Volume 3, Issue-12(3), December, 2016

International Journal of Academic Research

Published by
Sucharitha Publications
Visakhapatnam – 530 017
Andhra Pradesh – India
website :www.ijar.org.in

Office Address
Dr.T.V.Ramana, (9948440288)
46-8-10/B1, Near,Aditya School
Jagannaickpur, Kakinada- 533002
Andhra Pradesh-India
e-mail: drtvramana@yahoo.co.in

Design by
SS Xerox, Visakhapatnam

Special issue on

"ENERGY, ENVIRONMENT AND ECONOMY

-The Nexus, Implications and Initiatives"

Edited by
P.Rama Krishnam Raju
A.V.NagaVarma

INVITATION

ज्ञान-विज्ञान विमुक्तये

UGC Sponsored
Two day National Seminar on

"ENERGY, ENVIRONMENT AND ECONOMY

-The Nexus, Implications and Initiatives"

On9th& 10th, December 2016

Organised by

Departments of Economics (PG & UG)

Departments of Economics (PG & UG)
D.N.R. College (Autonomous)
Bhimavaram – 534 202
West Godavari District,
Andhra Pradesh.

UGC Sponsored Two Day National Seminar on

ENERGY, ENVIRONMENT AND ECONOMY

-The Nexus, Implications and Initiatives"

On9th& 10th, December 2016

SEMINAR ORGANIZING COMMITTEE

<table>
<tr><td colspan="2">CHIEF PATRONS</td></tr>
<tr><td>Sri G.V.Narasimha Raju, President,
D.N.R. College Association</td><td>Sri G. Satyanarayana Raju,
Secretary & Correspondent,
D.N.R. College Association</td></tr>
<tr><td colspan="2">Patrons:
All Members of the Governing Body, D.N.R. College Association</td></tr>
<tr><td>Chair Person
Sri P.Rama Krishnam Raju,
Principal (FAC)
Seminar Hon'ry Chairman:
Dr.J.Chandra Prasad, Retd Principal</td><td>Seminar Convener:
Dr. A.V.Naga Varma,
Head, Dept. of PG Economics</td></tr>
<tr><td colspan="2">Co-Conveners</td></tr>
<tr><td>Sri M.Lakshminarayana Raju,
Head, Dept. of Economics
Dr. K.A.S.P.Rama Raju, Vice Principal</td><td>Sri M.V.Raghupathi Raju
Vice Principal
Dr. K.V.V.A.P.T.Surya Rao, Reader & Former Director, PG Courses</td></tr>
<tr><td colspan="2">Members</td></tr>
<tr><td colspan="2">Dr. A. Krishna Mohan, Reader, P.G.Dept., of Commerce
Dr. A. Naga Raju, P.G.Dept., of Commerce
Smt. D.Surya Prabha, P.G.Dept of Economics
Sri. G.Milton, P.G.Dept of Economics
Dr.D.R.K.Subba Raju, HoD of PG Social Work
Dr.A.V.Narasimha Raju, PG Dept of Social Work
Smt Ch.Jhansi Lakshmi, PG Dept of Social Work
Dr.M.V.S.N.Raju, HoD of PG Telugu
Dr.A.K.Chandra Sekhar Rao, HoD of Maths
Sri A.Surendra, HoD of Geology
Dr.G.David Livingstone, HoD of Politics
Sri S.V.Narasimha Raju, HoD of Statistics
Sri P.V.Rama Raju, HoD of Commerce
Sri P.Hari Krishnam Raju, Dept of Commerce
Sri K.G.Krishnam Raju, HoD of Physics</td></tr>
</table>

Editor-in-Chief, IJAR – December, vol.3, issue 12(3), 2016

Typeset and Printed (Sucharitha publications) in India:

IJAR, concentrates on critical and creative research in Multidisciplinary and multiple languages Academic Research. This journal seeks to promote original research and cultivate a fruitful dialogue between old and modern thought. Views expressed in the articles is exclusively of the authors, thus, journal is not responsible of it in any case

Visit:www.ijar.org.in

E mail: drtvramana@yahoo.co.in

December, 2016

C O N T E N T S

Volume 3 **Issue 12(3)** **December, 2016**

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

India's energy crisis and the role of biomass: Issues and challenges

Prof. M.Prasada Rao, Dept. of Economics, Andhra University, Visakhapatnam
D.Surya Prabha, Research Scholar, Andhra University, Visakhapatnam
Y.Anil Kumar, Research Scholar, Andhra University, Visakhapatnam

Abstract: *India's recent electricity outages, which brought transport systems to a halt and removed lighting and cooling for large areas of one of the world's most populous nations, are the most severe manifestation of the issue of meeting increasing power demand in a rapidly growing nation. Biomass power projects provide part of the answer of how to meet this demand sustainably by using the waste products from India's agricultural sector.*
Key words: *energy demand, economic development, electrification*

The implications of India are growing energy demand:

India's energy demand is on the rise, driven by high population growth, the modernization of lifestyles, higher electrification rates and a rapidly growing economy. Annual growth in energy demand reached 8% recently, doubling the historical average annual growth rates of the past 30 years. With GDP expected to grow by 7.5% and energy demand expected to nearly double by 2030, India is set to surpass Japan and Russia to become the world's third largest energy consumer after the U.S. and China. This in turn will increase the GHG emissions by roughly three or four fold compared to 2005 levels with the power sector being the key driver of GHG increases.

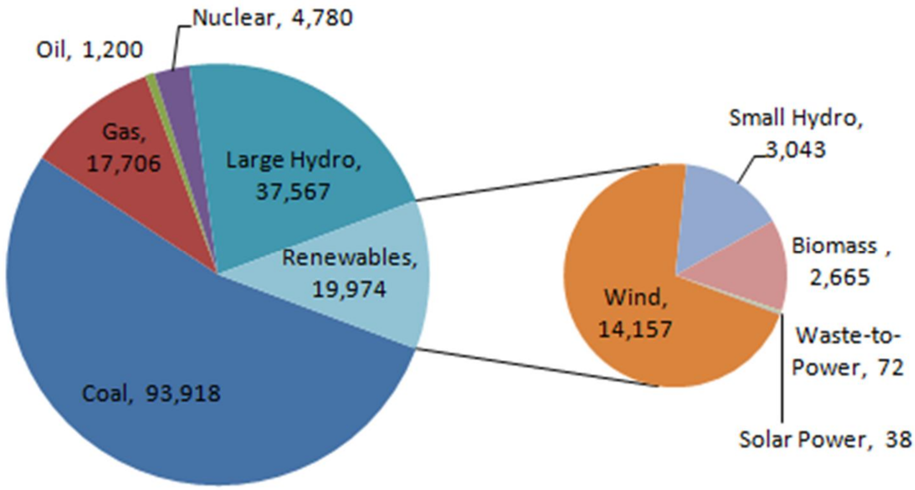
Surging energy demand is outstripping supply, raising concerns over the country's energy security. India already faces chronic electricity shortages, a situation that underscores the country's need for additional electricity generating capacity and the country's power demand is likely to increase by more than five-fold by 2030.

With coal being the dominant fuel used to produce energy in India (see diagram), the country faces severe public health, environmental and economic impacts that make coal's use unsustainable to say the least.

Despite their abundance, renewable energy sources represent only 11% of the country's electricity capacity. Biomass represents just 13% of renewable-based electricity capacity[2].

India's poverty reduction efforts and future economic development are inextricably linked to the expansion of modern energy availability to the poor and the elimination of chronic energy shortages. So solving the energy shortage through sustainable solutions - those that enable social and environmental development, as well as economic - is key. Biomass Power offers one such scalable solution.

Figure 1. India's Installed Electricity Capacity by Source (MW)



Agricultural waste means biomass is abundant:

Agriculture, a sector with huge untapped waste streams, will be critically important to the Indian economy for the foreseeable future. India has the opportunity to grow sustainably by using the waste from industrial and agro processes, using the 'eco-industrial' model of commerce that sees all waste as having value so that everything is reclaimed, reused, or recycled.

Despite India's rapid economic development 70% of the population still lives in rural areas and around 50% of the population is employed in agriculture, accounting for 16% of GDP (based on 2009-10 figures)[3]. Its arable land area of 157.9 million hectares (390.2 million acres) is second only to the United States. This has enabled India to become the world's second largest producer of paddy rice and wheat, among other agricultural products.[4]

With an estimated production of about 350 million tonnes of agricultural waste every year, residual biomass is capable of generating much needed clean, renewable power for India.

India's total biomass potential is estimated at 18,000 – 23,000 MW - this is at least six times more than the current installed capacity.

Benefiting rural poor:

Besides being a more sustainable fuel source, biomass also provides other socio-economic benefits. Owing to its availability across India, biomass can provide villages too remote or poor to connect to the national electricity grid with a local and sustainable form of energy. Distributed biomass-based power generation plants could also provide base load power that many other renewable sources cannot deliver.

Biomass-based energy also brings a new source of income to farmers, helping to diversify their income base and reduce the pressure to immigrate to more developed urban centres, which are already stressed by over-population.

The Role of Carbon Finance to Scaling-up Biomass Power:

Despite its high potential and varied benefits, biomass power development has been hindered by a number of barriers, mainly poor economics. New and more innovative sources of financing, like the carbon markets, are crucial to scaling up biomass power development.

The UN's Clean Development Mechanism (CDM) is beginning to help. As of August 2012, 401 projects out of a total of 2,252 (18%) CDM projects in India were biomass projects - in comparison, wind projects in India constitute 39% of all CDM projects.[5]

The voluntary carbon market provides an important complement to the CDM market. The voluntary carbon market, the smaller but more nimble sister market to the CDM, provides an important source of financing to smaller-scale biomass projects that, despite their higher transaction costs, often have significant community benefits.

In a country so dependent on fossil fuels to power its fast growing economy, it is imperative that new clean and abundant sources of energy be developed. With the aid of the carbon markets, biomass – in the form of agro-residues – can provide India with a locally sourced and sustainable form of energy with significant social, economic and environmental benefits.

References and notes:

1 Environmental and energy sustainability: An Approach for India, McKinsey & Company, 2009 (www.mckinsey.com).

2 Strategic Plans for New and Renewable Energy Sector for the Period 2011-7. Ministry of Power and Ministry of New and Renewable Energy, Government of India.

3 Economic Surveys 2009-10. Ministry of Finance, Government of India.

4 Major Food and Agricultural Commodities and Producers – Countries by Commodity. Food and Agriculture Organizations of the United Nations (FAO).

5 UNEP Risoe CDM pipeline spreadsheet.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

India's intended nationally determined contribution - Working towards Climate Justice: Policies and Challenges

Dr.D.R.K.Subba Raju, Head, Dept. of Social Work, D.N.R.College (A), Bhimavaram-534 202

Abstract: *India has a long history and tradition of harmonious co-existence between man and nature. Human beings here have regarded fauna and flora as part of their family. This is part of our heritage and manifest in our lifestyle and traditional practices. Environmental sustainability, which involves both intra-generational and inter-generational equity, has been the approach of Indians for very long. Much before the climate change debate began, Mahatma Gandhi, regarded as the father of our nation had said that we should act as 'trustees' and use natural resources wisely as it is our moral responsibility to ensure that we bequeath to the future generations a healthy planet.*

Key words: *human progress, environment, sustainable development*

Introduction

The desire to improve one's lot has been the primary driving force behind human progress. While a few fortunate fellow beings have moved far ahead in this journey of progress, there are many in the world that has been left behind. Nations that are now striving to fulfill this 'right to grow' of their teeming millions cannot be made to feel guilty of their development agenda as they attempt to fulfill this legitimate aspiration. Just because economic development of many countries in the past has come at the cost of environment, it should not be presumed that a reconciliation of the two is not possible. It is time that a mechanism is set up which will turn technology and innovation into an effective instrument for global public good, not just private returns. Almost all the macroeconomic models predict that anticipated needs in the future will be large. India believes that development and environment are not adversaries but can go hand in hand, if environmental sensibilities can be imbibed. Equitable, inclusive and sustainable development would be the key to a new model of growth that India is committed to pursue, which can be fostered and facilitated by a collaborative approach among the Developing and the Developed countries.

Policy frame work

India's environment policy is anchored in the Constitution of India, Article 48-A of the Constitution states that *"The State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country"*. The Indian development process is guided by the aspiration of making India prosperous and progress on the path of "*Development without Destruction*". The broad policy framework on environment and climate change is laid down by the National Environment Policy (NEP) 2006, which promotes sustainable development along with respect for ecological constraints and the imperatives of social justice. The current development paradigm reiterates the focus on sustainable growth and aims to exploit the co-benefits of addressing climate change along with promoting economic growth. The National Action Plan on Climate Change (NAPCC) provides a sharper focus on required interventions. Currently, NAPCC is implemented through eight National Missions, outlining priorities for mitigation and adaptation to combat climate change. The broad policy initiatives of the government are supplemented by actions of the State Governments, Non-governmental Organizations (NGOs), initiatives of the private sector and other stakeholders. 32 States and Union Territories have put in place the State Action Plan on Climate Change (SAPCC) attempting to mainstream climate change concerns in their planning process.

Many other national strategies and policies supplement the above efforts. The Energy Conservation Act has been enacted to encourage efficient use of energy and its conservation. The National Policy for Farmers focuses on sustainable development of agriculture. The National Electricity Policy (NEP) underscores the focus on universalizing access to electricity and promoting renewable sources of energy, as does the Integrated Energy Policy (IEP).Policies to promote actions that address climate concerns also include fiscal instruments like coal cess, cuts in subsidies, increase in taxes on petrol and diesel, market mechanisms including Perform Achieve and Trade (PAT), Renewable Energy Certificates (REC) and a regulatory regime of Renewable Purchase Obligation (RPO). The institutional arrangement for off take of renewable power will be further strengthened.

India's Progress in Combating Climate Change

In recognition of the growing problem of Climate Change, India declared a voluntary goal of reducing the emissions intensity of its GDP by 20–25%, over 2005 levels, by 2020, despite having no binding mitigation obligations as per the Convention. A slew of policy measures were launched to achieve this goal. *As a result, the emission intensity of our GDP has decreased by 12% between 2005 and 2010.* It is a matter of satisfaction that United Nations Environment Programme (UNEP) in its Emission Gap Report 2014 has recognized India as one of the countries on course to achieving its voluntary goal. India has a definite plan of action for clean energy, energy efficiency in various sectors of industries, steps to achieve lower emission intensity in the automobile and transport sector, a major thrust to non-fossil based electricity generation and a building sector based on energy conservation. India's on-going mitigation and adaptation strategies and actions are detailed in the following sections, along with the expected direction of activities in the near future.

Mitigation Strategies

Energy is a vital input for production and growth. Considering universal energy access and energy security as one of the fundamental development goals for the country, Government of India (GoI) has undertaken a two pronged approach to cater to the energy demand of its citizens while ensuring minimum growth in carbon emissions. On the generation side, the Government is promoting greater use of renewable in the energy mix mainly through solar and wind power and shifting towards supercritical technologies for coal based power plants. On the demand side, efforts are being made to efficiently use energy through various innovative policy measures under the overall ambit of Energy Conservation Act.

The energy intensity of the economy has decreased from 18.16 goe (grams of oil equivalent) per Rupee of GDP in 2005 to 15.02 goe per Rupee GDP in 2012, a decline of over 2.5% per annum.

Promotion of Clean Energy

India is running one of the largest renewable capacity expansion programs in the world. Between 2002 and 2015, the share of renewable grid capacity has increased over 6 times, from 2% (3.9 GW) to around 13% (36 GW). This momentum of a tenfold increase in the previous decade is to be significantly scaled up with the aim to achieve 175 GW renewable energy capacity in the next few years. India has also decided to anchor a global solar alliance, InSPA (International Agency for Solar Policy & Application), of all countries located between the Tropic of Cancer and the Tropic of Capricorn. Wind energy has been the predominant contributor to the renewable energy growth in India accounting for 23.76 GW (65.2%) of the renewable installed capacity, making India the 5^{th} largest wind power producer in the world. With a potential of more than 100 GW, the aim is to achieve a target of 60 GW of wind power installed capacity by 2022.

Solar power in India is poised to grow significantly with Solar Mission as a major initiative of the Government of India. Solar power installed capacity has increased from only 3.7 MW in 2005 to about 4060 MW in 2015, with a CAGR of more than 100% over the decade. The ambitious solar expansion programme seeks to enhance the capacity to 100 GW by 2022, which is expected to be scaled up further thereafter. A scheme for development of 25 *Solar Parks*, *Ultra Mega Solar Power Projects*, canal top solar projects and one hundred thousand solar pumps for farmers is at different stages of implementation. Government of India is also promoting solarization of all the 55,000 petrol pumps across the country out of which about 3,135 petrol pumps have already been polarized. Biomass energy constitutes about 18% of total primary energy use in the country and more than 70% of the country's population depends on it. However, it is currently used in an inefficient manner with high levels of indoor pollution. A number of programmes have been initiated for promotion of cleaner and more efficient use, including biomass based electricity generation. It is envisaged to increase biomass installed capacity to 10 GW by 2022 from current capacity of 4.4 GW.

Hydropower contributes about 46.1 GW to current portfolio of installed capacity, of which 4.1 GW is small hydro (upto 25 MW) and 41.99 GW is large hydro (more than 25 MW). Special programmes to promote small and mini hydel projects, new and efficient designs of water mills have been introduced for electrification of remote villages. With a vast potential of more than 100 GW, a number of policy initiatives and actions are being undertaken to aggressively pursue development of country's vast hydro potential. India is promoting Nuclear Power as a safe, environmentally benign and economically viable source to meet the increasing electricity needs of the country. With a 2.2% share in current installed capacity, total installed capacity of nuclear power in operation is 5780 MW. Additionally six reactors with an installed capacity of 4300 MW are at different stages of commissioning and construction. Efforts are being made to achieve 63 GW installed capacity by the year 2032, if supply of fuel is ensured.

Clean Coal policies: Coal based power as of now accounts for about 60.8% (167.2 GW) of India's installed capacity. In order to secure reliable, adequate and affordable supply of electricity, coal will continue to dominate power generation in future. Government of India has already taken several initiatives to improve the efficiency of coal based power plants and to reduce its carbon footprint. All new, large coal-based generating stations have been mandated to use the highly efficient supercritical technology. Renovation and Modernization (R&M) and Life Extension (LE) of existing old power stations are being undertaken in a phased manner. About 144 old thermal stations have been assigned mandatory targets for improving energy efficiency. Coal beneficiation has been made mandatory. Introduction of ultra-supercritical technology, as and when commercially available is part of future policy. Besides, stringent emission standards being contemplated for thermal plants would significantly reduce emissions.

National Smart Grid Mission has been launched to bring efficiency in power supply network and facilitate reduction in losses and outages. Green Energy Corridor projects worth INR (Indian National Rupee) 380 billion (USD 6 billion) are also being rolled out to ensure evacuation of renewable energy. The Government's goal of *Electricity for All* is sought to be achieved by the above programs that would require huge investments, infusion of new technology, availability of nuclear fuel and international support.

Enhancing Energy Efficiency

With the goal of reducing energy intensity of the Indian economy, Ministry of Power through Bureau of Energy Efficiency (BEE) has initiated a number of energy efficiency initiatives. The National Mission for Enhanced Energy Efficiency (NMEEE) aims to strengthen the market for energy efficiency by creating a conducive regulatory and policy regime. It seeks to upscale the efforts to unlock the market for energy efficiency and help achieve total avoided capacity addition of 19,598 MW and fuel savings of around 23 million tonnes per year at its full implementation stage. The programmes under this mission have resulted in an avoided generation capacity addition of about 10,000 MW between 2005 and 2012 with government targeting to save 10% of current energy consumption by the year 2018-19. Demand Side Management programmes have been launched to replace existing low-efficiency appliances:

During the last decade, there has been rapid transformation of efficient lighting in India. The sales of Compact fluorescent lamps (CFLs) have risen to about 37% of the total lighting requirements in 2014 from 7.8% in 2005. India has also launched an ambitious plan to replace all incandescent lamps with Light-emitting diode (LED) bulbs in the next few years leading to energy savings of up to 100 billion kilowatt hours (kWh) annually.

Standards and Labeling Programme launched by the Government of India enables consumers to make informed decision by providing information about the energy consumption of an appliance. Currently, 21 equipment and appliances are labeled. The programme has contributed to an increase of 25% to 30% in the energy efficiency of an average refrigerator or air-conditioner in 2014 compared to those sold in 2007. Super-Efficient Fan (that uses half as much energy as the average fan) programme has been launched. Further, two sets of Corporate Average Fuel Consumption standards for cars have been notified, with one coming into force in 2017 and the second set in 2022.

Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE), a risk sharing mechanism to provide financial institutions with a partial coverage of risk involved in extending loans for energy efficiency projects, and Venture Capital Fund for Energy Efficiency (VCFEE), a trust fund to provide "last mile" equity capital to energy efficiency companies, have been established. The Energy Conservation Building Code (ECBC) sets minimum energy standards for new commercial buildings. Eight states have already adopted and notified the ECBC, and over 300 new commercial buildings have become compliant. The Code would be made more stringent to promote construction of even more (Near-Zero) energy-efficient buildings. "Design Guidelines for Energy Efficient Multi-storey Residential buildings" have also been launched.

In order to both recognize energy-efficient buildings, as well as to stimulate their large scale replication, India has developed its own building- energy rating system GRIHA (Green Rating for Integrated Habitat Assessment), based on 34 criteria like site planning, conservation and efficient utilization of resources etc. A number of buildings including Commonwealth Games Village have been rated using GRIHA system. Indira Paryavaran Bhawan, the headquarters of Central Government's Ministry of Environment, Forest & Climate Change is a model building of Government of India and has received LEED India Platinum and a 5 Star GRIHA rating. It is a 'Net Zero Energy' building with 100% onsite power generation.

Enhancing Energy Efficiency in Industries

Infrastructure sectors, viz. electricity, coal and cement have seen a growth rate of 4.5% in the year 2013-14. The recent initiatives like Make in India, Digital India, creating National Industrial Corridors, streamlining environment and forest approvals, labour reforms and undertaking other measures for the ease of doing business have also fuelled the spurt in their growth rates. Amidst all this, policies to enable industries reduce their energy consumption play a critical role as an instrument for sustainable environment through various interventions like: Perform, Achieve and Trade (PAT), as a market based energy efficiency trading mechanism, at present covers 478 plants (designated consumers) in eight energy-intensive industrial sectors accounting for one-third of total energy consumption in the country. The mandated decrease in the specific energy consumption under PAT programme has led to a decline of 4 to 5% in their specific energy consumption in 2015 as compared to that in 2012. Energy Saving Certificates (ESCerts) are issued to consumers who over-achieve the target. The scheme is to be widened and deepened to include additional sectors like railways, electricity distribution and refineries in the next cycle and would cover more than half the commercial energy consumed in India. Zero Effect, Zero Defect (ZED): The Make in India campaign with ZED is a policy initiative to rate Medium & Small Industries on quality control and certification for energy efficiency, enhanced resources efficiency, pollution control, use of renewable energy, waste management etc. using ZED Maturity Assessment Model. The scheme launched in 2015, envisages coverage of about 1 million medium and small enterprises.

Developing Climate Resilient Urban Centers

Government of India in recent times has launched a number of schemes for transformation and rejuvenation of urban areas including Smart Cities Mission, Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and National Heritage City Development and Augmentation Yojana (HRIDAY): Under the Smart Cities Mission, 100 smart cities are planned with the objective to develop new generation cities, which will provide core infrastructure and a decent quality of life to its citizens by building a clean and sustainable environment. Smart solutions like recycling and reuse of waste, use of renewable, protection of sensitive natural environment will be incorporated to make these cities climate resilient. Atal Mission for Rejuvenation and Urban Transformation (AMRUT), a new urban renewal mission has been launched by Government of India for 500 cities with focus on ensuring basic infrastructure services such as water supply, sewerage, storm water drains, transport and development of green spaces and parks by adopting climate resilient and energy efficient policies and regulations.

References and notes:

1. European Council of Ministers of Transport (ECMT) (2006), Report on the90th Ministerial Session of the European Council of Ministers of Transport, May 2006, Dublin
2. ECMT (2007), Cutting Transport CO2 Emissions: What Progress? International Energy Agency (IEA) (2004), Prospects for CO2 Capture and Storage IEA (2004), World Energy Outlook 2004 IEA (2005),
3. Act Locally, Trade Globally: Emissions Trading for Climate Policy IEA (2006), Energy Technology Perspectives: Scenarios and Strategies to 2050 IEA (2006),

Renewable Energy: RD&D Priorities -- Insights from IEA Technology Programmes IEA (2006)

4. Science for Today's Energy Challenges: Accelerating Progress for a Sustainable Energy Future IEA (2006),

5. World Energy Outlook 2006

6. Modi, V., S. McDade, D. Lallement, and J. Saghir (2006), "Energy and the Millennium Development Goals", New York: Energy Sector Management Assistance Programme, United Nations Development Programme, UN Millennium Project, and World Bank

7. Nuclear Energy Agency/International Atomic Energy Agency (NEA/IAEA) (2006),

8. Uranium 2005: Resources, Production and Demand

9. OECD/African Development Bank (OECD/ADB) (2004), African Economic Outlook: 2003/04

10. OECD/IEA (2006), "Domestic Policy Frameworks for Adaptation to Climate Change in the Water Sector"

11. The Benefits of Climate Change Policies: Analytical and Framework Issues

12. OECD (2005), Bridge over Troubled Waters: Linking Climate Change and Development

OECD (2006), Environmental and Energy Products: The Benefits of Liberalizing Trade.

13. OECD (2006), "Report on the OECD Global Forum on Sustainable Development: Economic Benefits of Climate Change Policies", July 2006

14. OECD (2006), Subsidy Reform and Sustainable Development: Economic, Environmental and Social Aspects

15. OECD (2006), the Political Economy of Environmentally Related Taxes

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Energy implications of Economic Growth with Sustainability: Issues and Challenges

P.Naresh Babu, Lecturer in Economics, V.S.K.Junior College, Bhimavaram-534 201

Abstract: *Belief in economic growth has come to be seen as a solution for all India's social and political problems, including poverty, social exclusion and environmental degradation. This also explains why the economic growth rate is the only indicator of progress to which all Indian politicians - even on the political fringes - pays homage. Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the centre of conflict of opposing social groups where the effectiveness of the argument is often contingent upon oversimplification*

Key words: *national income, economic growth, housing, sanitation, food, water*

Introduction:

India's reluctance to slow down growth in order to pursue sustainability or inclusiveness is not irrational. The trauma of passage from a predominantly religious, feudal society to a more secular, egalitarian and industrial one requires the country to have an optimistic view of the future. The belief that growing wealth and technological sophistication will guarantee power and prestige provides this dose of optimism. If India is asked to consider the cost of growth in environmental degradation and social exclusion, it is likely to respond that more growth and more technology are the solution. However, the Indian Government's optimistic view of economic growth as a means to social inclusiveness, providing dignity and a decent quality of life for all, and ecological sustainability, is flawed. At the same time, the Western idea of sustainable development is equally untenable. It endorses the false promise that an expanding economy can be fully compatible with environmental sustainability.

In my view, the values of social inclusiveness and ecological sustainability will be properly prioritized only when economic growth ceases to be a proxy for development or progress.

Alternative indicators — such as the Genuine Progress Indicator developed in 1994 by Clifford Cobb, or Green GDP, which was formulated in the 1990s as a response to the inadequacy of GDP — have not yet taken root. Additionally, bringing about a change of values in a large underdeveloped nation is a complex, though not impossible, task. The starting point for any successful alternative definitions of growth and progress is that they cannot be exclusively applied to developing and poor nations. This must be an inclusive, globe-spanning endeavor. In 1987, the United Nations' Brundtland Report defined sustainable development as a process that "fulfils the needs of the present without compromising the ability of future generations to meet their own needs." The emphasis of intergenerational equity over interregional equity is instructive as the lives of future generations, presumably in rich countries, was portrayed as being more important than the present lives of the poor. In both the developmental and environmental camps, the concept of sustainable development was seen a means of achieving development without degradation. Two decades later, it has become a convenient slogan behind which countries like India can conceal "business as usual" growth policies.

Despite India's rapid growth, over 33% of its households still have no access to electricity - and over 70% still use fuel-wood, twigs and animal dung for cooking. In 2011, non-commercial energy comprised 24% of India's primary energy pie, following coal at 42%. Additionally, India's rural communities rely on female labor to collect and burn vast amounts of carbon-based fuels. This is possible because the opportunity cost of "female energy" remains negligible as long as the women are uneducated and unskilled.

Another key factor little appreciated outside India is the way in which the "poor" actually subsidize the consumption and therefore the pollution caused by the "rich." This becomes very clear as soon we consider the emission of greenhouse gases in the proper manner. The world at large lauds India for its low levels of per capita energy consumption. And indeed, carbon emissions per person are 1.5 tons, which is one-third of the global average and less than one-tenth that of the largest emitters in the world.

However, these low per capita consumption figures conceal a painful reality: that hundreds of millions of Indians remain without access to electricity. On the other hand, upper and upper-middle class Indians living in cities consume very high levels of energy. These high levels are exaggerated by the fact that many upper-income Indians use back-up generators to supplement the unreliable electricity supply in many parts of the country. Thus, the low energy consumption by a large number of the poor conceals the high consumption levels of the rich by bringing down the average figures. A measure of the true challenges ahead becomes clear when one considers what is required in terms of power production in order to provide an acceptable level of electricity to the people. The United Nations has established a standard of 1,000 KWh per person as the minimum necessary for an acceptable quality of life.

In India's case, that means that the country's power-generating capacity would have to be increased three to four times its current level — even though the country is already one of the world's largest energy consumers in the aggregate. Inconvenient facts like these put paid to the slow — indeed glacial — rate of progress in the international debate about sustainability, growth and the environment.

Rethinking sustainable development

The idea that we need a more socially inclusive and ecologically sustainable model for development has been around for a long time. The ways and means to achieve this are widely discussed. Inclusive development requires employment policies that can bring about a different primary income distribution. Sustainable growth, for its part, requires the creation of productive assets that conserve nonrenewable resources such as land, water and atmosphere and minimize environmental damage. These assets have to serve the ultimate goal of human well-being (housing, sanitation, food, water and energy) and also facilitate wealth creation (economic activity). The question that needs to be asked is not whether a new model is needed, but why the models that have been proposed are failing to make even a marginal impact on the current growth model.

The perceived link between well-being and growth will not be easy to break. As things stand, growth is the underlying basis of the advancement of social equality. It is also seen as the precondition for civil coexistence and governance. Indeed, introducing a different paradigm that seeks to arrest, slow down or freeze growth to address sustainability will require nothing short of a revolution. We have known for long that GDP is a poor measure of a nation's wellbeing. Even Simon Kuznets, who was the first to devise the national accounts from which GDP evolved, was fully aware of that fact as far back as 1962. Kuznets warned that distinctions between quantity and quality of growth, its costs and returns, and the short and the long run, were important. And he wrote presciently, "Goals for 'more' growth should specify more growth of what and for what." He was also very much aware that the simplicity of GDP was prone to misuse:

The valuable capacity of the human mind to simplify complex situations in a compact characterization becomes dangerous when not controlled in terms of definitely stated criteria. With quantitative measurements especially the definiteness of the result suggests, often misleadingly, a precision and simplicity in the outlines of the object measured....Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the centre of conflict of opposing social groups where the effectiveness of the argument is often contingent upon oversimplification.

While a new measure of a nation's well-being is difficult to design without wide consultation, it is possible to point out some characteristics that the new measure should possess:

1. The indicator should address human security - rather than national security.

We urgently need to recognize that human security must not remain limited to a concern with weapons. It concerns human life and dignity. At the same time, as long as "nations" are the primary target for policy action, India's — or any other country's — focus on "national interest" cannot be contested. This has an unfortunate effect on climate change policy. To date, it is fundamentally constructed through the twin lenses of national security and national economic strategy. For better or for worse, the "nation" remains the policymaking framework that legitimizes all others.

2. The newly devised measure should take note of limits to growth.

The rate of growth in emerging economies is now far more rapid than that of the now-developed world in the 18th and 19th centuries. It is far greater, in part, because it involves more than two-thirds of the global population. This means greater strain on natural capital. We have no precedent for managing such scales of growth under conditions of natural resource scarcity. Given these fundamental dynamics, the current climate discourse seeks to solve the problem in a framework that assumes the need for abundance. It also blindly postulates that technology will enable it to be sustained. Neither of these is supported by available evidence.

3. The new measure should prioritize the production of public goods over the production of private goods.

Economic growth under market-oriented policies is focused on the production of private goods through the efficient allocation of resources with minimal intervention beyond the legal infrastructure. It shies away from the provision of public goods such as social inclusiveness and environmental integrity. The International Task Force on Global Public Goods (GPG) has explored the concept of GPG to clarify the definition and to propose policy recommendations.

In assessing how it could be harnessed to reduce poverty and enhance welfare, the task force prioritized peace and security, trade regimes, financial stability, control of communicable diseases and sustainable management of the national commons. Measuring production of global public goods in such a framework, rather than worshipping GDP (which is both gross and domestic), would be a step in the right direction.

The world simply cannot wait any longer and must begin to measure the production of these public goods with the same fervor, rigor and excitement as we have long witnessed with the production of private goods — by GDP. We would measure nothing short of the production of progress and sustainability itself — in categories such as peace, equity, environmental integrity and knowledge.

