Energy Security: A Study on Contemporary Governance & Policies of Oil & Gas Sector in India

By

SANDIP SHARMA

B.E (MECH.), MBA (OIL & GAS)

College of Management & Economics Studies

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DECLARATION BY THE AUTHOR

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree or diploma of the university or other institute of higher learning, except where due acknowledgment has been made in the text.

"Sandip Sharma/ March, 2012"

THESIS COMPLETION CERTIFICATE

This is to certify that the thesis on **"Energy Security: A Study on Contemporary Governance & Policies of Oil & Gas Sector in India"** by **Sandip Sharma** in Partial completion of the requirements for the award of the Degree of Doctor of Philosophy (Management) is an original work carried out by him under our joint supervision and guidance. It is certified that the work has not been submitted anywhere else for the award of any other diploma or degree of this or any other University.

External Guide

Dr. Vikas Prakash
Place : New Delhi
Date: March, 2012

Internal Guide

Dr. Devendra Kumar Punia
Place: Dehradun, India
Date: March, 2012

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Executive Summary

Oil and gas constitutes an overwhelmingly major component of India's primary energy consumption, and being a country deficient in natural resources endowment, India's energy security policy is largely a policy for securing oil and gas. Indeed, oil and gas constitutes the major and most common form of energy source which drives economic activity across the world. Therefore, the countries of the world, whether as producers or as consumers, have drawn up different models of governance and policy making to address the issue of oil and gas and energy security. Some countries, which are richly endowed with petroleum resources have adopted models which maximise revenue returns and improve governance and resource exploitation. Other countries, like India have so far adopted a fragmented approach. Such a fragmented approach has often not obtained the most optimum returns for India. This thesis compares the governance models of these countries and then offers the unified energy agency model as a possible solution for this problem. It takes a look at the various models of governance across the world, and the best practises followed in relevant international organisations, the relevant organisations and legislations in India; on the basis of these studies, it proposes a viable model for the unified energy agency, referred to as the National Energy Security Agency (NESA), which can be built on the existing ministries, agencies, funds and legislations in the country. The thesis also studies how this unified agency can possibly effectively address the various energy security problems like fuel subsidies, mergers and acquisitions, project implementation, oil assets abroad, international cooperation, inter-sectoral coordination, acquisition of new technologies etc

List of Abbreviations

2 – D – Two Dimensional

3 – D – Three Dimensional

APM – Administered Price Mechanism

Bcm – Billion Cubic Meters

BEF – Bureau of Energy Efficiency

BOEMRE – Bureau of Ocean Energy Management, Regulation and Enforcement

CAG – Comptroller & Auditor General

CBM – Coal Bed Methane

CERT – Committee on Energy Research & Technology

CIF – Carriage, insurance & Freight

CNG – Compressed Natural Gas

COGOA – Canada Oil & Gas Operations Act

DGH – Director General of Hydrocarbon

DOE – Department of Energy

E & P – Exploration & Production

EMS – Directorate of Energy Markets & Security

EOR – Enhanced Oil Recovery

EPA – Environment Protection Agency

EPD – Emergency Policy Division

ERO – Electricity Reliability Organization

ETG – Expert Technical Group

FERC – Federal Energy Regulatory Commission

FOB – Freight on Board

GAIL – Gas Authority of India Limited

GDP – Gross Domestic Product

GED – Directorate of Global Energy Dialogue

GHG – Green House Gases

GW – Giga Watt

HPCL – Hindustan Petroleum Corporation Limited

IDSA – Institute for Defense Studies and Analyses

IEF – International Energy Forum

IEP – Integrated Energy Policy

IOR – Increased Oil Recovery

IREDA – Indian Renewable Energy Development Agency

JNOC – Japan National Oil Corporation

JOGMEC – Japan Oil, Gas & Metals National Corporation

KG – Krishna-Godavari

LED – Light Emitting Diode

LNG – Liquified Natural Gas

METI – Ministry of Economy, Trade and Industry

MMT – Million Metric Ton

MMTPA – Million Metric Ton Per Annum

MNRE – Ministry of New & Renewable Energy

MOPNG – Ministry of Petroleum & Natural Gas

Mtoe – Million Tonne Oil Equivalent

MTOGM – Medium-term Oil & Gas Markets

MW – Mega Watt

MWP – Minimum Work Programme

NDRC – National Development & Reform Commission

NEB – National Energy Board

NESA – National Energy Security Agency

NHTSA – National Transportation Safety Administration

NRCan – Natural Resources Canada

OFIC – Former Soviet Union

OIL – Oil India Limited

OMC – Oil Marketing Company

ONGC – Oil & Natural Gas Corporation

OPEC – Oil Producing & Exporting Countries

PDS – Public Distribution System

PEL – Petroleum Exploration License

PPAC – Petroleum Planning & Analysis Cell

PSU – Public Sector Unit

SDTC – Sustainable Development Technology Canada

SEO – Standing Group on Emergency Questions

SOM – Standing Group on the Oil Market

TPP – Trade Parity Pricing

U.S.A – United States of America

UNDP – United Nations Development Programme

UPA – United Progressive Alliance

USD – US Dollar

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Chapter 1: Introduction

This Chapter discusses the background of the oil and gas sector, policy and governance, and the state of policy making in India.

1.1 Background

The oil and gas sector in India has been a significant catalyst in fuelling the growth of the Indian economy. The importance of oil in India can be gauged from the fact that it accounts for 36 percent of the Primary Energy Mix in India (Tungatkar, 2011). Taken with natural gas, this percentage rises to 45 percent. (Tungatkar, 2011). Besides its contribution to the exploitation of the natural resources available in India, and provision of commercial and domestic energy to the population of India, the industry has also represented a powerful scope for investors in general, thus reflecting the relatively large industry of the industry in India.

Although the story of the Oil & Gas industry can be traced all the way back to October 1889 when oil was first explored in Digboi, Assam, the industry can be said to be relatively less well developed compared to other countries which have had similar timelines of history and economic growth (TERI, 2007). In the upstream sector for example, only a small percentage of India's sedimentary basins are under exploration and development. In the downstream sector, although the Government has dismantled the APM ( ) it continues to set the end-consumer go prices of fuel sold at retail pumps, and upstream companies such as ONGC and OIL are asked to partially bear the burden of under-recoveries of the Oil Marketing Companies. In other sectors like oil field services, with the increased exploration activity in India post NELP ( ), the coming years are likely to witness increased demand for oil and gas allied services in India, particularly given the focus on deepwater blocks and frontier basins. Services such as 2-D and 3-D seismic surveys, processing and interpretation, drilling rigs, well-logging, etc. are all

likely to witness robust growth, but a large chunk of these will be dependent on multi-national corporations and foreign expertise. In the refining sector, India has come a long way since the Mumbai Refinery of HPCL was commissioned post independence. Starting with relatively modest capacities, the public sector units (PSU) refiners have gradually ramped up capacities at existing locations or constructed Greenfield refineries at new locations. Today, there are more than 20 refineries, both large and small, in the country with even further additions being planned. India, which is already surplus in refining capacity, aims to emerge as a refining hub, leveraging its favourable geographic location close to the oil-producing regions of the Middle East and the ability of the latest refineries to process heavy, low-grade crude. Likewise, the Indian fuel market, despite being heavily subsidizing end-user prices, does hold some promise, more so if market forces are allowed free reign, given the fact that the number of vehicles on Indian roads is expected to increase substantially, in line with projections of economic growth.

While the preceding paragraph gave a bird's eye view of the situation in the Indian oil and gas sector, it did not mention the other aspects of the Indian energy scenario (like hydropower, coal, renewables etc) in order to provide some kind of a focus on the nature of the subject. As has been mentioned in the first paragraph, with oil and gas contribution to 45% of the primary energy mix (Tungatkar, 2011), this sector is without doubt the big daddy on the block. It is therefore natural that any discussion on the governance and policy making of energy security will be proportionately focused on the governance and policy making of oil and gas sector in India.

1.2 What is Policy and Governance

The making of public policy for a country as large, populous and diverse as India is intrinsically a more complex task than in a smaller political unit. In order to lay out in a rational manner the framework of discussion in this paper, we start off by first undertaking a discussion of the basic definitions of the terms, policy, governance, policy-making process etc.

The word governance derives from the Greek verb kubernáo which means to steer and was used for the first time in a metaphorical sense by Plato. In simple terms, it may be stated that Governance is the act of governing, and we may say further that in order to distinguish the term *governance* from *government*; "governance" is what *a* "government" does (Wikipedia, 2001). For the purposes of our discussion here we limit ourselves to government governance and not include the field of corporate governance. And in order to further crystallize the definition of governance for the purposes of the thesis, we can briefly revisit the two internationally accepted formulations for governance:

- The World Bank definition of governance as the exercise of political authority and the use of institutional resources to manage society's problems and affairs.
- United Nations Development Programme's definition of Governance as the rules of the political system to solve conflicts between actors and adopt decision (legality). It has also been used to describe the "proper functioning of institutions and their acceptance by the public" (legitimacy). And it has been used to invoke the efficacy of government and the achievement of consensus by democratic means (participation).

Thus from the above two definitions, we take the following points as those aspects of governance which are critical for analysis of any governance system:

1. the exercise of political authority
2. legality, participation & legitimacy
3. use of institutional resources to manage society's problems and affairs.

From the point of view of this thesis, the World Bank definition with its emphasis on the ‘use of institutional resources’ is better suited to analyse the oil and gas sector in India.

Policy, or more specifically, public policy, is government action or the principled guide to action taken by the administrative or executive branches of the state with regard to a

set of issues in a manner consistent with law and institutional customs. It may be more simply defined as the output of governance. In any society, governments enact laws, make policies, and allocate resources. Public policy is the sum total of the laws, regulatory measures, courses of action, and funding priorities concerning a given topic promulgated by a governmental entity or its representatives. A major aspect of public policy is law, including the specific legislations and more broadly defined provisions of constitutional or international law. Similarly, administrative actions, guidance, notifications etc (Dictionary, 2003) which also have an impact are a major component of the broad rubric called 'policy'. Thus, while governance can be said to be 'policy making process', policy may be defined as 'output of governance', thereby providing a simple but clearly articulated ' circular' definition of these terms.

A "good" policy-making process is one that "is committed to producing a high quality decision—not any particular decision" and that "invests any decision made with a high degree of legitimacy, power and accuracy". It would involve due consideration of up-to-date available subject-matter knowledge and relevant data, and the use of available analytical tools. A good policy-making process should produce policies which can be executed swiftly and successfully. This requires the close involvement, during formulation, of the persons who actually have to implement a policy on the ground, and implies a degree of 'decentralisation' of policymaking. At the same time, a degree of centralised control is necessary, so that the priorities and interests of implementers do not supplant the public interest. However, a comparison of the reality of policy-making in India with such a theoretical framework shows several shortcomings.

One of the main problems with policy-making in India is extreme fragmentation in the structure. For example, the transport sector is dealt with by five departments/Ministries in the government of India whereas in the US and UK it is a part of one department. Another problem is the excessive overlap between implementation, program formulation and policy making which creates a tendency to focus on operational convenience rather than on public needs. Policy-making in Indian ministries occurs at the levels of Director and above, but the most important level (crucial for consideration

of cross-cutting impacts) is that of the Secretaries to the Government of India, who are their Ministers' "policy advisers-in-chief". However, as mentioned earlier, the very same Secretaries spend a large part of their time bogged down on routine day-to-day administration of existing policy. Time is spent anticipating and answering parliamentary questions, attending meetings and functions on implementation issues etc. The result is that sub-optimal policies, where adequate attention has not been paid to citizen needs, tend to emerge.

Often public policy is made without adequate input from outside government and without adequate debate on the issues involved. The best expertise in many sectors lies outside the Government. Yet the policy processes and structures of Government have no systematic means for obtaining outside inputs, for involving those affected by policies or for debating alternatives and their impacts on different groups. Most developed countries have a system of widespread public debate before a policy is approved. Policy decisions are often made without adequate analysis of costs, benefits, trade-offs and consequences. Another important cause is inadequate professionalism of policy-makers and advisers. There is a school of thought which suggests that the excessive involvement of poorly informed generalists is the main cause of poor policy-making and implementation. However, when it comes to the realm of policymaking and the making of trade-offs, experience in government and the private sector suggests that this is usually best handled by an intelligent, well-informed person who has a wide rather than narrow perspective. This person could be termed the "intelligent and informed generalist" who, though not a specialist in any one field, is in fact a specialist in analysis, integration and synthesis—i.e. identifying problems, trade-offs and solutions. His strength and training lie in being well-informed about a variety of related subjects, in incisive analysis, and in intelligent use of information provided by specialists to frame policy options and assess their consequences.

1.3 Policy Formulation & Governance in Oil & Gas Sector in India

It has already been outlined how, due to the predominance of O&G sector in the energy mix, that sector holds the key to our Energy security. No doubt, given the current trend

of taking up more and more renewable energy, there will be more emphasis of research, government policy and private business in this sector. But even if nuclear and renewable energy are tapped to their optimum levels, O&G sector will continue to have a dominant position in the energy mix. Since India is an energy importing economy, at an international level, energy security for us will largely be energy security for the O&G sector, with a relatively lesser emphasis on nuclear energy and fuel supplies, and a much lesser emphasis on renewable and clean technology. In the domestic level, energy security will be about rationalizing and optimizing the energy markets, so that energy remains available and affordable, while continuing to provide adequate incentive for enterprise to participate in energy production.

There have been much debate and discussions on the need for 'integrated' policy making in the energy sector, or even having a unified ministry or agency to do this. As pointed out in the thesis later, having one single body to look after O&G, coal, power and renewable energy would be impractical in the Indian context. On the issue of 'integrated' policy making, we have the Planning Commission's Integrated Energy Policy document, which ties up the individual policy documents like Hydrocarbon 2025, Biofuels Policy etc. This document, while providing a ready reference to the policy planners, has not been very successful, since it is full of internal contradictions, and has not been updated frequently. In other words, 'integrated' policy making in India is linked to not the reality but the Five Year Plan timeline, and the only integration that is done is of consolidating the policy positions of all the ministeries and agencies, without reconciling the contradictions, or ensuring integrated administrative structures which can carry out the 'integrated' energy policy.

The purpose of this thesis is to explore options for improved governance and policy making in the O&G sector, thereby improving the country's energy security position.

The Planning Commission's Integrated Energy Policy document mentions the need for having an integrated national agency, but with the limited mandate for undertaking research and development. The inherent weaknesses in this suggestion are that:

- No clear instructions were given as to how the agency would be formed and funded.

- There are already a plethora of such agencies, run by the respective ministries. The real need is to consolidate these, and not create a new entity which would reinvent the wheel or duplicate the work.

- In the absence of an unified/integrated supervising body, the proposed new agency would just be another coordinating body between the various nodal ministries. The output would therefore continue to be fragmented and inefficient.

This thesis, therefore takes this suggestion of the IEP as an input, and builds up on it

1.4 Outline of Thesis

Chapter II undertakes the 'Review of literature', it is proposed to undertake a survey of the literature available on the subject, and which have been perused in the preparation of this thesis. Since the range of literature to be studied is vast, it is proposed to divide the Review of literature chapter wise.

Chapter III explains the Research Methodology being used to conduct the research. This chapter consists of the research design, which explains the scope of the research, objectives, research questions etc.

In Chapter IV, a systematic survey of the governance and policy making in the O&G sector of four countries will be undertaken. The natural endowment of each country is unique, and this naturally has an impact on the policy and governance of the country. For example, Canada is a resource rich country, particularly in oil and gas, and therefore it's dominant approach has been on market mechanisms for sustainable exploitation of its resources (Maxkeiser, 2011). The USA, while having significant endowments of natural resources is also the world's largest economy, and for this reason, energy security is a dominant consideration (CIA, 2011). The purpose of this chapter would be to present a brief description of the policy and governance of O&G sector in USA, Japan,

China, Canada, thereby providing us a good understanding of not only alternative systems, but also inspirational/desirable end goals for our own O&G sector.

The governance and policy making in relevant international bodies like the OPEC, IEA, and the IEF will be discussed. Given the energy mixes of most economies, O&G remains the most important source of energy, and since O&G resources are not equally distributed, international trade remains an important platform in energy security. Policy and Governance in this sector has to take into account international developments, not only from the point of view of developments in technology and corporate positions, but also socio-cultural developments, political and military developments etc. The case of the Arab uprisings, the subsequent rise in oil prices and the diplomacy in the IEA, OPEC etc demonstrates this only too clearly. Chapter IV will therefore give a brief description of the three major O&G international organizations—IEA, IEF and OPEC—along with a brief description of their policy/governance history. This will provide us important inputs to our later discussions on evolving an appropriate policy/governance structure for ourselves.

Also, there is a brief discussion on the 'Structure of governance in India'. This will essentially be a detailing of the relevant organizations in the O&G sector in India, the role each of them plays in the policy making, a brief description of the historical reasons for their existence, the role they have played in the reform of the O&G sector in India etc.

A comprehensive discussion of the relevant rules and provisions available for running the administrative machinery in India will also be done. This will include a discussion of the Constitutional provisions, the relevant provisions in the Allocation of Business Rules in Government of India as well as few case study organizations. This will be followed by a detailed discussion on the various mechanisms and administrative bodies which make energy security policy in India.

Chapter V would present a discussion on the conclusions and recommendations based on the findings of detailed comparisons carried out in last chapter.

Chapter VI will discuss the administrative structure of proposed organization 'NESA'. This Chapter will provide a detailed description of the structure and functioning of the proposed NESA. The broad idea is to be able to build an organization based on existing structures, talent, rules and funds, while trying to achieve competence in policy making of an international level. This Chapter will try and analyse the various failures in policy making in the O&G sector and how the new proposed structure would try and not make such mistakes in the future. This chapter would also discuss the legal provisions to create the proposed administrative structure.

Chapter 2: Review of Literature

This chapter undertakes the Review of literature available on the subject. Following sections summarizes the literature in related areas of Energy Security,

2.1 Energy Security

Security of obtaining adequate supply of a traded commodity, be it food or fuel, is generally a problem of the poor people, poor regions or poor nations. The rich with the power to pay the price, find willing suppliers for what they want. The World Energy Assessment report defines energy security as – the continuous availability of energy in varied forms in sufficient quantities at reasonable prices. This definition needs to be modified to reflect our situation better (UNDP, 1999). Energy security can be defined as follows:

"The country is energy secure when we can supply lifeline energy to 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 (UNDP, 1999)".

The various elements of this definition that may be noted are: "all her citizens", "lifeline energy", "effective demand", " safe and convenient energy", "at affordable costs", "at all times", "various needs", "prescribed confidence level", "shocks and disruptions" and "reasonably expected".

These are motivated by the following considerations:

(a) It is important that energy is supplied to all citizens. When the energy needs of only some citizens are met, it cannot be a sustainable situation.
(b) It is necessary to provide "lifeline" energy to all the citizens irrespective of their paying capacity. Energy up to a certain level is a basic necessity and

whether the state supplies it or not people will procure it in any way. If the state does not provide it environmental degradation can be expected.

(c) Effective demand, i.e., demand backed up by ability to pay for it, at market determined prices, should be met fully. If it is not, the rich will get what they desire but the poorer classes would not.

(d) Lifeline energy consumption for those who cannot afford energy at the market driven price, has to be made through subsidies. Energy security requires that the lifeline energy needs of the Nation are met in full.

(e) Safe and convenient energy is desirable as use of traditional fuels such as wood or dung cakes cause indoor air pollution and lead to adverse impact on the health, particularly of women and children.

(f) Energy is required in different forms to meet different needs. Energy in one form cannot be easily substituted by other forms of energy. Often such substitution involves cost or loss in the quality of service. For example kerosene can replace electricity for lighting but at a cost and a loss in quality of service. Fuel cells or batteries could replace IC engines using petrol or diesel but at a cost.

(g) Energy should be available at all times. Interruptions in energy availability can impose high costs on the economy and also on human well-being.

(h) To ensure energy security at all times, shocks and disruptions that can be reasonably expected must be anticipated. Ability to withstand shocks and disruptions is essential for energy security. However, since anything is possible, one cannot guard against all possible shocks at affordable costs. The surety of energy supply cannot be 100 percent. One can ensure supply only within a certain prescribed confidence level.

2.2 Nature of the Problem

Energy security has become a growing concern because India's energy needs are growing rapidly with rising income levels and a growing population. At the same time our dependence on imported energy has increased. From a level of 17.85% of Total

Primary Commercial Energy Supply (TPCES) in 1991 imports accounted for 30% of our TPCES in 2003. What is of particular concern is that imports comprise largely of oil. Oil imports constitute 72% of our total oil consumption and 26% of our TPCES (May, 2010).

The projection of energy requirement and various supply options show the country's growing dependence on import of energy. Not only oil and gas but also coal imports are likely to grow substantially. Energy security, thus is an important concern for India's energy policy.

The dependence on imports of oil causes two concerns. The first is the uncertainty regarding availability of oil. India's requirements as a proportion of global energy availability is expected to increase substantially (See *Figure 1*). Would we get all the oil that we need even when we are willing and able to pay the price? What do we do if supply is disrupted due to events outside our control? Wars, strikes, political upheavals in the oil exporting countries can suddenly drastically reduce global oil supply. Also in a situation of conflict, oil blockage may be imposed against India. One can think of many such eventualities. How do we keep our economy going in such a situation? How do we deal with this supply risk? The threat to energy security arises not just from the uncertainty of availability and price of imported energy, but also from the possible disruption or shortfalls in domestic production. Supply risks from domestic sources, such as from a strike in Coal India or Railways, also needs to be addressed.

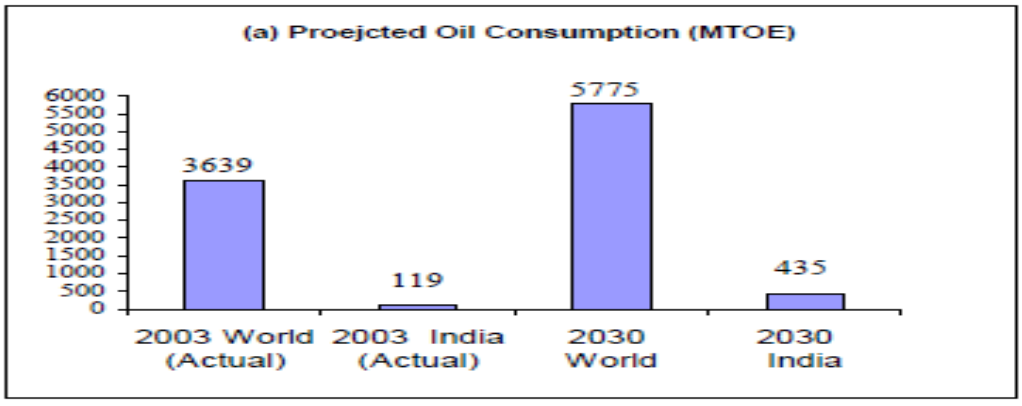

Figure 1: India's Growing Share in Global Energy Consumption

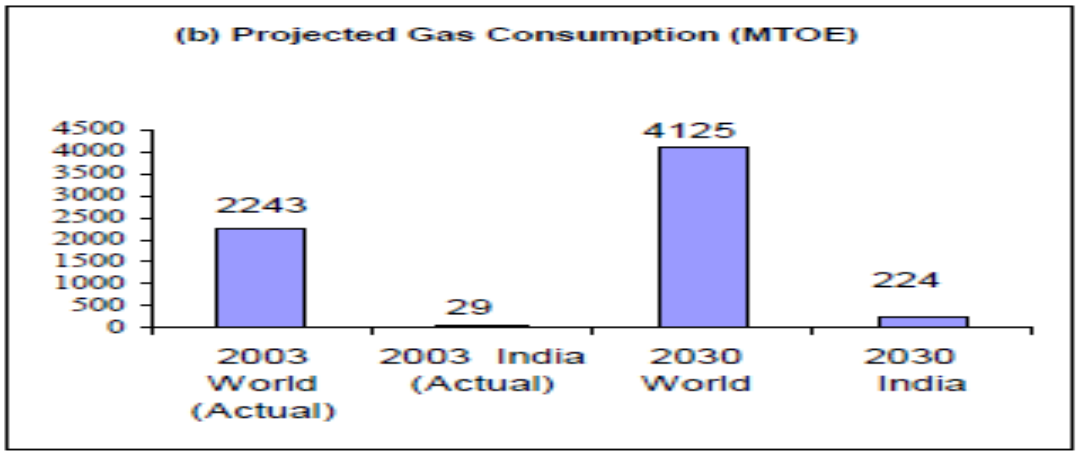

Figure 2: Projected Gas Consumption

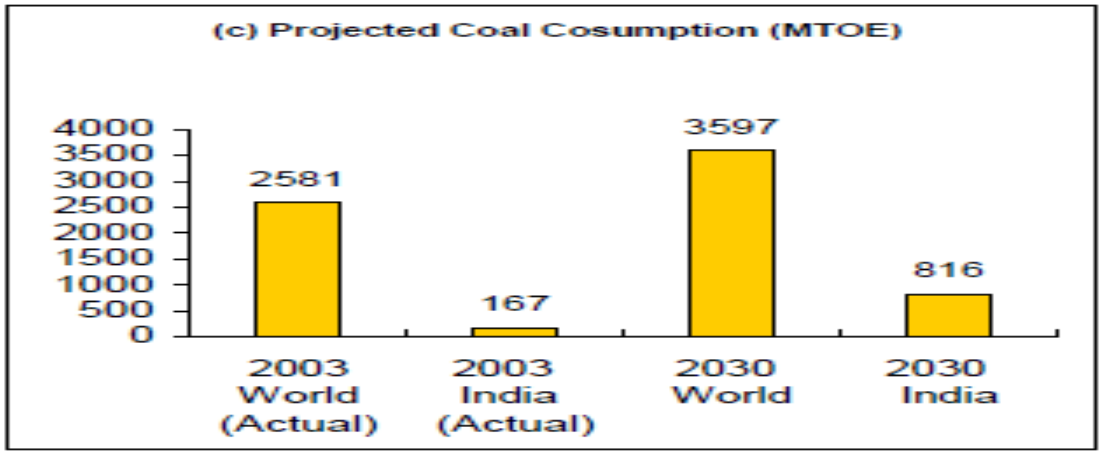

Figure 3: Projected Coal Consumption in India

SOURCE: FOR WORLD-IEA, 2005, *Projections for India are based on GDP Growth Rate of 8%*

The second concern is not disruption of supply but market risk of a sudden increase in oil price. While we may be able to pay for imports, the high oil price can cause inflation, slow down the economy and impose hardship on our people.

The adverse impact on the economy of sudden & large increase in oil price may be perceived as a more likely risk that we face compared to the risk of supply disruption. World Oil prices have fluctuated substantially over the years (see figure 4)

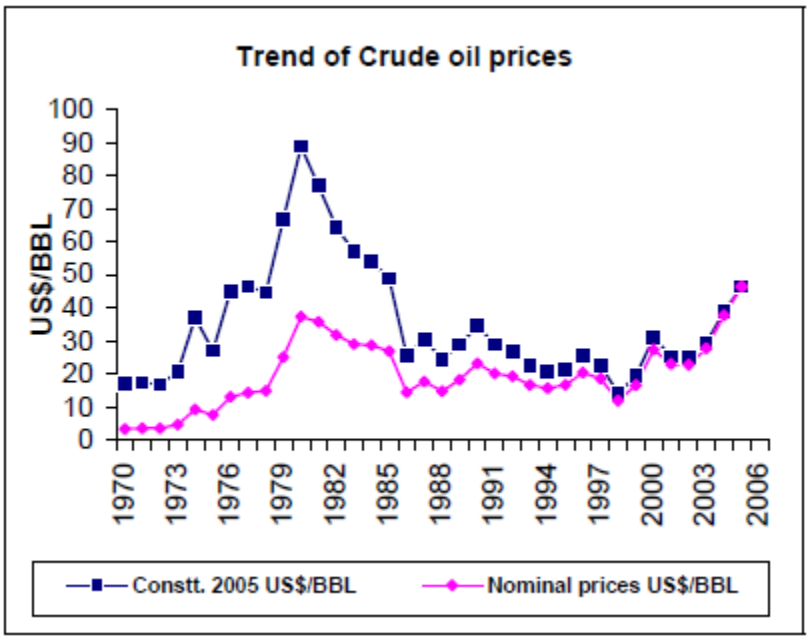

Figure 4: World Oil Prices

Any disruption in access to energy can be very expensive in welfare terms, as energy is critical for economic growth and for human survival and well-being. For example, if an increase in the price of oil or a disruption of oil supply or erratic power supply forces farmers to reduce the use of their pumps and tractors, the consequent reduction in agricultural output and employment can have serious adverse impact on the poor. Thus a Government may not transmit immediately a sudden large increase in the international price of imported energy to consumers. To be able to insulate consumers against such sudden price rise for price increase, Government may have to bear the burden of some time. This requires certain resilience in the government finances. Of course, if the price increase persists, it has to be transmitted to the consumers sooner or later.

Even when the country has adequate energy resources, technical failures may disrupt the supply of energy to some people. Generators fail; transmission lines trip or oil pipeline may spring a leak. There may be many such accidents that disrupt the supply of energy. One needs to provide security against such technical risks.

2.3 Policy Options for Energy Security

The effectiveness of measures to enhance energy security depends on the nature of disruption. The costs of the various measures also differ. One wants to minimise the expected cost for a desired level of confidence. The measures are reducing need for energy and imports, diversification of supply sources, maintenance of strategic reserve and obtaining equity oil or gas abroad that help in reducing the consequences of both supply risk and market risk. The action to improve energy security can be classified broadly in two groups. One that reduces risks and other that manages the risks. The major policy options are:

a) Reducing Risks

- Reduce the requirement of energy by increasing efficiency in production and use of energy;
- Reduce import dependence by substituting imported fuels by domestic fuels;
- Diversify fuel choices and supply sources;
- Expand domestic energy resource base.

(b) Managing the Risks

- Increase ability to withstand supply shocks;
- Increase ability to import energy and face market risk; Increase redundancy to deal with technical risk.

2.3.1 Reduce Energy Requirements

Major opportunities exist in reducing energy requirements without reducing energy services. Improvement in energy efficiency or conservation is akin to creating a domestic energy resource base. Such efficiency improvements can be made in energy extraction, energy conversion, energy transmission, energy distribution and end-use of energy. All of these efficiency improvements can come from currently commercial technologies. Some such examples are detailed below:

(a) India's recovery of in-place reserves can improve easily by 5-10 percentage points, for the same level of energy used for extraction. Better mine design, lowering mining costs, and using technologically advanced mining techniques are all valid options. In the case of oil and gas Improved Oil Recovery (IOR) and Enhanced Oil Recovery (EOR) techniques can improve exploitation of in-place reserves.

2.3.2 Diversify Supply Sources

The impact of short-term disruption of a normal source of supply will depend on how important is that source in our total imports. Thus the first measure for increasing security is to diversify our sources of supply both domestic as well as for import of oil or gas. India currently imports oil from many different countries as can be seen from Table 4.1. While we import oil from 25 different countries, nearly two-thirds of our imports are from four countries, i.e., Saudi Arabia, Nigeria, Kuwait and Iran.

Table 1: Sources of India's Oil Imports – 2004-05

	Country	Oil Imports (mmt)	% of Total Imports
OPEC	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**
Non – OPEC	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**

Energy security can be increased not only by diversifying sources of import of a particular fuel but also diversifying the energy mix by using different types of fuels. An economy that uses coal, oil, gas, nuclear, hydro and renewable of various kinds naturally is less dependent on one particular fuel, and hence less vulnerable to supply disruption of either domestic or imported energy sources. The security provided by such diversification is enhanced where the ability of the users to switch fuels increases. One should assess the uses in which different fuels or energy forms can substitute each other. In an emergency if rationing of a particular fuel is needed, it can be made less costly by encouraging use of substitutes by specific users. This can also have a bearing on the size of the strategic reserve that one needs.

Apart from sourcing oil or LNG imports from different countries, diversification can also be achieved by importing gas through pipelines or hydropower from neighbouring countries.

(a) Import of Gas through Pipelines: Gas imports from Iran through Pakistan, or from Central Asia through Afghanistan and Pakistan or from Myanmar through Bangladesh does provide a higher degree of energy security compared to equity

oil or gas. This is so because of security of supply. Supplying country typically invests in the pipeline and, hence, has a stake in maintaining the supply. Also, if supply to India is stopped, alternate buyers along the route may be difficult to find and the pipeline cannot be easily diverted like a LNG ship for example. Thus risk of disruption from the supplier is relatively smaller. There is, however, the risk of sabotage of the pipeline in the transiting country. This can be guarded against by the following:

1. Create an interest in the pipeline in the transiting country. For example, a common pipeline shared by India and Pakistan will have substantial gains for Pakistan too. There are economies of scale that reduce costs for Pakistan over the alternative of obtaining gas through a pipeline of its own. Also Pakistan would earn transit fees. With this the disruption can be of only a short duration.

2. Enlarge the domestic buffer stock of LNG, have redundancy in re-gasification facility and ensure that in case of disruption supplier would be obligated to provide LNG to compensate for the disruption in the supply of gas.

(b) Import of LNG: Importing LNG through long-term contracts provides a flexible alternative to pipelines. Since the global gas market has developed and LNG trade has increased, natural gas price is likely to match the opportunity cost of selling it as LNG. Thus the cost advantage of piped gas is likely to be not very large and has to be balanced against the risks of pipeline discussed above.

(c) Import of Hydro-Power through Nepal/Bhutan: Substantial scope exists for import of hydro-power from Nepal and Bhutan. This could enhance energy security as hydro-power which is particularly suited for meeting peak power demand can replace natural gas based generators which are also used for

peaking purposes. The problem of arriving at an agreement on the price of power needs to be resolved. The development of a market for power trading in the country provides a benchmark that should make this task simpler. Nepal and Bhutan may be given the right to sell power to anyone on the market.

2.3.3 Expand Resource Base and Develop Alternative Energy Sources

Resource base can be expanded in many ways: Enhance recovery from existing resource base, explore to find new reserves, obtain equity energy abroad and develop new sources of energy through R&D.

(a) Enhanced Recovery: Enhanced oil or gas recovery from existing fields is an obvious option. Recovery of oil and gas from abandoned and/or marginal fields may also be taken up. Director General of Hydrocarbon (DGH) may conduct a comprehensive review on enhanced oil recovery (EOL) schemes being implemented and its potential in all fields presently under production. However this should be optimised to balance the cost of such recovery against the total amount of oil or gas that may be recovered from the field.

(b) In-situ Coal Gasification: Similarly for coalfields, in-situ gasification may permit much higher recovery of coal than can be economically mined by conventional techniques. Technology development for in-situ gasification should be vigorously pursued.

(c) Coal Bed Methane: Methane is adsorbed in coal seams. This Coal Bed Methane (CBM) usually escapes into the atmosphere when coal is mined. Tapping and utilising the CBM as a source of commercial energy has been in vogue in the US & Australia for several years. The estimated potential of CBM in the country is in the range of 1400-2,600 billion cu. metres (bcm) (1260-2340 mtoe). The Government has formulated a CBM policy in 1997 and development of CBM is a concurrent responsibility of Ministry of Petroleum & Natural Gas and Ministry of Coal. So far, 13 blocks have been awarded on competitive bidding basis to various PSUs/private companies and 3 blocks on nomination basis for

exploration and production of CBM. The estimated CBM resources in these blocks are 850 bcm (765 mtoe) and a total production of about 23 MMSCMD at peak production level is expected from these blocks. In addition to this, Ministry of Coal with the assistance of UNDP/GEF is implementing a CBM Recovery and Utilisation Demonstration Project in Jharia coalfields under Coal S&T programme. Promotion of CBM exploration and production is essential to expanding the domestic resource base in the short to medium-term.

(d) Exploration: Efforts can be stepped up to find new reserves. Recent success by private as well as public sector companies such as Reliance and Gujarat State Petroleum Corporation Ltd. in finding gas shows the need to attract more players in exploration in the country.

(e) Equity Oil, Gas, Coal Abroad: Obtaining equity oil abroad does not particularly increase oil security against supply risk. The political risk of disruption of equity oil through embargos or nationalisation etc., would be similar to risk entailed in oil import from the same country. It does, however, constitute diversification of supply sources and thus has some value. It also provides a price cushion for a period that is typically longer than that provided by options and futures contracts, against market risk of sudden increase in prices on the world market. To the extent India owns that oil abroad, whether it is brought to India or sold in the international market, the value remains the same. Thus obtaining equity oil abroad should be mainly looked upon as a commercial investment decision. If the amount of money invested in obtaining equity oil were to earn a higher return in an alternate investment that would provide a better level of comfort against future increase in oil prices. Equity oil, however, does increase the country's access to imports. Thus we should explore and seize economically attractive opportunities for equity energy abroad. However, such investments, even on commercial basis, with country political and logistic risks, may not be attractive in some cases. The country may nationalise the industry and give you inadequate

compensation. The results in terms of actual yield of profits from overseas investments so far made have to be evaluated. Some ground rules for project/investment appraisal should be evolved. A simple way to ensure an independent oversight of the techno- economic viability of a new investment would be to require that it raises at least two-thirds of the funding required through off- shore commercial loans/equity on a stand-alone basis without recourse to sovereign guarantees and without recourse to the balance sheets of India's national energy companies.

