U.S.-INDIA ENERGY SECURITY COOPERATION, 1999-2008

Dissertation submitted to the Jawaharlal Nehru University
in partial fulfillment of the requirements
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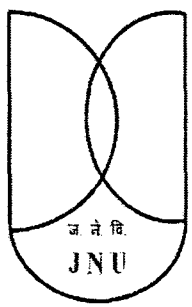
Degree of

MASTER OF PHILOSOPHY

SIDHANANDA PRADHAN



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DECLARATION

I declare that the dissertation entitled "**U.S.-INDIA ENERGY SECURITY COOPERATION, 1999-2008**" submitted by me in partial fulfillment of the requirements for the award of the degree of **MASTER OF PHILOSOPHY** of **Jawaharlal Nehru University** is my own work. The dissertation has not been submitted for any other degree of this University or any other university.

Sidhananda Pradhan

CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

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Dedicated to...

My Sweet, Loving and Caring Sisters
Haripriya, Krushnipriya, Priyanka Priyadarshani and
Jyathirmay

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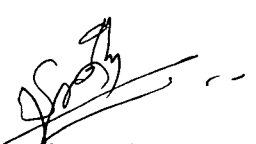

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List of Abbreviations

APEC -	Asia Pacific Economic Cooperation
CWG -	Coal Working Group
CSLF -	Carbon Sequestration Leadership Forum
CII -	The Confederation of Indian Industry EIA - Energy Information Administration
CBM -	Coal Bed Methane
DOE -	Department of Energy
DRUM -	Distribution Reform, Upgrades and Management
ESU -	Energy Security Unit (MEA, India)
FOIR -	Forum of Indian Regulator
FICCI -	Federation of Indian Chambers of Commerce and Industry
FOIR -	Forum of Indian Regulators
G-8 -	Group of Eight
GCC -	Gulf Cooperation Council
GDP -	Gross Domestic Product
GHG -	Green House Gas
GEC -	Global Energy Council
GAIL -	Gas Authority of India
IODP -	Integrated Ocean Development Programme
ICPEEB -	Indian Council for Energy Efficiency Business
IREDA -	Indian Renewable Energy Development Agency Ltd.
IPI -	Iran-Pakistan-India (pipeline)
IEA -	International Energy Agency
IEF -	International Energy Forum
IEA -	International Energy Agency
ITER –	International Thermonuclear Experimental Reactor.
JODI -	Joint Oil Data Initiative
LNG -	Liquefied Natural Gas
MOU -	Memorandum of Understanding
MNES -	Ministry of Non-Conventional Energy Sources
NRSE -	New and Renewable Sources of Energy
NELP -	New Exploration Licensing Policy

NAEWG -	North American Energy Working Group
OECD -	Organization of Economic Cooperation and Development
OLADE –	Organization Latin Americana de Energia
OPEC -	Organization of Petroleum Exporting Countries
PCRA-	Petroleum Conservation Research Association
PPAC -	Petroleum Planning Analysis Cell (India)
SAARC -	South Asian Association for Regional Cooperation
SPR -	Strategic Petroleum Reserve (US)
USTDA -	U.S. Trade and Development Agency
USIBC-	U.S.-India Business Council
USEA -	US Energy Association
UNSD -	United Nations Statistics Division

Chapter 1

INTRODUCTION

In international politics, mutual interest and mutual respect forms the basis of any strong relationship. The relationship between India and United States is one such kind. After many constrains, ups and downs and antagonism in the relationship between India and US for the last half of century by the historical factors, at present, there is sea change or paradigm shift in bilateral relations. India and US recognise each other as natural allies, and emerged as the largest and greatest democracies in the world. Both the nations share common values and are committed to values like human rights, democracy and rule of law, pluralism, multiculturalism etc. and pledge to promote stability, democracy, prosperity and peace all over the world. All these shared common values of tradition, culture and ideas have been enhancing ability to work together to provide global leadership in areas of mutual concern and interest[1].

In this era of modernization, globalization, liberalization or privatisation where the interaction and interdependence is a mantra, there is no exception for the India and US relationship, but is based on recognition of mutual respect and mutual interest. India recognised US as a superpower of the world in varied realms of military, economy, science & technology. On the other hand, the US has been recognising the changing positive role of India as a regional power and emerging world power, the growth of India's economy and its impact on US interests. So, the US vows to "help India become a major world power in the 21st century"[2]. It signifies that India has acquired in such an important place in the perception and imagination of U.S. foreign policy makers and administration in the contemporary world politics of mutual interest and mutual respect. India and U.S. has been working in varied areas of global concerns and mutual interests such as the war on terrorism and climate change; socio-economic-political and cultural; trade and commerce; and science & technology. But

1 India - U.S. Joint Statement Washington, DC July 18, 2005.

2 President George W. Bush had took a personal and special interest on India to make it as great power of 21st century and tried to work closely with Indian Government. And also See CRS Report 'India-U.S. Relations', June 21, 2005.

the most important area of opportunity or avenue for cooperation and collaboration is in the field of energy security.

Concept of Energy Security

In this contemporary period, the energy security has been a matter of debate and discussion in all over the world. Energy plays a significant role in the national security of any given country as a fuel to power of economic growth and development of a country. Therefore, energy security is very important in every aspect of civilized modern life. Energy security has wider connotations, and varies from the region to region and from country to country. Energy security has emerged as a prominent factor guiding the grand strategy and relations between and among the states in the global politics. The concept of energy security is also interrelated with the larger fabric social, economic and political construct of the country. Energy security refers to the "ability of a country to minimize vulnerability to supply interruptions and price increases in energy provision"[3]. So, energy security is one of the key forces driving international relations, as the U.S. National Intelligence Council's forecasting project speculates, "Growing demand for energy especially by the rising powers through 2020 will have substantial impact on geopolitical relations"[4]. The access to cheap and reliable energy has become an essential for operating of country's economies, growth, development and its survival and existence.

There are number of causes which are threats to energy security or energy insecurity. A variety of complex issues that are involved in it, but the most important might be limited availability of energy resources, which are exhaustible and depletable in nature. The matter of energy security has come into forefront because of the uneven distribution of energy supplies among the countries, oil-politics and political instability in the major energy producing countries, the competition over energy sources, attacks on energy infrastructure, warfare, accidents and natural disasters,

3. Sáez, Lawrence, (2007) "U.S. Policy and Energy Security in South Asia: Economic Prospects and Strategic Implications", *Asian Survey*, July/August, Vol. 47, No. 4, P. 658.

4. Ibid.

mismanagement and manipulation of energy supplies, terror Ibid.ism, price rise etc. All these causes have magnified energy vulnerability. The important events that illustrate picture of energy insecurity began with 1973 and 1977 oil crises which had great impact on the global order and the emergence of the OPEC cartel which was a particular milestone that prompted some countries to increase their energy security.

Energy security involves geopolitics, bilateral relations with other nations, diversification of sources of supply and various types of energy in the form of both conventional and non-conventional or renewables and non-renewables[5]. If we examine energy security in the context of India, more diverse supply patterns would reduce its sense of vulnerability to disruption. The long term approach or market oriented reforms, particularly, its growing receptive to foreign investment, and a reliance on global markets and cross-border investment are some of the Indian strategies are some which will be followed by India to meet its ever rising energy needs[6].

Like the energy grids act as a part of an energy security strategy, so the Military approaches are, in which military would provide security to infrastructure and installations of energy and avoid perceived multidimensional threats. In fact, the factor of globalization of oil markets offers more stability of supply to India, than either a blue water navy or a nuclear arsenal to address India's energy security[7]. The concept of energy security varies from country to country and region to region. For the developing countries it is how changes in energy prices will affect their balance of payments. For the countries like India and China, energy security is about their ability to rapidly adjust their new dependence on global markets, a major shift away from their former commitments to self-sufficiency[8]. Precisely, as an official definition of India, 'energy security' stated in the report of the *Integrated Energy Policy report 2006* as follows: "The country is energy secure when we can supply lifeline energy to

5 . Sharma. Ashok (2007)'India and Energy Security', *Asian Affairs*,38:2,158 -172

6. Manning, Robert A. (2000), *The Asian Energy Factor: Myths and Dilemmas of Energy, Security and Pacific Future*, New York: Palgrave.

7 . Ibid.

8. Sharma, Ashok (2007)'India and Energy Security', *Asian Affairs*. 38:2,158-172.

all our citizens as well as meet their effective demand for safe and convenient energy to satisfy various needs at affordable costs at all times with a prescribed confidence level considering shocks and disruptions that can be reasonably expected"[9].

Concept of Energy Security in India

Energy security in India can be defined in terms of the physical availability of supplies to satisfy demand at a given price, despite many security problem are involves such as supply risk, a price risk influenced by internal and external factors. A sustained energy security can be achieved with a proper balance between domestic and external energy sources accompanied with Research & development (R&D), scientific and technological support to minimize the risks. Energy security in India is very much interlinked with affordability and accessibility issues as the 'energy burden' for poor people. Government of India has been taking very carefully selected policies such as Integrated Energy Policy or the 'right energy mix' adopting multiply of energy sources in order to minimize energy price volatility and to supply energy at reasonable and affordable prices[10].

The energy diplomacy is one path of aspirations for cooperation running high among both producing and consuming countries to secure the energy security. Greater investment in native renewable energy technologies and energy conservation is also given an importance for this purpose. Many countries hold strategic petroleum reserves as a defence against the economic and political impacts of an energy crisis to secure energy security. Another very important area is the use of uranium for nuclear power, which practised in many countries to attain energy security. Nuclear fuel is considered as pollution free, green and reliable energy source. To attain energy security, one has to reduce in much dependence on a source of imported energy and increasing the number of suppliers, exploiting native fossil fuel or renewable energy resources, and reducing overall demand through energy conservation measures. Some

9. Planning Commission, 2006a *Integrated energy policy: report of the Expert Committee. Government of India*

10 Naik, Anant V., Sajal Ghosh, and V Raghuraman., "Energy Security Issues - India" Confederation of Indian Industry, July 2003 Web site: www.ciionline.org.

time, the geo-political uncertainty in the region has urgent need for new initiatives in national energy security policy in response to the international oil crises such as 1970s crisis. The results were upgrading its industrial structure, introduce energy conservation measures, develop new sources of energy supply, and engage in energy diplomacy to diversify and guarantee its energy supply.

Key Dimensions of Energy Security

The key dimensions of energy security can be summarized into four things, such as availability, accessibility, acceptability, and affordability[11]. Firstly, Availability captures the global energy resources that dominate current energy mix and are expected to remain the dominant sources of energy for the foreseeable future. Conventional and unconventional hydrocarbon resources and renewable resources such as wind, solar and bio-fuels are considered. Secondly, Accessibility addresses barriers to exploring and developing available resources. Barriers include geopolitical factors, financial and human resource constraints, fiscal regimes, and the need for major infrastructure and technology deployment. Thirdly, Acceptability reflects environmental and safety concerns. Finally, Affordability is ultimately about consumers being able to afford energy services provided to them but it also covers capital and operating cost structures for developing various energy sources[12]. The crux of energy security, can be achieved if proper cooperation, coordination, mutual negation between and among the countries, decentralization and proper distribution of energy resources with human face through the international laws and agreements.

Energy Scenario in India

India's quest for energy security has been emerging as one of the most challenging concerns of 21st century. Energy demand has been growing day by day which emanates as the result of population growth (especially rapidly increasing, vast & strong middle class), trade & commerce, transportation, agriculture, livestock,

11. Energy Security Quarterly - Issue 1, January 2008 - SARI/ENERGY
12. Ibid

household consumption of billion plus population, and in sum, to feed booming Indian economy and sustainable development of India. The process of globalization, liberalisation, industrialization, has accelerated the all around growth and development of countries, as result the demand for energy has also increasing as never before. As India has become the second fastest growing economy of the world, as such the demand for energy has been growing day by day. Now, India is the world's fifth largest energy consumer and may become third by the middle of this century. Overall power generation in the country more than doubled from 1991 to 2005.[13]. Though India is not very poor in natural resources, but India has relatively poor natural energy resource utilization and exploration, lack of latest modern scientific equipments use and poorly functioning energy market mechanism are generally considered as major constraints on sustained economic growth. Estimates pointed out that maintaining present rates of growth would require that India increase its commercial energy supplies by 4 per cent to 6 per cent annually in coming years[14]. According to the statistics of the US Energy Information Administration (USEIA), the Indian energy mix is comprised combustible renewables and waste 38 per cent, coal 33.2 per cent, oil 22.4 per cent, gas 4.2 per cent, hydro 1.2 per cent, nuclear 0.8 per cent, geothermal, solar and wind 0.1 per cent [15]. All these facts are compelling India to have a long term energy sources by which it would fulfil the appetite for energy security and the US has been offering the benevolence of helping hand through the landmark Indo-US Energy Security Dialogue.

Following two appendixes can provides a better sense of understanding about the energy scenario of India. The Appendix 'A' elucidate picture of the main power plants in India and the later is on the coal, a significant & the major source of energy, Appendix 'B' describes the coal production, use and imports of India,

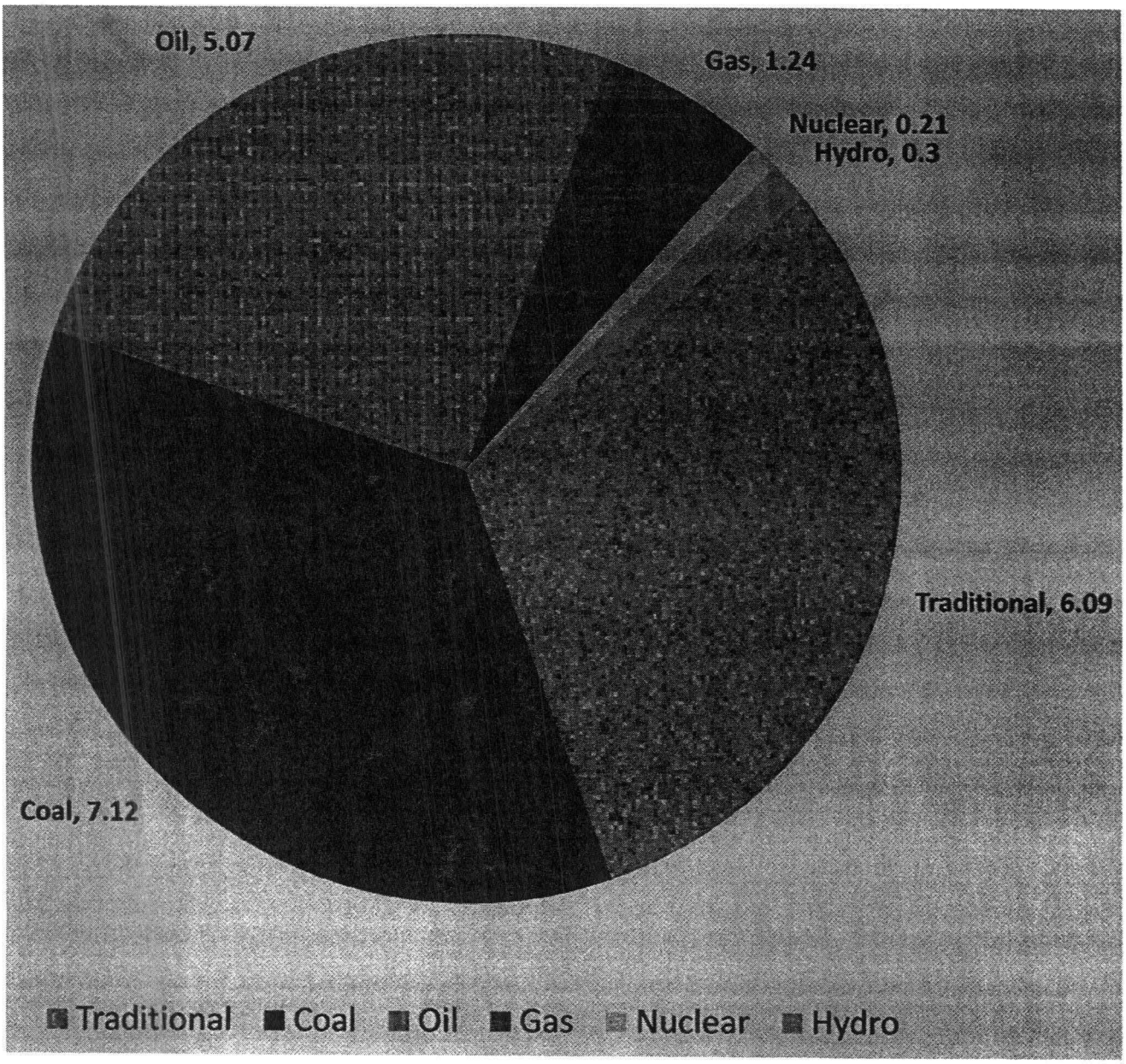
13. Ministry of Power report at [http://powermin.nic.in/reports/pdf/ar05_06.pdf].

14. Hate, Vibhuti "India's Energy Dilemma," Center for Strategic and International Studies, September 7, 2006, at [http://www.csis.org/media/csis/pubs/sam98.pdf]

15. IEA energy statistics online at http://www.iea.org/Textbase/stats.

Graph 1.1

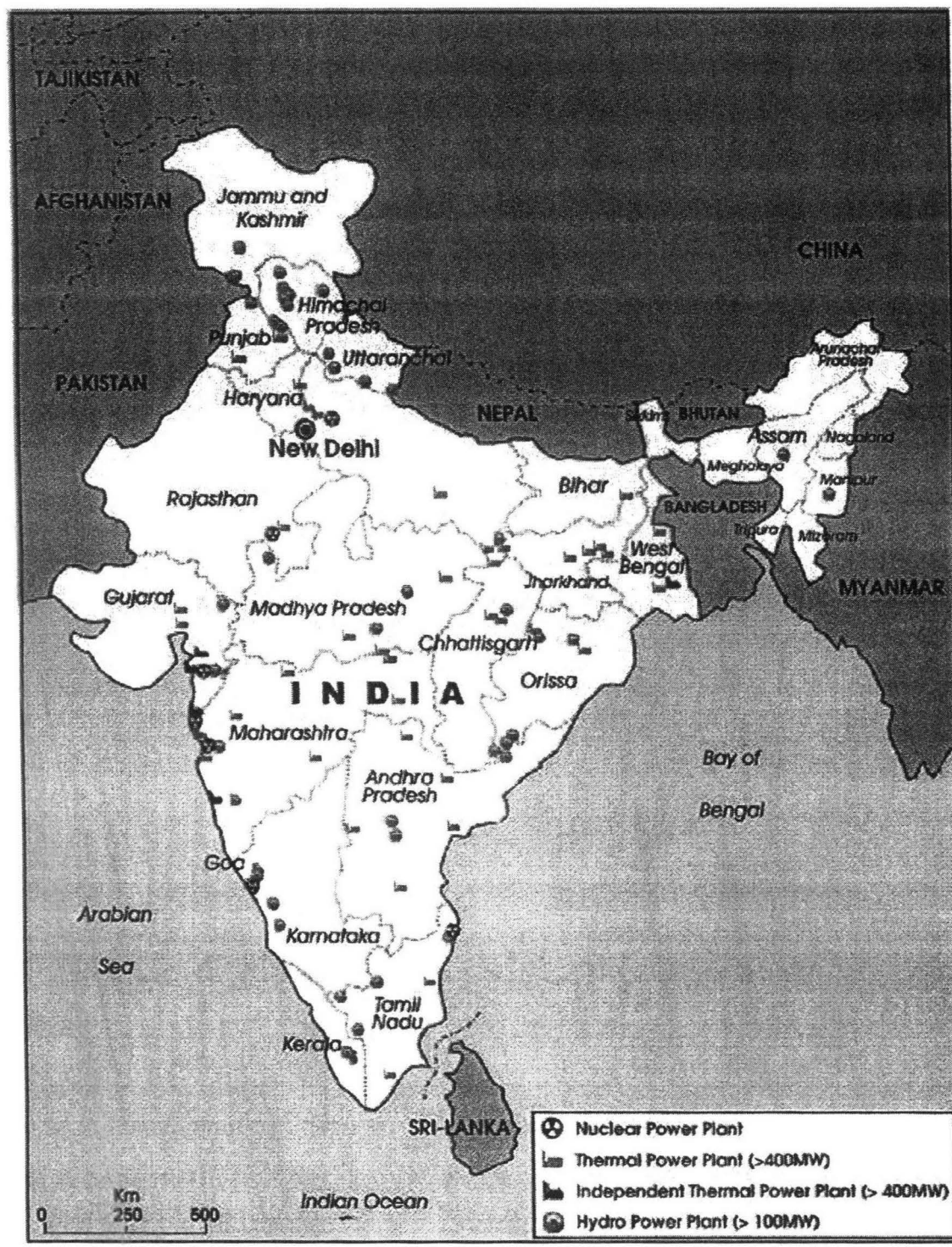
India's primary energy supply 2003–04 (in EJ).



Source: Integrated Energy Policy Report (Planning Commission, 2006a.

Graph 1.2

MAIN POWER PLANTS IN INDIA



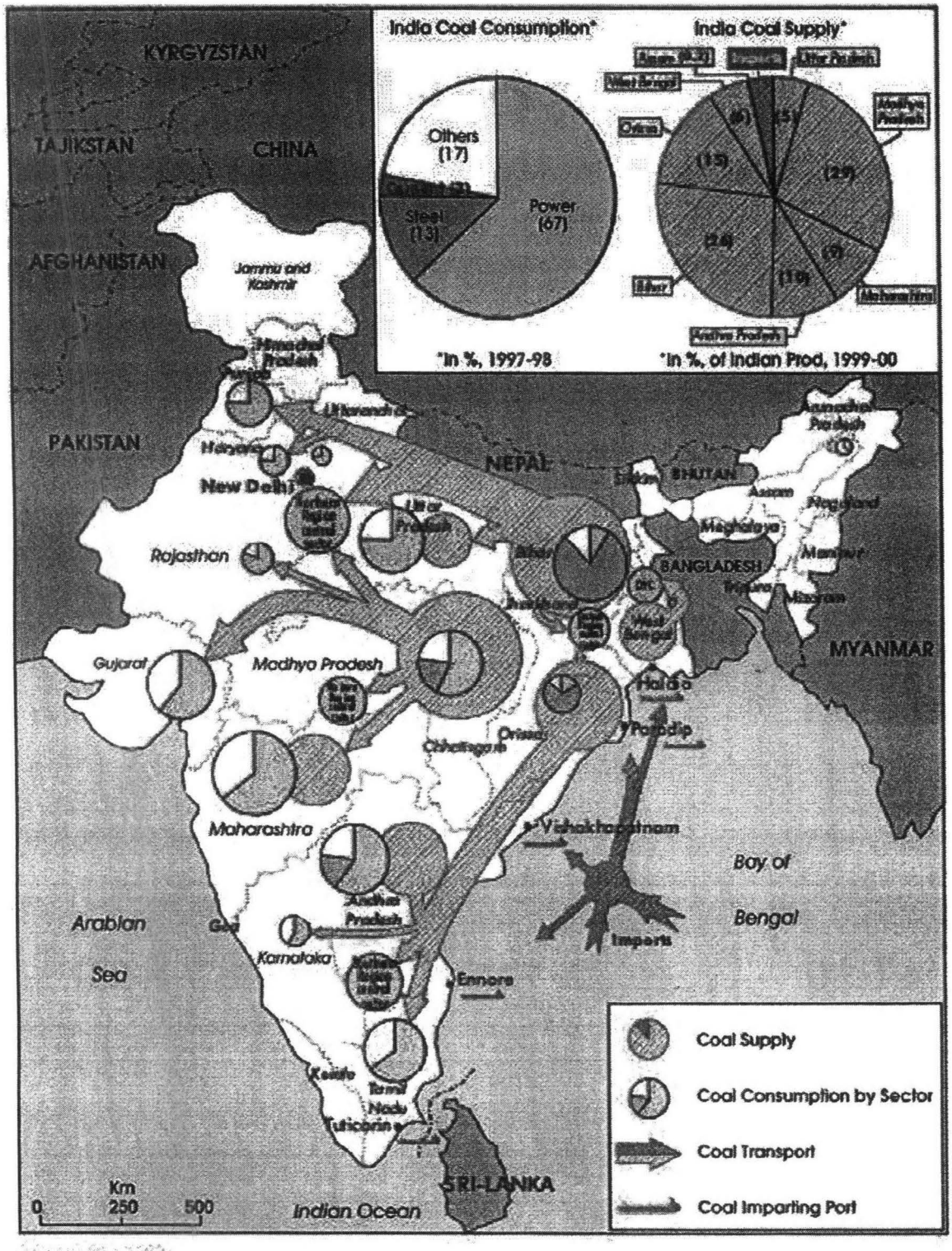
Source: TERI, 2000.