References and notes:

Arunabha Ghosh (2014) 'Clearing the Air on Clearances' Business Standard, 28 October.• Available at http://ceew.in/pdf/AG-BS-Column-Clearing-the-Air-on-Clearances-28Oct14.pdf

Rishabh Jain, Karthik Ganesan, and Vaibhav Gupta (2014) 'India's Coal Conundrum:• Spurring Growth vs. Energy Security vs. Environmental Sustainability', CEEW Factsheet, June

Vaibhav Gupta, Karthik Ganesan, and Rishabh Jain (2014) 'Natural Gas as a Pillar of• Growth: Domestic Production and Import Vulnerabilities', CEEW Fact Sheet, June Arunabha Ghosh (2014) 'Three Mantras for India's Resource Security' Seminar Magazine,• June. Available at http://ceew.in/pdf/AG-Three-Mantras-for-India-s-Resource-SecuritySeminar-658-Jun14.pdf

Suresh P Prabhu (2014) 'Handling the Energy Crisis' The Hindu, 18 April. Available at• http://ceew.in/pdf/CEEW-Handling-the-energy-crisis-SP-Article-in-The-Hindu- 18Apr14.pdf

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Electricity Shortages and Industry: Evidence from India

Dr.A.V.Nagavarma,
Head, P.G.Dept. of Economics, D.N.R. (A) College, Bhimavaram-534 202
M.Venkateswara Rao,
Lecturer & Head, Dept. of Library Science, D.N.R. (A) College, Bhimavaram-534 202

Abstract: *In many countries, electricity supply is cited as a primary impediment to firm growth and productivity. This column assesses the effect of endemic electricity shortages on Indian manufacturers. The average reported level of shortages reduces annual plant revenues and producer surplus of the average plant by 5-10%. While the complete elimination of shortages may not be plausible in the near term, simulations show that interruptible retail electricity contracts could substantially reduce the impact of shortages on manufacturers.*

Key words: *infrastructure, Low-quality, productivity*

Introduction

Low-quality infrastructure is often cited as one of the major barriers to growth in developing countries, and electricity supply is frequently rated among the top infrastructural constraints to business growth and productivity. A stark example of infrastructure failure is electricity supply in India. In the summer of 2012, India suffered the largest power failure in history – a cascading blackout that plunged 600 million people into darkness at its peak (Yardley and Harris 2012). Even under normal circumstances, however, the Indian government estimates that shortages amount to about 10% of demand at current prices – and this has been the case for at least two decades. By nature, firms rely on and benefit from high-quality infrastructure. Given the important role that firms play in the development process via aggregate productivity (Aghion and Howitt 2009), we ask how electricity shortages affect input choices, revenue, and productivity in the Indian manufacturing sector (Allcott et al. 2015). One potential prior is that because electricity is an essential input, shortages could significantly reduce output. But for exactly this reason, firms may insure themselves against outages through alternative energy supply. The limited existing evidence (such as Alam 2013 for India, and Fisher-Vanden et al. 2015 for China) could support either argument. We estimate the effects of electricity shortages across the entire country's formal manufacturing sector – this aggregate figure is important because while policymakers are well aware that shortages are a problem, developing countries like India typically have numerous pressing policy issues. Quantifying the losses from this and other distortions helps to allocate attention to the most 'binding' constraints to growth, as suggested by the framework of Hausmann et al. (2008).

Location and production of power plants

We collected and digitized comprehensive historical data starting in 1992 on the location and production of power plants and electricity supply shortfalls by state from annual publications of India's Central Electricity Authority. Figures 1 and 2 shows the variation in shortages within and across five major states from 1992 to 2010 – Uttar Pradesh experiences relatively high and variable shortages, in contrast to West Bengal having consistently low and stable shortage levels for the past 20 years. Another example, Karnataka, experience significant shortages in the early to mid-1990s, but these were substantially reduced in the mid-2000s. Gujarat had relatively reliable power supply by the end of the study period, but shortages had been more severe through the mid-2000s.

Figure 1.

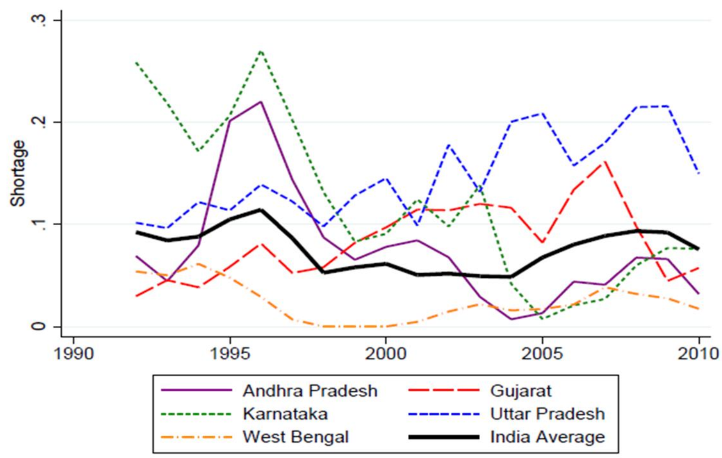
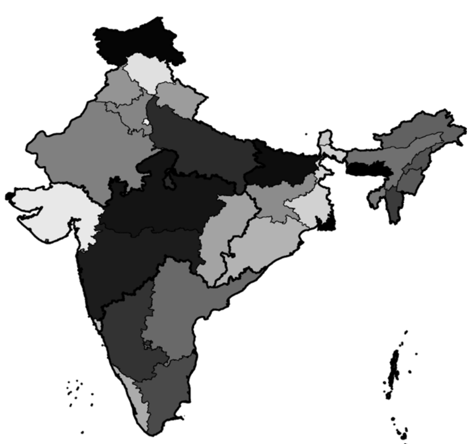


Figure 2.



Source: Allcott et al. (2015).

We model production separately for plants with and without generators. For plants with generators, shortages act like a time-varying input tax on electricity – when grid power is not available, these plants self-generate electricity at a higher cost. Plants without generators stop production during outages – as if facing an infinite input tax on electricity. This 'input tax effect' causes all plants to contract; those without generators contract substantially more. Productivity losses come from plants' waste of non-storable inputs. For example, when textile plants shut down, (non-storable) buildings and machines continue depreciating, but (storable) thread is left on the looms without waste. For this reason, the model predicts percent revenue losses to exceed percent productivity losses.

We estimate how variation in shortages affects plants in India's manufacturing sector using data from the Annual Survey of Industries. We instrument for annual shortage levels with shifts in electricity supply from new power plant construction and hydroelectric power availability. These supply shifts are not conditionally associated with agricultural output, electricity prices, or official estimates of what demand would be in the absence of shortages.

Shortages have a positive but economically small effect on energy input costs for plants with generators – a ten percentage-point increase in shortages increases average fuel expenditures by 1.8% of revenues, but this additional expenditure is seen alongside a decrease in grid electricity purchases. Average revenues decrease by 11%, which is largely explained by decreases in material inputs by a comparable amount. Since materials outlays comprise 70% of revenues on average, revenue productivity is reduced only a fraction of the reduction in revenues.

We apply the production function model using distributions of capital and productivity among plants in the Annual Survey of Industries to simulate the effects of shortages. Following Todd and Wolpin (2006), we validate the structural model using the agreement of the model's predicted effect magnitudes with those of the reduced form results. The simulated effects and instrumental variable estimates are statistically indistinguishable, which builds confidence that the estimates are reasonable and the model captures the first-order effects of shortages. We simulate that the assessed level of shortages reduced producer surplus by 9.5%, revenues by 5.6%, and productivity by 1.5% for the average plant in 2005.

As the estimates described above are identified by annual variation in supply shifters, they capture primarily 'short-run' effects of shortages, i.e. holding constant decisions such as generator capital stock and plant entry and exit. To shed light on long-run effects, we briefly study the association between plant characteristics and the average shortages in the two years preceding plant entry. We find suggestive evidence that plants in electricity-intensive industries are less likely to enter when shortages worsen, implying that shortages may have deeper effects on the composition of Indian industry.

The simulations allow us to provide two additional insights. First, shortages more severely affect plants that do not have generators, and generator costs have significant economies of scale (Figure 3). We simulate that as a result, variable profit losses average two to three times larger for small plants compared to large plants (Figure 4) – pointing to one potential factor in explaining India's bimodal plant size distribution.

Figure 3 Self-generation and plant size

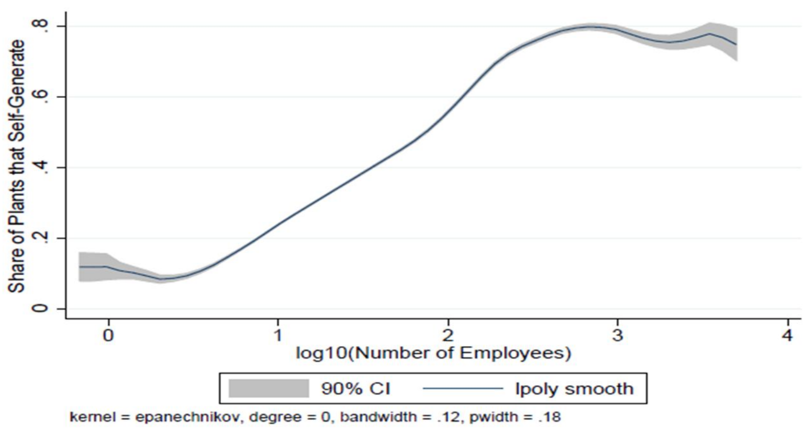
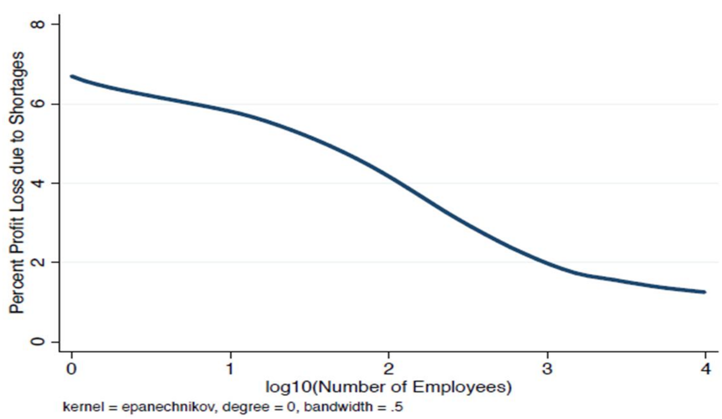


Figure 4 Simulated effects of shortages by plant size



Source: Allcott, Collard-Wexler and O'Connell (2015)

Second, we simulate the effect of interruptible electricity contracts. These contracts offer plants reduced retail prices in exchange for accepting more frequent power outages; efficiently allocating shortages to plants that can best deal with them. Our simulations show that if implemented nationwide, they could reduce producer surplus losses by more than an order of magnitude. While interruptible contracts do require additional physical infrastructure to implement, they may be a useful partial solution in the Indian context because due to political barriers that have prevented other market reforms to reduce shortages.

Conclusion:

While shortages might substantially affect manufacturing output in the short-run, our estimates explain little of the manufacturing productivity gap between India and more developed countries. An alternative contract regime would allow manufacturers to sort into allocatively efficient shortage levels, substantially reducing aggregate losses from shortages requiring neither large-scale energy sector reforms nor long-term elimination of shortages.

References and Notes:

Aghion, P and P W Howitt (2009), *The Economics of Growth*, MIT Press, Cambridge, MA.

Alam, M (2013), "Coping with Blackouts: Power Outages and Firm Choices", Working Paper, Yale University, November.

Allcott, H, A Collard-Wexler, and S D O'Connell (2015), "How Do Electricity Shortages Affect Industry? Evidence from India", *American Economic Review*, forthcoming.

Fisher-Vanden, K, E Mansur, and Q J Wang (2015), "Electricity Shortages and Firm Productivity: Evidence from China's Industrial Firms", *Journal of Development Economics* 114: 172-188.

Hausmann, R, D Rodrik, and A Velasco (2008), "Growth diagnostics", in N Serra and J Stiglitz (eds.) *The Washington consensus reconsidered: Towards a new global governance*, pp. 324-355.

Yardley, J, and G Harris (2012), "2nd Day of Power Failures Cripples Wide Swath of India", *New York Times*, 31 July, http://www.nytimes.com/2012/08/01/world/asia/power-outages-hit-600-million-in-india.html

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

India's Shift to Sustainable Energy

B.P.Naidu, Head, Dept. of Social Work, D.N.R.College (A), Bhimavaram-534 202

Ch.Ranga Rao. Lecturer, P.G.Dept. of Social Work ,P.G.Courses & Research Centre, D.N.R. College (A), Bhimavaram-534 202

Abstract: *India is the world's fourth-largest energy consumer and will likely overtake China in the next decade as the primary source of growth in global energy demand. As NBR has examined in its series of* publications for the Senate India Caucus*, India must overcome a number of challenges to meet its rising energy demand and sustain economic growth. The country is the world's third-largest carbon dioxide emitter, and India's* climate *and* environmental *challenges have been acknowledged by many policy and industry leaders. The Bharatiya Janata Party candidate for prime minister, Narendra Modi, among others, has called for an "energy revolution" to harness the country's coal, gas, hydro, nuclear, and wind resources to promote energy security and economic development in a sustainable manner.*

Key words: energy access, water security, agricultural productivity, disaster resilience

Introduction:

In this research paper we examine the steps India is taking toward a more sustainable energy future. He argues that while India has made important progress on renewable energy, low-carbon alternatives, and increased energy efficiency, much of the potential in this area remains unrealized, including opportunities for greater U.S.-India collaboration. India's National Action Plan on Climate Change (NAPCC) recommends that the country generate 10% of its power from renewable sources by 2015, and 15% by 2020. India is a key country in the efforts of the international community to shift to a sustainable, low-carbon path that will confront climate change, improve human health, and foster prosperity for all. In India, climate action will be most successful when integrated with efforts to tackle existing challenges in energy access, water security, agricultural productivity, disaster resilience, and broader economic development goals. For example, distributed or on-site generation of renewable energy, such as rooftop solar panels, can play a significant role in providing access, especially in rural areas. According to the World Bank, over 400 million people in India lack electricity.

India has taken important steps on renewable energy with increasing installed capacity. The renewable energy goals require continued effort, strong implementation, and improved utilization of capacity, but there are favorable signs. In 2008, India launched its NAPCC, featuring eight national missions, ranging from R&D to sustainable agriculture, with centerpiece programs to scale up solar power and energy efficiency. With respect to renewable energy, there are great opportunities for India and its international partners. As an Ernst & Young report states, in emerging markets "renewable energy potential is attracting high levels of foreign investment, generating new jobs and creating local supply chains.... For investors, renewable energy assets are generating robust returns." The role of government-to-government cooperation and public-private partnerships is also important.

The accompanying research shows that, while not in the lead globally, India's renewable energy initiative has been substantial, and there are signs of building momentum. KPMG estimates that grid parity for solar in India could take place in 2017–19. The Ernst & Young outlook for India for 2014 places it among the most attractive markets and forecasts growth "with ambitious targets and a series of large-scale project announcements." Last year, India nearly doubled its solar energy capacity and there was great interest demonstrated in the first projects under Phase 2 bidding conducted by the National Solar Mission. Also, the Ministry of New and Renewable Energy is expected to provide tax benefits and grid improvements to take advantage of the potential for more wind energy.

Many public officials and business leaders in India and internationally recognize the potential in India and are taking action. To make these measures successful and to go further faster, many realize that action is needed along a broad front. This includes technology and finance but also development of knowhow, streamlining of regulation and government administration, and a continued shift to greater reliance on the market. For example, while steps have been taken to deregulate fuel prices, the U.S. Energy Information Administration reports that India's Ministry of Coal and Mines continues to control allocation of coal and subsidies to companies. Also, to build public support, it is important to promote understanding of the economic, health, and other benefits of taking these steps. With India's growing economy and energy security needs, this agenda is challenging, but the opportunities are enormous. Not only is low-carbon energy compatible with economic growth, but in many cases, such as in providing distributed generation in rural areas, it is a better, more cost-effective option. It can help bring relief for smog-choked cities and a new wave of investment opportunities.

Cooperation between India and the United States on energy is important to shift our countries and the world to a sustainable, prosperous growth path. The U.S.-India Strategic Energy Dialogue is an important engine of this cooperative relationship along with PACE. The recent meeting of the dialogue involving Secretary Moniz and senior level participants from both countries provided an opportunity for in-person updates and direction for further steps on the PACE work plans. Cooperative R&D, financial support from U.S. agencies, partnerships to deploy clean energy, assessment of unconventional natural gas, and engagement of the private sector are key elements of PACE. Engagement by stakeholders with work on the three activity tracks under PACE—deployment, research, and energy access—can help maintain the momentum of this effort.

On a related note, the India-U.S. Track II Dialogue on Climate Change and Energy, convened by the Aspen Institute (on the U.S. side) and the Ananta Aspen Centre (in India), met in Washington and sent a letter to senior officials in both governments. Complementing and informing formal diplomatic relations, the Track II Dialogue aims to advance a bolder partnership between the two countries by creating space to exchange views on what each country is doing to tackle energy and climate change challenges and to discuss options for collaboration bilaterally and in multilateral arenas. The Track II Dialogue participants offered the following ideas to help further bolster clean energy and climate cooperation between India and the United States:

- Minimize the potential for trade disputes involving support for renewable energy by harmonizing policies, conducting early consultations on policies affecting renewable energy trade, and exercising restraint before initiating WTO disputes
- Create an India-U.S. partnership for climate resilience drawing on the experience of PACE
- Establish a framework for phasing down emissions of hydrofluorocarbons
- Under the existing Joint Clean Energy R&D Centers (part of PACE), leverage the whole U.S. Department of Energy R&D ecosystem of technologies to address opportunities in India and build capacity in science and engineering to enable innovation.

India, like the United States, needs to think strategically about how to achieve energy security, economic development, and environmental sustainability simultaneously. Typhoons and heat waves are growing in intensity. Sea-level rise threatens to inundate population centers. Warming will significantly affect crop yields and therefore food security. Urban areas choked with pollution are suffering hundreds of thousands of premature deaths. Lessening and avoiding the damage from these must be part of any strategy to seek gains from energy development. Moreover, India is heavily dependent on imports of oil (over 70%) and coal (11%), making home grown renewable energy an important option for improving energy security. With falling renewable energy prices, it is becoming easier to solve the simultaneous equation of environmental sustainability and development, a point which if recognized can add momentum to achieving both goals. KPMG sees conventional power costs rising and solar prices falling, with parity in 2017–19 or even earlier for some sectors such as industrial and commercial consumers.

India is heavily dependent on coal, which is a main source of the greenhouse gases driving global warming. To shift to a low-carbon path requires more efficient use of coal, demand-side management of energy, development of carbon capture and storage, use of natural gas as a bridge fuel, and a ramping up of renewable energy sources such as wind, solar, and hydropower. To accomplish the shift to low carbon, it is important to stress that the need is not just a question of fuels but also regulatory and functional challenges for the electricity sector, especially in providing modern energy access to all and in achieving development goals. This includes improving transmission networks to both deal with losses and support new technologies. Electricity losses in India during transmission and distribution were about 24% in 2010, and losses because of consumer theft or billing problems added 10—15%. [6] An important regulatory challenge is developing strong market and regulatory models for energy access using mini-grid and off-grid solutions. India has launched efforts to make the shift described here, with leadership at the national level and in states such as Gujarat and Maharashtra, but as many officials and stakeholders in India and internationally know, stronger, more widespread measures are needed.

In the shift to a low-carbon path in India, energy efficiency is a high-value target for action and an opportunity both for Indian and international investors and other stakeholders. India's National Energy Efficiency Mission includes the "Perform, Achieve, and Trade" program which sets a percentage by which companies must reduce energy intensity. Those that beat their targets receive tradable permits they can sell to plants that come up short and would otherwise face penalties. Other efficiency programs are directed at buildings, appliances, and vehicles. According to one study, by pursuing these efficiency gains, India can avoid 120 gigawatts of power capacity by 2030 and, with stronger measures, has the potential to achieve substantial additional gains. One energy expert has said that rather than building new, mostly carbon-emitting generation facilities, "investment in a more efficient electricity grid would do wonders for [India's] energy security and the environment," adding that "today, India's transmission and distribution losses are astounding." Another important opportunity for increased efficiency is in building codes, made critical by the massive urbanization expected in coming years. Buildings in India already consume over 30% of electricity and two-thirds of the buildings that will exist in 2030 will be built between now and that date. As an example of what can be done, the city of Hyderabad recently adopted an "energy conservation building code" for commercial and high-rise residential buildings, expected to garner major energy savings. There is a key role here for state and local governments working with the private sector to reap huge benefits for the low-carbon future. Another area for stepped-up action on efficiency is fuel economy, where India is moving forward with new standards but has greater potential. Though India has looked to the vehicle standards of the European Union, the measures in India are not as advanced.

India has repeatedly advocated for LNG imports from the United States as part of its energy security plan. Could you speak to what role greater gas consumption might play in helping meet India's energy needs in a sustainable manner.

Burning natural gas results in less carbon dioxide than burning coal, which means in principle that gas does not contribute as much too global warming. Thus, some people refer to natural gas as a bridge fuel to buy time to shift toward primary reliance on zero-carbon fuels and fuels used with carbon capture and storage. However, in such a strategy care must be taken to avoid the problems associated with extraction and transport of natural gas such as fugitive methane emissions and the environmental problems accompanying some forms of extraction. Methane, the primary component of natural gas and a potent greenhouse gas, is leaked or vented throughout the natural gas production life cycle, which undercuts the climate advantage natural gas otherwise has over coal. Common-sense regulations such as requiring periodic leak detection and repair at all major emissions sources, from the wellhead to the end-user, can reduce methane emissions while delivering more gas to market.

While shale-gas potential is generally seen as greater in other parts of the world, cooperation under the U.S.-India Strategic Dialogue includes shale-gas resource assessments and sharing lessons on extraction. If pursued with the precautions mentioned above, this initiative could contribute to the larger effort to explore the use of natural gas in a strategy to shift to a low-carbon path for sustainable development. While natural gas is not a long-term climate solution, if upstream methane emissions are reduced to the extent technologically feasible, it can be a first step toward reducing carbon dioxide emissions in the power sector. Natural gas can also help integrate additional renewable generation into the grid, as gas turbines can cycle down quickly when the sun is shining and the wind is blowing, and cycle up quickly as needed.

Conclusion:

In the Ernst & Young attractiveness index for renewable energy, the United States, China, Germany, Japan, the UK, Canada, and India are the top seven, in that order, ahead of France, South Korea, Brazil, Spain, Taiwan, Mexico, and others. The index also shows the relative strengths among the top countries, with Canada, the UK, and Germany leading in macro stability; the UK, Canada, and the United States leading in ease of doing business; and Japan, India, Germany, and China leading on prioritizing renewables. While overall the U.S. leads, the report notes that the gap is narrowing as “congressional gridlock continues to hamper U.S. policy.” All countries stand to benefit from renewed effort, and each has particular strengths to leverage and areas for improvement. The story that emerges from a close look at India and the India-U.S. collaboration described above is that, working together, our two countries can improve our efforts and reap great benefits. We can benefit by confronting together the challenges of climate change and energy security and by enhancing economic growth, jobs, and human health and well-being.

References and notes:

[1] Central Electricity Authority, “Executive Summary: Power Sector,” January 2014, http://www.cea.nic.in/reports/monthly/executive_rep/jan14.pdf.

[2] Neha Pahula et al., “GHG Mitigation in India: An Overview of the Current Policy Landscape,” World Resources Institute (WRI), WRI Working Paper, March 2014, http://www.wri.org/publication/ghg-mitigation-ind-policy.

[3] “Renewable Energy Country Attractiveness Index (RECAI),” EY, February 2014.

[4] “The Rising Sun: Grid Parity Gets Closer—A Point of View on the Solar Energy Sector in India,” KPMG, September 2012, https://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/Documents/the-rising-sun-grid.pdf.

[5] U.S. Energy Information Association, “India,” March 18, 2013, http://www.eia.gov/countries/cab.cfm?fips=in.

[6] Yoginder Alagh, "Transmission and Distribution of Electricity in India: Regulation, Investment, and Efficiency," OECD, http://www.oecd.org/dev/partnerships-networks/46235043.pdf.

[7] Rajat Gupta, Sushant Mantry, and Ganesh Srinivasan, "India: Taking on the Green-Growth Challenge," McKinsey & Company, 2012.

[8] Charles Ebinger, "India's Energy Policy and Electricity Production," National Bureau of Asian Research, Policy Q&A, October 2011.

[9] James Bradbury et al., "Clearing the Air: Reducing Upstream Greenhouse Gas Emissions from U.S. Natural Gas Systems," WRI, April 2013.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Impact of environment on international trade

G. Laitha Madhavi, P.B Siddhartha College of Arts and Science, Mogalrajpuram, Vijayawada-10

B. Kalpana, P.B Siddhartha college of Arts and Science, Mogalrajpuram, Vijayawada-10

Abstract: *Countries are becoming economically interdependent, characterized by a movement of goods, services, labour and capital across borders. Cooperation enables better linkages among the smaller marginalized producers and between smaller and larger mainstream enterprises. The International trade environment module is made to perceive all the aspects of the globalization on how trade and exports led to job creation, poverty reduction, prosperity and development in many communities. Producing goods, consuming goods and moving goods all have an environmental cost that is rarely included in the price we pay. This is also true for trading goods internationally. But it is by no means always the case that a locally sourced product is more environmentally friendly than one that has travelled a long distance. Trade can also help to reduce the negative consequences of economic growth by making environmentally-preferable products and technologies more easily available.*

Key Words: *Environment, Trade, effect of trade on environment, polital factors, barriers conclusion.*

Introduction

The relationship between environmental and trade agreements has been a subject of political and legal discussions for quite some time. International trade agreements are primarily aimed at the removal of trade barriers. International environmental agreements, on the other hand, partly contain obligations for countries to restrict the trade with certain dangerous goods (like chemicals or waste) or components of the natural environment (like protected species). This leads to a certain tension between trade and environmental agreements. There is also the risk that international trade agreements narrow the scope of states to establish environmental protection measures.

Sustainable development and protection and preservation of the environment are fundamental goals of the WTO.The WTO contributes to protection and preservation of the environment through its objective of trade openness, through its rules and enforcement mechanism, through work in different WTO bodies, and through efforts under the Doha Development Agenda.

Objectives

- To ensure both economic income and environmental quality.

- To promote both economic growth and an improved environment.
- To improve the environment that comes with a given level of income in market-measured terms.
- To reduce trade barriers and eliminate discriminatory treatment in international trade relations.
- To avoid the misuse of trade related measures for protectionist ends are fulfilled.

Effects of trade on the environment:

Trade shifts the incidence of environmental effects. Trade geographically separates production from consumption. When environmental effects are national and not trans boundary in their incidence and instead are mainly associated with production, trade may shift the environmental effects from one country to another. In addition, where consumption produces waste that has become an important part of the ecological cycle (for example, when nutrients are returned to the farmers' fields), trades separation of production and consumption may put stable ecosystems out of balance. In some cases, production in one country may have environmental effects on neighboring countries. For instance, water used for irrigation that then drains back into the river system raises the salt content for users in other countries downstream. In other cases, the act of production has beneficial global environmental effects. For example, planting trees that absorb and store carbon.

Although shifting the location of environmental damage may not affect total world environmental damage, it often poses problems of international concern. Where the negative effects are purely national, the unilateral action of one country to alleviate its own environmental problems may well raise costs to producers and hence cause a competitive handicap for its exports of affected products. If the country is big enough, the effect may be an increase in world trade prices, with consequences for all countries. In other cases, such as when an importer raises food safety standards, environmental protection measures may adversely affect exports from other countries.

Trade affects world production and consumption. trade causes global production and consumption to change. If there were no trade in coffee, for example, world consumption and production would be far less than it is, if only because coffee cannot be produced everywhere. The argument also applies to commodities that are produced in a far wider spectrum of countries than are tropical beverages. By exploiting comparative advantages, a country can enjoy higher levels of consumption and production which influence the ways in which natural and environmental resources are used and protected.

This basic interrelationship between trade and the environment implies that trade policy has an impact on the environment. Conversely, because environmental policy affects the supply and demand situation of commodities, it affects trade too. It is in recognition of this two way relationship that UNCED called for mutually supportive environmental and trade policies.

Measuring the effects:

The impact of trade on the environment depends on the volume of trade, the share of trade in production and consumption and the environmental impact of production and consumption. Large volumes of forestry and fishery products are traded along with several agricultural commodities including cereals, sugar, fats and oils, oilmeals, cassava, meat, bananas, fresh citrus, cotton, pulses, dairy products, wine, coffee and rubber. At the global level, the trade: production ratio is usually low, while for commodities such as tropical beverages and rubber world trade is the main stimulus to production. Trade in cereals accounts for little more than 12 percent of world production Table 24 presents the shares of exports in world production for several commodities.

The trade: Production ratio is often significant in some commodities for individual countries even when it is not significant globally. For example, while only 3 to 4 percent of world rice production is traded, exports account for more than 20 percent of production in Australia, the EC, Guyana, Pakistan, Thailand, Uruguay and the United States. At the same time, imports of rice account for more than 80 percent of consumption in as many as 4 3 countries.

The production and processing of commodities cause different amounts of environmental side-effects. These effects depend on numerous factors including technology, soils, topography, water quality and the ecosystem. There is no overall measure of pollution per tonne produced or consumed of a given product that can he applied to all countries and ecosystems.

Political Factors and Their barriers on International Trade:

Governments and politics play a large role in international business. The political environment in international business consists of a set of political factors and government activities in a foreign market that can either facilitate or hinder a business' ability to conduct business activities in the foreign market. There is often a high degree of uncertainty when conducting business in a foreign country, and this risk is often referred to as political risk or sovereign risk.

In a foreign market that can either facilitate or hinder a business' ability to conduct business activities in the foreign market. There is often a high degree of uncertainty when conducting business in a foreign country, and this risk is often referred to as political risk or sovereign risk.

A trade barrier is simply anything that makes it harder for a company to export products to a foreign country. Formal trade barriers are enacted by governments for the purpose of restricting imports to protect a country's domestic industries. Formal trade barriers include tariffs, which are taxes on imports that helps make domestic products more competitive and product quotas that limit the number of products imported into the country

Look at some common political factors that influence the international business landscape. The type of economic system a country builds is a political choice. Foreign countries often will have different economic systems from your domestic market and adjustments often need to be made to take these differences into account.For example, a country may operate in a market economy where private individuals own most of the property and operate most of the businesses. A market economy is usually the best economic environment for a foreign business because of the protection of private property and contract rights.

Some countries lean more towards a socialist economy where many industries and businesses are owned by the state. Operating businesses in this environment will be more difficult, but products can still be produced and sold as people still pick their jobs and earn money.A few countries operate under a communistic economic system where the state pretty much controls all aspects of the economy. Conducting business in this environment ranges from difficult to impossible.

Course, the reality is that all economies are mixed economies that take parts from two or more of the 'pure' economic systems. For example, you can conduct business in communist China in Hong Kong and other special areas where a market economy is allowed to operate.

Businesses also must often contend with different governmental systems. Examples include democracies, authoritarian governments, and monarchies. Some governments are easier to work with than others. Democracies, for example, are answerable to their citizens and the rule of law.

Authoritarian regimes are usually answerable to no one, including the law. It is less risky to conduct business in democracies and constitutional monarchies, a monarchy with a constitution that protects the public and subjects the monarch to the rule of law, than in countries with authoritarian regimes.

The next major factor is trade agreements. Countries often enter into trade agreements to help facilitate trade between them. If your country has entered into a trade agreement with another country, conducting business in that country will usually be easier and less risky because the trade agreement will provide some predictability and protection. One great advantage, for example, is that your products will be subjected to fewer trade barriers that serve as obstacles to exporting your products into the country.

Conclusion:

OECD has made the most active effort to grapple with the complex interactions between trade and environmental objectives. Even though it has very limited capacity to set and enforce policy among its members, OECD can bring a level of integration to trade/environment questions that few other bodies can. OECD's efforts are jointly supported by its environment directorate and its trade directorate, and its members' trade and environmental agencies are meeting to develop national positions. GATT as an institution has responded slowly to the unfolding dilemmas posed by the increasing convergence of trade and environmental issues

References

A K Dixit & V Norman –Theory of International Trade: A Dual, General Equilibrium Approach (Cambridge Economic Handbooks)

Amitrajeet A Bhatabyal& Hamid Beladi- The Economics of International Trade and the Environment

Ralph Folsom, Michael Gordon, John Spanogle, Michael Van Alstine- International Trade and Economic Relations in a Nutshell

Ronald B Mitchel- International Politics and the Environment (SAGE Series on the Foundations of International Re)

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Climate Change and Environment – An Indian Perspective: Issues and Challenges

V.Vijaya Kumar, Research Scholar, P.G.Dept. of Commerce, P.G.Courses & Research Centre, D.N.R. College (A), Bhimavaram-534 202

S.Keshava Nagu, Research Scholar, P.G.Dept. of Commerce, P.G.Courses & Research Centre, D.N.R. College (A), Bhimavaram-534 202,

Abstract: *Climate change is no longer a distant threat. The Fourth Assessment Report of the Inter-governmental Panel on Climate Change (IPCC), published last year, amply demonstrates that we are already experiencing climate change induced by human activities. Ever since the invention of fire, human activities have generated carbon dioxide and other greenhouse gases. However, till the advent of the Industrial Revolution, these emissions were well within the carrying capacity of the atmosphere. The Industrial Revolution, based on the combustion of hydrocarbons –initially coal, later also petroleum and natural gas – led to ever-increasing levels of emission and accumulation of carbon dioxide in the atmosphere, precipitating climate change.*
Key words: *carbon dioxide in the atmosphere, climate change*

Introduction:

Historically, and even currently, the excessive levels of emission of greenhouse gases have originated in the industrialized countries. Each inhabitant of the planet has an equal right to the atmosphere. By have grossly exceeding their fair share of atmospheric resources, the industrialized countries have caused climate change. India's per capita carbon dioxide emissions are just over 1 tonne, compared to the OECD average of over 11 tonnes. If all countries had the same per capita emission levels as India, the planet would not have faced a climate change problem.