(f) Gas to Liquid (GTL): In addition to sourcing piped natural gas and LNG, natural gas liquids may be another option. Major investments are being planned for conversion of gas to liquid in countries with large gas reserves viz., Qatar, Nigeria and Australia. India, with strong political ties with Russia and CIS countries, can consider setting up GTL plants in those countries under long-term arrangements wherein India gets a share of the liquids produced. However, a comprehensive study evaluating technology, available resources and economics would be necessary prior to entering into collaborative arrangement.

2.3.4 Expand domestic energy resource base

New Domestic Sources: The domestic resource base can also be expanded through developing hitherto poorly developed or new sources of energy. Some of these resources may require R&D to make them economical. Among these are:

(a) Gas Hydrates: Very large reserves exist in Indian waters and have the potential to provide vast amount of gas. Technology to exploit these economically in ecologically safe ways is yet to be developed. However, the potential size of the resource makes it mandatory to vigorously pursue R&D.

(b) Nuclear Power: With meagre availability of uranium in the country and vast resources of thorium, the long-term strategy has to be based on thorium. The three state strategy of development of nuclear power from pressurized heavy

water based reactors to fast breeder to thorium based reactors requires sustained R&D effort. Success in these efforts could deliver some 2, 50,000 MW of nuclear power by 2050 and much more thereafter. Given the limited resources of oil, gas and uranium, the thorium based nuclear option must be pursued. Failure to develop India's nuclear potential to the full would significantly increase India's dependence on domestic/imported coal. Nuclear power cannot only enhance energy security but also yield rich dividends by reducing carbon emissions.

(c) Wind: The potential for onshore wind power is assessed at 45,000 MW. The Wind Energy Society of India claims it to be as high as 100,000 MW. However, given that the average capacity factor realised by India's wind farms is only about 17%, the total contribution to energy from these plants would be relatively small. Thus while wind power may be pursued for environmental and economic reasons, its contribution to energy security would be very limited. The offshore wind power potential has not yet been assessed. Such assessments should be taken up immediately.

(d) Solar: Solar energy, if it can be economically exploited constitutes a major energy resource of the country. Solar electricity generated through thermal route or through photovoltaic cells provide comparable amount of electricity per unit of collector area. Both, currently provide about 15% conversion efficiency. While it is clear that the ratio of capital cost to efficiency of energy conversion needs to be brought down significantly, solar thermal and solar photovoltaic route to electricity remains a major scope for enhancing India's energy security. Nano-technology holds the hope for making a major breakthrough in solar photovoltaic technology.

(e) Energy Plantations: Growing fuel wood for running power plants either directly or after gasification can save coal or gas used for generating power. Since the country's energy needs are growing, imports of coal and LNG are also likely to

grow and be sizeable. Thus fuel wood plantations can help improve energy security. The scope for such plantations is substantial. For example, if 10 million hectares of wasteland can be converted to fuel wood plantations with a sustained yield of 100 million tonnes of wood per year. This can replace 100 million tonnes of domestic coal as the calorific value is identical. Moreover since this is a renewable fuel, no net carbon emission takes place. Thus all compensatory afforestation should be made with energy plantations. This will improve India's energy security.

2.4 Energy Security as a Vital Element of National Security

India's Minister of Petroleum and Natural Gas, Shri M.M.Deora, delivered a speech in the Shell Distinguished Lectures Series at Rice University, in Houston, Texas, U.S.A. on 31st March 2006. During the speech, he defined energy security in the Indian context as the assurance of energy supply to all Indian citizens at affordable cost at all times with a prescribed confidence level considering shocks and disruptions that can be expected (Singh A. K., 2009). He emphasized that energy security considerations for India require ensuring availability of energy sources through domestic efforts or through buying assets abroad. He also elaborated that energy security has emerged as a primary concern for Indian policy makers because of their nation's increasing dependence on imported energy. The dependence on import of oil causes two main concerns: first is the uncertainty regarding the supply of oil and second is its volatility. Michael T. Klare in his book, *Resource Wars*, identifies three factors related to energy security which are likely to introduce new stresses in the international system. The three factors identified by Klare are the relentless expansion in worldwide demand for energy, the emergence of significant energy shortages and the proliferation of ownership contests.10 Klare also discusses the possibility of the risk of conflict between countries that share or jointly claim a given resource deposit. He analyses the possibility of internal conflicts for resources which may lead to instability in the nation state concerned, as well as in the region and the world on the whole.

A.F. Alhaji, from the College of Business Administration, Ohio Northern University, has defined energy security and national security of India in the following words: “Oil and politics are intertwined with one another in an unending dance.”11 In his presentation on energy security of India at the Institute for Defense Studies and Analyses (IDSA), Alhaji states that as the significance of natural gas and LNG in international trade increases, gas and politics will develop a similar relationship. He also indicates that India needs both oil and gas, which puts it at a disadvantage when it negotiates with oil and gas-producing countries. According to him, fear of oil shortages may force India to cooperate with countries with which it would not otherwise cooperate. India’s need for oil or gas might force India to make foreign policy decisions that would compromise it on other important issues or principles. Alhaji concludes that while the foreign policy dimension focuses on diplomatic and trade relations, the security dimension deals with two issues: the physical security of energy installations and the energy needs of a nation’s military and police to protect the country or quell domestic uprisings, terrorist attacks, or any other violent threat to energy production. Threats to physical security of energy installations include terrorist attacks, human errors, natural disasters and technical malfunctions.

The clearest evidence of the undeniable relationship between national and energy security is seen in a paper presented by Jaswant Singh, at the Centre for Advanced Study of India, University of Philadelphia, Pennsylvania in 1998. The paper establishes that energy is security; deficiencies in this critical strategic sector compromise national security. In the paper Singh states that the principal global dynamic is now economic, supported by and interdependent with technological innovation. Changes resulting from this new dynamic, global in their effects, nonetheless have differing impacts on different societies, polities and military powers, and on all the other integral components of nations’ abilities to safeguard their security

At the ASEAN Regional Forum in 2000, it was proposed that India's security concerns extend beyond the confines of the conventional geographical definition of South Asia. Given its size, geographical location, trade links and the EEZ, India's security

environment ranges from the Persian Gulf to the straits of Malacca across the Indian Ocean, including the Central Asian region in the North West, China in the North East, and South East Asia.14 This analysis is an indicator of the energy security requirements of India dictating its national security concerns.

2.5 India's Energy Mix

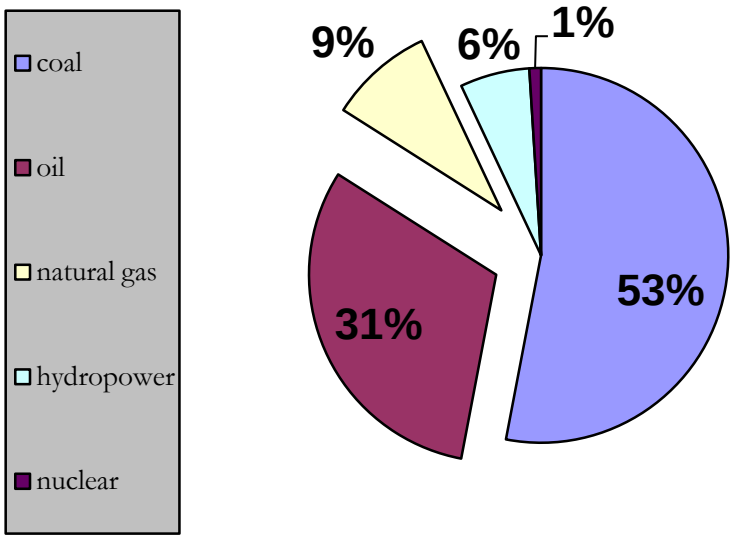

Figure 4: India's Energy Mix

Definition of Energy Security in India: : We are energy secure when we can supply lifeline energy[1] to all our citizens irrespective of their ability to pay for it as well meet their effective demand[2] for safe and convenient energy to satisfy their various needs at

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[1] *Lifeline energy is that energy up to a certain level which as a basic necessity, people will procure it in any way possible, whether the state supplies it or not.*

[2] *Effective demand is demand backed by the ability to pay at market determined prices.*

competitive prices at all times and with a prescribed confidence level considering shocks and disruptions that can be reasonably expected (Commission, 2006).

Principles of India's energy security policy: India aspires to a medium-to-long term strategy of implementing a strategic shift from fossil fuels to non-fossil fuels, from non-renewable to renewable sources of energy, and from conventional to non-conventional sources of energy. In order to meet the increased power requirement, India will need to pursue all available forms of energy.

Diversification of our oil and gas supply base is the key to the promotion of our energy security. We have achieved some success on this front. While maintaining our traditional supply lines from the Middle East, we have taken increased supplies from countries in Africa, Latin America, South-East Asia. In FY 2008-09, India actually sourced 15% of its oil from Africa, most of it from Nigeria, Angola and Egypt. Malaysia and Venezuela also figure among our top ten sources of crude (SkyscrapperCity, 2011). We are also seriously looking at the CIS region.

In the present context, we need to adopt a multi-pronged and coordinated energy strategy which requires - increasing the domestic supply of crude oil and gas by fast-tracking upstream activities; substituting oil consumption by gas and coal (keeping in view the relative energy yields in dollar terms of various fuel options); increasing reliance on renewable sources of energy such as nuclear energy, solar energy, wind energy and bio-fuels; increasing our own hydro-electricity production as well as develop mutually beneficial models to tap the hydro-electricity potential in neighboring countries; developing freight corridors to reduce diesel consumption; improving energy efficiency in key industries such as steel, cement and power generation; substituting petrol and diesel by CNG in the transportation sector; substituting kerosene lamps by solar lanterns; making public transport efficient, accessible and attractive, etc.

2.6 Energy Sector in India

The energy sector in India today is the subject of administration by a plethora of ministries, agencies, statutory bodies and regulatory bodies. If we take into account the Science and Technology aspect of energy, or the R&D aspect of energy, then the number of participating bodies in this sector goes up again manifold.

At the headline political level of the central government, there is a Group of Ministers (GOM), which is responsible for the overall decisions regarding the question of energy security in the country. The members of the GOM are the ministers of each of the line ministries, Deputy Chairman, Planning Commission and is chaired by Finance Minister (Narayan, 1999). Then at the second level, responsibilities for policy making and implementation in the energy sector are split between five different ministries—Coal, Power, Petroleum and Natural Gas, New and Renewable Energy and Dept of Atomic Energy. Under each ministry there are a plethora of Public Sector Enterprises and numerous research institutes.

It may be noted that in addition to these five ministries, other ministries that have influence over energy policy include the Ministry of Agriculture, which handles research and development for the production of biofuels feedstocks, the Ministry of Rural Development, which has responsibility for promoting jatropha plantations for the production of biodiesel, the Ministry of Science and Technology, which supports research into biofuel crops, especially in the area of biotechnology, and the Ministry of Environment and Forestry, which approves and administers clean development mechanism projects in India. In a similar way, Ministry of Water Resources which has a major say in the administration of water resources, is not involved in hydropower policy making (Commission, 2006).

In addition to the five nodal ministries, there is the Planning Commission which is responsible for the overall planning for the energy sector and is the servicing body for the Group of Ministers on energy security (mentioned above). Due to this position of the Planning Commission, as well as its position of prominence as the originator of the

Integrated Energy Policy, the Planning Commission is given a place of prominence in all energy security discussions. There after there are a multitude of regulatory bodies and commissions for the purpose of administrating the power/electricity/natural gas markets. This overall structure at the central level is complemented by additional bodies in the state level.

At this point, it may be pertinent to mention that according to the Constitution of India, there is no specific mention of energy security; but the specific components of energy security, like petroleum, coal, electricity, taxation, land regulation issues are spread out between the Concurrent List and the Union List. It may not be feasible to include the terminology 'energy security' in the Constitution, and it may also not be worthwhile to include such a wide-encompassing term in the Constitution. However, there is no mention of Energy Security in the Allocation of Business Rules which is the guiding document for distribution of work in government of India.

A detailed description of the Ministry of Petroleum and Natural Gas (which is the subject of this work) is given elsewhere. For the purposes of discussion of energy security administration, a brief description of other ministries is included here.

The Ministry of Power is concerned with long-term power-sector planning, policy formulation, assigning investment priorities, monitoring the implementation of power projects, training and manpower development, and the enactment and implementation of legislation with regard to thermal and hydropower generation, transmission and distribution. It liaises within the central government, with the SEBs and with the private sector (MoP, 2010). The Bureau for Energy Efficiency (BEE) is a statutory body under the Ministry of Power, set up under the Energy Conservation Law 2001, to co-ordinate energy efficiency and conservation policies and programmes. The Central Electricity Regulatory Commission (CERC) is responsible for regulating all activities related to power at the central and interstate level. Its responsibilities include managing electricity trading, regulating interstate transmission and tariffs, generating the tariffs of central utilities and regulating transmission lines (CERC, 2005). State Electricity Regulatory

Commissions (SERCs) deal with licensing, tariffs and competitive issues within each state (SERC, 2005).

The Ministry of Coal has overall responsibility for determining policies and strategies with respect to the exploration and development of coal reserves. It also supervises Coal India and its subsidiaries, as well as Neyveli Lignite Corporation (CIL, 2006).

The Ministry of New and Renewable Energy is responsible for carrying out the national programme to increase wind, small hydro and biomass-based power-generation capacity. It aims to expand the use of renewable energy in urban, industrial and commercial applications and, in remote rural areas, its application, particularly in cooking, lighting and motive power. It is also in charge of policy making in the field of biofuels (MNRE, 2008).

2.7 Comprehensive Review of Various Oil and Gas Policies in India

2.7.1 Pricing of Petroleum Products in India

For a country like India where more than three fourth of the current domestic crude oil requirements is met by imports and our import dependency on hydrocarbons is expected to only go up further in the future, a viable and sustainable pricing system for petroleum products is a key requirement of stable, long-term growth of the economy. It is in the interest of the Indian economy that we develop a financially strong and globally competitive oil industry, so as to provide an enduring platform to strengthen energy security of the country.

Over the years India has experimented with several methodologies for pricing. With a country with political sensitivities, there will be price restraints, and as long as there are price restraints there will have to be a formula. However, explicit formula-based pricing mechanism of petroleum products is not conducive to establishing a long-term viable and globally competitive oil industry in the country. Instead, the domestic consumer prices of petroleum products should be increasingly aligned with movements in international oil markets. Any ad hoc system of price fixation by the government may

provide a semblance of domestic price stability in the immediate-to-short term, but give rise to serious long-term instabilities in the demand-supply conditions in the country, competitive functioning of oil companies, and fiscal soundness of the government. It is therefore important that oil companies should have the freedom to set prices based on competitive market conditions.

Following is a brief overview of the pricing policy implemented in India over the years. Very broadly speaking, the government policy approach on pricing petroleum products since 1970s has moved between cost-based pricing and import parity pricing (IPP) (MoPNG, 2008). But, since 2004, the government has been setting consumer prices of petrol, diesel, domestic LPG and PDS kerosene on ad hoc basis so as to ensure petroleum price stability in the country in the face of extreme volatility in international oil markets.

Pre-independence: Up to 1939, there were no controls whatsoever on the pricing of petroleum products. Between 1939 and 1948, the oil companies themselves used to pool accounts for major products without any intervention by the government (Infraline, 2011).

Post-independence till 1960s : In 1948, an attempt was made to regulate prices through Valued Stock Account procedure. This was basically a cost plus formula based on import parity to which were added all elements of cost such as ocean freight up to Indian ports, insurance, ocean loss, remuneration, import duty and other levies and charges. The realization of oil companies under this procedure was restricted to the import parity price of finished goods plus excise duties/local taxes/ dealer margins and agreed marketing margins of each of the refineries. Any realization in excess of the normal was surrendered to the Government (Infraline, 2011).

1960s till the 1970s : Given the huge outgo of foreign exchange on imports, the government from time to time appointed a number of committees to examine or re-examine petroleum pricing.

The first such committee, headed by **K.R. Damle**, was constituted in the early sixties, mainly to examine the issue of foreign exchange conservation, particularly as the refining and product imports were in the hands of foreign oil companies. The Committee recommended for reduction of discounts from the Free-On-Board (FOB) prices (soni, 2005). Platt's Oil Gram was considered as the reference to fix the FOB prices. Furthermore, in view of the multiplicity of products and their usage, lubes and greases were kept out of the pricing formula, which had been essentially applied to bulk products. For lubes and greases the committee recommended **a block control system** under which a ceiling was fixed for blending charges, packaging and marketing costs and profit margins.

As the validity of the ceilings recommended by the Damle committee was only till March 1965, the government had set up another committee under the chairmanship of T.N. Talukdar. The **Talukdar committee** essentially extended the concepts laid down by the Damle committee, i.e. prices were to be based on the principle of **import parity with fixed formula** of build-up up to the carriage, insurance and freight (CIF). The price formula was firm and had the twin advantages of being reasonable and encouraged the oil companies to enhance their profitability by lowering costs. Additionally, it had the potential of a lower cost basis for fixing margins in the future.

The recommendations of the Talukdar committee were retained till December 1965, when the government appointed a committee under the chairmanship of Shantilal Shah. The **Shantilal committee** was required to determine the landed cost of imported POL (petroleum, oils and lubricants), feasibility of making all refineries, including inland refineries, as pricing points, marketing and distribution charges, and profit on distribution and marketing operations product wise, and determination of dealer commissions for MS (motor spirit or petrol), HSD (high speed diesel oil), SKO (superior kerosene oil) and LDO (light diesel oil). The recommendations of this committee had been implemented for a period of three years starting from June 1970. The Shantilal Shah committee, however, did not regard import parity to be a sound basis for fixing prices, given the economic and business environment of that time.

After the 1973 oil crisis the government constituted the oil price committee (OPC) under the chairmanship of S. Krishnaswamy in March 1974. The OPC recommended the discontinuation of the 'import parity' principle and instead suggested the Administered Pricing Mechanism (APM) for pricing of petroleum products. Based on these recommendations, the APM came into existence in December 16, 1977.

Thus, the first major policy shift in pricing of petroleum products occurred in 1976, when the Government replaced IPP of the 1960s by cost-plus pricing. This came to be known as Administered Pricing Mechanism (APM), which was applied to the entire oil sector.

APM from 1976-2002: The objective of the government was to shield the Indian economy from the high and volatile oil prices generated by the first Oil Shock in 1973-74. By 1995, government appointed a Strategic Planning Group on Restructuring of the oil industry (R Group) under Vijay Kelkar to study the deficits in the APM. The APM had one advantage, in that it was able to manage extreme volatility in prices. However the major weaknesses of APM were that:

- It did not induce competition in the marketplace
- It did not fulfill the consumer's interest for better products and services.
- It did not enable domestic oil companies to generate adequate financial resources for project development and capacity addition in this crucial sector.
- It created a huge Oil Pool deficit, which weakened the financial position of the public sector oil companies. It also placed a heavy financial burden on the Government by way of issuing oil bonds to PSU oil companies.
- The subsidies and cross subsidies built in the APM resulted in wide distortions in consumer prices.

It was therefore to dismantle the APM. The process of dismantling of APM and operationalisation of market determined pricing mechanism was notified in two successive Government resolutions in 1997 and in 2002. The 1997 resolution provided the four year phasing out of APM and the 2002 resolution completed the process. The dismantling was carried out in phases over four years, and was along the lines suggested by the Expert Technical Group (ETG), which had been appointed earlier to recommend on the process of dismantling. The ETG recommended complete dismantling of the APM in a phased manner over 4 to 5 years, beginning from 1 October 1997, and ushering in a market determined pricing mechanism. The dismantling primarily involved withdrawal of cost plus formula, abolition of retention prices and movement towards market driven prices, decanalisation of imports and exports, rationalization of import duties, reasonable tariff protection to encourage investment of a regulatory framework to oversee the functioning of and enforcing a competitive framework in the hydrocarbon sector (Infraline, 2011).

Period between 2002 and 2004: As a result of the study of the Kelkar Committee, there was a clear understanding that Future policies would be built on the following four considerations:

- That the price of indigenous crude oil would be market determined
- That the prices of petroleum products produced by the refineries will be based on import parity price.
- that the consumer prices of all other products except domestic LPG and PDS kerosene will be market determined.
- that there would be flat rate subsidies on PDS kerosene and domestic LPG.

Accordingly, between April 2002 to January 2004 oil companies changed the domestic consumer prices of petrol and diesel and domestic LPG based on market factors.

However, kerosene price was not changed. This situation started to change with the rise in international crude oil prices in 2004 (Infraline, 2011).

Between 2004 and 2005: During this period, the Government implemented a price band mechanism. The mechanism operated as follows: a limited freedom was given to oil marketing companies to revise retail prices within a band of +/-10% of the mean of rolling average of last 12 months and last 3 months of international C&F prices. In case of international prices breaching this band, the matter would be taken up with Ministry of Finance for modulation in excise duty rates. The above price band was operated only once effective 1 st August 2004 when prices of petrol and diesel were increased by Rs.1.10 per litre and Rs.1.42 per litre, respectively.

However, as oil prices rose sharply and there was uncertainty in international oil markets, the price band mechanism was abandoned. Thus, in October 2005, the Government constituted the Rangarajan Committee to examine the pricing and taxation of petroleum products with a view to stabilizing their prices and establishing transparent mechanism for autonomous adjustment of prices by the oil companies (Infraline, 2011).

Between 2005 and 2008 : Based on the report of the Rangarajan Committee, the government implemented a **trade parity pricing (TPP)** regime. The TPP regime worked as follows: A 'TPP price' was calculated based on a formula was a weighted average of import parity and export parity prices, in which the percentage share of import/export of these products provided the weights. These 'TPP prices' would serve as indicative ceilings within which the marketing companies would have flexibility to fix the actual retail prices of petrol and diesel. While the Committee recommended a formula for petrol and diesel at both refinery level as well as at retail level, in actual implementation., TPP was confined to the refinery level and the retail prices of petrol, diesel, domestic LPG and PDS Kerosene fixed by the Government remained below their TPP levels. This resulted in the problem of 'under-recoveries' for OMCs. The Government devised a burden sharing mechanism to meet OMCs under-recoveries. This

mechanism involved PSU upstream oil companies (viz., ONGC, OIL and GAIL) which extended hefty price discounts on their sale of crude oil to the OMCs, and the government which issued bonds every year.

There were several shortcomings with the TPP regime in the manner in which it was implemented. The mechanism of burden sharing lacked transparency and thereby gave rise to administrative delays and financial uncertainty. In pure financial terms, it only facilitated transferring the present problem to the future.

Further, as international oil prices kept rising since June 2006, and the fact that Government did not increase the retail prices of petrol and diesel till June 2008 resulted in the under-recoveries of PSU oil marketing companies (OMCs) reached unsustainable levels in 2008. At that stage the Government appointed the Chaturvedi Committee to look into the issue (Infraline, 2011).

Since 2008: The Chaturvedi Committee suggested the formula for refinery gate prices of petrol, diesel, domestic LPG and PDS kerosene should be based on FOB export prices (and not on TPP). After making the full price adjustments within a period of 9 months for petrol and 24 months for diesel the Government should disengage from the process of pricing of petroleum products and allow price to be an outcome of a competitive process. The pricing mechanism recommended by the Chaturvedi Committee was primarily meant to address the financial challenges associated with very high and unsustainable level of under-recoveries of oil marketing companies who were not permitted to pass the rise in oil prices on to the consumer prices. Once oil prices in the international market slumped in the second half of 2008, the magnitude of under-recovery burden came down significantly.

At the same time, the Integrated Energy Policy based on the recommendations of Expert group headed by Kirit Parikh, were approved by the Cabinet in December 2008. It recommended Trade parity pricing as one which reflects the opportunity costs of a consumer or a producer, with the stipulation that IPP is to be used for a product for

which the country is a net importer and EPP for a product for which it is a net exporter (Infraline, 2011).

2.7.2 Fuel Subsidies in India

Governments in all countries, either directly or indirectly influence domestic prices for petroleum products. Many governments, mainly in middle-income and low-income countries, directly control domestic fuel prices, often through the application of a pricing formula that explicitly links domestic fuel prices to the cost of domestic supply, the costs of storing and distributing fuel domestically, and a desired level of taxation. The issue of fuel pricing received a great deal of global attention in the aftermath of sharp increases in international fuel prices during 2007 and early 2008. During this period, governments throughout the world came under political pressure to mitigate the adverse impact of higher fuel prices on their populations by decreasing fuel taxes or increasing fuel subsidies. When the G-20 leaders met in Pittsburg in September 2009, they committed to rationalizing and phasing out inefficient fossil fuel subsidies over the medium term. The upturn in fuel prices since the end of 2009 and the ongoing emphasis on addressing climate change mean that the issue of fuel pricing is likely to remain high on the international policy agenda, as well as a pressing domestic issue of concern. India's growing dependence on imported oil products and the dramatic rise in the prices of crude oil to as high as $148/bbl the international market in July 2008 (MoPNG, 2008), followed by an equally dramatic fall, pose significant policy challenges. The Government's efforts to insulate domestic consumers, at least to some extent, resulted in huge fiscal burden for the Government and financial problems for the public sector oil marketing companies.

Subsidies have been prevalent in India since independence (Soni, 2011). It includes the supply of goods and services to sections of the population for free, or at prices below that charged to others, or at prices that are less than the cost of the good or service. Food grains, sugar, cotton mull and long cloth, kerosene, liquefied petroleum gas, diesel, coal, fertilizers, edible oil, water, electricity, rail and bus fares, airline tickets, health services, education, and many other commodities and services have all been subsidized

in the past, while many continue to be subsidized to this day. In a 'socialist' and democratic republic such as India, it is inevitable that many of the deprived sections of society and powerful vote blocs will be given subsidies. As a result, the supply of food grains, health care, and educational services to the poor below cost is considered to be a desirable element in social policies. Similar arguments are provided for other subsidies.

While being beneficial, subsidies pose a number of problems as well. For example, they distort the market and the effect of price signals on supply and demand. Groundwater levels in India have been depleted because of free or cheap electricity and cheap diesel made available for the operation of pump-sets to extract ground water. These factors have led to the cultivation of water-intensive crops on lands that are not suited for the purpose, hereby leading to the deterioration of the land's rable quality. The pump sets used are highly energy inefficient, and are estimated to consume 40% more power on average (Sandeep, 2010). The supply of cheap kerosene to the poor has led to its diversion in adulterating diesel for road transport. Further, the government in India does not always fully reimburse the producer for the subsidies put in place. Instead, the producer is expected to compensate for his costs by charging more from other consumers. These 'cross-subsidies' give distorted signals to investment decisions.

2.7.3 Petroleum Product Subsidies in India

India's energy basket largely comprises coal, petroleum, natural gas, and hydro-power. Of these, coal has the largest share (approximately 49%) in the total commercial energy consumption in India (EIA, Indian Energy Data, Statistics and Analysis, 2011). This is followed by petroleum products, which account for more than 37% of the country's total commercial energy consumption (2006/07). India is, however, not endowed with significant oil reserves, and nearly 80% of the crude oil consumed in the country is imported (EIA, Indian Energy Data, Statistics and Analysis, 2011).

Within petroleum products too, the consumption is skewed towards four products—petrol, diesel, liquefied petroleum gas (LPG), and kerosene—which together account for nearly two-thirds of the total product consumption in the economy.

Since India imports about 80% of its crude oil requirements, the international oil prices necessarily have a bearing on the domestic prices of Petrol and other petroleum products. In view of the steep increase and high volatility in the international oil prices since 2004-05, the Government has been modulating the retail selling prices of the four sensitive petroleum products; namely Petrol, Diesel, PDS Kerosene and Domestic LPG sold by the three Public Sector Oil Marketing Companies (OMCs), namely, Indian Oil Corporation, Bharat Petroleum Corporation and Hindustan Petroleum Corporation. The price of Petrol, both at refinery gate and the retail level has been made market determined effective 26.06.2010. However, in order to insulate the common man from the impact of rise in international oil prices, the Government continues to modulate the prices of the other three sensitive petroleum products, viz., Diesel, PDS Kerosene and Domestic LPG. As the crude oil prices have increased significantly in the period 2010-11, the Oil Marketing Companies are estimated to be incurring under-recoveries of Rs. 9.55/litre on Diesel, of Rs. 20.57litre on PDS Kerosene and of Rs. 356.07/cylinder on Domestic LPG, which have not been passed on to the consumers (PPAC, Petroleum Prices & Under-recoveries , 2011). Speaking of gross figures, during the year 2009-10 (April-December 2009), the public sector Oil Marketing Companies (OMCs) namely IOCL, BPCL and HPCL had incurred under-recoveries of Rs.29,353 crore on the sale of Petrol, Diesel, PDS Kerosene and Domestic LPG. The total under-recovery burden for the year 2009-10 was projected to be Rs.45,401 crore (PPAC, Petroleum Planning & Analysis Cell, 2008).

The under-recoveries on Petrol and Diesel have been met by the upstream oil PSUs namely ONGC, OIL and GAIL. These upstream PSUs have contributed Rs.8,364 crore through price discounts on crude oil and products to the OMCs.
For the under-recoveries on PDS Kerosene and Domestic LPG, Ministry of Petroleum & Natural Gas had approached the Ministry of Finance for financial assistance.

Economic features of petroleum product subsidies

At an Overall level in India, due to absence of substitutes and alternative energy sources, petroleum products typically have low price elasticity. This coupled with the fact that India is heavily imports-dependant, has made the prices of petroleum products a vital political subject.

As the costs of the primary raw material i.e., crude oil are more or less uniform internationally, in developed and developing countries, the rate of taxation in a country plays an important role in determining the retail prices of petroleum products. Taxes and Duties of the Central and State Governments constitute 48.4% and 24.5% of the retail prices of Petrol and Diesel respectively (at Delhi) (Headlines, 2009). However, the Central Government has been rationalizing taxes and duties on sensitive petroleum products.

The four products that are under price control, or are subsidized are Motor Spirit (MS) or petrol, High Speed Diesel (HSD), Superior Kerosene Oil (SKO) and Liquid Petroleum Gas (LPG). These products account for about 70% of the output of refineries of the public sector Oil Marketing Companies (OMCs) (Sebastian Morris, 2010). Each of the individual petroleum products has a differing economic characteristic.

Petrol is largely an item of final consumption. Its price, therefore, has a very small impact on inflation due to forward linkages. Given Indian economic condition, motorized vehicle owners are largely well-off persons belonging to the upper two/three deciles of the population. It is for this reason that the Expert Group on Pricing for government of India decided that there can be a full pass-through of international prices, since the cost increases can be borne by motorized vehicle owners; it therefore recommended that petrol prices should be market-determined both at the refinery gate and retail levels.

The economic characteristics of diesel in India are a little different from petrol/ Motor spirit. In India, trucks accounted for 37% and buses 12% of total diesel consumption in

2008-09 (GOI, 2010). Agriculture's share was 12% (i.e., used by tractors, thrashers, tillers, harvesters, pumpsets etc.). In the sensitive agriculture sector, it was felt by the Expert group that a full pass-through would not affect farmers, as a higher cost of diesel would get reflected in higher Minimum Support Price any way. For the transportation sector, increased prices due to a full pass-through are any way being passed on to consumers. Therefore the Expert group recommended that the price of diesel should also be market determined both at the refinery gate and retail levels.

Kerosene in India could be used for both cooking as well as for lighting. The primary objective of subsidizing kerosene is for lighting purpose. In the absence of electricity, kerosene has, for long, been the only source of lighting (apart from more expensive vegetable oil-based lamps). As per NSSO statistics, Only 1.3% of rural households use kerosene for cooking (GOI, 2010). Among the poorest four deciles, less than 1% used it for cooking but 60% used it for lighting. Current per capita allocation of kerosene varies from 9 to 14 litres per month (GOI, 2010), whereas NSSO data suggests that the norm of 5 litres per household per month should be more than adequate for lighting; most of the households use only 3.5 litres per month (GOI, 2010). This use of kerosene may be substituted either by renewable sources (3 W solar LED lamps costing Rs 1500 per unit) or by grid connectivity (Rajiv Gandhi Grameen Vidhyut Yojana) (RGGVY, 2005). Therefore there is no case for subsidy here. Further, there are significant distortions in the kerosene allocation, pricing and utilization due to leakages in the Public Distribution System. For instance, the average per capita kerosene allocation in high income States in 2007-08 was 14.1 litre which was 41% higher than that of the low income States (GOI, 2010). The distribution of PDS kerosene has therefore developed an inverse relationship with the income levels of states, which needs to be rationalized. Besides, with economic development and improvement in power supply, the percentage of households using kerosene in different States has declined and continues to decline. But against the actual decline in households using kerosene, the actual reduction in kerosene allocation has been much less. The price of PDS kerosene, which in the PDS system has not changed since 2002, could be raised by 66% to reach a level of around Rs. 15/litre

without putting undue burden on the poor. An unintended consequence of keeping low prices for PDS kerosene is the large price difference between PDS kerosene and diesel, which is an incentive to divert kerosene to adulterate diesel. Estimates suggest 35% or more of PDS kerosene is diverted for unauthorized purposes including adulteration (Bandyopadhyay, 2010). In addition to being low priced with comparison to domestic diesel, the price of PDS kerosene in India is also very low in comparison with that in the neighbouring countries namely, Bangladesh and Nepal. The price of kerosene in Bangladesh and Nepal is Rs. 29.28/litre and Rs. 36.29/litre respectively as in January 2010, more than 3 to 4 times the price in India (GOI, 2010). This naturally encourages cross-border smuggling and adulteration.

LPG is primarily used as a clean cooking fuel. From the economic point of view, it can be seen as a merit good. In India, it is a heavily subsidized product. Normally, a subsidized product ought to be given in limited amounts. The consumer subsidy on domestic LPG has grown from Rs 5,523 crore in 2003-04 to 17,600 crore in 2008-09 and is estimated to be around Rs 14,152 crore in 2009-10 (Bandyopadhyay, 2010). however, due to highly sensitive and political nature of the LPG pricing, domestic LPG is both heavily subsidized and available in unlimited quantity. In 2004-05, 57% of urban households but only 8.6% of rural households used LPG (Bandyopadhyay, 2010). The access to LPG has substantially increased; the Rajiv Gandhi Gramin LPG Vitrak Yojana launched in 2009 aims to cover 75% of the population by 2015 which will substantially increase access of rural households to subsidized LPG (GOI, 2010).

2.7.4 Public Finance Measures to Tackle Subsidies

As the retail selling prices of the sensitive petroleum products have not been maintained in line with the international oil prices, the Public Sector Oil Marketing Companies (OMCs) viz. Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL) and Bharat Petroleum Corporation Limited (BPCL) continue to incur under-recoveries on the sale of petroleum products. Several instances of this have been listed above. Government has been following an '**equitable burden sharing**

mechanism', under which the different stakeholders contribute in the following manner:

- Government through issuance of Oil Bonds/cash assistance;
- Upstream oil companies namely, Oil and Natural Gas Corporation (ONGC), Oil India Limited (OIL) and GAIL (India) Limited (GAIL) by way of price discount on Crude oil and products;
- Oil Marketing Companies (OMCs), by absorbing a part of under-recoveries; and
- Price increases for the consumers, from time to time.