Source: International Energy Agency. *Electricity in India:*

Providing Power for the Millions, OECD/IEA, Paris, 2002.

Graph 1.3

COAL PRODUCTION, USE AND IMPORTS



Sources: IEA analysis.

Source: International Energy Agency. *Electricity in India:*

Providing Power for the Millions, OECD/IEA, Paris, 2002.

In India, coal is the leading commercial energy source, accounting for more than half of national demand. India is the world's third most productive coal producer, and domestic supplies satisfy most demand, though, most of India's coal is an inefficient, low-grade, high-ash variety. Since the coal is regarded as the king energy in India, and most dependable source of energy that in Appendix 'C' clearly mentioned.

The consumption of oil accounts for 1/3rd of India's total energy consumption; almost 70% of this oil is imported mostly from the West Asia and Middle East countries. India's domestic natural gas supply is not likely to be enough with growing demand, and the India has to import as much as of natural gas, either via pipeline or as liquefied natural gas. Hydropower, especially plentiful in the North Eastern states of India and near the border with Nepal, supplies is only 5% of energy needs. Civil nuclear power, which Indian government officials and some experts say is a sector in dire need of expansion, currently accounts for just 1% of the country's energy supplies and less than 3% of total electricity generation[16]. Even optimistic projections suggest that civil nuclear power will provide less than 10% of India's generation capacity in 25 years and there are doubts about New Delhi's projected goal of generating 20 gigawatts of civil nuclear power by 2020[17]. The Indian government and policy makers finally recognised the importance of energy security for the sustainable economic growth and security of India are very closely linked to the supply of energy resources. The Indian government acknowledging the significance of energy security as an essential component of the country's life line of development, have been taking stapes for an integrated national energy policy, diversification of energy supplies, greater energy efficiency, rationalization of pricing mechanisms, energy governance etc. The U.S. government has also committed to assist India in promoting the development of stable and efficient energy markets and U.S.-India Energy Dialogue

16. Energy data from U.S. Department of Energy, Energy Information Administration, January 2007, http://www.eia.doe.gov/emeu/cabs/india.html]; Tanvi Madan, (2006) "India," Brookings Institution Energy Security Series Report, November at[http://www.brookings.edu/fp/research/energy/2006india.pdf]

17. John Stephenson and Peter Tynan, "Will the U.S.-India Civil Nuclear Cooperation Initiative Light India?" November 13. (2006) at [http://www.npec-web.org]; "Top Scientist Questions India's N-Energy Dream," (2007) Times of India (Delhi), September 9.

was launched in July 2005 to provide a forum for bolstering bilateral energy cooperation and collaboration[18].

During a March 2007 visit to New Delhi, U.S. Energy Secretary Sam Bodman hold wide-ranging talks with numerous Indian officials and business leaders to discuss India's energy needs and strategies for relevant bilateral cooperation. Secretary Bodman stressed "the absolute necessity of substantial and sustained investment in innovation on a global scale" and listed five major global goals for all countries, including the United States and India: firstly, diversifying the available supply of conventional fuels and expanding their production; secondly, diversifying energy portfolios through expanded use of alternative and renewable sources, including nuclear energy; thirdly, promoting increased energy efficiency and conservation; fourthly, reducing pollution and energy intensity in the global economy; and fifthly, protecting critical energy infrastructure[19]. India has to deal with three key interrelated challenges: stemming its growing energy deficit; containing active and emergent security threats; and limiting greenhouse gas emissions adequately while satisfying its energy needs for social and economic modernisation[20].

Only one fifth of the India's power is consumed by farmers' irrigation systems, making the farm lobby a powerful obstacle to curtailing subsidies provided by State Electricity Boards, which collectively lose billions of dollars annually. But, more than 35 per cent of India's electricity has been disappearing through irregularities, transmission losses, i.e., theft, and badly requires for healthy mechanism of management or energy governance. A rapidly increasing electricity crisis may be severely hampering India's ongoing economic security and development[21].

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18. U.S. Department of State fact sheet at [http://www.state.gov/p/sca/rls/fs/2005/ 49724.htm]. In May 2006, the Senate Foreign Relations Committee passed S. 1950, to promote global energy security through increased cooperation between the United States and India on non-nuclear energy-related issues, but the full Senate took no action on the bill.

19. http://newdelhi.usembassy.gov/pr032007a.html

20. Chellaney, Brahma, (2005)"India's Future Security Challenge: Energy Security" *India as a New Global Leader*, The Foreign Policy Centre, London, U.K. www.fpc.org.uk

21. "India Struggles With Power Theft,(2006)" BBC News, March 15; "Electricity Crisis Hobbles an India Eager to Ascend," New York Times, May 21, 2007; "Power Outages disrupt Life in India, (2008)" *Associated Press*, March 10.

India-US Energy Dialogue or Cooperation

The quest for easily availability of energy to run the country or to feed the booming economy is clarion call for India in this contemporary 21st century. The Prime Minister Manmohan Singh has been emphasizing energy security as the most important security concern, second only to food security. In this juncture a new Indian national energy security policy or approach is badly needed, which U.S. can augment India cherished goal of energy security. There are many way to attain the energy security, which vary in way and means from country to country. There may be many ways and means to attain energy, but the most important means now-a-days countries used to adopts is energy cooperation or energy dialogue between or among themselves. Like this above principle, the inception of US-India Energy dialogue formulated to address the concerns of energy security.

The US Secretary for Energy, Dr. Samuel W. Bodman and the Deputy Chairman of the Planning Commission of India, Dr. Montek Singh Ahluwalia, launched a new bilateral India-U.S. Energy Dialogue in Washington, DC on May 31, 2005[22]. The Energy Dialogue has build upon the broad range of existing energy cooperation between the two countries as well as develops new avenues of collaboration and cooperation. Its work has been organized across five Working Groups, which is supervised by a Steering Committee.

The goals of the Dialogue are to promote increased trade and investment in the energy sector and work with the public as well as private sectors to identify areas of cooperation and collaboration and building upon the broad range of existing cooperation, effort has made to secure, clean reliable and affordable sources of energy. The Five Working Groups has been established along with a Steering Committee to provide direction, supervision and future course of action of the Indo-

22. "The U.S.- India Energy Dialogue Joint Statement" http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf

US energy cooperation. It establishes broad goals and timelines and ensures coordination among the Working Groups on crosscutting issues such as energy security, future energy scenarios and trade and investment. These five Working Groups addresses topics, such as oil and natural gas, electric power, coal and clean coal technology, energy efficiency, renewable energy, new technologies such as hydrogen, and civil nuclear power.

US-India Energy Security Cooperation was initiated during the Vajpayee administration in 1999, but it was accelerated and synergized after later with number of agreements between two the governments. Energy cooperation between India and U.S. has not given importance during the year from 2001 to 2004, because of various reasons, especially devastating terrorist attack in U.S. on September 11, 2001. This incident has dramatically influenced and brought drastically changes in the American policies, programmes, orientations and brought paradigm shift in world order along with the Indo-US relationship. During this period, the bilateral cooperation mostly focused on the field like fighting global terrorism, civilian nuclear activities, space programs, trade in high technology, dialogue on missile defence programme, controlling the spread of Weapons of Mass Destruction (WMD) and Next Steps in Strategic Partnership (NSSP) etc. with India. U.S.-India cooperation in the field of energy has been crystallizing over the years in government, academia and industry level. Indo-US cooperation in the field of energy has been nurturing and booming by number of agreements, joint statements, declarations and Memorandum of Understandings (MoUs) between the two governments. US-India Energy Security Cooperation has undertaken mainly three aspects a) Energy Dialogue; b) Energy Governance; c) Energy Diplomacy. In this energy security cooperation dialogue between US and India has been signed a series of agreements in 1999, 2000, 2005, 2006, 2007, and 2008.

The second chapter attempts to analyse and examine all the issues of energy security, except civil nuclear energy; within the ambit of Indo-US Cooperation in the field of energy security during period of one decade from 1999 to 2008. The U.S.-India

relations have come under the foci of attention recently; it's the convergence of interests and American need or desire to seek new partners in furthering its interest that has driven this change. Interestingly energy security has been a key theme underscoring these relations as evident by the recent U.S. India nuclear deal. The logic is that the energy security concerns of countries like India is an issue area that may have unintended consequences for U.S. strategic interests in South Asia in particular, and in Asia in general. The ability of the U.S. to enable South Asian countries to maintain an adequate level of energy security is likely to be a crucial test of its policy in the region (Sáez 2007, 658). U.S has taken major step like, energy policy plan, which the Bush Administration recommended a review of the funding and performance of energy efficiency research and development for the purpose of determining appropriate funding for performance based research in public-private partnerships to attain energy security(Bamberger 2007). So, it's crystal clear that, the United States can play a role in regional energy cooperation and ensuring energy security by promoting greater cooperation and integration of regional energy markets in electricity and natural gas, as well as the unhindered cross-border trading of cleaner fuels and energy resources among South Asian countries.

It is well known that U.S. has well developed and established national energy security policy, strategy and mechanism, Research and Development (R&D) and Strategic Reserves to face future energy concerns. On the other hand, in India, the energy security issues have been ignored and neglected for years and decades. Whatever actions for energy security have been undertaken in India are very limited. India-US relationship has explored a new avenue for interactions, when they entered into an agreement of energy security cooperation. The energy cooperation between two countries was lunched during Vajpayee-Clinton Administration in 1999, with a 'Joint Statement on Cooperation in Energy and Related Environmental Aspects'[23] signed in New Delhi by the then U.S. Energy Secretary Bill Richardson, and Shri Jaswant Singh, Minister of External Affairs of India.

23. "Joint Statement on Cooperation in Energy and Related Environmental Aspects", (1999) Embassy of India, Washington, D.C, October 26.

The 'Joint Statement on Cooperation in Energy and Related Environmental Aspects' talk about the two Governments initiatives to mitigate the impact of energy production on environment and climate, and give on great important on the bilateral energy cooperation. A series and additional cooperation was undertaken with two governments. The Minister of External Affairs Jaswant Singh and U.S. Secretary of State Madeleine Albright signed a Joint Statement on 'Cooperation in Energy and Environment' issues on behalf of the India and the United States on March 22, 2000 in Agra[24]. The statement outlines a common agenda on clean energy development and environmental protection. It is significant to observe that there was no specific and major dialogue entered between US-India during the period 2001-2004. It may be worthy examining of this aspect. The most significant & intensified agreement was signed during Manmohan Singh-Bush Administration through 'India-U.S. Energy Dialogue' in May 2005[25]. The Energy Dialogue has build upon the broad range of existing energy cooperation between the two countries and also developed new areas of collaboration and cooperation. Its work has been organized across five Working Groups, which supervise by a Steering Committee. The Steering Committee consists of exports responsible for creating the rules, prospects, and guidelines for Energy Cooperation. Five Working Groups divided into five specialized areas. This dialogue was effectively pursued till the end of Bush Administration in 2008.

Energy Governance

The limited resources and supply of traditional or primary energy such as oil and natural gas, coal etc. urgently call for energy governance, the policies and mechanism to achieve the goal of energy security. So, what is Energy governance? The energy governance is as much as important as energy security, which connotes and involves

24. "U.S.-India Joint Statement on Energy and Environment Cooperation", (2000) March 22. http://www. usinfo.state.gov.

25 " The U.S.- India Energy Dialogue Joint Statement" http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf

issues like good management, proper distribution, use of smart modern technology, awareness among the public about the economy of energy wastage, effective and efficiency use of administrative machineries and tool for strictly implementation of stringent law and punishment against corruption, mismanagement and irregularities.

Energy governance is another key concept that is complementarily related to energy security. Energy governance involves multiple issues of international co-operation in energy security, synergising of policies among states and linking the areas of trade, environment and development which have a bearing upon energy relations, security and pattern of consumption. A broader need for global energy governance derives from the fact that energy concerns several policy fields. It is thus "a cross-cutting issue interrelated with other policy fields such as trade, environment, climate, and social policies, but also has a hard security policy dimension that is closely linked to the international political economy of oil and gas"[26].

There have been interesting and innovative suggestions regarding setting up a global body for energy governance, one such proposal is that a Global Energy Council consisting of energy ministers of the eight industrial countries currently in the G8 and five emerging market economies, namely Brazil, India, China, South Africa and Mexico (BICSAM) be formed to serve as a visible focal point for global energy issues and a mechanism for cooperation, coordination and harmonization of energy policies among the governments and key private sector as actors[27]. This provides scope for a further discourse on the need and possibility of global co-operation between the developing and developed world on energy governance.

So, the third chapter is Energy Governance in which there are various stapes (which are explained following) and initiatives have been taken between the India and U.S. governments for the proper energy governance mechanism which considered as soul

26. Westphal, Kirsten. (2006) "Energy Policy between Multilateral Governance and Geopolitics: Whither Europe?,, *European Energy Policy*. IPG 4/2006. p.47. http://library.fes.de/pdf-files/id/ipg/03931.pdf

27. Bradford, Colin I. (2007) "World Energy Needs, Climate Change & Global Governance Innovation" *World Energy council* 2007.

of the energy security in this contemporary world of energy. It is more about serious contemplation and depth of realization of the importance of sustainable energy security for the present as well as for the future generations and conscious effort to address this concern by each and every level in the society. For this purpose US and India government has been signed various agreements, established Working Groups, Steering Committees, organised seminars, workshops, conferences, official training programmes, creates public awareness through various above means about the economy of energy wastage.

The judiciously and transference use of strategies of energy governance, effectively and efficiently implementation of all means and mechanisms for obtain long-term energy security has given priority. The proper distribution, right management, and checking of irregularities, corruption etc. are very crucial to attain energy security. Department of Energy, which advanced an agenda for further U.S.-Indian cooperation on energy and to build strong markets for natural gas in India and holds government-to-government workshops on various matters. The working groups has focused on activities that facilitate the exchange of informations and develop lines of communication for policy, promote increased trade and investment in the oil and gas sector and examine steps to improve business climates and work with the private sector to identify areas of cooperation and collaborate with the business community on joint manners. There are many proposals formulated for this purpose, like a proposal for Strategic Petroleum Reserve, to meet the unexpected future demand of energy requirements.

The two governments have been looking forward to a series of time-bound energy governance actions in bilateral energy cooperation. The main purpose of this is with the transformed nature of the strategic partnership between India and the USA and to move forward towards the common objective of clean energy, energy efficiency, and energy security while pursuing the goal of sustainable development. The progress of energy cooperation has been so far satisfied by both governments for the broad

arrangements in quickest possible time for the working groups[28]. The Energy Dialogue' Steering Committee accomplishes as medium of energy governance for the development of plan of actions, monitor and administer the whole process. This plan of action established a roadmap for the Working Groups and for the energy governance, there are three major areas categorised: technical exchange visits; workshops and conferences; and actual projects. The Working Groups has supported workshops for technical and policy experts from the US and India governments and private sectors that focused on regulatory and technical issues.

The salient features of energy governance are setting up goals for the various working groups, include issues like strengthening mutual energy security and promoting stable energy markets to ensure adequate supplies of energy, that support desired levels of economic growth; exchanging informations and developing lines of communication for policy coordination in times of market instability; promoting trade and investment in the various sectors. Advancing understanding of efficient generation, transmission, distribution and use of electricity and promoting the exchange of information on regulatory policies; cooperating on programs and technologies with special emphasis on the distribution and utilization of electricity in urban and rural networks. Promoting the development and deployment of clean energy technologies and energy conservation practices that improve the efficiency of energy use leading to enhanced energy security and stable energy markets to support desired levels of economic growth with appropriate concern for the environment. There is gamut of issues involved in the energy governance but the crux is to attain a common objective of energy cooperation between India and the United States, and with the international community as a whole.

Energy Security and Environmental Problems

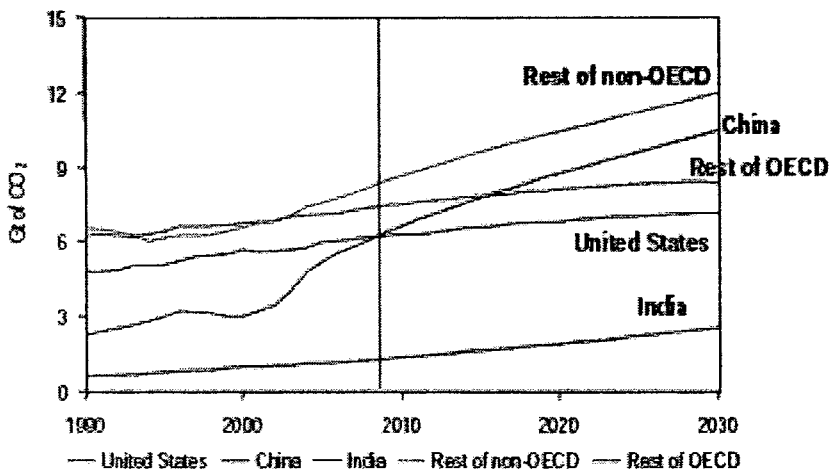
The problem of environmental degradation and climate change in one hand and dream of sustainable energy security with development on the another could be addressed

28. "India-US Joint Statement" New Delhi, March 2, 2006, http://www.dae.gov.in/press/020306jtstmt.htm

and solved through the policy or mechanism of energy governance. The questions of climate change, global warming and energy security would enable India and the U.S. to work together, through energy governance with other countries to pursue sustainable development and meet increased energy needs while addressing concerns of energy security and environmental problem. The U.S.-India Energy Dialogue also stressed to promote the imperatives of development and safeguarding the environment, commit to developing and deploying cleaner, more efficient, affordable, and diversified environmental friendly energy technologies[29].

Graph 1.4

Energy-Related CO2 Emissions



Developing economies account for over three-quarters of the increase in emissions to 2030. However, their per-capita emissions still remain well below those of the OECD.

Sources: IEA 2007

Energy Diplomacy

The fourth chapter is Energy Diplomacy in which attempt is made to justify the role of diplomacy to attain the energy security has been discussed and analysed thoroughly. The scarcity of resources make the situation tricky as more and more states are in to various stages of development and are vying for the vital energy resources that are scarce and limited. So, the energy diplomacy is another pillar of India's search for energy security which has been building of bilateral energy

29. Secretary Bodman Announces U.S. / India Energy Dialogue, May 31, 2005
http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf
& 'U.S.-India Joint Statement on Energy and Environment Cooperation, March 22, 2000. www. usinfo.state.gov

cooperation with immediate neighbouring countries to facilitate plans for regional natural gas and oil pipelines, including from Burma, Bangladesh, Iran and Turkmenistan[30].

India has also an impressive bilateral relation in the field of energy cooperation with extended neighbours' nations such as US, Russia, Brazil, Venezuela, Nigeria etc. On the one hand India and China have emerged as the rapidly growing energy consumers due to there high growth rate yet on the other developed world remains ahead in terms of energy consumption as compared to the newly emerging players[31]. Thus, Indian and Chinese companies and industries has been competing each other to acquire for energy sources across the globe i.e. in the African regions, in the Middle East countries, West Asia, Siberian regions etc. The dependence on energy resources and their scarcity have become important determinants of policies worldwide, the indication of which were felt strongly firstly in the 1970s, in this context David Howard Davis succinctly examine these factors of politics of energy in American context[32]. Thus the politics over energy is a prominent factor in determining the fate of energy security. India-Pakistan-Iran (IPI) pipeline has been remained a major concern for U.S., contemplating apprehensions that this would undermine the U.S. policy of isolating the Iranian regime in the global polity and economy[33].

So, on the one hand, the U.S. has consistently resisting this project and diplomatically mounting pressure on India to stop proposed pipeline, on the other hand, IPI is vitally required for India to secure energy security. Therefore, IPI remained as controversial issue. Over the long term, the United States could try to mitigate India's requirements for Iran (in the mater of energy) in its pursuit of great power status. But, some officials perceive that, India's bilateral ties with Iran may make India more valuable to the United States rather than less (Fair, 2006). India's energy diplomatic strategy would lay the path and means to address the India's hunger for energy. The major

30. Chellaney, Brahma. (2005) "India's Future Security Challenge: Energy Security" *India as a New Global Leader*, The Foreign Policy Centre, London, U.K.,. www.fpc.org.uk

31. Bradford, Colin J. (2007) "World Energy Needs, Climate Change & Global Governance Innovation", World Energy Council Report 2007.

32. Davis, David Howard (1978), *Energy Politics*, New York: St. Martin's Press

33. Pant, Girijesh. (2007)"Energy Security in Asia: The Necessity of Interdependence" *Strategic Analysis*, Volume 31, Issue 3 May, pp. 523-542.

issue of energy diplomacy is the Iran-Pakistan-India (IPI) pipeline which has been remained a major concern & challenge for U.S.'s interest and policy in West Asia & Middle East, and contemplating apprehensions that this would undermine the U.S. policy of isolating the Iranian regime in the global polity and economy.

The reality for India is that it is struggling to meet its energy demands. It currently imports 70 per cent of the crude oil it needs and its energy demands, both in oil and gas, are expected to double by 2020 as the country's economy growing rapidly. India needs energy-rich countries like Iran. Earlier in the year of 2005, Iran and India signed a $22 billion deal for Tehran to supply five million tonnes of gas a year to India. The proposed gas pipeline project is expected to come through Pakistan. Since the proposition of IPI pipeline, Washington has been conducting behind the scenes diplomacy with India, urging it to rethink such ambitious projects with Iran. So far, Delhi has not given in to the US pressure. The India-Iran partnership goes beyond the proposed gas pipeline. So, on the one hand, the U.S. has consistently resisting this project and diplomatically mounting pressure on India to stop proposed pipeline, on the other hand, IPI is vitally required for India's energy security. Therefore, IPI has been remained as controversial issue. India's traditionally close ties with Iran have become a major factor influencing how certain circles in Washington evaluate a US-India partnership vis-a vis IPI. As of now, India seems to be following a carefully balanced two-pronged track with regard to IPI.

While it has kept open its diplomatic and political channels vis-à-vis Iran, resisting US pressures to curtail its ties with Tehran. These diplomatic strategies are aimed at securing a major upstream presence through equity oil acquisition as well as the establishment of new transportation infrastructure such as transcontinental and trans-regional pipelines. India, in particular, is seriously examining the prospects of a strategic natural gas pipeline form Iran via Pakistan. If completed, such a project would fill a gap in the emerging Asian energy architecture. Oil, and particularly natural gas, will continue to be an important part of the Indian energy mix in the short-medium term and nuclear power can be seen as a substitute only in the long

term. "The gas pipeline from Burma could help invigorate economic development in India's restive North-East, which is connected to the rest of the country through an exceptionally narrow corridor crammed between Bhutan and Bangladesh"[34].

34. Chellaney, Brahma, (2005)"India's Future Security Challenge: Energy Security" *India as a New Global Leader*, The Foreign Policy Centre, London,U.K. www.fpc.org.uk.

