional sex roles were created by society and culture, therefore, If our society and culture change, we can change and eliminate the traditional sex roles. Next, laws and systems should be strictly regulated with severe panel regulation of laws, enterprises will obey the laws. If so, women will be able to work easily. It is natural for women to work as well as men. There should be more laws which control gender inequality. Also, women must enhance their consciousness about their own rights and abilities. The numbers of women who are taking science and engineering courses are on the increase, but this number is still small.

Enterprises tend to employ people who are familiar with science and engineering rather that humanities and home economics.

Gender inequality should be eliminated. It is necessary for people to be aware that things are changing as time goes on. It is also essential for women to make every effort to improve their status of society. Men should alter their idea that men are superior to women and women should take action. The GOB and local organizations should work to make more laws and strictly regulate the violation of these laws to eradicate gender inequality.

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Education for Employability

Mrs. Santosh

Abstract

Frequently mentioned by both employers and universities is entrepreneurship/enterprise: broadly, an ability to demonstrate an innovative approach, creativity, collaboration and risk taking. Employability is commonly seen as one of the manifestations of the rapid changes associated with the globalization era of the past two decades. This paper aims to make a focus on an individual's ability to gain initial employment, maintain employment, move between roles within the same organization, obtain new employment if required and (ideally) secure suitable and sufficiently fulfilling work, in other words- their employability, more important than the simple state of being employed.

Key words: Self-management, negotiating, apprenticeship, vocational.

Introduction:

Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational.

Employability can be defined as: a set of achievements – skills, understandings and personal attributes – that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy.Employability is the development of skills, abilities and personal attributes that enhance students' capability to secure rewarding and satisfying outcomes in their economic, social and community lives.

Few essential employability skills:

- Self-management – readiness to accept responsibility, flexibility, appropriate assertiveness, time management, readiness to improve own performance based on feedback/reflective learning.
- Team work– respecting others, co-operating, negotiating/persuading, contributing to discussions, and awareness of interdependence with others.
- Commercial and Customer Awareness– basic understanding of the key drivers for business success – including the importance of innovation and taking calculated risks – and the need to provide customer satisfaction and build customer loyalty.

- Problem Solving– analyzing facts and situations and applying creative thinking to develop appropriate solutions.
- Communication and literacy – application of literacy, ability to produce clear, structured written work and oral literacy – including listening and questioning.
- Application of numeracy – manipulation of numbers, general mathematical awareness and its application in practical contexts (e.g. measuring, weighing, estimating and applying formulae).
- Application of information technology – basic IT skills, including familiarity with word processing, spread sheets, file management and use of internet search engines.

Underpinning all these attributes, the key foundation, must be a positive attitude: a 'can-do approach, a readiness to take part and contribute, openness to new ideas and a drive to make these happen.

Educational providers across all levels are expected to respond to this new employability imperative. Public further and higher education institutions, in particular, have been encouraged to transform their curricula and pedagogies in its service. For colleges, the challenge has been especially stark as the rise of employability has been closely intertwined with the demise of apprenticeship and a related collapse of old business partnerships.

The purpose of this article, as a whole, is to improve our understandings of employability in a twofold manner: practically through the experiences and challenges of colleges; theoretically within the discipline of education. It is suggested that employability to begin to plan a methodological approach to working together on how education can promote employability for their students. Crucially, it starts from the assumption that employability is not as simple as it appears in either theory or practice. Hence employability is a concept where new relationships are supposed to be centred on a new approach to teaching and learning that moves away from old views of vocational education content, as a combination of trade theory and practical skills development, towards one that highlights core skills and attitudes, job seeking skills and a repackaged set of vocational skills and occupational skills.

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Symbiotic Relation between Education and Employment

***Mrs. K. Hymavathi**
**** Dr. Fakruddin Ali Ahmed**

Abstract

The relationship between education and employment is a symbiotic one. However, the contemporary context of today's economy has replaced "employment" with "employability".