TABLE 2: Under-recoveries at a Glance

Particulars (April -June)	2007-08	2008-09	2009-10	2010-11
Total Under Recovery	77123	103292	46051	20072
Compensation Mechanisms				
Oil Bonds or Cash Assistance by Government	35290	71292	26000	0
Upstream assistance	25708	32000	14430	6691
Total Assistance	60998	103292	40430	6691
Under recovery borne by OMCs	16125	0	5621	13381

2.7.5 Exploration and Production Policy in India

History of oil exploration policy in India: The exploration of hydrocarbons in India started in the year 1866 when Mr. Goodenough of Mckillop-Stewart company drilled a well near Jaypore in upper Assam and struck oil (Petrofed, 2009). This well however, was not enough for commercial production. Exploration activities continued and by 1882, the Assam Railway and Trading Company (ARTC) was able to register itself in

London to undertake exploration activities for more than 30 square miles in upper Assam (Petrofed, 2009). These initial exploration activities were essentially directed to discover sub surface oil. A few years later the first commercial discovery of crude oil was made at Digbhoy in the same region (1889). In 1893 rights were granted to the Assam Oil Syndicates which also erected a small refinery nearby at a place called Margharita. A new company, Assam Oil Company, AOP was formed in 1899 with a startup capital of pound 310,000 at Digbhoy to manage all these assets. In 1921 the Burma oil Company BOC which has a successful record in Burma bought all the shares and became the commercial and technical managers of AOC (Petrofed, 2009). By 1931 crude production had gone up to 250,000 tonnes per annum and oil exploration activities were spread all over the Assam-Arakan region. After independence Government of India framed the Industrial Policy Statement of 1948, giving top priority to the development of petroleum industry. While Burma Oil Company and Assam oil Company continued and intensified exploration activities in the North East the Indo-Stanzac petroleum project (a joint venture between GOI and Standard Vacuum Oil Company, USA) was engaged in exploration work in West Bengal. Independent India first oil discoveries were made at Nahorkatya near Digbhoy (1953) and Moran (1956). In 1955 GOI decided to develop hydrocarbon resources of the country as a part of the overall development of the public sector. The nodal Ministry at that time, the Ministry of Natural Resources and Scientific Research set up the oil and natural gas directorate ONGD in 1955. This department was essentially constituted around a core team of Geological Survey of India geoscientists. Around the same time it was decided by the Government to place mineral oil industry amongst schedule 'A' Ministries which meant that the development of this sector was the sole and excusive responsibility of the State. Also, realizing that the fledgling ONGD had limited financial and administrative capabilities as a subordinate office of the Ministry it was decided to upgrade the Directorate to the level of a Commission. ONGC started its work by undertaking geoscientific areas in those areas of the country which were similar in geological profile to other oil producing regions in other countries. Thus the initial thrust of exploration activities was concentrated in the Himalayan foothills the

adjoining Gangetic plain, the alluvial tracts of Gujarat, Assam and Bengal for example the first such well was in Himachal Pradesh (Jwalamukhi-1).

Meanwhile Oil India Private Limited had been incorporated and set up for the purpose of further development and production of Burma Oil Company – Assam Oil Company assets in upper Assam. It was registered as an Indian company with GOI owning one third of the shares. In October 1959 ONGC was converted into a statutory body by the Act of Parliament which further enhanced the powers of the ONGC. Thus ONGC and Oil India became the two central organizations around which exploration activities in the Indian petroleum sector revolved for the next few decades.

ONGC continued its exploratory drilling activities and extended it into other states like Tamil Nadu, Rajasthan, Andhra Pradesh, Bihar and J&K. These areas yielded limited success. However, ONGC was able to score some success in identifying hydrocarbons in the Krishna Godavari and Cauvery basin in the mid-1980s. Offshore seismic surveys started on an experimental basis, In 1962 in the Gulf of Cambay region. By 72-73 seismic surveys were able to identify a large structure in Mumbai offshore. Drilling was taken up in 1974, leading to India's biggest commercial discovery and establishing a new hydrocarbon province. Encouraged by this success, the entire western offshore became the scene of further systematic exploratory efforts. These discoveries, particularly in Mumbai High changed the oil scenario of the country. Over 5 billion tonnes of hydro carbons had been discovered as a result of these efforts. However, the most important outcome was the development of a globally competitive core competence within ONGC. In the meanwhile, by 1981 Oil India Limited had become fully owned by Government of India. This enabled Oil India to undertake exploration activities outside its original zone, the North East.

Pre- NELP exploratory efforts : As a result of the liberalized economic policy environment after 1991, Government of India decided to de-regulate and de-license the petroleum sector and retain only partial equity in the PSUs operating in this sector. Following this, ONGC was re-organized as a corporation in 1994. simultaneously, the

Government set up several committees to re-structure the oil and gas sector for example the Sunderrajan Committee Report of 1995 recommended single stroke de-regulation of the petroleum industry. The 'R Group' headed by petroleum secretary Dr. Kelkar however, had suggested a phased de-regulation. The Kaul Committee had recommended a re-structuring of the ONGC which resulted in the setting up of the Director General of Hydrocarbons DGH a body carved out of the ONGC to exclusively discharge the regulatory function related to hydrocarbons reservoir management. This was also the period when building on capacities accumulated over the previous years OIL and ONGC started venturing overseas. It is in this background that the Government of India introduced New Exploration Licensing Policy (NELP) to introduce further reforms in the fiscal and contractual environment of Oil Exploration activities.

We have seen in the preceding paragraphs how the E&P industry in India was dominated by two national oil companies – ONGC and OIL. With limited resources and technological exposure these two NOCs were essentially confined to onland and shallow water (less than 200 metres) offshore activities. Thus, a large part of India's potential hydrocarbon reserves, to the tune of 28 billion tonnes of oil and oil equivalent remained untapped. NELP was essentially a device to enable the oil and gas sector in India to tap into these reserves.

Sedimentary basins which are the geological sites of potential hydrocarbon reserves have been studied and categorized by the Director General of Hydrocarbons. According to DGH India has 26 sedimentary basins adding up to 3.14 million square kilometers. Of these, deep offshore (beyond 200 metres) is estimated to be nearly half that is 1.34 million square kilometres) . For the purpose of E&P activities these sedimentary basins are categorized into four. Category IV basins are those with uncertain potential but which may be explored due to their similarity with other basins in the world. Category III are sedimentary basins where the indicated hydrocarbons are considered geologically prospective. Category II basins are those which have a proven accumulation of hydrocarbons but no commercial production. Category I are those basins which have established commercial production. In 2005, category I basins occupied about 30% of

the total area and category III and IV together were more than 60% thereby indicating that we had been fairly successful in exploiting all known hydrocarbon reserves. This is largely due to the efforts of the DGH in carrying out regional surveys especially in deep waters. However, India's well density is a mere 11.76 wells per 10,000 sq Kms as against the world average of 1000. There is therefore, a lot of potential for E&P activities in India to be accelerated.

The earliest effort at attracting foreign companies into the E&P sector was in the mid 1970s when ONGC and OIL were the major players. At that time only Carlsberg of USA and Reading & Bates of Canada came to explore in India; even these two eventually pulled out but they did provide their findings to the Government. Failure to meet reserve Accretion target prompted the government to involve the private sector. This started the process of 'exploration bidding rounds', but the early rounds were not successful. The first four rounds took twelve years (1979-1991) and the next five rounds took two years (1994-1995) thereby reflecting the lack of consistent quality focus in this area. To raise the interest of foreign companies in this sector it was essential that the fiscal, contractual and policy regime governing the oil and gas sector in India be reformed.

In 1980 unfazed by the failure of the earlier effort a renewed offer was made to international players to come and explore for oil in India. This offer is now referred to as First Round. During this round 32 offshore blocks were offered to international players for E&P activities. Four companies responded to this offer and after negotiations a production sharing contract was concluded between Chevron and ONGC. However, Chevron drilled three wells without success and relinquished its contract area in 1985. The Second Round was announced in 1982 this time a mixed bag of 50 onshore and offshore blocks were put on offer. By this time the international oil market had weakened and what little international interest was available was directed to the offshore areas of China. Hence no bids were received for the Second Round.

The Third Round was announced in 1986 (24 offshore blocks). In the Third Round certain modifications were made in the fiscal regime; the royalty charge (15% was withdrawn(and the corporate tax was reduced (To 50%) 7 international companies made 12 bids for 9 blocks these ultimately culminated in 4 exploration contracts in the offshore east coast.

The Fourth Round was announced in 1991 in the backdrop of the Gulf Prices. A mixed bag of 72 offshore and onshore blocks was offered. A number of foreign companies also participated in this round.

By this time the Government had decided to award a few small and medium fields to private and joint sectors for the purpose of development activities. These were usually fields which were discovered by ONGC or OIL but could not be developed due to financial constraints. A total of 31 such small discovered fields and 12 medium sized fields were put up for development.

2.8 Energy Sector Reforms

Energy-sector reforms in India started in the early 1990s. The oil and gas sector was one of the first sectors in which the Government tried to introduce a much higher level of autonomy by allowing the public sector enterprises to work as corporate entities with their own Boards of Directors that would manage the companies at an arm's length distance from the Government. Private Sector participation in refineries was also introduced as a result of which the private sector body has a share of nearly 30% in India's refining capacities today.

At the national policy level, the major landmarks for oil and gas sector reforms in India are as follows: The first phase of oil-sector reform involved allowing private and foreign firms to participate in onshore exploration and production through production-sharing contracts. In 1996, a second phase of reforms began, allowing gradual private participation first in refining (1996-1998), then in upstream production (1998-2000) and finally in marketing (2000-2002). In 1997, the government announced the New Exploration Licensing Policy (NELP) to provide a more attractive framework for private

domestic and foreign investment in oil exploration. The government officially abolished the administered pricing mechanism (APM) in 2002 for all petroleum products except kerosene and liquefied petroleum gas (LPG).

The Government has also unbundled Oil Coordination Committee that was responsible for the complete supply planning and procurement of oil and gas in the country, into two entities – Petrofed which is a trade association for oil and gas and the Petroleum and Natural Gas Authority which is an independent regulator in the sector. Unfortunately, one of the weakest points of the regulator in this sector is the fact that it does not have a right to regulate the prices which continue to be in the domain on the Government.

In the case of power sector, reforms were introduced in the early 1990's and, through a process of learning, India has finally reached a stage where it has enacted the Energy Conservation Act in 2001 and the Electricity Act in 2003. The Energy Conservation Act required the establishment of a Bureau of Energy Efficiency as a deemed statutory autonomous body. The Electricity Act 2003 requires the functional unbundling of erstwhile vertically integrated state electricity boards and puts in lace regulatory commissions both at the federal and state level. These electricity regulatory commissions have significant powers and have the responsibility to determine not only the tariff structures in their areas of jurisdiction but also to satisfy quality of supply and service norms and create a competitive environment apart from several other functions.

The coal sector, unfortunately, is one sector that has not made adequate progress on reforms.

2.9 Factors Which Affect India's Energy Security

Herberg, in his testimony to the United States Senate Committee on Foreign Relations has hinted at energy resource competition between India and China including the Persian Gulf, in Russia and in the Central Asian and Caspian Sea region. He has also

indicated that energy security could become a major source of future tension between the two Asian giants. The testimony also indicates that China and India's growing energy security requirement has broad ramifications for the region across a wide range of geo-political, energy, and environmental issues.

Dr. Mohan Malik, in a report titled *China's Strategy of Containing India* published in the Power and Interest News Report in 2006, has provided valuable insight into the effect of China on India's energy and national security. He claims that both China and India are locked in fierce competition for stakes in overseas oil and gas fields in Asia, Latin America and the Middle East. He also describes India's aversion to Chinese moves to secure oil in Myanmar and the Bay of Bengal. Chinese build up of its naval presence in the South China Sea, the Malacca Straits, and the Strait of Hormuz is likely to prompt India to seek forward deployment of Indian naval assets in Taiwan, Japan and Vietnam.16 In his comments published by IDSA, J. Nandkumar, drawing on his expertise in strategic relations between India and China, gives an insight on the need to address geo-political rivalry amongst supplier or transit countries, which adversely affects India's trans-border energy transportation plans. In a report published on Rediff.com, Rakteem Katakey claimed that Iran could possibly replace India with China in the $7.4 billion gas pipeline project or go ahead with a two nation Iran-Pakistan pipeline (Chaudhury, 2009).

Shamila N. Chaudhary has published her views on the implications for conflict resolution nested in the projected Iran to India natural gas pipeline. She claims that the project forces the two countries to reconsider their political discourse and interdependence, especially in light of their energy crisis and desperate need for natural gas resources. She also claims that the final decision on the pipeline route for natural gas from Iran to India and the role Pakistan plays in that decision will directly impact the development of political and social discourse, foreign policy decisions, security concerns and regional conflicts in Afghanistan and Kashmir, and sectarian violence.

2.10 How does India's Energy Security affect her National Security?

The available literature helps identify the various factors which directly impact India's energy security. However, there is a distinct lack of existing literature connecting the independent variables affecting India's energy security with its national security. Despite the fact that most of the analysts and authors on this subject recognize the overbearing influence of energy security on foreign policy and national security concerns, they stop short of drawing out inferences related to India's national security. The thesis shall therefore make an attempt to analyze the interplay of various factors affecting India's energy security leading to her national security.

2.11 The United States and China's Energy Security Dilemma

Realist theories assume the "centrality of states" as the primary players in international politics and that "the world is anarchic" (Crawford, 1994). These two assumptions are consistent across various realist schools but the question of whether "security in the international system is scarce" divides offensive and defensive realists (Crawford, 1994). Offensive realists argue that security is scarce, and so nations feverishly pursue offensive strategies which increase their strength and power and inevitably lead to conflict, while defensive realists contend that security is abundant and so nations find that increasing their defensive capacity is the optimal strategy (Crawford, 1994). Defensive realism puts faith in the "intractability of the security dilemma" as a source of conflict in international politics.

John Herz first used the term "security dilemma" to describe the way groups or individuals act in anarchic environments (Waltz, 1979) Herd argues that political units, whether they are individuals, families, classes, or countries, living in an "anarchic society" will have concerns regarding "their security from being attacked, subjected, dominated, or annihilated by other groups and individuals" (Herz, 1950). For Herz, insecurity and fear compel political units to gain power so that they can "escape the impact of the powers of others" (Herz, 1950). The theory that in an anarchic system groups seek power as a means of achieving security stands in contrast to offensive

realist theories which argue that groups seek power because anarchy in the international system “provides strong incentives for expansion” (Taliaferro, 1965). In the second part of the security dilemma, Herz contends that the actions taken by groups to achieve security make other groups feel less secure and so both sides continuously try to “prepare for the worst” in what Herz calls “the vicious circle of security and power accumulation (Herz, 1950). The security dilemma has broad implications in the field of International politics and can be used to help understand how conflicts between nations arise and the strategies that can defuse these conflicts.

Offensive realism places a premium on the “utility of force” as a strategy for states to fulfill their interests and increase their security (Frankel, 1914). From this perspective, nations pursue policies expecting the use of force. This expectation of a fight stands in contrast to the way conflict arises in Herz’s security dilemma. In the security dilemma, both sides have common and compatible goals and interests but due to the structure of the international system the outcome can be tragic.

The security dilemma function in much the same way as the prisoner’s dilemma, that is two actors pursue self-interested policies and in the end are worse off than they would be if they had cooperated. Robert Jervis explains that “the inability to recognize that one’s own actions could be seen as menacing and the concomitant belief that the other’s hostility can only be explained by its aggressiveness” is part of the mechanism that breeds conflict and makes the security dilemma spiral out of control (Jervis 75).

Furthermore, Jervis also asserts that the inability to differentiate between offensive and defensive policies and arms can send two nations into a security dilemma (Jervis 186, 1978). Charles Glaser makes two additions to Jervis’s explanation for causes of the security dilemma. Glaser refutes the claim made against the security dilemma that greed is the ultimate source of international conflict (e.g. see Schweller, 1994) and argues that greed is a variable that enhances the security dilemma dynamic (Glaser, 1997). Glaser also reasons that a state can minimize the scale of the security dilemma by increasing “an adversary’s unit-level knowledge of the state’s motives” (Glaser, 1997).

That is if a state understands the true security enhancing defensive intentions of another state they will not respond as if those actions were offensive or aggressive and the security dilemma will remain minimal.

Charles Glaser makes concrete Jervis's claim that a nations attempt to increase its own security while decreasing another's leads to tragic ends (Jervis, 1978). Glaser argues that these attempts to increase one's own security provide incentives for the adversary to expand while they deplete one's own military's resources and come at a high cost (Glaser, 1997). From the perspective of a self-interested nation, actions which threaten the security of others are not the most beneficial (Glaser, 1997). This argument implies then that there are calculable incentives for a country to search for a way out of the security dilemma.

Kenneth Boulding writes about "real incompatibility," in which one state achieving its goals inhibits the carrying out of another state's goals and "illusory incompatibility" which describes the existence of a scenario where both countries can simultaneously realize their goals (Boulding, 1959). Understanding this distinction has implications for limiting the effects of the security dilemma. A nation that builds up its military to ensure national security does pose a real threat to another country and so the other country will often times proceed to build up its military also.

The ends for both countries are security and the means are arms proliferation. A growing military could represent a real threat but the ultimate goal for both sides, security, is an illusory threat. If the ends are compatible and the means are incompatible then discussion and cooperation between the two sides can limit the spiralling effects of the security dilemma.

The constant fear of being exploited by the other side reduces the incentives for cooperation even though both sides will be better off if they cooperate (Jervis, 1978). Cooperation requires that one country recognize that its fear is illusory and take the initiative to make a concession.

While most literature on the security dilemma grounds the discussion in military norms, as globalization brings the world closer together, a new range of interactions between nations provides a reason to examine whether the security dilemma can apply to other types of interactions. During the cold war nuclear proliferation provided a compelling argument for the security dilemma. Herz said that political units are "concerned about their security from being attacked, subjected, dominated or annihilated by other groups and individuals" and this explained well the U.S.-Russia nuclear proliferation (Herz, 1950). Discussions of security in terms of protection from annihilation or attack will undoubtedly address military concerns but Herz's inclusion of security with respect to domination or subjection permits a departure from the most common type of security dilemma analysis. If the security dilemma is an effective tool in understanding conflict escalation then restricting its use to only military and arms based conflicts and not exploring the range conflicts which result from fear of subjection or domination in their various manifestations limits our ability to describe other scenarios in international politics.

Applying the security dilemma theory on a situation requires proof that security is in fact at stake and a working definition of security. Keith Krause and Michael C. Williams challenge conventional understandings of security which focus on military concerns and argue that the "post-Cold War security order" forces us to re-examine and broaden our definition of security to include a range of threats from "economic and environmental issues to human rights and migration" (Williams, 1996).

Krause and Williams are part of a growing school of IR theory (e.g. see Crawford, 1994, which seeks to redefine the nature of security studies (Williams, 1996). Krause and Williams on one hand want to expand the discussion of security while on the other hand they want to ensure "scientific objectivity" and avoid an "anything goes" approach to security which has been a point of criticism for neorealist security analysis (Williams, 1996). Krause and Williams do not reach a comprehensive definition of security but rather advocate the importance of keeping definitions of security flexible in the dynamic world of politics (Williams, 1996).

In “The New Security Dilemma under International Interdependence,” Beverly Crawford expands the definition of security to include economic threats. Crawford challenges the understanding that a state’s security is contingent solely upon its military prowess, and argues that economic interdependence can take the protection of important military resources away from the state’s control (Crawford, 1998) While nations are interested in the benefits of economic interdependence, they are also concerned with protecting “dual-use technologies” and so Crawford maintains that nations will try to find a balance between an open market and protecting foreign powers’ access to valuable technologies (Crawford B. , 1994). Crawford believes that these protectionist policies instigate a security dilemma characterized by a slippery slope away from economic interdependence and cooperation (Crawford B. , 1994). Crawford explores a new realm of security and in doing so links economic security with traditional military security.

Energy, like high technology, has implications for national security. In the traditional sense, a country cannot be a military threat if it does not have the energy needed to fuel a large scale wartime economy. For import-dependent countries, energy security has broad implication for their foreign policy objectives and the power and leverage they wield in the international political scene. In “Energy Self-sufficiency and National Security” Joan Edelman Spero stretches the definition of national security to include threats that would damage “the functioning of the economic system as a whole” while inflicting political damage as well (Spero, 1973). As the country’s economic prowess withers and dependence on foreign resources increases, Spero contends that the country will lose its “bargaining position” and will be forced to compromise other policy objectives for access to energy. If energy dependency can reduce a nation’s range of policy choices and autonomy and threaten the functioning of the state, then energy security is inextricably linked to national security.

Crawford describes a situation where nations are forced to decide between policies that foster the free market’s allocation of resources and also the need to protect those resources which are critical for national security (Crawford, 1998). The competitive free market provides an environment that promotes the creation of new technologies but at

the same time nations want to put up protectionist barriers for national security reasons. In energy politics there is an analogous dynamic at play. As the global competition for energy heightens countries simultaneously try to promote trust in the allocative efficiency of the free market while at the same time attempting to secure resources through increased ownership.

If the argument holds that energy security is in fact a security issue, then the security dilemmas should, as it did for Crawford, provide an enlightening theoretical ground for the dynamics of global energy politics. In the summer of 2006, Andrew Monaghan published an article in which he argues for the existence of an "emerging energy security dilemma" between the EU and Russia (Monaghan, 2006). Monaghan asserts that Russia-European Union energy relations are beneficial for both actors (Monaghan, 2006). Specifically, member states of the European Union need Russian energy to run their economies and Russia needs the profits earned to maintain its growth (Monaghan, 2006). While cooperation is in both country's best interest, European critiques of Russian reliability and discussion of supply diversification and Russian talk of expanding a pipeline to the east threatens to set off a series of retaliatory measures and compromise the benefits gained through working together (Monaghan, 2006). While Monaghan describes a producer-consumer realization of the energy security dilemma, recently there has been limited discussion of a growing energy security dilemma between the world's two largest oil consumers, the United States and China.

There is a large body of literature that addresses the up-and-coming race for energy security between the U.S. and China (e.g. see Erickson, 2006, Klare and Volman, 2006, Lafargue, 2006, Leverett and Bader, 2005, Taylor, 2006, Zweig and Bi, nd) but only minimal work on the issue from the theoretical perspective of the security dilemma. In June of 2004, Paul Roberts wrote an article entitled "The Undeclared Oil War" in which he deemed U.S., China, and other's efforts to secure energy resources around the globe as "the real energy-security dilemma" in which these superpower's unavoidable quest for energy will become even more uncertain as their respective strategies for achieving energy security conflict with each other. More recently in April of 2006, Minxin Pei

wrote an article for the Strait Times entitled “China’s Big Energy Dilemma” in which he reasons that the security dilemma “describes nicely how China’s measures to improve it own energy security are causing concerns among other oil consuming nations”, namely the U.S. and Japan. Pei writes off the feasibility of (what does “writes off the feasibility of” mean?) accusations against China that they are trying to lock-up world oil supplies and in doing so discredits the threat china poses as illusory.

Stable relations between the U.S. and China are mutually beneficial, but history tells us that they are also dynamic. Both sides have their grievances regarding issues ranging from human rights to trade policy but these two countries have managed to uphold a level of conduct. Regardless of what actions the U.S. and China take in their respective quests for oil, the increasing global consumption of this non-renewable resource will make these two nations’ approach to the energy security dilemma an increasingly important topic. This issue deserves greater examination, particularly because if the theoretical prescriptions for the security dilemma are going to work then it would be prudent to delve further into the policies, actions, and rhetoric coming from both sides to learn just how snugly this issue fits the security dilemma.

Often times during a security dilemma, players recognize mounting tensions and what appear to be threatening advances from the opposing side but fail to examine critically the actions their side has taken which might have caused such advances. In the case of the US-China quest for energy security, rhetoric from both sides indicates an easy rationalization of their own strategies but a difficult time recognizing the other side’s concerns.

In a speech before the Council on Foreign Relations, Senator Joseph Lieberman, echoing both Henry Kissinger and Robert Zoellick, the Deputy Secretary of State, cites the competition for energy resources as “one of the biggest sources of potential friction between the U.S. and the PRC” (Council on Foreign Relations November 30 2006). Many other voices in American politics have reached such a conclusion and, like Lieberman, they seem to get stuck on the notion that China’s efforts around the globe are designed

"to lock up energy supplies" and that these aggressive nationalistic policies are of concern for the United States (CFR November 30 2006). The allegation that China's efforts are intended to "lock up" world energy resources is common and one that President Bush has made (Sanger, nd). Senator Lieberman lists actions taken by the Chinese around the world and places the onus on the Chinese to change their policies. Ultimately Lieberman, like so many others, emphasizes the need for cooperation between the U.S. and the PRC but does not examine the actions his own country has taken which have fostered this dangerous competition.

A majority staff report entitled "Securing America's Energy Future" looks at energy security from the same security dilemma perpetuating perspective voiced by Senator Lieberman. The report addresses what China has done to threaten U.S. national security as opposed to the threatening dynamic both sides are fostering.

The report highlights China's "increasingly aggressive tactics to secure long-term access to oil and natural gas" and a reliance on oil equity as a strategy in the "extended 'great game' of geopolitics" (Majority Staff Report May 8, 2006). Representative Christopher Smith of New Jersey voiced a similar fear concerning China's role in oil rich regions of Africa and its attempts "gain a stranglehold on precious African natural resources" and the threat it poses to American efforts to promote democracy on the continent (Smith, 2003). These opinions expressed in the Majority Staff report and by Representative Smith might be justified but this type of flag-raising rhetoric dangerously disregards the role both sides are playing in the increasingly competitive drive for energy security.

The Council on Foreign Relations released a report entitled "National Security Consequences of U.S. Oil Dependency" which analyses the U.S.-China race for energy security from the perspective of what the Chinese are doing to decrease U.S. security and not from the perspective of what dynamic both the U.S. and China are perpetuating which is threatening U.S. national security. According to this report, "the United states has correctly followed a policy strategy that, in large measure, has stressed the

importance of markets" while China has conversely pursued policies around the globe characterized by a "desire to 'lock up' particular supplies for the Chinese market" (CFR).

Rhetoric coming from China indicates a similar fear and skepticism regarding the U.S. actions in places of oil wealth. Just as the U.S. looks with fear upon Chinese oil acquisitions around the globe, the Chinese are very aware of U.S. foreign policy in the Middle East, particularly in Iraq. Pan Rui, an international relations specialist from Fudan University in Shanghai, explains: "The Middle East is China's largest source of oil. America is now pursuing a grand strategy, the pursuit of American hegemony in the Middle East. Saudi Arabia is the number one oil producer, and Iraq is number two. Now, the United States has direct influence in both countries" (Goodman, 2005) . U.S. officials would insist that their policy in Iraq is not about oil and would emphasize that Iraqi oil will be traded freely in the global market, but unfortunately as the Chinese are faced with the challenge of ensuring their future energy security the U.S. efforts in Iraq present an immediate obstacle and so the concern is expected. Chinese energy security worries stretch beyond just who controls the wells and include and increasing awareness of the United States' naval presence in shipping lanes crucial for supplying China with Oil. President Hu Jintao contends that the United States has "all along encroached on and tried to control navigation of the [Malaca] strait" (Salameh, 2010). Foreign policy experts and government officials in China are weary (wary?) of the actions which their counterparts in the United States reassure were not meant to compromise their energy security.

Both sides find it easy to rationalize their fears and their actions and as a result create dangerous misperceptions which become grounds for justification of further defensive actions. The rhetoric from each nation appears in line with Robert Jervis' observation that "the inability to recognize that one's own actions could be seen as menacing and the concomitant belief that the other's hostility can be explained by its aggressiveness" exacerbates the security dilemma.

2.12 Summary

India's energy security requirements are influenced to a great extent by the availability of resources, assurance of supply, and increasing global competition for ever-diminishing energy resources. This chapter introduced the literature that will help analyze the effect of India's energy security on her national security. Besides the published books, articles, and essays mentioned in this chapter, current and ongoing events available through the electronic media and internet have also contributed towards the development of the thesis.

Chapter 3: Research Methodology

This chapter details the research methodology adopted for achievement of the objectives of the study undertaken. This explains the rationale of the study followed by the statement of the research problem, scope of the study, objectives of the study further explaining the research design and sampling process and its selection. It further explains procedure of data collection and development of questionnaire and then concludes with explanation of the procedure of analysis & its presentation.

3.1 Rationale of the study

The rationale of the study initiates by the all these years of practise done by the researcher in the Oil & Gas industry. After spending so many years, working for many companies, the researcher found that, In India, there is no governance body & specific policy formed to focus in the direction of Energy Security. In other words, there has been very less work done to think about the future energy security aspects of India.

The above statement has been verified by going through a number of policy documents, available on government websites, databases etc. After conducting a reasonable amount of secondary research based on newspaper articles, policy documents, data on government websites, it was found that there are very less, dislocated or no policy documents existing to support India's Energy Security scenario as on 31st December 2011. Absence of these policy documents clearly indicates that we as a country are not focusing on the future energy needs. Further to this, the anxiety got created by the experience of the researcher, in the Oil & Gas industry, could not get satisfied by the existing documents & theories on policy level framework in the Oil & Gas sector. In technical terms, the researcher defines that anxiety as Research Gaps.

3.2 Research Problem

From the research gaps identified in the first section of this chapter the following research question has been formed.

"What are the existing governance/policy aspects with respect to Energy Security Scenario in Oil & Gas Sector in India and, how can the Energy Security aspects be addressed?"

The research problem attempts to identify the existing governance/policy aspects with respect to the energy security scenario specifically focusing the Oil & Gas sector. Also, as the second part of it, to counter the current crippled policy framework in Oil & Gas sector, it tries to explore alternatives to ensure energy security for India.

3.3 Research Objectives

Following are the research objectives for this study:

- To study and compare the governance, policy making & its implementation in Oil & Gas Sector in India with respect to energy security.
- To develop a framework for Energy Security Governance in Oil & Gas sector for India.

3.4 Research Questions

RQ1: What are the governance and policy making aspects with respect to Energy Security in Oil & Gas Sector in India & globally?

➔ This question tries to fetch answer for the current situation of policy making & governance framework in the Oil & Gas sector in India, also, a comparative view of global scenario also would be studied.

RQ2: What Governance framework would be suitable for India in line with the Q1?

➔ After answering the first question in terms of identifying the current gap between the Indian policy making & governance in Oil & Gas sector and, it's counter parts like the United States of America, Canada, Japan & China, a suitable framework for governing the Energy Security would be suggested.

3.5 Research Design

A research design is a framework or a blue print for conducting the research project which specifies details of procedure necessary for the obtaining information needed to structure and solve the research problem. The research design chosen to undertake the

present study is exploratory research. The rationale for choosing Exploratory Research is to get insights into, and develop understanding of the problem, to define it more precisely before identifying the relevant course of action and developing an approach.

3.5.1 Research Method

Document Analysis has been chosen as the method to carry out the research. "sometimes a good way to understand the reality of the researched is to examine the texts that they themselves produce. Depending on the nature of the cultural group being explored, this might involve an examination of local newspapers, locally produced television, and/or radio broadcasts. Or it may involve analysis of local art, the poetry and essays of schoolchildren, journals and diaries, and/or doctrine and dogma" (Leary, 2009).

The document analysis process:

PLAN

1. Create a list of documents you wish to explore.
2. If any documents are considered 'sensitive', seek ethics approval.
3. Do preliminary groundwork to determine whether they will be accessible.
4. Consider and plan for any translation needs.
5. If there are too many documents for analysis, develop an appropriate sampling strategy.
6. Consider what types of data you wish to gather from the documents.

GATHER

7. Gather relevant documents – be prepared for hiccups.
8. Develop and employ a scheme for organizing and managing the documents.
9. Make copies of original documents that can be annotated.

REVIEW

10. Assess the authenticity and credibility of the 'text'.
11. Explore the 'agenda' of the document and look for any biases.

INTERROGATE

12. Extract background information on author, audience, purpose, style.

13. Explore content – this can be done by occurrence, or by themes and issues.

14. Look for 'witting evidence' (what the document was meant to impart) and 'unwitting evidence' (everything else you can glean from the documents).

REFLECT/REFINE

15. View document analysis as an iterative and ongoing process.

16. Reflect on any difficulties associated with gathering the data, reviewing the sources, and exploring the content.

17. Modify the plan based on your reflections.

18. Gather, review, and interrogate additional documents as needed.

ANALYZE DATA

3.5.2 Procedure for Data Collection

In order to achieve the objectives of the present research, data was collected through Secondary and Primary sources.

3.5.2.1 Secondary Data

The first source of data for this study was secondary source from which theoretical background, conceptual framework and statistical data on Natural Gas and CNG industry were obtained. For secondary data, researcher visited to different libraries and collected material on the topic. Specific being: Library of University of Petroleum and Energy Studies, American Library, TERI Library, All India Institute of Management Studies Library, Library of Delhi University etc.

Apart from this, a lot of data was collected from the policy documents available on the websites of various ministries, national & International.

The use of internet was also of great help to the researcher as the various search engines namely, google.com, yahoo.com, exp.com, respond.com, indiatimes.com, altavista.com and others. The website ssrn.com also proved very helpful where researcher found good repository of international research papers.

The websites of magazines, such as DEW journal, Business World, Business Week, and Business Line were also used in collecting data. Website of a number of government and non government such as Ministry of Finance, Ministry of Petroleum and Natural Gas,

Petroleum Planning and Analysis Cell, Petroleum and Natural Gas Regulatory Board, Indian Petro, Infraline, Energy line etc also helped in collection of many relevant information.

Newspapers always have been a very important secondary information source for the researcher. The researcher used the Economic Times, Business Line, DNA, Hindustan Time, Times of India and Mint as a source for secondary data.

3.5.2.2 Primary Data

Primary data has been collected by means of semi-structured interviews conducted with five of top notch decision makers in India. The identity of the interviewees has not been disclosed because of their request for anonymity.

3.5.3 Data analysis and interpretation

Data analysis can be defined as "*a body of methods that help to describe facts, detect patterns, develop explanations, and test hypotheses. It is used in all of the sciences. It is used in business, in administration, and in policy*".

In the thesis, author has applied the Document analysis method on the secondary data collected from various sources (as mentioned in section 3.5.2.1) and the primary data obtained by interviewing 5 top decision makers of our country. The process of Document Analysis has been mentioned in the section 3.5.1.

Interpretations of the data analyzed in the chapter 4, have been presented in the Chapter 5 as "Conclusions & Recommendations".

3.5.4 Scope of the work

The scope of the work is limited to five countries i.e. India, USA, Canada, Japan & China.

Chapter 4: Energy Security Governance & Policy Making – Analysis & Findings

In this chapter, discussion on international scenario of governance and policy making has been done with respect to USA, CANADA, JAPAN, CHINA and India to get a comparative picture of the present scenario.

4.1 International scenario of governance and policy

This section discusses the present scenario of energy security governance and policy making in five countries.

4.1.1 UNITED STATES OF AMERICA

Within the US Government, jurisdiction over the production, transformation, transmission and consumption of energy is shared by several agencies in the executive branch. Supervision of the use of natural resources falls under the Department of the Interior. Energy-related research, development and deployment (RD&D) are under the auspices of the Department of Energy (DOE, 2010). The Federal Energy Regulatory Commission (FERC) oversees the interstate transmission of energy, and the Environmental Protection Agency (EPA) regulates the environmental impacts of energy transformations throughout the economy. The Department of Transportation (DOT) also plays an important role as the regulator of vehicle fuel economy. A new White House Office of Energy and Climate Change Policy were created in 2009 to coordinate some of the activities of these agencies. While all of these federal agencies have some voice in energy policy, the US Congress is responsible for creating the laws that govern the activities of these agencies and set the rules for energy markets. Since the 1970s, several major legislative packages have been introduced to define US energy policy. The National Energy Act of 1978 included legislation to promote energy conservation, to shift towards alternative energy sources, to create a market for independent power producers, and to give FERC greater authority over natural gas markets (DOE, 2010). The Energy Policy Act of 1992 further opened electricity markets to competition;

encouraged integrated resource planning by utilities; targeted improved energy management in federal agencies; promoted alternative transportation fuels; and required RD&D of technologies to enhance the production and efficient utilisation of renewable, fossil and nuclear energy resources (House, 1999). In 2005, a new comprehensive Energy Policy Act (EPAct 2005) was introduced as the successor to the 1992 Act. This was followed shortly after by the Energy Independence and Security Act of 2007 (EISA 2007). Together, these recent legislative packages substantially define the current US federal energy policy. The American Recovery and Reinvestment Act of 2009 (Recovery Act) is also noteworthy for having dramatically increased the funding of many federal energy programs.

Given the high dependence of the US on imported oil, policies meant to improve energy security have often focused on three areas: efficiency in the transportation sector, where more than 70% of oil products are consumed; enhancing domestic production of liquid fuels; and advancing transportation technologies that are less dependent on liquid fuels, such as hybrid electric vehicles. EISA 2007 mandated a 40% increase in combined car and light truck fleet fuel economy (CAFE) standards by 2020, reaching 14.9 kilometres per litre (35 miles per gallon), and required study of commercial vehicle fuel economy (CRS, 2001). In 2009, the administration proposed a plan to speed the introduction of the new CAFE standards. Under that plan, the EPA and the Department of Transportation's National Highway Transportation Safety Administration (NHTSA) jointly developed vehicle greenhouse gas (GHG) emissions standards and fuel economy standards that will increase average fuel economy from 11.6 kilometres per litre (27.3 miles per gallon) in 2011 to 14.5 kilometres per litre (34.1 miles per gallon) in 2016 (NHTSA, 2001). Recently, the DOT and EPA have also announced plans to regulate the fuel efficiency of heavy duty vehicles beginning in 2014 (NHTSA, 2010). The 2005 EP Act promoted enhanced domestic production of oil by removing some regulatory barriers and offering incentives for production from deepwater resources, low production wells and unconventional resources. One regulatory change was to exclude the underground injection of hydraulic fracturing fluids from regulation under the Safe Drinking Water

Act, which cleared an obstacle to the exploitation of tight sand and shale hydrocarbon resources. In this Act, Congress also made a clear statement that development of unconventional oil resources should be encouraged in order to reduce US dependence on foreign oil imports (DOE, 2010).