CHAPTER 2

Energy Security Dialogue or Cooperation

The quest for easy availability of energy to run the country or to feed the booming economy is a major driving principle for India in the 21st century. There are many ways and means to attain energy, but the most important means now-a-days countries used to adopts is energy cooperation or energy dialogue between or among themselves. Energy is the life line or backbone of any modern civilized nation's existence, growth, development and welfare. Without sufficient energy a country can't advance forwards on the path of progress and over all development and welfare of its people. The insufficiency endowment energy resources or lack of abundance natural energy resources has to rely on various sources for energy security. The Energy dialogue is one of the paths or medium to secure energy security, which a country goes for an agreement or engagement between or among the countries. This has been one the best way obtain energy security in this contemporary period when the energy demand is escalating soaring prices, which is unexpected and unlimited. Like this above reasons, the inception of US-India Energy dialogue formulated to address the concerns of energy security. The Energy dialogue between India and US has no exception, but based on mutual interest and mutual respect.

Origin of Indo-US Energy Dialogue

The origin of India-US Energy Security Dialogue goes back to the Clinton Administration of US and Vajpayee government of India during the period of late 1990s. The inception of Indo-US Energy Dialogue was with a landmark agreement "Joint Statement on Cooperation in Energy and Related Environmental Aspects" in October 26, 1999, between the U.S. Energy Secretary Bill Richardson and India's Minister for External Affairs, Jaswant Singh, signed this landmark agreement in New

Delhi[1]. India and the United States of America, the two largest and oldest democracies respectively, in the world and bestowed with abundant natural, scientific and skilled human resources, have a long history of mutually beneficial cooperation in the various fields i.e. science and technology, industry and trade, health and environment and culture and education etc. The two countries, recognizing the enormous promise for advancing their social and economic goals through cooperation in the field energy and have decided to intensify their cooperation in area of energy security[2]. The United States and India have created a Joint Consultative Group of Clean Energy and Environment to foster bilateral cooperation, government-to-government dialogue and encourage public and private sector cooperation in these sectors. The following joint statement on March 22, 2000, can elucidate succinctly the gravity of Indo-US energy dialogue:-

> By making clean energy widely available through development and application of new technologies and strengthening efforts to protect our environment and this planet's biodiversity, Indo-U.S. cooperation will contribute in significant measure towards further securing the welfare and quality of life of the peoples of the two countries[3].

In his testimony before the Committee on Foreign Relations of the Senate on July 26, 2005, Under Secretary of Energy David Garman said, "The United States and India recognizes their mutual interests are best served by working together in a collaborative fashion to ensure stability in global energy markets"[4]. The most significant and intensified agreement was signed during Manmohan Singh-Bush Administration through 'India-U.S. Energy Dialogue' in May 2005[5]. The US Secretary for Energy, Dr. Samuel W. Bodman and the Deputy Chairman of the Planning Commission of India, Dr. Montek Singh Ahluwalia, launched a new bilateral India-U.S. Energy Dialogue in Washington, DC on 31st May, 2005[6]. The

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1. Joint Statement on Cooperation in Energy and Related Environmental Aspects', Embassy of India, Washington, D.C, October 26, 1999. see also "U.S.-India Joint Statement on Energy and Environment Cooperation", March 22, 2000. http//www. usinfo.state.gov. and "The U.S.- India Energy Dialogue Joint Statement". http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf

2. Joint Statement on Cooperation in Energy and Related Environmental Aspects', Embassy of India, Washington, D.C, October 26, 1999. http//www.indianembasy .org/archive/archive/

3. According to the joint statement "U.S.-India Joint Statement on Energy and Environment Cooperation". March 22, 2000. http// www. usinfo.state.gov.

4. The testimony of Under Secretary David Garman before the Committee on Foreign Relations of the Senate on July 26, 2005.

5. Secretary Bodman Announces U.S. / India Energy Dialogue, May 31, 2005 http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf

6. Secretary Bodman Announces U.S. / India Energy Dialogue, May 31, 2005 http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf .

Energy Dialogue has build upon the broad range of existing energy cooperation between the two countries as well as develops new avenues of collaboration and cooperation. Its work has been organized across five Working Groups, which supervised by a Steering Committee. The Steering Committee consists of exports responsible for creating the rules, prospects, and guidelines for Energy Cooperation[7]. The goals of the Dialogue are to promote increased trade and investment in the energy sector and work with the public as well as private sectors to identify areas of cooperation and collaboration, and building upon the broad range of existing cooperation; and also effort has made to secure, clean reliable and affordable sources of energy.

The Five Working Groups along with a Steering Committee provides direction, supervision and future course of action of the Indo-US energy cooperation. It establishes broad goals and timelines and ensures coordination among the Working Groups on crosscutting issues such as energy security, future energy scenarios and trade and investment. The Working Groups addresses topics, such as oil and natural gas, electric power, coal and clean coal technology, energy efficiency, renewable energy, new technologies such as hydrogen, and civil nuclear power[8]. This dialogue was effectively pursued till the end of Bush administration'2008.

THE GOALS OF THE VARIOUS WORKING GROUPS:

Strengthening mutual energy security and promoting stable energy markets to ensure adequate supplies of energy that would support desired levels of economic growth; exchanging information and developing lines of communication for policy coordination in times of market instability; promoting increased trade and investment in the oil and gas sector. Advancing understanding of efficient generation, transmission, distribution and use of electricity and promoting the exchange of information on regulatory policies; cooperating on programs and technologies with

7 . ibid.

8 . . ibid.

special emphasis on the "last mile" distribution and utilization of electricity in urban and rural networks; developing cooperation on clean coal preparation and modern coal conversion systems in power generation[9]. A Memorandum of Understanding was signed on April 4, 2008 between the Ministry of Petroleum and Natural Gas and the Department of Energy, USA for cooperation in gas hydrates which, among other things would facilitate the establishment of a Gas Hydrate Technology Center in India. The Hindustan Petroleum Corporation Limited (HPCL) and the United States Trade Development Agency signed a Grant Agreement under which technical assistance would be provided for the proposed HPCL Asset Integrity Management Project[10].

India's Rising Energy Consumption

India is the world's fifth largest energy consumer and may become third by the middle of this century. Overall power generation in the country more than doubled from 1991 to 2005[11]. Coal is the country's leading commercial energy source, accounting for more than half of national demand. India is the third most coal producer in the world, and domestic supplies satisfy most demand but, most of the India's coal is an inefficient low-grade, high-ash variety and unhealthy. Oil consumption accounts for some one third of India's total energy consumption; about 70 per cent of this oil is imported, mostly from the West Asia or Middle East regions. India's domestic natural gas supply is not likely to keep pace with growing demand, and the country has to import as much as of its natural gas, either via pipeline or liquefied natural gas. Hydropower, especially abundant in the country's northeast and near the border with Nepal, supplies about 5 per cent energy needs. Nuclear power, which Indian government officials and some experts says that this is a potential sector and urgent need of expansion, currently accounts for only 1 per cent of the country's energy supplies and less than 3 per cent of total electricity generation[12]. Even optimistic projections suggest that nuclear power will provide less than 10% of

9 . India - U.S. Energy Dialogue Joint Statement Washington, DC May 31, 2005
U.S. Department of State, Washington, DC

10 . India US Energy Dialogue Meetings, New Delhi-March 31-April 4, 2008 Embassy of India - Washington DC April 4, 2008.

11 . Ministry of Power report at [http://powermin.nic.in/reports/pdf/ar05_06.pdf].

12 . Energy data from U.S. Department of Energy, Energy Information Administration, January 2007, [http://www.eia.doe.gov/emeu/cabs/india.html];

Table -2. 1

Key Energy Indicators for India

	1980	1990	2000	2005
Total primary energy demand (Mtoe)	209	320	459	537
Oil demand (mb/d)	0.7	1.2	2.3	2.6
Coal demand (Mtoe)	75	152	235	297
Gas demand (bcm)	1.4	11.9	25.4	34.8
Biomass and waste (Mtoe)	116	133	149	158
Electricity output (TWh)	119	289	562	699
TPES/GDP (index, 2005 = 100)	163	142	120	100
Total primary energy demand per capita (toe)	0.30	0.38	0.45	0.49
CO2 emissions per capita (tonne)	0.43	0.69	0.95	1.05
Oil imports	0.5	0.6	1.6	1.8
Electricity demand per capita (kWh)	174	341	553	639

Source: International Energy Agency, World Energy Outlook 2007: China and India Insights (Paris, France: OCED/IEA, 2007, p. 444).

India's generation capacity in 25 years and there are doubts about New Delhi's projected goal of generating 20 gigawatts of nuclear power by 2020[13]. Roughly one-fifth of the India's power is consumed by farmers' irrigation systems, making the farm lobby a powerful obstacle to curtailing subsidies provided by State Electricity Boards, which collectively lose billions of dollars annually. Moreover, from one-quarter to one-half of India's electricity is said to disappear though "transmission losses," i.e., theft[14].

During a March 2007 visit to New Delhi, U.S. Energy Secretary Sam Bodman hold wide-ranging talks with numerous Indian officials and business leaders to discuss India's energy needs and strategies for relevant bilateral cooperation. Secretary Bodman stressed "the absolute necessity of substantial and sustained investment in innovation on a global scale" and listed five major global goals for all countries, including the United States and India: 1) diversifying the available supply of

Tanvi Madan, "India, "Brookings Institution Energy Security Series Report, November 2006. [http://www.brookings.edu/fp/research/energy/2006india.pdf].

13 . John Stephenson and Peter Tynan, "Will the U.S.-India Civil Nuclear Cooperation Initiative Light India?," November 13, 2006, at [http://www.npec-web.org]; "Top Scientist Questions India's N-Energy Dream," Times of India (Delhi), September 9, 2007.

14 . India Struggles With Power Theft," BBC News, March 15, 2006; "Electricity Crisis Hobbles an India Eager to Ascend," *New York Times*, May 21, 2007; "Power Outages disrupt Life in India," Associated Press, March 10, 2008.

conventional fuels and expanding their production; 2) diversifying energy portfolios through expanded use of alternative and renewable sources, including nuclear energy; 3) promoting increased energy efficiency and conservation; 4) reducing pollution and energy intensity in the global economy; and 5) protecting critical energy infrastructure ecosystems, with agriculture, infrastructure, and water resources most affected[15].

Energy Security, Environment and Climate Change

Indian officials noted that India accounts for 17% of the earth's population but only 4% of its Green House Gas (GHG) emissions, thus far reject any policies or international agreements that would set limits on their own national emissions while calling it "imperative" that developed countries commit themselves to reducing their own emissions. New Delhi criticizes Washington for failing to take "historical responsibility for cumulative emissions" and for bringing "extraneous considerations of industrial competitiveness and employment" to bear on the debate. India asserts that its own continued economic development and poverty reduction efforts prohibit capping its GHG emissions and claim there has been a "persistent attempt" by some developed countries to "avoid their legal obligations" under international treaties[16].

In June 2008, the Indian government unveiled India's first-ever "national action plan" to address climate change, with Prime Minister Singh acknowledging that the country faced a "dangerous problem" and vowing to devote greater attention to renewable energy, water conservation, and preserving natural resources. The plan sets out eight "national missions" for sustainable development: solar energy; enhanced energy efficiency; sustainable habitat; conserving water; sustaining the Himalayan ecosystem; a "Green India;" sustainable agriculture; and a Strategic Knowledge Platform for Climate Change[17]. The United States and India note that their common desire to promote clean energy and protect the environment has guided past cooperation and joint initiatives. India-US, accorded high importance to this aspect of

15 . See at http://newdelhi.usembassy.gov/pr032007a.html.

16 . "Talk by Special Envoy of Prime Minister, Shri Shyam Saran in Mumbai on Climate Change," Indian Ministry of External Affairs, April 21, 2008.

17 . June 30, 2008 press release at [http://pmindia.gov.in/pressrel.htm]; "India Offers 8 Ideals on a Climate Change Policy, but Few Details," *New York Times*, July 1, 2008

bilateral energy cooperation. They intended to activate related mechanisms established in the past, including ministerial meetings under the Indo-U.S. Bilateral Energy Consultations, and to intensify further cooperation in the fields of clean energy and environmental protection, including the impacts of air and water pollution on human health[18].

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The two countries are taking many initiatives to mitigate the impact of energy production and use on the environment. India, which was the first country to establish a full-fledged Ministry for Non-conventional Energy Sources, is working to make renewable energy sources a viable and significant part of India's energy supply. India is one of the largest users of wind energy and solar energy in the world and has also made impressive advances in generating energy from wastes. India intends to achieve 10 per cent by 2012, a share for renewable energy in the capacity-additions of electricity nationwide. In the field of conventional energy, India is increasingly making fossil fuel energy cleaner and more efficient. India have been improving energy efficiency in the electric power sector by focussing on renovation and modernization including re-powering of old power plants to improve Plant Load Factor, upgrading and strengthening of sub-transmission and distribution to reduce Transmission and Distribution losses and introduction of legislation on energy conservation for promoting end-use energy efficiency. The Bureau of Energy Efficiency is acting as the important point for affecting end-use energy efficiency and formulating goals and objectives in this area. By implementing the above activities, India intends to achieve approximately a 15 per cent improvement in energy efficiency by 2007-08[19].

The United States and India reaffirm their strong support for international efforts to combat global climate change under the UN Framework Convention on Climate Change and its Kyoto Protocol, Clean Development Mechanism (CDM). They reaffirm the urgent need for international dialogue on ways in which developed and

18 . U.S.-India Joint Statement on Energy and Environment Cooperation", March 22, 2000. http://www. usinfo.state.gov.

19 . U.S.-India Joint Statement on Energy and Environment Cooperation", March 22, 2000. http://www. usinfo.state.gov

developing countries could participate in actions to combat climate change, in accordance with the principle of common but differentiated responsibilities, and in a manner consistent with sustained economic growth and social development. They recognize that, under the United Nations Framework Convention on Climate Change, the developed country Parties would take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to the developing country[20].

Provisions for implement the Agreement

The Joint Consultative Group would ensure an institutional framework between the two countries to (a) identify, initiate and monitor public and private collaborative projects in research, development, transfer, demonstration and deployment of appropriate technologies, and review policies in the areas of clean energy, renewable energy, energy efficiency and power sector reform, (b) explore and expand opportunities for commercial development and cooperation in clean energy, and (c) enhance cooperation on climate change issues that arise in the context of the United Nations Framework Convention on Climate. The two countries believe that their strong scientific and technological resources provide a sound basis for intensifying collaborative efforts, especially between the agencies of the two Governments, in research, development, demonstration and transfers of clean energy and renewable energy technologies and for improving efficiency in production and consumption of energy from conventional resources. Progress in these areas can enhance availability of energy and increase productivity and efficiency in the economy, while protecting the environment, reducing impact on the climate and preserving the bio-diversity and natural resources. The two countries emphasise the considerable mutual benefit of expanded private sector cooperation in the energy sector. They welcome the United States Energy Association, Confederation of Indian Industry-Private Sector Trade and Investment Working Group on Clean Energy and the Environment, and the creation of a Green Business Centre at Hyderabad. The Centre, a joint initiative of the Government of Andhra Pradesh, USEA and CII, is a commendable example of

20 . U.S.-India Joint Statement on Energy and Environment Cooperation", March 22, 2000. http://www. usinfo.state.gov

international private sector as well as Government-industry collaboration in the area of environment[21].

The five Working Groups and the Latest Development

Following are some of the major developments with five Working Groups laid out for the operation of the agreement efficiently and effectively. Those five Working Groups are: Oil and Gas, Coal, Power and Energy Efficiency, New Technologies and Renewable Energy, and Civil Nuclear. The five Working Groups have been consistently working rigorously materialize the energy security cooperation between the India and US, since its inception.

1) Oil & Natural Gas

India's sustained economic growth and security are intimately linked to the consistence supply of energy resources. The Indian government and policy makers are already acknowledged the importance of energy and awakened for energy security which is an essential component of the country's development agenda, calling for an integrated national energy policy and diversification of energy supplies, greater energy efficiency and rationalization of pricing mechanisms. The country's relatively poor natural energy resource endowment and poorly functioning energy market are widely viewed as major constraints on continued economic growth. Estimates indicate that maintaining recent rates of growth will require that India increase its commercial energy supplies by 4 to 6 per cent annually in coming years[22]. Adequate and reliable supplies of energy at reasonable cost are essential to fuel India's rapidly growing economy. The U.S. and India are becoming increasingly reliant upon oil and natural gas markets to satisfy their energy needs. Both nations depend heavily upon domestic supplies of coal for electric power generation and seek to increase their utilization of natural gas, renewable energy and nuclear power as well as pursue energy efficient

21 . U.S.-India Joint Statement on Energy and Environment Cooperation". March 22, 2000. http://www. usinfo.state.gov.

22. Hate, Vibhuti. "India's Energy Dilemma," Center for Strategic and International Studies, September 7, 2006, at [http://www.csis.org/media/csis/pubs/sam98.pdf

practices to ensure a balanced and sustainable energy economy that helps preserve a clean environment. The United States and India recognize their mutual interests are best served by working together in a collaborative fashion to ensure stability in global energy markets[23]. The Oil and Gas Working Group has been endeavouring to strengthen mutual energy security and promote stable energy markets to ensure adequate supplies of energy that support desired levels of economic growth. In addition, it has been working as a forum to exchange information and develop lines of communication for policy coordination in times of market instability, and promote increased trade and investment in the oil and gas sector. The Working Group has been meeting in number of occasions and formulating framework on future activities[24].

Oil and natural gas is an increasingly important fuel as India strives to meet growing energy needs by diversifying its fuel supply, with the focus on development of gas-fired electric power plants in coastal areas. India's domestic natural gas is unlikely to keep up with demand, and the country would have to import much of its natural gas, either via pipeline or as liquefied natural gas (LNG). Potential for gas use in India's growing economy is large and so far mainly, it has been constrained by insufficient supplies. India needs to almost triple its existing pipeline capacity over the next five years to accommodate LNG imports and growing domestic consumption. In India, there was no coherent natural gas policy and regulatory framework like the US till the period of late 90s. The price mechanism of natural gas also remains regulated, reducing incentives for energy companies in the Indian market[25]. The goal of the Oil and Gas Working Group, which is co-chaired by the Indian Ministry of Petroleum and Natural Gas and the U.S. Department of Energy, is to strengthen mutual energy security and promote stable energy markets to ensure adequate supplies of energy that would support desired levels of economic growth. To that end, the working group has focused on activities that facilitate the exchange information and develop lines of communication for policy, promote increased trade and investment in the oil and gas sector and examine steps to improve business climates and work with the private

23 . U.S. Department of Energy, U.S.-India Energy Dialogue, July 18, 2005, Washington, DC

24 . ibid.

25 . CRS Report on "U.S./India Energy Cooperation", S. HRG. 109–692, July 18, 2006

sector to identify areas of cooperation and collaborate with the business community on joint activities[26].

Importance of Technology Fair World for Energy Security

India's Minister of Petroleum and Natural Gas, Mr. Murli Deora urged industrialized nations on 5th April 2006 to help developing economies use emerging energy technologies to meet challenging demand of energy security. In his statement Mr. Deora said "Technologies in the field of gas hydrates, coal gasification, gas-to-liquids, coalbed methane, ultra-deep exploration and production are lesser known in the developing world"[27]. Mr. Murli Deora said, in a speech before the U.S. Energy Association, India is crafting an "integrated energy policy to provide a road map to augment and meet growing energy needs in an environmentally sustainable manner". India's demand for oil and gas is expected to grow at rates of 4.3 percent and 7.3 percent a year, respectively, between 2005 and 2025, he said[28]. India and the US have signed an agreement on FutureGen initiative that enabled India as the first country to join the government steering committee for the FutureGen initiative. FutureGen is a Department of Energy (DOE) program to build a coal-based power plant that removes and sequesters carbon dioxide while generating electricity and hydrogen. Deora went to Houston, where he met with energy companies as part of an international "road show" to discuss 55 blocks the country is putting up for oil and gas bidding, the sixth round under its new exploration licensing policy[29].

National Gas Grid:

With the assistance of the US companies and officials, India has been trying to work out for National Gas Grid. Construction of a ''National Gas Grid'' is one of the major national priorities and plans for the construction of over 7,000 km of pipelines for a cost of about $4.5 billion have been undertaken to address the concerns. The WGs are

26 . www.thcembassyofus.gov., New Delhi, India &www.indianambasy.org

27 . 1997-2008 World Business Council for Sustainable Development (WBCSD).

28 . ibid.

29 . ibid.

allowing the US to work with India on key areas of concern in the energy sector. A key example is our support of a national gas grid. Through the support of the U.S. Trade and Development Agency (USTDA), the Indian Ministry of Petroleum and Natural Gas, is exploring the feasibility of a national gas grid for reaching all major energy consuming areas in India. Expanded access to, and utilization of, natural gas is expected to facilitate economic growth and maintain sufficient energy supplies to avoid potential shortages as India's energy demand grows. This represents an example of the U.S.-Indian private and public sector cooperative efforts underway as a part of the U.S.-India Energy Dialogue[30].

In a speech Address by David Pumphrey, Deputy Assistant Secretary U.S. Department of Energy was remarkable of Indo-U.S. Conference on "Building Natural Gas Markets in India" in New Delhi, India May 17, 2006. That has been advancing agenda for further U.S.-Indian cooperation on energy and helping to build strong markets for natural gas in India. He said that, it is President Bush's conviction that US partnership with India would be one of our most important in the 21st century; a transformed U.S.-India relationship, premised upon a new strategic alliance for which energy security and energy cooperation play a key role. Both the United States and India face many challenges in fuelling its growing economy and satisfying the rising aspirations of their people. Recognizing the mutual interests is best served by working together in a collaborative fashion to ensure stability in global energy markets[31]. In addition, in partnership with the United States Agency for International Development (USAID), the U.S. Department of Energy's Clean Cities program has trained over 300 technicians and policy makers on CNG and autogas vehicles and stations. They also completed a CNG station design and assessment in the city of Delhi and helped form the Indian autogas coalition, which is made up of U.S. and India company representative and government officials, to help bring product to market and develop codes and standards for autogas stations and vehicles. There is also an engine demonstration project looking at ways to convert polluting diesel engine to cleaner fuels such as compressed natural gas and auto gas[32]. There has been a joint research

30 . CRS Report on "U.S./India Energy Cooperation", S. HRG. 109-692, July 18, 2006

31 . www.theembassyofus.gov., New Delhi, India &www.indianambasy.org

32 . ibid.

activities initiated i.e. the Department of Energy is currently working with India on the first hydrate drilling offshore India. The expectation was that the cruise could produce a wealth of data that would enhance or expand basic understanding of hydrates for aid both of ongoing R&D effort and accelerate efforts to develop methane production from hydrates in both countries[33].

There has been series of seminars, conferences, workshops etc. to mobilize private investment in India's energy sector and facilitated to identify viable commercial opportunities for American companies. This is a first and foremost, anticipation of American business community. With the enormous capital requirements for India's energy sector, foreign investment is crucial for meeting India's future energy needs[34].

India has revealed great progress with the enacting of the Petroleum Regulatory Board Law which created an independent regulatory body, and this working group have been assisting the further development of the structure and procedure of that organization. The government participants from both the U.S. and India have been participating in regulatory workshop to support India in developing a more competitive and transparent set of regulations. The development of a natural gas pipeline policy and the enactment of the Petroleum Regulatory Board Bill were significant steps in promoting both public and private sector investment in India's natural gas exploration and development, and infrastructure with the objective of improving energy supply security and expanding the importance of natural gas in India's energy mix[35]. The advancement of other aspects of government to government cooperation such as the grant agreement between the U.S. Trade and Development Agency (USTDA) and the Petroleum Policy Analysis Cell (PPAC) of the Ministry of Petroleum and Natural Gas to cooperate on a feasibility study for planning the development of a viable natural gas infrastructure. USTDA has had an active program in the Indian energy sector for some time, providing grants for feasibility studies,

33 . ibid.

34 . www.theembassyofus.gov., New Delhi. India &www.indianambasy.org

35 . ibid.

technical assistance and orientation covering both upstream and refinery projects in oil and natural gas, and well as supporting CBM projects and initiatives[36].