Though the responsibility for causing climate change lies with the affluent countries, its main victims will be the world's poor. Affluent countries will be able to adapt to climate change much more successfully because they possess the requisite capital, technology and human resources. Wealthy countries can build embankments to protect coastal areas threatened by sea-level rise, construct physical infrastructure capable of withstanding extreme weather events, switch over to new seed and plant varieties better suited to cope with climate change, adopt water conservation and other necessary measures. In contrast to developing countries, the industrialized countries will not be seriously handicapped by lack of financial resources or technological know-how

Last year, an article in *The Economist* noted that the Alps might lose their snow cover as a result of global warming, posing a threat to the ski resorts of Switzerland, the playground of the rich and famous. However, the journal was confident that the Swiss would be able to adapt successfully. It even suggested that the famous winter resorts might well be converted to cool hill stations to which Europeans might flee in summer to escape the heat of plains!

Low-income countries are much more vulnerable to the impacts of climate change. Last year, India had a good monsoon. It was the answer to the prayers of a billion Indians. Even so, the torrential rains and floods left thousands of people homeless and took a toll of hundreds of lives. This was not climate change; it was merely a benign seasonal change. Poverty stricken people, dwelling in flimsy huts, living in villages lacking durable infrastructure and decent communications, are unable to cope even with annual seasonal change, leave alone the sweeping transformation that may be wrought by climate change.

Responding to the urgency of the challenge, Prime Minister Manmohan Singh constituted a high-level Council on Climate Change last year. A national action plan on climate change is currently under preparation and is expected to be finalized shortly. The action plan will address both aspects of a response to climate change, namely, adaptation and mitigation.

Adaptation:

How should a low-income country like India respond to climate change? It is obvious that we must build up our capacity to cope with climate change and adapt to its impacts. This will be possible only if we can overcome the currently severe constraints of financial, technological and human resources. The only hope lies in rapid economic and social development. Without rapid economic development, we cannot overcome the grievous lack of financial resources required for adaptation. Without rapid social development in fields such as education and public health, our workforce will be unable to adapt successfully to climate change. For a low-income country, accelerated development is the key to successful adaptation. If development slows down, future generations in our country will be grievously incapable of coping with climate change. For a low-income country rapid development is synonymous with sustainable development.

What should we do in the short-run, apart from striving to accelerate growth rates? We currently have only a broad picture of the likely impacts of climate change on India. We are not yet able to predict in detail what impacts may be expected in a specific area (say, district or sub-division). Hence, it is not feasible to design short-term strategies exclusively for climate change. Rather, we need to identify elements of our existing development plans which are likely to also enhance our capacity for adapting to climate change and to accord higher priority to these programmes. Some examples of development programmes that also promote adaptation are those related to irrigation, water conservation, flood control, coastal zone protection and disaster management. Many, if not most, development programmes have significant co-benefits for adaptation to climate change. Thus, from both a short-term and long-term perspective, development itself is the best form of adaptation.

Mitigation:

India plays her due role in international initiatives to mitigate climate change, in accordance with the provisions of the UN Framework Convention on Climate Change (UNFCCC). India's *Initial Communication* to UNFCCC (2005) provides a detailed account of our response to climate change.

As we saw earlier, India requires rapid and sustained development not only for poverty eradication but also for the purpose of building up her capacity to cope with, or adapt to, the impacts of climate change. The crucial question, therefore, is how to address mitigation concerns without diverting scarce resources from the primary task of economic and social development. The answer lies in proactively identifying "win-win" measures, that are primarily intended to promote development but which also yield significant co-benefits in the form of reducing greenhouse gas emissions. Such "win-win" measures fall into three general categories.

1) *Cost-effective energy efficiency and energy conservation measures*: These can simultaneously advance India's development and climate change objectives. There is considerable potential for action on this front in all major areas. For example, in the power generation area, there is scope for adopting certain clean-coal technologies that satisfy the condition of cost-effectiveness. This applies also to efficient power transmission and distribution systems. In the transportation area, public transportation systems should be rapidly expanded in order to avoid undue reliance on the use of private vehicles, thereby limiting rising emissions in this sector. The use of bio-fuels should be encouraged, provided such fuels are not produced at the expense of food crops. In the industrial sector, special attention should be paid to improving energy efficiency measures wherever these do not entail major incremental costs.

2) *Promotion of energy security:* India's energy security interests are served by all measures that have the effect of reducing the country's heavy dependence on petroleum imports. Energy conservation and energy efficiency measures also serve to promote India's energy security interests. In addition, India adopts a number of measures for diversification of energy sources from petroleum to alternative fuels and sources in order to promote energy security. These include promotion of renewable energy – wind, solar and hydropower; promotion of nuclear energy; and new initiatives for harnessing domestic coal-bed methane. While these measures are primarily designed to promote energy security, they also generate important climate change co-benefits in the form of reduced carbon emissions.

3) *Health-related local environmental concerns*: In some cases, measures designed to address important health-related local environmental concerns can also produce important co-benefits for climate change mitigation. The decision to replace diesel by CNG as the fuel in the Delhi public transportation system is a good example. The measure was intended to address public health concerns arising from air pollution from suspended particulates. However, it also produces significant climate change co-benefits by reducing carbon emissions. Similarly, improved urban waste disposal systems result in cutting down emissions of methane – a greenhouse gas – even though their primary objective is to address public health concerns.

These are measures that simultaneously promote India's economic and social development objectives and global climate change mitigation. They are measures that India should adopt in its own national interests. It must be recognized, however, that India can only be expected to pursue measures that are cost-effective in terms of achieving its developmental objectives. Measures involving significant incremental costs can be implemented only if these additional costs are covered through international cooperation. India cannot be expected to adopt measures that would slow down its development – and thus imperil the capacity of future generations to cope with the impacts of climate change.

Conclusions:

The major themes of this short paper may be summed up in three propositions concerning the relationship between development and climate change in India and other low-income countries:

1) In the context of climate change, rapid development is sustainable development in the case of a low-income country. If they fail to develop rapidly, low-income countries will be unable to adapt to climate change with any degree of success. Future generations in these countries will have to pay a heavy price if the present generation fails to achieve rapid development. For low-income countries, development is the best form of adaptation.

2) In order to make their fair contribution to mitigating climate change, India (and other developing countries) should implement all feasible no-cost measures delivering mitigation co-benefits. They should also seek opportunities for implementing additional measures if the affluent countries meet the incremental costs.

3) It would be counter-productive for India (and other low-income countries), in terms of their economic and social progress as well as their local environmental goals, to divert scarce resources from these priorities to mitigation measures involving uncompensated incremental costs.

References and notes:

1. Bosello F, Roson R, Tol RSJ. Economy-wide estimates of the implications of climate change: Human health. Ecol. Econ. 2006; 58:579–591.

2. World Health Organization The 10 leading causes of death by broad income group, 2004. Available online: www.who.int/mediacentre/factsheets/fs266/en/index.html

3. Lancaster K. A new approach to consumer theory. J. Polit. Econ. 1966; 84:132–157.

4. Pearce D. Economic valuation and health damage from air pollution in the developing world. Energ. Policy. 1996; 3:627–630.

5. Viscusi WK, Aldy JE. The value of a statistical life: a critical review of market estimates throughout the world. J. Risk Uncertain. 2003; 27:5–76.

6. Hubbell BJ. Evaluating the Health Benefits of Air Pollution Reductions: Recent Developments at the U.S. EPA Prepared for the UK DETR/UN ECE Symposium on 'The measurement and economic valuation of health effects of air pollution. Institute of Materials; London, UK: February19–202001

7. Nelson JP, Kennedy PE. The use (and abuse) of meta-analysis in environmental and natural resources economics: an assessment. Environ. Resour. Econ. 2009; 42:345–377.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Energy, Environment and Economic Development: Policies and Challenges

T.S.K.Sirisha, Lecturer in English, D.N.R.College (A), Bhimavaram-534 202

Abstract: *Alternative indicators- such as the Genuine Progress Indicator developed in 1994 by Clifford Cobb, or Green GDP, which was formulated in the 1990s as a response to the inadequacy of GDP — have not yet taken root. Additionally, bringing about a change of values in a large underdeveloped nation is a complex, though not impossible, task. The starting point for any successful alternative definitions of growth and progress is that they cannot be exclusively applied to developing and poor nations. This must be an inclusive, globe-spanning endeavor.*

Key words: *globe-spanning, secular, egalitarian*

Introduction:

In both the developmental and environmental camps, the concept of sustainable development was seen a means of achieving development without degradation. Two decades later, it has become a convenient slogan behind which countries like India can conceal "business as usual" growth policies. India's reluctance to slow down growth in order to pursue sustainability or inclusiveness is not irrational. The trauma of passage from a predominantly religious, feudal society to a more secular, egalitarian and industrial one requires the country to have an optimistic view of the future. The belief that growing wealth and technological sophistication will guarantee power and prestige provides this dose of optimism. If India is asked to consider the cost of growth in environmental degradation and social exclusion, it is likely to respond that more growth and more technology are the solution. However, the Indian Government's optimistic view of economic growth as a means to social inclusiveness, providing dignity and a decent quality of life for all, and ecological sustainability, is flawed.

At the same time, the Western idea of sustainable development is equally untenable. It endorses the false promise that an expanding economy can be fully compatible with environmental sustainability. In my view, the values of social inclusiveness and ecological sustainability will be properly prioritized only when economic growth ceases to be a proxy for development or progress.

Alternative indicators - such as the Genuine Progress Indicator developed in 1994 by Clifford Cobb, or Green GDP, which was formulated in the 1990s as a response to the inadequacy of GDP — have not yet taken root. Additionally, bringing about a change of values in a large underdeveloped nation is a complex, though not impossible, task. The starting point for any successful alternative definitions of growth and progress is that they cannot be exclusively applied to developing and poor nations. This must be an inclusive, globe-spanning endeavor.

In 1987, the United Nations' Brundtland Report defined sustainable development as a process that "fulfils the needs of the present without compromising the ability of future generations to meet their own needs."
The emphasis of intergenerational equity over interregional equity is instructive as the lives of future generations, presumably in rich countries, was portrayed as being more important than the present lives of the poor.

In both the developmental and environmental camps, the concept of sustainable development was seen a means of achieving development without degradation. Two decades later, it has become a convenient slogan behind which countries like India can conceal "business as usual" growth policies. Despite India's rapid growth, over 33% of its households still have no access to electricity — and over 70% still use fuel-wood, twigs and animal dung for cooking. In 2011, non-commercial energy comprised 24% of India's primary energy pie, following coal at 42%.

Additionally, India's rural communities rely on female labor to collect and burn vast amounts of carbon-based fuels. This is possible because the opportunity cost of "female energy" remains negligible as long as the women are uneducated and unskilled. Another key factor little appreciated outside India is the way in which the "poor" actually subsidize the consumption and therefore the pollution caused by the "rich." This becomes very clear as soon we consider the emission of greenhouse gases in the proper manner.

The world at large lauds India for its low levels of per capita energy consumption. And indeed, carbon emissions per person are 1.5 tons, which is one-third of the global average and less than one-tenth that of the largest emitters in the world. However, these low per capita consumption figures conceal a painful reality: that hundreds of millions of Indians remain without access to electricity.

On the other hand, upper and upper-middle class Indians living in cities consume very high levels of energy. These high levels are exaggerated by the fact that many upper-income Indians use back-up generators to supplement the unreliable electricity supply in many parts of the country. Thus, the low energy consumption by a large number of the poor conceals the high consumption levels of the rich by bringing down the average figures.

A measure of the true challenges ahead becomes clear when one considers what is required in terms of power production in order to provide an acceptable level of electricity to the people. The United Nations has established a standard of 1,000 KWh per person as the minimum necessary for an acceptable quality of life. In India's case, that means that the country's power-generating capacity would have to be increased three to four times its current level — even though the country is already one of the world's largest energy consumers in the aggregate. Inconvenient facts like these put paid to the slow — indeed glacial — rate of progress in the international debate about sustainability, growth and the environment.

Rethinking sustainable development: The idea that we need a more socially inclusive and ecologically sustainable model for development has been around for a long time. The ways and means to achieve this are widely discussed. Inclusive development requires employment policies that can bring about a different primary income distribution. Sustainable growth, for its part, requires the creation of productive assets that conserve nonrenewable resources such as land, water and atmosphere and minimize environmental damage. These assets have to serve the ultimate goal of human well-being (housing, sanitation, food, water and energy) and also facilitate wealth creation (economic activity).

The question that needs to be asked is not whether a new model is needed, but why the models that have been proposed are failing to make even a marginal impact on the current growth model. The perceived link between well-being and growth will not be easy to break. As things stand, growth is the underlying basis of the advancement of social equality. It is also seen as the precondition for civil coexistence and governance. Indeed, introducing a different paradigm that seeks to arrest, slow down or freeze growth to address sustainability will require nothing short of a revolution.

We have known for long that GDP is a poor measure of a nation's wellbeing. Even Simon Kuznets, who was the first to devise the national accounts from which GDP evolved, was fully aware of that fact as far back as 1962. Kuznets warned that distinctions between quantity and quality of growth, its costs and returns, and the short and the long run, were important. And he wrote presciently, "Goals for 'more' growth should specify more growth of what and for what." He was also very much aware that the simplicity of GDP was prone to misuse:

The valuable capacity of the human mind to simplify complex situations in a compact characterization becomes dangerous when not controlled in terms of definitely stated criteria. With quantitative measurements especially the definiteness of the result suggests, often misleadingly, a precision and simplicity in the outlines of the object measured.... Measurements of national income are subject to this type of illusion and resulting abuse, especially since they deal with matters that are the centre of conflict of opposing social groups where the effectiveness of the argument is often contingent upon oversimplification.

While a new measure of a nation's well-being is difficult to design without wide consultation, it is possible to point out some characteristics that the new measure should possess:

1. The indicator should address human security — rather than national security.

We urgently need to recognize that human security must not remain limited to a concern with weapons. It concerns human life and dignity. At the same time, as long as "nations" are the primary target for policy action, India's — or any other country's - focus on "national interest" cannot be contested. This has an unfortunate effect on climate change policy. To date, it is fundamentally constructed through the twin lenses of national security and national economic strategy. For better or for worse, the "nation" remains the policymaking framework that legitimizes all others.

2. The newly devised measure should take note of limits to growth.

The rate of growth in emerging economies is now far more rapid than that of the now-developed world in the 18th and 19th centuries. It is far greater, in part, because it involves more than two-thirds of the global population. This means greater strain on natural capital. We have no precedent for managing such scales of growth under conditions of natural resource scarcity.

Given these fundamental dynamics, the current climate discourse seeks to solve the problem in a framework that assumes the need for abundance. It also blindly postulates that technology will enable it to be sustained. Neither of these is supported by available evidence. . The new measure should prioritize the production of public goods over the production of private goods. Economic growth under market-oriented policies is focused on the production of private goods through the efficient allocation of resources with minimal intervention beyond the legal infrastructure. It shies away from the provision of public goods such as social inclusiveness and environmental integrity. The International Task Force on Global Public Goods (GPG) has explored the concept of GPG to clarify the definition and to propose policy recommendations.

In assessing how it could be harnessed to reduce poverty and enhance welfare, the task force prioritized peace and security, trade regimes, financial stability, control of communicable diseases and sustainable management of the national commons. Measuring production of global public goods in such a framework, rather than worshipping GDP (which is both gross and domestic), would be a step in the right direction.The world simply cannot wait any longer and must begin to measure the production of these public goods with the same fervor, rigor and excitement as we have long witnessed with the production of private goods — by GDP. We would measure nothing short of the production of progress and sustainability itself-in categories such as peace, equity, environmental integrity and knowledge.

References and notes:

Ministry of Environment, Forests and Climate Change, December 2014. India's progressing in combating climate change –Briefing Paper for UNFCCC COP20 Lima, Peru, http://www.ghgsat.com/

Ministry of New and Renewable Energy, January 2015. http://mnre.gov.in/file-manager/UserFiles/Status-Note-on-SolarCities.pdf

Ministry of New and Renewable Energy, 2011. Indian Ministry of New and Renewable Energy website [URL:http://www.mnre.gov.in/].

Ministry of Power, 2011. Indian Ministry of Power website [URL:http://www.powermin.nic.in/].

Parliament of India, 2011. Parliament of India website [URL: http://parliamentofindia.nic.in/].

Pew Centre on Global Climate Change, 2011. Pew Centre on Global Climate Change website [URL:http://www.pewclimate.org/]. Now Centre for Climate and Energy Solutions [URL: http://www.c2es.org/

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Impact of Climate Change on Indian Agriculture

Dr.J.Rama Rao, Associate professor, Department of Economics,
Maharajah's Post Graduate College, Vizianagaram, Andhra Pradesh.

Abstract *Climate change is any significant long-term change in the expected patterns of average weather of a region (or the whole Earth) over a significant period of time. It is about abnormal variations to the climate, and the effects of these variations on other parts of the earth. These changes may take tens, hundreds or perhaps millions of years. Food security is both directly and indirectly linked with climate change. Any alteration in the climatic parameters such as temperature and humidity which govern crop growth will have a direct impact on quantity of food produced. Indirect linkage pertains to catastrophic events such as floods and droughts which are projected to multiply as a consequence of climate change leading to huge crop loss and leaving large patches of arable land unfit for cultivation which hence threatens food security. The net impact of food security will depend on the exposure to global environmental change and the capacity to cope with and recover from global environmental changes. On a global level, increasingly unpredictable weather patterns will lead to a fall in agricultural production and higher food prices, leading to food insecurity.*

Key words: *agriculture, Climate Change, Agricultural Research*

Introduction:

India is a predominantly agriculture-oriented economy, as 52 percent of the population directly depends on agriculture either as farmers or agricultural laborers, and their concentration is higher at 76 percent in the villages. Variation in climate will have a direct impact on the majority of the livelihood of the people. Food production in India is sensitive to Climate Change like variations in temperature and monsoon rainfall. Rise in temperature has a direct impact on the Rabi crop and every 10C rise will reduce wheat production by 4 to 5 Million Tones. Every small change in temperature and rainfall has significant effect on the quality and quantity of fruits, vegetables, tea, coffee, basmati rice and aromatic and medicinal plants

Climate change is any significant long-term change in the expected patterns of average weather of a region (or the whole Earth) over a significant period of time. It is about abnormal variations to the climate, and the effects of these variations on other parts of the earth. These changes may take tens, hundreds or perhaps millions of years. But increased anthropogenic activities such as industrialization, urbanization, deforestation, agriculture, change in land use pattern etc. lead to emission of greenhouse gases due to which the rate of climate change is much faster.

Climate change scenarios include higher temperatures, changes in precipitation, and higher atmospheric CO2 concentrations. There are three ways in which the "Greenhouse Effect" may be important for agriculture. First, increased atmospheric CO_2 concentrations can have a direct effect on the growth rate of crops. Secondly, CO_2-induced changes of climate may alter levels of temperature, rainfall and sunshine that can influence plant and animal productivity. Finally, rises in sea level may lead to loss of farmland by inundation and increasing salinity of groundwater in coastal areas. It considers the likely **changes** that **climate change** will bring in temperature, precipitation and extreme rainfall, drought, flooding, storms, sea-level rise and environmental health risks and the overall **impact** on **agriculture**.

The adoption of a new climate change agreement at the 21st Conference of Parties (COP 21) by 195 nations in Paris in December 2015 represents another milestone in the climate change front. The Paris Agreement sets a roadmap for all nations in the world to take actions against climate change in the post-2020 period. It seeks to enhance global action against climate change and limit global warming while reflecting the principles of equity and common but differentiated responsibilities and respective capabilities (CBDR-RC), in the light of different national Circumstances. An important feature of this new agreement is that it seeks to elicit ambitious action by each country by basing it on a country-driven approach with the contribution by each country to the global fight against climate change determined at national level.

The Millennium Development Goals (MDG) that was in place from 2000 to 2015 was replaced by the Sustainable Development Goals (SDG) with the aim of guiding the international community and national governments on a pathway towards sustainable development for the next fifteen years. A new set of 17 SDGs and 169 targets were adopted by the world governments in 2015. On the domestic front, India continued to take ambitious targets in its actions against climate change. As a part of its contributions to the global climate change mitigation efforts, India announced its intended nationally determined contribution (INDC) which set ambitious targets for domestic efforts against climate change. Including other efforts, the country has set itself an ambitious target of reducing its emissions intensity of its gross domestic product (GDP) by 33-35 per cent by 2030, compared to 2005 levels, and of achieving 40 percent cumulative electric Power installed capacity from non-fossil fuel-based energy resources by 2030.

India's agriculture

India's agriculture has been dependent on monsoons. Any change in monsoon trends drastically affects agriculture. Even the increasing temperature is affecting Indian agriculture. In the Indo-Gangetic Plain, these pre-monsoon changes will primarily affect the wheat crop (>0.5oC increase in time slice 2010-2039; IPCC 2007). In the states of Jharkhand, Odisha and Chhattisgarh alone, rice production losses during severe droughts (about one year in five) average about 40 percent of total production, with an estimated value of $800 million.

Increase in CO_2 to 550 ppm increases yields of rice, wheat, legumes and oilseeds by 10 to 20 percent. A 1oC increase in temperature may reduce yields of wheat, soybeans, mustards, groundnuts, and potatoes by 3 to 7 percent. There would be higher losses at higher temperatures. Productivity of most crops decreases only marginally by 2020 but by 10 to 40 percent by 2100 due to increases in temperature, rainfall variability, and decreases in irrigation water. The major impacts of climate change will be on rain fed or un-irrigated crops, which are cultivated on nearly 60 percent of cropland. A temperature rise by 0.5oC in winter temperature is projected to reduce rain fed wheat yield by 0.45 tons per hectare. Possibly there might be some improvement in yields of chickpeas, Rabi maize, sorghum and millets and coconut on the west coast and less loss in potatoes, mustard and vegetables in north-western India due to reduced frost damage. Increased droughts and floods are likely to increase production variability.

Recent studies done at the Indian Agricultural Research Institute indicate the possibility of a loss of between 4 and 5 million tons in wheat production in the future with every rise of 1oC temperature throughout the growing period. Rice production is slated to decrease by almost a ton/hectare if the temperature rises by 2 degree Celsius. In Rajasthan, a 2 degree rise in temperature was estimated to reduce production of pearl millet by 10 to 15 percent. If maximum and minimum temperatures rise by 3 and 3.5 degrees respectively, then soya bean yields in M.P will decline by 5 percent compared to 1998. Agriculture will be affected in the coastal regions of Gujarat and Maharashtra, as fertile areas are vulnerable to inundation and salinization.

Food security

Food security is both directly and indirectly linked with climate change. Any alteration in the climatic parameters such as temperature and humidity which govern crop growth will have a direct impact on quantity of food produced. Indirect linkage pertains to catastrophic events such as floods and droughts which are projected to multiply as a consequence of climate change leading to huge crop loss and leaving large patches of arable land unfit for cultivation which hence threatens food security. The net impact of food security will depend on the exposure to global environmental change and the capacity to cope with and recover from global environmental changes. On a global level, increasingly unpredictable weather patterns will lead to a fall in agricultural production and higher food prices, leading to food insecurity.

Food insecurity could be an indicator for assessing vulnerability to extreme events and slow-onset changes. This impact of global warming has significant consequences for agricultural production and trade of developing countries as well as an increased risk of hunger. The number of people suffering from chronic hunger has increased from under 800 million in 1996 to over 1 billion recently. United Nations population data and projections show the global population reaching 9.1 billion by 2050, an increase of 32 percent from 2010.

The world's population is expected to grow by 2.2 billion in the next 40 years, and a significant portion of the additional population will be in countries that have difficulties feeding themselves.

Preliminary estimates for the period up to 2080 suggest a decline of some 15 to 30 percent of agricultural productivity in the most climate-change-exposed developing country regions – Africa and South Asia. Even the IPCC, scarcely alarmist, says a 0.5 degree rise in winter temperature would reduce wheat yield by 0.45 tons per hectare in India. Rice and wheat have an important share in total food grain production in India. Any change in rice and wheat yields may have a significant impact on food security of the country. And this when Indian agriculture is already in crisis, and in the last twenty years 300,000 farmers have killed themselves.

Climate Change

Emissions from major countries

According to the World Meteorological Organization, 2015 was the warmest year, with temperature 1°C above the preindustrial era. This was owing to El Nino and warming caused by greenhouse gases (GHG). Anthropogenic emissions have been increasing at an unprecedented rate since the industrial revolution. According to an International Energy Agency (IEA) report (2015), concentration of CO_2 in 2014 was 40 per cent higher than in the mid-1800s. The energy sector is the largest contributor to GHG emissions and, within this, CO_2 emissions from combustion of fuels have the largest share. The global emissions profile shows that emissions have been distributed very unequally among different countries. If historical CO_2 emissions from 1970 to 2014 are considered, India with 39.0 Gt is way behind the top three emitters – the USA, the EU and China. The USA's emissions, for example, were around six times India's. Even if historical levels are discounted and only present levels considered, both in terms of absolute and per capita emissions, India is way behind the three major CO_2 emitters . In 2014, in terms of absolute emissions, China was at the top, while in terms of per capita emissions, the USA was at the top. India's per capita emissions are among the lowest in the world. If the different levels of development and differentiated responsibilities and equity are considered, the USA has the highest per capita CO_2 emissions and per capita income while India has the lowest of both among the four (Countries).

Sector-wise emissions

In terms of sectoral CO_2 emissions from fuel combustion, electricity and heat production was the largest contributor for China, India, the EU and the USA, more so for China and India, followed by the manufacturing industry for India and China and the transport sector for the US and the EU. These compositional patterns reflect the different priorities of these countries.

Impact of Climate Change on India's Agriculture

India's agriculture is more dependent on monsoon from the ancient periods. Any change in monsoon trend drastically affects agriculture. Even the increasing temperature is affecting the Indian agriculture. In the Indo- Gangetic Plain, these pre monsoon changes will primarily affect the wheat crop (>0.5C increase in time slice 2010-2039; IPCC 2007). In the states of Jharkhand, Odisha and Chhattisgarh alone, rice production losses during severe droughts (about one year in five) average about 40% of total production, with an estimated value of $800 million.

Increase in CO_2 to 550 ppm increases yields of rice, wheat, legumes and oilseeds by 10-20%. A 1C increase in temperature may reduce yields of wheat, soybean, mustard, groundnut, and potato by 3-7% much higher losses at higher temperatures. Productivity of most crops to decrease only marginally by 2020 but by 10-40% by 2100 due to increases in temperature, rainfall variability, and decreases in irrigation water. The major impacts of climate change will be on rain fed or un- irrigated crops, which is cultivated in nearly 60% of cropland.

Agricultural Productivity and Food Security

Food security is both directly and indirectly linked with climate change. Any alteration in the climatic parameters such as temperature and humidity which govern crop growth will have a direct impact on quantity of food produced. Indirect linkage pertains to catastrophic events such as flood and drought which are projected to multiply as a consequence of climate change leading to huge crop loss and leaving large patches of arable land unfit for cultivation and hence threatening food security. The net impact of food security will depend on the exposure to global environmental change and the capacity to cope with and recover from global environmental change.

According to A K Singh, Deputy Director -General (natural resource management) of the Indian Council of Agricultural Research (ICAR), medium- term climate change predictions have projected the likely reduction in crop yields due to climate change at between 4.5 and 9 per cent by 2039. The long run predictions paint a scarier picture with the crop yields anticipated to fall by 25 per or more by 2099. With 27.5% of the population still below the poverty line, reducing vulnerability to the impacts of climate change is essential. Indian food production must increase by 5 million metric tons per year to keep pace with population increase and ensure food security. Coping with the impact of climate change on agriculture will require careful management of resources like soil, water and biodiversity. To cope with the impacts of climate change on agriculture and food production, India will need to act at the global, regional, national and local levels.

Climate change and Indian Agriculture

- Large country with diverse climate
- Two thirds area rain dependent
- High monsoon dependency
- Diverse seasons, crops and farming systems
- Close link between climate and water resources
- Small holdings, poor coping mechanisms and low penetration of risk management products

Weather Impacts on Agriculture

* Rainfall drives water availability and determines Sowing time (rainfed crops)
* Temperature drives crop growth, duration; influences milk Production in animals and
  Spawning in fish
* Temperature, RH influence pest and diseases incidence on crops livestock and Poultry
* Radiation influences the photosynthetic productivity
* Wet & dry spells cause significant impact on standing crops, physiology, and loss of
  Economic Products (eg. fruit drop)
* Extreme events (eg. high rainfall/floods/heat wave/cold wave/cyclone /hail/frost) cause
  Enormous losses of standing crops, live stock and fisheries.

Overall impact on Agriculture

*Negative impact on rice, wheat and horticulture
• Neutral or positive on some crops like soybean, groundnut, coconut, potato in some zones
• Impact on livestock and fisheries still to be better understood
• Short term impacts in 10-15 years (in the range of 4- 6%) but long term impacts could be
as high as 25% (with business as usual scenario)
• Short term impacts can be addressed through better deployment of existing technologies
backed by few policy initiatives while long term impacts require strategic research on a
long term and a major policy changes.

Climate Change – Adaption and Mitigation in agriculture

Mitigation: To achieve the long-term temperature goal of holding temperature increase to below 2°C, in the context of sustainable development and efforts to eradicate poverty, Parties in the Agreement aim to reach global peaking of greenhouse gas emissions as soon as possible. The Paris Agreement operationalizes differentiation between developed and developing countries
mitigation actions through three main elements, namely, (a) by acknowledging that peaking of emission in developing countries will take longer; (b) by calling upon developed countries to take the lead in mitigation actions; and (c) by calling upon support to be provided to developing countries for implementation of climate change actions, recognizing that enhanced support will allow for higher ambition in their action.

Adaptation: Given the trends in global warming, even if the temperature rise is restricted to below 2°C, adaptation support would be required for developing countries like India. The agreement establishes the global goal on adaptation – of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change – with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the 2°C goal. Countries are required to update periodically their adaptation communication, but are given flexibility on the timing and method of communication.

1. Assist farmers in coping with current climatic risks by providing value - added weather services to farmers. Farmers can adapt to climate changes to some degree by shifting planting dates, choosing varieties with different growth duration, or changing crop rotations.
2. An Early warning system should be put in place to monitor changes in pest and disease outbreaks. The overall pest control strategy should be based on integrated pest management because it takes care of multiple pests in a given climatic scenario.
3. Participatory and formal plant breeding to develop climate - resilient crop varieties that can tolerate higher temperatures, drought and salinity.
4. Developing short - duration crop varieties that can mature before the peak heat phase set in.
5. Selecting genotype in crops that have a higher per day yield potential to counter yield loss from heat - induced reduction in growing periods.

6. Preventive measures for drought that include on-farm reservoirs in medium lands, growing of pulses and oilseeds instead of rice in uplands, ridges and furrow system in cotton crops, growing of intercrops in place of pure crops in uplands, land grading and leveling, stabilization of field bunds by stone and grasses, graded line bunds, contour trenching for runoff collection, conservation furrows, mulching and more application of Farm yard manure (FYM).
7. Efficient water use such as frequent but shallow irrigation, drip and sprinkler irrigation for high value crops, irrigation at critical stages.
8. Efficient fertilizer use such as optimum fertilizer dose, split application of nitrogenous and potassium fertilizers, deep placement, use of neem, karanja products and other such nitrification inhibitors, liming of acid soils, use of micronutrients such as zinc and boron, use of sulphur in oilseed crops, integrated nutrient management.
9. Seasonal weather forecasts could be used as a supportive measure to optimize planting and irrigation patterns.
10. Provide greater coverage of weather linked agriculture-insurance.
11. Intensify the food production system by improving the technology and input delivery system.
12. Adopt resource conservation technologies such as no- tillage, laser land leveling, and direct seeding of rice and crop diversification which will help in reducing in the global warming potential. Crop diversification can be done by growing non -paddy crops in rain fed uplands to perform better under prolonged soil moisture stress in kharif.
13. Develop a long- term land use plan for ensuring food security and climatic resilience.
14. National grid grain storages at the household/ community level to the district level must be established to ensure local food security and stabilize prices.
15. Provide incentives to farmers for resource conservation and efficiency by providing credit to the farmers for transition to adaptation technologies.
16. Provide technical, institutional and financial support for establishment of community banks of food, forage and seed.
17. Provide more funds to strengthen research for enhancing adaptation and mitigation capacity of agriculture.

Conclusion

Climatic changes and increasing climatic variability are likely to aggravate the problems of future food security by exerting pressure on agriculture. However, there are lot of uncertainties about the assessment of impact, adaptation and mitigation of climate change in agriculture. It is mainly because the methodology followed for such assessments is not standardized and sometimes is inaccurate and imprecise. Researchers follow different methodologies and arrive at contrasting results making it still more difficult to reach a logical conclusion and develop policy actions. There is a need to develop and apply a standard methodology across the board for various studies related to climate change and agriculture. The different chapters of this book present the recent, internationally accepted, and standard methodologies for studying the impacts of climate change on agriculture, measuring and developing inventories of greenhouse gas emissions, analyzing the vulnerabilities and application of adaptation and mitigation options.

References

1. Aggarwal PK, Singh AK, Shamra JS, Singh G, Gogoi AK, Rao GGSN and Ramakrishna,YS
Introduction of Global Climate Change and Indian Agriculture, PK Aggarwal,
ICAR, New Delhi, pp. 1-5.
2. Aiken, R, Climate Change impacts on Crop Growth in the Central High Plains,
Proceedings of the 21st Annual Central Plain Irrigation Conference, :14-15
3. Anupama Mahtho, Climate Change and its impact on Agriculture, International Journal of
Scientific and Research Publications, Volume 4, Issue 4, April 2014.
4. Economic Survey, 2015-16, Ministry of Finance, GOI, New Delhi.
5. Climate Change-Impact on Agriculture, Kurukshetra, June, 2013, p.25
6. Climate Change-Impact on Agriculture and Adaptive and Mitigative Measures by
Dr.Yashbir Singh Shivay and Dr. Anshu Rahal, Kurukshetra, September, 2013, p.39.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Environment and Economic Development

Dr. K. Radha Pushpavathi, Vice Principal, Reader in Economics, S.K.S.D Mahila Kalasala UG & PG (A), Tanuku

Smt. G. Aruna Kumari, Lecturer in Economics, S.K.S.D Mahila Kalasala UG & PG (A), Tanuku

Abstract : *Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs. The Environmental Kuznet Curve hypothesis establishes an inverted U-shaped relationship between economic growth and environment degradation. It assumes that environmental degradation increases when per capita Income reaches a certain point, or the turning point. We can say that there is inverse relationship between income and emissions, higher the income, lower the emissions and vice-versa. We find that although there is inverse relationship between development and environment the developing (low and middle income) countries of today have a unique opportunity to learn from the past history and thereby avoid some mistakes from earlier growth experiences. With increased awareness of environmental hazards and the development of new technologies in recent years that are cleaner than ever before, we might hope to see the developing countries turn their attention to preservation of the environment at earlier stages of development than has previously been the case.*

Key words: *environmental hazards, sustainable development,*

Introduction

Environment and economy are interdependent and need each other. Development that ignores its repercussions on the environment will destroy the environment that sustains life forms. What is needed is sustainable development which will allow all future generations to have a potential average quality of life that is at least as high as that which is being enjoyed by the current generation.