Graduate employability has been a global concern for all higher education sectors. Currently, the country is experiencing a major education overhaul through the implementation of the National Higher Education Strategic Plan. The strategic thrusts and critical agendas to enable our tertiary institutions to achieve world class status and at the same time support the national need for quality human capital. These initiatives can be broadly summarized under three themes: **academic, co-curricular activities, and industry link.**

Expectations of higher education have changed remarkably due to the global market changing environment and the changing landscape of higher education. At the same time, the increase global market competition demands that higher education equip graduates with more than just the declarative knowledge in specific domains but also the functional skills or work readiness skills to prepare graduates for the world of work. Thus, graduate employability has been a global concern for all higher education sectors, whereby higher education is expected to revitalize the learning environments to suit current job demands. Higher education is expected to foster learning outcomes that are valued by the employers. Building on the premise that higher education should provide rich environment to encourage student engagement and to stimulate complex skills.

Education and training create assets in the form of knowledge and skills which increase the productive capacity of manpower and this is referred to as human capital. Education is considered to be a process of skill formation and in this aspect it is treated at par with the process of capital formation. Economists argue that as demand for educational training increases, the systems need to meet the country's requirement for people with high levels of skill and knowledge. But the major stumbling block in this growth path is the inadequate skill set of the workforce. While on the one side we have the world's large stock of scientists, engineers and management graduates, we have been unable to derive full economic benefit from this talent base because of the **mismatch between industry needs and university output.** Skillful management of the intellectual capital could be a driver for growth and is imperative for Indian economy. The purpose of this study is to identify the employability skills required by young graduates and assess how there can be a value creation through effective knowledge management in terms of pedagogy, evaluation process and feedback mechanisms.

Employability is a vital word in consideration on the platform of commerce and industry and higher education especially professional education. It has witnessed skill gaps into the students wish to join industry. Present paper is a review paper in nature attempt to articulate views of researchers on employability skills, employer's perspectives on employability skills, employability skills gap and bridging the skills gap. The paper does not conclude in its own but facilitate more thinking on bridging the skill gap.

Keywords - Higher Education Institutions, entrepreneurship education, employability, challenges.

Introduction:

Emotion of higher education

Historically, the development of educational system in several centuries is old and has a vast tradition. In India during the Gupta dynasty (320 to 550 CE) urban institutes of higher learning such as Taxila and Nalanda were established where grammar, medicine, philosophy, logic, metaphysics, arts and crafts etc. were taught (Prabhu, 2006) and these institutes were even attended by students from China and Central Asia (Blackwell, 2004).

The education system under the rule of Mughal (1526–1803) adopted an inclusive approach with the monarch favouring additional courses: medicine, agriculture, geography, and even from texts from other languages and religions.

The British rule during the 19th century did not take adequate measures to help develop science and technology in India and instead focused more on arts and humanities. After, new policies in 1835 gave rise to the use of English as a medium of education.

Shortly after gaining independence in 1947, achieving 'education for all' became a priority for the government. The 86th Amendment of the Indian constitution makes education a fundamental right for all children aged 6-14 years. The National Policy of Education, 1986 envisioned that free and compulsory education should be provided for all children up to 14 years of age before the commencement of 21st century. Further to this many schools were established across the country in public sector and private sector. The general education and literacy among the Indian population started to increase slowly.

According to the 2013 census, the total literacy rate in India is 74.04%. The literacy rate for women is only 65.46%. The gap between rural and urban literacy rate is also very important in India. This is evident by the fact that only 59.4% of the population in rural areas are literate, compared to 80% of the urban population, which is 3% of the total population. Among the states, Kerala has the highest literacy rate of 93.91% and Bihar, the lowest at 63.82%.

As a result of spurge in literacy and expansion of school education in subsequent years more and more young people aspired to gain higher education after completing secondary and senior secondary school education. To develop the system of higher education, the government established the University Grants Commission in 1953.