Under Secretary Albright pushed to the zenith to the US-India Energy Cooperation by signing a "Historic Agreement to Promote Gas Hydrates as a Clean Alternative Energy Source" on April 4, 2008, in New Delhi. "As two of the world's largest energy users and world economies, the U.S. and India play a pivotal role in advancing global energy security," said Under Secretary Albright[37].

Under Secretary Albright and India's Secretary of Petroleum and Natural Gas, M.S. Srinivasan, also, signed a Memorandum of Understanding (MOU) for Cooperation in Gas Hydrates to guide future efforts in expanding the use of gas hydrates as a clean, abundant natural energy resource. The MOU provides a framework for the nations to exchange information and analyses, conduct joint studies and projects, exchange scientific and technical personnel, and facilitate the establishment of a Gas Hydrate Technology Center in India in order to increase understanding of the geologic occurrence of, and the potential for methane production from, natural gas hydrates in both India and the United States[38].

2) Coal and Clean Coal Technology

Coal is the country's leading commercial energy source, accounting for more than half of national demand. India is the world's third most productive coal producer, and domestic supplies satisfy most demand, though, most of India's coal is an inefficient low-grade, high-ash variety. Oil consumption accounts for some one-third of India's total energy consumption; about 70% of this oil is imported mostly from the West Asia or Middle East region. India's domestic natural gas supply is not likely to keep pace with demand, and the country will have to import much of its natural gas, either

36 . ibid.

37 . U.S. Dept of energy. www.departmentofenergy.gov.us

38 . U.S. Department of Energy. www.departmentofenergy.gov.us

via pipeline or as liquefied natural gas. Hydropower, especially abundant in the country's northeast and near the border with Nepal, supplies about 5% of energy needs. Nuclear power, which Indian government officials and some experts say is a sector in dire need of expansion, currently accounts for only 1% of the country's energy supplies and less than 3% of total electricity generation[39].

The Coal Working Group (CWG) has been promoting the efficient and environmental friendly and responsible use of coal. Its activities was designed to enhance the understanding of coal-related energy issues and promote the exchange of information on policies, programs, and technologies with special emphasis on coal utilization for power generation and clean fuels production[40]. The CWG has also been organising a number of workshops, seminars, conferences, training programmes etc. The objective of the CWG and all these is to: Enhance the understanding of coal-related energy issues and promote the exchange of information on policies, programs and technologies with special emphasis on coal utilization for power generation and clean fuels production; Promote the efficient and environmentally responsible use of coal; Promote increased trade and investment in the coal and coal power sectors; Encourage India's active participation in the Carbon Sequestration Leadership Forum, and Methane to Markets Partnership; Work with the private sector to identify areas of cooperation and collaborate with the business community on joint activities[41]. Since its inception, the Coal Working Group has had several meetings. Meeting summaries are hold on a number of topics, including: coal beneficiation; waste coal utilization; coal mine safety; coal mine methane; overburden dump stability; steep seem coal extraction; underground coal gasification and coal liquefaction. In addition, the CWG has developed a high level work plan that identifies the priority items of interest that would be pursued by the group[42].

39 . Energy data from U.S. Department of Energy, Energy Information Administration, January 2007, at http://www.eia.doe.gov/emeu/cabs/india.html; Tanvi Madan, "India," Brookings Institution Energy Security Series Report, November 2006 at http://www.brookings.edu/fp/research/energy/2006india.pdf.

40 . U.S. Department of Energy, U.S.-India Energy Dialogue, July 18, 2005, Washington, DC http://energy.gov/print/3284.htm

41 . US Department of Energy> International Activities> Bilateral Agreements > US-India Coal Working Group http//www.energy.gov/index.hmt.

42 . ibid.

The Coal Working Group has also been identified several high priority projects that would be pursued by two countries, including pursuing investment opportunities and information exchanges in the areas of coal mining and processing, coal mine safety, coal mine methane, and in situ coal gasification[43]. The U.S. Trade and Development Agency has provided a $360,000 for a feasibility study grant for the Neyveli coal mine expansion project. Technical exchanges and visits are underway between the U.S. and India to examine the potential for pilot projects in India in the areas of underground coal gasification and coal beneficiation/coal washeries[44]. In the area of coal-based power generation, a proposed strategic partnership has been established between India's National Thermal Power Corporation and the U.S. Department of Energy's National Energy Technology Laboratory to collaborate on advanced research and development of clean and efficient power generation. There has been a joint strive to study on the possibility of Integrated Gas Combined Cycle power plants in India[45].

President George W. Bush announced that India has become the first country to participate on the government steering committee for the U.S. Department of Energy's FutureGen project-an initiative to build and operate the world's first coal-based power plant that removes and sequesters carbon dioxide (CO2) while it produces electricity and hydrogen. As a partner, the Indian government has contributed $10 million to the FutureGen Initiative and Indian companies also be invited to participate in the private sector segment[46]. "We welcome India in to our effort to build the first zero-emissions coal power plant," Secretary of Energy Samuel W. Bodman said. "The success of the FutureGen Initiative will lead to the effective and environmentally clean use of coal to power economies around the globe." FutureGen will use coal a low-cost, abundant, and geographically diverse energy resource to globally supply clean energy. The FutureGen Initiative is a 10-year effort announced by President Bush to integrate advanced coal gasification technology, hydrogen from coal, power generation, carbon dioxide capture, and geologic

43 . Statement of David Pumphrey Deputy Assistant Secretary for International Energy Cooperation Office of Policy and International Affairs U.S. Department of Energy before the U.S. Senate Committee on Energy and Natural Resources United States Senate July 18, 2006.

44 . ibid.

45 . ibid.

46 . accessed at: http://energy.gov/print/3284.htm

storage[47]. FutureGen is scheduled to begin operations around 2012 and will be the first plant in the world to produce both electricity and commercial-grade hydrogen from coal simultaneously. Virtually every aspect of the 275 megawatt prototype plant would be based on cutting-edge technology. Technologies planned for testing at the prototype plant could ultimately lead to power plants that are fuel-flexible and capable of multi-product output. Eventually, the technologies could provide electric power generation with no emissions, including carbon dioxide, at a market competitive cost. FutureGen will emit virtually no airborne pollutants; no wastewater will be discharged; solid wastes will be converted to commercially valuable, environmentally benign products and carbon gases will be captured before they escape into the atmosphere[48].

The Coal Working Group is chaired by the U.S. Department of Energy's Office of Fossil Energy, and India's Ministry of Coal. The objective of the CWG is to: Enhance the understanding of coal-related energy issues and promote the exchange of information on policies, programs and technologies with special emphasis on coal utilization for power generation and clean fuels production; Promote the efficient and environmentally responsible use of coal; Promote increased trade and investment in the coal and coal power sectors; Encourage India's active participation in the Carbon Sequestration Leadership Forum, and Methane to Markets Partnership; Work with the private sector to identify areas of cooperation and collaborate with the business community on joint activities.

Since its inception, the Coal Working Group has had several meetings. Meeting summaries are available, along with copies of the technical presentations that address a number of topics, including: coal beneficiation; waste coal utilization; coal mine safety; coal mine methane; overburden dump stability; steep seem coal extraction; underground coal gasification and coal liquefaction. In addition, the CWG has developed a high level work plan that identifies the priority items of interest that will

47 . accessed at: http://energy.gov/print/3284.htm

48 . ibid.

be pursued by the group. The Coal Working Group (CWG) met for the first time the parties agreed that: the CWG would initially focus on coal washing or ash reduction, in situ coal gasification; coal liquefaction; coal mine closure and coal mine safety; and personnel training; participants should include government as well as private sector entities; and the CWG should meet in person in Washington, D.C. in the ensuing months[49]. The second Coal Working Group draws attention from the U.S. and Indian governments, industry, national laboratories, and research institutions, for overall Coal Working Group's goals and objectives, structure, scope of activities and membership. Among other proposed actions, the Coal Working Group committed to establishing a Coal Business Council-a resource to the group consisting of representatives from business, academia, and other non-government organizations. The third Coal Working Group out come was attracted over 50 participants from the US and Indian governments, industry, national laboratories, and research institutions. The participants discussed the overall Coal Working Group's goals and objectives, scope of activities, and proposed projects[50].

In addition, the Coal Working Group co-chairs, Jeffrey Jarrett, U.S. Department of Energy's Assistant Secretary for Fossil Energy, and Pradeep Kumar, Additional Secretary of India's Ministry of Coal, adopted and signed the jointly developed high level work plan. Coal Beneficiatio, Waste Coal Utilization, Advanced Coal Cleaning, Coalbed Methane, Coal Gasification, Overburden Dump Stability, Mining of Steep Seams, Coal Mine Safety[51]. The fourth Energy Dialogue Coal Working Group (CWG) meeting was held in Washington, DC on June 5-7, 2007. Many participants from the U.S. and Indian governments, industry, national laboratories, and research institutions discussed the achievements and the status of CWG projects, and reviewed three joint research and development projects addressing coal preparation that would promote energy security, pollution reduction and mitigation of greenhouse gases in ways that do not hamper economic development. In addition, stressed regulatory

49 . http://fossil.energy.gov/international/International_Partners/July_2005_CWG_Meeting.html

50 . ibid.

51 . ibid.

frameworks to ensure safety and environmental protection, and opportunities to implement CO2 capture and storage, and clean fossil energy technologies[52].

The major achievements are in three categories: technical exchange visits; workshops and conferences; and actual projects. With regard to Technical Exchange Visits: The Coal Working Group has sponsored several site visits to India and the United States for delegates from both countries to better understand operations and best practices associated with: coal beneficiation; waste coal utilization; surface and underground mining operations; coal mine safety; overburden slope stability; steep seam extraction; and mine reclamation[53].

Major Future Plans:

There is a future road map or plans relating coal was drowned by the CWG, which signifies huge task and progress of Indo-US Energy Dialogue. Some of the future plans are following:

A) The CWG has identified several areas of mutual interests, and draft proposals have been developed by the US side and provided to the Ministry of Coal and Coal India for their evaluation and funding consideration. Topics include: dry coal beneficiation; underground coal gasification; and waste coal utilization for power generation. B) Several potential areas were identified for potential collaboration between India's Central Institute for Mining and Fuel Research (CIMFR) and US DOE's National Energy Technology Laboratory (NETL). C) The Indian delegation identified several additional areas for possible collaboration including: addressing issues related to lignite coal including UCG and coal bed methane development, dump slope stability, and seepage water control in overburden reaches; examining innovative and accelerated techniques for coal resource characterization with an emphasis on geo-physical methods; coal liquefaction; developing a model approach to increase usable energy from indigenously mined coal; and assessing approaches for reviving selected

52 . http://fossil.energy.gov/international/International_Partners/June_2007_CWG_Meeting.html

53 . http://fossil.energy.gov/international/Publications/steering_committee_april08_swift.pdf

abandoned mines in Coal India Ltd[54]. D) USTDA is reviewing funding for consideration of a coal-to-liquid proposal in public-private partnership. The proposed cost-shared feasibility study and pilot testing could involve co-processing of lignite and refinery bottoms to produce high-grade liquid fuels in Gujrat[55]. E) The CWG would be work with representatives from the Confederation of Indian Industries (CII), USAID and NETL to explore the possibility of including coal processing technology providers in the proposed fall workshop for US service providers in India. In summary, the Coal Working Group has made significant progress, and laid the groundwork for maintaining our momentum into the future[56].

3) Power and Energy Efficiency

The Power and Energy Efficiency Working Group will advance understanding of efficient generation, transmission and distribution of electricity and promote the exchange of information on regulatory policies. It will develop cooperative programs and promote technologies to enhance end-use efficiency with special emphasis on the "last mile" distribution and utilization of electricity in urban and rural networks. It will also conduct cooperation on clean coal preparation and modern coal conversion systems in power generation[57]. The Government of India's Energy Vision and Indian Energy Efficiency Institutions In its latest draft report on an integrated energy policy, the Indian Planning Commission laid out a vision of providing energy security to all citizens of India[58]. Energy security broadly defined includes not only reducing vulnerability to supply disruptions but also ensuring that minimum energy needs of vulnerable households are met and that energy is used and supplied in an environmentally sustainable way. The three pillars of sustainable development economic, social and environmental, all need to be addressed in the provision of adequate energy supplies. The vision also recognizes that fuel flexibility is important

54 . ibid.

55 . ibid.

56 . ibid.

57 . U.S. Department of Energy, U.S.-India Energy Dialogue, July 18, 2005, Washington, DC

58 . Planning Commission, (2005), Government of India, Draft Report of the Expert Committee on Integrated Energy Policy. December http://planningcommission.nic.in/reports/genrep/intengpol.pdf

since energy carriers can substitute one another and, hence, an integrated policy can pay rich dividends. Articulating such a vision and making it implementable in the field of energy efficiency is a challenge faced not only by India but also by other major countries. In recognition of the importance of energy conservation, the Indian government created the Petroleum Conservation Research Association (PCRA) in 1978[59]. PCRA continues to play an active role in the promotion of petroleum fuel saving strategies and functions as a think tank to the government for proposing policies and strategies on petroleum conservation and environmental protection aimed at reducing excessive dependence on oil.

In 2001, the Indian parliament passed the Energy Conservation Act 2001, which established the Bureau of Energy Efficiency (BEE) which became operational on 1 March 2002 under the Ministry of Power. BEE's mission is to develop programs and strategies based on self-regulation and market principles with its primary objective to reduce the energy intensity of the Indian economy. BEE is developing regulatory and voluntary programs and strategies with primary objective to reduce the energy intensity of the Indian economy. Some key activities that BEE is pursuing include: the development of energy performance standards and labels for refrigerators; motors, air conditioners, and other mass produced equipment; certification of energy managers and auditors; assisting industry in the benchmarking of their energy use; and energy audits of prominent government buildings. BEE is also working closely with energy development agencies at the state level in order to deliver energy efficiency services including through public-private partnership. The Indian Parliament also passed the Electricity Act in 2003[60].

The Act consolidated laws related to generation, transmission, distribution, trade and use of electricity. Among other things, the Act called for the rationalization of electricity tariffs, creation of a competitive environment, and open access in transmission and distribution of electricity. The Act also mandated the creation of

59 . http://www.pcra.org/

60 . http://powermin.nic.in/acts_notification/electricity_act2003/preliminary.htm

regulatory commissions at the central, regional and state levels. As a consequence, the electric utility system is being unbundled, tariffs are being rationalized, and regulatory commissions are playing an active role in enforcement of bill collection and the promotion of DSM programs in some of the larger states. Under orders from the Maharashtra Electricity Regulatory Commission, for instance, utility companies in Maharashtra have initiated a lighting efficiency program in the residential sector[61], and the Bangalore Electricity Supply Company has initiated a similar program in Karnataka state[62].

Indian industry associations have played an important role in promoting energy efficiency. The Confederation of Indian Industry (CII) and Federation of Indian Chambers of Commerce and Industry (FICCI) are engaged in capacity building through the organization of training programs, workshops, conferences, exhibitions, poster displays, awards, and field visits. The Indian Green Business Centre is an example of an institution created by an industry association; CII, jointly with the Andhra Pradesh government and with technical support from USAID, established the Centre as a public private partnership[63].

Its building has acquired the LEED platinum rating, and one of its five working groups is engaged in facilitating energy efficiency improvement across industry through improved capacity utilization, fine tuning, and technology up gradation Private ESCOs have mobilized and recently set up the Indian Council for Energy Efficiency Business (ICPEEB) to network, provide input to policy makers, support business development, and disseminate information on energy efficiency[64].

61 . http://mercindia.org.in/Orders_2005.htm

62 . http://www.bescom.org/en/news/belp.asp.

63 . http://greenbusinesscentre.com/energyeffic.asp

64 . http://www.shrishakti.com/alternativeenergy/index.html

International Cooperation

Cooperation between US and India requires that entities with common energy efficiency goals and activities exist in the two countries, which is not the case today. At the federal level, the US DOE and EPA has several hundred staff members, and combined with the expertise at the national laboratories, thousands of staff are engaged in various facets of energy efficiency research, demonstration, development and transfer of technology. The US state governments, utility companies and commissions have similar magnitude of expertise for promotion of energy efficiency[65]. Cooperating with India would require that entities with similar functions exist in the country. A concerted effort on part of the Indian government and private sector to establish energy efficiency expertise at relevant entities and/or the creation of new entities will go a long way towards improving collaboration with the US and other countries. In India, the Energy Conservation Act 2001 provides for the establishment of state energy conservation agencies to plan and execute programs. The Power and Energy Efficiency Working Group organized the US-India Energy Efficiency Conference, which was hold in New Delhi. This Working Group promotes the exchange of information on technology and regulatory policies and would develop cooperative programs and promote technologies to enhance electricity endues efficiency. It is recognized by the Working Group that most energy efficiency technologies are cost effective, but implementation is hampered by institutional, procedural, and process barriers. This is not unique to India. There are lessons to be learnt from other countries in understanding ways that energy efficiency could be promoted in the Indian market environment. The main aim of the Conference is to explore the barriers to implementation of energy efficiency in India, illustrate ways in which such barriers are overcome, and delineate approaches of how energy efficiency markets could be triggered in India in the buildings and industrial sectors. This paper was prepared to provide background information for participants of the US-India Energy Efficiency Conference. It highlights energy efficiency technologies, barriers, and policies and programs that are being implemented in the US, India and other selected countries.

65 . http://www.eere.energy.gov/femp/program/utility/utilityman.energymanage.cfm.

The Significant Role of Energy Efficiency

The Indian economy has grown rapidly over the past decade. The rapid economic growth has been accompanied by commensurate growth in the demand for energy services that is increasing the country's vulnerability to energy supply disruptions. This vulnerability is not unlike that observed in the US and China[66], which too import an increasing share of their oil and gas requirement. India relies on indigenous coal, and to a lesser extent oil, to meet its energy demand. While the country has large reserves of coal, it relies on imported oil for almost two thirds f its oil needs, possesses limited natural gas reserves, and faces chronic electricity shortages. The inability of the electricity grid to supply reliable power, particularly to business consumers, has prompted increased use of captive power generation that often uses diesel fuel. The rising demand for petroleum products and natural gas is expected to be met through imports. Coupled with deteriorating coal quality, India's energy situation is likely to worsen its vulnerability to volatile fuel prices in a tightening world oil and gas market. These vulnerabilities are being addressed through diversification of energy imports, the development of indigenous fossil and renewable energy sources, and, last but not least, reduction of the intensity of energy use of the Indian economy. In this report, we focus on ways to stretch India's existing energy supply capacity by making energy use more efficient[67].

The increased efficiency would permit energy companies to meet their demand obligations, and energy-short businesses to increase production that will result in higher tax payments to governments at all levels. More efficient use of energy thus has the potential to reduce the nation's vulnerability in both the imported fuels and electricity markets. Efficiency improvement also has the potential to boost economic growth that can result in higher tax revenue for the government. An analysis of the electricity efficiency potential for India shows that efficiency improvement in combination with new supply can eliminate electricity shortages at the same

66 . While bulk of this report is about US and India, the highlight examples from China since that country have made substantial gains in reducing its energy intensity over the past two decades.

67 . There are two ways of increasing the efficiency of electricity use, first using energy efficient technologies to permanently reduce peak demand; and second, creating mechanisms that allow electricity customers to occasionally reduce electricity usage for short time periods in response to signals from system operators either for economic purposes or grid safety purposes.

investment level as for a business-as-usual electricity supply scenario[68]. A similar analysis of macroeconomic benefits for India's state of Maharashtra illustrates that redirecting electricity saved through efficiency improvements to electricity-short businesses has the potential to increase economic output and tax revenue, which could reduce the state government's fiscal deficit by 15 to 30% depending on the size of backup power generation[69]. Economic analyses of energy efficiency, including Demand Response (DR), technologies often portray these as being cost-effective when compared with supply alternatives. Since they reduce energy use or shift peak energy use to off-peak hours they also eliminate deleterious environmental consequences and vulnerability to supply disruptions.

There are lessons to be learnt from other developed and developing countries, such as the US and China, in understanding ways that energy efficiency could be promoted in the Indian market environment. The main goal of this report is to explore approaches that ensure that public policy and programs work with market forces and businesses for implementation of energy efficiency[70]. The conclusion by noting the lessons learned and the key activities that India could pursue in moving forward in implementing energy efficiency programs in the country. The suitable things should be noted out for the best practices that could be implemented in India to promote energy efficiency.

4) New Technologies and Renewable Energy

During the period of year from 1990 to 2002 India failed to achieve any noteworthy progress in the management and development of its energy sector, especially in the areas of cleaner and renewable energy. At that time, there was dearth of a holistic energy policy and the increasingly reliance on road transportation or underdeveloped

68. Sathaye J., J. Roy, R. Khaddaria and S. Das, (2005) Reducing Electricity Deficit through Energy Efficiency in India: An Evaluation of Macroeconomic Benefits Accepted for presentation at the Fifteenth International Input-Output Conference held from June 27 to July 1, 2005 at Renmin University, Beijing, China.

69. Phadke A., Sathaye J. and Padmanabhan S. (2005) Economic benefits of Reducing Maharashtra's electricity shortage through end-use efficiency improvement *LBNL Report* 57053.

70. "Implementing End-use Efficiency Improvements in India: Drawing from Experience in the US and Other Countries" US- India energy efficiency technology cooperation conference, 2-3 May, 2006, New Delhi. http://www.eere.energy.gov/femp/program/utility/utilityman.energymanage.cfm.

infrastructure etc. are further worsening the situation. More funds need to be allocated towards rapid upgrading and expanding India's railway infrastructure and improved road taxes for transport vehicles need to be applied. To promote the effective use of renewable energy sources strong, committed leadership is urgently required, and the US is committed to assist, guide, to provide technical help for realisation of India dream for energy security. U.S.-India energy cooperation has also focused on the fostering of reliable sources of fuels, including development, deployment, and commercialization of technologies for sustainable, renewable fuels. This work includes creating public-private sector partnerships, as well as the promotion of investment, trade, and technology cooperation in the development of renewable resources such as solar, wind, hydro, and biomass. The Minister of Non-Conventional Energy Sources had discussed with experts at DOE's National Renewable Energy Lab to exploit potential areas of collaboration in hydrogen and bio fuels research[71].

Renewable Energy Deployment

Table-2. 2

India's Renewable Energy Potential and Targets.

	POTENTIAL (MW)	INSTALLED CAPACITY AS OF MARCH 2007 (MW)	TARGET OF 11TH FIVE-YEAR PLAN (MW)
Small hydro	15,000	1,976	1,400
Wind	45,000	7,092	10,500
Solid biomass	19,500	569	500
Bagasse CHP	3,500	615	1,200
Waste-to-energy	1,700	43	400
Solar		3	50
Distributed RE power systems			950
Total	**84,700**	**10,298**	**15,000**

Source: Report of the Working Group on New and Renewable Energy for 11th Five-Year Plan.

71 . Statement of David Pumphrey Deputy Assistant Secretary for International Energy Cooperation Office of Policy and International Affairs U.S. Department of Energy before the U.S. Senate Committee on Energy and Natural Resources United States Senate July 18, 2006

The Ministry of Non-Conventional Energy Sources (MNES) is the central ministry of the Indian government for all matters relating to new and renewable energy. Although it has a very well defined mission, its performance to date has not been impressive. Some of the major MNES's mission is as follows[72].

1. Energy Security: Development and deployment of alternate fuels (hydrogen, bio-fuels and synthetic) to help bridge the gap between domestic crude oil demand and supply

2. Development and Deployment: Renewable (bio-energy, wind, hydro, solar, geothermal & tidal) energy to supplement fossil fuel based electricity generation;

3. Technology Ladder for Traditional Biomass: More efficient and cleaner conversion of biomass to meet the energy needs of cooking, lighting and motor power in rural areas;

4. Availability, Accessibility, Affordability: Normative levels of energy supplies to energy deficient sections of the population; and

5. Per-capita Energy Consumption: Consumption to be at par with the global average level by 2050, through a sustainable fuel-mix[73]. The Indian Renewable Energy Development Agency Ltd. (IREDA) was established in 1987 as a public sector non-banking company under the Ministry of Non-Conventional Energy Sources (MNES), with the objective of providing loans for new and renewable sources of energy (NRSE)[74].