Biofuels represent another avenue for improving US energy security and have received strong policy support. Development of vehicles powered by alternative fuels and biofuel production were promoted by the 2005 EP Act, but EISA 2007 brought biofuels to the forefront of US energy security policy. EISA mandated a fivefold increase from previous biofuel use targets by 2022, requiring fuel producers to use a minimum of 136 billion litres (36 billion gallons), up from 34 billion litres (9 billion gallons) in 2008. To meet environmental objectives, from 2016, new biofuel production towards the mandated target is to be derived from cellulosic or other advanced biofuels that reduce lifecycle greenhouse gas emissions by at least 50%. Most of the new biofuel is to be produced domestically, and the target includes provisions to reduce the required volumes if costs are judged too high or supplies are inadequate (CRS, Calculation of Lifecycle Greenhouse Gas Emissions for the Renewable Fuel Standard (RFS), 2010). The Recovery Act sought to advance the commercialisation of electric vehicles by investing in facilities that manufacture batteries and other electric vehicle components. The government invested more than USD 2 billion in nearly 50 different electric vehicle and component manufacturing projects (DOE, 2010). Electric vehicles offer energy security benefits by shifting transportation energy demand from oil to electricity. Roughly half of US electricity is provided by coal-fired power plants, and coal is a domestically abundant resource and thus provides energy security benefits. However, coal's high CO2 emissions present a challenge for US climate policy.

In 2007, US consumers spent an estimated USD 1.2 trillion on energy purchases and major US energy companies' domestic operations netted around USD 46 billion (EIA, 2010 h). The government plays many roles in this large market, including as owner of resources, regulator of industry, and supporter of research and development.

4.1.1.1 Upstream Development

The Department of Interior's Bureau of Land Management (BLM) administers over 2.8 million square kilometres of mineral estate, of which about 180 000 square kilometres is currently leased for oil and gas development (BLM, 2010). The Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), another office of the Department of Interior, leases another 174 000 square kilometres of offshore energy and mineral resources. The BLM and BOEMRE also lease public lands and offshore areas for the development of above-ground energy resources such as solar and wind. While the US Government plays a large role in leasing surface and mineral rights, it is not the sole owner of such rights. States and individuals also own and lease surface lands and underground mineral rights for energy extraction.

Regulation of upstream development is shared by state and federal governments. In some cases, the division between state and federal is clear. For example, state oil and gas commissions prevent the waste of resources and protect public safety in state territory. In the federal offshore territory, offices of the Department of Interior exercise similar responsibilities. But such clear divisions are not always the case. For example, state offices of environmental protection monitor environmental impacts and enforce state environmental laws. At the same time, the EPA acts as a backstop on environmental issues, ensuring that, at minimum, upstream activities comply with such federal laws as the Clean Air Act and the Clean Water Act. In such cases where state and federal regulatory responsibilities overlap, coordinating the activities of state and federal agencies is an important task.

4.1.1.2 Electricity and Gas Markets

The federal government regulates the interstate transmission of electricity and gas, as well as wholesale sales of electricity, under the Federal Energy Regulatory Commission (FERC). FERC's mandate is to 'ensure supplies of energy at just, reasonable and not unduly discriminatory or preferential rates'. In regulating wholesale electric power markets, FERC has implemented a policy of fostering competition (FERC, 2008). This has meant granting open access to transmission lines and thereby allowing wholesale

customers to meet their needs with purchases from any number of wholesale suppliers connected across a regional grid. Competitive wholesale electricity markets function using distinct models in different regions. Regional Transmission Organizations and Independent System Operators administer transmission networks and operate wholesale markets across a large part of the US and Canada. In other regions, bilateral contracting between consumer and supplier with separate contracting for transmission remains the norm.

Retail electricity markets are regulated by the states. There are thousands of retail electricity providers in the US and they operate under a variety of regulations. Most retail customers are served by regulated, investor-owned utilities (69%), but public power systems (14%) and cooperatives (12%) also serve millions of customers (FERC, 2008). State regulators ensure that these providers serve their customers at rates that are 'fair, reasonable and non-discriminatory'. In the 1990s, many states began to explore options for restructuring retail electricity markets to create competition among electricity providers while continuing to regulate distribution networks as natural monopolies. Fifteen states now allow some customers a choice of electric service provider, but efforts to deregulate retail electricity markets slowed when, in 2000 and 2001, California's newly deregulated retail market proved vulnerable to abuse, leading some customers' bills to quickly triple and forcing some distribution utilities into bankruptcy.

Natural gas markets are similar to electricity markets, with competitive wholesale markets supplying federally regulated transmission pipelines, delivering into state regulated distribution networks. The Federal Energy Regulatory Commission once set natural gas prices, but wellhead prices were fully deregulated in 1993 (Shapiro, 2007). Now FERC's pricing activities for natural gas are limited to determining pipeline rates for gas transmission. The Department of Transportation's Pipeline and Hazardous Materials Safety Administration regulates gas transmission pipelines to ensure they are operated safely. Pricing and safety on natural gas distribution networks is regulated by state agencies.

4.1.1.3 Research and Development

The scope of energy-related research and development (R&D) supported by the US Government has expanded from a focus on nuclear energy and basic science in the 1960s to include fossil fuels, energy efficiency, renewable energy and carbon sequestration. Much of this expansion occurred in the immediate aftermath of the 1973 oil crisis. In the five years following the crisis, energy R&D spending more than tripled. New support for fossil energy, renewable energy, and efficiency absorbed much of the increase. Though the amount of spending then declined sharply during the 1980s, the broader scope was preserved

The Department of Energy (DOE) is the lead agency for research and development activities (DOE, 2010). The DOE funds 21 laboratories and technology centres, as well as research conducted at universities across the US. Currently supported research ranges from particle physics to pilot projects for carbon capture and sequestration. The total government spending for energy-related research and development had remained relatively stable since the 1990s at around USD 3 billion a year (DOE, 2010). The Recovery Act changed this by investing billions more in R&D facilities, pilot projects and the new Advanced Research Projects Agency for Energy. However, the Recovery Act was a one-time economic stimulus and R&D spending may soon return to previous levels. Some US business leaders have argued that to confront the energy challenges that the US faces, the government should more than triple spending on clean energy research and development.

4.1.1.4 Energy Efficiency

The department of Energy is the entity responsible for funding the initiatives to develop energy efficient and renewable energy technologies practices, and products for homes, buildings & industries. At the state level, building codes are regulated, allowing factors like climate, economics, and power supply to affect code design, while still retaining the energy-reduction benefits of code uniformity. States also use customized incentives to attract and therefore support industries in emerging markets, such as green technologies (DOE, 2010).

4.1.1.5 Renewable Energy

The origin of reliance on renewable energy can be traced back to the enactment of Public Utilities Regulatory Policy Act, 1978 (Eric Martinot, 1998). The policy required utilities to purchase power from small or large renewable energy generators on a mandatory basis. The task of harnessing renewable energy through funding the continuous Research & Development comes under the jurisdiction of Department of Energy (DOE, 2010).

4.1.2 Canada

Canada is the fifth largest energy producer in the world (behind the US, Russia, China and Saudi Arabia) and is a major energy exporter, being the most important source of US energy imports (EIA, Governance of Energy Development, 2009). Canada has abundant reserves of oil, natural gas, coal and uranium in its western provinces, and huge hydropower resources in Quebec, British Columbia, Newfoundland, Ontario, and Manitoba. At 174.7 billion barrels, Canada's proven oil reserves are the second largest in the world (NRcan, Review of Issues affecting the price of Crude, 2010). The reserves are largely concentrated in oil sands; there are also significant offshore oil and gas deposits near Nova Scotia and Newfoundland. Energy production is very important to the Canadian economy, accounting for approximately 7% of GDP and 363 000 jobs, representing 2% of the Canadian labour force in 2008.

In Canada, jurisdiction over energy matters is shared between the provincial and federal governments. Under the Canadian Constitution, provinces are the owners and managers of energy resources (except for uranium), while control of international and interprovincial trade is a federal responsibility. Through Natural Resources Canada (NRCan), the National Energy Board (NEB), and other government departments—including Environment Canada, Fisheries and Oceans Canada, Indian and Northern Affairs Canada, and Foreign Affairs and International Trade Canada—the federal government works with provincial governments to implement economy-wide development strategies and to honour international agreements (OECD, 2006).

Energy policy in Canada is primarily market-based. Due to its abundant and diverse resource base, physical energy security is not an issue in Canada. However, sustainable development of existing resources to ensure adequate supplies for the future is a key priority. Policies are therefore aimed at promoting economic growth while encouraging the sustainable development of resources and limiting environmental impacts. NRCan intervenes in areas where the market does not adequately support these policy objectives: regulation to protect the public interest and promote health and safety; and policies and programs that encourage scientific and technological research, promote energy efficiency, and assist the development of renewable and alternative energy sources.

4.1.2.1 Oil and Gas Markets

Wellhead oil and natural gas prices in Canada have been fully deregulated since the Western Accord and the Agreement on Natural Gas Markets and Prices between the federal government and energy-producing provinces were agreed to in 1985. The agreements opened up the oil and gas markets to greater competition by permitting more exports, allowing users to buy directly from producers and unbundling production and marketing from transportation services. Oil and gas pipeline networks continue to be regulated as natural monopolies (Plourde, 2010). The NEB, a federal regulatory body reporting to Parliament through the Minister of Natural Resources, has the main responsibility for regulating international and interprovincial transport networks, as well as exports. Provincial authorities have the main responsibility for regulating local and regional distribution networks. Under the Canada Oil and Gas Operations Act (COGOA), the NEB continues to develop and maintain regulations regarding exploration and development activities in non-Accord Frontier Lands (NEB, 2010).

4.1.2.2 Electricity Markets

In most provinces, the electricity industry is highly integrated with the bulk of generation, transmission and distribution services provided by one or two dominant utilities. Although some of these utilities are privately owned, many are Crown corporations owned by the provincial governments. Independent power producers also

exist, but rarely in direct competition with a Crown corporation. Exceptions include Alberta, which has moved to full wholesale and retail competition and Ontario, which has established a hybrid system with competitive and regulated elements. Retail electricity prices vary across the provinces, in terms of both their level and the mechanism by which they are set. In 2007, residential prices per kilowatt-hour ranged from USD 0.06 to USD 0.14. Provinces with an abundant supply of hydroelectricity have the lowest prices. In most provinces, prices are set by the regulator according to a cost of generation plus reasonable rate of return formula. Retail electricity prices in Alberta are more market-based than in other provinces and territories, and the remaining regulated price plan is gradually being phased out. In Ontario, both regulated and deregulated price plans are offered. Institutional arrangements have been made to improve the reliability of the electricity power system. The US Energy Policy Act of 2005 called for the creation of an Electric Reliability Organization (ERO) to address reliability concerns of the North American grid that were prompted by the 2003 blackout. In July 2006, the Federal Energy Regulatory Commission (FERC) certified the North American Electric Reliability Corporation (NERC) as the ERO, authorising NERC to enforce reliability standards on the owners, operators and users of the bulk power system. The governments of Canada and the US also established the Bilateral Electric Reliability Oversight Group as a forum in which the US Department of Energy, FERC, NRCan and provincial energy ministries can discuss issues of mutual concern.

4.1.2.3 Research and Development

Federal-level energy research, development and demonstration (RD&D) is undertaken by many agencies working in close coordination with NRCan. The main focus of Canada's energy RD&D activities is the sustainable production, use and export of Canada's energy resources. This is achieved through the use of technologies and systems for the efficient production and use of energy that respect the environment and are sustainable for future generations. These technologies facilitate cleaner air and water, improved land use and the reduction of GHG emissions, within the scope of a market-driven economy accompanied by intervention in areas of strategic interest (NRcan, 2008).

Public funds are provided through federal programs, as well as from other private and public partners. Because of the federal government's interest in practical solutions and economic applications, privately initiated RD&D activities are encouraged, and those that complement the government's goals are funded primarily through private–public partnerships, i.e. the government working with private-sector firms and consortia. The federal government also acts as a leader, coordinator and facilitator of RD&D with all stakeholders. The general thrust of the federal effort has been towards greater integration of science and policy, with greater concentration on applied research and technology development in cooperation with private and public sector partners.

4.1.2.4 Energy Efficiency

The Energy Efficiency Act of 1992 provides for the making and enforcement of regulations on performance and labelling requirements for energy-using products such as dishwashers, water heaters, refrigerators, space heating and cooling equipment, and industrial motors. The goal of the Act is to transform the market by eliminating the least efficient products and promoting the development and deployment of new, high-efficiency products. To increase its scope and effectiveness, the Energy Efficiency Act was amended in 2009 (Office of Energy Efficiency, 2008). One of the important provisions was to provide the authority to regulate standby power consumption in an effective manner. Standby power consumption is estimated to account for as much as 10% of household electricity use in Canada. The amendments would also make it possible to prescribe standards not only for products that use energy but also for products, such as thermostats, that affect energy use. Other provisions of the amendments would ensure a level playing field for dealers of affected products and will improve the well-known EnerGuide label to make it even easier for Canadians to make informed choices when shopping for energy-using products. The proposed eleventh and twelfth amendments to the Energy Efficiency Regulations include minimum energy performance standards for many appliances, and equipment types, including standards for standby power consumption for three consumer electronic products, and more stringent standards for electric motors and domestic water heaters.

4.1.2.5 Renewable Energy

Canada is a global leader in the generation of clean, renewable energy. Hydroelectricity, the largest renewable energy source in Canada, accounts for 60% of Canada's electricity generation, and Canada is the world's second largest producer of hydropower. Other renewable energy sources, such as biomass, wind and solar, contribute to a total share for renewable energy of approximately 62% of the economy's electricity generation.

The Government of Canada is committed to reducing Canada's total GHG emissions by 17% from 2005 levels by 2020 (Keenan, 2011). The government also intends to implement regulations that will require an amount of renewable fuels equal to 5% of the volume of the gasoline pool by 2010 and 2% renewable content in diesel and heating oil by 2012 upon successful demonstration of renewable diesel fuel use under the range of Canadian conditions (Keenan, 2011). The drivers for federal support for renewable energy include environmental benefits, diversification of the energy mix, energy security, and industrial and economic development. The Government of Canada provides support to the renewable energy sector through programs, tax activities.

In 2007, the federal government announced a number of ecoENERGY Initiatives. These programs provide almost CAD 4 billion in funding to assist the development of a more sustainable energy system. The initiative includes the ecoENERGY for Renewable Power Program, a four-year, roughly CAD 1.5 billion investment to increase the supply of renewable energy from a number of sources. Budget 2009 announced CAD 2 billion in new measures to support a cleaner and more sustainable environment, and help meet Canada's climate change objectives. (Tax measures for the renewable energy sector are outlined earlier in the 'Fiscal regime and investment' section.) RD&D activities are geared to increasing the efficiency and reducing the cost of emerging technologies and are supported by funding programs through Sustainable Development Technology Canada (SDTC), as well as NRCan's Program for Energy Research and Development (PERD) – see also the earlier 'Research, Development and Demonstration' section. To help foster the adoption of renewable energy technologies, Canada is developing and sharing knowledge that allows the global community to make cleaner energy choices –

Canada's RETScreen International Clean Energy Project Analysis Software is an analysis tool that allows project planners to evaluate the feasibility of renewable and energy efficiency projects in the early stages. The SDTC, which was established by the government in 2001, is a not-for-profit foundation that operates two funds aimed at the development and demonstration of innovative technological solutions:

- The CAD 550 million SD Tech Fund supports projects that address climate change, air quality, clean water, and clean soil
- The CAD 500 million NextGen Biofuels Fund supports the establishment of first-of-kind large demonstration-scale facilities for the production of next generation renewable fuels.

4.1.3 Japan

Japan is the world's third largest economy after the United States and China. Japan's real GDP in 2008 was about USD 3597.66 billion (USD (2000) at PPP). Japan's population of 127.7 million people had a per capita income of USD 28 172 (Wikipedia, Economy of Japan, 2011). The Japanese economy slowed down in 2008. Japan's GDP increased by 2.1% in 2007 compared to the previous year, but it decreased by 0.7% in 2008 (IADB, 2010).

Japan possesses only modest indigenous energy resources and imports almost all of its crude oil, coal and natural gas requirements to sustain economic activity. In 2008, proven energy reserves included around 44 million barrels of oil, 21 billion cubic metres of natural gas and 355 million tonnes of coal.

The Ministry of Economy, Trade and Industry (METI) is responsible for formulating Japan's energy policy (METI, 2010). Within METI, the Agency for Natural Resources and Energy is responsible for the rational development of mineral resources, securing stable supplies of energy, promoting efficient energy use, and regulating electricity and other energy industries. The Nuclear and Industrial Safety Agency is responsible for the safety

of energy facilities and industrial activities, while the Ministry of Foreign Affairs formulates international policies.

The aim of Japan's energy policy is to achieve the '3E' goals—energy security, economic growth and environmental protection (for example, against global warming)—in an integrated manner. The Basic Law on Energy Policy (2002) presents the core principles of Japan's energy policy: 'assurance of a stable supply', 'adaptation to the environment', and 'use of market mechanisms'. The Strategic Energy Plan based on this law was revised in 2007. It focuses on achieving the construction of an international framework for energy conservation and countermeasures to global warming; the establishment of the nuclear fuel cycle at an early stage; the promotion of new energy sources for electric power suppliers; assurance of the stable supply of oil and other fuels; the promotion of international cooperation in the energy and environmental fields; and the development of an energy technology strategy.

In 2006, Japan launched the New National Energy Strategy in response to the global energy situation. The strategy contains a program of action to 2030 that places considerable emphasis on achieving energy security. Its five targets are further energy efficiency improvements of at least 30%; increasing the share of electric power derived from nuclear energy to more than 30%–40%; reducing oil dependence in the transport sector to about 80%; raising Japanese investment in oil exploration and development projects; and reducing overall oil dependence below 40%. The Strategic Energy Plan was revised again in 2010. It is required to be reviewed at least every three years, and to be revised if needed. In this revision, two new principles—'energy-based economic growth' and 'reform of the energy industrial structure'—were added to the three existing principles of 'energy security', 'environmental suitability' and 'economic efficiency' (METI, 2010).

The Strategic Energy Plan aims to fundamentally change the energy supply and demand system by 2030 and has set ambitious targets for 2030:

- Doubling the energy self-sufficiency ratio (18% at present) and the self-developed fossil fuel supply ratio (26% at present) and as a result, raising Japan's 'energy independence ratio' to about 70% (38% at present)
- Raising the zero-emission power sources ratio to about 70% (34% at present)
- Halving CO2 emissions from the residential sector
- Maintaining and enhancing energy efficiency in the industrial sector at the highest level in the world
- Maintaining or obtaining top-class shares of global markets for energy-related products and systems.

If the policies in the Strategic Energy Plan are implemented in a strong and sufficient manner, the economy's total energy-related CO2 emissions are expected to be reduced by 30% or more in 2030 compared to the 1990 level. A 30% emissions reduction means that about a half of the reduction that has to be achieved from the current level to 2050 (80% reduction compared to 1990) will have been realised in 2030 (METI, 2010).

4.1.3.1 Oil Markets

Japan aims to decrease its oil dependency, partly because of its experiences during oil crises. However, oil still accounts for around 50% of Japan's total primary energy supply and is expected to take the dominant share of Japan's future energy supply (BP, 2011). Securing a stable supply of oil will continue to be one of Japan's major energy policy issues. Japan's oil supply structure is vulnerable to supply disruption incidents because Japan imports almost all of its crude oil. In preparation for possible supply disruptions, Japan has been pursuing emergency measures by holding emergency oil stockpiles and by conducting the independent development of resources and promoting cooperation with oil-producing economies to manage emergencies.

The Japan National Oil Corporation (JNOC) managed the economy's stockpile business until 2003. JNOC provided financial and technical assistance to the Japanese oil

industries for their oil and natural gas exploration and development, both domestically and abroad. In 2004, the functions of the stockpile business were transferred to Japan Oil, Gas and Metals National Corporation (JOGMEC), which was established in February 2004. Following the Specially Designated Public Corporation Rationalisation Plan, JOGMEC was established through merging JNOC and the Metal Mining Agency of Japan (APERC, 2007). Japan's oil stocks are well in excess of the International Energy Agency's 90-day net import requirements. As of January 2008, Japan held the equivalent of 151 days of net imports, including state-owned and private-sector stocks. Competition in the domestic oil product market continues (IEE, 2009). The major Japanese petroleum companies are seeking to reduce their refining capacity to comply with the law on the Promotion of the Use of Non-fossil Sources and Effective Use of Fossil Energy Materials by Energy Suppliers, which requires petroleum companies achieve a 13% share of heavy oil cracking unit capacity in their total distillation capacity. The number of service stations has been declining over the last 15 years because of market liberalisation. In this context, the Japanese Government aims to establish a fair and transparent market in terms of quality and prices, where oil product retailers are able to play an important role as the point of interaction with final consumers.

4.1.3.2 Natural Gas

Demand for natural gas has been increasing rapidly over the past two decades. Between 1980 and 2007, natural gas demand grew at an annual rate of 5%—the fastest growth in all primary energy sources (Research, 2006). This robust growth is expected to continue, partly for environmental reasons and ease of use. Japan has undergone natural gas market reform since 1995 in an attempt to lower the cost of gas supply and increase the economy's industrial competitiveness in the global market. Natural gas is supplied almost entirely by imports in the form of LNG from Indonesia, Malaysia, Brunei Darussalam, Australia and Russia (from April 2009). Since Japan has placed priority on the stable and secure supply of LNG, Japanese LNG buyers have generally been paying a higher price than buyers in Europe or the United States under long-term 'take or pay' contracts with rigid terms on volume and price. However, Japanese gas and electric

utilities are faced with mounting pressure to reduce costs because of the deregulation of gas and electricity markets. The utilities have been making efforts to secure LNG supply on flexible terms that enable them to quickly respond to changes in the market situation and to supply gas at lower prices (JOMEC, 2010).

In addition, Japan has promoted the technological development of production/processing of methane hydrate, which is abundant in ocean areas surrounding Japan and is viewed as a future energy resource (JOMEC, 2010).

4.1.3.3 Electricity Market

Electricity was the second-largest contributor (next to petroleum) to total final energy consumption in 2008. Increased use of electrical appliances in the home, the widespread use of personal computers and related information technology in offices, and a shift in industry structure to more services-based sectors has driven the steady increase in electricity consumption in recent years.

Japan's electricity price has been among the highest of the developed economies. To lower the electricity price and increase industrial competitiveness, Japan has undergone a program to reform the electricity sector, through three cycles of amendments to the Electricity Utilities Industry Law, in 1995, 1999 and 2004. Japan aims to boost its solar power capacity to 10 times the 2005 level by 2020 and to 40 times the 2005 level by 2030 to help it cut greenhouse gas emissions. To meet these high targets, Japan started an economy-wide feed-in tariff system in November 2009, under which utilities buy surplus solar power produced by households and factories at a guaranteed price for about 10 years. The guaranteed price started at JPY 48/kWh for residences using less than 10 kW, and at JPY 24/kWh for residences using more than 10 kW and for non-residential producers. The cost of introducing the system is passed on to consumers evenly, resulting in a rise in electricity fees per family of about JPY 100 a month in 10 years (OECD, Regulatory Reform in Japan, 1999).

4.1.3.4 Energy Efficiency

Within Japan's May 2006 National Energy Strategy, the Energy Conservation Frontrunner Plan reinforces the economy's strategy to reduce petroleum consumption. Setting a target to improve energy efficiency by 30% relative to 2006 by 2030 (IEEJ, 2008), the Japanese Government pledged to establish a state-of-the-art energy supply–demand structure within a market of high prices, which the government expects to endure for the medium to long term. Beyond a sustained promotion of energy efficiency, the Japanese Government pledged to optimise energy use by reducing oil dependence through improvements in the energy intensity of the oil-intensive transport sector. The Energy Conservation Frontrunner Plan sets a strategy to achieve this energy efficiency target through strategic planning in the medium and long term. It establishes a plan to develop energy conservation technology and to develop and disseminate a benchmarking approach, so that the energy conservation effect can be quantitatively verified. The Strategic Energy Plan in 2010 set these current initiatives (IEEJ, 2008):

- Enhancing Japan's energy efficiency (already the highest level in the world) through introducing the most advanced technologies for replacing equipment in the industrial sector
- Making net-zero-energy houses available by 2020 and realising net-zero energy houses as the average across the economy by 2030
- Setting compulsory energy-saving standards for houses and compiling compulsory standardisation targets
- Replacing 100% of lighting with highly-efficient lamps (including LED and organic EL lighting) on a flow basis by 2020 and on a stock basis by 2030
- Introducing new integrated standards for energy consumption in all buildings for implementation in two years
- Enhancing support and regulatory measures (including top-runner standards) to increase the take-up of energy-saving consumer electronics, energy-saving

information technology equipment, heat pump water heaters, fuel cells, hybrid construction machines and other highly efficient equipment

- Raising next-generation vehicles' share of new vehicle sales to up to 50% by 2020 and up to 70% by 2030 by mobilising all possible policy measures.

4.1.3.5 Renewable Energy

Japan aims to raise the share of renewable energy in its energy mix to 10% by 2020, to alleviate global warming, diversify energy sources, and promote environment-related industries. The government will introduce sustainable standards for biofuels to reduce greenhouse gases. The target is to increase the share of biofuels to 3% of gasoline-equivalent sold in Japan by 2020. This is expected to reduce greenhouse gases and encourage the introduction of the next generation of biofuels technologies (such as celluloid and algae) (IEE, 2009). Japan is implementing a system of feed-in tariffs, where electric power companies are obliged to buy electricity generated by renewable sources at a certain price. Utilities are required to pay attention to the burden to consumers, and implement measures for stabilising the power grid.

4.1.4 China

China is the world's largest energy producer and second-largest energy consumer (after the United States). Based on provisional statistics, total energy consumption in 2009 was 2.146 billion tonnes of oil equivalent (toe), 5.2% more than in 2008. However, its per capita primary energy consumption, at 1.61 toe in 2009, is far lower than that of many developed economies and below the world's average, and is almost one-fifth of the per capita energy consumption of the United States. China was the third-largest economy in the world, following the United States and Japan, when measured by its 2009 nominal GDP. However, in 2010 China overtook Japan to become the second-largest economy in the world. China is rich in energy resources, particularly coal. In 2009, it was the largest producer and consumer of coal in the world, as well as the fifth-largest producer and second-largest consumer of oil (BP, 2011). China's 2009 coal output increased markedly, to 2.97 billion tonnes, a 6.1% increase compared with 2008 (NBS, 2008). In the same year, China became a net coal importer, after a long history of

being a net coal exporter (China became a net oil importer in 1993, after a similarly long period as a net oil exporter). According to recent estimates, China has recoverable coal reserves of around 114.5 billion tonnes, proven oil reserves of 14 832 million barrels and proven natural gas reserves of 2455 billion cubic metres (bcm) at the end of 2009. In addition, China is endowed with 400 gigawatts (GW) of hydropower potential, more than any other economy. Coal and oil resources have been utilised more extensively than natural gas and hydro for power generation and industrial development.

China's energy consumption has grown rapidly, in line with robust economic development and accelerated industrialisation. Energy has become an important strategic issue for China's economic growth, social stability and security. A low-carbon society is a goal for China: the structural transformation of energy is considered the key to economic restructuring, which is also seen as an important indicator of social progress. Achieving the goal of a low-carbon and orderly energy structure is the basis of China's energy strategy.

There are some financial incentives for efficient utilisation of energy and environmental protection. Since 2007, central and provincial budget organisations have followed a program of green government procurement, which requires government departments to make the purchase of energy-saving products a priority. China has established special funds for development of renewable energy. In addition to the central government initiatives, most provinces and some prefectures have established special funds for energy conservation and emissions reduction with annual budget allocations.

4.1.4.1 Energy Security

'More coal, less oil and gas' characterises China's energy resource (Singh, 2005). The most efficient use of available resources is accepted as the economy's necessary guiding principle. China has also strengthened the security of its oil supply through building and supporting bilateral cooperation with new trading partners, and through globalisation of its oil and gas assets. The trend to energy diversification in China, in terms of the fundamental energy system, energy structure and regional energy development, is

considered important for formation of a secure energy base. Recognising its vulnerability to international market changes, China has been trying to increase the security of its oil supply by encouraging Chinese companies' upstream investment activities in Kazakhstan, Venezuela, Sudan, Iraq, Iran and Peru, in the way of cooperation with international or local companies. After 16 months of construction, the China–Russia crude oil pipeline was completed in September 2010; this is designed to transport 150 million tons of crude oil per year from 2011 to 2030. In addition, the China–Central Asia natural gas pipeline was completed in December 2009 (Shibutani, 2011).

4.1.4.2 Energy Market

Reforms of the energy sector have been pushed steadily. The reforms focus on the establishment of an energy industrial system that adjusts to the socialist market economic system. The main reforms have included the reorganisation of the energy industry sector and the establishment of economy-wide energy sector companies; the establishment of coal market price mechanisms, such as removing controls on coal prices; perfecting the oil price mechanism and adjusting the oil price; establishing the modern enterprise system (including the participation of many electricity companies and oil companies in overseas markets); the implementation of electric power system reform, including the establishment of the electricity regulatory commission, two grid companies, five power generation groups and four auxiliary companies; and moving renewable energy commercialisation forward.

Another area of market reforms is in energy capitalisation. Chinese energy companies have expanded their resource base through international capital markets, with the three top oil companies in China now listed in various locations around the world (Jianhai, 2005). The Chinese coal industry includes between 40 and 50 listed companies, with a total market value of more than CNY 1000 billion, while the electricity industry also has between 50 and 60 listed companies with a total value of more than CNY 600 billion in early 2009.

4.1.4.3 Coal Market

A revised draft of the Coal Law was submitted to the State Council in September 2008. The aim of this is to establish a complete legal system for coal that will fully protect the development of the Chinese coal industry and help it progress in a healthy and sustainable direction. Compared with the current Coal Law, the revised version focuses on increasing the qualification requirements needed for coal development and raising the ratio of industrial concentration, as well as proposing to establish a coal strategic resources reserve system. It also highlights some other points: the rationalisation of the coal industry management system, and emphasis on the coal industry development plan (NRDC, 2007).

The Coal Industrial Policy, which is the first industrial policy for China's coal industry, was issued by the NDRC on 23 November 2007. The policy includes 10 chapters, including development targets, industrial distribution, industrial access, industrial organisation, industrial technology, safety, trade and transportation, economical use and environmental protection, labour protection, and ensuring measures. The policy aims to build a new coal industry system, change the industry's mode of economic development, and promote its healthy development in China (NRDC, 2007). The government has traditionally participated in negotiating the price of coal. After more than a decade of gradual reform, on 15 December 2009, NDRC issued a document of "instructions for improving the work of dovetailing the supply, transport and demand of coal", which declared that the government would exit the negotiations between coal buyers and sellers. From April 2009, Shanxi province, the most important coal production area, started its process of coal enterprise merger and reform (DR. HUAICHUAN RUI, 2010). According to the Shanxi coal industry restructuring and revitalization plan, issued by the Shanxi provincial government, the number of coal mines in Shanxi would be reduced by 2011 from a total of 2598 to 1000. This would involve the closure of 'backward' small coal mines and the concentration of production to several larger enterprises that are stronger in terms of technology, management and financing (DR. HUAICHUAN RUI, 2010).

4.1.4.4 Oil Market

In 2008, based on the Highway Law and other relevant regulations, the NDRC, the Ministry of Finance, the Ministry of Transport and the State Administration of Taxation jointly drafted a proposal on a fuel tax reform program. The program was approved by the State Council and took effect from 1 January 2009 (NRDC, 2007). The main aim of the reform is to standardise government fees and charges, and it includes two aspects. First, it abolishes all fees related to road maintenance, waterway conservation, road transport management, road passenger and freight surcharges, water management and water transport passenger and freight surcharges, as well as the government approval of road charges on secondary loans, which will be done gradually and in an orderly fashion. Second, the reform raises the gasoline consumption tax allowance from CNY 0.2 to CNY 1 per litre for gasoline and from CNY 0.1 to CNY 0.8 for diesel; the unit tax on other oil products also increases similarly. For gasoline and diesel oil, the consumption tax aims to implement a fixed amount of taxation rather than ad valorem taxation. When the National Standardisation Technical Committee for the Oil and Natural Gas Industry was set up on 9 May 2008, China's oil and natural gas industry standardisation entered a new stage of development. The committee is mainly responsible for petroleum geology, oil exploration, oil drilling, logging, oil and gas field development, gas production, storage and transportation of oil and gas, oil and gas measurement and analysis, oil pipes, offshore oil engineering, production safety and environmental protection.

4.1.4.5 Natural Gas Market

Natural gas can be considered high quality and relatively clean energy, with its high conversion efficiency, lower environment cost, low investment cost, and short construction periods. There is an increasing global trend in actively developing natural gas resources, and China's energy industry is now rapidly expanding in this area. The industrial chain to end users of natural gas is extending, while diversification in natural gas consumption is increased. On 30 August 2007, China released its National Gas Utilization Policy, which was intended to ease natural gas supply and demand, and optimise the structure of natural gas utilisation. The Chinese Government has been

accelerating the establishment of a market-based pricing mechanism for natural gas products (NRDC, 2007). The disadvantages of a government-controlled natural gas price are becoming apparent, with the domestic price of natural gas well below the international price of natural gas and alternative energy prices. The price of natural gas has also varied between domestic regions. On 31 May 2010, the NDRC issued a notification increasing the benchmark price of domestic onshore natural gas, which took effect on 1 June 2010. It aims to create an appropriate increase in the domestic natural gas price and improve related policies concerning natural gas prices and supporting measures (NRDC, 2007).

The National Standardization Management Committee issued a standard for determining natural gas energy (GB/T22723-2008) in 2008, with effect from 1 August 2009. The committee also provided metering methods based on international practice. The Emission Standard for Coal-bed Methane/Coal Mine Gas was issued in 2008, which called for better utilisation of coal-bed methane/coal-mine gas and the development of small scale power sources based on use of the gas.

4.1.4.6 Electricity Market

As well as the energy-related legislation listed earlier, these laws also regulate the electricity industry in China: the Electricity Law, the Energy Conservation Law, the Renewable Energy Law, the Regulations on Electricity Regulation, and the Basic Operating Rules for the Electric Power Market. The State Electricity Regulatory Commission regulates electricity trading and ensures that markets play a greater role in resources allocation. Its main aims are to (Capgemini, 2010):

- continue the construction of regional electricity market platforms and complete the regional electricity market model
- deepen cross-provincial power transaction standardisation

- promote direct transactions between power-generating companies and large users and independent power transmission and distribution companies, thus creating bilateral trading markets
- build up the joint factory system for information sharing
- improve the early warning system for demand and supply of power and thermal coal.

China's power shortage problems experienced early in the new century have been largely resolved. From 2002 to 2006, installed electricity generation capacity increased rapidly; that growth rate has slowed since 2007. The power structure is becoming more optimal as the share of coal-fired electricity decreases and hydropower increases. Since 2007, China has accelerated the closing of inefficient small thermal power plants. The economy achieved its goal of shutting down 50 million kW capacity of such plants between 2006 and 2010 – reaching the target early, in June 2009.

In November 2009, the NDRC, the State Electricity Regulatory Commission and the NEA jointly issued a tariff adjustment program, which came into effect from 20 November 2009. Under the program, the economy-wide average sales price of electricity would increase by CNY 0.028 per kilowatt-hour. At the same time, opinions are being widely sought on a proposal to accelerate tariff reform. On 9 October 2010, NDRC released a draft guidance document on the implementation of a residential electricity step tariff—public feedback is sought on the proposal to change the existing single form of residential electricity pricing to segment pricing according to levels of electricity consumption (i.e. if the user consumed more electricity, the incremental electricity use would be paid for at a higher price) (NRDC, 2007).

4.1.4.7 Renewable Energy

The development of renewable energy in China is seen as inevitable, and of benefit to the sustainable development of society and the economy. China plans to vigorously develop renewable energy and nuclear energy, with the aim of reaching a 15% share for

non-fossil fuels in its primary energy consumption by 2020 (NRDC, 2007). (NRDC, China Renewable Energy and Sustainable Development Report, 2007), the general goal of which is to raise the share of renewable energy steadily. It also aims to promote the development of renewable energy technologies and industries so that essential renewable energy equipment can be produced domestically by 2010, and local manufacture can be based mainly on home-grown intellectual property rights by 2020. The target for power from renewable energy is 300 million kW of hydro power, 30 million kW of wind power, 1.8 million kW of solar power, 30 million kW of biomass energy, and 0.1 million kW of tidal power by 2020. China is actively encouraging the application of solar thermal technologies to build an area of 300 million square metres of solar water heaters by 2020. China will also promote household biogas and livestock farm biogas to achieve annual use of 44 billion cubic metres by 2020. The draft Development Plan for the Emerging Energy Industry has been submitted to the State Council for approval; this proposes that the targets for solar power, wind power and nuclear power by 2020 are adjusted to be much more ambitious (Massy, 2010). Since 2006, China has introduced a series of financial and tax policies to boost the development of renewable energy power projects.