Labour market and employability

More than 25% of world's workers are Indians and the Indian industry would face its biggest challenge ever: a talent shortage of 3.1 million knowledge workers, across Industry by 2010. This was further supported by the fact that currently, only 25% of fresh engineers and a mere 10% of fresh graduates are actually employable. The educational and skill profile of existing workforce is very poor and is primarily responsible for its low productivity.

Though enrolments in academic institutions are high in numbers; more than 90% in primary classes, around 60 % in upper primary classes, more than 30 % in higher secondary and above 10 % in higher education, the percentage of people having marketable skills is woefully low. As per National Sample Survey on employment and unemployment only 10.1% of male workers and 6.3% of female workers possessed specific marketable skills and the percentages were marginally higher in urban areas.

The levels of vocational skills of labour force in India compare poorly with other countries. Only 5% of the Indian labour force in the age group 20-24 had vocational training compared to 96% in Korea and varying between 60-80 % in industrial Countries. This suggests to the fact that education system in India is extremely focused towards general academic education with little or no vocational orientation. Among the Indian graduates, a large majority (41.2%) are working in the community and personal services sector.

This includes government, defence, education and health services. More than 30% of the main workers in this sector have graduate degree or above. In the manufacturing sector, only about 10% of workers are graduates and above. This is not surprising since 16.9 million (out of 41.6 million) workers in manufacturing are in the household industries and large proportion of jobs in manufacturing in India do not require higher education qualifications. During the 1990s, there has been a shift from low productivity sectors earlier to middle productivity sectors such as financial and business services category.

During this period, nearly half of the workers in financial services sector that includes insurance, real estates and business services and also scientific and research services were graduates or above. After 2000, there appears to have been a surge in employment in IT and IT enabled services sector. As per NSSO 56th round and the Annual Survey of Industries, while in the year 2000-01 the gross value added by the organised sector is 75.24%, it employed only 13.85% of the workforce. Of the total number of job seekers at the end of 2004, 72.3% were educated. This suggests that over the years job seekers are becoming more educated. At the same time, the majority of job seekers are inexperienced, freshmen and do not possess skills to qualify them into any category of occupation. In overall terms India has a huge problem of unemployment and underemployment. The number of unemployed persons in India steadily increased from around 7.78 million in 1983 to 10.6 million in 2000 placing the unemployment rate at around 2.8%. There is also evidence to suggest that persons with technical qualifications have the highest unemployment rate suggesting a mismatch between the labour market requirement and the training provided .Therefore, it is not surprising that the unemployment rate of graduates at 17.2% is significantly higher than the overall rate of unemployment in the country. Nearly 40% of the graduates are not productively employed. Of the total unemployed population of 44.5 million, unemployed graduates are 4.8 million. Ghose (2004) pointed out the fact that the young people with some education would not want to engage in low-productivity, low-income work in the informal sector. They want non-manual work, preferably in the organized sector. The very fact that they have some education also means that their families have some capacity to support them. Visaria (1998) noted that many of the unemployed have rather poor qualifications in terms of their performance at the examinations and have little

aptitude or the capacity for the type of work they aspire for. Many of the unemployed are also perceived as unemployable by the industry.

Angle on demand and supply:

According to Indian Council for Research on International Economic Relations (ICRIER), in 1950 India had 2,63,000 students enrolled in 750 colleges, which were affiliated with 30 universities. By 2005, the numbers had grown dramatically: 11 million students in 17,000 colleges affiliated with 230 universities.

Another 10 million students were enrolled in 6,500 vocational institutions. Despite this phenomenal growth, India would have to nearly quadruple existing college seats and more than quadruple the number of professors to achieve the 20% Gross Enrolment Rate (GER) by 2014, cited in the Venture Intelligence report, 2010.

Another measure of India's demand for higher learning is the number of Indian students studying abroad. The total cost of this endeavour is US$ 3.9 billion and as of November 2009, more than 100, 000 Indian students are studying in United States which is far greater than any other foreign country .

The rate of unemployment among youth is quite larger than the overall national unemployment rate, which is actually a common trend for most of the nations in the world, developed and developing countries alike. The alarming trend for India, however, is the higher unemployment rate among higheducated youth and young people in urban areas.