The exact production figures of Indian renewable energy are very difficult to find. MNES mainly focuses on installed capacity thus how much of this installed capacity is productive is not known. More over hydro-electricity produced by constructing big dams cannot be considered as renewable sources. The President of India in his Independence Day speech mentioned that the current share of renewable in the total primary energy is around 5%[75]. Again the figures on primary energy provided by different sources vary widely. The BP Energy statistics mentioned below probably do

72 . Dey. Dipankar. (2005/ 2006) "Energy and Sustainable Development in India", HELIO International / India, *Sustainable Energy Watch* 2005/2006, p. 52

73 . Dey. Dipankar. (2005/ 2006) "Energy and Sustainable Development in India", HELIO International / India, *Sustainable Energy Watch* 2005/2006, p. 52

74 . ibid.

75 . *The Economist*, Sept 24, 2005

not considered the non-commercial source of renewable energy such as biomass etc., which as per MNES calculation constitutes more than 31.78% of total primary energy supply. In 2001-02, the major components of the non-fossil fuel were: nuclear (1.18%) and renewable (33.52%). The later consists of hydro (1.73%); biomass (31.76%); wind (0.03%); solar and bio fuel. The difference in the statistics is mainly due to existence of large traditional source like bio mass in the total primary energy mix. If the contribution of animal and human energy is added the contribution of traditional source would be higher[76].

The New Technology and Renewable Energy Working group would promote the development and deployment of clean, new and renewable energy and technologies leading to enhanced energy security and stable energy markets that will support desired levels of economic growth with appropriate concern for the environment[77]. Promoting the development and deployment of clean energy technologies and energy conservation practices that has been improving the efficiency of energy use leading to enhanced energy security and stable energy markets that supporting desired levels of economic growth with appropriate concern for the environment[78]. Beside the above all cooperation, The Renewable Energy and Distributed Generation Task Force are helping to install biomass power generation units in three demonstration sites in India: In Madhya Pradesh, in Uttar Pradesh and in Orissa. The demonstration of renewable energy will reduce the dependence of these villages on fossil fuel energy and ultimately promote economic independence. Also works under way to build capacity in three Indian states, West Bengal, Gujarat and Punjab[79].

5) Civil Nuclear Power

The civil nuclear energy issue is an exception of my study, though the gravity this for India's as a potential and promising source of future energy. Without addressing such a issue of compelling appeal seemed to be discontented and glimpse of a brief account

76 . Dey, Dipankar. (2005/ 2006) Energy and Sustainable Development in India, HELIO International / India, *Sustainable Energy Watch* 2005/2006, p. 52

77 . U.S. Department of Energy, U.S.-India Energy Dialogue, July 18, 2005, Washington, DC

78 . Secretary Bodman Announces U.S. / India Energy Dialogue, May 31, 2005
http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf

79 . Reno Harnish (2007) Phase II of Renewable Energy in America National Policy Conference November 28-29, American Council on Renewable Energy (ACORE), Washington, DC.

is indispensable. Civil nuclear energy also widely considered and recognised as a very important part of India's energy future. However, any meaningful collaboration in this area is contingent on modification of legal framework as proposed under the U.S.-India Civil Nuclear Cooperation Initiative[80]. Fortunately, by the special effort of the President George W. Bush and Prime Minister Manmohan Singh, within the four years' of agreement, all those legal frameworks and so called hurdles related to the domestic and international laws dealt the Civil Nuclear Agreement was already mission accomplished.

India's current civilian nuclear program has an installed capacity of 3,850 megawatts electric (MWe), but, according to the Government of India, it is expected to reach 20,000 MWe by 2020. Looking longer term, the U.S. and its International Thermonuclear Experimental Reactor (ITER) partners, the European Union, Russia, Japan, Republic of Korea and China, have invited India to participate as a full partner in the international research project which aims to demonstrate the feasibility of fusion power. U.S. support has been an instrumental in ensuring implementing the agreement and providing energy security for India. The ITER partnership represents the first significant and concrete step towards greater cooperation between the U.S. and India in the area of civil nuclear energy[81]. The heart of the nuclear deal is also for India's search for energy security and is part of larger energy dialogue which focuses on oil and gas, coal, power, energy efficiency and renewable energy and new technologies[82].

The Civil Nuclear Working Group will foster exchanges between the Department of Energy and the Nuclear Regulatory Commission (NRC) and India's Department of Atomic Energy and Atomic Energy Regulatory Board on each country's peaceful nuclear energy-related initiatives, including national practices, research interests, approaches to regulatory oversight and views of the role of nuclear energy in meeting

80 . Statement of David Pumphrey Deputy Assistant Secretary for International Energy Cooperation Office of Policy and International Affairs U.S. Department of Energy before the U.S. Senate Committee on Energy and Natural Resources United States Senate July 18, 2006.

81 . Statement of David Pumphrey Deputy Assistant Secretary for International Energy Cooperation Office of Policy and International Affairs U.S. Department of Energy before the U.S. Senate Committee on Energy and Natural Resources United States Senate July 18, 2006.

82 . Mukharjee, Pranab. "No compromise on N-pact with US", The Peninsula On-line Qatar's leading English Daily.mht, date 5/5/2007.

global energy requirements. These exchanges may include discussions on peaceful applications of fusion science and related fundamental research topics[83].

Dialogue and action on issues associated with civilian uses of nuclear energy and its control; exchanges between the Department of Energy and the Nuclear Regulatory Commission (NRC) and India's Department of Atomic Energy and Atomic Energy Regulatory Board on each country's nuclear energy-related initiatives, practices, research interests, regulatory oversight and view of the role of nuclear energy in meeting global energy requirements; discussions on fusion science and related fundamental research topics[84]. Building upon the broad range of existing cooperation, we believe that we can mobilize secure, clean, reliable and affordable sources of energy. A key objective of this Dialogue include promoting increased trade and investment in the energy sector by working with the public and private sectors to further identify areas of cooperation and collaboration. Much attention has focused on the civil nuclear energy cooperation initiative, which is important, because of its potential to advance energy security, enhance the global non-proliferation regime, further environmental protection, and foster economic and technological development in both of our countries[85]. The U.S. government has committed to assist India in promoting the development of stable and efficient energy markets; the U.S.-India Energy Dialogue was launched in July 2005 to provide a forum for bolstering bilateral energy cooperation, and it has been successfully accomplishing since its inception to till the end of Bush Administration in 2008[86].

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83 . U.S. Department of Energy. U.S.-India Energy Dialogue, July 18, 2005, Washington. DC

84 . Secretary Bodman Announces U.S. / India Energy Dialogue, May 31, 2005
http://www.pi.energy.gov/documents/IndiaUSEnergyDialogueJointStatement.pdf

85 . www.theembassyofus.gov., New Delhi, India &www.indianambasy.org

86 . U.S. Department of State fact sheet at [http://www.state.gov/p/sca/rls/fs/2005/ 49724.htm]. In May 2006, the Senate Foreign Relations Committee passed S. 1950, to promote global energy security through increased cooperation between the United States and India on non-nuclear energy-related issues, but the full Senate took no action on the bill.

Chapter-3

Energy Governance

This chapter would examine the mechanism, policy or strategy of energy governance under aegis of U.S.-India energy cooperation in the context of attainment of sustainable energy security while examining it's opportunities and challenges. Management is one of the ingredient features of energy governance which is well defined in the Indo-US Energy Dialogue i.e. division of working groups, steering committees, specialized experts, officials and business communities to take responsibility of a particular area. There are number of seminars, conferences, and workshops are organised to create the public awareness about the economy of energy wastage and energy misuses. U.S-India energy security cooperation is driven by the energy governance in which negotiation over price, demand-supply, and implication of various agreements were analysed, scrutinized, discussed & debated by experts of both the countries. The U.S.-India Energy Dialogue stressed to promote the imperatives of development and safeguarding the environment, entrust to developing and deploying cleaner, efficient, affordable, and diversified environmental-friendly energy technologies. To avoid any kind of disputes, conflicts, and misunderstandings during the implementing or operation of Indo-US Energy Security Cooperation agreement between two countries, the role of energy governance is essential and paramount. There is a growing need for Indo-US bilateral energy governance dialogue, which enlightening to focus on the history of government structures in the international energy trade (i.e. disruption fuel supply by the US, after India's nuclear test in 1974). It must be emphasized that energy exploration and exploitation has been a story of permanent conflict between consumers and producers, importers and exporters, so energy governance has very important role to play. This inheritance nature of changes in the international political economy of oil and gas and world of energy structures have been in flux. First and foremost, for both countries to address collectively pressing global problems of environmental and climatic sphere by adopting mechanism of energy governance, which is very closely interconnected with energy security. A broader need for energy governance derives from the fact that energy concerns several policy fields having a cross-cutting issues interrelated &

interconnected with other policy fields such as trade, environment, climate, social policies and also closely linked to the volatile international political economy of oil and gas. World oil demand is rising by almost three percent annually and demand in India in particular has risen dramatically. The main objectives of Indo- US energy governance is building up an energy community, by setting standards for the energy market economy and providing a basis for contractual and trade relations, creating a basis for a rule of law. There are some interrelated risks identified which can commonly addressed by energy governance: Physical risks deriving from disruptions; economic risks related to price increases, environmental risks associated with 'irresponsible consumption of energy[1]. Other central issues of energy governance such as market harmonization and market transparency strategies of the U.S-India energy cooperation has to synthesised as major principle of enhanced energy security & energy supply. There is a continued and persistent demand for Indo-US political cooperation (to attain energy security), which comes within the ambit of energy governance. Indo-US energy governance mechanism is highly required to pursue a role which is not in competition with India's consumerism but in cooperation and political dialogue in order to avoid highly competitive and conflictive politics and instead to link the energy trade with policy issues such as the environment and climate. The energy security is not divisible, but can only be achieved collective cooperation through proper application of energy governance.

Definition of Energy Governance

The inadequate available of energy resources and supply of traditional or primary energy such as oil and natural gas, coal etc. are limited and lack of sufficient use of modern technology while exploring the energy resources or energy generation are urgently called for energy governance, the policies and mechanism to achieve the goal of energy security. The definition of energy governance is wider, deeper, and extensive; and varies from country to country & region to region; but the essence of energy governance experiencing and remaining omnipresence with equal degree. But the following explanation would crystallise about the definition and understanding of energy governance.

1 Ruthless use of energy without concerning its implication on ecology, global warming, pollution or survival of mankind; lack of use of smart technology while production or consumption of energy; huge industrial profit oriented activities or unrestricted fossil fuel burning.

The energy governance is as much as important as energy security, which connotes and involves issues like good management, proper distribution, use of smart modern new technology, reform of energy sector, use of national energy grid or network, creating awareness among the public about the economy of energy wastage, effective and efficiency use of administrative machineries and tools for strictly implementation of stringent law and punishment against corruption, mismanagement and irregularities or energy theft.

Energy governance is an attribute or key concept that is very much interrelated with energy security. Energy governance involves multiple issues of international co-operation in energy security, synergising of policies among states and linking the areas of trade, environment and development which have a bearing upon energy relations, security and pattern of consumption.

Therefore, we can affirm that the energy governance is "a cross-cutting issue interrelated with other policy fields such as trade, environment, climate, and social policies, but also has a hard security policy dimension that is closely linked to the international political economy of oil and gas"[2]. For examples:- there have been interesting and innovative suggestions regarding setting up a global body for energy governance, one such proposal is that a Global Energy Council (GEC) consisting of energy ministers of the eight industrial countries of G8 and five emerging market economies, namely China, India, Brazil, South Africa and Mexico have created to serve as a visible focal point for global energy issues and a mechanism for cooperation, coordination and harmonization of energy policies, prices among the governments and key private sector as actors[3]. This provides scope for a further discourse on the need and possibility of global co-operation between the developing and developed world on energy governance. The energy governance is practised when there is a tension between power of geopolitics which is state-centric, on the one hand and multilateral cooperative authority based on market and institutions on the other. In this process of energy governance, it is anticipated to analyze the reasons behind

2. Westphal, Kirsten. "Energy Policy between Multilateral Governance and Geopolitics: Whither Europe?" European Energy Policy, IPG 4/2006. p.47. http://library.fes.de/pdf-files/id/ipg/03931.pdf

3 Bradford, Colin I. (2007) "World Energy Needs, Climate Change & Global Governance Innovation" *Global Energy Council*, 2007.

the tension, specifying energy which makes it an unstable issue for global energy governance[4]. If we put it on another way, one can observe that, energy governance is based on rule of law, justice for needy, and fair for neglected; accessibility, availability and distribution of energy with human face of society.

The significance of energy governance can be comprehended which International energy Agency (IEA) has defined very succinctly.

"If the vicious cycle of energy poverty and human under-development is to be broken, governments must act to improve the availability and affordability of modern energy services, especially electricity. Good governance in the energy sector is critical to attracting infrastructure investment. Effective competitive markets give consumers choice and drive down costs"[5].

Improved governance in the energy sector has been shown to enhance the ability of developing countries to attract foreign direct investment and stimulate broad economic development with benefits for everyone. In general layman's language, energy governance refers to how decisions are made, implemented, and enforced within a energy sector and related areas as well as how disputes are resolved relating the energy issues. Energy governance means more public's accessibility, coupled with the principles of accountability, transparency, and rule of law.

Dimensions of Energy Governance

Some of the important dimensions of energy governance which are considered as threshold to procure energy security are briefly discussed as following:

1) Energy Governance through Energy Reforms

Reform of the energy sector includes a number of objectives, key among them are increased access to energy services, especially among economically and socially disadvantaged populations; greater energy efficiency, and lower operating costs. One of the assumptions underlying many reform programs is that market mechanisms are

4 . Westphal, Kirsten. (2006), "Energy Policy between Multilateral Governance and Geopolitics: Whither Europe?" European Energy Policy, IPG 4/2006. http://library.fes.de/pdf-files/id/ipg/03931.pdf

5 . International Energy Agency, *World Energy Outlook 2004*. http://usaid.govUSAID:

the best way to achieve these objectives. Though, market mechanisms cannot bring the desired changes unless they are specifically governed by energy governance. Putting markets in place requires reforms that provide incentives and initiatives to increase the flow of private capital and public sector extractive industry funds toward improved infrastructure serving the poor. Reforms are also needed to make utilities more transparent and reduce corruption. Moreover, market reforms mean developing regulations and enforcement mechanisms to achieve cost savings, which can be shared by suppliers and consumers. Energy sector reform has also opened up new opportunities for civil society to contribute to the policy making process (World Energy Outlook, 2004). Public participation in policy development and the regulatory process is an essential component of markets that seek to achieve the social and environmental objectives of reform. In the countries where energy is among the first sectors reformed, the process has been replicated across other sectors, providing a valuable example of energy governance. By promoting participation and accountability, the energy sector can provide a platform for overall reform to achieving energy governance.

2) **Energy Governance through Public Education and Awareness**

It is important that citizens and consumers understand the importance of the economy of energy wastage, and misuse of energy through public education and awareness creation. The education about the energy matters is supreme importance among the public through various methods of schooling, seminars, workshop, conferences, and lectures. Public participation in the process also considered as vital, by which not only access to information, but also, the direct participation in shaping policies and laws at national, state, and local levels, and ensuring effective enforcement. Public involvement enhances the process of accountability of governments and the private sector involved in providing energy services. Effective energy governance requires the active participation of each of these players in the design, development, an implementation of energy policies, reforms, and regulations, and then only fully realisation of energy governance is expected. [6]

6 . "USAID: energy, democracy, governance, and conflict management", U.S Aid Agency for International Development (USAID), http://www.usaid.gov

3) Energy Governance through Political leadership

Political leadership is needed to promote reforms that would improve the performance of the energy sector, in terms of both the quality and quantity of service provided. This obligates governments to understand the commercial nature of energy, the range of options for government administration of the sector, appropriate levels of intervention, the commercialization of state owned industries or companies, and the creation of an enabling environment for private sector participation. It also necessitates serving as a guardian of the public good in the expenditure of extractive industry revenue. Governments have a new and different role to play in mediating the interests of energy enterprises and energy consumers and in enforcing good governance and democratic processes[7].

4) Energy Governance through Corporate Governance

The notion of cooperate energy security suggests the need for creating international, transnational, and multinational political coalitions having a strategic multi-faceted perspective focused on for energy governance[8]. Good corporate governance is needed to provide the operating framework within which businesses which are directed and controlled, including adhering to international accounting standards, managing finances transparently, being accountable to shareholders, and making decisions on corporate affairs in an organized and in consistent manner. Good corporate energy governance is necessary for running the sector according to sound commercial practices, reducing risks, and increasing investor confidence.

5) Energy Governance through Conflict Management

The government has to provide the basic services, including energy, for which the citizens are complete reliable upon government. A USAID study showed that investments in the energy sector increase the likelihood of country stability and have positive benefits on quality of life[9]. Poor energy governance or management of energy

7 . "USAID: energy, democracy, governance, and conflict management", U.S Aid Agency for International Development (USAID), http://www.usaid.gov

8 . Cutler, R. M. (2007) "The New Concept of Cooperative Energy Security." *Oil, Gas & Energy Law Intelligence* 5, no. 4.

9 . http://www.usaid.govUSAID

resources can cause inequities and economic distortions that trigger instability, trouble and conflict. In many oil and gas producing countries, for example, lack of energy governance or mismanagement of revenues have fuelled corruption, benefited the prosperous at the expense of the poor, and led to political instability[10]. This has resulted in a few taking a larger share of the profits, rather than sharing the wealth among many. Fluctuating oil and gas prices further intensify the problem, contributing to debt and expanding the gap between the energy rich and energy poor, energy-have and energy have-not. So, the strong Energy Governance is urgently commanded, which would ensure that, more effective energy sector management and strengthening of energy enterprises to address accessibility and affordability can enhance domestic stability, address inequalities, improve living standards, increase job opportunities, decentralise and democratise the energy right for all.

6) **Energy Governance through Research & Development**

The research and Development (R&D) in the field of energy sector constitutes a major component of energy governance, which relies, believes in implementation of the latest scientific & technological developments in energy sector, resulting "Energy Revolution"[11]. An energy revolution would raise energy production, efficiency, green & clean energy in a sustainable manner. The real revolution only take place is one of attitudes and ideas, which are essentially believed to be product of research, investigation, and experiment activities that needs many of the new technologies. In the general, "if we put them to work and create systems that allow for all the growth we want without running out of energy or harming the earth, we will have achieved true energy independence" (Zakaria, 2009).

The best example of how a research, scientific and technology development and deployment would yield greater energy efficiency, and production, such as the Solar Photovoltaic (PV) energy. Photovoltaic (PV) technology converts sunlight directly into electricity. PV technology makes use of the abundant energy in the sun, and has little impact on the environment. It can be used in a wide range of products, from small consumer items to large commercial solar electric systems. Its energy source

10 . "USAID: energy, democracy, governance, and conflict management", U.S Aid Agency for International Development (USAID), http://www.usaid.gov

11 . Zakaria, Fareed (2009) "Free at Last: How to achieve genuine energy independence ", *The Newsweek*, April, 4th.

from sunlight which is free and abundant; PV systems can guarantee access to electric power right to every body[12].

Energy governance & India's energy scenario

In this contemporary period, the issues of energy experiencing significant changes in the landscape of international political affairs and its related policy fields, affected by historical events of world politics. As it is well known that, the energy governance is interrelated and interconnected with multitude issues of socio-economic, political, geographical and scientifically. So, a broader need for global energy governance derives from the fact that energy concerns several policy fields. It is thus a cross-cutting issue interrelated with other policy fields such as trade, environment, climate, and social policies, but also has a hard security policy dimension that is closely linked to the international political economy of oil and gas[13]. World oil demands are rising by almost three percent annually, and demand in China and India in particular has risen dramatically. But the last few years have not only witnessed an increase in demand but also a crisis in supply because of the small amount of spare capacity that is left to meet the growing demands and to balance disruptions on the oil. This is due to the fact that in the 1990s, when oil prices were low, little was invested in new production sites and energy infrastructure. To meet the increasing demand of about 50 percent by 2030, an estimated investment of 105 billion US dollars per year will be needed, according to the International Energy Agency (IEA).

India is the world's fifth largest energy consumer and may become third by the middle of this century. Overall power generation in the country more than doubled from 1991 to 2005[14]. Coal is the country's leading commercial energy source, accounting for more than half of national demand. India is the world's third most productive coal producer, and domestic supplies satisfy most demand, but most of India's coal is an inefficient low-grade, high-ash variety. Oil consumption accounts for some one-third of India's total energy consumption; about 70% of this oil is imported, mostly from

12 . Energy Information Administration, Official Energy Statistics from the US Government. http://www.eia.doe.gov/.

13 . Westphal, Kirsten., Energy Policy between Multilateral Governance and Geopolitics: Whither Europe? European Energy Policy, IPG 4/2006. http://www.library.fes.de/pdf-files/id/ipg/03931.pdf

14 . Ministry of Power report at http://powermin.nic.in/reports/pdf/ar05_06.pdf

the West Asia and Middle East region. India's domestic natural gas supply is not likely to keep pace with demand, and the country will have to import much of its natural gas, either via pipeline or as liquefied natural gas. Nuclear power, which Indian government and some experts emphasises for expansion which currently accounts for less than 3% of total electricity generation[15]. Just about one-fifth of the India's power is consumed by farmers' irrigation systems, making the farm lobby a powerful obstacle to curtailing subsidies provided by State Electricity Boards, which collectively lose billions of dollars annually and from 1/3rd to 1/2nd of India's electricity is disappearing though transmission losses, i.e., theft, which is strongly covered by on through effective energy governance, then only India can avoid a escalating electricity crisis which might constantly hampering India's sustained economic security and development[16].

With emissions of more than 500 million tons of carbon dioxide per year, India is the world's fourth-largest producer of greenhouse gases (GHGs), after the United States, China, and Russia. Per capita emissions are, however, only about one-sixteenth those of the United States. But, Indian officials have been noting that India accounts for 17% of the earth's population but only 4 per cent of its GHG emissions, thus far reject any policies or international agreements that would set limits on their own national emissions while calling it "imperative" that developed countries commit themselves to reducing their own emissions. The contradiction is that, New Delhi used to criticizes Washington for failing to take "historical responsibility for cumulative emissions" and for bringing "extraneous considerations of industrial competitiveness and employment" to bear on the debate. India asserts that its own continued economic development and poverty reduction efforts impede capping its GHG emissions and claim there has been a "persistent attempt" by some developed countries to "avoid their legal obligations" under international treaties[17].

The high concentration of oil natural resources such as gas reserves in the Caspian Sea Basin in Central Asia, and the Persian Gulf, whereas the reserves of the

15 . Energy data from U.S. Department of Energy, Energy Information Administration, January 2007, at http://www.eia.doe.gov/emeu/cabs/india.html; Tanvi Madan, "India," Brookings Institution Energy Security Series Report, November 2006 at http://www.brookings.edu/fp/research/energy/2006india.pdf.

16 . "India Struggles With Power Theft," *BBC News*, March 15, 2006; "Electricity Crisis Hobbles an India Eager to Ascend," *New York Times*, May 21, 2007; "Power Outages disrupt Life in India," *Associated Press*, March 10, 2008.

17 . "Talk by Special Envoy of Prime Minister, Shri Shyam Saran in Mumbai on Climate Change," Indian Ministry of External Affairs, April 21, 2008

Organization of Economic Cooperation and Development (OECD) countries are depleting: 65 percent of global oil reserves are located in the unstable countries of the Middle East (Westphal, 2006). So, the strategy of energy governance is the best method to address all this concerns of unequal endowment natural resources, resulting tug of war for resources among the countries, between have and have not. This multilateral global challenges must be debated with multilateral energy governance approach aims to manage interdependence on the basis of anonymously and equally applied rules and an access to resources and investment moderated by market mechanisms, along with strong involvement of private companies (Westphal, 2006).