The term 'sustainable development' was popularized in Our Common Futre, a report published by the World Commission on Environment and Development (WECD) in 1987. According to WECD p.43"development which meets the needs of the present without compromising the ability of future generations to meet their own needs." Acceptance of the report by the United Nations General Assembly gave the term political salience and in 1992, leaders set out the principles of sustainable development at the United Nations Conference on Environment and development in Rio de Janerio, Brazil.

Relationship between Environmental Kuznet Curve and Economic Development:

In the early stages of economic growth, the awareness of environmental problems is low or negligible and environment friendly technologies are not available. Environmental degradation increases with growing income up to a threshold level beyond which environmental quality improves with higher per capita income (Dinda 2004).

Kuznet (1955) predicted that the changing relationship between per capita income and income inequality is an inverted U-shaped curve. As per capita income increases, income inequality also increases at first and then starts declining after a turning point (TP). So the distribution of income becomes more unequal in early stage of income growth and then the distribution moves towards greater equality as economic growth continues (Kuznet 1955). After 1990, the Kuznets curve got a new existence i.e. the level of environmental degradation and per capita income follows the same inverted U-shaped relationship as does income inequality and per capita income. The inverted U-shaped relationship between economic growth and measured pollution indicators (environmental quality) is known as EKC. Kuznet's name was attached to the inverted U-shaped curve which established a relationship between pollution and economic development because it resembled the original inverted U-shaped relationship kuznet curve which ascertains the relationship between income inequality and economic development. However, Panayotou (1993) first coined it as the Environmental Kuznet Curve. The relationship can be shown by an inverted U-shaped EKC. The EKC establishes a long term relationship between environmental impact and economic growth.

As economic development speeds up with the intensification of agriculture and other resource extraction, at the take-off stage, the rate of resource depletion begins to exceed the rate of resource regeneration and waste generation increases in quantity and toxicity.

At higher levels of development, structural change towards information-intensive industries and services coupled with increased environmental awareness, enforcement of environmental regulations, better technology and higher environmental expenditures results in leveling off and gradual decline of environmental degradation. As income increases, there is transition in the economy. Economy moves from natural process of economic development i.e. from a clean agrarian economy to a polluting industrial economy, and again to a clean service economy (Arrow et al. 1995).

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

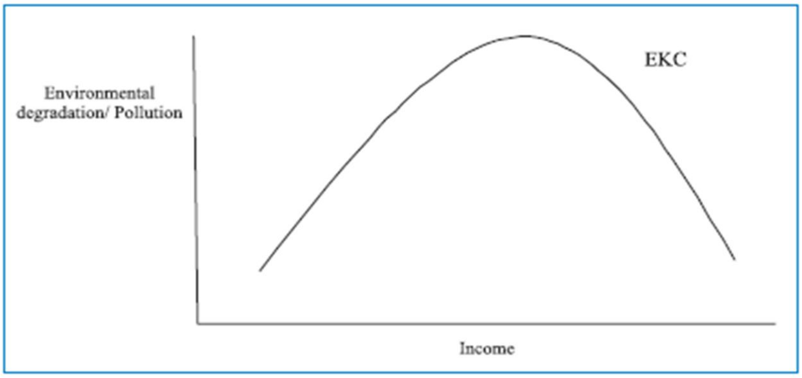


Figure1: Environmental Kuznet Curve (EKC)

Economic development can be traced back to the industrial revolution and to the industrial development in the modern world. The industrial revolution irreversibly changed the nature of labour, consumption, family structure, social structure and the thought processes of the individuals. The amazing thrust in the field of production, power, science and technology brought along with it even the bad effects of environmental degradation. Development may be defined as double-edged sword, which has far reaching effects on the environment. The ill effects of development are many but unlike the benefits, they are not visible and are camouflaged.

Specific Effects: There are large differences in state level per capita emissions due to the enforcement of pollution laws and the use of outdated industrial technology. Low income states are still sources of emissions because of land conversion through burning and replanting of tree crops while high income states are emitting increasing emissions because of industrial and municipal wastes.

Production Structure: Developed countries have fairly stable production structures, whereas rapidly industrializing and developing countries have unstable production structure. A change in the composition of consumption has resulted in a downturn in pollutants (Rothman, 1998).

Institutional Change: Along with the economic development, societies advance with their social, legal and fiscal infrastructures that are essential to enforce environmental regulation (Bhattarai and hamming, 2001). Institutional changes triggered by citizens' demand for cleaner environments are more likely to occur in democratic countries (Shafik and Bandyopadhyay, 1992).

Research and Development: As income grows, people can adopt better and efficient technology that provide cleaner environment. This preferential behaviour of people should be reflected through their income elasticity. The income elasticity of public research and development funding for environmental protection is positive (Komen et al., 1997). This indicates the key role of such public investments for environmental improvements in reducing environmental degradation. As income levels rise, decreasing relationships are found for some pollution indicators in developed countries. The effect of economic growth on pollution/ emissions differs substantially among high income countries. This also depends on the adoption of new technology.

Innovation and Adoption: New technologies, unambiguously, improve productivity but create potential dangers to the society such as new hazardous wastes, risk and other human problems. These externalities are unknown in the early phase of diffusion of technology; in later stages regulation becomes warranted to address it. Once the technology is regulated, this may stimulate the gradual phase out of existing technology. So, a cyclical pattern arises in technologies, which first diffuse, then become regulated and finally are phased out by next generation of technologies (Smulder and Bretschger, 2000).

Technological and Organisational Change: Improved technology not only significantly increases productivity in the manufacture of old products but also the development of new products. There is a growing trend among industries to reconsider their production processes and thereby take environmental consequences of production into account. This concerns not only traditional technological aspects but also the organization of production as well as the design of products. Technological changes associated with the production process that may also result in changes in the input mix of materials and fuels (Lindmark, 2002).

References:

Gerlagh R., (2008). "A climate-change policy induced shift from innovations in carbon-energy production to carbon-energy saving," Energy Economics 30, 425-448.

Goulder L.H. and S. Schneider, (1999), "Induced Technological Change and the Attractiveness of CO2 Abatement Policies," Resource and Energy Economics 21, 211-253.

Gray W. B. and R. J. Shadbegian, (1998), "Environmental Regulation, Investment Timing, and Technology Choice", Journal of Industrial Economics 46:235-256.

Greenstone M., (1998), "The Marginal Effects of Environmental Regulations of the Manufacturing Sector: Evidence from the 1970 and 1977 Clean Air Act Amendments", Princeton University.

Grossman G. M. and A. B. Krueger, (1993), Environmental Impacts of a North American Free Trade Agreement. In The Mexico-U.S. Free Trade Agreement, P. Garber, ed. Cambridge, Mass.: MIT Press.

Grossman G. M. and A. B. Krueger, (1995), "Economic Growth and the Environment", The Quarterly Journal of Economics, MIT Press, vol. 110(2), pages 353-77, May.

Kurukshetra Magazine Yojana Magazine, June 2012

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Exploring nexus between urbanization growth and environment: with reference to south Asian countries

A.Surendra, Head, Dept. of Geology, D.N.R.College (A) College, Bhimavaram-534 202

Abstract: *The nexus between, urbanization, economic growth and environmental quality has been a source of great controversy for a very long time. There are two extreme views regarding this nexus. The first view demonstrates that rapid urbanization and modernization lead to expansion of economic activity. This greater economic activity or economic growth is inevitably leads to environmental degradation and consequently economic and ecological collapse. The second extreme approach has been demonstrates the view that those environmental problems worth solving will be addressed more or less automatically as a consequence of economic growth and modern urbanization. This debate has still prolonged because of lack of substantial empirical evidence on how environmental quality changes at different income levels and at different level of urbanizations. Compilation of such evidence has been constrained by the absence of data for a large number of countries. At present, the situation is much improved and this paper takes a step of systematic analysis in exploring these nexus by using Log-linear, Log–lin and Lin-log models. Since it is very complex phenomenon, theoretically it is quite difficult to explore this nexus .However it is not impossible even though there are some problems exist like intercept value of variables and identification of dependent and independent variables. By considering available data of different indicators (from period 2001 to 2010) and with the help of econometric models an honest attempt is being made towards the exploring this casual nexus. Especially South Asian countries were considered for study and it arrived at conclusion that there is positive nexus between urbanization and economic growth and on the contrary negative linkages are found between economic growth and environmental quality.*

Keywords: *Urbanization, GDP, GDP per Capita, Improved Sanitation, Forest Depletion, Economic Growth, Environmental Degradation.*

Introduction:

Urbanization refers to a process of transition of traditional economy into the modern economy. As a consequence of modernization, rapid and continuous urbanization has taken place in all over the world during the last century. Rapid industrialization or the localization of the industries and faster growth of population, highly degradation of natural resources, high standard of living cost, and high level of pollutant and level of pollution are the major distinctive features of modern urbanization. Since urbanization significantly contributing in economic growth by several way, in modern era of developing countries urbanization has becomes a key and an engine of economic growth. It has demonstrated by several studies that significant nexus prevails between urbanization and economic growth. But there is also another dark side of urbanization which cannot be neglected in modern concept of sustainable development. It is universal truth that rapid natural resource degradation has taking place in the process of urbanization. A very little empirical research has been conducted on the issue of urbanization, economic growth and environment nexus. Under this backdrop it is necessary to explore this spiral nexus in order to better management, planning and administration of the urban environment.

The nexus between, urbanization economic growth and environmental quality has been a source of great controversy for a very long time. There are two extreme views regarding this nexus. The first view has been demonstrates that rapid urbanization and modernization lead to expansion of greater economic activity. This greater economic activity or economic growth is inevitably lead to environmental degradation and consequently in economic and ecological collapse. The second extreme approach has been demonstrates the view that those environmental problems worth solving will be addressed more or less automatically as a consequence of economic growth and modern urbanization. This debate has still prolonged because of lack of substantial empirical evidence on how environmental quality changes at different income levels and at different level of urbanizations. Compilation of such evidence has been constrained by the absence of data for a large number of countries. At present the situation is much improved and this paper takes a step of systematic analysis in exploring these nexus by using available data. In order to make the study more intensive three basic models are used e.g. Log-linear, Lin –log and Log-lin. Since it is very complex phenomenon, theoretically it is quite difficult to explore this nexus .However it is not impossible even though there are some problems like intercept value of variables and identification of dependent and independent variables. By considering available data of different indicators (from period 2001 to 2010) and with the help of econometric models an honest attempt is being made toward the exploring this casual nexus. Especially South Asian countries were considered for study.

II. Objectives of the Study: The major objectives of the present research work are as below. 1. To observe the nexus between urbanization and economic growth, 2. To examine the nexus between urbanization and environment, 3. To explore the nexus between environment and economic growth.

Iii. Research methodology:

A) Data Source and Data Collection: The present research is purely analytical type of research which exclusively relies on secondary data. The necessary data has been collected from the report of the World Bank. The collected data has been processed and tabulated by using Excel Software. The statistical tools such as, multiple correlations, log- linear regression equations are applied for data analysis and interpretation. The present paper has considered ten years period from 2001-02 to 2010-11 and attempts were made to examine the coiled nexus between urbanization, economic growth and environment quality in context of South Asian countries namely Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan and Sri Lanka. In case of absences of some indicators of time series data the panel data has been used.

B) Hypothesis: Following hypothesis has been formulated. 1. The significant positive correlation prevails between economic growth and urbanization. 2. There significant positive correlation exists between economic growth and level of pollution. 3. There is significant negative nexus between urbanization and environment quality.

C) Review of research literature: Existing gathered literature has shows that there is positive relationship between urban areas (specifically, their share of national population) and level of economic development. Numerous studies have confirmed that there is positive relationship between per capita income and urbanization levels (Fay and Opal, 2000; and Polese, 2005).Other studies have repeatedly confirmed the disproportionate contribution of urban areas to national income and product (world Bank, 1991).Many studies have verified the positive link between productivity and the agglomeration of economic activity in cities (Gleaser, 2000, Krugman, 2000 and Quigley, 2007). On the contrary, Polese (2005) argues that, the relationship ISSN: 2319-8753 International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 2, Issue 12, December 2013 Copyright to IJIRSET www.ijirset.com 7811 between urbanization and economic growth is weak at least in recent times, and as such does not foster growth of region's economies. Generally, there is exercised enormous control of cities over national economies. They provide jobs, access to the best cultural, educational and health facilities and they act as focal point for communication and transport which are necessary conditions for economic development of any nation. Although they also cluster massive demand for energy, generate large quantities of waste and concentrate pollution as well as social adversity. According to Todaro and Smith (2003), there is a close association between urbanization and per capita income. Including other economic development indicators it is one of the most observable and sticking fact to development process. According to Quigley, (2007), the economic and social crises that have enveloped most of the developing countries are as a result of urban growth without proportional economic development.

V. Results of The Study: The major findings of the study are as below Correlation Results 1) The economic growth and declining environment quality are strongly and positively correlated. 2) It has also seen from foregoing analysis that economic growth and rate of urbanization are also positively correlated. 3) Urbanization and environment are negatively and significantly correlated. Regression results revels that at with the increase in per capita income level, environment quality goes to decline. 2) As a consequence of economic growth rapid CO_2 emission has been taken place in south Asian countries and one percent change in income level will leads to 1.65 percent change in CO_2 emission. That has been proved by the regression table. 3) Income elasticity of urban sanitation is -0.48, whereas in case of urban population it is 0.57. 4) All the indicators are very strongly good fitness to the regression line (R^2).

References and notes:

1. Allen. J. and Barnes, D, 'The Causes of Deforestation in Developing Countries', Annals of the Association of American Geographers,Vol. No.2 pp 75,(1995).

2. Davis, S. 'Indigenous Views of Land and the Environment', World Bank Working Paper, Washington, D.C. (1992).

3. Diwan, I. and Shafik, N. 'Investment, Technology and the Global Environment: Towards International Agreement in a World of Disparities', (1992)

4. P. Low and R. Safadi (eds), Trade Policy and the Environment, The World Bank, Washington, D.C. (1992).

5. Grossman, G. and Kruger, A... 'Environmental Impacts of a North American Free Agreement', in P. Gabor (ed.), the US-Mexico Free Trade Agreement, MIT Press, Cambridge, MA. (1993).

6. Holtz-Eakin, D. and Seldon, T... 'Stoking the Fires? CO2 Emissions and Economic Growth', Mimeograph, Syracuse University, Syracuse, NY. (1992).

7. Johnson, B. Responding to Tropical Deforestation. An Eruption of Crisis and Array of Solutions, Conservation Foundation, London; World Wildlife Fund, Washington, D.C. (1991).

8. Kneese, A. V. and Sweeney, J. Handbook of Natural Resource and Energy Economics, North-Holland, Amsterdam (1985)...

9. Seldon, T. and Song, D. 'Environmental Quality and Development: Is there a Kuznets Curve for Air Pollution?' Mimeograph, Syracuse University, Syracuse, NY. . (1992).

10. World Bank 'The Forest Sector: A World Bank Policy Paper', Washington, D.C. (1991).

11. Neamt, S. Economic Development and Environment Quality: an Econometric Analysis" The World Bank, 1818 The H Street NW, Washington, DC 20433, USA (1994), „

12. World Bank-World Data Bank, World Development Report 2010.

13. Fay, M. and Opel, C. Urbanization without Growth: a not so Uncommon Phenomenon, Working Paper, World Bank, Washington DC (2000).

14. Polese, N. Cites and National Economic Growth: A Reappraisal. Rutledge Taylor & Francis Group. Urban Studies, 42, 8(2005)

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Energy and economic development: An assessment of the state of knowledge

V.V.Ramana, Head, Dept. of Economics, Sir C.R.Reddy College (A), Eluru-534 001

B.Santha Raju, Lecturer, Dept. of English, D.N.R.College (A), Bhimavaram-534 202

Abstract: *Energy development is an integral part of enhanced economic development. The fact that expanded provision and use of energy services is strongly associated with economic development leaves open how important energy is as a causal factor in economic development, however; and energy development competes with other opportunities for scarce capital and opportunities for policy and institutional reform. In this paper we first give a brief conceptual discussion that seeks to identify the channels through which increased availability of energy services might be a key to stimulating economic development along different stages of the development process. We then examine some empirical work to see what evidence it might provide regarding possible channels of influence. The evidence underscores the importance of energy development in concert with other forms of development. More work is needed to better understand the magnitude of energy's importance for economic development.*

Key Words: *energy. Economic development, productivity, poverty alleviation*

Introduction:

Energy development, interpreted broadly to mean increased provision and use of energy services, is an integral part of enhanced economic development. Advanced industrialized societies use more energy per unit of economic output and far more energy per capita than poorer societies, especially those still in a pre-industrial state. Energy use per unit of output does seem to decline over time in the more advanced stages of industrialization, reflecting the adoption of increasingly more efficient technologies for energy production and utilization as well as changes in the composition of economic activity (see, e.g., Nakicenovic 1996). And energy intensity in today's developing countries probably peaks sooner and at a lower level along the development path than was the case during the industrialization of the developed world. But even with trends toward greater energy efficiency and other dampening factors, total energy use and energy use per capita continue to grow in the advanced industrialized countries, and even more rapid growth can be expected in the developing countries as their incomes advance. The fact that expanded provision and use of energy services is strongly associated with economic development leaves open how important energy is as a causal factor in economic development. Development involves a number of other steps besides those associated with energy, notably including the evolution of education and labor markets, financial institutions to support capital investment, modernization of agriculture, and provision of infrastructure for water, sanitation, and communications.

Energy and Economic Development:

This is not just an academic question; energy development competes with other development opportunities in the allocation of scarce capital and in the allocation of scarce opportunities for policy and institutional reform. The landmark research by Sam Schurr and colleagues remains one of the best and most convincing examples of the potential for positive synergy between energy development and broader economic development for industrial societies (see Schurr 1984 for a summary). Schurr argued that apart from changes in the composition of economic activity toward less energyintensive goods and services, and an increase in the thermal conversion efficiency of energy in the economy, observed productivity increases for nonenergy production factors partly resulted from increased use of more flexible energy forms (liquid fuels and especially electricity), through which "the discovery, development, and use of new processes, new equipment, new systems of production, and new industrial locations" was enhanced (Schurr 1984, 415). A critical element of Schurr's argument is that changes in the quality of energy services drive broader economic productivity, apart from the physical availability of energy per se. These arguments are further developed in a subsequent part of this paper. In large part, however, the literature on energy and development—including the literature relevant to lower-income countries—focuses on how energy demand is driven by economic development (see, e.g., Barnes and Floor 1996) and on how energy services can be improved for developing countries (Dunkerley et al. 1981; OTA 1991, 1992; Barnes and Floor 1996; ESMAP 2000). Less is found in the literature on the importance at the margin of energy advance versus growth in other inputs as an agent of economic development. To partly paraphrase a venerable RFF book title (Darmstadter et al. 1979), the literature has given much consideration to how developing societies use energy, and less to how energy-using societies develop. In this paper we begin with a brief conceptual discussion that seeks to identify the channels through which increased availability of energy services might be a key for stimulating economic development along different stages of the development process. A fundamental tenet of economic theory is that short of some hypothetical saturation point, an increment to any factor of production implies a ceteris paribus increase in output. More is always more.

Knowledge Development:

Therefore, our theoretical discussion seeks to highlight ways in which the contribution of increased energy availability might somehow disproportionately stimulate development. This discussion is motivated partly by recent developments in the theory of endogenous economic growth with increasing returns (Barro and Sale-i-Martin 1995), though that literature has said little about energy per se. After laying out some conceptual ideas, we then examine some empirical work to see what evidence it might provide regarding possible channels of influence. We do find some illustrations of a disproportionate role for energy. However, that evidence also underscores the importance of energy development in concert with other forms of development. Moreover, the Resources for the Future

Toman with Jemelkova amount of relevant literature we found was fairly limited, and in many cases it was difficult to separate out various influences in the study to see how energy might be exerting a disproportionate role. This underscores our conclusion that although much is known about how the productivity of energy provision and use might be augmented at the micro level, more work is needed to understand the magnitude of its importance for economic development at an economy-wide level. As is always the case with development questions, institutional puzzles loom large in this query. Energy and Development: Conceptual Linkages The linkages among energy, other inputs, and economic activity clearly change significantly as an economy moves through different stages of development. Barnes and Floor (1996) describe this phenomenon as an energy ladder, though it is recognized by these authors and others that the ladder concept does not imply a monotonic transition from one type of energy to another. At the lowest levels of income and social development, energy tends to come from harvested or scavenged biological sources (wood, dung, sunshine for drying) and human effort (also biologically powered). More processed biofuels (charcoal), animal power, and some commercial fossil energy become more prominent in the intermediate stages. Commercial fossil fuels and ultimately electricity become predominant in the most advanced stages of industrialization and development. Again, energy resources of different levels of development may be used concurrently at any given stage of economic development: electric lighting may be used concurrently with biomass cooking fires. Changes in relative opportunity costs as well as incomes can move households and other energy users up and down the ladder for different energy-related services. Despite the substantial differences in energy forms and economic activities across different stages of development, some common elements can be seen. Energy provision or acquisition is a costly activity requiring a variety of inputs, whether that cost is denominated in terms of household labor allocated to biomass gathering or expenditures for commercial fuels and the inputs needed to provide them. Energy utilization also does not occur in a vacuum but depends on the opportunity costs of other inputs, notably various types of capital goods (be they cook stoves or electricity grids). Finally, the literature makes clear that observed patterns of energy production and utilization reflect a great deal of subtle optimizing behavior, given the constraints faced by the economic actors (Barnes and Floor 1996; OTA 1991, 1992).

Those constraints can impede better outcomes, however; and much of the work to date on energy development has concerned how lower-cost and more effective energy services can be delivered Resources for the Future Toman with Jemelkova by alleviating or working around financing and informational barriers as well as regulatory distortions. Recognizing that the details of energy-development relationships differ considerably along the different stages of development, we can use a very simple model of an economy to discuss in general conceptual terms the possible ways in which increased energy availability might be especially important to economic development. of a more complex dynamic process). Obviously, this simple setup omits many important elements, including the dependence of final output on other intermediate goods and the coproduction of environmental residuals with valued economic outputs. In the diagram, we show two schedules for the marginal value product of lighting services—lumens in providing various household benefits (longer reading time, easier reading, more security, and the like). The schedule MVP0 represents the situation at a lower level of income, which we assume is also associated with use of lower-quality and higher-per-lumen-cost kerosene lighting. At this lower level of income, the introduction of lower-per-lumen-cost electric lighting will raise total lighting used and generate an economic welfare increase measured by Area abcd (the fall in cost of inframarginal lighting usage) plus Area bce (the consumer surplus from increased lighting utilization). The schedule MVP1 represents the marginal value product of lighting services at a higher income level induced by an increase in energy service availability—perhaps as a result of improved education capacity or ability to shift household tasks to evening hours and devote time during the day to paying work. Along this higher schedule, the additional (multiplier) benefits of lighting are reflected in additional benefits from baseline consumption (Area eghi) as well as in benefits from a further induced increase in usage (Area efg).

Conclusion:

Provision of Energy Services Consider first the provision of energy services in above. Suppose that an increase of x% in inputs resulted in an energy services output of more than x%. Then by expanding inputs economy-wide by x%, economy-wide output could grow by more than x% because of the “extra” expansion experienced in intermediate energy inputs. It follows that final output could be increased in this case even if the scale of energy inputs were expanded at the expense of other factors in final output. An increase not just in the raw provision of energy per se but in scale—including changes in the types of energy services offered and the organization of markets to allow for greater specialization of effort—seems likely to lower considerably the need to be undertaken. However, such efforts are by no means trivial in terms of theory or data, as illustrated by Lopez’s (1998) detailed work on land use and agriculture. The models need to be constructed in a way that reflects the structural and institutional realities of developing economies. Moreover, difficult causality issues need to be addressed. If one finds, for example, that within a country areas of greater economic development are associated with greater availability of higher-quality and more efficient energy, how does one separate the influence of energy on development from the influence of other factors (more fertile land, better-educated people) that could have driven development, with expanded energy availability following? This kind of difficult analysis also will be needed to deepen our understanding of energy influences Resources for the Future Toman with Jemelkova on development. But until better data and modeling frameworks are available, priority should be given to the sectoral-level assessments.

References and Notes:

1. Barnes, D.F., K.B. Fitzgerald, and H.M. Peskin. 2002. “The Benefits of Rural Electrification in India: Implications for Education, Household

Lighting, and Irrigation." Draft manuscript, July.

2. Barro, R.J., and X. Sala-i-Martin. 1995. Economic Growth. Cambridge, MA: MIT Press.

3. Brennan, T., K.L. Palmer, R.J. Kopp, A.J. Krupnick, V. Stagliano, and D. Burtraw. 1996. A Shock to the System: Restructuring America's Electricity System. Washington, DC: Resources for the Future.

4. Brown, S.P.A., and M.K. Yücel. 2002. "Energy Prices and Aggregate Economic Activity: An Interpretative Survey." Quarterly Review of Economics and Finance 42: 193–208.

5. Darmstadter, J., J. Dunkerley, and J. Alterman. 1979. How Industrial Societies Use Energy. Washington, DC: Resources for the Future.

6. Dunkerley, J., W. Ramsay, L. Gordon, E. Cecelski. 1981. Energy Strategies for Developing Countries. Washington, DC: Resources for the Future. Energy Sector Management Assistance Programme

7. (ESMAP). 2000. Energy Services for the World's Poor. World Bank/ESMAP Energy and Development Report. ———. 2002a. Rural Electrification and Development in the Philippines: 7. Ezzati, M., A.D Lopez, A. Rodgers, S. Vander Hoorn, C.J.L Murray, and the Comparative Risk Assessment Collaborating Group. 2002. "Selected Major Risk Factors and Global and Regional Burden of Disease." The Lancet 360, November 2: 1347–60.

8. Jorgenson, D.W. 1981. "Energy Prices and Productivity Growth." Scandinavian Journal of Economics 83(2): 165–79.

9. Nakicenovic, N. 1996. "Freeing Energy from Carbon." Daedalus 125(3): 95–112. Office of Technology Assessment (OTA). 1990. Physical Vulnerability of Electric System to Natural Disasters and Sabotage. Report OTA-E-453, June. http://www.wws.princeton.edu/~ota/.

10. Schurr, S. Sonenblum, and D. Wood (eds.), Energy, Productivity, and Economic Growth. Cambridge, MA: Oelgeschlager, Gunn and Hain. Schurr, S.H. 1982. "Energy Efficiency and Productive Efficiency: Some Thoughts Based on American Experience." Energy Journal 3(3): 3–

11. Weyant, J.P., and J.N. Hill. 1999. "Introduction and Overview." Energy Journal, Special Issue (The Costs of the Kyoto Protocol: A Multi-Model Evaluation): vi–xiiv.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

The nexus approach to water–energy–food security: an option for adaptation to climate change

Dr.B.S.Santha Kumari, Head, Dept. of History, D.N.R.College (A), Bhimavaram

Abstract: *This article draws attention to the importance of the interlinkages in the water, energy, and food nexus, and the implications for sustainable development and adaptation. The potential synergies and complementarities among the sectors should be used to guide formulation of effective adaptation options. The issues highlight the need for a shift in policy approaches from a sectoral focus, which can result in competing and counterproductive actions, to an integrated approach with policy coherence among the sectors that uses knowledge of the interlinkages to maximize gain, optimize trade-offs, and avoid negative impacts.*

Keywords: *adaptation to climate change, Hindu Kush Himalayan region, policy coherence, synergies, trade-offs, water–food–energy nexus*

Introduction:

The global community is looking for new approaches and solutions to adaptation to climate change and development challenges such as water, energy, and food security. The Rio + 20 Declaration 'The Future We Want' stresses the need for a balanced integration of economic, social, and environmental concerns into economic development, and also highlights the need to address food, water, and energy security in such a manner as to reduce the adverse impacts on nature (on water, biodiversity, air, and climate). One of the greatest challenges facing humanity is how to manage global warming and mitigate its adverse effects on human and natural systems. Meeting this challenge has emerged as a top priority in the national and international development agendas. Adaptation to climate change is a global priority and is critically important for developing countries, where large numbers of people depend on climate-sensitive sectors such as agriculture, forestry, and fisheries, have limited resources and capacity, and live in climate-vulnerable settings such as mountains and coastal areas (WRI, 2011WRI. (2011). *World resources 2010–2011: Decision making in a changing climate – adaptation challenges and choices*. Washington, DC: World Resources Institute, United Nations Development Programme, United Nations Environment Programme, World Bank.). The goal of adaptation is to reduce vulnerability to both climatic and non-climatic changes, so it is closely Water, energy, and food nexus and adaptation to climate change: a conceptual framework: Although a growing body of literature is emerging on both adaptation to climate change and the water, energy, and food nexus, the linkage between the two is rarely explored.

Evolving approaches to adaptation to climate change Development practitioners and academics have paid increasing attention in recent years to the question of adaptation, although different scholars define adaptation in different ways based on their professional interests. In terms of climate change, the Intergovernmental Panel on Climate Change (IPCC) Working Group 2 on Impacts, Adaptation and Vulnerability defines adaptation as 'the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities' (IPCC, 2007IPCC. (2007). *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group 2 to the 4th Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University presses). The concept continues to evolve, however, and its focus is gradually changing from just responding to the impacts of climate change to addressing the underlying factors that cause vulnerability and addressing development challenges

Principles of sustainable adaptation:

Although the need to adapt to a changing climate is now widely acknowledged, the 'hows' of effective adaptation remain far from clear. Debates on climate change adaptation have taken place largely outside the broader discourse on sustainable development.

Although, as yet, there is no framework or set of principles for sustainable adaptation that has been agreed by all stakeholders, certain key principles can be discerned:

- Adaptation entails measures that reduce poverty and vulnerability and enhance long-term resilience in a changing climate.
- Adaptation comprises actions that strengthen the adaptive capacities of the poor, including the management of the natural resources on which their livelihoods depend; manages risks; and uses resources in an efficient and sustainable manner to meet the needs of present and future generations.
- Adaptation in one sector or by one community does not undermine the resilience of others.
- Adaptation responses and mechanisms do not undermine long-term sustainability.

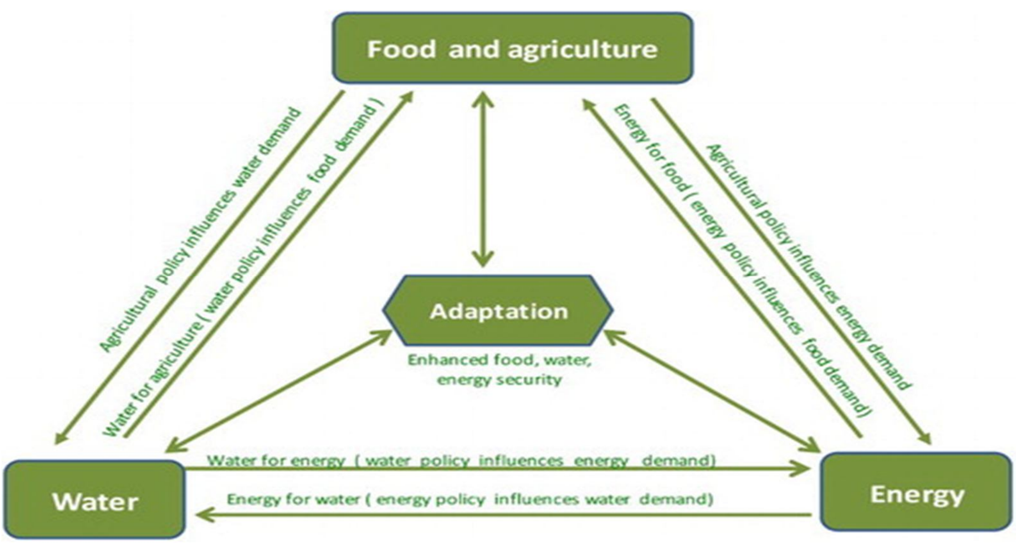
Interlinking actions: concept of the food, water, and energy nexus:

The discourse on food, water, and energy security is driven by growing pressure on natural resources. The interdependencies among water, energy, and food are numerous and multidimensional, and their relationship is often called the food, water, and energy nexus (although the order of the components. The need for an integrated approach in development has been recognized at different stages of development planning. An integrated approach to rural development was introduced in the 1970s in many developing countries. The aim was to reduce poverty through the integration of public services and the promotion of synergy and complementarity among different agencies at the local level, focusing on health, social welfare, agriculture, and income generation. The approach raised huge aspirations for improving the delivery of public services and reducing poverty. For example, India introduced an integrated programme in the sixth and seventh five-year plans (1980–1990). Among other actions, subsidized loans were distributed to over 15 million families to promote income-generating activities. The programme failed to meet expectations, however. Although described as integrated, it mainly focused on credit delivery and there was little integration of the other public services actually required for poverty reduction. Moreover, political influence in credit delivery and weak support from the central ministries undermined the effectiveness of implementation.