The lower youth unemployment in rural areas can be explained in terms of the largest labour share in agriculture (59.2%) as compared to industry (17.2%) or services (23.8%). Probably, the same reason can formal education or with bare minimum elementary education. Keeping pace with the demand of globalised economy with shifting focus on knowledge-workers and skilled manpower driven employment , India's youth needs to be empowered with such a value-based education, which inculcates those necessary 'employment skills.'

Lessons to be learned:

On review of the occupational structure, education and skill profile of the workforce, labour market trends and problems of graduate unemployment, it is clear that

India faces formidable employment challenges. The country has to provide jobs for the 8 million new workers expected to enter labour force annually over the next decade and increase the earnings of currently more than 100 million workers who live in poverty.

In addition, gender, caste, regional disparities have also to be addressed. A majority of the unemployed youth consists of persons with no prior work experience. They are new entrants into the workforce. The high rates of youth unemployment have probably contributed to the rise in the proportion of youth aspiring to go for higher education. A large proportion of higher education does not provide employability skills and those that provide are of poor quality.

An employment potential study by Confederation of Indian Industries (CII) for 36 sectors prospects that an additional 2.5 million jobs would be created in the automotive sector, while the financial sector could employ another 1.1 million people. The construction industry could employ 9.9 million more people, whereas the defence equipment sector sees the possibility of generating only 160,000 jobs. Employment potential in banking & financial services sector is 1.1 million jobs. Other important sectors where high employment is possible are oil & gas (2.3 million), gems & jewellery (3.16 million), healthcare (6.1 million), horticulture (2.6 million), khadi (1.9 million), media & entertainment (1.0 million), retail (9 million).

Integration of labour markets globally accompanied with technological changes offer an opportunity. The demographic differentials provide a distinct advantage due to the young profile of its workforce. Report of a High Level Strategic Group in 2003 says that by 2020 could possibly generate (direct or indirect) job opportunities for 10-24 million people by providing an increasing array of services to advanced countries that currently face skill shortages and additional 10-48 million jobs could be created by servicing overseas consumers of services such as medical, tourism and education (AIMA,2003). The emerging global occupational structure offers an opportunity to provide workforce for the knowledge economy beyond the national borders.

Further, it also has opportunity by sending its people for work abroad. For a country like India with large population and huge capacity to generate skilled professionals at home and by education abroad, out-migration of professionals is now seen as an opportunity and not a threat. It is seen that advanced countries have a big appetite for skilled professionals. In a globalised economy, countries compete for

markets by creating and attracting technically skilled talent. A large part of such flow is through education abroad. Host countries perceive workers who studied in their countries to assimilate into their new societies quickly. Freeman (2005) sees that a country like India with large population and sizeable number of scientists and engineers could threaten North's monopoly in the hi-tech sectors by producing innovative products and services, which terms as *human resource leapfrogging* that countries like India could possibly create.

In totality, outlook for job opportunities looks good. It can become a magnet economy attracting high skilled and high waged investment capital from the MNCs, and offer high value added services to the rest of the world. This would require to adopt an outward looking approach to reach out to the global markets and focus on sectors where it has resource advantage. This transformation also reflects the emerging global occupational structure on the basis of a more efficient division of labour across nations. Technological changes, particularly rapid growth of new information and communication technologies is responsible for this.

India has witnessed accelerated growth in the services sector over the last few years. Within the services sector, other business services [which include Information Technology (IT) / Information Technology

Enabled Services (ITES)] have seen phenomenal growth in recent years with a significant proportion of the same coming from exports and outsourcing. According to the World Bank (2004), it exhibits a strong revealed comparative advantage (RCA) in services, particularly software services as compared to goods.

The country has leveraged its rich pool of human capital with quality educational institutions and large English speaking population. Globally positioned in IT-ITES sector with a cumulative average growth rate (CAGR) of 35.3% over the financial years 2000-05 amounting to US$ 17.9 billion in 2004-05.