4.1.4.8 Energy Efficiency

China has a comprehensive program focusing on promoting energy conservation and reducing emissions. Recent initiatives include strengthening accountability systems for measuring energy efficiency, and continued phasing out of inefficient and high emission production units in key industries and sectors. In the Eleventh Five-year Plan, the government set a target of decreasing energy intensity (energy consumption per unit of GDP) by 20% from the 2005 level by 2010, and reducing emissions of major pollutants by 10% by 2010—the equivalent of reducing energy consumption from 1.28 tonnes to 1.02 tonnes of coal per CNY 10 000 of GDP (NRDC, China Renewable Energy and Sustainable Development Report, 2007). If this target were achieved, it could save 620 Mt of standard coal equivalent and reduce CO2 emissions by 15 Mt. The main measures implemented to achieve the target include strengthening the responsibility and

accountability expectations; strict control of 'heavy energy consumption and heavy pollution'; elimination of outdated production capacity, including the closure of small coal mines, electricity plants, refineries, and iron and steel production plants; promotion of energy-efficient products; improvement of the energy structure; development of economic incentive policies and establishment of a long-term mechanism for energy conservation; improvement of the regulations and standards, with accompanying strengthening of supervision and inspection; economy-wide initiatives to strengthen the guidance of consumers; and the introduction of efficient technologies throughout the energy supply chain, from production and transportation through to consumption.

Overall the Chinese Government considers the adjustment of economic structures and the transformation of economic development patterns to be important. It has formulated and implemented a series of industrial policies and special programs with resource and energy conservation as important components, and has promoted the optimisation and upgrading of industrial structures, to form a pattern of economic growth with less input, less consumption, fewer emissions and higher efficiency.

In recent years, the State Council issued several important laws and regulations on energy conservation. Besides the revised Energy Conservation Law (issued on 28 October 2007, effective from 1 April 2008), the State Council issued the Public Sector Energy Saving Regulation on 2 August 2008 (effective from 1 October 2008). On the same day, the General Office of the State Council distributed the notice of In-depth Development of Energy Saving Action to All Chinese People. On 7 August 2008, the Civil Energy Bill was published. The Chinese Government also published the Notification about Further Strengthening Fuel-efficiency and Power-saving. In July 2006 the NDRC and other departments issued the Opinion on Implementing 10 Key Projects of Energy Conservation in the 'Eleventh Five-year Plan' Period, based on the Mid- and Long-term Special Plan for Energy Conservation. The economy is expected to conserve 240 Mtce (168 Mtoe), and thereby reduce CO2 emissions by 550 Mt, during the Eleventh Fiveyear Plan period (NRDC, Coal Policy Document, 2007).

The Standardization Administration has approved 46 economy-wide standards supporting the Energy Conservation Law since 2007, most of which have been in effect since 1 June 2008, including 22 mandatory standards on the limitation of energy consumption of energy-intensive products, 11 mandatory energy-efficiency standards for energy end-use products, and five vehicle fuel economy standards. China issued catalogues of the fifth batch of products for energyefficiency labelling in 2009 together with implementation rules, increasing the number of products subject to energy-efficiency labelling to 19 at the end of 2009. In addition, there is a voluntary label in China, the energy-efficiency endorsement label, which at the end of 2009 covered 60 categories of products. The Ministry of House and Urban–Rural Development has issued three energy-efficiency design standards for residential buildings, one for public buildings and one design standard for efficient lighting systems.

In order to support energy performance contracting projects and promote the development of the energy service industry in China, the Ministry of Finance and NDRC jointly issued a notification about the Interim Measures for Funding Financial Incentives for Energy Performance Contracting Projects on 3 June 2010. The government will provide one-off funding to the energy conservation service company according to the energy conserved. On 17 September 2010, NDRC published a regulation on Interim Measures for Energy Assessment and Review of Fixed Assets Investment Projects, which aims to strengthen the management of energy conservation in fixed asset investment projects (NRDC, Coal Policy Document, 2007). In August 2010, a new government procurement list was issued, as a part of the System of Government Procurement of Energy-efficient Products: 28 categories covering about 30 000 models produced by 605 manufacturers were on the list. For nine categories it is compulsory to purchase from the energy-efficient list; this includes air conditioners, four lighting products, televisions, water heaters, computers, printers, monitors, toilets and water nozzles.

4.1.4.9 Program of Benefiting the Public through Energy-Efficient Products

The Program to Benefit the Public through Energy-efficient Products, implemented from May 2009, covers financial subsidies for energy-efficient products with first or second

grade energy efficiency in 10 categories (air-conditioners, refrigerators, washing machines, flat panel televisions, microwave ovens, electric cookers, induction cookers, water heaters, computer monitors and electric motors). The program aims to promote domestic demand for efficient products by subsidising manufacture of efficient equipment (local governments are also subsidised to procure efficient equipment). The subsidies aim to close the price gap between energy-efficient products and other products. The implementation of the program is expected to increase the demand for energy-efficient products and to increase their market share by 10–20 percentage points, reaching 30%. It could save more than 75 billion kilowatt hours of electricity each year and reduce CO2 emissions by 75 Mt. After 1 June 2010, the subsidy for high-efficiency air conditioners has been set at CNY 200–250 per set for grade 1, and CNY 150–200 per set for grade 2. Air conditioners were the first product subsidised, followed by passenger cars and motors. The implementation rules for the energy-efficient passenger cars incentive program have been issued, taking effect on 1 June 2010. The first and second versions of the product list of energy-efficient passenger cars have been issued: 140 models produced by 22 manufacturers were on the list. In August 2010, the first product list of energy-efficient motors was issued, covering 996 models of small and middle-sized three-phrase asynchronous motors produced by 11 manufacturers and 65 models of rare-earth permanent magnet three-phrase synchronous motor produced by three manufacturers. The subsidy for high-efficiency motors will be CNY 15–40/kW and CNY 40–60/kW, based on the energy-efficiency grade.

In February 2009, the Provisional Measures for the Administration of the Public Finance Funds for Subsidising the Demonstration and Promotion of Energy-efficient Vehicles and New Energy Vehicles were issued by the Ministry of Finance and the Ministry of Science and Technology. This supported 13 cities, including Beijing, to take the lead in popularising the use of these vehicles in the public service sectors (such as public transport, taxi services, government work, sanitation and postal services) and provided subsidies for the purchase of the cars and the construction of required facilities. In addition, China lowered the excise tax for small cars to encourage the purchase of

energy-saving cars from September 2008 (Zhang, 2009). The Ministry of Finance and the State Administration of Taxation announced a change in the policy on car consumption tax. The change raised the rate of this tax from 15% to 25% for large passenger cars (3–4 litre engine capacity) and from 20% to 40% for cars with engines over 4 litres, and lowered the rate from 3% to 1% for cars with engines of 1 litre or less.

4.1.5 India

In order to sustain an economic growth rate of 8-10% over the next 25 years, India would require augmentation of primary energy supplies by nearly 4 times, and an increase in power generation from the current level of 1, 60,000 megawatts to about 8,00,000 megawatts by 2030-31 (ICLEI, 2007). At the same time, in terms of consumption figures, In 2008, with total primary energy consumption of 621 million ton oil equivalent**, India was the fourth largest consumer of energy in the world** (EIA, Indian Energy Data, Statistics and Analysis, 2011). The period since 2004 has been marked by an economic growth rate of over 9% per annum, which has been achieved with an energy growth of less than 4% per annum**.** This reduced energy intensity of the economy is reflected by the fact that Per capita energy consumption in India is less than 500 kgoe[3] (MoEF, 2007), compared to the global average of nearly 1,800 kgoe. Our energy mix currently is 53% based on coal, 31% on oil, 9% on natural gas and only 6% from hydropower and 1% from nuclear energy (EIA, Annual Energy Outlook, 2010 h). If this energy mix remains unchanged over the next 25 years then our dependence on imported fossil fuels will continue, and by 2030-31, it is estimated that we would have to import 66% of our coal, 90% of our oil and 60% of our natural gas (EIA, Indian Energy Data, Statistics and Analysis, 2011).

4.1.5.1 Overview of Policy Framework in Energy Security in India

Each of the five nodal ministries is responsible for the implementation of policy frameworks in their respective areas. As has been already described earlier, under the

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[3] *Kilogrammes of oil equivalent*

Indian Constitution, there is no one categorization of Energy Security; instead elements of Energy Security are distributed over Union, State and Concurrent Lists. But the overarching principle has been that the central government has prevailed over state government in almost all energy and energy-security related matters. However, State governments in India have considerable responsibilities in the energy sector, especially in the area of power. The Indian parliament cannot legislate over certain aspects of this sector in the states. In general, as in most federal systems, the states are responsible for implementing national laws, but can also issue state laws and regulations of application in their own territory. As a result the evolution of power-sector reforms and the level of penetration of renewable energy sources, particularly biofuels, differ widely among states. Other policy areas like city gas distribution networks, inter-state product or resource pipelines, petrochemicals, etc show a reasonable uniformity in application of policy and law.

In the oil and gas sector, the main policy documents are the India Hydrocarbon Vision 2025, read in conjunction with the Integrated Energy Policy 2006 (Commission, 2006). The Ministry of Petroleum and Natural Gas has been the nodal ministry of the hydrocarbon policy as implemented through the Directorate General of Hydrocarbons and the Oil Industry Development Board. It is interesting to note that this one of the first documents which explicitly refers to energy security in the oil and gas sector by stating that the aim of the Vision 2025 document is to “To assure energy security by achieving self-reliance through increased indigenous production and investment in equity oil abroad”. The other major policy framework for the oil and gas sector in India has been the New Exploratory and Licensing Policy, a detailed discussion of which is included elsewhere. In addition to the Hydrocarbon Vision 2025 document and the NELP, the following acts and Policies are being directly implemented by the Ministry of Petroleum and Natural Gas (MoPNG, 2008):

1. Petroleum Act, 1934 (30-1934) and the rules made there under.

2. The Oilfields (Regulation and Development) Act 1948 (53 of 1948).

3. The Petroleum pipelines (Acquisition of Right of User in land) Act, 1962 (50 of 1962).
4. Kerosene (Restriction on use and fixation of price) Order, 1993.
5. Kerosene (Fixation of Ceiling prices) Order, 1970.
6. Paraffin Wax (supply, Distribution and Price Fixation) Order, 1972.
7. Light Diesel Oil (Fixation of Ceiling Price) Order, 1973,
8. The ESSO (Acquisition of Undertaking in India) Act, 1974 (4 of 1974)
9. The Oil Industry (Development) Act, 1974 (47 of 1974) and Rules 1975.
10. Furnace Oil (Fixation of Ceiling Price and Distribution) Order, 1974.
11. The Burmah-Shell (Acquisition of Undertaking in India) Act, 1976 (2 of 1976).
12. The Caltex Acquisition of shares of Caltex Oil Refining (India) Ltd. and of the Undertakings in India Caltex (India) Limited Act, 1977 (17 of 1977).
13. Domestic Gas Pvt, Ltd. and parcel Investment private ltd. takeover of Management Act, 1979.
14. Kosan Gas Acquisition Act. 1979.
15. Lubricating Oils & Greases (Processing, Supply and Distribution) Regulation Order 1987.
16. Liquified Petroleum Gas (Regulation of supply and Distribution) Order, 1993.
17. Motor Spirit and High Speed Diesel (Prevention of Malpractices in Supply and Distribution) Order, 1990.

Electricity is a concurrent subject at Entry 38 in List III of the seventh Schedule of the Constitution of India. The Ministry of Power is primarily responsible for the

development of electrical energy in the country. The Ministry of Power is responsible for the Administration of the Electricity Act, 2003, and the Energy Conservation Act 2001 (MoP, 2010). Besides these, the Ministry is concerned with perspective planning, policy formulation, processing of projects for investment decision, monitoring of the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to thermal, hydro power generation, transmission and distribution.

The Ministry of Coal is responsible for development and exploitation of coal and lignite reserves in India. The main role of the ministry is the exploration and development of coking coal and non-coking coal and lignite deposits in India, as well as all matters relating to production, supply, distribution and prices of coal. The development and operation of coal washeries, other than those for which Department of Steel (ISPAT Vibhag), is also the responsibility of the Ministry of coal (CIL, 2006). The various laws and policies allocated to the Coal Ministry under the Government of India (Allocation of Business) Rules, 1961, are as follows:

1. Administration of the Coal Mines (Conservation and Development) Act, 1974 (28 of 1974).
2. The Coal Mines Provident Fund Organization.
3. The Coal Mines Welfare Organization.
4. Administration of the Coal Mines Provident Fund and Miscellaneous Provision Act, 1948 (46 of 1948).
5. Administration of the Coal Mines Labour Welfare Fund Act, 1947 (32 of 1947).
6. Rules under the Mines Act, 1952 (32 of 1952) for the levy and collection of duty of excise on coke and coal produced and dispatched from mines and administration of rescue fund.

7. Administration of the Coal Bearing Areas (Acquisition and Development) Act, 1957 (20 of 1957).

8. In addition to the above, administration of the Mines and Minerals (Development and Regulation) Act, 1957 (67 of 1957) and other Union Laws in so far the said Act and Laws relate to coal and lignite and sand for stowing, business incidental to such administration including questions concerning various States are also under the purview of the Ministry.

The Ministry of New and Renewable Energy (MNRE) has been categorized as a Scientific Ministry in the Government of India. As mentioned elsewhere, the ministry undertakes research and development of Biogas and programmes relating to Biogas units; Solar Energy including Solar Photovoltaic devices and their development, production and applications; Programme relating to improved chulhas and research and development thereof; Indian Renewable Energy Development Agency (IREDA); All matters relating to small/mini/micro hydel projects of and below 25 MW capacity; Research and development of other non-conventional/renewable sources of energy and programmes relating thereto; Tidal energy; Integrated Rural Energy Programme (IREP); Geothermal Energy; Bio-fuels: (i) National Policy; (ii) research, development and demonstration on transport, stationary and other applications; (iii) setting up of a National Bio- fuels Development Board and strengthening the existing institutional mechanism; and (iv) overall coordination (MNRE, 2008).

4.1.5.2 Oil & Gas Markets

Prior to 1942, there was no organisation in the Government of India dealing exclusively with oil. Arrangements for meeting the requirements of the country, except that of the defence department, were more or less left to the private oil companies. Then In February 1947, two organizations dealing with oil were amalgamated to form a Petroleum Division under the Department of Works, Mines and Power. In 1952 certain subjects relating to oil were transferred from the Petroleum Division to other ministries. Refineries and synthetic oil plants were entrusted to the Ministry of Production and

those relating to oil prospecting, exploration concession etc. became the concern of the Ministry of Natural Resources and Scientific Research for undertaking exploration, exploitation and refining of oil in the country. With the formation of the new central cabinet after the general elections in April 1957, the ministries were re-organised. Ministry of Natural Resources and Scientific Research and the Ministry of Production were abolished and a new Ministry of Steel, Mines and Fuel were set up with two departments viz. Department of Iron and Steel and Department of Mines and Fuel. In 1962, the Department of Mines and Fuel was made into a separate Ministry. In 1963, a new Ministry of Petroleum and Chemicals was formed with two departments viz. Department of Petroleum and the Department of Chemicals. Again in February 1969 the Departments of Petroleum and Chemicals were placed along with the Department of Mines and Metals under the newly created Ministry of Petroleum, Chemicals, Mines and Metals. In the late eighties, the Petrochemicals Division was taken out of the Ministry of Petroleum and transferred to the Department of Chemicals, and the Ministry was renamed as the Ministry of Petroleum & Natural Gas. The Ministry of Petroleum & Natural Gas, gets its authority under item no. 53, list 1, Seventh Schedule, Article 246 of the Constitution of India. Under the Constitution of India, the government continues to be owner of the petroleum resources, with various operators only being leases holders (MoPNG, 2008).

Allocation of work under Government of India: Generally speaking, the Ministry of Petroleum and Natural Gas is responsible for exploration and exploitation of petroleum resources, including natural gas in India. Production, supply, distribution, marketing and pricing of petroleum including natural gas and petroleum products also fall within the purview of the ministry. It is additionally responsible for planning, development and regulation of oil field services and administers several acts relating to the petroleum sector. Specifically, the functions may be listed as:

- Exploration and exploitation of petroleum resources, including natural gas.

- Production, supply, distribution, marketing and pricing of petroleum, including natural gas and petroleum products.
- Oil refineries including lube plants.
- Additives for petroleum and petroleum products.
- Lube blending and greases.
- Planning, development and control, of and assistance to all industries dealt with by the ministry.
- All attached or subordinate offices or other organisations concerned with any of the subjects specified in the list.
- Planning development and regulation of oil field services.
- All Public sector projects falling under the subject included in this list.

The following laws are implemented by the Ministry:

- The Oil fields (Regulation and Development) Act, 1948 (53 of 1948).
- The Oil and Natural Gas Commission Act, 1959 (43 of 1959)
- The Petroleum Pipelines (Acquisition of Right of User in Land) Act, 1962 (50 of 1962)
- The Esso (Acquisition of Undertakings in India) Act, 1974 (4 of 1974)
- The Oil Industry (Development) Act, 1974 (47 of 1974).
- The Burmah-Shell (Acquisition of Undertakings in India) Act, 1976 (2 of 1976).
- The Caltex (Acquisition of Shares of Caltex Oil Refining (India) Limited and of the Undertakings in India of Caltex India Limited Act, 1977.

- Administration of the Petroleum Act, 1934 (80 of 1984) and the rules made there under.

Administratively, MOPNG currently has a Secretary, one Additional Secretary and four Joint Secretaries – one for exploration, one for refining, one for marketing and international cooperation. In terms of overall strength it has about 300 functionaries at various levels. There are 14 public sector undertakings, 3 subsidiaries and seven other organizations under the administrative control of the ministry. Oil Industry Development Board (OIDB) is one of the seven organisations and it in turn funds four of the seven organisations namely, Petroleum Conservation Research Association (PCRA), Oil Industry Safety Directorate (OISD), Centre for High Technology (CHT) and Directorate General of Hydrocarbons (DGH). As the functions performed by PCRA, OISD, CHT are very essential for the petroleum industry to be competitive, it was decided that the industry itself should fund these organisations through such mechanisms as it may devise, and hence the need for the cess funded OIDB (details below). In addition, there are 14 PSUs, under the administrative control of the Ministry (MoPNG, 2008). These are listed below:

Public Sector Undertakings

1. Oil & Natural Gas Corporation Ltd.

2. Oil India Limited

3. Indian Oil Corporation Limited

4. Bharat Petroleum Corporation Limited

5. Hindustan Petroleum Corporation Limited

6. Kochi Refineries Limited

7. Chennai Petroleum Corporation Limited

8. IBP Company Limited

9. Engineers India Limited

10. Bongaigaon Refinery and Petrochemicals Limited

11. Biecco Lawrie & Company Limited

12. Gas Authority of India Limited

13. Numaligarh Refinery Limited

14. Balmer Lawrie & Company Ltd.

Subsidiaries

1. O.N.G.C. Videsh Limited

2. Indian Additives Ltd. (Joint Venture of CPCL)

3. Indian Oil Blending Ltd. (Joint Venture of IOC)

4.1.5.3 Functioning of the Ministry

The areas of work can be grouped into three broad categories, exploration, refining and marketing & distribution.

Exploration: ONGC and OIL are engaged in the exploration and production of oil and natural gas in the country. Both ONGC and OIL are set target under the MOU system, and by and large they have achieved their MOU targets of crude oil production. As part of the liberalisation of the petroleum sector, foreign and Indian companies are encouraged to participate in the exploration and development activities to supplement the efforts of national oil companies, with a view to narrowing the gap between supply and demand. Thus, a number of contracts have been awarded to both foreign and Indian companies to undertake exploration activities and development of fields on production sharing basis. Most acreages are explored/produced on contracts awarded through open bidding.

Refining: The present refining capacity is 182.086 Million Metric Tonnes Per Annum (MMTPA) comprising of 107.456 MMTPA by PSUs and 72.50 MMTPA by private sector. At present, there are 20 refineries operating in the country, out of which 17 are in public sector and 3 are in private sector. Out of the 17 public sector refineries, 8 are owned by Indian Oil Corporation Limited (IOCL), 2 each by Chennai Petroleum Corporation Limited (a subsidiary of IOCL), Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL) and Oil and Natural Gas Corporation Limited (ONGC) and 1 by Numaligarh Refinery Limited (a subsidiary of BPCL). The private sector refineries belong to Reliance Industries Limited and Essar Oil Limited (MoPNG, 2008). To meet the growing demand for petroleum products, a number of grass root refineries, as well as expansion of existing refineries have been commissioned, some of which are under various stages of implementation.

Marketing and Distribution: Four public sector oil companies namely Indian Oil Corporation, Bharat Petroleum Corporation, Hindustan Petroleum Corporation and IBP Company Limited are engaged in marketing of LPG in the country. With the increased availability of LPG, the number of LPG customers enrolled by them has also increased manifold.

International cooperation: To address its energy concerns, India is continually committed to bilateral cooperation with foreign countries both in upstream and downstream sectors. The main idea is to promote long-term engagement of Indian companies in the hydrocarbon sector abroad. The specific areas to be pursued abroad are:-

- Equity participation in developed oil and gas fields;
- Exploration and production contracts in new fields, both oil and natural gas;
- Participation in mid-stream and downstream projects in the oil and gas sector;
- Promotion of Indian participation in transnational oil and gas pipeline projects;

- Participation in bilateral bodies such as Joint Commissions and Joint Working Groups on Hydrocarbon Cooperation to ensure that India's interests in specific countries are effectively projected and pursued;

- Participation at regional and global multilateral forum to pursue issues of interest to India such as organization and functioning of oil markets; investments and joint ventures in the Hydrocarbon sector and cooperation between academic and research institutions to promote R&D, transfer of technology, training, dissemination of data on hydrocarbon, etc.

Joint Working Groups with the following countries have been formed: Australia, Norway, Romania, Turkey, South Africa, Venezuela, Kuwait, Turkmenistan, Kazakhstan, and Russia. Though Saudi Arabia and Sudan are tow of India's major oil suppliers, so far no Joint Working Groups have been formed with them. Brazil and Colombia are other important countries where JWGs need to be formed.

4.1.5.4 Other Organizations under MoPNG:

- **Oil Industry Development Board (OIDB)**

The Oil industry Development Board is primarily an institution committed towards development of Oil Industry in the country, by means of providing Financial and other assistance for development of hydrocarbon sector, conservation of petroleum products and energy security of the country. The legal basis for the OIDB is the Oil Industry (Development) Act, 1974. This Act was enacted following successive and steep increase in the international prices of crude oil and petroleum products since early 1973. In addition, the Hydrocarbon Vision 2025 also envisages that sufficient resources may be made available for appraising the unexplored/ partly explored acreages through Oil Industry Development Board cess and other innovative resource mobilization approaches (OIDB, 2006).

The Oil Industry (Development) Act provided for the establishment of a Board for development of oil industry and for that purpose to levy duty of excise on crude oil and

natural gas and for matters connected therewith. The cess that has been levied on crude oil, from time to time, is currently as follows:

- Rs.60 per tonne w.e.f. 23rd July, 1974
- Rs.100 per tonne w.e.f.13th July, 1981
- Rs.300 per tonne w.e.f. 15th February, 1983
- Rs.600 per tonne w.e.f. Ist March, 1987
- Rs.900 per tonne w.e.f. Ist February,1989 to 28th February 2002.
- Rs.1800 per tonne w.e.f. Ist March,2002
- Rs.2500 per tonne w.e.f. Ist March,2006

It may be noted that no cess is leviable on crude oil produced from NELP blocks. Out of such proceeds, funds (the Oil Industry Development Fund) are made available to the Board by after due appropriation by the Parliament for utilization towards various activities envisaged under the Act. The Central Government has paid an amount of Rs. 902 crore to OIDB out of the cess amount of more than Rs. 88297 crore since inception and up to 31st March 2010 (OIDB, 2006). In addition, The OIDB also generates its internal resources by way of interest income on loans given to various oil sector companies and short-term investment of surplus funds in Fixed Deposit Receipts. The cess receipts along with these internal receipts have contributed to Oil Industry (Development) Fund to accumulate to Rs.9845 crore approximately as on 31st March, 2010 (OIDB, 2006).

The funds may be given as loans or grants to institutions for specific projects, or as Regular Grants. The eligible areas may be in the upstream E&P activities, downstream, environment, efficiency, human resource development or energy security sectors. OIDB has provided financial assistance of Rs. 28786 crore in the form of loan assistance to oil

companies and grant-in-aid of Rs.1448 crore to various institutions/companies since its inception and up to 31st March 2010 (OIDB, 2006).

In respect of OIDB grant in aid related to upstream sector, a Peer group comprising Joint Secretary (Exploration) Ministry of Petroleum & Natural Gas, Secretary, OIDB and representatives from DGH, ONGC, and OIL constituted by OID Board examines the proposals in the first instance and gives its recommendations. The recommendations of the Group are submitted before the OID Board for taking a decision. The projects that are approved by OID Board with an outlay of more than Rs.25 lakh are sent to Central Government for conveying its approval before release of grant money (OIDB, 2006).

The projects related to downstream sector are considered and recommended by Scientific Advisory Committee (SAC) on Hydrocarbons set up by the Ministry. These projects are primarily funded through CHT. The members representing SAC are eminent persons in various fields of Oil Industry. The tenure of this Committee is two years after which Ministry of Petroleum & Natural Gas reconstitutes it.

Some of the major activities being undertaken by the OIDB are (OIDB, 2006):

- Construction of Strategic Crude Oil Storages through a Special Purpose Vehicle named “Indian Strategic Petroleum Reserves Limited” (ISPRL): 5.33MMT crude oil storage at 3 locations at Mangalore, Vishakhapatnam and Padur.
- Pre feasibility studies for phase II of strategic storage of petroleum products Program (15 MMT of various petroleum products)
- Setting up of Rajiv Gandhi Institute of Petroleum Technology (RGIPT).
- Hydrogen Corpus Fund of Rs 100 Crore to fund 6 R&D projects for usage of Hydrogen as a source of energy
- National Gas Hydrate Programmes (NGHP) of around Rs 147 crore to undertake mapping of gas hydrates for its utilization as future alternate energy resource by abstracting methane from solids below the sea-beds in deep oceans.

The Government has set up five organizations namely Directorate General of Hydrocarbons (DGH), Petroleum Conservation Research Association (PCRA), Centre for High Technology (CHT), Oil Industry Safety Directorate (OISD) and Petroleum Planning and Analysis Cell (PPAC) to work in different aspects of petroleum related activities. As per the directives of the Government, the activities of these organizations are financed by OIDB including their administrative expenditures.

- **Petroleum Planning and Analysis Cell (PPAC)**

The PPAC is an attached office to the Ministry of Petroleum and Natural Gas. The main job of the PPAC is to assist the Government in discharge of some of the functions earlier being performed by the earlier OCC. Subsequent to the dismantling of the Administered Pricing Mechanism (APM) in the petroleum Sector with effect from 1st April 2002, Oil coordination Committee (OCC) had been abolished. The Oil industry Development Board (OIDB) is funding the expenditure of PPAC. The Head Quarters of the Cell are at New Delhi (India) (PPAC, 2008). The main functions of the PPAC are as follows:

- Administration of subsidy on PDS Kerosene and Domestic LPG.
- Administration of Freight subsidy for far flung areas.
- Maintenance of Information data bank and communication system to deal with emergencies and unforeseen situations.
- Analyzing the trends in the international oil market and domestic prices.
- Forecasting and evaluation of petroleum import and export trends.
- Operationalzing the sector specific surcharge schemes, if any.
- The services of PPAC are also utilized to wind up the Oil Pool Account.

But primarily the PPAC is essentially the data system and repository of the oil and gas sector in the Indian economy. The Ministry of Petroleum and Natural Gas has been publishing time series data since 1950-51 on an annual basis. Since the inception of the

PPAC data series are available on a fortnightly basis in the sectors of trade demand, production, subsidy prices, infrastructure, and marketing and refining. The data is also brought in the form of a publication, “Basic Statistics on Indian Petroleum and Natural Gas”.

It may be noted that in 2006, the Petroleum Natural Gas Regulatory Board Act was passed by the Parliament, which mandated the PNGR Board to maintain a “data bank” and “information system” relating to the activities of petroleum and natural gas. However PNGRB is yet to notify the Regulations on the above. In parallel, the National Statistical Commission Bill is also under consideration. the provisions of these two legal statues could alter the position and role played by the PPAC significantly.

- **Directorate General of Hydrocarbons (DGH)**

The Directorate General of Hydrocarbons (DGH) was established in 1993 under the administrative control of Ministry of Petroleum & Natural Gas through Government of India Resolution. In terms of its position in the oil and gas sector, it is essentially an upstream advisory & technical regulatory body, with the mandate to promote exploration & management of both conventional petroleum & natural gas resources as also non-conventional hydrocarbon energy. The DGH runs out of funds provided by the OIDB.

The Government of India, in the Ministry of Petroleum & Natural Gas felt the need to have an appropriate agency to regulate and oversee the upstream activities in the petroleum and natural gas sector and also advise the Government in these areas. For this purpose, the Dasgupta Committee, which had reviewed the management of the Bombay High reservoir, had recommended creation of an autonomous conservation board to oversee and review that oilfield development conforms to sound reservoir engineering practices in line with national interests. The Kaul Committee, which examined ONGC’s organizational structure also recommended the establishment of an independent regulatory body called the Directorate General of Hydrocarbons. The upstream petroleum sector has been largely a monopoly of public sector companies and

that was being increasingly thrown open to private investment which invariably led to a number of new operating companies in the private and joint sectors entering the field. There was thus a need to establish an agency that could effectively supervise the activities of all these companies, taking into account the national interest.

The DGH operates through a system of governing council and administrative council supervising the work of the directorate through the Director-General. The Governing Council is the legislative organ, which regulates the policies and administers the DGH. All powers, functions and responsibilities of the DGH vest in the Governing Council which overseas the functioning of DGH through its Director General. The Administrative Council for DGH was constituted to guide and take care of all administrative aspects of its functioning. The Administrative Council, in particular, will take decisions on various matters concerning establishment and budget, as also under take periodic review of the functioning of DGH. The Chairman & members of the Administrative Council are eminent persons in the field of oil exploration and production and are appointed by the GOI. The Administrative Council is headed by Chairman of the council. The other members of the Administrative Council, are Secretary P&NG – Chairman, Addl. Secretary, MOP&NG, Secretary OIDB, JS(J) MOP&NG, JS(F&A) MOP&NG and Director General, DGH .in addition, there is an Advisory Council. The Chairman & members of the Advisory Council are eminent persons in the field of oil exploration and production and are appointed by the Government of India.

DGH is broadly bestowed with the responsibility of managing the various activities with regard to Indian E&P acreages. They are in terms of awarding blocks, executing production sharing contracts, monitoring developments etc. These include several responsibilities like implementation of New Exploration Licensing Policy (NELP), matters concerning the Production Sharing Contracts for discovered fields and exploration blocks, promotion of investment in E&P Sector and monitoring of E&P activities including review of reservoir performance of producing fields. In addition, DGH is also engaged in opening up of new unexplored areas for future exploration and development of non-conventional hydrocarbon energy sources like Coal Bed

Methane(CBM) as also futuristic hydrocarbon energy resources like Gas Hydrates and Oil Shales.

- **Petroleum India International (PII)**

Petroleum India International (PII) is a consortium of public sector companies in the petroleum, Petrochemicals and engineering sector. PII was established in 1986 with the common objectives of mobilizing the individual capabilities of its member companies into a joint endeavour for providing technical, managerial and other human resources on a global basis.

PII has provided technical back up services, management consultancy HRD and training services, turnaround maintenance of refineries, information technology and procurement services to the oil and gas sector in Madagascar, Bahrain, Nigeria, Kuwait, Abu Dhabi, Qatar, Yemen, Male and Ghana.

- **Indian Institute of Petroleum (IIP)**

The Indian Institute of Petroleum (IIP) one of the leading constituent laboratories of the Council of Scientific & Industrial Research (CSIR), established through an act of Parliament in the year 1959. The Institute is devoted to multidisciplinary areas of Research and Development in the downstream sector of hydrocarbon and related industry. The Institute has undertaken R & D work in petroleum refining, natural gas, alternative fuels, petrochemicals and utilization of petroleum products in IC engines and in industrial and domestic combustion; to provide technical and analytical services to petroleum refining and related industry including technology transfer for developing novel, state-of-art technologies and products. During its formative years, it worked with the Institut Francais du Petrole (IFP), France, the world renowned petroleum research organisation, under UNESCO programme during 1960 to 1964. It became an ISO 9001 certified Institute in 1998.

The Institute follows a consortium approach for development of its technologies and for providing the total engineering package to its clients. On the mutually agreed terms and conditions, the technology is licensed to industry either on royalty basis or one-time cost basis. Within the scope of the license of the IIP Process granting the right to use IIP's know-how, IIP ensures:

- The supply of all the required documents (Basic Engineering package)
- The full training of licensee's personnel in IIP's facilities.
- All necessary assistance, if requested for the start up of the licensee's plant
- The disclosure if requested of all future improvements of the IIP Processes

Today the IIP has more than 175 patents granted to it sealed in various countries, including India. in addition several papers are published every year in international journals and tie-ups with international R&D institutes are undertaken to promote exchange of scientific experience and expertise. The Institute has developed several world class technologies in the refining, catalysis, additives and related areas. Thirty eight technologies having licensed capacity around 28 million tones per annum have been transferred to industry. It may be said that there is no refining facility in India today which does not use some IIP intellectual property or technologies licensed by IIP.

❖ **ONGC Videsh Limited (OVL)**

ONGC Videsh Limited (OVL), a wholly-owned subsdiary of ONGC, was in corporated as Hydrocarbons India Private Limited on 5th March, 1965 with an initial authorised capital of Rs. 5 lakh, for the business of international exploration and production. Its name was changed to ONGC Videsh Limited on 15 th June, 1989. The authorised and paid-up share capital of OVL as on 31st March, 2007 was Rs. 1,000 crore. The primary business of the company is to prospect for oil and gas acreages abroad. These include acquisition of oil and gas fields in foreign countries as well as exploration, production, transportation and sale of oil and gas (MoPNG, 2008).

OVL currently has participation in 39 projects in 15 countries namely, Vietnam (3 projects), Russia (2 projects), Sudan (3 projects), Iran (1 project), Iraq (1 project), Libya (3 projects), Myanmar (5 projects), Syria (2 projects), Egypt (2 projects), Cuba (2 projects)

Research & Development

In order to promote the development of indigenous capabilities to attain technological competence and self-reliance in the hydrocarbon sector, a dedicated technology cell - Centre for High Technology (CHT) was created by Ministry of Petroleum & Natural Gas on 27th May 1987. CHT was envisioned to function as the executive wing of Ministry of Petroleum & Natural Gas in order to advise and implement the scientific & technological programmes for the oil Industry.

Today it functions as a satellite organisation under administrative control of the Ministry of Petroleum & Natural Gas, Government of India. It functions under the overall guidance and supervision of the Governing Council. The Governing Council is headed by the Secretary, Government of India, Ministry of Petroleum & Natural Gas (MoP&NG) as the Chairman and all Joint Secretaries and Advisers in the MoP&NG and Chief Executives of IOCL, BPCL, HPCL, CPCL, NRL, MRPL, GAIL, EIL, IIP, OIDB as members. The Executive Director of CHT is the Member Secretary of the Governing Council. The expenditure of CHT is funded through grants from OIDB.

CHT works primarily in the field of Petroleum Refining and Storage, Handling, and transportation of crude oil and Petroleum products and Gas, but is also tasked with administrative work as well as work in the area of advanced technology like Coal to Liquids and Carbon capture. Some of its activities are as under:

- Review of Physical Performance of Refineries
- Integrated Refinery Business Improvement Program

- Development of energy factor for new process units and Revalidation of factors for the existing units in refineries
- Performance Audit of Refineries
- Coal to Liquid (CTL) Fuels Technology Development by EIL-R&D and BPCL-R&D
- Participation in joint studies under the Asia-Pacific-Partnership (APP6) on "Carbon Capture & Storage and IGCC technology"
- Review Of Auto Fuel Policy By The Committee
- Review of Applications for Foreign Technology Collaboration
- Secretarial and technical support to the Scientific Advisory Committee and the Hydrogen Corpus Fund

4.1.5.5 Power & Energy

Planning Commission was set up in March, 1950. India's commitment to planned economic development is an affirmation of our faith in the role of the government to ensure "inclusive growth" of our people with due regard to our environment. The Planning Commission of India plays a key role in this framework. It prepares the five year and annual plans of the country; plays an important part in the allocation of resources; acts as a vital think tank for the Government; holds periodic reviews of progress made in achieving development goals; and proposes mid-course corrections.

