International Journal on Emerging Technologies (Special Issue on *RTIESTM-2016*) **7**(1): 125-128(2016)

ISSN No. (Print) : 0975-8364
ISSN No. (Online) : 2249-3255

Holistic Technologies and Production Systems: The Shifting Paradigms in Global Energy Scenario

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(Received 14 October, 2015 Accepted 24 November, 2015)
(Published by Research Trend, Website: www.researchtrend.net)

I. INTRODUCTION

Every day, the world produces carbon dioxide that is released to the earth's atmosphere and which will still be there in one hundred years' time. This increased content of Carbon Dioxide increases the warmth of our planet and is the main cause of the so called "Global Warming Effect". One answer to global warming is to replace and retrofit current technologies with Holistic alternatives that have comparable or better performance, but do not emit carbon dioxide. We call this Alternate or holistic energy. By 2050, one-third of the world's energy [1] will need to come from solar, water, bio-mass, wind, geothermal and other renewable resources. Who says this is none else, but British Petroleum and Royal Dutch Shell, two of the world's largest oil companies. Climate change, population growth, and fossil fuel depletion mean that renewables will need to play a bigger role in the future than they do today. The use of clean alternative energies such as the home use of solar power systems will help ensure man's survival into the 21st century and beyond.

II. ENERGY NEEDS AND FUTURE

According to Index Mundi [2] the energy needs of individuals in terms of electricity consumption per capita (kWh per person) the highest is in Iceland and lowest is in Afghanistan. India ranks 153rd.
Iceland 52620 kWh/person (Highest)
Norway 24558 kWh/person (2nd Highest)
Kuwait 16091 kWh/person (3rd Highest)
United States 11920 kWh/person (9th)
China 3494 kWh/person (70th)
India 498 kWh/person (153rd)
Pakistan 390kWh/person (159th) …….{as per June 2012 data}

III. HOLISTIC APPROACH TO LIFE

Before discussing about Holistic technologies, we must share the current global status of the existing population. What if the major problems now humanity is facing like poverty, emerging diseases, resources crunch, overpopulation and global warming, to name a few were so intertwined that we couldn't hope to address one without addressing the others? And what if we really couldn't expect to address many at once without changing our approach entirely? Earlier methods to solve the crisis no longer suffice for the task at hand. Only more holistic approach is required like:
-Life cycle thinking
-Global collaboration
-Market based incentives to Holistic production
-Integrated interdisciplinary solutions
-Investments in sustainable systems

IV. POPULATION AND RESOURCES SCENARIO

Also we must have a close look at the population scenario of the Globe. Global population growth will create a perfect storm of food, water and energy shortages by 2030, according to the UK government's chief scientist. By 2030, world population is expected to hit 8.3 billion, causing a 50 percent increase in the global demand for food and energy and a 30 percent increase in the demand for fresh drinking water a resource that is already in short supply for about a third of the world's people. Researchers found a six-fold increase in water and energy use for only a two-fold increase in population size. The World Health Organization has reported that environmental degradation due to excessive dependence on Fossil Fuels, combined with the growth in world population, is a major cause of the rapid increase in human diseases.

According to Population Connection, population growth since 1950 is behind the clearing of 80 percent of rainforests, the loss of tens of thousands of plant and wildlife species, an increase in greenhouse gas emissions of some 400 percent and the development or commercialization of as much as half of the Earth's surface land.

V. WHAT'S UNPRECEDENTED?

Now if we study the Population part of the last century something unprecedented is clearly noticed. Earth's Population has very meager beginning and for thousands of years since early dawn to 1800's it never crossed one Billion.In 1809, a big milestone in human history, human population crossed 1 Billion landmark. It took another 111 years to double to 2 billion in 1920.The next doubling took almost 52 years to cross 4 billion 1972.Now at present the World Population is 7.35 Billion (26/10/2015). [5] Every year new population is added that is equivalent to entire population of Germany and to aggravate it further, every day a new city with population around 1.75 lakh is added to World's population. By about Spring-2024 we will be 8 Billion. Again the earth's population will take 52 years for exact double (from 4 Billion to 8 Billion). Imagine the year 2076 when global population will hit 16 billion.