The Purpose of Energy Governance

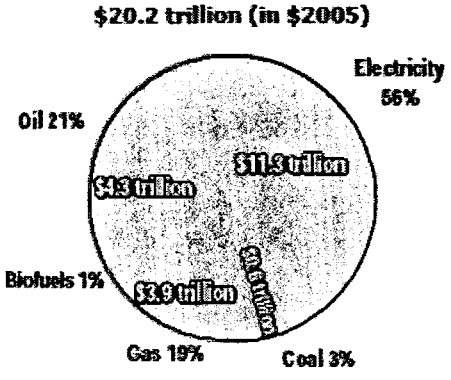
Energy Governance is driven and encouraged for energy investment, use new scientific technology and pricing mechanism issues which interact with trade, tax, growth, inclusive development policies and environment protection. Energy issues are multi-sectoral and therefore, the established Global Energy Council (GEC) at the Organization of Economic Cooperation and Development (OECD) took advantages of existing capacity to analyzing complex issues and existing practices in facilitating national government and private sector decisions. The highest priority issues for the GEC is to draw on business, finance, technology and government leaders to identify the three or four sources of energy for the future that have the potential to significantly upgrade their share of total energy needs so as to reduce global reliance on conventional coal and oil. Natural gas and LNG, biomass and other renewable biofuels, nuclear energy, and clean coal technologies seem to be among the most promising possibilities[18].

In its Millennium Statement, World energy Council (WEC) established three sustainability objectives while coining the 3 'As', they are accessibility to all people- 'Affordable' energy for all; 'Availability' in terms of continuity of supply and quality and reliability of service; and 'Acceptability' in terms of social and environmental

18. Bradford, Colin I. (2006) World Energy Needs, Climate Change & Global Governance Innovation, *World Energy Council*, 2006.

goals. One of the main objectives of energy governance is providing energy for all (either rich or poor) 'inclusively' which have provision of the basis for WEC's work since then and they underpin the analysis of Energy Policy Scenarios to 2050[19].

Graph-3.1, Energy Investment 2005-2030



In the Reference Scenario, investment needs exceed $20 trillion-$3 trillion more than previously projected, mainly because of higher unit costs.

Sources: IEA -2007

The strategies of energy governance include upstream investment in producing countries, long-term contracting at premium prices, diversifying fuels and suppliers of each, promoting dual fuel technologies, efficiency and conservation, and building strategic reserves. The global experience with the investments shows that inadequacy of tariffs, non-payment by customers, weak enforcement of bill collection, administrative inefficiency and the lack of enforcement of laws and contracts can lead to energy insecurity unless adopted stringent energy governance mechanism[20].

Significance of Energy Governance in the US-India Energy Dialogue

In this chapter discussion and analyse on the Energy Governance, including study of system, strategy or mechanism of US-India Energy Dialogue. Besides, it examines

19 . "Energy for Tomorrow's World-Acting Now", *World Energy Council Statement*, 2000, London

20 . Energy Security Quarterly - issue 1, January 2008 - SARI/Energy.

various stapes and initiatives that have been taken between the India and U.S. governments for the proper energy governance mechanism which is considered as soul of the energy security in this contemporary world of energy. It is more about serious contemplation and depth of realization of the importance of sustainable energy security for the present as well as for the future generations and conscious effort to address this concern by each and every level in the society. For this purpose US and Indian government have signed various agreements, established Working Groups, Steering Committees, organised seminars, workshops, conferences, official training programmes, creates public awareness through various above means about the economy of energy wastage. The judiciously and transference use of strategies of energy governance, effectively and efficiently implementation of all means and mechanisms for obtain long-term energy security has given priority. The proper distribution, right management, energy reforms, and checking of irregularities, corruption etc. is very crucial to attain energy security. Department of Energy, which advanced an agenda for further U.S.-Indian cooperation on energy and to build strong markets for natural gas in India and holds government-to-government workshops on various matters. The working groups has focused on activities that facilitate the exchange of information and develop lines of communication for policy, promote increased trade and investment in the oil and gas sector and examine steps to improve business climates and work with the private sector to identify areas of cooperation and collaborate with the business community on joint manners. There are many proposals formulated for this purpose, like a proposal for Strategic Petroleum Reserve, to meet the unexpected future demand of energy requirements.

The two governments have been looking forward to a series of time-bound energy governance actions in bilateral energy cooperation. The main purpose of this is with the transformed nature of the strategic partnership between India and the USA and to move forward towards the common objective of clean energy, energy efficiency, and energy security while pursuing the goal of sustainable development. The progress of energy cooperation has been so far satisfied with both governments for the broad arrangements in quickest possible time for the working groups[21]. The Energy Dialogue' Steering Committee accomplishes as medium of energy governance for the

21. "India-US Joint Statement" New Delhi, March 2, 2006. http://www.dae.gov.in/press/020306jtstmt.htm

development of plan of actions, monitor and administer the whole process. This plan of action established a roadmap for the Working Groups and for the energy governance, there are three major areas categorised: technical exchange visits; workshops and conferences; and actual projects. The Working Groups has supported workshops for technical and policy experts from the US and India governments and private sectors that focused on regulatory and technical issues.

The objectives of energy governance are setting up goals for the various working groups, include issues like strengthening mutual energy security and promoting stable energy markets to ensure adequate supplies of energy, that support desired levels of economic growth; exchanging information and developing lines of communication for policy coordination in times of market instability; promoting trade and investment in the various sectors. Advancing understanding of efficient generation, transmission, distribution and use of electricity and promoting the exchange of information on regulatory policies; cooperating on programs and technologies with special emphasis on the distribution and utilization of electricity in urban and rural networks. Promoting the development and deployment of clean energy technologies and energy conservation practices that improve the efficiency of energy use leading to enhanced energy security and stable energy markets to support desired levels of economic growth with appropriate concern for the environment. There is gamut of issues involved in the energy governance but the crux is to attain a common objective of energy cooperation between India and the United States, and with the international community as a whole.

In line with the US's model of working groups, India has been able to establish Joint Working Groups on coal with France, Germany, Russia, Canada, Australia and China. These collaborations are basically aimed to bring in new technologies in both the underground and the opencast sectors, promoting efficient management, skill development and training, seeking bilateral funds for the import of equipment not manufactured in India and accessing foreign financial assistance to meet the investment requirement[22].

22 . Sharma, Ashok (2007)'India and Energy Security', *Asian Affairs*, 38:2, 158-172

Energy Governance and Environmental Problems

The problem of environmental degradation and climate change in one hand and dream of sustainable energy security development, on another could be solved through the policy or mechanism of energy governance. India is the world's fourth-largest emitter of greenhouse gases[23]. So, India expected to be work out immediately about the concerns of environmental and climate change issues along the US and world community. The questions of climate change, global warming and energy security would enable India and the U.S. to work together, through energy governance with other countries to pursue sustainable development and meet increased energy needs while addressing concerns of energy security and environmental problem. The U.S.-India Energy Dialogue also stressed to promote the imperatives of development and safeguarding the environment, commit to developing and deploying cleaner, more efficient, affordable, and diversified environmental friendly energy technologies. The two governments of India and the US seriously consider of cooperation on energy security, air quality, and climate change contributes to sustained economic growth through increased production and efficiency. U.S.-India cooperation is also strengthening efforts to manage greenhouse gas emissions and cut harmful air pollution without constraining economic development. They have been working vigorously on the issue of environment along with climate change. The United States and India both promote commercial deployment of clean-coal technologies, energy efficiency, methane recovery, renewable energy technologies, oil and gas development, market monitoring, management of energy demand, and emission-free nuclear energy[24].

The Energy Governance and Climate Change

23 . www.state.gov/p/sca/rls/fs/2005/49724.htm

24 . "U.S.-India Relationship: A Strategic Partnership" The White House Office of the Press Secretary, September 26, 2008

The United States and India reaffirm their strong support for international efforts to combat global climate change under the UN Framework Convention on Climate Change and its Kyoto Protocol. They reaffirm the urgent need for international dialogue on ways in which developed and developing countries could participate in actions to combat climate change, in accordance with the principle of common but differentiated responsibilities, and in a manner consistent with sustained economic growth and social development. They recognize that, under the United Nations Framework Convention on Climate Change, the developed country Parties would take all practicable steps to promote, facilitate and finance, appropriate, the transfer of, or access to, environmentally sound technologies and set up as role model for the developing countries[25].

The purposes identified by partnership members in climate change, include to "creating a voluntary, non-legally binding framework for international cooperation to facilitate the development, diffusion, deployment, and transfer of existing, emerging and long term cost-effective, cleaner, more efficient technologies and practices among the Partners through concrete and substantial cooperation so as to achieve practical results"[26]. Task forces on eight industrial or business sectors were established to review the status of their sectors with regard to clean development and climate, to identify cost and performance objectives and realistic goals, and report on recommended actions within their sectors. The eight Task Forces are: Cleaner Fossil Energy, Renewable Energy and Distributed Generation, Power Generation and Transmission, Steel, Aluminium, Cement, Coal Mining, and Buildings and Construction[27].

In June 2008, the New Delhi government unveiled India's first-ever "National Action Plan" to address climate change, with Prime Minister Singh acknowledging that the country faced a dangerous problem and paying greater attention to renewable energy, water conservation, and preserving natural resources. The plan sets forth eight "National Missions" for sustainable development: solar energy; enhanced energy efficiency; sustainable habitat; conserving water; sustaining the Himalayan

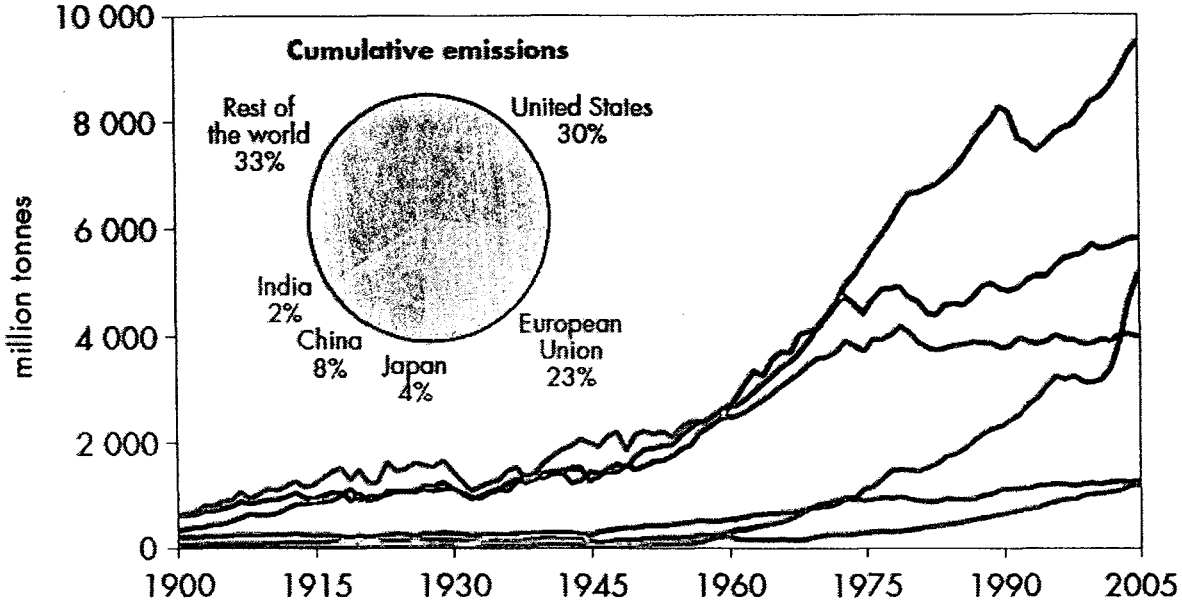
25 . U.S.-India Joint Statement on Energy and Environment Cooperation", March 22, 2000. http://www. usinfo.state.gov/march22/text/2000.hmt.

26 . CRS Report for Congress, "Climate Change: The Kyoto Protocol and International Actions", June 8, 2007.

27 . ibid.

ecosystem; a Green India; sustainable agriculture; and a Strategic Knowledge Platform for Climate Change[28]. The following graph explains the rate of emissions by major countries of world.

Figure 5.8: **Energy-Related CO_2 Emissions by Region, 1900-2005***



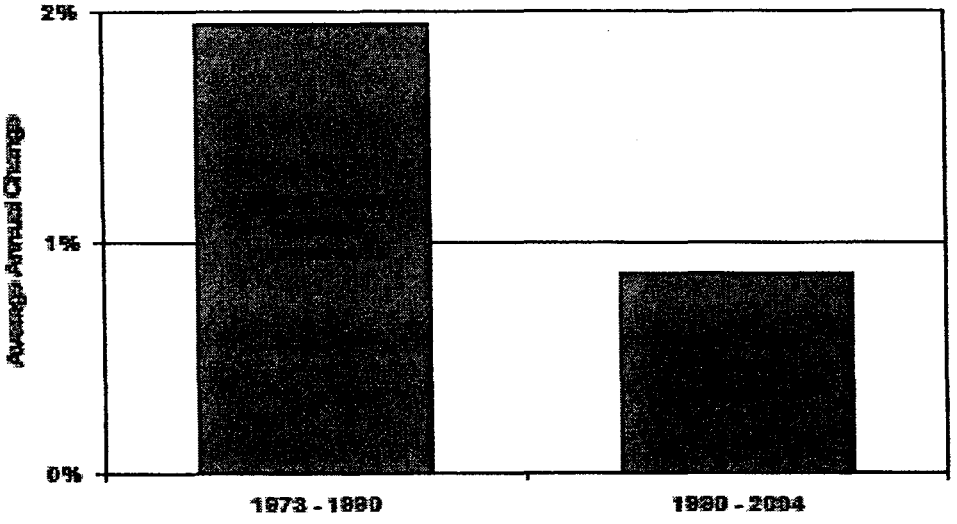
Source: World Energy Outlook, 2007.

Energy Governance and Energy Efficiency

One of the most important areas of cooperation between the U.S. Government and the Government of India is improving energy efficiency. Energy efficiency investments could make a major contribution to shaping the future demand for energy in India. The cooperation between the Department of Energy (DOE) and India has focused on facilitating the development and deployment of energy efficient technologies and practices, including those directed at the industrial, residential, and transportation sector. Building on much of the work of the U.S. Agency for International Development mission in India, the Power and Energy Efficiency working group has engaged in several projects designed to decrease energy demand and improve power generation infrastructure in India.

28 . "India Offers 8 Ideals on a Climate Change Policy, but Few Details," June 30, 2008 press release at http://pmindia.gov.in/pressrel.htm; *New York Times*, July 1, 2008.

Energy Efficiency: We must - and we can - do better!



Since 1990, the rate of energy efficiency improvement in IEA countries has been less than 1% p.a. - much lower than in previous decades.

Sources: IEA- 2007

The U.S.-India Energy Efficiency Technology Cooperation Conferences has been, jointly organized by DOE and India's Ministry of Power, in many occasions with technical support from USAID and sponsorship by several Indian and U.S. industry groups on 6th March, 2008. The focus of the conferences was on industrial and building energy efficiency which driven by energy governance. Among the key recommendations that came from the events was to establishment of five regional centers of excellence in energy efficiency in India as well as a collaborative program of assistance in developing macro-economic energy efficiency indicators. Such a center of excellence for efficient lighting technologies and products is called the "Lights Museum and Energy Centre" in Bangalore[29]. Cooperation is also continuing on energy efficient buildings and on the development of building codes, and a U.S. team conducted training in India in many times.

29 . Statement of David Pumphrey Deputy Assistant Secretary for International Energy Cooperation Office of Policy and International Affairs U.S. Department of Energy before the U.S. Senate Committee on Energy and Natural Resources United States Senate July 18, 2006.

Major achievements in field of energy governance

Some of the major path breaking achievements and progress in the field of energy governance under the auspices of the US-India Energy Dialogue are following:

1) India's First Program in Energy Management

Energy management is identified as synonymous with the energy governance which is given a due consideration in the US-India Energy Dialogue. In July 15, 2005, U.S.-India Joined hands to improve power sector through energy governance with launching India's First Program in Energy Management, which is regarded as one of significant step toward energy governance and continued bilateral cooperation on energy. The United States and India launched an Executive Post Graduate Diploma in Business Management (PGDBM) in Energy Management to groom power and energy sector executives in India. One of the first of its kind in India, this 15th month program implemented by the Management Development Institute which includes a specialization in power distribution as a part of the Distribution Reform, Upgrades and Management (DRUM) project of the U.S. Agency for International Development (USAID). The post-graduate diploma in energy management would address the demand for specialized training in India's institutes of higher learning, which enables creating global leaders to manage and effectively lead change in the energy sector through energy management and governance. The two governments definitely believe that energy governance would enhance the business management skills of power sector executives is very important for India's overall economic development.

This training program under DRUM would provide professional development for electric utility personnel and develop a cadre of trained executives to lead the country's power distribution utilities into the future. The activity forms a cornerstone for strategic and sustainable growth in the power sector, and, thereby, contributes to overall economic growth of the country. Under DRUM, USAID and the Ministry of Power are working together to demonstrate that commercially viable power utilities are key to meeting consumer needs and expanding supply. DRUM is a $30 million effort that includes a major training component. Approximately 25,000 utility

personnel would be trained in improved technical, commercial, and managerial electricity distribution practices.

2) **FutureGen project Initiative**

U.S. and India reach historic agreement on FutureGen Project where India becomes the first nation to accept U.S. invitation to participate in innovative clean coal project[30]. Indian government has contributed $10 million to the FutureGen Initiative project to join the government steering committee and Indian companies have also been invited to participate in the private sector segment[31]. In April 2006, India became a partner in the FutureGen international partnership which would works to create a zero-emissions coal-fired power plant that produce hydrogen and sequester carbon dioxide underground, enabling greater use of coal in an environmentally sustainable way. Successfully demonstrating and adopting this technology allow India to reduce the intensity of future greenhouse gas emissions from the burning of their abundant coal resources. India became the first country to join the United States on the FutureGen Government Steering Committee and plans to participate in the FutureGen Industry Alliance[32]. The U.S. Department of Energy's FutureGen project Initiative to build and operate the world's first coal-based power plant that removes and sequesters carbon dioxide (CO2) while it produces electricity and hydrogen. The major aim of India to participate in the FutureGen Initiative effort is to build the first zero-emissions coal power plant, while enabling effective and environmentally clean use of coal to power economies around the globe. The FutureGen Initiative would use coal a low-cost, abundant, and geographically diverse energy resource to globally supply clean energy. The FutureGen Initiative is a ten year effort to integrate advanced coal gasification technology, hydrogen from coal, power generation, carbon dioxide capture, and geologic storage[33].

3) **International Thermonuclear Energy Research (ITER)**

30 . "India to take part in Future Gen project: Place for India in steering committee", *The Hindu*, Friday, Mar 03, 2006.

31 . accessed at: http://energy.gov/print/3284.htm

32 . "India to take part in Future Gen project: Place for India in steering committee", *The Hindu*, Friday, Mar 03, 2006.

33 . accessed at: http://energy.gov/print/3284.htm

India's participation in the multi-billion dollar International Thermonuclear Energy Research (ITER) is an important step towards the common goal of full civil nuclear energy cooperation. ITER is an international project that seeks to make use of fusion energy for electricity production a reality. The main ITER facility would be in Cadarache, France, and all partners would participate in its construction, research and development. India was invited to join the initiative as a full partner by the U.S. and its other partners includes, the European Union, Russia, Japan, South Korea and China.

3) Carbon Sequestration Leadership Forum (CSLF)

The US and Indian governments has also initiated the multi-national Carbon Sequestration Leadership Forum (CSLF) and became active participants in the FutureGen project. India is the first CSLF member to participate in FutureGen, and it builds upon the U.S.-India Energy Dialogue. The CSLF is a voluntary climate initiative that includes 20 nations and the European Commission. CSLF members are engaged in cooperative technology development aimed at enabling the early reduction and steady elimination of carbon dioxide[34].

5) Forum of Indian Regulators (FOIR)

There have been many sessions of the regional transmission meeting of the Forum of Indian Regulators (FOIR) to discuss best practices and continued cooperation between U.S. and Indian electricity regulators. One of the forum's goals is to improve the regulation of energy distribution which is an integral part of energy governance[35]. The US-India Energy Dialogue have contributed to India to launched a very progressive program to increase its generation capacity by 100,000 MW by 2012, and that in order to achieve this goal, India would require investment in the energy sector and a strong regulatory system to ensure that investors receive adequate rates of return that would encourage additional investment and growth. The U.S. has wealth of experiences in implementing open access in transmission and very helpful to India to opens up transmission and distribution systems to competition. USAID has numerous programs

34 . accessed at: http://energy.gov/print/3284.htm

35 . US-India Seek Improved Energy Regulation to Improve Efficiency. June 08, 2005.

that have been working with the Indian energy sector under the aegises of the US-India Energy Dialogue[36].

6) **Integrated Ocean Development Programme (IODP)**

As part of the Indo-U.S. energy dialogue, India has also sought membership in the Integrated Ocean Development Programme (IODP), an international drilling programme for scientific deep sea research led by Japan and the U.S. It aims to study the unknown deep biosphere by studying core samples and monitoring bore-holes, an important first step towards harnessing as hydrates as a source of energy. The National Gas Hydrate Progam has identified specific areas in Indian deep sea waters for conducting further geo-scientific surveys. It is believed that commercial exploitation of gas hydrates may start some time in the period 2015-20[37].

7) **Distribution Reform Upgrades and Management Program**

Another major advancement have been made towards rural electrification led by USAID which launched a public-private partnership with the General Electric Company to increase access to clean and affordable energy services in rural communities in India. The Distribution Reform Upgrades and Management program under USAID have also completed detailed project reports on four model projects on efficient power distribution in the states of Karnataka, Maharashtra, Gujarat and Delhi[38].

USAID is working actively with the public and private sectors, and civil society to enable them to operate better in an energy sector characterized by liberalized markets and democratic political institutions. Key energy governance activities include improving policy, legal, and regulatory frameworks to establish necessary conditions of energy service delivery; increasing institutional ability to provide or deliver energy management services; and increasing public understanding of and participation in

36 . USAID India Newsroom - Press Releases, US-India Seek Improved Energy Regulation to Improve Efficiency.mht. http://www.usaid.gov.org.

37 . "India to take part in Future Gen project: Place for India in steering committee", *The Hindu*, Friday, Mar 03, 2006

38 . Statement of David Pumphrey Deputy Assistant Secretary for International Energy Cooperation Office of Policy and International Affairs U.S. Department of Energy before the U.S. Senate Committee on Energy and Natural Resources United States Senate July 18, 2006.

decisions regarding energy services. Through the combined efforts of the key stakeholders, like good governance in democracy, energy governance in the energy sector is paying off, resulting in increased and better energy services with human face, that are improving people's lives and livelihoods.

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Chapter-4

Energy Diplomacy

In this chapter attempt has been made, while discussing and analysing thoroughly, to justify the role of diplomacy to attain the energy security. Energy Diplomacy is an endeavour of India to define its energy engagement with the leading players of energy market in the globalize world. The contemporary world of energy market has been going through structural changes with the ramification of power relationships between the suppliers petro-politics or oil diplomacy and hungry consumers concerns over the volatile global market prices. The scarcity of resources make the situation tricky as more and more states in various stages of development are vying for the vital energy resources that are scarce and limited. So, the energy diplomacy is a pillar of India's foreign policy to search for energy security which has been building of bilateral energy cooperation with immediate neighbouring countries to facilitate plans for regional natural oil and gas pipelines, including from Iran, Burma, Bangladesh, and Turkmenistan.[1] India has also an impressive bilateral relation in the field of energy cooperation with the extended neighbour's nations beside the US; other counties are Russia, Brazil, Venezuela and Nigeria.