Before and during the time of independence, policy makers in India have been conscious of the importance of planned development as a means of raising the country's standard of living. This consciousness found expression in the appointment in 1938 of the National Planning Committee by the Indian National Congress. The work of the Committee was, however, interrupted by political and other developments in the beginning of the World War II. In 1944, the Government of India established a separate Department of Planning and Development and at its instance, the Central as well as the Provincial Governments prepared a number of development schemes to be undertaken

after the war. Problems of planning were reviewed towards the end of 1949 by the Advisory Planning Board which was appointed by the Interim Government of India, an important recommendation of the Board being the appointment of a Planning Commission to devote continuous attention to the whole field of development, so far as the Central Government was concerned with it. As per the allocation of business Rules of Government of India, the following are the tasks assigned to the Commission:-

(i) To make an assessment of the material, capital and human resources of the country, including technical personnel and investigate the possibilities of augmenting such of these resources as are found to be deficient in relation to the nation's requirements;

(ii) To formulate a Plan for the most effective and balanced utilization of the country's resources;

(iii) On determination of priorities, to define the stages in which the Plan should be carried out and propose the allocation of resources for due completion of each stage.

(iv) To indicate the factors which are tending to retard economic development, and determine the conditions which, in view of the current social and political situation, should be established for the successful execution of the Plan;

(v) To determine the nature of machinery which will be necessary for securing successful implementation of each stage of the Plan in all its aspects;

(vi) To appraise from time to time the progress achieved in the execution of each stage of the Plan and recommend for adjustments of policy and measures that such appraisal may show to be necessary; and

(vii) To make such interim or ancillary recommendations as appear to it be appropriate either for facilitating the discharge of the duties assigned to it; or, on a consideration of the prevailing economic conditions, current policies, measures and development programmes; or on an examination of such specific problems as may be referred to it for advice by Central or State Governments.

Besides the above, the Government of India (Allocation of Business) Rules have also assigned responsibilities to the Planning Commission in respect of (a) Public cooperation in National development (b) Hill area development programme (except in the North Eastern Region), and (c) Institute of Applied Manpower Research.

The day to day working of the Commission is carried out on a collective responsibility. However, for convenience, each Member has been given charge of a group of subjects. While, each Member individually deals with various technical and other problems pertaining to his allotted subject, the important policy matters are considered by the Commission as a whole. The Prime Minister in his capacity as Chairman of the Planning Commission, participates and gives direction to the Commission on all major issues of policy.

The work of the Commission is organised into technical Divisions/Units. They are headed by Principal Advisers/Advisers/Joint Secretaries. All the Divisions in the Planning Commission may be grouped into three types of Divisions as indicated below : -

i) Administrative Divisions: They render services pertaining to administration, accounts, library, training and other general services to the employees of the Commission.

ii) General Divisions: These are concerned with certain aspects of the entire economy e.g. Perspective Planning, Financial Resources, International Economics, Plan Coordination, State Plans including Multi-Level Planning, Hill Area Development Programme, Labour Employment and Manpower, Science & Technology, Project Appraisal and Management, Development Policy and Socio- Economic Research.

iii) Subject Divisions: These are concerned with specific fields of development e.g. Agriculture, Environment and Forests, Water Resources, Power and Energy, Industry and Minerals, Transport, Communication and Information, Village and Small Industries, Rural Development, Education, Health, Nutrition and Family Welfare, Housing & Urban Development, Social Development and Women's Programme, and Backward Classes.

All the Divisions in the Planning Commission maintain close contacts with the concerned Central Ministries/State Governments and various non-official agencies, study and examine various problems and issues in relation to the formulation as well as implementation of the Plan Programmes and Policies in their respective fields. They also organize research studies, which are deemed necessary for planning either on their own or through competent external institutions/organizations. The senior officers of the Planning Commission have also been designated as Principal Adviser (State Plans) or Adviser (State Plans) who help the Commission in keeping close touch with the progress of planning and its implementation in States. Each Principal Adviser (SP) or Adviser (SP) has a group of States/UTs allotted to him or her and helps in maintaining close liaison between Central Government and these States/UTs. He/she visits from time to time the concerned States/UTs, gives necessary advice and guidance to the Planning Commission and Executive authorities at the State/UT level and brings the difficulties and problems of the latter to the notice of the Planning Commission and Ministries/Departments at the Centre. The State Plans work is co-ordinated by Joint Secretary (State Plans).

The functions of the Power and Energy Division, which is relevant to our discussion are detailed below:-

Energy Policy unit's functions are:

1. Reviewing the energy situation in the country in global and environment changes and proposing future energy options on an integrated and coordinated basis;

2. Evolving an integrated energy policy covering commercial and non-commercial sources of energy and suggesting arrangements for management of supply and demand in sectors and monitoring their implementation keeping in view technology options in industry, transport etc. having regard to the intensity of energy use;

3. Proposing optimal mix of all forms of energy, keeping in view their inter-se availability, opportunity costs and conservation of energy; and

4. Periodically assessing the likely demand and availability of different forms of energy and suggesting appropriate arrangements to meet the country's energy needs keeping in view the need to conserve resources as well as the environment

Power Unit:

The functions are mainly related to three inter-related aspects of power planning, i.e. formulation, implementation and evaluation of power programmes including generation, transmission and distribution. The Power Unit is also responsible for policy and programmes relating to new and renewable sources of energy (Mahanta, 2010). Close liaison is maintained with concerned Ministries and Departments.

The primary functions of the Unit are:

i) Drawing up programmes of development for formulating Five Year Plans. This includes formulation collection and collation of data largely related to State wise growth of capacity, utilization of energy, benefits and financial outlays.

ii) Formulation of Annual Plans of the States, Union Territories and the Central Sector. A thorough review of on-going projects/schemes both in respect of physical progress and financial expenditure is made.

iii) Estimation of Statewise/Scheme wise financial requirements with reference to completion schedule and targets.

iv) Examination of State Government's proposals as discussed in the Working Groups and finalisation of scheme-wise outlays in consultation with the State Governments.

v) Preparation of brief notes of the States on Plan proposals in respect of power sector for meeting between the Deputy Chairman and Chief Minister of the States.

vi) Examination of Plan proposals and finalisation of scheme- wise outlays in respect of Central Ministries and PSU's related to power sector.

vii) Plan evaluation - involves appraisal/assessment of success/failure of power programmes and its implementation during entire period of the Five Year Plan.

viii) Quarterly review of the physical and financial performance of various power & renewable sources of energy programmes implemented by concerned Central Ministries and States.

ix) Policies relating to new and renewable sources of energy and examination of proposals of power generation from alternative sources.

ix) Examination of technical, financial and economic viability of power projects, their appraisal and assessment of priorities among schemes.

xi) Examination of proposals and allocation of funds for Rural Electrification giving necessary thrust to electrify the left-out villages and also to enhance the house-hold electrification in electrified villages. Under the Flagship programme of Rajiv Gandhi Grammen Vidyutikarn Yojana (RGGVY).To meet the electricity and energy requirement for the rural population, Non-Conventional Energy programmes are also implemented through Ministry of New renewable Energy Sources.

xii) Representation in various Committees - The Unit is associated with meetings and committees set up by the Central Government Departments related to Power Programmes. Some important Committees are Annual Power Survey Committee and Standing Linkage Committee on Coal.

xiii) Review and analysis of policies relating to participation of private sector in the power sector,

xiv) Examination of financial working of the State Electricity Boards.

xv) Examination of proposals relating to amendments of Electricity Acts.

xvi) Examination of policies relating to power sector reforms for the State Power Utilities.

xvii) Review of requirements of technology for sustainable supply of electricity.

xviii) Examination of subjects for discussion in Parliamentary Standing Committee meeting and Zonal Council Meetings.

xix) Examination of draft notes for Cabinet / CCEA Notes and preparation of comments. On receipt of final Notes for Cabinet / CCEA, the brief note is prepared for Deputy Chairman.

xx) Serves as a Secretariat for the Committee constituted by the National Development Council.

Coal Unit

1. Planning Activity - Preparation of Annual and Five Year Plans of Coal and Lignite Sector. For Five Year Plan formulations, Working Groups are set up. The Reports of the Working Groups are critically evaluated and proposals are inter-sectoral issues, exploration needs infrastructure requirements for coal and lignite sector development, research and development needs, policy issues, thrust areas, investment requirements etc. For Annual Plan formulations, proposals obtained from various coal companies and Ministry of Coal are carefully examined through analysis by in- depth discussions at several levels, network analysis of projects each costing Rs. 100 crore and above to decide physical targets and Plan outlay, etc. to meet the objectives.

2. Monitoring and Appraisal of Plan programmes and schemes. Conducting Half Yearly Performance Reviews.

3. Review of Plan sectoral Policies and Programmes and inter- sectoral linkages with respect to Five Year Plan / Annual Plan objectives and targets. Based on Monitoring and appraisal of Plan programmes and Schemes, review meetings are organised with concerned Ministries / Departments to resolve emerging issues and problems.

4. Undertaking studies, independently or through setting up of Working Groups, Expert Groups, etc. meetings at Inter-Ministerial level on Strategies and Policy related

emerging issues for Coal and Lignite Sector development, Clean Coal Technologies, Coal Bed Methane, Coal Liquification, Carbon Capture & Sequestration and Low Carbon Growth.

5. Representation on various Standing Committees, Working Groups for decisions on short, medium and long-term at Inter- Ministerial levels etc., Inter-Ministerial Group on Clearance of Coal Projects, Special Long-term Linkage Committee for Coal Supply to Power Stations, Cement Plant, etc., Scientific Research Committee, Coal Gasification Committee, Joint Board on Mining engineering, Education and Training, etc. Central Geological Programming Board, Coal Conservation Development Advisory Committee etc.

6. To examine the policy package and regulatory framework etc. necessary to facilitate private sector participation in Coal and Lignite Sector, necessity for restructuring of Coal and Lignite Industry, Public Sector Undertakings disinvestments, Clean Coal Technologies and related policy issues to make coal and Lignite Sector more competitive.

7. The other functions which are attended to by Coal Unit include Parliament Questions, development and continuous updating of computerised data base for Coal and Lignite Sector, dealing with papers/notes for Cabinet and other high level Committees relating to decision making at highest levels, etc. For organisational development, the officers attend seminars, workshops, field visits and short-term training programmes in aspects relating to coal and lignite sector planning.

8. Co-ordination with other Divisions of Planning Commission and supply/exchange of data / information.

Petroleum Unit

The major functions are related to various inter related aspects of Petroleum and Natural Gas sector namely exploration & production of oil and gas, transportation of oil and gas, gas processing, refining, marketing of petroleum products, import of oil and Natural Gas, price trends in the international oil and gas market and research & development. In addition, various policy matters and thrust areas for sectoral reforms and privatization initiatives are also taken up for detailed examination. The primary functions of the Unit are:-

i) Formulation of Five Year Plans for the Petroleum and Natural Gas sector, in consultation with concerned Ministries, Oil Companies, Chamber of Commerce& Industry, Institution etc. by setting up Working Groups.

ii) Formulation of Annual Plans for operationalising the Five Year Plans.

iii) Review of Annual Plan's implementation with regard to the major performance indicators for the sector through Half Yearly Performance Reviews.

iv) Appraisal of upstream and downstream sector project proposals for investment decisions.

v) Association with various Groups/Committees/Task Forces, constituted from time to time for in depth study of specific areas like gas pricing, gas utilization policies, estimation of long term demand for petroleum products, import of gas / Liquified Natural Gas, etc.

vi) Formulation of short, medium and long-term Energy / Petroleum Policy in consultation with various concerned Ministries / Departments / Financial Institutions / Industrial and Commercial associations etc.

vii) Preparation of technical and Status papers covering important activities of upstream and downstream sectors.

viii) Studies involving linkages of petroleum & natural gas sector with other sectors of economy, energy and industry.

ix) Examination of proposals of Joint-venture involving private sector participation in Petroleum & Natural Gas sector, restructuring / disinvestment of oil and gas sector and related policy issues.

x) Study of trends in the crude oil, petroleum and gas pricing in the international markets.

xi) Study reports submitted by various Committees / Expert Groups / Task Forces constituted by the Government as well as various consultancy organizations on the performance / functioning of Petroleum and Natural Gas sector.

xii) Examination of Public Investment Board Notes, Cabinet/CCEA Notes, Notes for the consideration of Committee of Secretaries and Committee on Economic Reforms, Parliament Questions and other VIP communications.

xiii) Coordination with other divisions of Planning Commission for supply/ exchange of data/ information.

Scientific Advisory Committee (SAC) on Hydrocarbons

MoP&NG created Scientific Advisory Committee (SAC) on Hydrocarbons in 1981, to advise Govt. of India on policies to ensure optimum processing of Hydrocarbon raw material as Fuel and Chemical.

Objectives

- To examine and comprehensively deliberate R&D project proposals submitted by various R&D organizations / Academic institutions, for suitable recommendations to MOP&NG for funding by CHT/OIDB
- To play a supportive role for identifying and formulating long range technology plans and working out suitable mechanism for adoption of indigenous processes

- To support new ideas and changes for effecting improvements in Hydrocarbon industry.

SAC on Hydrocarbons is the only such Committee functioning without any break since its inception in 1981, out of the several SACs constituted by the Govt. of India in early 1980s under the various economic ministries.

4.1.5.6 Renewable Energy

The Ministry of New and Renewable Energy (MNRE) is the nodal Ministry of the Government of India for all matters relating to new and renewable energy. The broad aim of the Ministry is to develop and deploy new and renewable energy for supplementing the energy requirements of the country (MNRE, About us, 2006).

The role of new and renewable energy has been assuming increasing significance in recent times with the growing concern for the country's energy security. Energy self-sufficiency was identified as the major driver for new and renewable energy in the country in the wake of the two oil shocks of the 1970s. The sudden increase in the price of oil, uncertainties associated with its supply and the adverse impact on the balance of payments position led to the establishment of the Commission for Additional Sources of Energy in the Department of Science & Technology in March 1981 (MNRE, Ministry of New and Renewable Energy Resources, 2008). The Commission was charged with the responsibility of formulating policies and their implementation, programmes for development of new and renewable energy apart from coordinating and intensifying R&D in the sector. In 1982, a new department, i.e., Department of Non-conventional Energy Sources (DNES), that incorporated CASE, was created in the then Ministry of Energy. In 1992, DNES became the Ministry of Non-conventional Energy Sources. In October 2006, the Ministry was re-christened as the Ministry of New and Renewable Energy.

India gets sun light for over an average of 290 days throughout the year, which make ir a potential solar power generator. India has a target of producing 20,000 MW of solar

energy by the 2020 (MNRE, Solar Mission 2020, 2010). Wind is the other type of renewable technology being used in the country to generate power.

POLICY NETWORK FOR RENEWABLE ENERGY DEVELOPMENT

Renewable energy gained significance in India with growing concern for 'energy security'. Energy self sufficiency has been identified as the major driver for renewable energy in India with rising insecurity in relation to fluctuating oil prices. India does not have any integrated renewable energy policy but within various other policies relating to electrification some incentives for renewable energy have been given.

• Within the electricity act 2003, it requires each State regulatory commission to specify the minimum percentage of electricity that each distribution utility must source from renewable energy sources.

• The National Electricity Policy 2005 stipulates that progressively the share of electricity from non-conventional sources would need to be increased; such purchase by distribution companies shall be through competitive bidding process; considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the commission may determine an appropriate differential in prices to promote these technologies.

• Under the National Rural Electrification Policy also for villages/habitations where grid connectivity would not be feasible or not cost effective, off-grid solutions based on stand-alone systems may be taken up for supply of electricity. Where these also are not feasible and if only alternative is to use isolated lighting technologies like solar photovoltaic, these may be adopted.

• Various states give financial subsidies on renewable energy utilities like PV, home lighting systems, solar water heater etc. The Ministry of New and Renewable Energy also gives various incentives to individuals for installing various such utilities.

Chapter 5: Conclusions & Recommendations

In the preceding chapter, we briefly discussed the following issues: International scenario of governance and policy, wherein we discussed the governance mechanisms and principles in countries like USA, Japan, China, Russia and Australia; we then also reviewed the governance and policy making in relevant international bodies like the IEA,OPEC and WEF; we then took a overview of the administration of energy security in India, followed by a brief review of the various oil and gas policies in India; and finally, we discussed the need for an unified agency and international experiences.

In this chapter, we will aim to derive some conclusions from this review, which will enable us in turn to make some definitive recommendations. In this we may make use of a modification of a principle very commonly used in legal practice, namely the Mischief Rule. The mischief rule is one of three rules of statutory construction traditionally applied by English courts, the other two being the “plain meaning rule” (also known as the “literal rule”) and the “golden rule.” The rule was first laid out in a 16th century ruling of the Exchequer Court. The main aim of the rule is to determine the "mischief and defect" that the statute in question has set out to remedy, and what ruling would effectively implement this remedy. The rule was first set out in a case called the Heydon's Case in 1584 where the court ruled that there were four points to be taken into consideration when interpreting a statute:

1. What was the common law before the making of the Act?
2. What was the mischief and defect for which the common law did not provide?
3. What remedy the Parliament hath resolved and appointed to cure the defect And,
4. The true reason of the remedy;

And then the office of all the judges is always to make such construction as shall suppress the mischief, and advance the remedy.

In the similar manner, with respect to the study of energy security, we have endeavoured to follow a rational construction of the research process, where first we have tried to find what is the common practice in India with reference to energy security issues, then second, what are the defects in such a practice; thirdly, what has been the international practice to address such defects, and thereafter studying the true and best way of addressing the defect. Based on this, we shall be in a position to 'advance the remedy', i.e., make certain recommendations.

5.1 Energy Security Governance

5.1.1 Need for a Statutory Mention of Energy Security in the Law of the Land

According to the constitution of India, there is no specific mention of Energy Security. Also, there is no mention of Energy Security in the allocation of Business Rules which is the guiding document for the distribution of work in government of India.

If you look at the USA, since the 1970s, several major legislative packages have been introduced to define US energy policy. The National Energy Act of 1978 included legislation to promote energy conservation, to shift towards alternative energy sources, and to create a market for independent power producers. The Energy Policy Act of 1992 further opened electricity markets to competition; In 2005, a new comprehensive Energy Policy Act (EPAct 2005) was introduced as the successor to the 1992 Act. This was followed shortly after by the Energy Independence and Security Act of 2007 (EISA 2007). Together, these legislative packages substantially define the current US energy policy. **In comparison India does not have any analogous legislation which addresses Energy as one entity; we have instead separate policies for coal, O&G, power and renewable.**

Energy policy in Canada is primarily market-based. This is again a big difference with respect to India, where we are only making the transition from a planned economy to a

market economy, and therefore we can only depend on market mechanisms operating within a framework of law.

In Japan, The Basic Law on Energy Policy (2002) presents the core principles of Japan's energy policy: 'assurance of a stable supply', 'adaptation to the environment', and 'use of market mechanisms'. The Strategic Energy Plan (SEP) based on this law was revised in 2007. **But in India, while we have an IEP which can be said to be analogous to SEP, there is no legislation or statute backing it.**

The case of China is more interesting. There are a series of laws related to energy in China today, such as the Coal Law, the Electricity Law, the Renewable Energy Law, the Energy Conservation Law, the Environmental Protection Law, and the Cleaner Production Promotion Law. The Protection of Oil and Pipelines Law was endorsed by the Standing Committee of the National People's Congress on 25 June 2010 and came into effect on 1 October 2010. The drafting of a comprehensive legal basis for the energy sector, the Energy Law, has also made positive progress. **Thus we see that even in China, where there exists a situation similar to India of fragmentation, there is move towards a unified legislation.**

5.1.2 Reduced Number of Agencies or Unified Ministry for Energy Security Management

The ideal case is found in Japan, where the management of energy security policy is done with remarkable precision and has achieved widely acclaimed success in recent years. Only one ministry, the Ministry of Economy, Trade and Industry (METI) is responsible for formulating Japan's energy policy. Within METI, the Agency for Natural Resources and Energy is responsible for the rational development of mineral resources, securing stable supplies of energy, promoting efficient energy use, and regulating electricity and other energy industries.

Based on the Japanese experience the Chinese have been moving towards an unified administrative set up as well. To strengthen coordination and decision-making, China has established a high-level coordinating body—the National Energy Committee, which

is in charge of drawing up China's energy strategy and deliberating on major issues in energy security. Premier Wen Jiabao is chairman of the committee. In March 2008, the National Energy Administration (NEA) was formed, administrated by the National Development and Reform Commission (NDRC), which is the equivalent to the Planning Commission in India.

Other countries have situations which vary in a wide range. Within the US Government, jurisdiction over the production, transformation, transmission and consumption of energy is shared by several agencies in the executive branch. Supervision of the use of natural resources falls under the Department of the Interior. Energy-related research, development and deployment (RD&D) are under the auspices of the Department of Energy. The Federal Energy Regulatory Commission (FERC) oversees the interstate transmission of energy, and the Environmental Protection Agency (EPA) regulates the environmental impacts of energy transformations throughout the economy.

In Canada jurisdiction over energy matters is shared between the provincial and federal governments. The provinces are the owners and managers of energy resources (except for uranium), while control of international and interprovincial trade is a federal responsibility. There are only two major agencies at the national level—the Natural Resources Canada (NRCan), and the National Energy Board (NEB). Since Canada is primarily a market based economy which is richly endowed with resources, we may not draw too many parallels form this case.

5.2 Energy Security Policy Making

5.2.1 Ownership of Resources (Renewable & Non-renewable)

There is a need for equal distribution of ownership and management of natural energy resources. In most models of energy resource exploitation, there is a distribution of ownership and management of natural energy resources between the central government and the provincial governments and even individuals. However, there are limitations in the Indian federal structure and the constitutional law which do not permit this.

In the US, the central Government plays a large role in leasing surface and mineral rights, it is not the sole owner of such rights. States and individuals also own and lease surface lands and underground mineral rights for energy extraction. In Canada, jurisdiction over energy matters is shared between the provincial and federal governments. Under the Canadian Constitution, provinces are the owners and managers of energy resources (except for uranium), while control of international and interprovincial trade is a federal responsibility. We cannot draw much lessons from Japan and China, since Japan is a small state where there are no provincial governments, and China is a communist state where state owns everything in any case. However, China has implemented a series of reforms around energy investment, government regulation, market adjustment, and management of state-owned energy companies. China encourages investment diversification in the energy sector, offers autonomy to business in any form and at any level, and seeks to attract foreign capital and advanced technology to China's energy industry.

5.2.2 Oil & Gas and Power

The need for coordination is particularly necessary in a situation where there are multiple levels of ownership and regulation. In the USA, Regulation of upstream development is shared by state and federal governments. In some cases, the division between state and federal is clear. For example, state oil and gas commissions prevent the waste of resources and protect public safety in state territory. In the federal offshore territory, offices of the Department of Interior exercise similar responsibilities. But such clear divisions are not always the case. In such cases, where state and federal regulatory responsibilities overlap, coordinating the activities of state and federal agencies is an important task. Similarly in China, the major nature of work of the NEA is coordination. The NEA comprises 10 departments, with an authorized staff size of 152 civil servants. It is responsible for developing and implementing energy industry planning, industrial policies and standards, as well as for administration of the energy sector including coal, oil, natural gas, power including nuclear power, and new and renewable sources of energy.

In India, if one would go through the policy documents of various verticals like Oil & Gas, coal, power etc., it can be found that Central Government has prevailed over state government almost all energy & energy security matters. In most of the federal systems, state government is responsible for implementing national laws, but can also issue state laws & regulations of application in their own territory. The varying level state government's powers have resulted in non-uniform over all development, for example, the level of penetration of renewable energy differ widely among states. Whereas, policy areas like city gas distribution networks, inter-state product or resource pipelines, petrochemicals, etc show a reasonable uniformity in application of policy and law. There is no single coordination executive agency which can do the job. The nearest possible body is the Planning Commission which is a mere advisory body and does not have the necessary mandate.

5.2.3 Energy Markets & Energy Efficiency

Countries which have unified agencies and legislations or which are making a move towards unified agencies and legislations have a better record of improving energy security, implementing energy market reforms, and energy efficiency norms. If we take the case of the USA, where there is a package of unified and focused legislations on obtaining energy security, we see that such a measure has enabled addressing contradictions in an effective manner. It is a common case in Indian scenario that resource exploitation legislations (on O&G exploration or coal blocks for exploration) are often set back by environmental laws, thereby affecting our long term energy security. In the USA, however we see a different scene, due to the presence of unified legislation. The 2005 EPAct promoted enhanced domestic production of oil by removing some regulatory barriers and offering incentives for production from deepwater resources, low production wells and unconventional resources. One regulatory change was to exclude the underground injection of hydraulic fracturing fluids from regulation under the Safe Drinking Water Act, which cleared an obstacle to the exploitation of tight sand and shale hydrocarbon resources. Thus it was ensured that development of

unconventional oil resources should be encouraged in order to reduce US dependence on foreign oil imports (US Congress 2005).

Another policy failure for India has been that of biofuels, where precious little has been done. In India, biofuels falls in a 'policy and administrative gap' between the domains of renewable energy, oil and gas and agriculture, with the result that no nodal ministry can take a constructive lead in the subject. In the context of USA however, Biofuels represent another avenue for improving US energy security and have received strong policy support. Development of vehicles powered by alternative fuels and biofuel production were promoted by the 2005 EPAct, but EISA 2007 brought biofuels to the forefront of US energy security policy.

Take the case of Canada in implementing energy efficiency targets. The Energy Efficiency Act of 1992 provides for the making and enforcement of regulations on performance and labelling requirements for energy-using products such as dishwashers, water heaters, refrigerators, space heating and cooling equipment, and industrial motors. The goal of the Act is to transform the market by eliminating the least efficient products and promoting the development and deployment of new, high-efficiency products. To increase its scope and effectiveness, the Energy Efficiency Act was amended in 2009. One of the important provisions was to provide the authority to regulate standby power consumption in an effective manner. Standby power consumption is estimated to account for as much as 10% of household electricity use in Canada. The amendments would also make it possible to prescribe standards not only for products that use energy but also for products, such as thermostats, that affect energy use. Other provisions of the amendments would ensure a level playing field for dealers of affected products and will improve the well-known EnerGuide label to make it even easier for Canadians to make informed choices when shopping for energy-using products. In India, the Bureau of Energy Efficiency (BEE) has been able to achieve something similar.

The most compelling story however comes from Japan. Its efforts to make electricity cheaper have been largely possible due to the unified agency structure. Japan's electricity price has been among the highest of the developed economies. To lower the electricity price and increase industrial competitiveness, Japan has undergone a program to reform the electricity sector, through three cycles of amendments to the Electricity Utilities Industry Law, in 1995, 1999 and 2004. Japan aims to boost its solar power capacity to 10 times the 2005 level by 2020 and to 40 times the 2005 level by 2030 to help it cut greenhouse gas emissions. To meet these high targets, Japan started an economy-wide feed-in tariff system in November 2009, under which utilities buy surplus solar power produced by households and factories at a guaranteed price for about 10 years. The guaranteed price started at JPY 48/kWh for residences using less than 10 kW, and at JPY 24/kWh for residences using more than 10 kW and for non-residential producers. The cost of introducing the system is passed on to consumers evenly, resulting in a rise in electricity fees per family of about JPY 100 a month in 10 years.

Likewise in the sector of energy efficiency, Japan has been able to reap the benefits of a unified agency structure. Within Japan's May 2006 National Energy Strategy, the Energy Conservation Frontrunner Plan reinforces the economy's strategy to reduce petroleum consumption. Setting a target to improve energy efficiency by 30% relative to 2006 by 2030, the Japanese Government pledged to establish a state-of-the-art energy supply–demand structure within a market of high prices, which the government expects to endure for the medium to long term. Beyond a sustained promotion of energy efficiency, the Japanese Government pledged to optimise energy use by reducing oil dependence through improvements in the energy intensity of the oil-intensive transport sector. The Energy Conservation Frontrunner Plan sets a strategy to achieve this energy efficiency target through strategic planning in the medium and long term. It establishes a plan to develop energy conservation technology and to develop and disseminate a benchmarking approach, so that the energy conservation effect can be quantitatively verified. The Strategic Energy Plan in 2010 set a wide range of initiatives like:

- Enhancing Japan's energy efficiency (already the highest level in the world) through introducing the most advanced technologies for replacing equipment in the industrial sector
- Making net-zero-energy houses available by 2020 and realising net-zero energy houses as the average across the economy by 2030
- Setting compulsory energy-saving standards for houses and compiling compulsory standardisation targets
- Replacing 100% of lighting with highly-efficient lamps (including LED and organic EL lighting) on a flow basis by 2020 and on a stock basis by 2030
- Enhancing support and regulatory measures (including top-runner standards) to increase the take-up of energy-saving consumer electronics, energy-saving information technology equipment, heat pump water heaters, fuel cells, hybrid construction machines and other highly efficient equipment
- Raising next-generation vehicles' share of new vehicle sales to up to 50% by 2020 and up to 70% by 2030 by mobilising all possible policy measures.

5.2.4 Research & Development

The unified agency structure is more efficient in promoting R&D in the energy security sector. Today in India, there is no single funding mechanism, tax regime, fiscal regime or body for promoting R&D in energy security. There are of course various such things in the individual sector, like O&G, power, coal and renewable. But since there is a lack of unified focus on the R&D objectives, most of the research output is disseminated, scattered and not consolidated for any commercial gains. However the world wide experience in this is different.

Take the case of USA. The Department of Energy (DOE) is the lead agency for research and development activities. The DOE funds 21 laboratories and technology centres, as well as research conducted at universities across the US. Currently supported research ranges from particle physics to pilot projects for carbon capture and sequestration. The total government spending for energy-related research and development had remained relatively stable since the 1990s at around USD 3 billion a year. The Recovery Act

changed this by investing billions more in R&D facilities, pilot projects and the new Advanced Research Projects Agency for Energy. Federal-level energy research, development and demonstration (RD&D) is undertaken by many agencies working in close coordination with NRCan. The main focus of Canada's energy RD&D activities is the sustainable production, use and export of Canada's energy resources. This is achieved through the use of technologies and systems for the efficient production and use of energy that respect the environment and are sustainable for future generations. These technologies facilitate cleaner air and water, improved land use and the reduction of GHG emissions, within the scope of a market-driven economy accompanied by intervention in areas of strategic interest.

Public funds are provided through federal programs, as well as from other private and public partners. Because of the federal government's interest in practical solutions and economic applications, privately initiated RD&D activities are encouraged, and those that complement the government's goals are funded primarily through private–public partnerships, i.e. the government working with private-sector firms and consortia. The federal government also acts as a leader, coordinator and facilitator of RD&D with all stakeholders. The general thrust of the federal effort has been towards greater integration of science and policy, with greater concentration on applied research and technology development in cooperation with private and public sector partners.

Summary table of conclusions :
1. There is a need for a statutory mention of Energy Security in the law of the land.
2. Countries with reduced number of agencies or unified ministries usually perform better in their management of energy security.
3. There is a need for equal distribution of ownership and management of natural energy resources.

4. The need for coordination is particularly necessary in a situation where there are multiple levels of ownership and regulation.
5. Countries which have unified agencies and legislations or which are making a move towards unified agencies and legislations have a better record of improving energy security, implementing energy market reforms, and energy efficiency norms.
6. The unified agency structure is more efficient in promoting R&D in the energy security sector.

5.3 Recommendations

After studying the governance & policy making framework of various major oil producing countries, the researcher has come to a conclusion that India needs a Unified Energy Security Agency to support its endeavors to protect its energy security needs. A name has been suggested for this agency i.e. National Energy Security Agency (NESA). The mandate of this agency will be to address the conclusions arrived at in the previous section.

In the next chapter, the author proposes the Organizational structure of NESA along with analysis of various policy issues with respect to NESA. Also a Brief review of the legal provisions for India's administrative structures is given to explain the position and functioning of NESA.

Chapter 6: Proposed Unified Agency for Energy Security Management - NESA

This chapter explains the governance and policy making in the international bodies followed by the explanation of the legal structures of the Indian Administration. In the last section, NESA would be tested against the policy or governance level issues, which have already happened and were not very well dealt.

6.1 Governance and Policy Making in Relevant International Bodies

This section talks about the governance & Policy making in the international bodies like OPEC, IEF and IEF.

6.1.1 OPEC

6.1.1.1 History

The Organization of the Petroleum Exporting Countries (OPEC) is a permanent, intergovernmental Organization, created at the Baghdad Conference on September 10–14, 1960, by Iran, Iraq, Kuwait, Saudi Arabia and Venezuela. The five Founding Members were later joined by nine other Members: Qatar (1961); Indonesia (1962) – suspended its membership from January 2009; Socialist Peoples Libyan Arab Jamahiriya (1962); United Arab Emirates (1967); Algeria (1969); Nigeria (1971); Ecuador (1973) – suspended its membership from December 1992-October 2007; Angola (2007) and Gabon (1975–1994). OPEC had its headquarters in Geneva, Switzerland, in the first five years of its existence. This was moved to Vienna, Austria, on September 1, 1965 (UNDP, 1999).

OPEC's objective is to co-ordinate and unify petroleum policies among Member Countries, in order to secure fair and stable prices for petroleum producers; an efficient,

economic and regular supply of petroleum to consuming nations; and a fair return on capital to those investing in the industry.

The 1960s

OPEC's formation by five oil-producing developing countries in Baghdad in September 1960 occurred at a time of transition in the international economic and political landscape, with extensive decolonisation and the birth of many new independent states in the developing world. The international oil market was dominated by the "Seven Sisters" multinational companies and was largely separate from that of the former Soviet Union (FSU) and other centrally planned economies (CPEs). OPEC developed its collective vision, set up its objectives and established its Secretariat, first in Geneva and then, in 1965, in Vienna. It adopted a 'Declaratory Statement of Petroleum Policy in Member Countries' in 1968, which emphasised the inalienable right of all countries to exercise permanent sovereignty over their natural resources in the interest of their national development. Membership grew to ten by 1969 (UNDP, 1999).

The 1970s

OPEC rose to international prominence during this decade, as its Member Countries took control of their domestic petroleum industries and acquired a major say in the pricing of crude oil on world markets. On two occasions, oil prices rose steeply in a volatile market, triggered by the Arab oil embargo in 1973 and the outbreak of the Iranian Revolution in 1979. OPEC broadened its mandate with the first Summit of Heads of State and Government in Algiers in 1975, which addressed the plight of the poorer nations and called for a new era of cooperation in international relations, in the interests of world economic development and stability. This led to the establishment of the OPEC Fund for International Development in 1976. Member Countries embarked on ambitious socio-economic development schemes. Membership grew to 13 by 1975 (UNDP, 1999).

The 1980s

After reaching record levels early in the decade, prices began to weaken, before crashing in 1986, responding to a big oil glut and consumer shift away from this hydrocarbon. OPEC's share of the smaller oil market fell heavily and its total petroleum revenue dropped below a third of earlier peaks, causing severe economic hardship for many Member Countries. Prices rallied in the final part of the decade, but to around half the levels of the early part, and OPEC's share of newly growing world output began to recover. This was supported by OPEC introducing a group production ceiling divided among Member Countries and a Reference Basket for pricing, as well as significant progress with OPEC/non-OPEC dialogue and cooperation, seen as essential for market stability and reasonable prices. Environmental issues emerged on the international energy agenda.

The 1990s

Prices moved less dramatically than in the 1970s and 1980s, and timely OPEC action reduced the market impact of Middle East hostilities in 1990–91. But excessive volatility and general price weakness dominated the decade, and the South-East Asian economic downturn and mild Northern Hemisphere winter of 1998–99 saw prices back at 1986 levels. However, a solid recovery followed in a more integrated oil market, which was adjusting to the post-Soviet world, greater regionalism, globalisation, the communications revolution and other high-tech trends. Breakthroughs in producer-consumer dialogue matched continued advances in OPEC/non-OPEC relations. As the United Nations-sponsored climate change negotiations gathered momentum, after the Earth Summit of 1992, OPEC sought fairness, balance and realism in the treatment of oil supply.

The 2000s

An innovative OPEC oil price band mechanism helped strengthen and stabilise crude prices in the early years of the decade. But a combination of market forces, speculation

and other factors transformed the situation in 2004, pushing up prices and increasing volatility in a well-supplied crude market. Oil was used increasingly as an asset class. Prices soared to record levels in mid-2008, before collapsing in the emerging global financial turmoil and economic recession. OPEC became prominent in supporting the oil sector, as part of global efforts to address the economic crisis. OPEC's second and third summits in Caracas and Riyadh in 2000 and 2007 established stable energy markets, sustainable development and the environment as three guiding themes, and it adopted a comprehensive long-term strategy in 2005.