Interfaces between the water, energy, and food nexus and adaptation strategies:

The water, energy, and food nexus and adaptation responses are interlinked in numerous ways. The main elements of the nexus and links with adaptation are shown in Figure 1. It is critically important for policy makers to understand the linkages between the water, energy, and food nexus and adaptation when devising sustainable adaptation strategies.

FIGURE 1 The interfaces among water, energy, food, and adaptation



Key challenges of food, water, and energy security and adaptation to climate change in HKH countries:

South Asia is one of the most dynamic regions of the world in terms of population growth, economic progress, urbanization, and industrialization. The demographic, economic, and environmental changes in South Asia have increased the demand for resources, including food, water, and energy, and intensified their use, which has serious implications for adaptation strategies to ensure food, water, and energy security in the region. Within South Asia the HKH region is particularly vulnerable to climate change impact, with the vast majority of the population increasingly exposed to growing physical, social, and economic risks and vulnerability in the face of looming water, food, and energy security challenges.

Increasing population and declining agricultural land:

The population of South Asia almost tripled, from 588 million to 1.6 billion, in the half century from the late 1950s to 2010, and is expected to reach 2.2 billion by 2025. With high population growth and industrial development, cereal demand is projected to rise to 476 million tonnes by 2025, compared to 241 million tonnes in 2000. However, this higher agricultural production has to come from the same amount of land, or maybe even less land because of the competing uses related to population growth, urbanization, and industrialization. Economic growth will also influence this dynamic. For example, in China, economic growth has resulted in a change in dietary preferences towards meat and other energy-intensive foods, further intensifying the demand for water, energy, and grain to feed livestock. The problems are compounded in the mountains of the HKH, where the land is steep and fragile, and farming and grazing have already been extended to marginal areas. Intensification of agriculture and land use can lead to rapid degradation of land resources and a reduction in production potential.

Stagnating or declining food production:

Although total food production is increasing because of the additional area brought under irrigation, per capita food consumption has remained stagnant in many parts of South Asia in recent years Estimates indicate that climate change will result in a decrease in crop yields in South Asia by up to 30% by 2050 if there are no changes in the practices used and appropriate adaptation measures are not taken. Low levels of consumption have contributed to persistent hunger and malnutrition. In South Asia, which is home to more than 40% of the world's extreme poor (living on less than $1.25 a day) and 35% of the world undernourished. Food, water, and energy security in South Asia: A nexus perspective from the Hindu Kush Himalayan region.

Increasingly water- and energy-intensive food production in the face of water and energy scarcity:

Around 39% of the cropland in South Asia is under irrigation, and irrigated land accounts for 60–80% of food production. As a result, agriculture consumes about 90% of the water and 20% of the total energy used in the region. Water, once considered abundant, has become increasingly scarce. Per capita water availability in Pakistan, for example, dropped to close to 1000 m^3 per annum in 2010 from 5000 m^3 in 1951, while that in India is projected to drop to 1140 m^3 per annum by 2050 from 1986 m^3 in 1998. Water scarcity has also become a growing concern for food security in China. About three-fifths of the irrigation water in the region comes from groundwater with about 60% of the population in India and 65% in Pakistan relying on groundwater for irrigation. India and China are already extracting groundwater 56% and 25% faster than it can be replenished, respectively. The increased extraction of groundwater has increased demand for energy and lowered the groundwater table in many parts of the HKH region, especially in the northwestern Himalayas. This has created a serious concern for the entire region, as the shortage of water and energy severely constrains not only agriculture, but also overall economic growth and human well-being.

Key challenges:

Despite the complex interdependency of food, water, and energy among competing uses, each country in the HKH region has put forward a NAPA to address the adverse impacts of climate change using a sectoral adaptation approach, with little or no attention being paid to a nexus-based system-wise adaptation approach to deal with the vulnerability to climatic and non-climatic changes. Considering that water, energy, and food are vital resources for poverty and vulnerability reduction, it is critically important to prioritize and devise an integrated adaptation option based on a nexus assessment that reduces vulnerability to both climate and non-climate changes.

Synergies and trade-offs in the water–energy–food nexus and adaptation strategies:

As water, energy, and food are vital resources for poverty and vulnerability reduction, understanding the linkages among them is critical for adaptation planning. Understanding trade-offs and synergies or complementarities in the water, energy, and food nexus can provide new insights for developing effective adaptation strategies. Given the complex interplay of water, energy, and food demand and supply, numerous challenges and opportunities exist to minimize trade-offs and promote synergies to formulate effective adaptation options. The nexus approach provides a framework for addressing competition for resources and enhancing resource use efficiency. The goals and principles of the nexus approach and of climate change adaptation are closely linked and interconnected, as are the focus and strategies. Effective adaptation and nexus approaches share many common features. Management of water, energy, and food security has an impact on adaptation, and the strategies and policies aimed at climate mitigation and adaptation have significant implications for nexus challenges.

While some adaptation measures such as water-use efficiency, renewable energy, and growing biofuels on wasteland might have positive implications for water, energy, and food resources, other measures for adaptation and mitigation such as extensive groundwater pumping, desalination plants, inter-basin transfers of water to deal with water scarcity, and growing biofuels to deal with fuel scarcity, may increase nexus challenges. Considering the energy, water and food nexus: Towards an integrated modelling approach. For example, micro-irrigation technologies such as drip and sprinkler irrigation reduce water demand by increasing efficiency, but increase energy demand. Similarly, growing biofuels on wasteland can enhance the energy supply and reduce dependence on fossil fuels, but diverting cultivable land for biofuels can threaten food security and lead to social impacts in terms of higher food prices. The engagement of business community has contributed to decoupling resource use and minimizing trade-offs between water and food. For example, faced by a shortage of water due to drought in Australia, the Coca Cola Company invested in water-use efficiency both in their operation and in the management of watershed and springs. This has considerably reduced the water required per unit of beverage production, and has improved the quality of watershed and springs and ensured a sustainable flow of water. Promoting strong public–private partnerships thus offers an innovative solution for managing nexus challenges.

Conclusion

Developing countries face a difficult challenge in meeting the growing demands for food, water, and energy, which is further compounded by climate change. Effective adaptation to change requires the efficient use of land, water, energy, and other vital resources, and coordinated efforts to minimize trade-offs and maximize synergies. The goals and principles of the nexus approach and of climate change adaptation are closely linked and interconnected, as are the focus and strategies. Effective adaptation and nexus approaches share many common features. Management of water, energy, and food security has an impact on adaptation, and the strategies and policies aimed at climate mitigation and adaptation have significant implications for nexus challenges.

References

Alagh, 2010Alagh, Y. K. (2010). The food, water and energy interlinkages for sustainable development in India.*South Asian Survey*, *17*(1), 159–178. doi: 10.1177/097152311001700112[CrossRef]).

IPCC, 2007IPCC. (2007). *Climate change 2007: Impacts, adaptation and vulnerability. Contribution of Working Group 2 to the 4th Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.)

Beddington et al., 2012Beddington, J. R., Asaduzzaman, M., Clark, M. E., Bremauntz, A. F.,Guillou, M. D., Jahn, M. M., Wakhungu, J. (2012)

Agriculture & Food Security, *1*(1), 1–9. doi:10.1186/2048-7010-1-10[CrossRef]).

Dev & Sharma, 2010Dev, S. M., & Sharma, A. N. (2010).*Food security in India, performance, challenges and policies*. (Oxfam India Working Paper Series VII).

http://re.indiaenvironmentportal.org.in/files/food%20security%20in%20india.pdf)

Liu et al., 2007 Liu, J., Dietz, T., Carpenter, S. R., Alberti, M., Folke, C., Moran, E., … Taylor, W. W. (2007). Complexity of coupled human and natural systems. *Science*, *317*, 1513–1516. doi: 10.1126/science.1144004[CrossRef], [PubMed], [Web of Science ®])

Rasul, 2014Rasul, G. (2014). Food, water, and energy security in South Asia: A nexus perspective from the Hindu Kush Himalayan region. *Environmental Science and Policy*, *39*, 35–48. doi:10.1016/j.envsci.2014.01.010[CrossRef], [Web of Science ®]).

Gupta & Deshpande, 2004Gupta, S. K., & Deshpande, R. D.(2004). Water for India in 2050: First-order assessment of available options. *Current Science*, *86*,1216–1224.[Web of Science ®]).

Liu et al., 2007Liu, J., Dietz, T., Carpenter, S. R., Alberti, M., Folke, C., Moran, E., … Taylor, W. W. (2007). Complexity of coupled human and natural systems. *Science*, *317*, 1513–1516. doi: 10.1126/science.1144004[CrossRef], [PubMed], [Web of Science ®]).

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Climate change, energy, and developing countries: policies and programmes

Dr.S.Venkata Raju, Lecturer S.G., Dept. of Physics, D.N.R. College (A), Bhimavaram-534 202

Abstract: *Disruption of the global climate, driven by human activities, has emerged over the past few decades as a major issue of concern. It is now increasingly apparent that the impacts of a changing climate will be significant and widespread. At the same time, it is also clear that tackling the problem of rising greenhouse gas concentrations in the atmosphere will be an enormous undertaking. Given that carbon dioxide emissions from fossil-fuel combustion contribute significantly to the climate problem, many people in industrialized countries view the anticipated growth of fossil-fuel use in developing countries' energy sectors with grave concern. A few countries, the United States being a prominent example, have refused to undertake binding commitments to reduce their greenhouse gas (GHG) emissions in the absence of action by developing countries. At the same time, the growth of energy demand and use in developing countries is also seen as a significant driver of increasing stress on the global energy markets.*

Key words: *carbon dioxide, human activity, cooking, heating, lighting*

Introduction

Energy services underpin almost all aspects of human activity. These services provide basic needs such as cooking, heating, and lighting. They fuel a range of industrial activities, and they sustain today's transportation and communication systems. For these reasons, the energy sector plays a prominent role in the national policies of all countries. Furthermore, expenditures on energy account for 7-8% of countries' gross domestic product (GDP), a significant amount indeed.

For developing countries, expanding and modernizing their energy sector is particularly important since the limited availability of energy constrains human and economic development. The lack of modern energy services can prevent the realization of basic human needs like education, sanitation, health, and communication.3 Insufficient and unreliable power can also constrain industrial production. As countries become richer, energy consumption per capita rises Correspondingly to satisfy increasing demand for energy services from both the industrialization process and rising living standards.

Energy supply and security in developing countries:

Like the uneven development of economies around the world, energy consumption and service varies significantly across countries. In 2002, the global total primary energy supply (TPES) was about 10,230 million tons of oil equivalent (mote).8 Developing countries, with about three-quarters of the world's population, accounted for just over 37% of this total (about 3850 mote).9 The Organization for Economic Co-operation and Development (OECD) countries, with less than a fifth of the world's population, consumed about 53% (about 5345 mote).

Climate change and developing countries:

In recent years, climate change has received significant and increasing attention for its possible impacts on humans, ecosystems, and economies, and for the scale of efforts necessary to mitigate the problem. Climate change is driven by the accumulation in the Earth's atmosphere of heat trapping greenhouse gases (GHGs) resulting from anthropogenic activities. Carbon dioxide (CO2), mostly the product of fossil fuel combustion, is the single largest contributor to the problem, accounting for about 60% of the direct radioactive forcing of all greenhouse gases. Thus, the climate issue is intimately linked to the modern energy sector. The most recent data indicates that CO2 levels in the atmosphere now exceed 380 parts per million by volume (ppmv), a significant rise from the climate policies of industrialized countries and developing countries.

Conflicts, tradeoffs and synergies:

Developing countries have generally viewed the need to enhance energy supply as a high priority in their energy policies. This attention has particularly been focused on enhancing commercial energy supply, especially fossil-fuels for electric power and transportation. This inherently presents a conflict with climate change issues. Simultaneously, the substantial attention paid to power sector reforms intended to promote economic efficiency and investment-friendly context in the sector, has often precluded appropriate consideration of energy efficiency on the end-use side. These power-sector reforms have shown only mixed success in most developing countries, with the agenda often driven by aid agencies, consonant with the general worldwide shift towards market-based and private-sector led approaches. This has also resulted in scant attention being paid to broader environmental or sustainability concerns.

Furthermore, the single-minded focus on the commercial energy sector frequently ignores the issue of energy for the poor. While there have been some efforts towards tackling this problem, they generally have not been commensurate with the magnitude of the challenge (China being a notable exception). In some sense, the appearance of the climate change issue has served to further marginalize energy-poverty, since domestic and international concerns have been directed towards GHG emissions growth in developing countries. This overlooks the two billion people who by virtue of their involuntarily low-energy-consuming lifestyle are contributing to the goals of the climate convention. This leads to a "polluters get paid" principle, while non-polluters get ignored.

Yet, there are also possibilities for approaches with synergistic positive outcomes across multiple challenges. For example, a concerted focus on improving the efficiency of energy use would help reach multiple goals at the same time. It would reduce the pressure to expand energy supply, therefore contributing to energy security. Energy efficiency would also mitigate greenhouse gas emissions per unit of energy service delivered and also decrease local air pollution. Similarly, appropriate attention to renewables could supplement the energy supply while also helping to ameliorate energy poverty through judicious choice of technologies and applications, like solar lanterns, micro-hydro, and biomass gasification. Improvements in traditional technologies such as improved cook stoves or the introduction of modern energy services to the poor can make a positive climate impact by eliminating products of incomplete combustion that are greenhouse gases. These technologies will also deliver significant positive health and other benefits to users.

Interactions between Energy and Climate Policies of industrialized Countries and Developing Countries:

There are numerous links between the energy and climate policies of industrialized and developing countries. For primary energy sources such as oil and natural gas, where demand has strained the global energy markets and caused recent price increases, the large appetite of industrialized countries far outweighs the demand in developing countries. The latter economies, however, are more sensitive to such price increases. Climate policies of industrialized countries affect developing countries in two ways. One, GHG emissions from industrialized countries is much larger than those of developing countries. The long atmospheric lifetime of these GHGs further magnifies the responsibility of industrialized countries for climate change. But, it is the developing countries that are generally based on a renewable fuel and, because it is a gas, being combusted with high efficiency in simple devices, has by far the lowest GWC [global warming commitment] emitted at the stove per meal and is indicative of the advantage that upgraded fuels made from biomass have in moving toward sustainable development goals.").

This has perhaps the greatest implication for energy for the poor, an issue that receives only marginal attention in industrialized countries even though their technological capabilities could make an enormous contribution. The framing of the problem invariably shapes the search for the Solution. Clearly, in the energy and global environment arena, the lines of influence run more strongly from industrialized to developing countries than vice-versa. This is contrary to the common portrayal in the media and by many analysts of the risks posed by the growth in energy demand and greenhouse gas emissions in developing countries. Therefore, a better understanding of the energy needs and aspirations of developing countries, viewed in a global and historical context, is imperative. Such a foundation is necessary for jointly solving the energy and environmental challenges faced by the global community of nations in the twenty-first century.

References and notes:

1. United nations development program (undp) et al., world energy assessment, overview update 2004 33 (jose goldemberg & thomas b. Johansson, eds., 2004) [hereinafter world energy assessment 2004], available at http://www.undp.org/energy/docs/weaou_full.pdf.

2. The world bank group, fueling india's growth & development: world bank support for india's energy sector (july 1999), http://lnweb18.worldbank.org/sar/sa.nsf/

3. World energy assessment 2004, supra note 3, at 26-31.

4. Energy balances of non-oecd countries, supra note 8, at 338-40.

5. International energy agency (iea), world energy outlook 31 (2004) [hereinafter, world energy outlook 2004].

6. World bank, world development indicators database, http://web.worldbank.org/wbsite/ external/datastatistics/0, content mdk: 20535285~menupk: 1192694~pagepk: 64133150~pi pk: 64133175~thesitepk: 239419, 00.html

7. International energy agency, key world energy statistics 14-15, 18-19 (2005), http://www.iea.org/dbtw-wpd/textbase/nppdf/free/2005/key2005.pdf

8. World bank, rural energy and development for two billion people: meeting the challenge for rural energy and development (1997) at 5 [hereinafter world bank 1997], http://www.eldis.org/static/doc12261.htm.

9. V. Mishap et al., indoor air pollution: the quiet killer, no. 63 analysis from the east-west center 6-7 (2002), http://www.eastwestcenter.org/stored/pdfs/api063.pdf.

10. B. Biagini et al., non-governmental organization and energy, encyclopedia of energy (cutler cleveland ed. 2002).

11. Goddard institute for space studies, giss surface temperature analysis (2005), http://data.giss.nasa.gov/gistemp/2005/.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

India's Climate and Energy Policies and facts

D. Surya Prabha, Lecturer, P.G.Dept. of Economics, D.N.R. College (A), Bhimavaram-534 202. Email: suryaprabhaeconomics@gmail.com

K.Nanaji, K.Anand Siva Sagar, U.Evanajali and M.A. Economics (Previous) Students, P.G.Courses and Research Centre, D.N.R. College (A), Bhimavaram-534 202

Abstract: *India is the fastest-growing major economy in the world. India has a number of policies that contribute to climate mitigation by reducing or avoiding greenhouse gas emissions. In June 2008, the Prime Minister released India's first National Action Plan on Climate Change, which identified eight core "national missions" running through 2017. The 11th India's National Mission on Sustainable Habitat also includes initiatives such as the Energy Conservation Building Code, mandated for commercial buildings in eight states, and actions to support recycling, waste management, and improved urban planning.*

Key words: *Climate Change, greenhouse gas, fossil fuel*

Introduction

India is the fastest-growing major economy in the world. It is the fourth largest greenhouse gas emitter, accounting for 5.8 percent of global emissions. India's emissions increased by 67.1 percent between 1990 and 2012, and are projected to grow 85 percent by 2030 under a business-as-usual scenario. By other measures, India's emissions are relatively low compared to those of other major economies. India accounts for only 4 percent of global cumulative energy-related emissions since 1850, compared to 16 percent and 15 percent for the United States and China.1 India produces about 2 tons of CO_2e per capita, versus 20 tons and 8 tons, respectively, in the United States and China. Coal accounted for 43.5 percent of the total energy supply in 2011, followed by biofuels and waste (24.7 percent), petroleum (22.1 percent), natural gas (6.7 percent), hydropower (1.5 percent) and nuclear (1.2 percent).2 India is working to meet growing energy demand by securing affordable supplies and attracting infrastructure investment in. By 2022, it aims to provide electricity to the 25 percent of the population (more than 300 million people) who don't have it.3 India pledged under the Copenhagen Accord to reduce its CO_2 intensity (emissions per GDP) by 20 to 25 percent by 2020 compared to 2005 levels.4 India appears on track to achieve its voluntary pledge, though emissions are not projected to peak until around 2050 or later. On October 1, 2015, India formally submitted its intended nationally determined contribution (INDC) to the climate agreement due in December 2015 in Paris. Among its key elements:

- To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level.
- To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030, with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).

• To create an additional carbon sink of 2.5 to 3 billion tons of CO2 equivalent through additional forest and tree cover by 2030.

Policies contributing to climate mitigation: India has a number of policies that contribute to climate mitigation by reducing or avoiding greenhouse gas emissions. In June 2008, the Prime Minister released India's first National Action Plan on Climate Change, which identified eight core "national missions" running through 2017. India's current Five-Year Plan (2012-2017), which guides overall economic policy, includes goals to:

• Achieve average 8 percent annual GDP growth;

• Reduce emissions intensity in line with India's Copenhagen pledge; and •

Add 300,000 MW of renewable energy capacity. Since taking office in May 2014, Prime Minister Narendra Modi has taken steps to scale up clean energy production and Center for Climate and Energy Solutions has initiated a shift in India's stance in international climate negotiations. One of his first acts was to rename the environment ministry the Ministry of Environment, Forests and Climate Change. In January, the newly reconstituted Prime Minister's Council on Climate Change launched new initiatives on wind energy, coastal zone management, health and waste-to-energy.

Renewable energy: At the federal level, India has implemented two major renewable energy-related policies: the Strategic Plan for New and Renewable Energy, which provides a broad framework, and the National Solar Mission, which sets capacity targets for renewables. The original Solar Mission includes the following targets for 2017: 27.3 GW wind, 4 GW solar, GW biomass and 5 GW other renewables. For 2022, these targets increase to: 20 GW solar, 7.3 GW biomass and 6.6 GW other renewables. SOLAR In November 2014, the Indian government announced that it would increase the solar ambition of its National Solar Mission to 100 GW installed capacity by 2022, a five-time increase and over 30 times more solar than it currently has installed. To this end, the government also announced its intention to bring solar power to every home by 2019 and invested in 25 solar parks, which have the potential to increase India's total installed solar capacity almost tenfold.

Wind: The Twelfth Five Year Plan proposes a National Wind Energy Mission, similar to the National Solar Mission, and the Indian government recently announced plans to boost wind energy production to 50,000 to 60,000 MW by 2022. It is also planning to promote an offshore wind energy market.

Coal: A tax on coal has raised $2.85 billion for India's clean energy fund. The tax rose in July 2014 from Rs. 50 ($.80) to Rs. 100 ($1.60) per ton, and doubled again in March 2015 to Rs 200 ($3.20) per ton.

Energy efficiency and conservation:

India's National Mission for Enhanced Energy Efficiency8 implements the Perform, Achieve and Trade (PAT) Mechanism, covering the country's largest industrial and power generation facilities.9 PAT covers more than 50 percent of fossil fuel use and set a target to reduce energy consumption at participating facilities 4-5 percent in 2015 compared to 2010 levels.

Transportation: In early 2014, India announced new vehicle fuel-economy standards (Indian Corporate Average Fuel Consumption standard) of 4.8 liters per 100 kilometers (49 MPG) by 2021-2022, a 15 percent improvement. Biofuel legislation has set a target of 20 percent blending of ethanol and biodiesel in 2017.

Smart cities: Prime Minister Modi has launched an initiative to create 100 "smart cities" with better transport systems, utilities, and energy networks to address the challenges of urban growth. The 11th India's National Mission on Sustainable Habitat also includes initiatives such as the Energy Conservation Building Code, mandated for commercial buildings in eight states, and actions to support recycling, waste management, and improved urban planning.

Conclusion

The present paper analyses the India's Climate and Energy Policies and facts**.** India's National Mission for Enhanced Energy Efficiency8 implements the Perform, Achieve and Trade (PAT) Mechanism, covering the country's largest industrial and power generation facilities.9 PAT covers more than 50 percent of fossil fuel use and set a target to reduce energy consumption at participating facilities 4-5 percent in 2015 compared to 2010 levels. Behind, challenges has to solve.

References:

1. Data from WRI, 2011. "6 Graphs Explain the World's Top 10 Emitters," available at www.wri.org/blog/2014/11/6-graphsexplain-world%E2%80%99s-top-10-emitters

2 Data from US EIA. 2013. "India," available at http://www.eia.gov/countries/analysisbriefs/India/india.pdf.

3 Data from World Bank, 2014. "Access to electricity (% of population)," available at http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS/countries.

4 Government of India, 2010. Copenhagen pledge, available at http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/indiacphaccord_app2.pdf

5 Government of India, 2013. "Twelfth Five Year Plan (2012-2017)," available at http://12thplan.gov.in

6 Government of India, 2011. "Strategic Plan for New and Renewable Energy Sector for the Period 2011-17," available at http://mnre.gov.in/file-manager/UserFiles/strategic_plan_mnre_2011_17.pdf

7 Government of India. "JNN Solar Mission," available at http://www.mnre.gov.in/solar-mission/jnnsm/introduction-2/

8 Government of India. "National Mission for Enhanced Energy Efficiency (NMEEE)," available at http://www.beeindia.in/schemes/schemes.php?id=8

9 Government of India. "Perform, Achieve and Trade (PAT)," available at http://www.beeindia.in/content.php?page=schemes/schemes.php?id=9

10 Data from IEA, 2014. "World Energy Outlook 2014."

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

The fall in Crude Oil Prices and its effect on Indian Economy

Dr.D.Sujatha, Sr. Assistant Professor, MR PG College, Vizianagaram, AP

Abstract: *Energy is a foundation stone of the modern industrial economy. Energy provides an essential ingredient for almost all human activities. it provides services for cooking and space/water heating, lighting, health, food production and storage, education, mineral extraction, industrial production and transportation. Modern energy services are a powerful engine of economic and social development, and no country has managed to develop much beyond a subsistence economy without ensuring at least minimum access to energy services for a broad section of its population. While increased financial flows into oil in recent years may have contributed to increased volatility of oil prices, it is hard to find clear evidence of speculative forces or financialization driving the price decline. Weaker demand and substitution effects have pushed down prices of other energy commodities. The paper is to cover the (1) Fall in crude oil prices and effects of fall in crude oil prices in India.*

Key words: *education, mineral extraction, industrial production, transportation*

Introduction

Energy is a foundation stone of the modern industrial economy. Energy provides an essential ingredient for almost all human activities. it provides services for cooking and space/water heating, lighting, health, food production and storage, education, mineral extraction, industrial production and transportation. Modern energy services are a powerful engine of economic and social development, and no country has managed to develop much beyond a subsistence economy without ensuring at least minimum access to energy services for a broad section of its population. Crude oil is a naturally-occurring substance found in certain rock formations in the earth. It is a dark, sticky liquid classified as a hydrocarbon. It is a compound containing mainly carbon and hydrogen. Crude oil is highly flammable and can be burned to create energy. Petroleum= Petra (Rock) + Oleum (Oil) (Latin) .Global crude oil prices are at a four-year low but India has raised excise duty. Experts say there's a method to the madness: extra funds can cushion the impact when prices rise

When fuel consumers across the country were in a celebratory mood with petrol and diesel prices coming down by Rs 10 and Rs 6 respectively. On November 12, the Government raised excise duty by Rs 1.50 per liter on both petrol and diesel. On December 2, the duty on petrol was raised by Rs 2.25 per liter and on diesel by Re 1 a liter. All this, even as the price of the Indian basket of crude oil came down from $105 a barrel in April to $77/barrel in November. An oversupply in global markets, a slump in demand, and OPEC countries' decision not to curb production, crude oil prices have fallen to a four-year low. However, those expecting further relief in the first fortnight of December were in for disappointment, even though oil marketing companies (OMCs) did not pass on the burden of excise duty increase to consumers.

This decision is to raise excise duty as an attempt by successive governments to

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

utilise the petroleum ministry as a cash cow. Taxes on petroleum products contributed Rs 2.6 lakh crore in 2013-14 to the combined kitty of the Centre and states. Fuel prices have a cascading effect on inflationary processes and the duty increase will artificially keep the gap between the global price fall and domestic fall wider. "The benefit of low fuel prices in the international market has not been passed on to the common man

Oil prices fell by about 50 percent between June 2014 and January 2015: The drop consisted of several phases. The initial gradual slide was from $110 a barrel of Brent oil in 2014 to $80 a barrel before the OPEC meeting in 1st November. Subsequently, the Brent oil price fell sharply to below $50 a barrel by yearly,. January 2015, before recovering partly to about $65 a barrel in May 2015. By contrast medium –term Brent futures did not materially drop below the established $90-$100 a barrel range until after the OPEC meeting. When they adjusted rapidly to about $70-$75 a barrel, and have stayed in this range since the first half 0f December, notwithstanding the sizable rally in spot prices since the start of the year.

Crude Oil in India

Crude Oil Production India Kuwait Thousand Barrels Daily UAE Mexico Canada China Iran US Saudi…Russia 0 2000 4000 6000 8000 10000 12000 Source: BP Statistical Review of World Energy 2011. Crude Oil Consumption Russia Thousand Barrels Daily India Japan China US 0 5000 10000 15000 20000 25000 Source: BP Statistical Review of World Energy 2011. India's Oil Import 11% 34% 18% 5% 10% 22%Iran Saudi Arabia Other Western Hemisphere Africa Other Middle East Source: Global Trade Atlas. Energy Consumption In India 7% 24% 1% 42% 24% Oil 2% Nuclear Combustible and Waste Other Renewable Coal Source: The International Energy Agency. Consumption of Major Petroleum Products 9% 8% 40% 36% 7% LPG Kerosene Diesel Petrol All other products Source: Ministry of Petroleum Basic Statistics. Crude Oil Price Source:- Energy Information Administration and Bureau of Labor Statistics 2012. Crude Oil Subsidy 78% jump Chart Title 80000 60000 40000 20000 0 Crude Oil Subsidy Rs in Cr 2010-11 2011-12 . Impact of increase in oil prices on growth and inflation levels in India GDP=Private Consumption + Gross Investment + Govt Spending + (Export – Import).International Increase in Extent of fall in Extent of fall in Extent of oil international manufacturing GDP growth increase in WPI prices per oil prices (%) sector (%) (%)barrel ($) (%)50 38.9 2.1 0.4 1.560 66.7 9.7 1.9 3.670 94.2 16.9 3.4 5.780 122.2 24.5 4.9 7.9140 126.1 29.7 7.3 7.2

As far as India is concerned, falling crude is certainly a blessing for the economy as it helps macro-economic management (both budget and fiscal) by improving macro fundamentals. India imports more than two- thirds of its requirement, which constitutes around 30 percent of total imports. A fall of one-dollar in the price of oil saves the country about Rs 40 billion. Adding to that the fall in international oil prices will reduce subsidies that help sustain the domestic prices of oil products (LPG, kerosene)

Moreover, lower crude price will surely facilitate room to the Reserve Bank of India in adopting growth-centric approach while reviewing monetary policy. It is estimated that a fall of USD

10 in crude could reduce the Current Account Deficit by roughly 0.5 percent of GDP and the fiscal deficit by around 0.1 to 0.4 percent of GDP.

Investment bank Nomura estimates that the windfall up to a level of USD 40 can potentially boost growth by up to 0.4 percent in the current financial year.

Also, a recent research report says that a 10 percent decline in oil prices could reduce retail inflation (Consumer Price Index-based inflation) by around 0.2 percent and push up the gross domestic product (GDP) growth by 0.3 percent.

But on the flip side, analysts are also highlighting the potential downside risks associated with lower oil prices. It would be wrong to ignore implications of falling oil prices on markets and the way businesses and companies operate.

Fall in Crude Oil Prices its Negative effect on Indian Economy

Oil is critical for India. For one, India imports more than two- thirds of its requirement, which constitutes 37 percent of total imports. A one-dollar fall in the price of oil saves the country about 40 billion rupees. That has a three-fold effect spread across the economy.

First, if the average fall in oil prices is about $4 per barrel in 2014-15, the trade deficit will shrink by about $3 billion. In the April-June quarter, the current account deficit had dropped to $7.5 billion, mainly due to customs duty on gold imports. Add to that the fall in oil prices and the current account deficit should come down further and harden the rupee against the dollar.

Second, the fall in international oil prices will reduce subsidies that help sustain the domestic prices of oil products. Petrol prices are already decontrolled. The more commonly used diesel had been staggered deregulation since September 2012.

Third, the fall in international prices of oil will have a soothing effect on inflation. But it won't be strong enough because the consumption of oil in industry is not that high except in the manufacture of certain products like carbon black. It is possible that the fall in the price of oil will adversely affect the budgets of many OPEC members and there will be pressure to cut supplies even before the November meeting. It is also possible that demand for oil may recover with the onset of winter and prices may crawl up. Hence, an uptick in prices is possible in the last quarter of the current year. It would therefore be prudent to take maximum advantage from the current fall in prices.

Current account balance: India is one of the largest importers of oil in the world. It imports nearly 80% of its total oil needs. This accounts for one third of its total imports. For this reason, the price of oil affects India a lot. A fall in price would drive down the value of its imports. This helps narrow India's current account deficit - the amount India owes to the world in foreign currency. A fall in oil prices by $10 per barrel helps reduce the current account deficit by $9.2 billion, according to a report by Live mint. This amounts to nearly 0.43% of the Gross Domestic Product - a measure of the size of the economy.

Inflation Oil price affects the entire economy, especially because of its use in transportation of goods and services. A rise in oil price leads to an increase in prices of all goods and services. It also affects us all directly as petrol and diesel prices rise. As a result, inflation rises. A high inflation is bad for an economy. It also affects companies - directly because of a rise in input costs and indirectly through a fall in consumer demand. This is why the fall in global crude prices comes as a boon to India. Every $10 per barrel fall in crude oil price helps reduce retail inflation by 0.2% and wholesale price inflation by 0.5%, according to a Money control report.

Oil subsidy and fiscal deficit: The government fixes the price of fuel at a subsidized rate. It then compensates companies for any loss from selling fuel products at lower rates. These losses are called under-recoveries. This adds to the government's total expenditure and leads to a rise in fiscal deficit - the amount it borrows from the markets. A fall in oil prices reduces companies' losses, oil subsidies and thus helps narrow fiscal deficit. However, since diesel was recently deregulated, the fall in oil prices will likely have less effect on the government's fiscal deficit. Moreover, the government still has to pay for previous under-recoveries. Any benefit from the fall will be offset by payments for the past under-recoveries.

Rupee exchange rate: The value of a free currency like Rupee depends on its demand in the currency market. This is why it depends to a great extent on the current account deficit. A high deficit means the country has to sell rupees and buy dollars to pay its bills. This reduces the value of the rupee. A fall in oil prices is, thus, good for the rupee. However, the downside is that the dollar strengthens every time the value of oil falls. This negates any benefits from a fall in current account deficit.

Petroleum producers: The fall in global oil prices may be beneficial to India, but it also has its downsides. Directly, it affects the exporters of petroleum producers in the country. India is the sixth largest exporter of petroleum products in the world, according to media reports. This helps it earn $60 billion annually. Any fall in oil prices negatively impacts exports. At a time when India is running a trade deficit - high imports and low exports, any fall in exports is bad news. Moreover, a lot of India's trade partners and buyers of its exports are net oil exporters. A fall in oil price may impact their economy, and hamper demand for Indian products. This would indirectly affect India and its companies. For example, the share prices of Bharti Airtel and Bajaj Auto fell because of the devaluation of the Nigerian currency - Naira. Both the companies have a significant presence in the African country.