VI. AVAILABILITY OF RESOURCES VS. EVER-GROWING DEMAND

Current global population of over 7 billion is already two to three times higher than the sustainable level. Several recent studies show that Earth's resources are enough to sustain only about 2 billion people at a European standard of living. Currently, over 7 billion of us are consuming about 50% more resources than Earth is producing – during any given time period. For example, in the past twelve months we have consumed the resources that it took the planet about eighteen months to produce. We are consuming our resource base. To become sustainable with Earth's resources, what are our choices? Reducing overall consumption by 50% would do it for now. Or, reducing population by 3 to 4 billion would do it. It's more likely that a combination of both – large declines in consumption and human numbers – will be necessary. If all of the world's 7 billion people consumed as much as an average American, it would take the resources of over five Earths to sustainably support all of them. Americans make up only 5% of the world's population and yet consume 20% of its energy! Every time an American spends a dollar, the energy equivalent of a cup of oil is used to produce what that dollar buys! Isn't the World following American standards of living?

VII. ENERGY NEEDS VS. POPULATION EXPANSION

If there is a relationship between energy consumption and population growth, the different types of energy consumed may have different effects. If biomass is the only energy source, populations will not grow very fast. In such organically based economies, the problem of expanding raw material supply, and especially the related problems associated with the very modest energy supply maxima…must curb growth with increasing severity as expansion takes place. The emergence of coal as an energy source eliminated the carrying capacity limits to population growth that any traditional and biomass energy based culture would never accommodate. Similarly, the predominance of oil after the middle part of the twentieth century raised the carrying capacity even further. Following this hypothesis, a simple energy-based model of population growth can be divided into four components:

-Biomass Population - population growth due to biomass energy

-Coal Population - population growth due to coal

-Oil Population - population growth due to oil

-Natural Gas Population- population growth due to natural gas

VIII. SUM OF ENERGIES MODEL OF POPULATION GROWTH

Now to make the above clearer we must understand the Sum of Energies model of Population Growth. [3] This energy-based population growth model assumes a general pattern:

> -Introduction of a new energy source – raises population's carrying capacity, and population grows towards that new limit

-Energy source adoption matures – population growth due to that energy source slows, as competition for the energy source intensifies and its production reaches a peak

This is a sum-of-energies Component view of the world's population:

-Biomass Population - Slow Growth - open frontiers – lower quality energy – developing country fuel - low contribution to world's population

-Coal Population- Fast Logistic Growth - forming frontiers - medium quality energy – developing country fuel - high contribution to world's population

-Oil Population – Logistic Growth (so far) - fixed frontiers - high quality energy – global fuel - high contribution to world's population

-Natural Gas Population- Logistic Growth (so far) - fixed frontiers - high quality energy – rich country fuel - high contribution to world's population

IX. WHAT NEXT? - FUTURE SCENARIOS

There are three general scenarios that the world's energy future may take. [4] Their effects on population will be radically different. They are:

- Continued fossil fuel growth
- Fossil fuel decline and no sufficient substitute
- Fossil fuel decline and a new source of energy

So a new global trend may emerge that may replace fossil fuels.

-A higher quality energy source, say fission, could lead to further productivity improvements, reducing the pressure on existing resources and further raising the ceiling on population size. But it lies closer to the realms of science fiction than science.

-A Renewable energy source, like solar or wind power, is less efficient. It has less ability to perform work and to raise productivity. Another problem with low quality energy sources is that their net energy is low - they require a large proportion of energy in, to get some energy out - in contrast to oil and gas. A switch to a lower quality energy source from fossil fuels will put further pressure on other remaining energy sources, such as wood and coal. This could lead to further pressures on land and other resources and hence lower the population ceiling. Low quality energy resources do not support large populations.

What's Best is Best: One major advantage with the use of renewable/holistic energy is that as it is renewable it is therefore sustainable and so will never run out. Renewable/Holistic energy facilities generally require less maintenance than traditional generators. Their fuel being derived from natural and available resources reduces the costs of operation. Even more importantly, holistic energy produces little or no waste products such as carbon dioxide or other chemical pollutants, so has minimal impact on the environment. Renewable/Holistic energy projects can also bring economic benefits to many regional areas, as most projects are located away from large urban centers and suburbs of the capital cities.