6.1.1.2 Governance

OFID was conceived at the Summit of the Sovereigns and Heads of State of the OPEC Member Countries (MCs) held in the Algerian capital, Algiers, in March 1975. It was established in January 1976, as a collective financial facility to consolidate the assistance extended by its Member Countries namely Algeria, Gabon, Indonesia, Islamic Republic of Iran, Iraq, Kuwait, SP Libyan AJ, Nigeria, Qatar, Saudi Arabia, United Arab Emirates and Venezuela (Gas, 2007).

OFID's resources are additional to those already made available by OPEC MCs through a number of bilateral and multilateral channels. The resources of OFID consist mainly of voluntary contributions by OPEC MCs and income derived from OFID's investments and loans (interest and service charges). OFID's operations were launched in August 1976 with initial resources of about $800 million (Gas, 2007). This amount has since then been replenished three times. It has also been further increased by the profits accruing to seven OPEC Member Countries through the sale of gold held by the International Monetary Fund (IMF). All non-OPEC developing countries are, in principle, eligible for OFID assistance. However, the least developed and other low-income countries are accorded priority and, therefore, receive a larger share. Over the years, OFID has spread its financing to 125 countries, of which 51 are in Africa, 42 in Asia, 28 in Latin America and the Caribbean, and four in Europe.

6.1.2 IEA

6.1.2.1 History

The International Energy Agency came into being in 1974 in response to the need for the major energy consuming countries to co-operate effectively on a broad spectrum of energy policies and most urgently on security of oil supply. The origins of the Agency may be found in the fundamental changes in economics and politics associated with the international oil market during the period leading up to the Middle East War crisis of 1973- 1974 and the industrial countries' responses to those changes (IEA, 2002).

Today, the International Energy Agency (IEA) is an autonomous body which was established in November 1974 within the framework of the Organisation for Economic Co-operation and Development (OECD) to implement an international energy programme. It carries out a comprehensive programme of energy co-operation among twenty-three of the OECD's twenty-four Member countries. The basic aims of the IEA are (IEA, 2002):

i) Co-operation among IEA participating countries to reduce excessive dependence on oil through energy conservation, development of alternative energy sources and energy research and development;

ii) An information system on the international oil market as well as consultation with oil companies;

iii) Co-operation with oil producing and other oil consuming countries with a view to developing a stable international energy trade as well as the rational management and use of world energy resources in the interest of all countries;

iv)A plan to prepare participating countries against the risk of a major disruption of oil supplies and to share available oil in the event of an emergency.

IEA participating countries are: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom,

and the United States. The European Commission takes part in the work of the IEA. Therefore, the IEA's four main areas of focus are:

- **Energy security**
- **Economic development**
- **Environmental awareness**
- **Engagement worldwide**

The initiative in proposing the establishment of the new energy institutions was taken by U. S. Secretary of State Kissinger in the midst of the 1973- 1974 crisis (IEA, 2002), when American thinking about the magnitude of the problem and the need for international co-operation had evolved to the point where new proposals could be made. In his address to the Pilgrims Society in London on 12 December 1973, Secretary Kissinger stated that the energy crisis of 1973 could become "the economic equivalent of the sputnik challenge of 1957" (DOE, 2010). With regard to the energy crisis, Secretary Kissinger remarked that it was "not simply a product of the Arab-Israeli war; it is the inevitable consequence of the explosive growth of world-wide demand outrunning the incentives for supply". The long-term solution to the economic aspect of the energy crisis would be "a massive effort to provide producers an incentive to increase their supply, to encourage consumers to use existing supplies more rationally, and to develop alternate energy sources". In order to realize these objectives and to co-ordinate an international research program to develop new energy technologies, Secretary Kissinger proposed that an "Energy Action Group" be established by the countries of Europe, North America and Japan. *This proposal, which constituted the first official statement concerning new institutional arrangements, grouped together high officials of those countries and provided for participation of the European Economic Community and the developing countries.*

Thereafter, on 11-13 February 1974 the Washington Energy Conference brought together Ministerial level representatives of the thirteen principal oil consumer

countries (Belgium, Canada, Denmark, France, the Federal Republic of Germany, Ireland, Italy, Japan, Luxembourg, The Netherlands, Norway, the United Kingdom and the United States). This time, Secretary Kissinger emphasized first that "the energy situation poses severe economic and political problems for *all* nations. Isolated solutions are impossible" .He declared that "this challenge can be met successfully only through concerted international action", and he recognized that developing countries must be brought into the consultation on the energy problems. A basic consideration was that Cooperation *not* confrontation must mark our relations with the producers".

Shortly after the close of the Washington Conference, the Energy Coordinating Group (ECG) convened in Brussels to carry out the mandate given by the Conference and to develop the programme in detail. All of the Washington Conference countries, with the exception of France, participated in the ECG, together with the OECD and the Commission of the European Communities. The deliberations culminated in agreed proposals for the establishment of the IEA. These took the form of two draft instruments. The first was a draft OECD Council decision establishing the International Energy Agency called officially the "Decision of the Council Establishing an International Energy Agency of the Organization", and the second was the draft treaty entitled "Agreement on an International Energy Program". Later, The Decision was adopted unanimously by the OECD Council on 15 November 1974, with abstentions by Finland, France and Greece (IEA, 2002). The text of the Decision brought into existence the IEA, by stating that "…is hereby established as an autonomous body within the framework of the Organisation". The governing board of the IEA would be the supreme decision making body of the IEA, and all elements of the Agreement on an International Energy Program were adopted as the work programme of the IEA.

6.1.2.2 Governance

The organization of the IEA is divided into a system of Standing Groups and directorates through which the various outputs of the IEA are generated, validated and benchmarked as the OECD approved outcome of oil and gas market research (IEA, Organizational Structure, 2001).

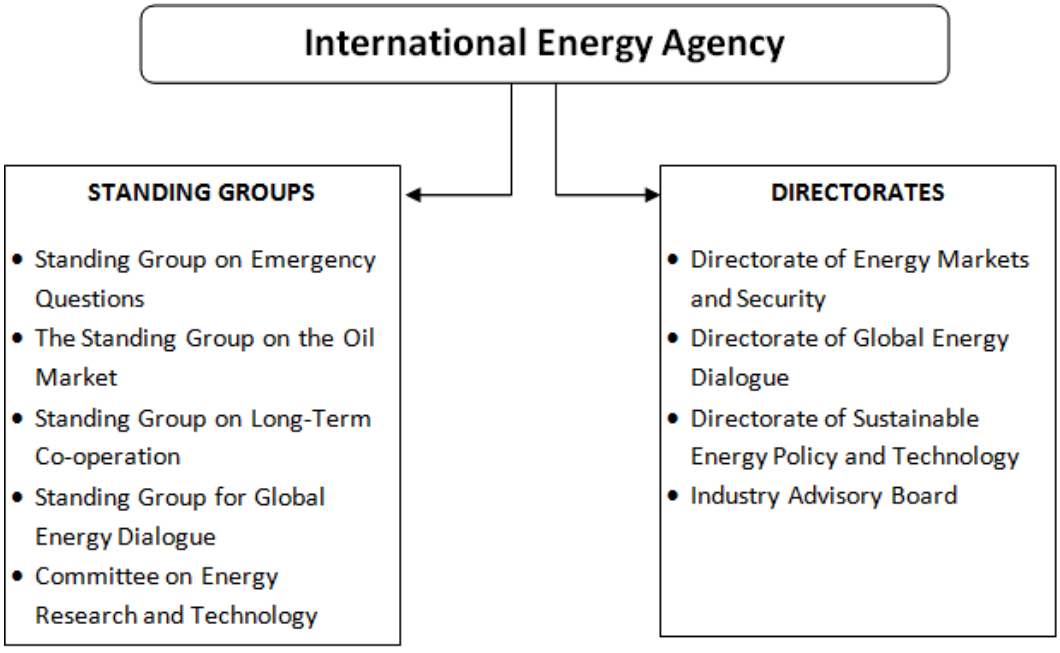

FIGURE 5: Organizational structure of IEF
Source: IEF

Standing groups

The Standing Group on Emergency Questions (SEQ): is responsible for all aspects of IEA oil emergency preparedness and collective response to supply disruptions.

The Standing Group on the Oil Market (SOM): monitors and analyses short- and medium-term developments in the international oil market to help IEA Member countries react promptly and effectively to changes in market conditions.

The Standing Group on Long-Term Co-operation (SLT): encourages co-operation among IEA member countries to ensure their collective energy security, improve the economic efficiency of their energy sector and promote the environmental protection in provision of energy services. The SLT has established an expert body: the Working Party on Energy Efficiency.

The Standing Group for Global Energy Dialogue (SGD): is responsible for work with countries and regions outside of the IEA membership, including China, Russia and India. Many SGD projects draw upon both regional and sectoral expertise and are carried out jointly with other IEA divisions.

The Committee on Energy Research and Technology (CERT) : co-ordinates and promotes the development, demonstration and deployment of technologies to meet challenges in the energy sector. The CERT has established four expert bodies: the Working Party on Fossil Fuels; the Working Party on Renewable Energy Technologies; the Working Party Energy End-Use Technologies and the Fusion Power Co-ordinating Committee. The IEA provides a framework for more than 40 international collaborative energy research, development and demonstration projects known as Implementing Agreements.

Directorates

Directorate of Energy Markets and Security (EMS)

The Directorate of Energy Markets and Security takes a comprehensive approach to energy market analysis – including oil, gas, coal, nuclear, electricity and renewable energy – and energy security policies. It also initiates and monitors key policy issues raised by new developments such as regulatory reform and market liberalization. The Directorate has four divisions:

1. Oil Industry and Markets Division (OIMD)
2. Emergency Policy Division (EPD)
3. Gas, Coal & Power Markets Division - (GCP)
4. Renewable Energy Division (RED)

The Oil Industry Markets Division follows short- and medium-term developments in the international oil market, looking in detail at world oil supply, demand, refinery, biofuels,

and inventory and price developments. Forecasts through to the end of the following year are published monthly in the Oil Market Report (OMR), while projections for the next five years are published yearly in the Medium-Term Oil and Gas Markets (MTOGM).

The Standing Group on the Oil Market (SOM) monitors and analyses short- and medium-term developments in the international oil market. The SOM prepares current oil market assessments from information submitted by member governments, international oil companies and others. Issues covered include: exploration and production developments, demand, price and refining trends, and international trade in petroleum products. The group collects and analyses information on world oil supply and demand, stock levels and changes, oil imports and exports, refinery operations, and prices. The SOM holds conferences on a bi-annual basis and is responsible for the influential IEA monthly Oil Market Report (mentioned above)

Emergency Policy Division (EPD) role is to examine oil security issues, including global supply/demand prospects, geo-political risks to the oil market, production capacity and refinery flexibility and emergency response policies and procedures. The Standing group on emergency questions (SEQ, see above) and EPD work closely with the international oil industry, notably through an Industry Advisory Board (IAB)(see below).

Gas, Coal & Power Markets Division (GCP) undertakes analysis of coal, gas and electricity – including renewable and nuclear generation – in the context of energy market developments. This division monitors key policy issues raised by regulatory reform and market liberalisation in the energy sector.

Renewable Energy Division (RED) : Previously part of the Energy Technology Office of the IEA, the Renewable Energy Unit (REU) was moved to the Directorate of Energy Markets and Security in September 2008 as part of the IEA response to a changing world energy framework and in recognition of the need to accelerate the large-scale penetration of renewable energy technologies into the market to reduce CO2 emissions. The REU was formed in 1999 to provide support to the Working Party on Renewable Energy Technologies (REWP), a sub-body of the Committee on Energy Research and

Technology, and to act as an interface with the ten IEA renewable energy technology Implementing Agreements.

Directorate of Global Energy Dialogue (GED)

The Directorate of Global Energy Dialogue (GED) works with member and non-member countries to promote co-operation and dialogues on all aspects of energy policy and technology. One of its important functions is to promote closer engagement between the IEA and major energy consumer, producer, or transit countries which are not IEA members ("dialogue" countries). Non-member countries can and do already participate as full members in the IEA network of energy technology Implementing Agreements. Dialogue countries have also been invited, from time to time, to participate as observers in IEA Committee meetings. In addition to its outreach work, GED co-ordinates regular In-Depth Reviews in which the energy policies of each IEA member are "peer reviewed" by experts from other member countries.

GED supports the work of and is guided by the Agency's Standing Group on Global Energy Dialogue (SGD), Standing Group on Long-Term Policy Co-operation (SLT) and Committee on Energy Research and Technology (CERT). The Directorate has the following divisions:

1. DALSA works with dialogue countries in Asia Pacific, Latin America and sub-Saharan Africa

2. DEMA similarly works with dialogue countries in Europe, the Middle East, and North Africa

3. Country Studies Division (CSD) co-ordinates In-Depth Reviews

Directorate of Sustainable Energy Policy and Technology (SPT)

The Directorate of Sustainable Energy Policy and Technology (SPT) is responsible for sustainable (demand-side) energy policy and energy technology policy. The Director serves as Chief IEA Technology Co-ordinator responsible for ensuring linkages between

the Committee on Energy Research and Technology (CERT), the IEA Implementing Agreements and the Secretariat in terms of technology issues. The work of the Directorate is guided both by the CERT and the Standing Group on Long-Term Co-operation (SLT). The Directorate implements a considerable number of activities under the mandate of the G8 leaders in Heilgendamm (2007) and Hokkaido (2008). SPT includes the following two divisions and three units:

- Energy Efficiency and Environment Division (EED)
  - Climate Change Unit (CCU)
  - Energy Efficiency Unit (EEU)
- Energy Technology Policy Division (ETP)
  - Technology Network Unit (NET)
- Carbon Capture and Storage Technology Unit (CCS)

Industry Advisory Board (IAB)

The IAB was established by the IEA in 1974 to provide advice and consultation on emergency response issues and related oil supply/demand questions. In the event of the activation of the IEP emergency measures, the IAB is responsible, for advising on the practical execution of the emergency measures under the direct supervision of the IEA. The IAB membership is drawn from the group of Reporting Companies. It includes about half the Reporting Companies, with all majors represented and other companies on a pragmatic basis to give adequate geographical coverage. The IAB is available permanently for consultation on issues of emergency response and to provide expertise in oil supply and logistics. During an oil supply disruption, the IAB would advise on the evolving supply situation and assist in determining the extent of any shortfall in supplies, as well as advising on the general steps necessary to minimize the effects of an interruption in oil supplies. The IAB also advises the IEA on technical procedures to be

followed in measuring individual countries' stocks and it contributes to designing the tests of IEA emergency response systems. A subgroup of the IAB, the Industry Supply Advisory Group (ISAG) is available during a crisis to facilitate exchange of information on supplies.

6.1.3 IEF

6.1.3.1 History

The IEF is the world's largest gathering of Energy Ministers. The Forum is an intergovernmental arrangement that serves as a neutral facilitator of informal, open, informed and continuing global energy dialogue among its membership of energy producing and energy consuming States, including transit States. The 86 Member Countries of the IEF account for around 90% of global oil and gas supply and demand. In addition to IEA and OPEC countries, transit states and key energy players, including Brazil, China, India, Mexico, Russia and South Africa, participate in the Forum. The magnitude and diversity of this engagement is a testament to the IEF's position as a neutral facilitator. Through the Forum and its associated events, IEF Ministers, their officials, energy industry executives, and other experts engage in a dialogue of increasing importance to global energy security. The IEF and the global energy dialogue are promoted by a permanent Secretariat of international staff based in the Diplomatic Quarter of Riyadh, Saudi Arabia.

From its difficult and confrontational beginnings in Paris in 1991 the global producer – consumer dialogue on energy has developed through the International Energy Forum (IEF) so that it is now the world’s largest gathering of Energy Ministers. Through the Forum and its associated events, IEF Ministers, their officials, energy industry executives, and other experts engage in a dialogue of increasing importance to global energy security.

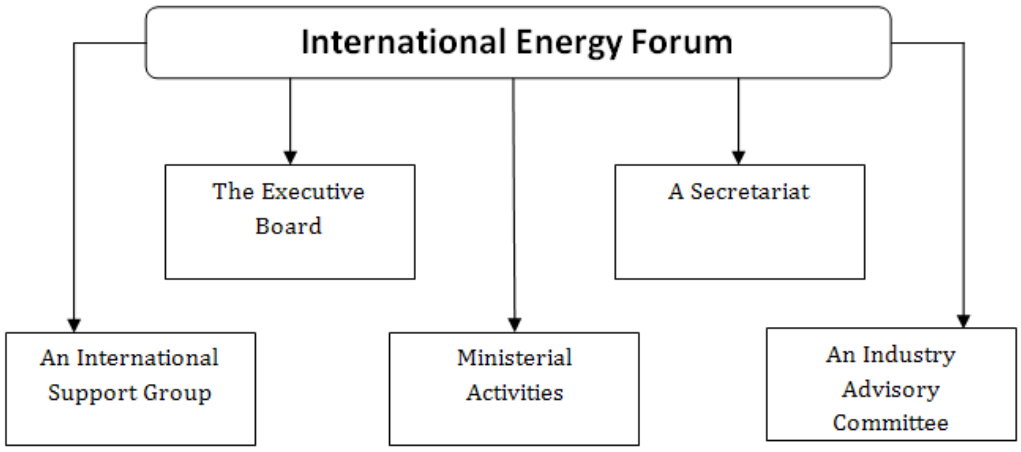

FIGURE 6: Organizational structure of IEF

6.1.3.2 Governance

International Energy Business Forum (IEBF)

The International Energy Business Forum (IEBF) provides a platform for discussion between Ministers and Chief Executive Officers of leading energy companies. At the 8th IEF in Osaka, Japan, industry leaders and Ministers met informally prior to the Ministerial meeting itself. The Netherlands convened the first IEBF at the 9th IEF in Amsterdam on May 22, 2004 (IEBF, 1996). The 2nd IEBF was held two years later at the 10th IEF in Doha, Qatar, and was attended by CEOs of more than 30 leading oil and gas companies. The success of these initial meetings earned the IEBF a permanent role and it is now regularly convened the day before each IEF Ministerial. The findings of the IEBF meeting are fed directly into the IEF Ministerial and subsequent IEF symposia to ensure that Ministers participating in the Forum are cognizant of the concerns foremost in the minds of industry leaders. This communication is essential to the health of the dialogue.

The IEBF has grown in stature and continues to attract the biggest names in oil and gas because the relationship between government and industry is an increasingly crucial element in the complex process that ensures product is delivered to the market in an affordable, timely and sustainable manner. No private company or sovereign nation can

effectively address the myriad issues facing the energy sector unilaterally. But, if both embrace the concept of energy security as a shared responsibility, the world can move closer to more sustainable and stable energy systems and markets.

The IEBF provides a platform for industry leaders to register and debate their views and concerns with the audience most essential to their success—the world's key energy policymakers. The IEBF is a unique opportunity to freely and openly address sensitive subjects which would otherwise be left unsaid or dealt with less effectively on an ad hoc or bilateral basis.

Joint Organisations Data Initiative (JODI)

The Joint Organisations Data Initiative (Jodi) is a concrete outcome of the producer-consumer dialogue. In 2001, six pioneering organisations (APEC, Eurostat, IEA, OLADE, OPEC and UNSD) answered the call by Energy Ministers at the 7th IEF Ministerial in 2000 in Riyadh to address the issue of the lack of data transparency in oil markets, seen as a cause of excessive price fluctuations, and established the Joint Oil Data Exercise. The Initiative was established as a permanent mechanism in 2003 and Jodi, the "Joint Oil Data Initiative" was born. Following endorsement by Ministers, the IEF Secretariat assumed the role and responsibility as the co-ordinator of Jodi in January 2005 (IEBF, 1996). The Jodi partners' successful establishment of oil data provision architecture inspired IEF Ministers to call for an extension of the Initiative to cover natural gas (JodiGas) and annual data on upstream and downstream capacity and expansion plans (JodiInvestment). To accommodate progress on these new challenges beyond oil data transparency, the seven Jodi partner organisations have now re-branded Jodi as the Joint Organisations Data Initiative.

Executive Board

The Secretariat of the International Energy Forum is governed by an Executive Board comprising fifteen IEF countries plus the IEA and OPEC Secretariats as non-voting members. The Executive Board is the only decision-making body of the Secretariat. Decisions by the board are typically achieved through consensus, but if necessary, a

voting majority is sufficient. Following each IEF Ministerial, a new Executive Board is selected by a core group of Board members under the chairmanship of the host country of the next IEF Ministerial. The host country is joined in this selection panel by their co-hosts, as well as the host and co-host of the previous IEF. Saudi Arabia, as the host country of the headquarters of the Forum's permanent Secretariat, completes the core group alongside the Secretariats of the IEA and OPEC. Seection of the remaining members aims to reflect an overall balance among consuming and producing countries, developed and developing countries, and geographical parity. The selection process also affords due consideration to the respective contributions of countries to the IEF and its Secretariat, as well as to rotational needs.

International Support Group (ISG)

In addition to the guidance provided by members of the Executive Board, the Secretariat and the IEF Ministerial's Host Country are advised on the IEF's programme of work and on the theme and content of the IEF Ministerial by a group of committed IEF countries. Previously known as the Informal Support Group, the International Support Group (ISG) predates the IEF Secretariat and has long been the cornerstone of the agenda-crafting process for the IEF Ministerial. With a strong foundation of institutional memory, the ISG offers advice and experience to both the IEF Host Country and the Secretariat of the IEF. The global nature of the ISG's membership provides a wealth of policy advisors and senior experts to IEF and the IEF Ministerial's Host Country. Their collective wisdom and experience informs the agenda of the IEF, improves the content of the global energy dialogue, and ensures that the IEF remains at the forefront of that dialogue. The ISG's suggestions for the IEF and IEBF are considered by the Secretariat, IEF Ministerial Host Country and the Executive Board in the formulation of each Ministerial's agenda. The IEF increasingly relies on this group of committed countries for guidance and counsel on the implementation of its programme of work, as approved by its Executive Board. Membership of this group is granted at the invitation of the Secretary General and Chairperson of the Executive Board, though there is an automatic right of access for those countries which pay their contributions to the IEF Secretariat regularly.

Industry Advisory Committee (IAC)

The IEBF is supported by the Industry Advisory Committee (IAC) which is currently drawn from the ranks of NOCs and IOCs headquartered in those countries that are members of the International Support Group. The Committee was first convened in June 2005 at the invitation of the IEF Host Country, Qatar. The primary purpose of the IAC is to allow for industry input on the IEBF agenda. The IAC also reinforces the importance of industry to the dialogue and, through constant counsel with the IEF, deepens the IEF's understanding of industry's perspective on issues relevant to the IEF's programme of work. Membership in this group is at the invitation of the Secretary General and Chairperson of the Executive Board.

The first proposal for a producer –consumer dialogue was made in the World Commission on Environment and Development in 1987 which called for closer cooperation between consumers and producers. At the World Economic Forum in Davos in 1989, the Chairman of the Commission and the Norwegian Prime Minister Gro Brundtland called for an informal "Workshop of Ministers" from both producing and consuming countries to discuss energy related issues. But it was the Gulf War that proved to be a turning point in producer-consumer relations.

In the backdrop of events leading to the Gulf War crisis in 1990, the OPEC Ministerial Committee convened an extraordinary meeting in Vienna in August 1990 (OPEC, 2000). The meeting was successful in reaching a deal in which OPEC members agreed to "increase production, according to need". At the same time, OPEC's Vienna agreement also called for consumers "to actively participate in the stabilisation process".

Then on October 1, 1990 in the UN General Assembly, the Venezuelan President Perez called for an urgent meeting of producers and consumers under the auspices of the UN to help the world face "the political realities of oil", stating that "excessive fluctuations are harmful to all of us, consumers and producers, and only favour speculators". He proposed that the dialogue should start with a meeting between OPEC and the IEA.

Calls for the producer-consumer dialogue intensified in the aftermath of the Gulf War, this time led by Iran. Iran organised a conference in Isfahan on 27-29 May 1991 entitled 'Oil and Gas in the 1990s: Prospects for Cooperation'. One of the objectives of the Isfahan meeting was to open new lines of communication between the various producer and consumer parties, which had been blocked due "to many misconceptions and misunderstandings".

In the same year, the governments of France and Venezuela called for a **Paris Energy Meeting** at the ministerial level between representatives of oil-exporting and consuming countries. None of the major players—USA, OPEC, IEA, Saudi Arabia---participated significantly in this meeting. The outcome of this meeting was that there was a consensus on a few broad issues, such as the need to strengthen the market so it can function in a proper manner, and to improve transparency so individual players can base their investment and purchasing decisions on accurate information.

Another producer-consumer meeting in July 1992 followed the Paris meeting. The meeting, entitled "**Global Energy Policy Inter-relationship**" was hosted by Norway with Egypt and Italy acting as co-hosts. This meeting reiterated the importance of the producer –consumer dialogue.

These two meetings are now referred to as the 1st and 2nd international Energy conference. The **3rd International Energy Conference** was held in Spain on 19-20 September 1994 (IEBF, 3rd International Energy Conference, 1994). In this conference, for the first time, the participants made an explicit reference to price stability. Such a concluding remark represented a U-turn from the previous approach, which had excluded any discussion on prices. The concluding remarks of the meeting also emphasised the increasing strategic importance of natural gas in energy security, calling for measures to increase its use in the energy mix.

The **4th International Energy Conference**, held in Venezuela on 25-27 September 1995 – the first time such a meeting had been held in an OPEC country - proved to be disappointing (IEBF, 4th International Energy Conference, 1995). By the time of the **5th**

International Energy Conference held in Goa, India in 1996, the dialogue had lost momentum and had failed to make any concrete achievements (IEBF, 5th International Energy Conference, 1996). While parties recognised that the exchange of views between producers and consumers was useful, the dialogue had turned futile, with both parties simply reiterating their positions.

In 1998, key players such as Saudi Arabia started showing greater interest in the producer-consumer dialogue. This can be explained in large part by the events surrounding the oil market in 1998, where over-production and decline in Asian oil demand in the aftermath of the Asian financial crisis caused a collapse in the oil price.

It was against this background that the **6th International Energy Conference** took place in Cape Town in South Africa in October 1998 (IEBF, 6th International Energy Conference, 1998). After the meeting in South Africa, Saudi Arabia, suggested a new name for the producer-consumer dialogue: the **International Energy Forum**, which would underline the informal character of the meetings and could lead to more open discussions, avoiding the more binding and strict "Conclusions and Recommendations" that were otherwise adopted.

The **7th IEF in Riyadh i**n 2000 saw an important development in terms of both appearance and content. For the first time in IEF history, the US was represented at the Secretary of State level; the USA also for the first time came out clearly in support of a price range which overlapped with that of OPEC at that time. By this time, energy had become a more important topic on the US political agenda, with the occurrence of the Californian electricity crisis and other Iraq related developments. The 7th International Energy Forum held in Riyadh from 17-19 November 2000 proved to be the turning point for the institutionalisation of the producer-consumer dialogue (IEBF, Overview, 1996). In that meeting, Saudi Arabia's then Crown Prince Abdullah Ibn Abdulaziz Al-Saud proposed to create a permanent Secretariat and headquarters for the IEF. Prior to this, the IEF as an organisation had remained largely informal, providing a regular, biannual forum for producers and consumers. The proposal to establish the IEF Secretariat was

welcomed at the Ministerial meeting and embraced two years later at the 8th International Energy Forum in Osaka in September 2002.A permanent body of staff subsequently began its work in December 2003 in temporary accommodation and then relocated to the newly built headquarters in Riyadh in 2005.

Reform process in the IEF post 2008: By 2008-2009, a second reform process was initiated with the aim of further strengthening the institutional framework of the IEF in order to facilitate and promote a more effective and productive dialogue. The sharp swings in oil prices in 2008 and 2009 helped shift the global attention back onto the oil market and provided the much needed support for the institutional development of the IEF. In June 2008, Saudi Arabia called for an ad-hoc meeting between producer and consumer countries with the aim to identify the causes of the current high oil prices. This was followed up with the London Energy Meeting in December 2008. An Expert Group (EG) was established pursuant to the decisions made in the Jeddah and London ad-hoc Energy Meetings (2008) to provide recommendations to the 12th International Energy Forum (IEF) Ministerial meeting on 29-31 March 2010 in Cancun, Mexico for "strengthening the architecture of the international dialogue, the IEF, and reducing volatility in the oil market" (IEF, 2010). A High Level Steering Group (HLSG), coordinated by the IEF Secretariat and including officials from the host and co-host countries of the 12th IEF, along with the hosts of the two ad-hoc Ministerial meetings in Jeddah and London, oversaw the terms of reference and work of the EG. The HLSG was chaired by HRH Prince Abdulaziz Bin Salman Bin Abdulaziz Al-Saud of Saudi Arabia and co-chaired by Graham White of the United Kingdom. The EG recommendations for areas of reform were modified by the HLSG and both the recommendations and the implementation plan of the HLSG were reviewed and endorsed by an Expanded High-Level Steering Group (EHLSG) composed of representatives from producer and consumer, developed and developing countries, to be presented to the ministers at the 12th IEF Ministerial in Cancun in March 2010. Resulting from the EG recommendations, the most important proposal accepted at the 12th IEF Ministerial was that of the IEF Charter.

The agreement to establish an IEF charter represents a decisive juncture in producer-consumer relations. For the first time the Charter describes the IEF as: an intergovernmental arrangement that serves as a neutral facilitator of informal, open, informed and continuing global energy dialogue among its membership of energy producing and energy consuming States, including transit States. As per the new charter, the institutional structure of the IEF will be as under:

- The primary body of the IEF will be the Biennial Ministerial Meetings. The Host state and the co-host state will be the President and Vice-president of the Biennial Ministerial. In addition to this, if at any time more than 5 member states so request, a Extraordinary ministerial may also be convened.

- For the two year duration of each Biennial, an Executive Board is constituted, which serves as the governing body of the IEF. The executive board is to be constituted of 31 member states (23 permanent and 8 rotating members). The 23 members are selected as 11 leading producer-countries and 11 leading consumer-countries, plus the Host state.

Given its position as the 4th largest oil-consumer, India is a member of the Executive Board.

6.2 Legal Provisions for Administrative Structures in India

This section comprises of the literature on the legal structure of India. It explains what constitution tells us about the functioning of various agencies in accordance of rules of business. Also, structures of various administrative departments have been mentioned.

6.2.1 Constitution and Rules of Business

The Constitution has provided an elaborate framework for the governance system in India. Part V, chapter 1 deals with the union Executive, chapter II deals with the Parliament and chapter IV deals with the union Judiciary. The Executive Power of the union vests in the President and is exercised by him either directly or through officers subordinate to him in accordance with the constitution (Constitution, 2010). Article 74

provides that there shall be a council of Ministers with the Prime Minister as the Head to aid and advise the President who shall, in the exercise of these functions, act in accordance with such advice. Article 75 provides that the Prime Minister shall be appointed by the President and the other Ministers shall be appointed by the President on the advice of the Prime Minister. Article 77 provides for the conduct of Government Business (Constitution, 2010):

(1) All executive actions of the Government of India shall be expressed to be taken in the name of the President.

(2) Orders and other instruments made and executed in the name of the President shall be authenticated in such manner as may be specified in rules to be made by the President, and the validity of an order or instrument which is so authenticated shall not be called in question on the ground that it is not an order or instrument made or executed by the President.

(3) The President shall make rules for the more convenient transaction of the business of the Government of India, and for allocation among Ministers of the said business.

Further, Article 73 of the Constitution lays down the executive powers of the union as follows: Subject to the provisions of this Constitution, the executive power of the Union shall extend –

(a) To the matters with respect to which Parliament has power to make laws; and

(b) To the exercise of such rights, authority and jurisdiction as are exercisable by the Government of India by virtue of any treaty or agreement: Provided that the executive power referred to in sub-clause

(a) Shall not, save as expressly provided in this Constitution or in any law made by Parliament, extend in any State to matters with respect to which the Legislature of the State has also power to make laws.

(2) Until otherwise provided by Parliament, a State and any officer or authority of a State may, notwithstanding anything in this article, continue to exercise in matters with respect to which Parliament has power to make laws for that State such executive power or functions as the State or officer or authority thereof could exercise immediately before the commencement of this Constitution.

Exercising powers vested by virtue of Article 77, the President has made the "The Government of India (Allocation of Business) Rules". The Rules stipulate that the business of the Government of India shall be transacted in the Ministries, Departments, secretariats and Offices specified in the First Schedule to these rules. The distribution of subjects among the departments shall be as specified in the second schedule to these Rules. The manner in which the officers are required to help the Minister in discharge of his/her executive functions is governed by the Government of India (Transaction of Business) Rules (Constitution, 2010). The Rules provide that all business allotted to a Department shall be disposed of by, or under general or special directions of, the Minister-in-charge, subject to certain limitations where consultation is required with other departments or where cases have to be submitted to the Prime Minister, the cabinet and its committees or the President.

These Rules also provide for the constitution of the following standing committees of the cabinet and each standing committee shall consist of such Ministers as the Prime Minister may, from time to time, specify. As of now, these committees are:

1. Appointments committee of the cabinet

2. Cabinet committee on accommodation

3. Cabinet committee on economic affairs

4. Cabinet committee on management of natural calamities

5. Cabinet committee on parliamentary affairs

6. Cabinet committee on political affairs

7. Cabinet committee on prices

8. Cabinet committee on security

9. Cabinet committee on world trade organisation matters

The Rules also provide for appointment of ad hoc committees of Ministers for investigating and reporting to the cabinet, and, if so authorized, for taking decisions on such matters. The Rules also stipulate that it shall be the responsibility of the Departmental secretary, who shall be the administrative head thereof, to ensure observance of these Rules in the Department.

6.2.2 The Structure of a Department, Attached Office and Subordinate Office

The work of Government of India is distributed into different Ministries/ Departments. A Department has also been defined in the General Financial Rules as follows (Expenditure, 2004):

Department -

(1) A department is responsible for formulation of policies of the government in relation to business allocated to it and also for the execution and review of those policies.

(2) For the efficient disposal of business allotted to it, a department is divided into wings, divisions, branches and sections.

(3) A department is normally headed by a secretary to the Government of India who acts as the administrative head of the department and principal adviser of the Minister on all matters of policy and administration within the department.

(4) The work in a department is normally divided into wings with a Special Secretary/Additional Secretary/Joint Secretary in charge of each wing. Such a functionary is normally vested with the maximum measure of independent functioning and responsibility in respect of the business falling within his wing subject, to the overall responsibility of the Secretary for the administration of the department as a whole.

A wing normally comprises a number of divisions each functioning under the charge of an officer of the level of Director/Joint Director/Deputy Secretary. A division may have several branches each under the charge of an Under Secretary or equivalent officer.

A section is generally the lowest organisational unit in a department with a well-defined area of work. It normally consists of assistants and clerks supervised by a Section Officer. Initial handling of cases (including noting and drafting) is generally done by, assistants and clerks who are also known as the dealing hands.

While the above represents the commonly adopted pattern of organization of a department, there are certain variations, the most notable among them being the desk officer system. In this system the work of a department at the lowest level is organised into distinct functional desks each manned by two desk functionaries of appropriate ranks e.g. Under Secretary or Section Officer. Each desk functionary handles the cases himself and is provided adequate stenographic and clerical assistance.

The secretary is the administrative head of a Department and in a Department, the structure may comprise special secretaries, Additional secretaries, Joint secretaries, Directors, Deputy secretaries, under secretaries and section Officers. The functions of each of these are spelt out in the central secretariat Manual of Office Procedure as follows:

(a) Secretary – A Secretary to the Government of India is the administrative head of the Ministry or Department. He is the principal adviser of the Minister on all matters of policy and administration within his Ministry/ Department, and his responsibility is complete and undivided.

(b) Special Secretary/Additional Secretary/Joint Secretary – When the volume of work in a Ministry exceeds the manageable charge of a Secretary, one or more wings may be established with Special Secretary/Additional Secretary/Joint Secretary, incharge of each wing. Such a functionary is entrusted with the maximum measure of independent

functioning and responsibility in respect of all business falling within his wing subject, to the general responsibility of the Secretary for the administration of the wing as a whole.

(c) Director/Deputy Secretary – Director /Deputy Secretary is an officer who acts on behalf of the Secretary. He holds charge of a Secretariat Division and is responsible for the disposal of Government business dealt within the Division under his charge. He should, ordinarily be able to dispose of the majority of cases coming up to him on his own. He should use his discretion in taking orders of the Joint Secretary/Secretary on more important cases, either orally or by submission of papers.