Conclusion: As far as India is concerned, falling crude is certainly a blessing for the economy as it helps macro-economic management (both budget and fiscal) by improving macro fundamentals (inflation, fiscal deficit and current account deficit). But on the flip side, analysts are also highlighting the potential downside risks associated with lower oil prices. It would be wrong to ignore implications of falling oil prices on markets and the way businesses and companies operate. Here, it must be noted that India is heavily dependent upon foreign institutional investors (FIIs) and foreign direct investment (FDI) inflows and when bank funding of such a high magnitude and budgets of oil exploring companies go haywire, Indian markets would feel the pinch. Also, these bankruptcies and sovereign defaults will aggravate the economic slowdown at the global level, which might impact India's exports. A whole range of other issues are also linked with lower oil prices. Servicing of high foreign debt and cash flows of Indian companies also is a concern.

References

Government of India, 2013. "Twelfth Five Year Plan (2012-2017)," available at http://12thplan.gov.in

Government of India, 2011. "Strategic Plan for New and Renewable Energy Sector for the Period 2011-17," available at http://mnre.gov.in/file-manager/UserFiles/strategic_plan_mnre_2011_17.pdf

Government of India. "JNN Solar Mission," available at http://www.mnre.gov.in/solar-mission/jnnsm/introduction-2/

Government of India. "National Mission for Enhanced Energy Efficiency (NMEEE)," available at http://www.beeindia.in/schemes/schemes.php?id=8

Government of India. "Perform, Achieve and Trade (PAT)," available at http://www.beeindia.in/content.php?page=schemes/schemes.php?id=9

Data from IEA, 2014. "World Energy Outlook 2014."

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Environment and urbanization – the nexus: policies and programmes

Ch. Sundeep Kumar, D.Anjaneyulu and D.Rajeswari & M.A. Economics (Final) Students, P.G.Courses & Research Centre, D.N.R. College (A), Bhimavaram-534 202

Abstract: *Economic growth and Environment Quality According to Environmental Kuznets Curve there is invert U-shaped relationship between economic growth and environmental degradation. That is with the increase in economic growth, environmental degradation also goes on increasing and this process to be continue up to the potential or maximum economic growth level and then afterword it is not possible to further increase in economic growth with deteriorated natural resources. After this maximum growth every attempt of accelerating economic growth hampers natural resources without further increase in economic growth. In present study the same model has been tried to test empirically in context of above mentioned nine Asian Countries.*

Keywords: *Urbanization, GDP per Capita, Improved Sanitation, Forest Depletion, Economic Growth, Environmental Degradation.*

Introduction:

Urbanization refers to a process of transition of traditional economy into the modern economy. As a consequence of modernization, rapid and continuous urbanization has taken place in all over the world during the last century. Rapid industrialization or the localization of the industries and faster growth of population, highly degradation of natural resources, high standard of living cost, and high level of pollutant and level of pollution are the major distinctive features of modern urbanization. Since urbanization significantly contributing in economic growth by several way, in modern era of developing countries urbanization has becomes a key and an engine of economic growth. It has demonstrated by several studies that significant nexus prevails between urbanization and economic growth. But there is also another dark side of urbanization which cannot be neglected in modern concept of sustainable development. It is universal truth that rapid natural resource degradation has taking place in the process of urbanization. A very little empirical research has been conducted on the issue of urbanization, economic growth and environment nexus. Under this backdrop it is necessary to explore this spiral nexus in order to better management, planning and administration of the urban environment.

Urbanization and the nexus: The nexus between, urbanization economic growth and environmental quality has been a source of great controversy for a very long time. There are two extreme views regarding this nexus. The first view has been demonstrates that rapid urbanization and modernization lead to expansion of greater economic activity. This greater economic activity or economic growth is inevitably lead to environmental degradation and consequently in economic and ecological collapse. The second extreme approach has been demonstrates the view that those environmental problems worth solving will be addressed more or less automatically as a consequence of economic growth and modern urbanization. This debate has still prolonged because of lack of substantial empirical evidence on how environmental quality changes at different income levels and at different level of urbanizations. Compilation of such evidence has been constrained by the absence of data for a large number of countries. At present the situation is much improved and this paper takes a step of systematic analysis in exploring these nexus by using available data. In order to make the study more intensive three basic models are used e.g. Log-linear, Lin –log and Log-lin. Since it is very complex phenomenon, theoretically it is quite difficult to explore this nexus .However it is not impossible even though there are some problems like intercept value of variables and identification of dependent and independent variables. By considering available data of different indicators (from period 2001 to 2010) and with the help of econometric models an honest attempt is being made toward the exploring this casual nexus. Especially South Asian countries were considered for study.

The present research is purely analytical type of research which exclusively relies on secondary data. The necessary data has been collected from the report of the World Bank. The collected data has been processed and tabulated by using Excel Software. The statistical tools such as, multiple correlations, log- linear regression equations are applied for data analysis and interpretation. The present paper has considered ten years period from 2001-02 to 2010-11 and attempts were made to examine the coiled nexus between urbanization, economic growth and environment quality in context of South Asian countries namely Afghanistan, Bangladesh, Bhutan, India, Iran, Maldives, Nepal, Pakistan and Sri Lanka. In case of absences of some indicators of time series data the panel data has been used.

Existing gathered literature has shown that there is positive relationship between urban areas (specifically, their share of national population) and level of economic development. Numerous studies have confirmed that there is positive relationship between per capita income and urbanization levels (Fay and Opal, 2000; and Polese, 2005).Other studies have repeatedly confirmed the disproportionate contribution of urban areas to national income and product (world Bank, 1991).Many studies have verified the positive link between productivity and the agglomeration of economic activity in cities (Gleaser, 2000, Krugman, 2000 and Quigley, 2007). On the contrary, Polese (2005) argues that, the relationship ISSN: 2319-8753 International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 2, Issue 12, December 2013 Copyright to IJIRSET www.ijirset.com 7811 between urbanization and economic growth is weak at least in recent times, and as such does not foster growth of region's economies. Generally, there is exercised enormous control of cities over national economies. They provide jobs, access to the best cultural, educational and health facilities and they act as focal point for communication and transport which are necessary conditions for economic development of any nation. Although they also cluster massive demand for energy, generate large quantities of waste and concentrate pollution as well as social adversity. According to Todaro and Smith (2003), there is a close association between urbanization and per capita income. Including other economic development indicators it is one of the most observable and sticking fact to development process. According to Quigley, (2007), the economic and social crises that have enveloped most of the developing countries are as a result of urban growth without proportional economic development. To Quigley (2007), urbanization on one hand is destructive, while on the other, it is the base for development process of any region. The relationship between urbanization has long popular issue of debate in the literature of economic development. According to Rakodi (2004), cities of developing countries are faced with the challenges of rapid population increase with unaccompanied economic growth. The foregoing analysis clearly reveals that there is clear cut nexus between urbanization and economic development but the literature has not covered impact of urbanization on the environment. Recently the United Nation published "World Urbanization Prospects (2009)" and pointed out that 2010 is the break-even year of the world urban rural population. By the middle of 2009, the number of people living in urban areas (3.42 billion) had surpassed the number living in rural areas (3.41 billion) and since then the world has become more urban than rural. It is also stated that the growth rate of urbanization in developing countries is more than developed countries.

Conclusion: The major findings of the study are as below Correlation Results 1) The economic growth and declining environment quality are strongly and positively correlated. 2) It has also seen from foregoing analysis that economic growth and rate of urbanization are also positively correlated. 3) Urbanization and environment are negatively and significantly correlated. Correlation Matrix Growth Growth Urbanization Environment Per capita GDP growth urban pop Sanitation CO2 Emission Forest depletion per capita.

References:

World Bank-World Data Bank, World Development Report 2010.

Polese, N. Cites and National Economic Growth: A Reappraisal. Rutledge Taylor & Francis Group. Urban Studies, 42, 8(2005)

World Bank 'The Forest Sector: A World Bank Policy Paper', Washington, D.C. (1991).

Grossman, G. and Kruger, A.. 'Environmental Impacts of a North American Free Agreement', in P. Gabor (ed.), the US-Mexico Free Trade Agreement, MIT Press, Cambridge, MA. (1993).

Holtz-Eakin, D. and Seldon, T... 'Stoking the Fires? CO2 Emissions and Economic Growth', Mimeograph, Syracuse University, Syracuse, NY. (1992).

Fay, M. and Opel, C. Urbanization without Growth: a not so Uncommon Phenomenon, Working Paper, World Bank, Washington DC (2000).

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Climate Change and Development in Indian Context

P.V.Rama Raju, Head, Dept. of Commerce, D.N.R. College (A), Bhimavaram-534 202

Abstract: *While achieving "development", remains as a major challenge of the developing countries; most of them are not in a position to ensure basic human need such as food, shelter, clothing and minimum "standard of living" to all of their citizens. getting rid from poverty, employment, literacy and lack of basic access to primary health care and education, free from malnutrition, stabilizing population, reduction in infant mortality rate, ensuring safe drinking water and sanitation still remains far-off for the more than the ninety per cent population of the world today. On the other hand, due to higher Green House Gas emissions, earth is experiencing a higher rise in temperature (40 Centigrade in 100 years), which drastically influencing the changes in the weather patterns, resulting in melting the Ice-caps, causing flash floods, droughts, cyclones, hurricanes, abnormal increase or decrease in rainfall, arising water scarcity, desertification, change in crop-yield, sea level rise or coastal flooding, causing victor-borne diseases, and many unexpected natural disasters including the changes in major river systems and even adversely affecting Bio-diversity.*

Key words: *primary health care, education, malnutrition, Green House Gas emissions*

Introduction:

As a priority, Development certainly comes first. Because Climate Change Policy, cannot solve the problems and need of a developmental prospects of a country and at the same time initiatives for Adaptation and Mitigation for Climate Change, can also not be ignored; since this is closely linked to the process of development at each stage. The climate of the future is going to be different from the climate of the past; hence from our experience and traditional knowledge, built over the years, we should able to adopt appropriate Climate Change Policies and subsequently implement the Mitigation Strategies; otherwise the poorest of the poor would suffer the most, since they are the ones, most vulnerable to climate change process. The most of the Developing Countries, unfortunately do not have sufficient either financial resources or technological know-how to support their minimum developmental programmes and in such a situation, Adaptation and implementing Mitigation Policy would certainly be an additional burden for them. In fact, Capacity Building assumes prime importance in such a context for the Developing World. India has the world's second largest population and fourth largest economy, with a per capita annual GDP of $ 2.4. While our economy has been among the fastest growing in the world in the last two decades, the major part of this growth is due to the service sectors, including information technology, bio-technology, and media and entertainment. The nation aims to reduce the poverty rate to 15 per cent, provide full employment, and ensure food, energy and economic security and double per capita income – all by 2012. In order to achieve these goals, India has developed an open, market-based economy. India's carbon emissions per capita, is the lowest in the world, averaging only one-quarter of the global average and one-twentieth the U.S. rate.

While India places a higher priority on development needs, policies driven by economic and environmental challenge have reduced growth in greenhouse gas (GHG) emissions. The greatest challenge has been economic liberalization and restructuring to improve living standards of the people. Pressure from citizen activists to reduce air pollution has also led to sufficient legal interventions in mandating strong clean air measures that affect energy systems. India ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993 and the Kyoto Protocol in 2002. First, our per capita Green House Gas emissions are only a fraction of the world average, and an order of magnitude below that of many developed countries. This situation will not change for several decades to come. We do believe that the ethos of democracy can support equal per capita rights to global environmental resources. In Five-year Planning process, India stated placing " Environment Protection ", due importance right from its fifth Five-year Plan. The Ninth Plan (1997-2002) recognizes the synergies among environment, health, and development, and identifies as one of its core objectives, as the need for ensuring environmental sustainability of the development process through social mobilization and participation of people at all levels (Planning Commission 1997).

Research and Development Approach:

The Approach Paper to the India's Tenth Five-year Plan (2002-2007) links economic development and poverty with environmental degradation. As the poor are dependent on nature for their livelihoods, they are highly vulnerable to natural calamities, environmental degradation, and ecological disasters. Any economic development, which destroys the environment, may aggravate problems of poverty, unemployment, and disease. Moreover, the Approach Paper also emphasizes that India would target a high rate of economic growth (8% GDP), simultaneously striving for enhancement of human will being. This includes adequate levels of consumption of food and other consumer goods, access to basic social services (education, health, drinking water, and basic sanitation), expansion of economic and social opportunities for all individuals and groups, reduction of disparities, and greater participation in decision-making. This is the key challenge for the Indian economy at the start of the new millennium. Targets set for India's Tenth Plan period (2002-07) and Beyond · Growth in gross domestic product at 8% for the period 2002-07 · Reduction of poverty ratio by 5% by 2007 and by 15% by 2012 3 · Providing gainful high-quality employment to the addition to the labor force over the plan period · Admittance of all children in school by 2003; completion of five years of education by children by 2007 ·

Reduction for gender gaps in literacy and wage rates by at least 50% by 2007 · Reduction in the decadal rate of population growth between 2001 and 2011 to 16.2% · Increase in literacy rate to 75% within the Plan period · Reduction of infant mortality rate to 45 per 1000 live births by 2007 and to 28 per 1000 live births by 2012 · Reduction of maternal mortality ratio to 2 per 1000 live births by 2007 and to 1 per 1000 live births by 2012 · Increase in forest and tree cover to 25% by 2007 and to 33% by 2012 ·

Sustained access to potable drinking water for all villages within the Plan period · Cleaning of major polluted rivers by 2007 and other notified stretches by 2012 Although the countries of the developing world are more vulnerable to climate change, their contribution to the greenhouse problem has been much smaller than that of developed countries, Historically, developed countries have been responsible for more than 60% of GHGs (greenhouse gases) added in the last 100 years (WRI 2001). This is recognized in the UNFCCC, which follows the principles of 'common but differentiated responsibilities' and 'respective capabilities' in addressing its ultimate objective of stabilizing atmospheric GHG concentrations. In 1990, India accounted for approximately three per cent of global GHG emissions. The major part of India's emissions came from fossil-fuel-related CO2 emission. In per capita terms, India emitted 1.19 tons of CO2 – equivalent, compared to Japan's 8.8 tones and US's 19.8 tones in the same year (ADB-GEF-UNDP 1998). Ten year later, India's CO2 emissions from fossil flue combustion continue to be much lower than those of key Developed Countries. In per capita terms, India's emissions constitute just a fraction of the world average. Despite its low share in atmospheric GHG concentrations, and its overriding development priorities, India is undertaking numerous initiatives that contribute significantly to international efforts for atmospheric protection, thus putting the country on the path of climate-friendly development. Recent Energy and Emissions Profile After climbing steadily for at least two decades, India's energy, power, and carbon intensities all began to decline rapidly after 1995 and this shift suggests the start of a decoupling of energy and economic growth, as has historically occurred in industrialized nations at higher per capita income levels.

Industrial development has contributed significantly to economic growth in India, though not without an environmental price. With coal accounting for over half of total primary energy consumption, this industrial development has been fueled by a relatively high-polluting energy source. Industrial pollution is increasing public health risks, and abatement efforts are consuming a significant portion of India's GDP. Energy consumption by the industrial sector accounted for 41 per cent of the total energy consumption in 1998. Non-commercial biomass energy meets the cooking needs of most rural India households and nearly half of urban households. Although commercial forms of energy are penetrating rural and traditional sectors, biomass still accounts for roughly one-third of total Indian energy use. India's carbon emissions have grown by 63 per cent over the last decade, despite the decline in carbon intensity later in the decade. This emissions growth results primarily from energy use associated with economic development and heavy dependence on coal. Methane, originate primarily from rice paddies and ruminant cattle, contributed one-third of India's total GHG emissions, although its share decreased rapidly with the rise in energy related carbon emissions. Appropriate Mitigating Measures Growth of energy-related carbon dioxide emissions in India was reduced over the last decade by an estimated 111 million tons. The key factors in these reductions have been economic restructuring, local environmental protection, and technological change. These drivers have been mediated through economic reform, enforcement of existing clean air laws by the nation's highest court, and renewable energy incentives and development programs funded by the national government and foreign donors. In 2000 alone, energy policy initiative reduced carbon emissions growth by 18 million tons-about 6 per cent of India's gross energy-related carbon emissions. Market reform driven by domestic policy and international dynamics over the past decade has improved India's fuel quality, technology standards, infrastructure, and operating practices. A key example is power sector restructuring and reform. This Electricity Supply Act of 1905 designated electricity as essentially a human right in India. The advent of market-based pricing for both power and liquid fuels is replacing the administered-price system of the old planned economy. Current prices and bill collections now cover about two-thirds of the cost of power; they remained amount is recovered by only through various forms of subsidy. In some cities such as Delhi and Bangalore power costs more than the U.S. average. Many people still do not pay for power, meaning that the high price reflects a large cross subsidy for the poor and free riders. Liquefied petroleum gas, which is used widely for cooking, is modestly subsidized, but prices are headed toward international levels. Other market reforms have allowed the import of foreign 5 cars and appliances, which generally are more energy-efficient than those they replace. Technology development measures in the energy sector have contributed a series of small but notable reductions in emissions growth. Improvements in stoves, reduction of gas flaring in fossil-fuel production, improvements in demand- and supply-side efficiency, and the introduction of modern renewable energy systems now mitigate about 18 million tons of carbon per year. None of these measures has been exploited to its full potential, and many could lead to further reductions in emissions growth in the future.

Lower carbon emissions also have resulted from important technological advancements in coal washing. Indian coal averages approximately one-third ash, wreaking havoc with boilers and their efficiency, driving up transportation costs, and creating serious air pollution. One recent government policy restricts the transportation of unwashed coal to less than 1,000 kilometers. Customers are motivated to reduce ash content to improve efficiency, reduce local pollution, and cut freight costs. New combustion technologies, including supercritical coal-fired power plants, are being introduced, and the capture of coal-bed methane is being promoted. While coal shall continue to be the most important source of energy in India in the foreseeable future, we are promoting many technological innovations in this sector to enhance efficiency and reduce its environmental impacts. Government policy has included public investment to develop the Natural Gas infrastructure for long-distance and local distribution as well. One example is the HBJ 1,500- kilometer high-pressure gas pipeline from near Mumbai to the north of Delhi, which carries 4 to 5 billion cubic meters of gas from off-shore production. The share of gas in power generating capacity has risen to 8 percent against the 2 per cent ten years ago. Liquefied petroleum gas has significantly replaced commercial coal and kerosene in urban households. Public vehicles have been converted to Compressed Natural Gas. India has instituted a sizable renewable energy program over the past 20 years, which is implemented by the

Ministry of Non-Conventional Energy Sources, since 1992. About 3.3 million household Biomass Gasification Systems have been built, which produce 3-4 cubic meters of Biogas per unit per day, enough to supply cooking fuel for a large percentage of rural homes. A larger scale program has improved the efficiency of wood stoves in 34 million homes, reducing deforestation in areas, where wood-fuels were unsustainably harvested. Forest covers nearly one-fifth of India's geographical landmass. The per capita deforestation rate has been among the lowest of the major tropical countries. In recent years, closed forests have actually increased in total area. Forest conservation measures include prohibiting the use of forestland for 6 non-forestry purposes, encouraging agro-forestry and private plantations to meet industrial wood needs, and expanding areas under protection. During the last decade, over 14 million hectares were protected under Indian forestry programs.

Future Mitigation Options:

These efforts have led to a steady increase in the rate of forestation, significantly contributing to the removal of atmospheric carbon. Future Mitigation Options Projections assuming sustained economic growth and continued dependence on domestic coal resources, suggest sharply rising energy use and GHG emissions in India. One study - The Asia Least-Cost Greenhouse Gas Abatement Strategy (ALGAS), projected energy-sector carbon emissions of at least 688 million tons in 2030, which is nearly three times then the current level. Forestry-related emissions would reach 21 million tons of carbon by 2020 and about 29 million tons by 2030. More recent studies have given lower energy-related estimates, one projecting 572 million tons in 2020. The ALGAS scenario is driven by a continuation of economic, demographic, and energy trends and current policies. The economy would grow at an annual rate of 5 per cent, increasing GDP in 2030 to nearly five times the present level. India's population would increase from 1 billion to 1.35 billion. Demand and Supply side efficiency measures alone could avoid 45 million tons of emissions. The cost of these measures depends on the extent to which they would be applied, which in turn depends in part on the stringency of GHG production policies. India could in the midterm help finance these mitigation measures by selling emission reduction credits, either through the Clean Development Mechanism established under the Kyoto Protocol or in a futures market based on expectations that future global policies would certainly impose more stringent GHG restrictions, provided that credits could be banked and sold.

Conclusion:

Now let us pledge for: · Recognition that, given current scientific knowledge, deep cuts in emissions will be necessary to avoid dangerous climate change. These must be achieved with the principles of equity and common but differentiated responsibilities. · Increased capacity and financing for adaptation must be ensured. In practice, adaptation should be integrated with sustainable development. However, without far deeper emissions reductions, no amount of adaptation can stave off catastrophic impacts. · Fair and adequate public participation in Decision-making and implementation, which requires increased public awareness, education and training. · Reaffirmation at what the right to sustainable development is fundamental to achieving the goals of the convention and the protocol. This includes making poverty eradication a global priority, just as it includes shifts to equitable and sustainable patterns of consumption. Climate Change has emerged as one of the most serious environmental concerns of our times, which is a global phenomenon with diverse local impacts. There is a need to pay adequate attention to the concerns of developing countries on vulnerability and adaptation issues; hence Adaptation is the key theme for the eight Conference of Parties of UNFCCC at New Delhi, let us expect this should not be a substitute for Mitigation for cutting back emissions. The New Delhi Declaration should provide us with a sound basis for global cooperation, reflecting the consensus that addressing the challenge of climate change as an integral part of achieving sustainable development to create a better world for all our people.

References and Notes:

1. Jorgenson, D.W. 1981. "Energy Prices and Productivity Growth." Scandinavian Journal of Economics 83(2): 165–79.

2. Nakicenovic, N. 1996. "Freeing Energy from Carbon." Daedalus 125(3): 95–112. Office of Technology Assessment (OTA). 1990. Physical Vulnerability of Electric System to Natural Disasters and Sabotage. Report OTA-E-453, June. http://www.wws.princeton.edu/~ota/.

3. Schurr, S. Sonenblum, and D. Wood (eds.), Energy, Productivity, and Economic Growth. Cambridge, MA: Oelgeschlager, Gunn and Hain. Schurr, S.H. 1982. "Energy Efficiency and Productive Efficiency: Some Thoughts Based on American Experience." Energy Journal 3(3): 3–

4. Weyant, J.P., and J.N. Hill. 1999. "Introduction and Overview." Energy Journal, Special Issue (The Costs of the Kyoto Protocol: A Multi-Model Evaluation): vi–xiiv.

5. Ezzati, M., A.D Lopez, A. Rodgers, S. Vander Hoorn, C.J.L Murray, and the Comparative Risk Assessment Collaborating Group. 2002. "Selected Major Risk Factors and Global and Regional Burden of Disease." The Lancet 360, November 2: 1347–60.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

The geopolitics of energy -implications for south and South East Asia

V.Vijay Kumar, Lecturer in Commerce, Sir C.R.Reddy College, Eluru, W.G.Dist.

P.Hari Krishnam Raju, Lecturer in Commerce, D.N.R.College(A), Bhimavaram,

Abstract: The geopolitics of energy in today's world principally revolves around oil and, to a lesser degree, gas, both of which are not merely trading but geopolitical commodities. Global energy geopolitics will be principally shaped by the 'arc of energy', stretching from the Gulf region to the Caspian Sea, through Siberia and the Arctic region to the Russian Far East, Alaska and Canada. It is in this region that nearly 80 percent of the world's oil and gas, including potential reserves, are located. Asian countries, having the world's most dynamic economies, and comprising half the world's population, will remain dependent on energy from this arc. They will also be the principal consumers of energy from this region in the coming decades. The already complex traditional geopolitics of this region, marked by myriad inter-state disputes and instability, have been immensely further complicated by energy geopolitics and created enormous tensions and potential deadly conflicts.

Key words: military power, people's welfare, global demand

Introduction:

Given the size of its reserves, the Persian Gulf region will remain critical to ensuring that there is sufficient production to meet the increasing global demand for oil, particularly for Asian countries. Asian countries cannot count much on Russia, the other large global oil producer, since the latter's priority market will be Europe, since it brings Russia both economic and geopolitical benefits. The geopolitics of gas are much more complicated than those of oil since multi-billion dollar gas pipelines or Liquefied Natural Gas trains tend to hardwire producers and consumers inflexibly, and the huge investments require many years to become profitable. At present, two-thirds of India's imported oil comes from the Gulf region and another 15 percent from Nigeria. In the foreseeable future, India will have to continue to rely largely on Gulf oil. Equity investments in oilfields abroad will have only a marginal impact on India's energy dependency on the Gulf. The presence of a large and prosperous Indian population in the Gulf region is an additional factor that makes this region important. India, thus, needs to give much greater attention to the Gulf countries in its foreign policy priorities

India must have a strategic understanding on energy with China too since both are major energy consumers seeking energy from the same sources and also because China also holds the key to finding a viable alternative energy transportation route from Eurasia to India that bypasses Afghanistan/Pakistan. In the new geo-political realities of the 21st century, bold and innovative, even visionary, approaches are needed in inter-state relations, including in the area of energy security. The fructification of such a

Eurasian energy blueprint offers the exciting prospect of transforming the Central Asian region into a strategic space uniting major Asian energy producers, consumers and transit countries in a web of interdependence. Instead of being the battlefield of a new 'Great Game', Central Asia could become the crossroads of a 21st century version of the traditional Silk Route, with gas and oil pipelines replacing caravan convoys. The Himalayas-Karakoram region could truly become a frontier zone of peace, friendship and development, rather than one of confrontation and conflict. A mega-project like this would also act as a huge stimulus for the global economy. Such a conceptual breakthrough would have far-reaching long-term consequences.

Role of South Asia

South Asia is a key region that will play an important part in the geopolitics of energy. Given its location and size, its economic and military strength and potential, and its position as a growing consumer of energy, India will be very much a part of global energy geopolitics in the coming years. If it is regarded as a responsible stakeholder and a reliable transit country, Pakistan can also become a critical player in global energy geopolitics and get many economic and political benefits. While currently self-sufficient in oil and gas, Southeast Asia may in future have to turn to the Gulf for its energy security. It also has to ensure that satisfactory security arrangements remain in place for transit of energy shipments through the waters of this region, especially the Malacca Straits, so that the major consumers of energy do not feel tempted to resort to unilateral measures or work out alternative transportation routes that bypass or divide the region.

Contemporary Geopolitics of Energy

In the modern era, the geopolitics of energy operate on similar principles, with the difference that, in today's interdependent world, the matrix is more complex and sophisticated. Most countries, the industrialized ones in particular, have become unprecedentedly energy-dependent not just for their continued prosperity but even for their very survival. Whenever a country that needs and consumes energy in large quantities has a shortfall of energy – and this includes almost all the major powers in the world today – its foreign policy priorities have to be geared in large part to ensuring that adequate, reliable and cheap imported energy is available to it easily and securely. Only then can that country sustain its economic growth and its society's lifestyle. A second, equally important, imperative is to ensure that sufficient energy is available for military purposes. The geopolitics of energy arise out of the fact that most of the world's principal energy producers are not its principal consumers. For the energy producing countries, energy is not only a source of enormous power and wealth; it also constitutes leverage, since energy is a strategic resource whose denial to any rival or enemy increases the latter's vulnerability. Energy can thus be used as a very effective weapon of war. Russia, for example, is successfully using energy as a very important geopolitical tool in its relations with the countries of its 'near abroad' as well as Europe.

The geopolitics of energy in today's world principally revolve around oil and, to a lesser degree, gas. The 20th century was truly the 'century of oil.' The extraordinary technological advancements, the transportation revolution that unified countries and regions and created an interdependent globalised economy, the agricultural revolution which freed up a huge labour force from the agricultural to the manufacturing and services sectors, the thriving of sustainable concentrated urban conglomerations, the lifestyle facilitated by the petrochemical industries, the ability to amass military power and project it across the oceans – all these developments that have made the 20th century unique would not have been possible without access to plentiful and cheap oil. Oil constitutes the critical energy source for today's industrialized economies as well as for the developing economies. Without oil, the world as we know it would not exist. Disruptions in production and supply could bring the industrialized economies to a grinding halt.

Gas, increasingly being used as a substitute for coal in power generation and for heating, and as a substitute for oil in the transportation sector, has of late acquired more salience in energy security. Nuclear energy is deeply mired in geopolitics, because the fuel and technology used to produce nuclear power can also produce nuclear weapons, which is why the global trade in nuclear materials and fuels is controlled by the cartel of the Nuclear Suppliers Group. Even though coal is and will remain for some time the most important fuel in the overall energy mix of most developing and industrialising economies, the geopolitics of coal is limited for a number of reasons: coal is so far available in adequate quantities within most countries that need it and international trading in coal is relatively restricted; the sheer bulk of coal creates some constraints in transportation in very large quantities; and environmental considerations have to be kept in mind in expanding the use of coal which leaves a dirty footprint on our planet's eco-system and climate. As for hydropower, its geopolitics is quite important, but strictly in a regional context, and that too only in some parts of the world like South Asia and Central Asia.

Oil in the 20th Century

When oil was discovered at the turn of the 20th century, it generated palpable excitement and hope. For the first six decades of the 20th century, oil was a commodity that was under the control of the West. Cheap oil was the foundation of the West's unprecedented economic growth and prosperity, and of its military strength. Western oil companies ("the Seven Sisters") controlled global oil production and trade. The world was shaken out of complacency by the first oil embargo in 1973 leading to oil prices rising to dizzy heights. A second oil crisis followed in 1979, after the fall of the Shah of Iran. But the world weathered these crises. The attempts by Organization of Petroleum Exporting Countries (OPEC) to manipulate oil prices have not been very successful. OPEC is often a divided house. Moreover, as oil is essentially fungible, though not fully so because different grades of oil require dedicated refineries, Saudi Arabia with its significant spare capacity could always increase its oil production at short notice and keep prices in check. In this way, prices never went out of reach and, therefore, remained a manageable concern.

Is the World Running Out of Oil?

Opinion is divided whether the world is running out of oil. There is some substance to the view that it is not. Statistics show that over the last two decades the world's proven reserves have risen by a little over 50 percent. Saudi Aramco, the world's largest oil company, has repeatedly dismissed fears that the world has reached the point of "peak oil." In assessing the availability of oil reserves, it feels that the world should consider not just conventional oil but all the liquid energy resources in place including condensates, natural gas liquids, tar sands, bitumen, extra heavy oil, oil shale, gas-to-liquids and even bio fuels, all of which would be economical to extract at the current high prices of oil and which can serve as substitutes for oil in many fields. By this calculation, the total in-place conventional oil is about 5.7 trillion barrels and the total in-place liquids about 13-16 trillion barrels, of which only 1.1 trillion barrels have been consumed so far. Moreover, it is true that large areas of the world remain unexplored for even conventional oil, possibly because it was not considered economical to risk huge sums of money in oil exploration when ample oil was more easily and cheaply available elsewhere. Similarly, the International Energy Agency's assessments may well be conditioned by the desire to reassure people in their member-countries that there is no threat to their established way of life, including the mantra of steady economic growth.

Role of Gulf Oil

It is estimated that global consumption of oil and other liquid fuels, which at present is about 85 million barrels per day, is expected to go up to 97 million barrels per day in 2015 and 117 million barrels per day in 2030. About three-fourths of this increase in demand will come from the developing countries, 45 percent from China and India alone. The Persian Gulf region will remain critical to ensuring that there is sufficient production to meet this increasing demand. The figures about Gulf oil speak for themselves: in 2006, this region held 743 billion barrels of oil (over 55 percent of global reserves, with 25 percent with Saudi Arabia alone), and produced 25.4 million barrels per day (more than 31 percent of global production). More important for the rest of the world is the fact that the region exported three-fourths of its production, amounting to more than 38 percent of global exports; that it has more than 80 percent of the world's excess production capacity; and that its R:P ratio is nearly 80 (against a world average of 40.5), which means that, at the current rate of production, the Gulf's reserves would last for about 80 years.

Nature of International Trade in Gas

In the 21st century, gas is slated to play only a marginally more important role in the overall energy mix but it has attracted attention since it is a 'clean' fuel and the global reserves are relatively unexploited (natural gas has a R:P ratio of 63.3 against oil's 40.5). As in the case of oil, more than 70 percent of the world's gas reserves are in the Gulf, Russia and Central Asia, with just three countries viz. Russia (26.3 percent), Iran (15.5 percent) and Qatar (14 percent) accounting for over 55 percent of proven global reserves. However, it is the OECD countries producing a little less than 38 percent of total global production that account for as much as half of global consumption, even though they have less than 15 percent of global gas reserves.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

India's Energy Challenges

Basic Parameters

India is today the world's fifth largest consumer of energy even though its current per capita consumption of energy is very low (490 kilogrammes of oil equivalent per capita, compared to a world average of 1780 kilogrammes). If its economic growth remains at the current high level of eight to nine percent per annum, it is likely to move up to third place by 2030. It is axiomatic that efficient and reliable energy supplies are a precondition for sustaining India's economic growth. Even if India's economic growth slows down to 5-6 percent per annum, its energy requirements will still increase sharply over the next 25 years. The Integrated Energy Policy report of the Indian Planning Commission, released in 2006, envisages that, by 2031-32, India's primary energy supply will increase at least treble, and demand for electricity increase by five to six times from 2003-04 levels.

Conclusion

Global energy geopolitics will be principally shaped by the 'arc of energy' stretching from the Gulf region to the Caspian Sea, through Siberia and the Arctic region to the Russian Far East, Alaska and Canada. It is in this region that nearly 80 percent of the world's oil and gas, including potential reserves, are located. Asian countries, having the world's most dynamic economies, and comprising half the world's population, will remain dependent on energy from this arc Southwest Asia, washed by the northern Indian Ocean and the Persian Gulf, and the adjoining landlocked Central Asia, has become the most militarized region in the world, much like Europe was during the Cold War era. Even though the United States, the world's largest consumer of energy, is following a conscious policy of reducing its energy reliance on Asia, it remains firmly entrenched at multiple locations on land and sea in the Eurasia-Indian Ocean region. Its traditional policy of dominating the Gulf, which is inextricably linked to energy geopolitics, remains in place. Unfortunately, this has given rise to many destabilizing tendencies with a global impact, such as terrorism and fundamentalism. The already complex traditional geopolitics of this region, marked by myriad inter-state disputes and instability, have been immensely further complicated by energy geopolitics and created enormous tensions and potential deadly conflicts.