On the one hand India and China have emerged as rapidly growing energy consumers due to there high growth rate, on the other developed world remains ahead in terms of energy consumption as compared to the newly emerging players[2]. Thus, Indian and Chinese companies and industries has been competing each other to acquire for energy sources across the globe i.e. in the African regions, in the Middle East countries, West Asia and Siberian regions. The unequal endowment of natural energy resources as a matter of fact that the dependence on imported energy resources and their scarcity have become important determinants of policies worldwide, the indication of which were felt strongly firstly in the 1970s the politics of energy in the world politics (Davis, 1978). Thus the politics over energy which is defining the

1 Chellaney, Brahma (2005), "India's Future Security Challenge: Energy Security" India as a New Global Leader, The Foreign Policy Centre, London, U.K., www.fpc.org.uk

2.Bradford, Colin I. (2007), World Energy Needs, Climate Change & Global Governance Innovation" *World Energy Outlook*, 2007.

relationships of countries in the today' world politics, is a prominent factor in determining the fate of energy security.

Iran-Pakistan-India (IPI) pipeline has been remained a concern for U.S., contemplating apprehensions that this would undermine the U.S. policy of isolating the Iranian regime in the global polity and economy[3]. The U.S. has consistently resisting this project and diplomatically mounting pressure on India to stop proposed pipeline, which is vital for India's energy security. Therefore, IPI remained as controversial issue of debate and discussion for policy makers and scholars. Over the long term, all that the U.S. could do to mitigate India's requirements for Iran (in the mater of energy) by promising in its pursuit of great power status. But, some officials perceive that, India's bilateral ties with Iran may make India more valuable to the United States than the otherwise (Fair, 2006).

This chapter also examines the role of Indian diplomacy which is striving for energy security. Other factors examined are the influence of US diplomacy in the field of energy security in India and other nations in the context of contemporary global energy market affairs. India-Pakistan-Iran (IPI) pipeline which has been remained a foremost concern for U.S. Administration. Because of various reasons, the America wants to isolate and restrain the prominence Iranian political affairs in the Gulf region and in the world politics. Therefore, the American administration has been pursuing India and diplomatically pressuring to restrain from the proposed gas pipeline with Iran, which is crucial for India to maintain its sustainable economic growth and overall development of country that emanates only from the energy security. Therefore, IPI has been remained as controversial issue. Also in this chapter attention has paid to India's external energy policy or diplomatic relationship with other major players of energy exporting countries and its ramification on the predominance of American interests and apprehensions.

3 Pant, Girijesh. "Energy Security in Asia: The Necessity of Interdependence" *Strategic Analysis*, Volume 31, Issue 3 May 2007, pp. 523-542

Definition of Energy Diplomacy

There are many definitions of the energy diplomacy put forth by the scholars and diplomats in various ways, in multitude forms. But, the fundamental nature or essence of energy diplomacy is more or less same or common form of definition, meaning and aim. The concept or definition of energy diplomacy is the conscious effort to make external relationship in the field of energy between or among the countries driven by desire for energy security which interrelated with geopolitical compulsion, strategic interest, promotion and protection of national security and national interest is known as energy diplomacy. For example, - if we consider the Indian course of action encouraged and motivated by the energy-driven foreign policy that recognised as 'enlightened self-interest' policies of energy diplomacy[4]. Energy is the area where India's independent foreign policy has the most immediate connection with its projects and programmes of economic growth. Energy efficiency, fiscal reform, expanding the possibilities for private sector involvement in energy, and energy diplomacy are all different facets of the some basic requirement to provide services to the India's growing energy market.

Characteristics of Energy Diplomacy

The international political and economic system has been undergoing the process of structural change, in many ways by the global energy diplomacy. This change has created a new environment for global energy markets and energy relationships. The changing geopolitical relations can greatly affect the direction, risk profile and size of energy investments and energy trade flows and also lead to adaptations in governments' energy policies and business strategies of energy companies. The international financial catastrophe would undoubtedly have a further impact on energy investments, if not fully backed by the energy diplomacy. The energy diplomacy can only keeps on track of unprecedented regional, national, and international developments into account which can help to understand the possible direction of energy futures.

4 Bahgat, Gawdat (2006)'India's Energy Security', *Minerals & Energy - Raw Materials Report*,21:3,35-41

Following are some of the significant characteristics of energy diplomacy, which has been influencing dramatically and dynamically on the state of affair of energy security. These attributes are geopolitics, overseas energy policies, energy dialogues or cooperation, investment in overseas energy sectors, energy infrastructure development in abroad, and rationalize mechanism of global market prices.

Energy Diplomacy and Energy Security in India

India emerged as the second fastest growing economy of the world, only ahead is China. To keep pace with the growth long term, a rapidly increasing search for energy is required. India is currently the world's fifth largest energy consumer, and is expected to jump to third place by 2030, behind only the United States and China. But limited energy reserves at home have forced India to look abroad to satisfy much of this huge demand for oil, natural gas, and coal. In fact, India's dependence on foreign oil is projected to reach more than 90 percent by 2030, according to projections from the U.S. Department of Energy[5]. Following table illustrates the per cent oil imports.

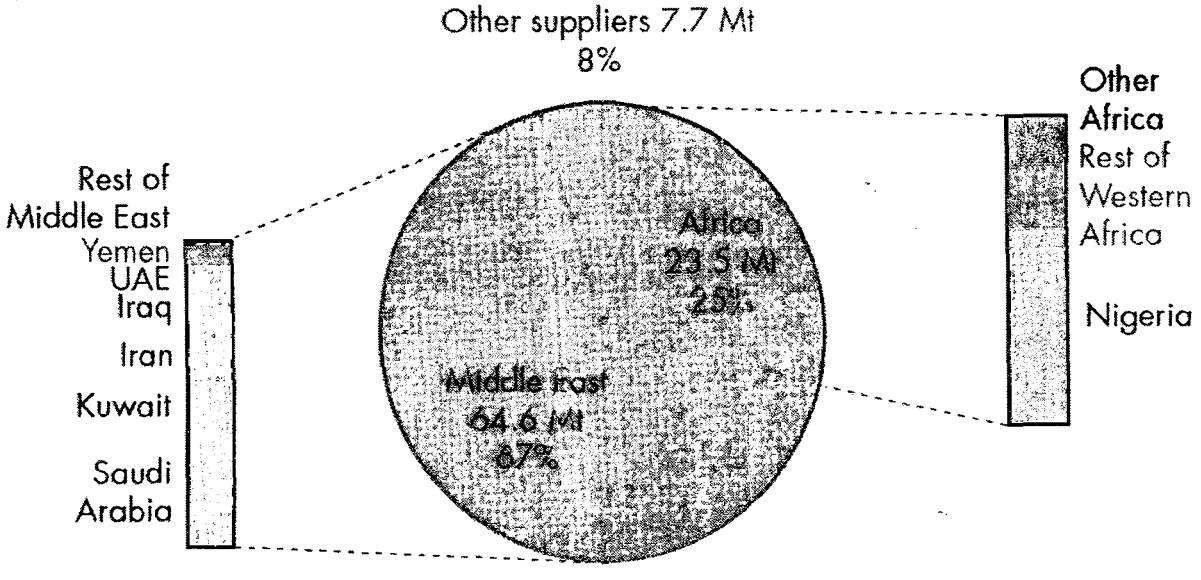
Table-4. 1, Source of India's oil imports

Country		Oil Imports (mmt)	% of Total Imports
Middle East Region	Iran	9.61	10.03
	Iraq	8.33	8.69
	Kuwait	11.36	11.85
	Neutral Zone	0.15	0.15
	Oman	0.14	0.14
	Qatar	1.19	1.24
	Saudi Arabia	23.93	24.96
	UAE	6.43	6.71
	Yemen	3.51	3.66
	Sub Total	**64.64**	**67.43**
Other Regions	Angola	2.44	2.55
	Brazil	0.29	0.30
	Brunei	0.81	0.84
	Cameroon	0.35	0.36
	Congo	0.14	0.14
	Egypt	2.12	2.21
	Equador	0.15	0.16
	Equitorial Guiena	1.66	1.73
	Gabon	0.28	0.29
	Libya	1.47	1.53
	Malaysia	3.43	3.58
	Mexico	2.28	2.38
	Nigeria	15.08	15.73
	Russia	0.16	0.16
	Sudan	0.33	0.34
	Thailand	0.27	0.28
	Sub Total	**31.23**	**32.57**
Total		**95.86**	**100.00**

5. "India's Growing Dependence on Energy from Abroad", *Centerpoint*, September 2008. Woodrow Wilson International Center for Scholars, Washington, DC http// www.wilsoncenter.org/index.cfm?fuseaction=centerpoint.welcome

In addition to its struggle to secure supply, India is becoming increasingly aware of the fact that its economy is highly vulnerable to supply disruptions. Until the year 2006, India did not have an energy security policy or contingency plans to fall back on in case of crisis. Nor is it a member of an organization like the International Energy Agency (IEA), which was created in the aftermath of the 1973 oil crisis with the objective of protecting its members from any future disruptions in the energy market. As a first step, the Indian Government has proposed building up an oil buffer stock for protection against market volatilities[6].

Graph 4.1 Crude Oil Imports by Origin, Fiscal Year 2004/05



Source: Planning Commission (2006)

The above table 4.1 indicates India' Crude Oil Imports by Origin, Fiscal Year 2004/05 from the countries around the world.

India's international energy strategy or energy diplomacy incorporates i.e. pursuing trans-national pipeline projects; expanding bilateral supply contracts; procuring new technologies; acquiring upstream assets; and securing foreign investment. India's overseas energy strategy relates to its foreign policy goals in which energy plays an enabling role in many of India's strategic relationships. But in every relationships energy may not be the primary driver, but nevertheless helps to deliver other strategic or political interests. For example, for New Delhi, the proposed U.S.-India nuclear

6 . Sharma, Ashok (2007)'India and Energy Security', *Asian Affairs*. 38:2,158 -172

agreement is less about energy security- as the nuclear fuel it would provide would fall far short of meeting India's high energy demand and more about strengthening strategic ties with Washington. Similarly, India has a healthy relationship with Saudi Arabia and attracting Saudi investment for local energy projects in India which further helps to bring the countries closer together.

India is pursuing a diverse strategy towards addressing its energy security concerns. Domestically, India is reforming energy production, distribution, and consumption while liberalising market to attract foreign investment to help boost domestic production. Indian companies are pursuing strategies to help India become a regional supplier of refined products. To expand capacity, India is exploring increasing its use of nuclear power, hydro-power, and alternative fuels. At the same time, India is promoting energy diplomacy as part of its foreign policy agenda. One such approach is to diversify its supply by securing access to hydrocarbon supplies from around the world through energy diplomacy.

Since the domestic production alone would not be sufficient to meet the projected needs for either oil or gas, India is also increasing its efforts abroad. At the same time, since two-thirds of India's oil imports come from one single region, i.e., the Gulf Co-operation Council (GCC) countries, India is following the footsteps of other major oil importing economies, and making great efforts to obtain supplies from sources outside the Gulf. The Indian Government has urged leading public-sector energy companies such as the ONGC to secure energy resources overseas by participating directly in the global energy market, and investment by Indian companies in overseas oilfields. ONGC has bought equity stakes in oilfields in Iraq, Sudan, Libya, Angola, Burma, Russia (Sakhalin), Vietnam, Iran and Syria. Other Indian public-sector undertakings are too involved, not only in acquiring exploration and exploitation rights, but also in establishing sales outlets for Indian petroleum products and in offering a variety of technical services.

New Delhi's energy diplomacy extends from Central Asia to the Middle East, Africa, and Latin America, and has yielded various bilateral agreements and memorandums of understanding. India's National Oil Companies (NOCs) negotiate for energy access and development privileges around the world. These firms are sometimes accused of

"exploiting concern" about energy insecurity to benefit their bottom lines. In response, New Delhi has sought to ensure that NOCs not only make profits, but also contribute to the economic development of the countries in which they have a presence. The India's Planning Commission projects that India must at least triple its primary energy supply and five-fold its electricity generation to maintain the 8 percent annual GDP. In an effort to assess India's energy security policy, the Asia Program and the Global Energy Initiative have been assisting India[7].

India has very good energy diplomacy with Iran, Sudan, Burma, and Cuba, to which Washington perceives as India's pursuit of a 'mercantilist strategy' i.e. a determined quest 'to lock up' energy deals with anyone and by any means. India has been emphasizing ownership of energy resources instead of access to them which is a violation of the market principles the United States seeks to uphold in the global energy realm. Despite these troublesome factors, the Washington is quite supportive of India's overseas energy strategy, and often critical of China's which in actuality is very similar to India's strategy of energy diplomacy. India's government has taken its energy challenges quite seriously. As the significance of this issue, the Ministry of External Affairs (MEA) has created an Energy Security Unit (ESU). According to the MEA, this new actor was established "to support India's international engagement through appropriate and sustained diplomatic interventions.[8]"

India has been searching to meet its growing energy requirements from every source. Therefore, India is seriously thinking about the creation of a "South Asian Energy Ring", under aegis of South Asian Association for Regional Cooperation (SAARC), which would comprise trans-national energy lines in electricity, gas and oil that would facilitate trade of energy in South Asia. South Asian Energy Ring would set up a grid interconnection with all the countries of South Asia comprising India, Nepal, Bhutan, Sri Lanka, Bangladesh, Maldives, Pakistan, and Afghanistan[9].

Also, New Delhi's drive to cooperate with other nations has expanded to other neighbours. India has called for the creation of a so-called "Asian Oil Community" to

7 . "India's Growing Dependence on Energy from Abroad", *Centerpoint*, September 2008. Woodrow Wilson International Center for Scholars, Washington, DC http// www.wilsoncenter.org/index.cfm?fuseaction=centerpoint.welcome

8 . Ministry of External Affairs. http//:www.mea.gov.in

9 . Srivastava, Siddharth (2007) " India grapples with energy issues" *Asia Times Online South Asia news*, Mar 24

promote a dialogue between the energy producing nations of Azerbaijan, Kazakhstan, Russia, Turkmenistan, and Uzbekistan and energy consuming nations of China, India, Japan, and South Korea. There was an important event convened in New Delhi in January 2005 between major Asian energy consumers such as China, India, Japan, Malaysia, and South Korea and major Persian Gulf producers Iran, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The goal was to foster energy partnership between the two sides and address mutual concerns about security of both supply and demand[10]. Given Russia's massive hydrocarbon resources, India has expressed strong interest in investing in and working with Russian companies. India's Oil and Natural Gas Corporation, for example, owns a 20 per cent stake in Russia's Sakhalin-1 project[11].

Like other energy consuming nations, India tries to diversify the sources of its oil and natural gas supplies. However, the bulk of India's imported oil comes from the Persian Gulf. The top five oil exporters to India are Saudi Arabia, Nigeria, Kuwait, Iran, and Iraq. This close cooperation between the two sides reflects longstanding historical, cultural, and strategic ties[12]. The Gulf Cooperation Council (GCC) states and India share strategic ties with the United States. Meanwhile, despite hostile relations between Washington and Tehran, Iran enjoys good relations with India. Traditionally, Iran has not had an easy relationship with Sunni-dominated Pakistan which is India's key rival[13].

China Factors and India's energy diplomacy

India and China each are vying for a growing share of the global energy market. While some of their interests are compatible, some are conflicting. Both countries can share technical expertise, but both are competing for supplies and influence with major producers. The efforts of Chinese and Indian energy companies have a major bearing on American energy interests abroad. These companies are investing in countries where U.S. firms are absent or prohibited, such as Iran, Sudan, Burma, and

10 . 'India Calls for Asian Oil Market', (2005) *Dawn*, January 7.

11 . 'India Plans Large Investment in Russian Oil', *Moscow Times*, January 20, 2005

12 . Kemp, Geoffrey (2006) 'The East Moves West', *National Interest*, No.84, Summer, pp.71-77. p. 71

13 . Hussein, Syed Rifaat (2006)'Changing Dynamics of Relations between South Asia and the Gulf Region', *Journal of South Asian and Middle Eastern Studies*. Vol. 29, No.3, Spring. pp.16-35. p. 29

Cuba, as well as in nations that are major crude suppliers to the United States, such as Canada, Venezuela, and Saudi Arabia.

Indian companies have lost to their Chinese counterparts in bidding for big leases in Nigeria, Ecuador and Kazakhstan. Similarly, the competition between India and China for new energy sources in Central Asia is also clearly well underway. So far, the collaborative efforts between India and China regarding new energy sources have been minimal. It is fair to assume that as far as energy is concerned, Sino-Indian relations would continue to be competitive. So, the India and China have concluded that cooperation is very important, rather than competition, which would serve their national interests. Both signed an agreement in January 2006 to coordinate their acquisition of oil and gas assets abroad. This agreement was preceded by a successful joint bid by the Indian company Oil and Natural Gas and China National Petroleum Corporation (CNPC) for PetroCanada's Syrian oil and natural gas assets[14]. Commenting on this deal, India's then Petroleum and Natural Gas Minister Mani Shankar Aiyar said "When companies from the two sides submit a joint bid, no project would be beyond our reach." Chen Geng, President of CNPC, enthusiastically reciprocated these sentiments: "we should go forward together and bid, otherwise it is the third party which wins[15]."

Role of Diplomacy on the US-India Energy Dialogue

Growing concerns about energy security prompted the U.S. and India to launch a new energy dialogue in 2005 that reflects the transformed strategic relationship between the world's two largest democracies. The United States and India recognize their mutual interests are best served by working together in a collaborative fashion to ensure stability in global energy markets. Adequate and reliable supplies of clean energy at reasonable cost are essential to fuel India's rapidly growing economy. Both the U.S. and India are increasingly reliant upon global oil and natural gas markets to satisfy their energy needs.

14 . Rai, Saritha (2006) 'China and India: Bidding Partners, at Least on Paper', International Herald Tribune, January 20.

15 . Varadarajan, Siddharth. (2006) 'India, China and the Axis of Oil'. *The Hindu*, January 24

A July 2005 Joint Statement resolved to establish a U.S.-India "global partnership" through increased cooperation on energy and the environment, on economic issues, on democracy and development, on non-proliferation and security, and on high-technology and space. U.S. policy is to isolate Iran and to ensure that its nuclear program is used for purely civilian purposes. India has never shared U.S. assessments of Iran as an aggressive regional power, even though India voted with the US against Iran in the International Atomic Energy Agency (IAEA) opposing Iranian proposed nuclear programme.

From the US-India energy dialogue, an important result initiated is the cooperation between the US and Indian navies against piracy and maritime terrorism, and pledged to protect and promote both countries interests while transporting and shipping in sea roots. The two countries have mutual concerns over the threat posed to their energy security and external trade by maritime terrorism and have been cooperating in this regard bilaterally as well as through the Working Group on Maritime Security of the Council on Security Cooperation Asia Pacific (CSCAP), of which both are members.

In the US Energy Diplomacy and Security Act of 2006 passed by the US Congress has Section 3 emphasizing on energy diplomacy and security while stressing on clean and sustainable energy sources which are important for national security. Energy diplomacy and security Act declares that achieving energy security requires enhanced engagement with foreign governments, including promotion of investment, renewable fuels and energy efficiency. Beside depending on traditional sources of energy, the purposes includes creations of strategic energy partnerships i.e. a policy to increase global availability of renewable energy sources, advancement of renewable energy production, R&D and deployment of various new technologies, such as renewable energy and energy efficiency technologies.

The United States is sympathetic to India's energy needs, and has established a high-level energy dialogue to find ways of cooperating and using the scientific know-how of both countries to benefit India's energy market. The proposed India-U.S. agreement on civil nuclear cooperation also has potential energy benefits (Haté, 2007). The United States has remains India's one of the most important external ally, and the area of overlap between Indian and U.S. strategic interests continues to grow.

But in many of the areas where the US and India have handicapped to harmonise their interests, like IPI pipeline which has have an important energy dimension[16].

IPI Gas Pipeline & the Concerns of the U.S.

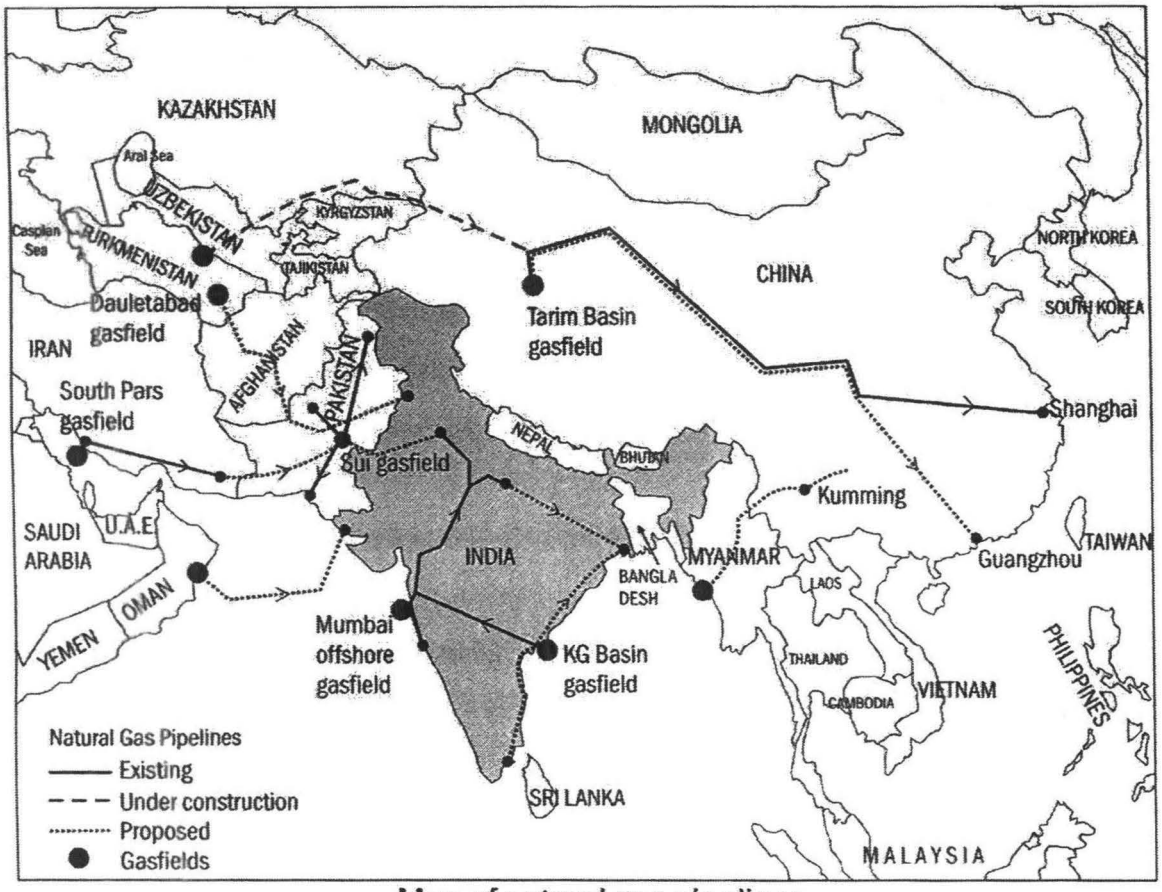
India's energy diplomatic strategy lays the path and means to address the India's hunger for energy. The major issue of energy diplomacy is the IPI pipeline which has been remained a major concern and challenge for U.S.'s interest and policy in West Asia & Middle East. The reality for India is that it is struggling to meet its energy demands. It currently imports 70 per cent of the crude oil to the needs and the demands both in oil and gas are expected to double by 2020 as the country's economy growing rapidly. India needs energy-rich countries like Iran to fulfil the energy demands of its future generations. Earlier in the year of 2005, Iran and India signed a $22 billion deal for Tehran to supply five million tonnes of gas a year to India. The proposed gas pipeline project is expected to come through Pakistan. Since the proposition of IPI pipeline, Washington has been conducting diplomacy behind the scenes with India, urging it to rethink such ambitious projects with Iran. So far, Delhi has not given up in to the US pressure.