Holistic/Renewable-The Indian Way: Now let us study how this Holistic system can change the Indian scenario. The need to change must stem out from our domestic as well as our industrial users. So a new revolution is needed that must stem out of public-government participation. Let us study few examples:

-Ralegan Siddhi is a village in Maharashtra state. It is considered a model of environmental conservation. For energy, the village uses solar power, biogas and a windmill. The project is heralded as a sustainable model of a village republic. The village's biggest accomplishment is in its use of non-conventional energy. All the village street lights each have separate solar panels.

-Dharnai in Bihar unshackled from darkness and declared itself as an energy-independent village. With the launch of Greenpeace's solar-powered 100 kilowatt micro-grid, quality electricity is being provided to more than 2,400 people living in this village. Earlier diesel generators were the only source of electricity.

-Moser Baer Clean Energy Limited (MBCEL) has commissioned a 5 MW grid connected solar PV project at Sivaganga, Tamil Nadu. The project is implemented under the 50 MW generation based incentive scheme of the Ministry of New and Renewable Energy, Government of India.

-India's first satellite-controlled solar power plant has come up in Lalpur village in Punjab's Hoshiarpur district. Built at a cost of 35 crore, the project will produce 4.2 MW of electricity. The plant uses the 'Single Axis Tracking East West Tilt Technology', which follows the path of the sun during the day to generate eight percent more units of electricity.

-Charanka village in Gujarat, Chinnachintakunta in Andhra Pradesh, Hiware Bazar in Maharashtra & so on…..

Holistic and Decentralized Energy Technologies: Now let us study what are the major holistic technologies and a production system that we can use for a long period of time i.e. it is sustainable as well as environment friendly.

-Biogas obtainable from anaerobic digestion of moist biomass such as animal and human excreta, kitchen waste, moist agro-waste, sewage effluents. It can also create bio-manure in form of slurry.

-Generation and utilization of Producer gas obtainable from partial combustion of all kinds of biomass like wood, charcoal, rice-husk, sawdust, dry agro-waste etc.

-Decentralized production of biodiesel from esterification of various vegetable oils.

-Production of ethanol as a liquid fuel for engines from agro-waste.

-Technologies for Briquetting to obtain compact/smokeless solid fuel from all kinds of loose biomass.

-Energy efficient cook stoves.

Gadgets and Implements: Also we can use gadgets and Implements to facilitate efficient utilization of human muscle power and animal draught power.
-Human operated agro-tools and domestic appliances.
-Animal operated irrigation pumps and other agricultural equipments.
-Improvised designs of animal driven carts.
Solar, Water and Wind Energy: Also we can better use solar water and wind energy as this form is best sustainable and will collapse only if our planet structure collapses. Some of the best use of the above are:
-Solar water heater, solar cookers, solar driers etc.
-Solar photo-voltaic systems.
-Decentralized solar power generation and refrigeration systems.
-Microhydel electro-mechanical power generation systems utilizing the hydro-energy of waterfalls, check-dams, and flowing waters in streams, canals and rivers in a decentralized manner.
-Decentralized wind power devices for water pumping, electricity generation etc.
System for water conservation and water shed management and efficient utilization of rain water and for eco-restoration.
In Domestic System: Also in our domestic system we can bring a major shift and can usher the use of holistic energy for better future:
-Technologies and Architecture promoting green building materials and energy conservation.
-Construction with compressed/stabilized mud blocks and terracotta tiles.
-Bamboo Architecture.
-Lawry-Baker low cost brick work construction.
-Solar architecture with energy conservation and passive heating /cooling of buildings.
-Multiple crafts and artisanal works
-Above all technologies and systems should be carried out in technical institutes, universities, government agencies and at village levels by various NGO's and socio-spiritual organizations and motivated individuals

X. CONCLUSION

Hence it is imperative from all the above said discussion that holistic technology is the need of the hour. We must depend more and more on this holistic/sustainable/renewable/alternate energy for the betterment of our planet. Once we are able to characterize this criterion of appropriateness i.e. people-friendliness and eco-friendliness we will be able to usher the criteria of renewability as well as the preservation of natural balance in all the orders of our life. More and more we need to depend on local resources and invent novel methods for its utilization and expertise. Our young generation is facing this daunting challenge to bring in new technologies that can cater to the sustainable part of energy production system. Also government is also realizing this need and is providing huge subsidies on installations of these energy management models. This right understanding provides a holistic vision for technologies, production systems and management models. There are also many inspiring experiments going on in this direction which can instill confidence in these alternative models.

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