References :

Data from WRI, 2011. "6 Graphs Explain the World's Top 10 Emitters," available at www.wri.org/blog/2014/11/6-graphsexplain-world%E2%80%99s-top-10-emitters

Data from US EIA. 2013. "India," available at http://www.eia.gov/countries/analysisbriefs/India/india.pdf.

Data from World Bank, 2014. "Access to electricity (% of population)," available at http://data.worldbank.org/indicator/EG.ELC.ACCS.ZS/countries.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

A case study of Atmospheric particulate matter over Eluru

Y.S.L.Vijaya bharathi[1], G. Aravind[2], P.Devipriya[3], S.Lakshmi prasanna[4]
[1]Department of chemistry, C.R.Reddy College of P.G.Courses, Eluru, Andhra Pradesh
[2,3]Department of botany, Andhra Loyola College, Vijayawada, Andhra Pradesh,
[4]Dept of zoology, Sri padmavathi mahilaviswavidyalayam, Tirupathi, Andhra Pradesh

Abstract:*Eluru, growing city near to Greater Vijayawada having both urban and rural cultures. Most of the part of air was adulterated because of using old vehicles, impure automobile fuels and lubricants. The quantity of PM_{10} particles (RSPM)& (TSPM) has been furnished in the data during the period of September – October in the year 2016. These were measured in the residential area (Fire station) of Eluru. The particulate matter are having less than or equal to 10µm size (PM_{10} particles) can settle in bronchi and leading to respiratory problems. Prolonged exposure to these particulate matter concentrations reduces the lifespan and cause pulmonary, lung cancer mortality.*

Keywords: *PM_{10} particulates, Respairable suspended particulate matter, Total suspended particulate matter, Lubricants.*

1.Introduction:

Now, Airpollutionisthemajorproblemeverywhere. Ambientatmosphericconditions are declined due to industrialization, usage of old vehicles (older vehicles do not have emission control technology)& adulterated fuels and lubricants, and also urbanization, Use of adulterated fuels, crowding at traffic, increase in vehicular transportation. In Eluru, the transportation includes two wheelers, three wheelers, four wheelers etc.., Most of the population of middle class and below middle class people were dependent on RTC (Road Transport Corporation). The fuel used in the RTC is CNG (Carbon nitrogen gas), where as in three wheelers and four wheelers the used fuel is diesel. It is estimated that the pollutants emitted from combustion diesel are 8.4µg/km.[1] Diesel is more harmful than CNG. The pollutants that are emitted from combustion of diesel are particulate matters. The atmospheric substance, not gaseous but like a droplets or solid particles or mixture of both simply known as particulates. [2] They results in asthma, also lead to problems in visibility and cause cancer. Due to small size of particulates they can easily enter the bronchi causing respiratory problems. It depends on their physicochemical properties. [3] They also effects lungs and tissues.[4] Particulates are nothing but diverse groups that contains carbon nuclei on to which various compounds are absorbed. Typical particulate includes coarse particles and fine particles. Where coarse particles are formed from road dust or during a construction and fine particles are formed due to burning of fuels. These are composed of carbonaceous materials and trace metal compounds. The studies of these pollutants were takes place under EPA (Environmental Protection Agency). [5]

Eluru, having tropical climate, and the temperature around 28.2°c, but it is 33.2°c during summer (May). It was located near the greater Vijayawada and NH5 is passing through the Eluru. Hence there is much scope for development of urban growth. Having high transportation and mixed life style of rural and urban is the main aspect of growth of the city which leads to pollution results to climatic changes. Most of the sources for transportation are three wheelers (auto), the fuel used in these vehicles is adulterated diesel. This leads to more emission of particulate matters in to air. Sulphur content in the diesel and lead contents, benzene levels in gasoline has remarkable effects on the particulate emissions. Heavy vehicles with large engines emits more pollutants than that of smaller vehicles. The main sources for the evolution of particulate matter from the construction, monuments, and cultural heritage sites.

Impact on environment:

Due to the emission of harmful pollutants environment will be effected badly. Flora, including plants, domesticated and wild animals will effect physically and chemically by air pollution. The dust particles that are settled on the leaves can disturb photosynthesis and sometimes pollination too. The plants should absorb the suspended pollutants from the air leads to hazardous effects.

The impact of transportation on environment can be reduced by routing traffic away from the population and reducing traffic congestion. Bypass roads and route widening are the best solution

Materials and methods:

Eluru, growing city, district head quarters of West Godavari, with amixedlifestyleofruraland urban cultureslocatedinAndhra Pradesh nearly 60km tothe greater Vijayawadahavingexcellenttransportation. The population of Eluru is 190,062(2001). The longitude of thiscityis16^{0} 42^{I} 0^{I} towards north and 81^{0} 6^{I} 0^{II} towards the east. Thepeaktemperatureshouldbe 33.2°c, normaltemperature should be seen as 28.2°c. The seasons observed in this climate were winter, summer, Monson.Due to rapid increase of population, there also greater increase in using of vehicles. Fire station, N.R.Pet the famous area in Eluru where the values of RSPM and TSPM in the air are observed. When compared to Vijayawada, Eluru has a bit of less traffic and National highway NH5 is passing through Eluru. Hence there will be gradual increase of transportation which leads to high levels of atmospheric pollutants.

Study sites:

Fire station, near to new bustand famous area in the Eluru selected for the present study. Due to increase of population transportation there is heavy traffic load includes number of two wheelers, three wheelers, four wheelers, RTC busses etc.., through the day. Hence the quantity of respirable suspended particulate matters and total suspended particulate matters are observed in this area. The objective of this study is monitoring the ambient atmospheric particulate matters in the selected area of Eluru.

Analysis: The particulate matter in the air was actually measured with the help of Respirable dust sampler (RDS) APM 460 and operated at an average flow rate of 1.0 to 1.5 m^3 min^{-1}. They were measured by using filter paper methods. However the data was collected from pollution control board, Eluru. The RSPM and TSPM values are calculated using following equations.

$$RSPM = \frac{W_2 - W_1 * 10^6}{V}$$

Where W_1 = weight of the paper before filtration
W_2 = weight of the paper after filtration
V = Total volume of the air taken for observation

$$Dust = \frac{W_2 - W_1 * 10^6}{V} \quad ug / m^3 \quad = NRSPM$$

TSPM = NRSPM +RSPM

3. Result and discussions:

The calculated RSPM and TSPM values were tabulated and mention in the tables for SeptemberandOctober. Thehighervalueseenduringthemonth of October. Fire station is a commercial area showing seasonal variations in atmospheric particulate matters. DuetothetemperaturevariationOctoberisshowing higher value of particulates than that of September.

The RSPM and TSPM values are tabulated as follows:

Table1. Air particulate matter quantities of monthofSeptember

	value of RSPM		value of TSPM	
	Day maximum	Day average	Day maximum	Day average
01.09.2016	74	64	178	97
03.09.2016	78	66	187	100
06.09.2016	72	63	173	95
08.09.2016	74	65	178	98
11.09.2016	76	65	182	99
16.09.2016	74	62	178	94
19.09.2016	70	64	168	96
22.09.2016	74	66	178	99
26.09.2016	72	65	173	97

Conclusion:

So, in this article it is observed that there is gradual increase from September to October. Highestvalueobserved in the month ofOctober. It may because of high temperatures, and there should be more use of electronic technology, leadstoincreaseof respirable suspended particulate matter in the air.

Table2. Air particulate matter quantities of monthOctober:

Sampling date	value of RSPM		value of TSPM	
	Day maximum	Day average	Day maximum	Day average
01.10.2016	88	71	211	109
03.10.2016	90	70	216	107
05.10.2016	92	72	221	110
07.10.2016	84	69	202	104
10.10.2016	86	71	206	108
16.10.2016	88	73	211	111
19.10.2016	90	73	216	112
22.10.2016	92	75	221	114
27.10.2016	94	79	226	119

References:

1. Watkins, L.H. 1991. Air pollution from road vehicles. Transport and Road Research Laboratory, London,U.K.

2. DevendraDohara, vijayantPanday "Monitoring of Ambient air quality in India – A Review " in international journal of Engineering sciences &research technology , Dohare, 3(12): December , 2014.

4. D S Khandbahale and R S Saler, "Ambient AirQuality Monitoring in Nashik city (Maharashtra,India)" in BionanoFrontier, Vol. 6 (2) July – December 2013.

5. PrakashMamta, Bassin J.K, "Analysis Of Ambient Air Quality Using Air Quality Index – A Case Study" in International Journal of Advanced Engineering Technology, IJAET/Vol.I/ Issue II/July-Sept.,2010/106-114.

3. AvnishChauhan, MayankPawar, Rajeev Kumar and P. C. Joshi, "Ambient Air Quality Status in Uttarakhand (India): A Case Study of Haridwar And Dehradun Using Air Quality Index" in Journal of American Science 2010;6(9)

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Sustainable development as a framework for developing country participation: International climate change

D.Saroja Babu, Research Scholar, Dept. of Social Work, Andhra University, Visakhapatnam-530 003

Abstract: *Climate change is increasingly recognized by countries and other stakeholders around the world as a long term common environmental problem that can only be addressed through global actions with wide participation. This is required in order to ensure stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system in accordance with Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC), (UN 1992). Such stabilization requires deep emission reductions, which can only be maintained if implemented by worldwide actions. This calls for the establishment of international framework conditions that are firm enough to facilitate climate change mitigation. These conditions also have to be attractive to a very diverse group of countries and stakeholders, given different development levels and very diverse economic, social, and environmental perspectives of climate change policies.*

Key words: *climate system, environmental perspectives, climate change policies*

Introduction:

The paper presents arguments and ideas on how future international climate change cooperation can be developed in a way where international framework conditions ensure that there is a worldwide incentive to participate, but wherein as much freedom and initiative as possible are given to countries and other stakeholders. The challenge is to create incentives that are strong enough to initiate that decision makers including business, households and governments take climate change mitigation into consideration in their routine decisions. International cooperation

in this way can be said to be established based on a strong element of bottom up initiatives. One of the most critical issues in developing climate policies with such a bottom up element is the design of appropriate international framework conditions that can facilitate climate benign actions by individual stakeholders. The term ''framework conditions'', in this context, should be understood in a broad way and can both include international agreements like the UNFCCC and the Kyoto Protocol, regional collaboration such as implemented in the European Union (EU), and national or state level regulations.

There are several rationales for talking about framework conditions in such a Broadway rather than only focusing on strict emission reduction targets in terms of an international agreement. First of all experiences with the ratification and implementation of the Kyoto Protocol demonstrate that it has not been possible to ensure ratification by all original signatures to the Protocol. Secondly, there has not yet been a lot of progress in ensuring a broad participation in future agreements about binding emission targets after 2012.

China and India. A number of recent policy experiences are assessed as a basis for discussing how future development based climate policy initiatives could make it attractive for these large developing countries to participate in international GHG emission reduction efforts.

The paper suggests a number of alternative policy mechanisms that can bring the large developing countries on board in international climate change cooperation, and the environmental integrity, effectiveness, and equity of these mechanisms are discussed in relation to various stakeholder perspectives.

International climate cooperation

Climate change is linked to general development issues in a much stronger way than many other international environmental problems implying that climate policies will have significant synergies and tradeoffs with other policy areas. Similarly, development policies have large side-impacts on climate change. Given the precedence of economic development goals in the political agenda of nations, the many development and climate linkages, imply that climate change needs to be addressed as part of a broader policy agenda.

The approach to international climate cooperation that is advocated in this paper is different from the conventional style of international climate negotiations that have been very focused on a climate centric agenda, aiming to get parties together in a general agreement about GHG emission reduction targets from a normative environmental perspective.

There are several difficulties in the establishment of international climate agreements based on such an environment-centric policy agenda. As just mentioned, climate change is not an isolated environmental problem, but is closely linked to more general development issues. Furthermore, climate policies can imply significant costs and benefits, and redistributions of these among stakeholders, within- and across generations. Such distributional issues can become very pertinent in negotiations about GHG emission reduction targets, since this implies a negotiation about the distribution of reduction costs. Quota allocations imply a complicated ex ante burden sharing at a point in time, where emission reduction costs as well as the benefits of avoided climate change are still very uncertain.

Emission reduction target

Any emission reduction target has a potential economic value, which critically depends on marginal emission reduction costs and rules governing international emission trading schemes and other flexibility mechanisms. Thus, distributing GHG emission reduction targets is akin to distributing current and future wealth. According to many modeling studies, cost effective global GHG emission reduction markets are likely to imply that a relatively large share of the reductions are traded, and this trade can be more or less beneficial to different buyers and sellers in different parts of the world (Halsnæs and Olhoff 2005). It is therefore not trivial to agree about the allocation of emission reduction targets (Ellerman and Decaux 1998; Weyant 1999; Lasky 2003).

1. An incentive for stakeholders to control GHG emissions needs to be

established. Myriad measures for creating incentives can be used including international agreements, national laws, voluntary agreements, and specific climate finance models.

2. GHG emission reductions have to be ''visible'' and measurable as a sort of tangible attribute to given activities, and this i.e. requires that there is an agreed standard for GHG emission measurements. The UNFCCC and the IntergovernmentPanel on Climate Change (IPCC) GHG inventory work and reporting systems provide a good basis for this.

It is worth recognizing in relation to item 1 that international agreements as well as national laws and voluntary actions that imply GHG emission reductions have to be based on some sort of perception about the value of avoiding negative climate change impacts. Since climate change impacts are very uncertain, and since various Governments and stakeholders will experience and perceive these differently; they are expected to have different mitigation policy ambitions. International GHGemission reduction targets as a consequence can tend to be the least common denominator for perceived climate risks implying rather small ambitions. (Mitig Adapt Strat Glob Change (2008) 13:105–130)

To avoid this, mitigation policies alternatively can be build around economic principles following the logic that countries engage based on willingness to accept as an insurance value against climate change. It can be expected to be easier for countries to agree on a reduction cost focused approach rather than on emission targets, since the uncertainties surrounding the benefits of emission reduction targets often are perceived as larger than the uncertainty of mitigation costs (IPCC 2002).Such an approach, however, will embody uncertainties regarding the actually achieved emission reduction efforts since these will depend on mitigation costs. The mitigation cost literature is very rich, but studies predominantly are scenario and modeling studies that in a theoretical way address the future. ImplementingGHG emission reductions in practice might result in different costs than the availablestimates and these can both be higher and lower than expected in ex ante based on cost calculations. Some of the major factors that can influence the implementation costs include technological change, efficiency of carbon markets, transaction costs, and the scope of carbon markets in terms of participants and geographical coverage.

The intensity is expected to be as low as 20% of its 1970 level in 2030. These decreasing energy intensities are a result of multiple factors including structural change in economic outputs towards less energy intensive sectors, and increasing efficiency of energy conversion. The decreasing energy/GDP intensity that is demonstrated for Brazil, China and India is offset by increasing CO2 intensity of energy consumption from 1970 to 2030 as shown. This carbonization tendency of energy supply predominantly is strong for India and Brazil, while a much slower growth is seen for China. The increasing CO2 intensity of energy consumption reflects that the introduction of more commercial energy forms in the countries to a large extent is expected to imply increased use of fossil fuels.

Adaptation and mitigation links:

Global climate policies have traditionally focused either on adaptation or on mitigation without considering potential links. However, integrated adaption and mitigation policies might be attractive for various reasons. Many climate policy options can both have significant impacts on adaptation and mitigations, and mitigation options can also be directly and indirectly influenced by climate change. It is also important to recognize that combining adaptation and mitigation perspectives might make it much more attractive to developing countries to participate in international climate cooperation (Muller 2002). There is a growing recognition that development through its common determinant of imitative and adaptive capacities can be a framework for integrated policies, and further development of these capacities can be an important element in meeting developing countries demand for supportive measures to adapt to climate change (Yohe and Moss 2000).

Biomass and land use policies have large synergies and substantial co-benefits for climate change mitigation and adaptation. In the forestry sector, opportunities for linking mitigation and adaptation exist in forestation and reforestation projects like commercial bio-energy, agro-forestry, forest protection and forest conservation through sustainable management of native forests (Masera et al. 2001). Numerous country specific case studies emphasise these options (Fearnside 2001; Ravindranath et al. 2001; Asquith et al. 2002). Projects that help contain deforestation and reduce frontier expansion can deliver mitigation benefits. In addition, they accrue developmental and adaptation benefits, such as from decreasing migration of young rural population to cities, protection of biodiversity and watershed and soil conservation.

Technological development and diffusion: Technologies used in production and consumption activities are among the key drivers of greenhouse gas emissions. Energy technologies, especially those on the supply-side, are long lived and interface with complex infrastructures. Transfer of efficient and cleaner technologies to developing countries will enlarge choices and produce cross-enhancements which can deliver significant positive spillovers for climate change.

environment and mechanisms for technology transfer. New technology transitions imply social transformations and capacity of people and organizations to continuously adapt to changing circumstances and to acquire new skills. Governments can create enabling environments through myriad measures like well-enforced regulations, taxes and standards and removal of subsidies. Other measures include reforming legal system to reduce regulatory risk, protecting intellectual

Property rights, encouraging financial reforms, competitive and opening of national capital markets and international capital flows that support Foreign Direct Investment (FDI). A number of mechanisms for technology transfer exist such as the National System of Innovations, Overseas Development Assistance, and the Global Environmental Facility (GEF), multilateral banks, Kyoto Protocol Mechanisms and other bilateral and multi-lateral initiatives.

(Mitig Adapt Strat Glob Change (2008) 13:105–130)

A number of OECD countries and international organizations are actively involved in a discussion about mainstreaming of climate change into development policies. Climate change vulnerability and adaptation have been the starting point of the efforts and one of the early activities was the establishment of an interagency initiative in involving agencies like UNDP, UNEP, FAO, World Bank, Asian Development Bank, African Development Bank, OECD, EU, and the German and UK governments.

The agencies have worked collaboratively on a mainstreaming report entitled 'Poverty and Climate Change: Reducing the Vulnerability of the Poor through Adaptation' (ADB et al. 2003). The report includes a general conceptual discussion about linkages between poverty and climate change vulnerability, which illustrate the many specific ways in which climate change issues are embedded in development pathways like discussed previously in the paper.

It is also important that a number of overseas development assistance programmes (ODA's) considers implementing mainstreaming of climate change into development assistance. Some countries including the UK, Germany and Denmark currently are in the process of developing specific guidelines for their development

Programmes (Danida 2005) Also the OECD has developed official guidelines for how climate change risks should be taken into consideration in development cooperation

Conclusion:

A number of EU countries have actively promoted the establishment of an international agreement or some other cooperation mechanism that is to be targeted towards renewable energy technology implementation. One of the rationales for this has been renewable energy's contribution to GHG emission reductions. It was proposed in the World Summit on Sustainable Development (WSSD) in Johannesburg, 2002 to adopt a specific target for renewable energy shares for countries, but the target was not adopted. However, a number of follow up activities,

Including the Bonn Renewable 2004 Action Programme, include specific proposals for how renewable energy targets and other goals like GHG emission reduction can be combined (DEA 2004). The Bonn action program includes targets for a doubling of the global installed renewable energy capacity, a target for investments, CO2 emission reductions of 1.2 bill tons carbon per year in 2015, targets for donor finance, and for access to electricity in rural areas with the aim that up to one billion people can be given access to energy services from renewable energy by 2015 compared to about 50 million today.

References:

1. Mitig Adapt Strat Glob Change (2008) 13:105–130
2. Mitig Adapt Strat Glob Change (2008) 13:105–130 125
3. Yohe and Moss 2000
4. Masera et al. 2001
5. Danida 2005
6. UN 1992

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Energy and sustainable development for India

Dr. D.Srinivas, Lecturer in commerce, MVN JS& RVR College, Malikipuram, EG Dt, A.P

Abstract: *India as well as the world is watching the need for India's energy and associated greenhouse gas emissions. This Editorial Introduction provides a very brief summary of the most recently available energy and emissions data, outlines the structure of the issue, fills some information gaps, and offers brief comments for some sustainable paths to the future. I discussed measures for reducing energy consumption use of fossil fuels, and renewable energy emplacement, will also reduce GHG(Greenhouse Gas) emissions. This Introduction provides a very brief summary of the most recently available energy and emissions data, outlines the structure of the topic, fills some information gaps, and offers brief comments for some sustainable paths to the future.*

Keywords: *emissions, available energy, Nuclear power*

Introduction:

It is necessary to have a broad picture of current developments in India to appreciate the articles of Issue in qualitative and quantitative terms as well as in comparative terms with other countries and the world as whole. India, at 1.17 billion people, is the second most populated country in the world and is home to 17% of the world population. Its primary energy consumption (in 2007) was 18.65 EJ, 3.75% of the entire world. It amounts to 15.9 BJ/person-year. With a world average consumption of 72.4 BJ/person-year, China's of 56.2 BJ/person- year, Europe's of 146.2 BJ/person-year, and U.S. of 355.5 BJ/person- year, and with India's strong GDP (Gross Domestic Product) growth of about 9% (2007, expected to drop somewhat due to the current worldwide economic turndown) and a relatively high population growth of 1.55% (compared with 0.65% for China, 0.97% for the U.S., 0.11% for the European Union, and 1.17% for the world, all 2009 estimates), it is obvious that significant growth is expected as the people of India increase in number and strive to improve their standard of living. The fractions of the energy resources supplying the primary energy demand . More than half is met by coal, 10% of which is imported. It is also noteworthy that much animal power is used (according to some: estimates 12,000 MW, or about 8% of the installed electric capacity but the share of animal power and non-commercial biomass is dropping every year due to economic progress. Nuclear power generation in India is not addressed in the SI in detail, and a few very brief comments about this important subject follow.

India generates only 2.5% of its electricity from nuclear power, but 6 new reactors are under construction (second only to the Russian Federation, and there are plans to increase this fraction, especially encouraged by the signing in 2008 of the India-U.S. nuclear agreement, in which the ban on nuclear technology and fuel trading with India was lifted. It was initially proposed to allow India to add 25,000 MWe of nuclear power capacity (about 16% of India's current electricity production) through foreign fuels and technology. While nuclear power use reduces CO_2 (carbon dioxide) emissions, the problems of waste storage, proliferation risk, and to some extent safety, that have arrested nuclear power growth in many countries, remain largely unresolved so far. In 2008 India's per capita GDP (PPP (purchasing power parity) $ of the year 2000) was $2800, with annual growth rate of 3.7%. To avoid confusion it is noted that the overall real GDP (not PPP nor per capita) growth was 9% in 2007.

Energy intensity

The energy intensity, in 2007, in MJ per PPP $ of the year 2000, of India was 7.9, as compared for example with that of 13.8 of China, 6.9 of Europe, and 9.3 of the U.S. There is always room for improvement, but it also depends on the choice of economic products: financial activities such as banking, or computing and software development, have a very low energy intensity, while manufacturing products such as aluminum, steel, glass, plastics and paper have a very large one. India continuously faces severe electricity shortages, which are estimated by the government to be eliminated by adding about 63% generation capacity by the year 2012. It is noteworthy that transmission losses are very high, approaching 40% in part due to grid problems and in part due to illegal unpaid use. Despite a recent drop in economic growth rate, India's energy demand continues to increase. Energy demand in the transport sector is expected to be particularly high, as vehicle ownership is increasing rapidly.

Greenhouse gas emissions To consider one environmental impact criterion into account, energy-related CO_2 emissions (2006) for India were 1300 million metric tons (4.4% of the world total), i.e. 1.16 metric tons per capita. In comparison, those for China were 6012 million metric tons (4.58 metric tons per capita), OECD (Organization for Economic Co-operation and Development) Europe 4429million metric tons (8.2 metric tons per capita), and the U.S. 5900 million metric tons (19.57 metric tons per capita). Based on PPPGDP, the CO_2 emissions are 0.34 metric tons per thousand PPP $ of the year 2005, as compared with 0.65 for China, w0.33 for OECD Europe, and 0.51 for the U.S. This is relatively not bad for India as a country that primarily uses coal.

Greenhouse gas emissions: To consider one environmental impact criterion into account, energy-related CO_2 emissions (2006) for India were 1300 million metric tons (4.4% of the world total), i.e. 1.16 metric tons per capita. In comparison, those for China were 6012 million metric tons (4.58 metric tons per capita), OECD (Organization for Economic Co-operation and Development) Europe 4429million metric tons (8.2 metric tons per capita), and the U.S. 5900 million metric tons (19.57 metric tons per capita). Based on PPPGDP, the CO_2 emissions are 0.34 metric tons per thousand PPP $ of the year 2005, as compared with 0.65 for China, w0.33 for OECD Europe, and 0.51 for the

U.S. This is relatively not bad for India as a country that primarily uses coal.

Fuel switching and new technologies Substitution of other oil and natural gas for coal would significantly reduce CO 2 emissions but is not likely to increase much because of the scarcity of these fuels and the abundance of coal. Most of the natural gas is imported, with increasing priority for fertilizer production and other chemical processes, and not power generation. At the same time, development of advanced technologies for the conversion of coal to oil, and especially to synthetic gas, as well as new power generation systems such as the IGCC (integrated gasification combined power cycles) could help in this direction.

Renewable energy :Opportunities for lowering the CO2 emissions to PPP GDP $ ratio obviously help in reducing emissions and/or increasing the PPP GDP. Increased use of renewable energies will enable the former, traditionally by use of hydropower and biomass that together already supply about 7% of the total energy demand, and more recently by the rapid increase in use of wind power (mostly motivated by tax benefits) that brought its installed peak capacity to about 6000 MWe. While about 1.65 million m 2 of water heating solar collectors are installed in India, it is a minute fraction of both the potential and the overall energy consumption. A growing but miniscule amount of electric power is generated by photovoltaic devices. Both wind and solar power generation are at least two orders of magnitude below potential, thus allowing large expansion if the economics permit. A critical need for the increased use of inherently intermit- tent renewable sources of energy such as wind and solar, for electricity generation, is the availability of an extensive and smart electricity distribution grid. Large expansion of the use of biomass and hydropower, by perhaps more than an order of magnitude for the former and three-fold for the latter is feasible based on resource avail- ability, but sustainability has to be proven.

Energy, economics, and efficiency: The prevailing opinion among researchers is that a relationship exists between economic growth and energy consumption, but the direction of the causation of these relationships, i.e. whether increase in energy consumption drives GDP growth or the other way around, or both, is not always clear and varies for different countries . Denmark for example has demonstrated that wise energy and economy management resulted in the doubling of the GDP over the 35-year period between 1972 and 2006, without change in energy consumption and with a 10% population growth during the same period. While the circum- stances for Denmark and India are very different, it would be unwise to presume in planning that growth of GDP automatically requires a commensurate growth of energy consumption.

All the above-discussed measures for reducing energy consumption use of fossil fuels, and renewable energy employment, will also reduce GHG emissions. Reasonable cost technology is also available for carbon capture when fossil fuels are used in power generation, yet practicality of technologies for sequestration of the captured carbon is still very uncertain. If and when sequestration become practical it may be economically wise to attempt to cluster large coal power generation plants at a relatively short distance

We also note that countries with a large agriculture (India ranks second in the world in agricultural production) also have large associated emissions of GHG, such as methane and N 2O. These amount to about 37% of India's total GHG emissions albeit for 1994), and we remark that some fraction of that is energy related due to the large use of animal power. Important measures must be taken to reduce these emissions too, and reasonable methods are available.

Energy conversion and use are associated with major environ- mental, economical and social impacts, and all large energy projects should therefore be designed and implemented sustain- ably. Sustainability is only emerging as a science, and thus must be developed and applied urgently to provide analysis and evaluation tools.

Sustainable development is founded on the three pillars of economic, environmental and social impacts. While the first two pillars are discussed in the topic more extensively, it is very important to address the social pillar, without which sustainable development cannot succeed. "Thus, there is a great need for moving towards a philosophy of "planning with people" that empowers project-affected people and allows them to influence decision-making, rather than "planning of people" or "planning for people".

References

1 U.S. Department of Energy, Energy Information Administration. India energy profile http://tonto.eia.doe.gov/country/country

2 International Energy Agency. Key world energy statistics http://www.iea.org/textbase/

3 India Environmental Portal. Animal power, http://www.indiaenvironmentportal.org.in/node/3361.

4 U.S. Department of Energy, Energy Information Administration. U.S. emissions. Report #: DOE/EIA-0383

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Non-Conventional energy Position in India: an overview

Srit. Tirupati Naidu, Lecturer in Economics, MR College (A), Vizianagaram.

Abstract: *The problem of energy has attracted the attention of scholars, researches and economists world over. In fact, as early as in 1865 W.S. Jevons, has written extensively, on the coal question. However, the problem of energy caught the world attention in 1973 due to Arab oil crisis. Since then several studies were conducted with regard to energy. The source of Energy is broadly classified into two categories, viz., conventional and non-conventional Energy Sources. Conventional energy includes both commercial energy and non-commercial energy. Major sources of commercial energy are coal and lignite, oil and gas, hydroelectric resource and uranium. Non-commercial energy sources of energy consist of firewood, vegetable waste and dried dung. These sources are called non-commercial sources, as they are supposed to be free and command no price with this view "the government of India set up DNES.*

Key words: *Conventional Energy, electricity generation, capacity*

Introduction

The present installed electricity generation capacity in Atomic Energy Sector in 4,560 MW. Total electricity generated in this sector was 36.1 Billion KWh in 2014-15. The problem of energy has attracted the attention of scholars, researches and economists world over. in fact, as early as in 1865 W.S. Jevons, has written extensively, on the coal question. However, the problem of energy caught the world attention in 1973 due to Arab oil crisis. Since then several studies were conducted with regard to energy. The source of Energy is broadly classified into two categories, viz., conventional and non-conventional energy sources.

Conventional energy includes both commercial energy and non-commercial energy. Major sources of commercial energy are coal and lignite, oil and gas, hydro electric resource and uranium. Non- conventional energy generally takes the form of solar energy, wind energy and tidal power. Solar energy potential is almost unlimited in a tropical countries like India. Similarly, wind energy is available in abundance, especially in coastal areas and in hilly regions. But both solar energy and wind energy are not so far utilized especially in developing countries due to lack of cost effective technologies. However, conventional sources of energy, non-conventional energy use is on the rise world over.

Energy sources are also classified as Renewable and Non-renewable energy. Fire wood, animal dung, agricultural wastes, animals' energy, human energy etc., are renewable in nature and are still in use even today. However, their use vary from region to region and from village to village depending on various factors. Firewood though considered as a renewable source is becoming scarce day by day due to deforestation. As a result bio-gas is considered as an important solution to the present energy crisis especially in rural areas. Besides being an important domestic energy source for cooking, it is also considered as important sources such as coal, oil, gas, etc., are fast depleting and are causing concern world over in recent years.

Energy plays a significant role in economic development of a country. Its role is increasing over the years in the Agricultural Industrial, Transport and Communications and the household sectors of the economy. In fact, per capita consumption of energy is deemed as one of the indicators, of the state of economic development of nation. It is also observed that there is a positive relationship between per capita consumption of electricity and per capita G N P of different countries.[1.]

Source of energy

Broadly there are two important categories of sources of energy (1) Renewable sources of energy viz., bio-gas, bio-mass, wind power, solar power, tidal power and geothermal energy. (2) Non-renewable sources of energy viz., coal, petroleum, hydro power and nuclear power

Non-conventional energy:

Renewable sources of energy also called as non-conventional sources of energy, have played a little role in the overall commercial energy production till recently. At the federal level, India has implemented two major renewable energy-related policies: the Strategic Plan for New and Renewable Energy, which provides a broad framework, and the National Solar Mission, which sets capacity targets for renewables. The original Solar Mission includes the following targets for 2017: 27.3 GW wind, 4 GW solar, GW biomass and 5 GW other renewables. For 2022, these targets increase to: 20 GW solar, 7.3 GW biomass and 6.6 GW other renewables. SOLAR In November 2014, the Indian government announced that it would increase the solar ambition of its National Solar Mission to 100 GW installed capacity by 2022, a five-time increase and over 30 times more solar than it currently has installed. To this end, the government also announced its intention to bring solar power to every home by 2019 and invested in 25 solar parks, which have the potential to increase India's total installed solar capacity almost tenfold.

Wind:

The Twelfth Five Year Plan proposes a National Wind Energy Mission, similar to the National Solar Mission, and the Indian government recently announced plans to boost wind energy production to 50,000 to 60,000 MW by 2022. It is also planning to promote an offshore wind energy market.

Coal: A tax on coal has raised $2.85 billion for India's clean energy fund. The tax rose in July 2014 from Rs. 50 ($.80) to Rs. 100 ($1.60) per ton, and doubled again in March 2015 to Rs 200 ($3.20) per ton.

Energy efficiency and conservation:

India's National Mission for Enhanced Energy Efficiency8 implements the Perform, Achieve and Trade (PAT) Mechanism, covering the country's largest industrial and power generation facilities.9 PAT covers more than 50 per cent of fossil fuel use and set a target to reduce energy consumption at participating facilities 4-5 per cent in 2015 compared to 2010 levels. India has a vast potential of Renewable Energy sources. However, efforts to harness the renewable sources of energy were only launched only launched only in 1980's. The Indian Renewable Energy Development Agency Limited (IREDA) was established in march, 1987 as a public sector enterprise for the promotion, development and Financing of New And Renewable Source Of Energy, (NRSE) technologies. The investment on renewable source of energy, though negligible during the sixth and seventh five year plans gained momentum from eighth plan onwards. In the year 1995-96 IREDA sanctioned loan assistance of Rs.602.22 crores. A sizable industrial base was been created in the country in various renewable energy technologies such as solar, thermal solar photovoltaic, wind, small hydro, biomass, etc. an aggregate capacity of about 900MW has been installed already based on these technologies was Established. Further, estimates of potential energy availability suggest enormous room for growth upto 20,000 MW from wind energy, 17,000mw from biomass and 10,000 mw from mini-micro hydro projects in India. Ocean thermal, sewage and tidal power have a potential of another 79,000mw. The target from various renewable energy sources has been increased to 175 GW by the year 2022.