Now an international services hub and it commenced with IT-enabled services, both voice and data, and expanded to all knowledge sectors, such as pharmaceuticals, biotechnology, and engineering design. This sector directly employs 1.35 million people and 80% of them are engineers and other graduates. This number is likely to go up to 2.5 million in the next five years. Though the growth of IT / ITES sector would have a limited impact of the overall employment scenario , its share in

graduate employment is significant. In addition, it has many multiplier effects on the economy. It has created indirect employment opportunities for 1.15 million people in transport, catering, construction, security and housekeeping services. Large disposable income of a relatively young section of society has fuelled consumer demand. There has been a surge in demand for cars, two-wheelers, real estate, hotel and airline travel. Adding more than US$ 0.22 billion in direct tax revenue, the sector is contributing to rapid growth in consumer demand, hotel accommodation and air-traffic demand, and the demand for real estate both for offices and housing .

Instead of providing employment, the current focus is on making people employable so that the existing demand supply mismatch can be rectified. Employability is often referred to as the acquisition of skills, which allows a person to remain employable. From the perspective of employers, 'employability' often seems to refer to 'work-readiness', that is, possession of the skills, knowledge, attitudes and commercial understanding that will enable new graduates to make productive contributions to organizational objectives soon after commencing employment. Though this may appear to be very restrictive, there are pressures on higher education institutions from its stakeholders to make more explicit efforts to develop the 'key', 'core', 'transferable' and/or 'generic' skills needed in many types of high-level employment. This is not unique to one single country, but seen in most parts of the world.

In the context of higher education, the broad concept of employability was suggested in the NCIHE Report, 1997, that identified a set of key skills which were 'relevant throughout life, not simply in employment'. Dearing defined these skills as communication, numeracy, IT and learning how to learn at a higher level and recommended that provision of such skills should become a central aim for higher education.

Strategies to be adopted:

The traditional forms of academic governance are increasingly criticised not only because they are unwieldy but also because, in large and bureaucratic institutions, they are highly inefficient. Demand for accountability is growing and it will put academic institutions of the country into considerable difficulty in the times to come. At present, no general agreement exists concerning the appropriate level of governmental

involvement in higher education. The challenge will be to ensure faculty control over governance in universities that are presently maintained in a complex and bureaucratic environment.

While diversification of the new post-secondary institutions to meet diverse needs of the employment demand is by no means an entirely unprecedented phenomenon, it is a trend that has been of primary importance in developed countries and it must reshape its academic system towards this. Besides, reforms are needed in labour laws and active labour market policies to deliver better outcomes. It is estimated that 30% to 40% in formal manufacturing jobs are getting lost due to rigidity in labour market regulations. Hence, regulatory reforms are needed to accelerate job growth. Also adopting strategies such as aligning higher education and labour market by curricular reforms, value education, promoting entrepreneurship education, improving life skills and soft skills, increasing industry interface and building partnership with foreign universities could improve the employability of students and better transition to job market.

Conclusion:

An expanding economy is in urgent demand for qualified work force. The challenge lies at aligning the education in line with the demand and needs of this growing economy. However, the country has an examination system in place of an efficient educational system at the higher education level. Though the current developments in higher education system focuses by large in producing work force employable in information and communication industries, there is a profound gap in the employability of higher education graduates in other sectors such as teaching, research and development and policy making. Also education being a large business in the country with enormous number of education providers at the higher education level, there lays the problem of delivering too many courses and programmes without properly assessing the market demand and employability. Quality assessment and control of such institutions often goes impaired for want of an efficient monitoring and evaluation process and the existing system being corrupt. Lack of policy, institutional and financial support for promoting higher education and employability of the passed outs is often lacking and found to confine the process of education for sustainable development in the country. Finding reliable solutions for developing the higher education system to

facilitate sustainable economic growth is the call. However, it will require persistent policy, polity and political motivation in the right direction from the stakeholders which lacks at the moment in the country.

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