The India-Iran relationship and friendship goes back to an ancient civilisation. India's traditionally close ties with Iran have become a major factor influencing how certain circles in Washington evaluate a US-India partnership vis-a vis IPI. As of now, India seems to be following a carefully balanced two-pronged track with regard to IPI. While it has kept open its diplomatic and political channels vis-à-vis Iran, and it is partially resisting US pressures to curtail its ties with Tehran. These diplomatic strategies are aimed at securing a major upstream presence through equity oil acquisition as well as the establishment of new transportation infrastructure such as transcontinental and trans-regional pipelines. India, in particular, is seriously examining the prospects of a strategic natural gas pipeline form Iran via Pakistan. If completed, such a project would fill a gap in the emerging Asian energy architecture. Oil, and particularly natural gas, will continue to be an important part of the Indian

16 . Haté, Vibhuti. (2007) "India's Energy Dilemma", *South Asia Monitor*, Center for Strategic and international studies, Washington D.C. Number 98, September.

energy mix in the short-medium term and nuclear power can be seen as a substitute only in the long term.

Following Map 4.2 shows the proposed Natural gas pipelines of India.



Map of natural gas pipelines

Source: *India's Energy Security* by Noronha and Sudarshan, (2009).

US Energy Secretary Samuel Bodman, during his visit to New Delhi, has said that Washington has India that it is opposed to the gas pipeline from Iran. He said clearly at the highest levels of the Indian government that the United States opposes the development of the Iranian pipeline to India, while believing that Iran is seeking to develop nuclear weapons, and anything support for that endeavour would be something that Washington shall oppose. A prominent US legislator, Congressman Tom Lantos, who is head of the House of Representatives' Committee on International Relations, has introduced a bill that, if passed, would ensure that India and Pakistan are not able to proceed with their gas pipeline connecting to Iran. The legislation, the Iran Counter-Proliferation Act of 2007, seeks to target companies

investing in Iran's energy sector by ensuring that deals with Iran worth more than $20 million would bring the investors under US sanctions.

In May 2007, Indian Oil Minister Murali Deora assured concerns of Left Front parties that India "will not be cowed down by any threat" regarding its relations with Iran, saying that India's participation in the IPI pipeline project "is not the business of the United States[17]". Indian Petroleum Minister Deora said that India could not be pressured and India is going ahead with discussions on the pipeline project with Iran and Pakistan. Iran and India are 'determined' and signed an agreement to build a natural-gas pipeline via Pakistan. The World Bank described the pipeline as a win-win deal and expressed readiness to fund the project. New Delhi has linked the Indo-US nuclear cooperation with the country's energy security which needs to tap all sources of energy and keep options in this regard open. This is at the heart of the India-US nuclear understanding and the larger US-India Energy Dialogue, resulting India and the US has became an important partners in India's quest for energy security[18].

The transportation of gas from Iran to Pakistan and India has a sound commercial basis. Iran gas reserves, estimated to be more than 940 trillion cubic feet, constitute 18 percent of the world's gas reserves, second only to Russia. The reserves offshore in the Persian Gulf are geographically the nearest gas fields to the Indian subcontinent[19]. The distance of proposed pipeline would be about 1900 km long, well within the range of economical gas supply by pipeline vis-à-vis Liquefied Natural Gas (LNG)[20].

Several rounds of official and ministerial-level meetings among the three countries have served to clarify a number of issues pertaining to the project-technical, commercial, financial, and legal, as the three countries pursue a "safe and secure world class project. Tripartite meetings on technical and commercial matters have also taken place at the officials' level. Not surprisingly, the principal issues pertain to gas price and project structure. Also the security aspect of the pipeline is a matter of grave concern in this project. Decisions on these complex items are bound to take

17 . Deora, M. (2007) India Won't Be Cowed Down: Deora" *The Hindu* (Chennai), May 9.

18 . Srivastava, Siddharth (2007) "Indian energy: A delicate balancing act" *Asia Times Online South Asia news*, May 11, 2007.

19 . Sourie, A. (2005)"Iran-Pakistan-India Gas Pipeline Project and its Economic and Political Impact", *ORF Energy News Monitor*, Il. 16 (14 October) 3-4.

20 . Diwanji, Ambrish K. (2000) "Geopolitical Issues Set to Dominate Proposed Gas Pipeline From Iran to India", *The Rediff Business Special*, April 13.

time, however, throughout this period; the leaders of the three countries involved have repeatedly conveyed their full political support for the project and their deep interest in its successful outcome. Thus, the project has been effectively removed from the domain of extraneous bilateral, regional, and global political issues, and is being pursued only on the basis of commercial considerations[21].

India's choice of energy partners like Iran, Libya, Syria and Sudan has occasionally led it to work contrary to the interests and purposes of the United States. Iran has been the most debated, controversial, complex and difficult example. The then U.S. Secretary of State Condoleezza Rice publicly said, during a March 2005 visit to New Delhi, that the United States had serious problems with the proposed pipeline. This statement led to some Indian concern about whether Washington would try to undercut India's other strategic interests in Iran. The U.S. has not focused thus far on India's energy purchases in Iran or even on India's work on the Iranian port at Chabahar.

There are further U.S. concerns that India seeks energy resources from Iran, benefiting financially a country the United States is seeking to isolate. Indian firms have taken long-term contracts to acquire of Iranian gas and oil resources. Natural gas purchases could be worth many billions of dollars, but far differences over pricing and transport have precluded sales. Building upon growing energy ties is the proposed construction of a pipeline to deliver Iranian natural gas to India through Pakistan. The Bush Administration repeatedly expresses strong opposition to any gas pipeline projects involving Iran, but top Indian officials insist the project is in India's national interest and they remain "fully committed" to the multi-billion-dollar venture.

The Iran-Libya Sanctions Act (P.L.107-24) required the President to impose sanctions on foreign companies that make an "investment" of more than $20 million in one year in Iran's energy sector. New Delhi insists it is going ahead with a proposed joint pipeline project to deliver Iranian natural gas to Pakistan and on to India. Earlier in 2007, officials from the three countries resolved a long-running price-mechanism dispute, opening the way for a fourth meeting of the India-Pakistan Joint Working

21. Muni, S.D. and Pant, Girijesh. (2005), *India's Search for Energy Security: Prospects for Cooperation with Extended Neighbourhood*, Rupa & Co, New Delhi

Group on the IPI Pipeline in Islamabad, where the two countries agreed to split equally expected gas supplies. Indian leaders consistently describe the pipeline project as being in the nation's interest for greater energy security. As Iran and Pakistan move to finalize the pipeline project, India in April 2008 confirmed that it would rejoin talks. Beijing has also expressed its interest in Pakistani proposals that China participate in the IPI project, which possibly spurring more energetic Indian participation[22].

Iran President Mahmoud Ahmadinejad arrived in New Delhi in April 2008, for a five-day visit and met with top Indian leaders. India's foreign secretary expressed satisfaction with the course of the bilateral relationship and stressed his government's view that building a physically secure, economically and commercially viable natural gas pipeline from Iran to India would be in both countries' interests[23]. The foreign secretary had clarified the apprehensions about India's relations with Iran would remain strong and close not withstanding India's warm relations with the Untied States. He said that India's deeper engagement with Iran would facilitate regional stability and that, "Everything we do with Iran is open, above-board, and quite clear to everybody[24]."

During the visit of Iranian president Mahmoud Ahmadinejad, a State Department of US spokesman had expressed hope that New Delhi would call on Ahmadinejad to meet U.N. Security Council requirements that Iran to suspend its uranium enrichment activities. The comment sparked outrage and indignation in New Delhi, where the External Affairs Ministry responded by saying India and Iran were "perfectly capable" of managing their own bilateral relations and needed no external guidance in this regard[25]. Ever-optimistic Iranian leaders anticipate a trilateral agreement to launch the project was signed in mid-summer 2008. Such a development could be considered as significant failure of U.S. policy that could convey a serious message about America's allegedly declining international and regional clout. Some independent analysts and Members of Congress assert that completion of an IPI

22. China Shows Interest in Iran-Pakistan-India Gas Pipeline Project." *BBC Monitoring South Asia*. April 26, 2008

23. "India Official Dismisses Iran Reports," (2007) Washington Post, May 2. and India's Long-Standing Ties with Iran Straining Alliance with U.S.," *The Washington Post*, September 20.

24. "Briefing by Foreign Secretary Shri Shivshankar Menon on Visit of President Ahmadinejad of Iran to India," Indian Ministry of External Affairs, April 29, 2008

25. "India Bristles at US Comments on Ahmadinejad Visit," (2008) *Agence France Presse*, May 22. http://www.state.gov/r/pa/prs/dpb/2008/apr/103842.htm.

pipeline would represent a major confidence-building measure in the region and could bolster regional energy security while facilitating friendlier Pakistan-India ties.

According to the Indian Ministry of External Affairs, India and Iran enjoy historical ties. In its annual report, the Ministry claims, 'The year 2004-2005 saw further deepening and consolidation of India-Iran ties,' with "increased momentum of high-level exchanges" and "institutional linkages between their National Security Councils." Iranian leaders, always looking for new allies to frustrate U.S. attempts to isolate Iran, echo the positive sentiments and say that India's current relations with the United States will not weaken their own ties with New Delhi[26]. Thus sentiments were reaffirmed by both India- Iran, when the trilateral agreement was signed in 2008.

Indian leaders regularly speak of "civilizational ties" between the two countries, a reference to the interactions of Persian and Indus Valley civilizations over a period of millennia. As U.S. relations with India have grown both deeper and more expansive in the new century, some in Washington believe that New Delhi's friendship with Tehran could become a significant obstacle to further development of U.S.-India ties. However, India-Iran relations are unlikely to derail the further development of a U.S.-India global partnership. At the same time, given a clear Indian interest in maintaining positive ties with Iran especially in the area of energy commerce New Delhi is unlikely to abandon its relationship with Tehran or to accept dictation on the topic from external powers.

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26 . Indian Ministry of External Affairs, Annual Report 2004-2005; and "Iran Sees Good Ties With India Despite India-US Nuclear Deal," (2006) *Agence France Presse*, Mar. 30.

Chapter-5

CONLUSION

In the contemporary period of globalization, no country can isolates itself from the dynamic and ever changing nature of world politics, which has to facilitate the mandatory of phenomenon of interaction, interdependence and interrelation with the comity of nations. Not a single country in the modern civilization can be a self-fulfilled and self-dependence in every sphere of requirements, necessities, or resources for its survival. It is the nature of modern states to provide dignified and decent life for its citizens. So, it is always important to promote interdependence than independence or dependence in this globalize world for the countries like the US and India. The amalgamation of interests and congruence of socio-political, economic, cultural, ideas or value systems are mesmerizing each other for the friendship and cooperation between the US and India. The US-India Energy Security Cooperation is also based on the above principles, values or ideas which are driven by mutual national interests and mutual respects.

CONVERGENCE OF INTERESTS

Because of various historical reasons Indo-US relationship was in constrains, antagonism, difficulties, ups and downs for the last half of century, but in recently period one can experience sea change and paradigm shift in the bilateral relations. India and the US recognised each other as natural allies, and across the globe two nations are known as the largest and greatest democracies of world respectively. Both the nations shares common values, and committed to values like human right, democracy and rule of law, pluralism, multiculturalism and pledge to promote stability, democracy, prosperity and peace across the globe. These shared tradition of common values, culture and ideas have been enhancing ability to work together for the betterment of the two countries and advancement of human civilization. Its needs not to mention, that the US is sole superpower of the world in almost all areas such as socio-economic-political, military, science & technology, IT, communication etc. Therefore, it's better for India to have friendship and interaction with the great power

like the US to serve its interests and effective address the concerns, which used to emanate from the process of endurance of India.

The US also recognised the changing constructive role of India as a regional power and emerging world power. India have been achieving the second highest sustained economic growth and second largest populated country (in both cases only ahead is China) in the world; billion plus population with large emerging middle class, well educated with the knowledge of English language, advanced computer skilled major working force, revolution of IT sectors, highly skilled honest professional like doctors and engineers, etc. has sensitised world, including the US. Therefore, the US and India has been trying to congruence their interests to mutual interests. It is necessary to note that, the importance of India has acquired in such a significant place in the perception and imagination of the U.S. government officials and foreign policy makers in the era of dynamic globalise world politics, where the interactions and friendship matters a lot. So, the US also comes forward to help India to realize its dream to become a major world power in the 21st century, in returns the US also seek to serves its own interests. All these world views encouraged India and U.S. to work together in varied areas of global concerns and mutual interests such as the war on terrorism and climate change; socio-economic-political and cultural; trade and commerce; and science & technology. But the most important area of opportunity or avenue for cooperation and collaboration is in the field of energy security, which has been beneficial for India.

Energy Security Dialogue or Cooperation

In this globalize world, the energy security has become such an important subject, which has been a matter of debate and discussion in all over the world. Energy plays a significant role in the national security of any given country as a fuel to power of economic growth and development of a country. Therefore, energy security is very important in every aspect of civilized modern life. Energy security has wider connotations, and varies from the region to region and from country to country. Energy security has emerged as a prominent factor guiding the grand strategy and relations between and among the states in the global politics. The energy security is

interrelated with the larger fabric social, economic and political establishment of a society. The easy access to cheap, sustainable and reliable energy has become an essential for operating of country's economic growth and development. There are varieties of multifarious issues that are with energy security; nevertheless the most important part is limited availability of energy resources, which are exhaustible and depletable in nature. The matter of energy security has came into front line because of the uneven distribution of energy resources among the countries, petro-politics or oil politics and political instability in the major energy producing countries, the competition over energy sources, attacks on energy infrastructure, warfare, accidents and natural disasters. These aspects are obligated and encouraged the US and India to have energy security cooperation serves their interests best. The US-India Energy security cooperation's mechanism or strategy of energy governance has initiated to fight against the practices like mismanagement, manipulation of energy supplies, contain the thefts, and fluctuating global price rise.

The origin of India-US Energy Security Dialogue could be placed in the post cold war era. It was initiated by the Clinton Administration of US and Vajpayee government of India in late 1990s. The commencement of Indo-US Energy Dialogue was with a landmark agreement "Joint Statement on Cooperation in Energy and Related Environmental Aspects" in October 26, 1999. The United States and India also have created a Joint Consultative Group of Clean Energy and Environment to foster bilateral cooperation, government-to-government dialogue and encourage public and private sector cooperation in March 22, 2000. The objectives of joint statement was to make clean energy widely available through development and application of new technologies and strengthening efforts to protect our environment and this planet's biodiversity, Indo-U.S. cooperation has contributed in significant measure towards further securing the welfare and quality of life of the peoples of the two countries although for India more. The United States and India recognizes their mutual interests are best served by working together in a collaborative fashion to ensure stability in global energy markets. But the most significant and profound agreement was signed during Manmohan Singh-Bush Administration through 'India-U.S. Energy Dialogue' in May 2005. The Energy Dialogue is based on the broad range of existing energy cooperation between the two countries while developing new areas of collaboration

and cooperation. The Energy Dialogue also organized across five Working Groups, which supervised by a Steering Committee. The Steering Committee consists of experts responsible for creating the rules, prospects, and guidelines for Energy Cooperation. The aims of the Dialogue are to encourage increased trade and investment in the energy sector and work with the public as well as private sectors to identify areas of cooperation and collaboration, and building upon the broad range of existing cooperation; and effort made to secure, clean reliable and affordable sources of energy.

The Five Working Groups along with a Steering Committee provides direction, supervision and future course of action of the Indo-US energy cooperation. The Energy Dialogue in the energy governance mode has establishes broad goals and timelines and ensures coordination among the Working Groups on crosscutting issues such as energy security, future energy scenarios and trade and investment. The Working Groups addresses topics, such as oil and natural gas, electric power, coal and clean coal technology, energy efficiency, renewable energy, new technologies such as hydrogen, and civil nuclear power. Strengthening mutual energy security and promoting stable energy markets to ensure adequate supplies of energy that would support desired levels of economic growth; exchanging information and developing lines of communication for policy coordination in times of market instability; promoting increased trade and investment in the oil and gas sector. Advancing understanding of efficient generation, transmission, distribution and use of electricity and promoting the exchange of information on regulatory policies; cooperating on programs and technologies with emphasis on the distribution and utilization of electricity in urban and rural networks; developing cooperation on clean coal preparation and modern coal conversion systems in power generation. This dialogue was effectively pursued till the end of Bush administration in 2008.

India's Rising Demand for Energy Security

India is the world's fifth largest energy consumer and may become third by the middle of this century. Coal is the country's leading commercial energy source,

accounting for more than half of national demand. India is the third largest coal producer in the world, and domestic supplies satisfy most demand but, most of the India's coal is not high quality. Oil consumption accounts for some one third of India's total energy consumption; about 70 per cent of this oil is imported from the West Asia or Middle East countries. India's domestic natural gas supply is not likely to keep pace with growing demand, and the country has to import as much as of its natural gas, either via pipeline or liquefied natural gas. Hydropowers, especially abundant in the supplies only contribute about 5 per cent energy needs. Nuclear power, which Indian government officials and some experts says that this is a potential sector and urgent need of expansion, currently accounts for only 1 per cent of the country's energy supplies and less than 3 per cent of total electricity generation. Approximately one-fifth of the India's power is consumed by farmers' irrigation systems, making the farm lobby a powerful impediment to curtailing subsidies provided by State Electricity Boards, which collectively lose billions of dollars annually. Moreover, from one-quarter to one-half of India's electricity disappear though transmission losses and theft.

Energy Security, Environment and Climate Change

Indian officials noted that India accounts for 17% of the earth's population but only 4% of its Green House Gas (GHG) emissions, thus far reject any policies or international agreements that would set limits on their own national emissions while calling it imperative that developed countries commit themselves to reducing their own emissions. The developed and major countries like the US account near about 29 to 30%, the European Union 18%, Japan 4%, China 8%, and Russia 15% while India's cumulative emissions is only 4%. So, New Delhi has been criticizing Washington and other for failing to take responsibility for cumulative emissions and for bringing irrelevant considerations of industrial competitiveness and employment to bear on the debate. India asserts that its own continued economic development and poverty reduction efforts prohibit capping its GHG emissions and claim there has been a persistent attempt by some developed countries to avoid their legal obligations

under international treaties. In June 2008, the Indian government unveiled India's first-ever national action plan to address climate change, with Prime Minister Singh acknowledging that the country faced a dangerous problem and vowing to devote greater attention to renewable energy, water conservation, and preserving natural resources. The plan sets out eight national missions for sustainable development: solar energy; enhanced energy efficiency; sustainable habitat; conserving water; sustaining the Himalayan ecosystem; a Green India; sustainable agriculture; and a Strategic Knowledge Platform for Climate Change. The two countries are taking many initiatives to mitigate the impact of energy production and use on the environment. India, which was the first country to establish a full-fledged Ministry for Non-conventional Energy Sources, is working to make renewable energy sources a viable and significant part of India's energy supply. India is one of the largest users of wind energy and solar energy in the world and has also made impressive advances in generating energy from wastes. The United States and India reaffirm their strong support for international efforts to combat global climate change under the UN Framework Convention on Climate Change and its Kyoto Protocol, Clean Development Mechanism (CDM). They recognize that, under the United Nations Framework Convention on Climate Change, the developed country Parties would take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to the developing country.

Energy Governance

Energy Governance or Management is one of the ingredient features of energy governance which is well defined in the Indo-US Energy Dialogue i.e. division of working groups, steering committees, specialized experts, officials and business communities to take responsibility of a particular area. There were number of seminars, conferences and workshops that were organised to create the public awareness about the economy of energy wastage and energy misuses. U.S-India energy security cooperation is driven by the energy governance in which negotiation over price, demand-supply, and implication of various agreements were analysed, scrutinized, discussed & debated by experts of both the countries. The role of energy

governance is essential and paramount to keep away from any kind of disputes, conflicts, and misunderstandings during the implementing or operation of Indo-US Energy Security Cooperation agreement between two countries. The inheritance nature of the global energy market affairs is always fluctuates. A broader need for energy governance derives from the fact that energy concerns several policy fields having a cross-cutting issues interrelated & interconnected with other policy fields such as trade, environment, climate, social policies and global energy market. The main objectives of Indo- US energy governance is to building up an energy community, by setting standards for the energy market economy and providing a basis for contractual and trade relations, creating a basis for a rule of law. There are interrelated risks identified which has been commonly addressed by energy governance such as physical risks deriving from disruptions; economic risks related to price increases, environmental risks associated with irresponsible consumption of energy without human heart. Other central issues of energy governance such as market harmonization and market transparency strategies of the U.S-India energy cooperation have been agreed. The energy security is not divisible, but can only be achieved by collective cooperation through proper application of energy governance. The energy governance connotes and involves issues like good management, proper distribution, use of smart modern new technology, reform of energy sector, use of national energy grid or network, creating awareness among the public about the economy of energy wastage, effective and efficiency use of administrative machineries and tools for strictly implementation of stringent law and punishment against corruption, mismanagement and irregularities or energy theft. Energy governance is an attribute or key concept that is very much interrelated with energy security. Energy governance involves multiple issues of international co-operation in energy security, synergising of policies among states and linking the areas of trade, environment and development which have a bearing upon energy relations, security and pattern of consumption.

The Energy Governance, a system, strategy or mechanism of US-India Energy Dialogue, in which there are various steps and initiatives have been taken between the India and U.S. governments for the proper energy governance mechanism which considered as soul of the energy security in this contemporary world of energy. It is all about serious contemplation and depth of realization of the importance of

sustainable energy security for the present as well as for the future generations and conscious effort to address these concerns. The proper distribution, right management, energy reforms, and checking of irregularities, corruption is very crucial to attain energy security. Under the aegis of US- India energy dialogue, the energy governance has focused on activities that facilitate the exchange of information and develop lines of communication for policy, promote increased trade and investment in the oil and gas sector and examine steps to improve business climates and work with the private sector to identify areas of cooperation and collaboration. There are many proposals formulated for this purpose, like a proposal for Strategic Petroleum Reserve, to meet the unexpected future demand of energy requirements or disruptions.

Energy Diplomacy

US-India Energy Cooperation in the diplomacy mode produces strains especially in the issue of alternative source of energy from Iran. The US actions and intentions are in contrary with the spirit of the US- India energy dialogue vis-à-vis to the proposed Iran-Pakistan-India (IPI) gas pipeline. The fundamental nature of India's energy diplomacy is a conscious effort to make external relationship in the field of energy between or among the countries driven by desire for energy security which interconnected with geopolitical compulsion, strategic interest, promotion and protection of national security and national interest. India and China have emerged as the rapidly growing energy consumers due to their high growth rate, yet other developed world remains ahead in terms of energy consumption as compared to the newly emerging players. Thus, Indian and Chinese companies and industries have been competing each other to acquire for energy sources across the globe i.e. in the African regions, in the Middle East countries, West Asia, Siberian regions. Thus the politics over energy which is defining the relationships of countries in the today's world politics is a prominent factor in determining the fate of energy security.

India's Energy Diplomacy is an endeavour of India to define its energy engagement with the leading players of energy market in the globalized world. The energy diplomacy is a pillar of India's foreign policy to search for energy security which has been building of bilateral energy cooperation with immediate neighbouring countries.

But the Iran-Pakistan-India (IPI) pipeline has remained a major concern for U.S., contemplating apprehensions that this would undermine the U.S. policy of isolating the Iranian regime in the global polity and economy. Therefore, the U.S. has consistently resisted this project (which is in contrary to the essence of energy dialogue), and diplomatically mounting pressure on India to stop proposed pipeline, which is considered as vital for India' energy security. The role of Indian diplomacy has been to acquire energy security, but the influence of US diplomacy in the present global energy market affairs has remained disturbing for India. Because of various reasons, the America wants to isolate and restrain the prominence Iranian political affairs in the Gulf region and in the world politics. Therefore, the American administration has been pursuing India and diplomatically pressuring India in number of occasions to restrain from the proposed gas pipeline with Iran, which is crucial for the India to maintain sustainable economic growth and overall development of country that emanates only from the energy security. Therefore, IPI is essential for India, but this issue has remained controversial between the two countries.

.....The End.....

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