Conclusion

In order to harness renewable energy, the Ministry of Non-conventional Energy chalked out a programme for a fourfold increase in power generation from Renewable Energy sources by the end of the eighth plan period. The " strategy action plan " prepared by the ministry has hiked the target of power generation from 600mw as envisaged by the eighth plan to 2000mw. The ministry has also sought to achieve this by providing incentives to attract large scale private investment in this sector. A part from an upward revision in targets of power generation from well known renewable energy sources, there are also untapped sources. The strategy and action plan envisages increase of power through renewable sources. Further power generation from wind, cartel based small hydro power projects and biomass co-generation was also encourages in the eighth five year plan. The present installed electricity generation capacity in atomic energy sector in 4,560 MW. Total electricity generated in this sector was 36.1 billion KWh in 2014-15.

Reference.

1) Bhagat RP (1996) : Rural Electrification and Development, Deep & Deep Publications, New Delhi.
2) Government of India economic survey, (1996-97).
3) Kurukshetra October, 2005.
4) CMIE India's energy sector, September, 1996.
5) Bhagat R.P. Rural Electrification and Development, Deep & Deep Publications, New Delhi,Page No.86.
6) Ruddar dutt & KPM Sundaram, 'Indian Economy, 70th revised two colour edition (2015), S. Chand & Co. Ltd., Ram Nagar, New Delhi.
7) Government of India, Economic Survey 2015-16.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Enhancing life skills of worker to create an effective work environment in the organizations- An approach

Ch.Lakshmi Narasamma, Former Faculty Dept. of Psychology, D.N.R. College of Education, Bhimavaram.
Dr.K.Kiran Kumar Varma, Asst. Professor, .R.K.R. Engineering College, Bhimavaram

Abstract: *Training in life skills and dynamic work event turn every worker as a responsible, independent and dedicated to realize the goals of any organization. World Health Organization **(WHO)** identified 10 life skills that are Self Awareness, Critical Thinking Skills, Problem Solving Skills, Inter personal relations sills, Coping up with stress, Empathy, Coping up with Emotions, Effective Communication Skills, Decision Making Skills, Creative Thinking Skills of human beings. They are previously concerned as hereditary components but formed to be socially learned during the interpersonal, social situations. So can be enhanced by giving appropriate training.*
Key words: *Communication Skills, executing programs, human behaviour*

Introduction

It is easy to control the material factors involved in a phenomena where as it is impossible to estimate the human behaviour to a required scope of influence. It is the major factor that decides the extent of success in implementing and executing programs. Inspire of this complexity and fluctuations in the thinking actions of human behaviour. The branch of knowledge called the psychology try its best to observe, measure, control and predict human behaviour in the scientific ways. This endless effort starts to show its results in the field of medicine, industries, military services.

The present article is an attempt to bring the fruitful results of researchers done by Holland, an eminent military psychologist who postulates a theory called, " The theory of Careers" which states that the personality of the employees and characteristics of their work environment are similar as mirror images. The mindset of the like minded workers create a clone like work environment in their surroundings. He and his associates formed six types of work environment that prevails in the organisations.

The World Health Organisation until the recent past has given importance to the medical related programs to crate healthy society. But WHO it realised the concept of Mental Health as a major factor in creating a peaceful, harmonies and prosperous society, It expands its research to the psychological aspects of human beings. WHO identified 10 life skills that are Self Awareness, Critical Thinking Skills, Problem Solving Skills, Inter personal relations sills, Coping up with stress, Empathy, Coping up with Emotions, Effective Communication Skills, Decision Making Skills, Creative Thinking Skills of human beings. They are previously concerned as hereditary components but formed to be socially learned during the interpersonal, social situations. So can be enhanced by giving appropriate training.

The present article tries to create an awareness to the enterprenure to establish a work environment of his choice by sharpening the 10 life skills of his employee. Now we can go through the list of 6 work environments identified by Holland and 10 life skills by WHO to create a work environment of required characteristics.

1. Realistic Environment:

This environment is the one that encourages and rewards success in the use of one's hands and in the manipulation of things. It is a world of concrete and predictable which rewards with values, money, possessions and power.

This environment can be created by people with the life skills of self-awareness which reflects by possessing a sense of being aware of their personal assets and liabilities, where they are good at and bad at besides the level of aspiration. So ends in success by having self-control and emotional intelligence. Decision making in selection are among a wide number of available solutions by following realistic, practical at the same time not violating the prescribed rules and regulations. This is the primary skill needed in the realistic environment it is also influenced by the interpersonal relationship skills to create an environment of achievement.

2. Investigative Environment:

It is the environment which encourages and reward success in the use of intellect and in the manipulation of abstract. It is a world of observing, investigative and theorising, and its values and rewards with status and recognition.

This environment needs primarily the life skills as critical thinking which go through every minor details of any activity. The creativity in another life skills which results in producing a new solution to a existing problem and adding new features to a existing situation by expanding its field of influence. Problem solving is the skill used in overcoming hurdles raised in the process of progression.

3. Artistic environment:

It is one encourages and reward success and creative values. It is a world of the abstract, aesthetic and original. It rewards with recognition and increasing freedom to create in one's way.

This is full of freedom and an atmosphere of harmonious relationships. When a person brings his innersole into ventilation he became an artist himself and able to go into the true nature and facts involved in the elements around him. Those who have empathy will feel every aspects of the events as his own. He should also have flexibility, fluency, perceiving similarities and commonalities in different situations and able to estimate their consequences (creative thinking)

4. Social Environment:

This is an environment that encourages and rewards success in sociability and helping values and tends to promote social activities. The needed life skills of this environment are effective communications interpersonal skills.

The analytical and synthetic skills in using a piece of information and expressive skills in form of verbal and non-verbal, patient listening ability, to react in a spur of moment and interpersonal relationship skills were exhibited by tolerance, positive, attitude, reciprocity, lack of prejudices and stereo types and not going into the personal space of the members of the group. It needs recognition and approval from other people along with the above said life skills the self-awareness of the individual is important as many of the conflicts arise due to overestimating once own abilities and under estimating others capabilities.

5. Enterprising environment:

It rewards risk taking, intensive and innovative activities and values. It is a world invites new challenges to overcome, rewards status and money. This environment needs problem solving and decision making and empathetic life skills. An enterprise is not built solely by individuals but by people who work like an internet of abilities, efforts in interpersonal and communication skills.

6. Conventional environment:

This environment needs the life skill as critical thinking which helps in effective management of the available data. If found to missed any important aspects then the problem solving skills help in bringing an immediate solution to the problem and this environment creates a need called self-esteem which can be easily achieved by the self-awareness skills. So by detailed analysis of 6 models of work environment according to career theory and the 10 life skills recognised as very essential ingredients in the personality of the individual by the World Health Organisation. We can come into conclusion that we can create a work environment of our choices by keeping groups of likeminded people. This can be achieved by continuous training in the required life skill. To bring the fullest out of the individuals the physical and psychological needs of the worker should be taken seriously. The recent findings in the field of social psychology reveals a fact that if we want to increase the self-esteem of a person the best option is promoting the self-esteem of the group in which a person is a member.

The success of any enterprise is not depends on material resources or technological aspects or political support. But simply the personality dimensions of the group of workers who create the work environment. The recent trends in the field of business bring CEO's who are fresh university graduates without a penny in their pockets but full of creative ideas in their mind. They are doing miracles because they are dealing very carefully with the psychological aspects of their workers in tapping their abilities. Recognizing and honoring the individual and the group brings tremendous positive changes in the attitude of the people related to the organization.

Conclusion

According to Abraham Marlow a social psychologist postulates a theory of needs which says that if lower order needs like basic safety and belonging need get satisfies then man creates higher and higher esteem needs like self-esteem and self-actualization. So training in life skills and dynamic work event turn every worker as a responsible, independent and dedicated to realize the goals of any organization.

References

Krenke et al. (2001). Coping with school-related stress and family stress in healthy and clinically referred adolescents. Journal European Psychologist Issue, 6, 123-132.

Kristenson M, Eriksen HR., Sluiter J.K., Starke D., Ursin H (2004). Psychobiological mechanisms of socioeconomic differences in health. Soc Sci Med, 58, 1511–1522.

Mary, S., & Christyn, D. (2008). Evolution of a resilience intervention to enhance coping strategies and productive factors and decrease symptomatology. Journal of American College Health, 56, 445-453.

Megumi, S., & Katsuyuki, Y. (2007). Stress coping and the adjustment process among university freshman. Counselling Psychology Quarterly, 20, 51-67

Pardini, D., Lochman, J., & Wells, K. (2004). Negative emotions and alcohol use initiation in high-risk boys: The moderating effect of good inhibitory control. Journal of Abnormal Child Psychology, 32, 505–518.

Pierceall, E.A. & Keim, M.C. (2007). Stress and coping strategies among community college students. Community College Journal of Research and Practice, 31, 703-712. [17] Robotham, D. & Julian, C. (2006). Stress and higher education

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Energy Security and Sustainable Development

Satyanarayana Kanakala , Asst. Prof., Pydah PG College , Visakhapatnam

Swati Rani and Pooja kumari, M.Com Students, Pydah PG College. Visakhapatnam

Abstract:
India is the world's third largest producer of coal and its third biggest importer of coal. Our nation's development, growth, employment and poverty alleviation depends basically on the energy use, its availability and affordability. Many of the economic activities at the households, firms, factories, offices, business places, transportation and construction etc need energy. About two decades back, we had a slogan "Power for all" now " Power for all 24X7" and will transform to quality power and on to green power. The government is expected to provide not only the basic freedoms enshrined in our Constitution, but also the basic Right to clean air and water. Most of the energy projects are capital intensive and long gestation period, financial pay back periods. However the Eco friendly and renewable solar energy in recent years became cost effective and fall in prices. It is the right time to promote renewable energy and discourage non- renewable. Keeping in view our projected GDP growth rate around 7.5%, it is necessary, more new renewable energy projects in to the pipe line to meet the energy challenges to achieve economic challenges. In this paper the writers wish to correlate the usage of renewable and non- renewable energy source taking the secondary data and suggest a careful planning is required to direct investments to appropriate sectors of the economy.

Key words: Energy Security, energy consumption, GDP growth

Introduction: Energy use, its availability and affordability in continue to the crucial ingredient development growth and employment and poverty elevation. India is, slowly and study gaining importance in the world energy scenario. Total energy use expanded in the past 50 years with a shift from noncommercial energy to commercial energy sources. The trends in production of commercial energy in the past five decades indicate coal as the most abundant among all commercial energy sources. The petroleum and natural gas sector also seen significant in domestic production and supply.

Energy Security: Energy is the prime mover of a country's economic growth. Availability of energy with required quality of supply is not only key to sustainable development, but the commercial energy also have a parallel impact and influence on the quality of service in the fields of education, health and, in fact, even food security. In the last decade India has been one of the most developing countries of the world with an average GDP growth of around 6% and around 8% in last couple of years. With the growing GDP of 8%, India is moving parallel to China in terms of development, but the energy consumption is catching up as well. But the country is finding it increasingly difficult to source all the oil, natural gas, and electricity it needs to run its booming factories, fuel its cars, and light up its homes.

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

According to a report by IEA (International Energy Agency), India needs to invest a total of 800 billion dollars in various stages by 2030 to meet its energy demand. India accounts to around 2.4% of the annual world energy production, but on the other hand consumes 3.3% of the annual world energy supply. And this imbalance is estimated to surpass Japan and Russia by 2030 placing India into the third position in terms of annual energy consumption. According to Integrated Energy Policy, for a 9% growth over a sustained period, imports of crude oil in 2031-32 may be between 362-520 million tonnes with import dependence of 91%-94%. For natural gas, it may be 25-135 (Mtoe), which means an import dependence of 20%-57% of supply. Coal imports may be between 300- 736 (Mtoe), which may be an import dependence of 34%-57%. Total import dependence may be 58%-67%, as against the current level of 25%, with imports estimated at the higher end at 1,382 (Mtoe) and total energy consumption at 2,077 (Mtoe).

Around 23 % of rural India continues to use Traditional Fuels such as firewood's, Crop residue and dung cakes. These too have environmental and health concerns as their combustion releases poisonous gasses. It also brings hardship on rural women and girls as they spend substantial time on collecting this fuel. In recent years decentralized clean energy sources have increased and Use of portable solar cookers is catching up. This is important part of government agenda of 'Inclusive and Sustainable development'. India's domestic renewable power generation base is expanding rapidly on the back of various incentives such concessional loans, Tax holidays, 100 % depreciation allowance etc. Govt. has also allowed 100% FDI in renewable energy and there is interaction of government in this field with about 22 countries. As a result sector is growing at 20% from last 5 years.

Wind energy is dominant source, followed by bio-power, small hydro and solar energy 12th plan envisages development in following manner (this data is for Grid Interactive power generation)-
Wind energy – 15000 MW
Solar Energy (both photovoltaic & Thermal) – 10000 MW
Bio energy – 500 MW
Small Hydro – 2100 MW
Baggase Cogeneration – 1400 MW Total target from renewable sources is 55000 MW (total target of 318000 MW)

It takes 4 to 5 years for a coal thermal project to fructify, unless it is held up. It would take 8 to 10 years for a large hydro project to be commissioned. It is necessary to have a large shelf of projects in the pipeline, if future capacity addition has to be smooth, keeping in view our projected GDP growth rate of around 8 per cent. It is estimated that at present, a total of 65,185 MW thermal and hydro projects are under construction, out of which hydro projects are 9,289 MW. Projects having a capacity of 30, 070 MW are held up for various reasons.

Variability Problem of renewable energy:
As we know weather is variable and so is sunlight and wind. Wind is not present at all times, even if present doesn't blow at same speed and direction. This will result in variation in speed of wind mills, in turn of Turbines. Same is true for solar plants as sunrays vary throughout day in in intensity depending upon time of the day and clouds in the sky. This results in fluctuating voltage. When proportion of

this variable power is high as to total power on grid, then wastage, in efficiency and losses increase. To remedy this problem Smart Grids are required which are capable of self-adjustments

Table-1 Capacity addition: Performance overview during eighth to twelfth Plan

	During VIII[th] Plan (5 yrs)	During IX[th] Plan (5 yrs)	During X[th] Plan (5 yrs)	During XI[th] Plan (5 yrs)	During XII[th] Plan (4 yrs)
Central	7,717	3,624	11,085	14,340	15,142
State	6,835	9,450	6,245	16,732	19,291
Private	1,431	5,061	2,670	23,012	49,558
	15,983	**18,135**	**20,000**	**54,084**	**83,991**
Thermal	13,555	13,597	12,114	48,540	80,180
Hydro	2,428	4,538	7,886	5,544	3,811
Cumm. (Th + Hyd)	**15,983**	**18,135**	**20,000**	**54,084**	**83,991**

Source: MoP

Measuring in Economic way of Sustainability: In economic parlance SD requires maintenance of intergenerational wellbeing that is to ensure that total well-being of the future generations of individuals do not decline over time. In other words, SD ensures that the future generations of individuals are at least at the same level of welfare as enjoyed by today's generation. Hence, intergenerational equity in welfare of the future generations lies at the heart of sustainable development. However, a no declining well-being across generations is sufficient to ensure that sustainability is achieved, but it is not a necessary condition. To determine the necessary condition it is important to understand the relation between the actions of the present generation and its far reaching, potential consequences felt over multiple generations.

The conducive policies initiated by the Government of India have helped in bringing about competitive rates through bidding process. The Tariff Policy has been amended to increase the solar power consumption and mentioned that "within the percentage so made applicable, to start with, the SERCs shall also reserve a minimum percentage for purchase of solar energy from the date of notification of this policy which shall be such that it reaches 8 per cent of total consumption of energy, excluding hydropower, by March 2022 or as notified by the Central Government from time to time". The Tariff Policy would mandate the States to buy solar power.

Achievement of 100 GW of solar power will lead to abatement of 170.482 million tonnes of CO_2 over its life cycle. With an enhanced target of 100,000 MW, upto 1 million jobs will be created. More employment and investment opportunities will enhance income. Higher solar power targets will augment power generation in India improving energy security and energy access. Solar manufacturing will also pick up after visibility on this investment opportunity to support these targets. Power generation through solar will offset conventional power generation, reducing the need to import coal and gas and lead to foreign reserve savings. Revenue to the Government through taxes and duty, etc., from plants in power generation and manufacturing will also increase and solar projects will provide a productive use of abundant wastelands. Further, there are growing concerns about the viability of the newly bid projects. With project auctions becoming increasingly competitive, margins are coming under pressure and leading players to take increasingly more risks. Increased domestic manufacturing of solar cells and modules capacity may take care of the risk and help in capacity addition programme of the Government of India.

Table-2: The Way Forward

Physical Progress (Achievements) As on 31.05.2016

Ministry of New & Renewable Energy			
Programme/ Scheme wise Physical Progress in 2016-17 (& during the month of May, 2016)			
Sector	FY- 2016-17		Cumulative Achievements
	Target	Achievement	(as on 31.05.2016)
I. GRID-INTERACTIVE POWER (CAPACITIES IN MW)			
Wind Power	4000.00	106.40	26932.30
Solar Power	12000.00	559.78	7568.64
Small Hydro Power	250.00	1.80	4280.25
BioPower (Biomass & Gasification and Bagasse Cogeneration)	400.00	0.00	4831.33
Waste to Power	10.00	0.00	115.08
Total	**16660.00**	**670.98**	**43727.60**
II. OFF-GRID/ CAPTIVE POWER (CAPACITIES IN MW_{EQ})			
Waste to Energy	15.00	0.00	160.16
Biomass(non-bagasse) Cogeneration	60.00	0.00	651.91
Biomass Gasifiers	2.00	0.00	18.15
-Rural -Industrial	8.00	0.00	164.24
Aero-Genrators/Hybrid systems	0.30	0.00	2.69
SPV Systems	100.00	2.07	325.40
Water mills/micro hydel	1.00	0.00	18.71
Total	**186.30**	**2.07**	**1341.26**
III. OTHER RENEWABLE ENERGY SYSTEMS			
Family Biogas Plants (in Lakhs)	1.10	0.00	48.55

Conclusion: With India's given resources, the energy sector has performed well in recent years. It is a capital intensive sector and the public interface the large. For the sector to be on the right way, political sagacity at the centre and the states is imperative. Substantial synergy and momentum has been achieved over the last two years through a horizontal integration of the Ministries of Power, Coal and new renewable energy. The Energy Sector is undergoing rapid transformation. While ensuring that the gains of commercial energy reach all segments of society, its transformation and use has to become environmentally benign and commercially sustainable. The Right to Commercial Energy has to coexist with the Right to Clean Air in the future.

Suggestions: Power generation through solar will offset conventional power generation, reducing the need to import coal and gas and lead to foreign reserve savings. Revenue to the Government through taxes and duty, etc., from plants in power generation and manufacturing will also increase and solar projects will provide a productive use of abundant wastelands. Demand Side interventions in UDAY such as usage of energy efficient LED bulbs, agricultural pumps, fans & air-conditioners and efficient industrial equipment through PAT (Perform, Achieve, and Trade) would help states in reducing peak load, flatten load curve and thus help in reducing energy consumption. We're indeed living in a golden age, when the first major push to innovative ways for energy usage has come up. Interestingly, saving a unit of electricity comes out to be way cheaper than producing it in the first place. This way, we are able to cater to the growing demand by not simply increasing the electrical production but majorly saving electrical units through effective appliance efficiency

References

1) Anil razdan-" energy sector : the challenge of power for all- yojana, aug 2016, vol 60,p10.
2) Arun kumar tipatthi- " the national solar mission : marching ahead solar energy- yojana aug, 2016, v60, p 46
3) Ritu mathur- " india's energy challenges and sustainable development"-yojana, aug 2016, vol60, p16
4) Dr. S.K. JHA- " Restructure in power sector: A Pthway to future sustainable development, The management accountant, Feb 2014 v49, p32-36
5) http://www.insightsonindia.com/2014/11/02/indias-energy-security-renewable-sources-of-energy

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Renewable Energy- The Way to Achieve Sustainability

Aravind Manadarapu ,
Asst. Professor, Dr LB College, Department of MBA , Visakhapatnam
K. Umanageswari,
Asst. Professor, Dr LB College, Department of MBA , Visakhapatnam

Abstract: India may be the richest in renewable energy but poor in utilization. About 70% of India's energy/ power generation are coal based which is a nonrenewable and cause environmental damage. In spite of technological changes it is not good to use non-renewable resources for energy/ power generation. The present government while reviewing the energy security recommending the breakup of the country's coal monopoly that is Coal India limited within a year. Sustainable development defined in different ways, elaboration of sustainable development as "A process that meets the needs of the present generation without compromising over the ability of the future generations to meet their own needs" In this paper the writer wish to correlate taking the secondary date into account about the availability and usage of renewable and non renewable energy and how to achieve the sustainable development without damaging the environment. He wants to suggest using more renewable energy, less non renewable energy. In this respect policy makers should take much care in implementing the same and encourage the production and consumption of renewable energy.

Key words: Renewable energy, human timescale, sunlight, wind, rain, tides, waves

Introduction:
Renewable energy is generally defined as energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/ cooling, transportation, and rural (off-grid) energy services.

Wind power: Airflows can be used to run wind turbines. Modern utility-scale wind turbines range from around 600 kW to 5 MW of rated power, although turbines with rated output of 1.5–3 MW have become the most common for commercial use; the power available from the wind is a function of the cube of the wind speed, so as wind speed increases, power output increases up to the maximum output for the particular turbine Typically full load hours of wind turbines vary between 16 and 57 percent annually, but might be higher in particularly favorable offshore sites.

Hydropower: Wave power, which captures the energy of ocean surface waves, and tidal power, converting the energy of tides, are two forms of hydropower with future potential; however, they are not yet widely employed commercially.

Solar energy: Solar energy, radiant light and heat from the sun, is harnessed using a range of ever-evolving technologies such as solar heating, photovoltaic's, concentrated solar power (CSP), concentrator photovoltaic's (CPV), solar architecture and artificial photosynthesis. Solar technologies are

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute solar energy. Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light dispersing properties, and designing spaces that naturally circulate air. Active solar technologies encompass solar thermal energy, using solar collectors for heating, and solar power, converting sunlight into electricity either directly using photovoltaic's (PV), or indirectly using concentrated solar power (CSP).

Geothermal energy: High Temperature Geothermal energy is from thermal energy generated and stored in the Earth. Thermal energy is the energy that determines the temperature of matter. Earth's geothermal energy originates from the original formation of the planet and from radioactive decay of minerals

Bio energy: Biomass is biological material derived from living, or recently living organisms. It most often refers to plants or plant-derived materials biomass can either be used directly via combustion to produce heat, or indirectly after converting it to various forms of biofuel. Conversion of biomass to biofuel can be achieved by different methods which are broadly classified *thermal*, *chemical*, and *biochemical* methods. Wood remains the largest biomass energy source today

Renewable energy in India: It comes under the purview of the Ministry of New and Renewable Energy (MNRE). Newer renewable electricity sources are targeted to grow massively by 2022, including a more than doubling of India's large wind power capacity and an almost 15 fold increase in solar power from April 2016 levels. Such ambitious targets would place India amongst the world leaders in renewable energy use and place India at the centre of its International Solar Alliance project promoting the growth and development of solar power internationally to over 120 countries.

From 2015 onwards the MNRE began laying down actionable plans for the renewable energy sector under its ambit to make a quantum jump, building on strong foundations already established in the country. MNRE renewable electricity targets have been up scaled to grow from just under 43 GW in April 2016 to 175 GW by the year 2022, including 100 GW from solar power, 60 GW from wind power, 10 GW from bio power and 5 GW from small hydro power. The ambitious targets would see India quickly becoming one of the leading green energy producers in the world and surpassing numerous developed countries. The government intends to achieve 40% cumulative electric power capacity from non fossil fuel sources by 2030.

The target is given for "bio-power" which includes biomass power and waste to power generation.

The figures above refer to newer and fast developing renewable energy sources and are managed by the Ministry for New and Renewable Energy (MNRE). In addition as of September 30, 2016 India had 43,112.43 MW of installed large hydro capacity, which comes under the ambit of Ministry of Power. In terms of meeting its ambitious 2022 targets, as of April 30, 2016, wind power was almost half way towards its goal, whilst solar power was below 7% of its highly ambitious target, although expansion is expected to be dramatic in the near future. Bio energy was also at just under half way towards its target whilst small hydro.

Table I: Installed Grid interactive renewable power capacity in India as of Sep 30, 2016 (RES MNRE)

Source	Total Installed Capacity (MW)	2022 target (MW)
Wind Power	28082.95	60,000.00
Solar Power	8513.23	100,000.00
Biomass Power (Biomass & Gasification and Bagasse Cogeneration)	4882.33	*10,000.00
Waste-to-Power	115.08	
Small Hydro Power	4323.35	5,000.00
Total	**44,783.33**	**175,000.00**

A **non-renewable resource** (also called a finite resource) is a resource that does not renew itself at a sufficient rate for sustainable economic extraction in meaningful human time-frames. An example is carbon-based, organically-derived fuel. The original organic material, with the aid of heat and pressure, becomes a fuel such as oil or gas. Earth minerals and metal ores, fossil fuels(coal, petroleum, natural gas) and groundwater in certain aquifers are all considered non-renewable resources, though individual elements are almost always conserved. In contrast, resources such as timber (when harvested sustainably) and wind (used to power energy conversion systems) are considered renewable resources, largely because their localized replenishment can occur within time frames meaningful to humans.

India Energy Challenge: India's energy challenge India needs more power day by day because of the increase in demand for power and growing population. Not only to cover its daily power shortfalls, but also to support its economic development. According to CEA, the peak demand in 2008 was 120 gig watts of power, while only 98 gig watts could be supplied. According to an analysis by the Indian PV project developer Aston field, quoting the President of India Energy Review, this deficit is likely to grow to 25 gig watts by 2012. The targeted share of renewable energy is 24% for 2031, with the amount of solar energy increasing to 56 gig watts of installed power. The average electricity consumption in India is still among the lowest in the world at just 630 kWh per person per year, but this is expected to grow to 1000 kWh within coming years. Every The Ministry of Power has set an agenda of providing Power to All by 2012. It seeks to achieve this objective through a comprehensive and holistic approach to power sector development envisaging a six level intervention strategy at the National, State, SEB, Distribution, Feeder and Consumer levels. 5 month, 8-10 million new mobile phones are connected in

India. This is an interesting market segment for solar PV as well: thousands of new GSM poles will be needed across the country.

Sustainable Development

Energy conversion and use are associated with major environmental, economic and social impacts, and all large energy projects should therefore be designed and implemented sustainably. Sustainability is only emerging as a science, and thus must be developed and applied urgently to provide analysis and evaluation tools. Sustainable development is founded on the three pillars of economic, environmental and social impacts. While the first two pillars are discussed in the SI more extensively, it is very important to address the social pillar, without which sustainable development cannot succeed. There is a great need for moving towards a philosophy of ''planning with people'' that empowers project-affected people and allows them to influence decision-making, rather than ''planning of people'' or ''planning for people''.

Planning for India's energy future requires addressing multiple and simultaneous economic, social and environmental challenges. While there has been conceptual progress towards harnessing their synergies, there are limited methodologies available for operational, a multiple objective framework for development and climate policy. We propose a 'multi-criteria decision analysis' (MCDA) approach to this problem, using illustrative examples from the building and cooking sectors

Measuring sustainability in economic terms

In economic parlance, SD requires maintenance of intergenerational wellbeing, that is, to ensure that total well-being of the future generations of individuals do not decline over time. In other words, SD ensures that the future generations of individuals are at least at the same level of welfare as enjoyed by today's generation. Hence, intergenerational equity in welfare of the future generations lies at the heart of sustainable development. However, a non-declining well-being across generations is sufficient to ensure that sustainability is achieved, but it is not a necessary condition. To determine the necessary condition it is important to understand the relation between the actions of the present generation and its far reaching, potential consequences felt over multiple generations.

Take for instance, two cities situated along a river bank, one 'upstream' and the other 'downstream'. Then, the actions of the people living upstream (say, polluting the water) will have severe impact on the health of the people living at the downstream city. On similar lines, one could argue that the actions of the present generation of people living upstream in time will have adverse impacts on the future generations who live downstream. Therefore, the actions of the present generation will determine the very existence and the conditions of existence of the future generations. Hence, the welfare of the present generation cannot be treated in isolation to the future generations' welfare.

Suggestions

- There is widespread popular support for using renewable energy, particularly solar and wind energy, which provide electricity without giving rise to any carbon dioxide emissions.

- Harnessing these for electricity depends on the cost and efficiency of the technology, which is constantly improving, thus reducing costs per peak kilowatt, and per kWh.
- Utilizing electricity from solar and wind in a grid becomes problematical at high levels for complex but now well-demonstrated reasons. Supply does not correspond with demand.
- Back-up generating capacity is required due to the intermittent nature of solar and wind, but at high levels the economics of this are compromised.
- Policy settings to support renewable are generally required to confer priority in grid systems and also subsidies them, and some 50 countries have these provisions.
- Utilizing solar and wind-generated electricity in a stand-alone system requires corresponding battery or other storage capacity.
- The possibility of large-scale use of hydrogen in the future as a transport fuel increases the potential for both renewable and base-load electricity supply.

Conclusion

Turning to the use of abundant renewable energy sources other than large-scale hydro for electricity, there are challenges in actually harnessing them. Apart from solar photovoltaic (PV) systems which produce electricity directly, the question is how to make them turn dynamos to generate the electricity. If it is heat which is harnessed, this is via a steam generating system. Sun, wind, waves, rivers, tides and the heat from radioactive decay in the earth's mantle as well as biomass are all abundant and ongoing, hence the term "renewable". Only one, the power of falling water in rivers, has been significantly tapped for electricity for many years, though utilization of wind is increasing rapidly and it is now acknowledged as a mainstream energy source. Solar energy's main human application has been in agriculture and forestry, via photosynthesis, and increasingly it is harnessed for heat. Until recently electricity has been a niche application for solar. Biomass (eg sugar cane residue) is burned where it can be utilized, but there are serious questions regarding wider usage. The others are little used as yet. If the fundamental opportunity of these renewable is their abundance and relatively widespread occurrence, the fundamental challenge, especially for electricity supply, is applying them to meet demand given their variable and diffuse nature. Policies which favour renewables over other sources may also be required. Such policies, now in place in about 50 countries, include priority dispatch for electricity from renewable sources and special feed-in tariffs, quota obligations and energy tax exemptions.

References

1) Anil razdan-“ energy sector : the challenge of power for all- yojana, aug 2016, vol 60,p7
2) Dr. Saibai kar- “ the critical balance : power supply, environment and the economy”,

the management accountant, feb 2014 v49, p27

3) Anupama airy- power for all by 2009 no longer a distant dream, yojana, aug 2016, vol 60, p 69
4) Ritu mathur- " india's energy challenges and sustainable development"-yojana, aug 2016, vol60, p16
5) Dr. S.k. Jha- " restructure in power sector: a pthway to future sustainable development, the management accountant, feb 2014 v49, p32-36
6) Www.wikipedia.in

International Journal of Academic Research
ISSN: 2348-7666; Vol.3, Issue-12(3), December, 2016
Impact Factor: 4.535; Email: drtvramana@yahoo.co.in

Guidelines to the Authors : These give credentials to your paper. *Plagiarism is strictly prohibited. Authors are jointly and severely responsible for any sort of plagiarism*

1. **Manuscript** must be on a standard A4 size paper setting and ***less than 12 pages*** prepared on 1.5 spaces and typed in 12 point Times New Roman Font.
2. **Author Name(S) & Affiliations:** The author (s) full name, designation, affiliation (s), address, mobile/landline numbers, and email/ address should be underneath the title.
3. **Abstract:** Abstract should be in fully italicized text, not exceeding 300 words. The abstract must be informative and present overall idea (explain background, aims, methods, results and conclusion) of the paper.
4. **Keywords**: Abstract must be followed by list of keywords, subject to the maximum of five. These should be arranged in alphabetic order
5. **Introduction** : A short introduction of the research problem followed by a brief review of literature and objectives of the research
6. **Objectives and Methodology**: Describe the materials used in the experiments and methods used for data collection, statistical tools used in data collection
7. **Results/findings and discussion:** This segment should focus on the fulfillment of stated objectives as given in the introduction. It should be contain the findings presented in the form of tables, figures and photographs.
8. **Conclusion**: Analysis conclude with suitable and effective suggestions (if any)
9. **Style of Referencing:** The list of all references should be alphabetically arranged. It must be at the end of the manuscript. The author (s) should mention only the actually utilized references in the preparation of manuscript and they are supposed to follow Harvard Style of Referencing. The author (s) is supposed to follow the references as per following:

Books:

Sundara Rao M., (1996), "Tribal Development." Tata McGraw, Hill, New Delhi, page. 250

Contributions to books:

Ramana T.V (2008) ," Education- A multi-Dimensional weapon for all-round Development: Edited by D.Pulla Rao, Development of Education-Emerging Dimensions in 21st Century, Chapter 13, pp.190-202.

Journal and other articles:

Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

Conference papers: Chandel K.S. (2009): "Ethics in Commerce Education." Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

Unpublished dissertations and theses:

Kumar S. (2006): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

Online sources: Always indicate the date that the source was accessed, as online resources are frequently updated or removed.

Website: Kelkar V. (2009): Towards a New Natural Gas Policy, Economic and Political Weekly,refered on February 17, 2011 http://epw.in/epw/user/viewabstract.jsp

Note: *Papers relating to the Languages may be followed as their research (Ph.D/M.Phil) style*