(d) Under Secretary – An Under Secretary is in charge of the Branch in a Ministry consisting of two or more Sections and in respect thereto exercises control both in regard to the despatch of business and maintenance of discipline. Work comes to him from the sections under his charge. As Branch Officer he disposes of as many cases as possible at his own level but he takes the orders of Deputy Secretary or higher officers on important cases."

Each Department may have one or more attached or subordinate offices. The role of these offices is:

(1) Where the execution of the policies of the government requires **decentralisation of executive action** and/or direction, a department may have under it executive agencies called `Attached' and `Subordinate' offices.

(2) Attached offices are generally responsible for **providing executive direction required in the implementation of the policies laid down by the department** to which they are attached. They also serve as **repository of technical information** and advise the department on technical aspects of question dealt with by them.

(3) Subordinate offices **generally function as field establishments or as agencies responsible for the detailed execution of the policies of government**. They function under the direction of an attached office, or where the volume of executive direction involved is not considerable, directly under a department. In the latter case, they assist

the departments concerned in handling technical matters in their respective fields of specialisation."

6.2.3 Other Administrative Structures

Besides, the attached and subordinate offices there are a large number of organizations which carry out different functions assigned to them. These may be categorized as follows (Expenditure, 2004):

1. Constitutional Bodies: Such bodies which are constituted under the provisions of the Constitution of India.

2. Statutory Bodies: Such bodies which are established under the statute or an Act of Parliament.

3. Autonomous Bodies: Such bodies which are established by the Government to discharge the activities which are related to governmental functions. Although such bodies are given autonomy to discharge their functions in accordance with the Memorandum of Associations etc., but the Government's control exists since these are funded by the Government of India.

4. Public Sector Undertakings: Public Sector Undertaking is that part of the industry which is controlled fully or partly by the Government. These undertakings have been set up in the form of companies or corporations in which the shares are held by the President or his nominees and which are managed by Board of Directors which includes officials and non-officials.

The preceding section has provided a brief discussion of the legal-administrative framework which is in place in Government of India for the purpose of carrying out the work of governance. While this is a largely theoretical discussion, it must still be accorded due importance, since any new/proposed organization should be positioned within this existing framework. In reality however, government of India today has a wide range of administrative structures for the conduct of its business. These structures are all derived from the legal-administrative framework discussed above. The following

section is a discussion on the different categories of administrative units that operate in the government of India today. For the ease of explanation, each model is explained with the help of an example organization. The purpose of this discussion is to be able to understand what model of organization is most suited for the proposed National Energy Security Agency.

6.2.4 Models of Administration

6.2.4.1 Bureau Model: the Bureau of Energy Efficiency

The Government of India set up Bureau of Energy Efficiency (BEE) on 1st March 2002 under the provisions of the Energy Conservation Act, 2001 (BEE, 2007). The mission of the Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001 with the primary objective of reducing energy intensity of the Indian economy. BEE co-ordinates with designated consumers, designated agencies and other organizations and recognize, identify and utilize the existing resources and infrastructure, in performing the functions assigned to it under the Energy Conservation Act. The Energy Conservation Act provides for both regulatory and promotional functions. It is headed by a Director General, with the rank of a Joint Secretary.

6.2.4.2 Board structure: the National Diary Development Board

The National Dairy Development Board -- initially registered as a society under the Societies Act 1860 -- was merged with the erstwhile Indian Dairy Corporation, a company formed and registered under the Companies Act 1956, by an Act of India's Parliament - the NDDB Act 1987 (37 of 1987), with effect from 12 October, 1987. The new body corporate was declared an institution of national importance by the Act. The general superintendence, direction, control and management of NDDB's affairs and business vests with a Board of Directors (BEE, 2007).

6.2.4.3 Authority Structure: National Pharmaceutical Pricing Authority

The NPPA is an organization of the Government of India which was established to fix/ revise the prices of controlled bulk drugs and formulations and to enforce prices and

availability of the medicines in the country, under the Drugs (Prices Control) Order, 1995. The Government decided to establish an independent body of experts to be called as the National Pharmaceutical Pricing Authority, consisting of a Chairperson in the status of the Secretary to the Government of India, Members having expertise in the field of pharmaceuticals, economics and cost accountancy and Member Secretary in the status of Joint Secretary / Additional Secretary to the Government of India, and the same is entrusted with the task of price fixation revision and other related matters such as updating the list of drugs under price control by inclusion and exclusion on the basis of the established criteria / guidelines. The National Pharmaceutical Pricing Authority is empowered to take final decisions, which shall be subject to review by the Central Government as and when considered necessary.

6.2.4.4 Non-constitutional Commission: the Tariff Commission

The present Tariff Commission was established in September 1997 (Commission T. , 2006). The Commission functions as an expert body to recommend appropriate tariff levels keeping in mind the larger economic interests of our country. Bureau of Industrial Costs & Prices was merged with the Commission in April 1999, to provide in-house support. The Commission also conducts studies on costing and price fixation referred to it by Central Ministries and Agencies. Matters concerning State Governments and their agencies have also been studied by the Commission. The Commission is headed by a Chairman in the rank and pay of Secretary to the Government of India and assisted by Member Secretary in the rank and pay of Additional Secretary to the Government of India.

6.2.4.5 DRDO model

DRDO was formed in 1958 from the amalgamation of the then already functioning Technical Development Establishment (TDEs) of the Indian Army (DRDO, 1999)and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO). DRDO was then a small organisation with 10 establishments or laboratories. Over the years, it has grown multi-directionally in terms of the variety of subject disciplines, number of laboratories, achievements and stature. DRDO is a

network of more than 50 laboratories which are deeply engaged in developing defence technologies covering various disciplines, like aeronautics, armaments, electronics, combat vehicles, engineering systems, instrumentation, missiles, advanced computing and simulation, special materials, naval systems, life sciences, training, information systems and agriculture. Presently, the Organisation is backed by over 5000 scientists and about 25,000 other scientific, technical and supporting personnel (DRDO, 1999). Several major projects for the development of missiles, armaments, light combat aircrafts, radars, electronic warfare systems etc are on hand and significant achievements have already been made in several such technologies.

6.2.4.6 Centre model

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Department of Information Technology (DIT), Ministry of Communications & Information Technology (MCIT) for carrying out R&D in IT, Electronics and associated areas. Different areas of C-DAC, had originated at different times, many of which came out as a result of identification of opportunities (RCCF, 1998). The setting up of C-DAC in 1988 itself was to built Supercomputers in context of denial of import of Supercomputers by USA. Since then C-DAC has been undertaking building of multiple generations of Supercomputer starting from PARAM with 1 GF in 1988. Almost at the same time, C-DAC started building Indian Language Computing Solutions with setting up of GIST group (Graphics and Intelligence based Script Technology); National Centre for Software Technology (NCST) set up in 1985 had also initiated work in Indian Language Computing around the same period (RCCF, 1998).

Electronic Research and Development Centre of India (ER&DCI) with various constituents starting as adjunct entities of various State Electronic Corporations, had been brought under the hold of Department of Electronics and Telecommunications (now DIT) around 1988. They were focusing on various aspects of applied electronics, technology and applications. With the passage of time as a result of creative echo system that got set up in C-DAC, more areas such as Health Informatics, etc., got created; while right from the beginning the focus of NCST was on Software

Technologies; similarly C-DAC started its education & training activities in 1994 as a spin-off with the passage of time, it grew to a large efforts to meet the growing needs of Indian Industry for finishing schools. C-DAC has today emerged as a premier third party R&D organization in IT&E (Information Technologies and Electronics) in the country working on strengthening national technological capabilities in the context of global developments in the field and responding to change in the market need in selected foundation areas. Â In that process, C-DAC represents a unique facet working in close junction with DIT to realize national policy and pragmatic interventions and initiatives in Information Technology. As an institution for high-end Research and Development (R&D), C-DAC has been at the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging/enabling technologies and innovating and leveraging its expertise, caliber, skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the Department of Information Technology, Ministry of Communications and Information Technology, Government of India and other stakeholders including funding agencies, collaborators, users and the market place.

6.2.4.7 National Council Model: ICCR

Indian Council for Cultural Relations (ICCR) is a corporate body, with the following authorities under it : a General Assembly; a Governing Body; a Finance Committee; and Any other Committee which the President, the General Assembly or the Governing Body may set up for discharging any of the functions of the Council. The office bearers of the Council are President, Vice-Presidents, Director General and Financial Adviser (ICCR, 1998).

The Director General shall be the principal Executive Officer of the Council and shall be appointed by the President of the Council with the approval of the Governing Body. His tenure, terms and conditions of service will be subject to the approval of the Governing Body; The Director General shall be ex-officio Member-Secretary of the General Assembly, the Governing Body and member of the Finance Committee; It shall be the duty of the Director General to execute contracts on behalf of the Council; to formulate

and present the programme of the activities and budget estimates to the Governing Body of the Council in consultation with the Financial Adviser and the Finance Committee.

6.2.4.8 National Authority model: the National Biodiversity Authority

India has enacted the Biological Diversity Act, 2002. The act provides for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and for matters connected therewith or incidental thereto. It primarily aims at giving effect to the provisions of the Convention on Biological Diversity (CBD) suiting to India's national needs and circumstances (MOEF, 1997). At the national level, NBA has been established by Government of India in October, 2003 at Chennai, Tamil Nadu under the Section 8 of the Act for pursuing the implementation of the Biological Diversity Act, 2002. NBA consists of a Chairperson, 10 Ex-officio and 5 Non official members. The functions of NBA are as follows:-

1. Advise the Government of India on matters relating to conservation of biodiversity, sustainable use of its components and equitable sharing of benefits arising out of utilization of biological resources.

2. Regulate activities and issue guidelines for access to biological resources

6.2.5 Structure, Organization Design of NESA

Based on the above discussion, we may now undertake a discussion on the structure and organization design of the proposed National Energy Security Agency, NESA. The purpose of the NESA should be to separate routine administrative and legislation functions from strategic aspects. The nature of work it will have to undertake will be a combination of technical work, administrative work, policy work, commercial-economic work as well as strategic thinking.

6.2.5.1 Unified Ministry Model

There is much discussion on the question of whether we should have a unified ministry of energy which can undertake this work. We have earlier seen elsewhere in this thesis

that certain countries like USA, Canada, Australia and Japan have administrative structures which are in essence a “unified energy ministry”. We may reject this model of governance for India for the following reasons:

1. The countries like USA, Canada, Japan and Australia are at an advanced stage of development. Their economies are entirely based on free-market principles, with the role of the government as arbiter, legislator, and regulator. This situation does not apply to India, where the socio-economic realities are different. For example, the issue of Administered Price Mechanism for pooled natural gas in the domestic sector; or kerosene subsidies. Therefore India cannot hope to have a single, streamlined ministry to administer all energy subjects, since the nature of the work is too vast.

2. Due to the rolled-back role of the state in energy administration in these countries, the relative budgets for these ‘unified ministries’ (if we do not include the R&D budget) are quite limited. However, in India, a similar situation does not apply. The Petroleum Minister, for example, not only has the budget of the Petroleum Ministry at his disposal, he also has the budgets of all the oil-sector PSUs under some measure of control. A similar situation exists in the Ministry of Coal and Ministry of Power. If we add up the revised 2010-11 budgetary figures for these ministries (38558.53, 447.66 and 8551.76 crores of Rupees respectively), the total figure comes to Rs 47558 Crores, which is more than the budgets of External Affairs, Home, Commerce, Health, or Development of North East Region (Finance, 2011). Such a unified ministry would be a super-ministry in terms of budgetary allocation, as well as in terms of ability to create jobs/employment. The creation of such a super-ministry would therefore require much political will and lot of administrative work.

3. A unified ministry in the Indian context would be a leviathan ministry. It would be large, unwieldy and cumbersome. Assuming that only Petroleum, Power and Coal ministries are unified, the resultant single ministry would have to incorporate three cabinet level ministers, three minister of state level ministers, and three secretaries into one ministry. In addition, in New and Renewable Energy, the relevant divisions of

Planning Commission, Earth Sciences etc are also incorporated, there will be more secretaries, joint secretaries and other officials to be organised into one ministry. This in itself would be a gargantuan exercise. In this context, it may be noted that even in China, where is no requirement for parliamentary/democratic approval of such actions, when there was a move to build super-ministries, energy was not made into a super ministry. According to the plan, five new "super ministries" were proposed-the ministry of industry and information, the ministry of human resources and social security, the ministry of environmental protection, the ministry of housing and urban-rural construction, and the ministry of transport. For the energy sector, a high-level inter-ministerial coordinator, called the National Energy Commission, was established, with a national bureau of energy to be set up as its working office under the National Development and Reform Commission (NDRC), the equivalent of the Planning Commission in India. We may therefore take the lesson from China in rejecting the unified ministry argument.

6.2.5.2 Coordinating Body Model

If not a single unified ministry, then how best do we model an administrative structure which will deal with the issue of energy security? One option we may consider is the Chinese model, referred to above, i.e., setting up a high-level/ministerial-level coordinating mechanism, with a dedicated secretariat for dealing with issues on energy security. In fact, currently the Government of India has one such mechanism. In UPA-1, there was the mechanism of the Energy Coordination Committee, in effect a Group of Ministers supported by secretary-level officers to deal with energy coordination issues. In UPA-2 this has been replaced by a Group of Ministers on coordinating external interface of India's Energy Security.

The Energy Coordination Committee was constituted on 13th July 2005 to enable a systematic approach to policy formulation, promote coordination in inter department action and function as a key mechanism for providing institutional support to decision making in the area of energy planning and security. The Prime Minister was the Chairman of the Energy Coordination Committee and the members were –

- Minister of Finance
- Minister of Petroleum and Natural Gas
- Minister of Power
- Minister of Coal
- MOS for Non-Conventional energy sources.
- Deputy Chairman, Planning Commission
- Member (Energy) Planning Commission.
- Chairman Economic Advisory Council to PM.
- Chairman National Manufacturing Competitiveness Council.
- National Security Advisor.
- Principal Secretary to PM (Convenor)

Member Secretary, Planning Commission, Cabinet Secretary and the Secretaries of iii) Department of Economic Affairs, Ministry of Finance, iv) Ministry of Petroleum and Natural Gas, v) Ministry of Power, vi) Ministry of Coal. vii) Ministry of Non Conventional Energy Sources, viii) Ministry of Atomic Energy ix) Economic Advisory Council to PM, would be permanent invitees to the meetings of the committee. The Committee terms of reference were

- Identify key areas requiring energy policy initiatives , so that the
- overall objectives of economic development, energy security and
- energy efficiency are met ;
- Monitor Vulnerabilities that directly impinge on energy security aspects ;

- Outline the follow up action that needs to be taken for implementing identified policy initiatives;
- Identify institutional mechanisms for implementing policies;
- Periodically monitor key policy decisions;
- Commission studies which would enable arriving at appropriate decisions.

The Committee held a total of nine meetings and the following issues were discussed.

1) Energy sector - Challenges and Options.

2) Availability of Power - addressing constraints of supply of coal and gas.

3) Issues relating to the Coal Sector.

4) Issues relating to the Petroleum and Natural Gas Sector.

5) Issues relating to the Power Sector (Thermal and Hydropower).

5) Report of the Expert Committee on Energy Policy.

In UPA-2, the Group of Ministers (GOM) mechanism was formed to improve upon the previous Energy Coordination Committee. The GOM was formed specifically to provide guidance in coordinating external interface on energy security matters was constituted by the approval of Prime Minister in June 2010. The Terms of Reference of the Group of Ministers are as follows:

- Consideration of external energy security interface
- Specific proposals to strengthen energy security matters which require support with other countries. The issues in this regard may also be raised by Ministries of Petroleum and Natural Gas, Power, New and Renewable Energy, Coal, External Affairs or Finance; and

- Other areas where policy intervention is required to augment availability of energy through international cooperation.

The Group of Ministers is chaired by the Finance Minister and is serviced by the Planning Commission. The other members are:

- Minister of Finance
- Minister of Petroleum and Natural Gas
- Minister of Power
- Minister of Coal
- MOS for New and Renewable Energy
- External Affairs Minister
- Deputy Chairman, Planning Commission
- National Security Advisor.

This GOM met for the first time on July 8, 2010. The GOM had identified a number of areas which could be deliberated in detail in the next meeting. Deputy Chairman, Planning Commission was to examine the feasibility of creating a Sovereign Wealth Fund. The Finance Minster mentioned that diplomatic efforts need to be expedited for developing power capacity in Nepal, Bhutan and Myanmar. As oil imports are likely to grow by 4 times the current level in the next 20 years, diplomatic efforts need to be initiated to acquire more oil and gas assets overseas (OIL, 2006).

However, we can argue convincingly that this kind of a coordinating body is not suited for the purposes of energy security. Firstly, energy security is not only about coordinating a response, or coordinating the efforts of various ministries. It is primarily a work which requires leadership in identifying energy security problems, opportunities and solutions; it requires a command and control structure in order to be able to

respond promptly to energy security crises; it does not necessarily need political leaders to take decisions, since there is a large amount of technical work and political accountability may be ensured by other parliamentary mechanisms; finally, the work to be done would be of an advisory nature to the Head of Government of India, who can then pass on appropriate instructions to the nodal ministries as required. There is therefore no need to have separate collegiums for doing this work. The reason why such a mechanism was implemented in China is because the nature of the political system there is different from India. In China, due to the single party rule of the Communist Party, the top leadership body is a politburo, and each member of the politburo is a power centre in his/her own right. The energy coordinating body is China is more about balancing political sensitivities and turfs, rather than energy security per se.

The Indian experiment in having a coordinating mechanism has worked well so far as far the coordination aspect of the job is concerned. In may be noted that the mechanism lacked energy security focus in its first avatar in the UPA-1. For example, there was no membership for the External Affairs Minister, though India is an energy importing country. The composition of the GOM in UPA-2 is a little more focused and relevant, but the GOM itself has not been meeting as frequently as required. For example, since the first meetings in July 2010, there have been turbulent changes in the international energy scenario; the Jasmine revolution pushed oil prices to USD 100 (Wae, 2011) and above; the devastating earthquake in Japan caused a world-wide relook at nuclear energy and caused gas prices to rise up. India had its own specific problem of oil payments with Iran following the dismantling of the Asian Currency Union. There were also significant changes in the domestic oil and gas industry in terms of corporate law and decisions. Yet, during all these events, the GOM did not meet even once, due to the preoccupation of the political leaders with other issues of governance. We may therefore, safely conclude that this kind of a coordinating mechanism will always face the difficulty of being held at ransom to political events. Energy security is a job which requires a man constantly ‘on the watch’. It cannot be held second to other events/issues of importance. Nor can it be relegated to the position of fire-fighting.

6.2.6 Functions of the proposed National Energy Security Agency

Before we discuss and analyse the various possibilities of administrative structure for the National Energy Security Agency (NESA), it would be instructive to first outline the various functions and responsibilities of the NESA. We have already seen in the previous chapters some of the shortcomings of the existing policy-governance framework in the national energy security scenario, in particular the oil and gas sector. While discussing the 'unified ministry model' and the 'coordinating body model', we have already mentioned some of the desirable qualities of the NESA. These are recounted here below for the sake of continuing the discussion:

- The NESA should be a part of the executive wing of the government.
- It would be desirable but not essential for the NESA to be a corporate body.
- While having the power to legislate, settle disputes and regulate the market, the NESA should be more than a legislator, arbiter and regulator. In this context, it may be necessary to have an independent Energy Security Act to give a statutory status to the NESA.
- The NESA should have its separate budgetary allocation, subject to the parliamentary accountability, but independent of financial control from the nodal ministries.
- The NESA should have expertise in the fields of the nodal ministeries, i.e., Petroleum and Natural Gas, Power, Coal, and New and Renewable Energy, without taking over the day to day functioning of these ministries or their attached PSUs.
- The NESA should address issues of both domestic energy security as well as the external energy security interface.
- The NESA should have coordinating role, command and control/leadership role and crisis manager role.

- The NESA should have technical/scientific, financial, strategic, administrative but not commercial abilities in terms of carrying out its role.

- The NESA should build upon the existing capabilities embodied in various R&D institutions, bring the various policy, financing and scientific organizations in the country together.

- The NESA should fill in certain gaps which exist in the current energy security governance scenario in the country.

- The NESA output should be of more importance than the advisory output of the Planning Commission, and yet the decision making should not be as constrained or inefficient as in the nodal ministries.

6.3 Analysis of the Administrative structure of the NESA

In the preceding section some of the basic criteria for the proposed NESA were outlined. Very briefly speaking, the NESA would be a part of the Executive wing of the Government, would not be a nodal Ministry like the Ministry of Petroleum and Natural Gas etc., would have an advisory role like the Planning Commission, would perform a coordinating as well as crisis management role. It is apparent from the brief mandate of the proposed NESA that the administrative structure required to execute such a mandate would have to be a unique structure at the same time it has to flow out of the existing provisions in the Constitution of India and the allocation of business rule, while at the same time ensuring that the organization does not interfere with the existing mandate of the nodal ministries or the Planning Commission.

In the preceding sections we have discussed at length the administrative structures of various energy security related ministries in Government of India (particularly Ministry of Petroleum and Natural Gas) as well as the relevant international organizations. The proposed NESA structure therefore draws elements from the international organizations as well as from the relevant institutions in Government of India. It is felt that such an hybrid approach is the best way to approach the problem of energy security which has

both domestic and international aspects. This way we are able to build on the existing experience of administrative structures in India as well as incorporate the best international practices in the relevant area.

In particular the one organization which is used as a template for the proposed NESA is the International Energy Agency (IEA an organization of the OECD. The structure of the IEA has been discussed elsewhere. Very briefly the IEA is a autonomous body working within the framework of OECD and implementing a comprehensive programme of energy cooperation amongst 23 different countries. In a similar fashion the proposed NESA would work within the framework of the Constitution of India / Central Government and cater to the Energy Security requirements of all the states of the Indian Union.

Domestically the NESA would take over a large part of the financing and functioning of the Oil Industry Development Board (OIDB). The OIDB has been described in detail in a previous section elsewhere. Very briefly the OIDB is established under the Oil Industry Development Act 1974 and is a premier body for funding all activities related to the development of the oil industry in the country. The money for these activities is raised by means of various levies as authorized by the 1974 Act (MoLJCA, 2009). As such the OIDB not only funds research and development activities hosted by PSUs and refineries but also funds institutes like Rajiv Gandhi Institute of Petroleum Technology, Centre for High Technology, Petroleum Planning and Analysis Cell etc. It is proposed that the NESA would take over some of the core functions of the OIDB and re-organize the administrative relationship between the OIDB and the various beneficiary organizations so as to constitute a effective kernel for the proposed NESA.

6.3.1 Structure of Governance

Following the structure of IEA it is proposed that the NESA will be organized as a directorate / Bureau similar to the Bureau of Energy Efficiency. In this capacity therefore the organization will therefore headed by a Director General. It is suggested that the Director General of NESA should be given the same rank as that of Deputy Chairman

Planning Commission i.e Cabinet Rank. This flows from our previous proposition that the output of the NESA should have more priority than the Advisory output of the Planning Commission. However, this may be little difficult to implement as currently there is no such precedence in Government of India. The National Security advisor for example is given the rank of a Minister of State and he heads the National Security Council Secretariat. The Director General Bureau of Energy Efficiency is a Joint Secretary level Officer. Various statutory and non-statutory commissions are headed by a Secretary level Officer. Therefore, while it is desirable that DG, NESA should have a Cabinet rank it may be only practical to have him as a Secretary Level Officer or an eminent person with Minister of State Rank.

The DG, NESA would preside over four directorates each headed by a Director of the level of Joint Secretary / Additional Secretary to Government of India. This directorate structure is derived from the similar structure in IEA. The four directorates are as follows:-

- Directorate of Strategy and Emergency
- Directorate of Energy Markets
- Directorate of Energy Policy
- Directorate of Technology Research and Funding

6.3.1.1 Directorate of Strategy and Emergency (DSE)

As mentioned above the DSE would be headed by a Joint Secretary / Additional Secretary level Director. It will be responsible for looking into all Energy Security work which have a strategic impact or are connected to an emergency response. In effect this Directorate is an upgraded version of the Emergency Policy Unit within the Directorate of Energy Markets and Security in the IEA. Since India is an energy importer it is more desirable to have a full fledged Directorate which deals with our strategic and emergency requirements.

This Directorate could be divided into three divisions to be headed by a Director-level or Senior Scientist level Officer. These three divisions would be:

- **Low-carbon Energy Division:** This division would be a new division built by amalgamating some of the scientists deployed under MNRE and MOEF that would focus on the development of indigenous technology as well as acquisition of foreign technology in the area of low carbon energy. An example of this kind of work would be the National Hydrogen Fuel Programme or the Aviation Bio-fuel Policy. Under the current Energy Security Administration several of the proposed low carbon technology come under the mandate of several Ministries typically the nodal ministry would be in charge of developing a policy framework whereas the beneficiaries of their policy would be the subject of another ministry and finally the technological and funding aspects would come under a third ministry. This kind of a fragmented approach has not only been inefficient but has also not been corrected by the presence of either the Planning Commission or the Group of Ministers Mechanism. It is therefore essential that low carbon technology, which is essentially a multi-ministry, multi-sectoral subject matter, be given its own independence executive body to ensure effective policy making and implementation.

- **Emergency Response Division (ERD):** This division would be responsible for coordinating the emergency response of the Government of India to any Energy Security crisis. As a starting point this Division would be manned by people with relevant experience from the National Disaster Management Authority (NDMA), armed forces logistical units or petroleum executive with relevant experience. In the short to middle term foreseeable future the energy crisis for India would be in the nature of oil supply disruptions, volatility in the energy commodity prices, damage or disruption to energy infrastructure. There have seen significant examples of all three types of energy crisis in the period 2010-2011. The Emergency Policy Division of IEA looks at precisely these kinds of issues. One of

the pressing requirements in this sector would be the need to maintain accurate data bases of crude and products stockpiles with various PSUs in the country. This is an important part of the emergency response mechanism of the IEA. India lacks such a system though currently some kind of statistics is maintained at the Ministry of Petroleum and Natural Gas and at the PPAC (Petroleum Planning and Analysis Cell). It is not possible to suggest at this stage whether the PPAC, which is funded out of the OIDB should be with the Emergency Response division of NESA or with some other Division but definitely this component is a very critical component of the functioning of the NESA

- **ISPRL** (Indian Strategic petroleum Reserves Ltd): currently India's strategic reserves are being handled through a special purpose vehicle called the ISPRL. This is in charge of crude oil cavern storage at three locations in India (Mangalore, Vishakapatnam and Padur), worth 9-10 days of import quantities (MOPNG, 2007). The current IEA / OECD prescription for strategic reserves is for 90 days worth of import requirements. All the 23 IEA member countries have excess of 90 days storage. This kind of a strategic stock level has enabled IEA to allow for stock draw and intervene in the oil markets following the Libyan crisis (IEA intervention on 23 June 2011). Post Fukushima Japan was also able to rely on its nearly 120 days strategic stock piles though according to information in the public domain there was not much stock draw in this case (MOPNG, 2007). Currently in Government of India there is some consideration as to whether we should also build up our storage capacity to 90 days worth of oil imports. There are two issues which need to be considered in this case – one the cost involved in building the caverns and – two the procurement of crude oil to fill these caverns. In the past as China built up its strategic stock piles, particularly in the run up to the Beijing Olympics in 2008 there was a sustained pressure in the oil markets causing crude oil prices to go up to $148 per barrel (MOPNG, 2007). Such a intervention by India would also lead to such an upward price trend. This may not be feasible in the immediate short term.

However, it would definitely be a desirable goal for India's energy security and this directorate of the NESA would need to be seized of this issue.

- A possible additional Division within the DSE would be the one to handle the proposed deployment of a sovereign wealth fund (SWF). There has been much discussion in recent times on the need for India to have its own sovereign wealth fund whose monies could be deployed for securing of energy assets abroad. Recent discussions at the Group of Ministers Mechanism have suggested that a sovereign wealth fund could have a corpus of three to ten per cent of India's forex reserves to be deployed for this kind of activities. It may be noted that most of the successful sovereign wealth funds have originated in crude oil rich countries and the funds have traditionally been deployed in a non democratic manner into real estate sector for maximum gains. Even the SWF of China has a major exposure to real estate. Therefore it remains to be seen how the SWF, if formed in India, behaves with respect to portfolio management. Since the SWF would need a full time professional fund manager which can only be head hunted from the financial sector it is unlikely that such a high profile post would be brought under the aegis of the NESA. However, a director level officer may be placed within the DSE with exclusive charge of coordinating the work of the SWF.

6.3.1.2 Directorate of Energy Markets

This concept is taken from the IEA. In the IEA the Directorate of Energy Markets and Security is the most important directorate since it takes a comprehensive approach to all sectors of energy markets analysis – coal, gas, oil, nuclear, electricity and renewable energy. In fact the Emergency Policy Division is also subsumed under the Directorate of Energy Markets in the IEA. However, this situation may not be easily replicated in India as the nodal ministries are responsible for policy making in their respective domains. Bringing in all those domains under the NESA would make it an inefficient behemoth which will not be able to address the more pressing issues of National Energy Security. However, there are certain areas of work which are currently not under any one Ministry or in some cases not under any Ministry which need to be addressed

nevertheless from the perspective of Energy Security. These issues include energy projects, corporate governance and competition /regulation issues. The directorate of Energy Markets (DEM) of the NESA would have the mandate to go in to these issues.

- Projects Division: This division would look into the issue of energy projects being executed in India and abroad in all the sectors (coal, oil, natural gas, hydro and Uranium) as well as the development of transmission and energy markets projects. It would be a nodal point for the various energy exchanges, electricity regulatory authorities, Discoms, Electricity Boards, city gas distribution enterprises etcfor all project implementation related issues. The mandate of this division would be to ensure that all energy projects in India, whether in the private sector or in the public sector are completed on time and are not held up by governance issues. One of the major problems facing implementation of energy projects in India is connected to acquisition of land, payment of compensation, right of way etc. This kind of problem requires intense consultations with local administration who are the competent authorities to issue the permits or make the payments. However, the pressures of democratic politics need to be balanced with the imperatives of national energy security. The projects division would bring to the table an ability to solve these problems at the grass roots level by mobilizing necessary political and administrative will at the national level.
- Competition and Regulation Division: With the establishment of the Central electricity Authority, petroleum and natural gas regulatory board and other such regulatory bodies, regulatory administration has come of age in India. Today, as has been outlined elsewhere, the administered price mechanism regime is being gradually dismantled and being replaced by free market structures. The PNGRB is the nodal regulatory body in the area of oil and gas particularly dealing with city gas distribution networks and pricing disputes. The competition and regulation division of the NESA will have the mandate to closely interact with and guide the functioning of the various regulatory

bodies in the country and build up a corpus of regulatory advice and judicial principles which will be consistent with our national energy security goals. The portions of the OIDB which deal with the funding of PNGRB can be hived off and amalgamated into this division.

- Corporate Governance and Legislation Division: The mandate of this division would be to look into and monitor the governance of energy PSU and the private sector. The recent disputes in the oil and gas sector like Cairns Vedanta dispute or Reliance KG D6 have shown the necessity for having a dedicated unit in the energy security administrative apparatus to handle these kinds of issues. The most important aspect of these kinds of disputes is that they have an adverse impact on the country's image as an investment destination apart from the fact that they are not conducive to retaining high end multinational technology within the country. This division will therefore, be a nodal point for the handling of such disputes as well as development of appropriate legislative and statutory instruments to institutionalize and investor friendly energy security regime in the country. The relevant officers with energy sector experience from the Department of Public Enterprises and Ministry of Corporate Affairs may be used to set up this Division.

6.3.1.3 Directorate of Energy Policy (DEP)

This directorate, headed by an Additional Secretary / Joint Secretary level Officer ideally sourced from one of the Technical Services like the Indian Economic Service, will be in-charge of developing and implementing a coordinated and comprehensive Energy Policy. It has been discussed previously how the NESA would be based out of existing structures in the government like the OIDB. The DEP will be a typical example of how existing structures from various Ministries / Departments in the Government of India will be re-organized under the NESA. Currently, each of the Nodal Ministries have a Director or a Joint Secretary level Officer dealing with the subject matter of International Cooperation and the Ministry and the Department as a whole is

responsible for formulation of policy within their domain. Further, the power and energy division in the Planning Commission is in-charge of developing a Advisory Policy Framework for the guidance of each of the energy ministries. It is proposed to amalgamate these two administrative structures i.e. the international cooperation units in the nodal ministries and the Power and Energy Division in the Planning Commission to set up the DEP. Most of the International Cooperation activities conducted by the nodal ministry are a reflection of our Energy Security Policy. For example in the Ministry of Petroleum and Natural Gas the activities undertaken by the International Cooperation Division include participation in International Organization, undertaking bilateral discussions with other countries for transfer of technology or resolving outstanding issues, or negotiating international energy projects. For the net energy importing country like India it is obvious that International Cooperation is an extension of the National Energy Policy. It has been noted on several occasions that there is a disconnect between our international commitments or international trends and domestic practice. Currently, the flow of information is such that the relevant international cooperation Joint Secretary would participate in the deliberations of the International Organization concerned, and then file a report which will be circulated to other Ministries, Planning Commission etc. There is no real integration of international feedback into the domestic policy making. At the same time, each of the Nodal Ministries participate in their respective international deliberations without having a coherent idea of India's overall standing in the International Energy Sector. For example, the Ministry of Power, may participate in support of an international conference aiming at a clean energy future whereas some of our commitments do not support such an initiative. This kind of un-coordinated, mutually contradicting positions of the government of India enables international pressure groups to drive their agenda on our policy space. The IEA has been repeatedly making use of this defect in our Energy Policy to engage with various Ministries. The DEP by having a single Head for Energy Policy – whether international or national – would hopefully resolve and address this anomaly in the Indian Energy scene. At the same time, it will be necessary to ensure that once the DEP is functional other Ministries relinquish their roles in international cooperation and allow the

representative of DEP to participate on their behalf in international organizations. While this may seem unlikely to happen due to the presence of turf wars in government of India, there is a precedent even for this. The Department of Science and Technology (DST), or the numerous Health and Family Welfare Institutes under their respective Ministries in fact participate in international organizations in such a manner for example, though the nodal ministry for engagement with the European Union in the Ministry of Commerce on all subjects including funding of scientific research the actual decision making and implementation is done by the DST scientists. The DEP under the NESA would therefore function under a similar arrangement whereby domestic and international policy legislation would still remain under the control of nodal Ministries but interactions based on those policy as well as feedback and corrective action for the policies would be the sole prerogative of DEP, NESA.

6.3.1.4 Directorate of Technology Research and Funding (DTRF)

The DTRF will take over the funding activities of the OIDB as its take off point. Currently the OIDB is funding both institutions as well as programmes. One of the shortcomings of the OIDB funding model is that a large portion of the money is being given as loans or grants to institutions in the upstream or downstream sector without any perspective of long term energy security. For example about 250 crores are provided as funds for the Hydrogen Corpus Fund and the National Gas Hydrate Programme whereas nearly 28786 crores have been given as financial assistance to downstream companies for research into improvements and refining technology (MoPNG, 2008). This is not a desirable situation as the downstream companies are usually able to pass on R&D costs to the customers or can purchase / avail of latest refining technology through business partnerships. Increased funding for Hydrogen Fuel Research or gas hydrate research would have ensured better outcomes in these areas. It is common practice in most economies to undertake state funding for these kind of frontier research programme the outcomes of which are both of national importance and such that cannot be funded by any other means. The OIDB also provides funding to Petroleum Conservation Research Association (PCRA), Oil Industry Safety Directorate (OISD) etc. While the OISD

can be attached to the Ministry of Petroleum to continue with regulatory work on safety aspects, the rest of the activities of the OIDB may be fully brought under DTRF of NESA.

The previous paragraphs have outlined the basic administrative structure and organization of the proposed NESA. However, the NESA cannot function in isolation given the democratic imperative of our polity. It is essential that the NESA should have three major connections to the governance eco systems within which it will operate:

- Connection to Industry: Like the IEA the NESA should also have an Industrial Advisory Body (IAB) which will provide real time inputs to the NESA on the perspective of the Energy Industry. The IAB may be composed of both eminent businessmen and eminent scientists and could meet on a bi-annual or annual basis in order to take stock of the work carried out by NESA and if it is in alignment with the healthy growth of the energy industry. The purpose of having scientific representatives would be to ensure that the right kind of scientific input is given on an unbiased basis to the NESA in terms of technology trend, acquisitions and progress in the field of energy.

- Connection to the Executive: The DG, NESA should report directly to the Prime Minister of India. In this way he will be operating in a manner similar to the NSA (National Security Advisor) or the Prime Minister's Special Envoy. This is essential in order to ensure that the output of the NESA is not only given due importance but also overriding priority over the output of the nodal ministries or the Planning Commission. By having an institutional reporting mechanism directly to the Prime Minister of India it will eventually be possible to ensure that the functioning of each of the nodal Ministry is in line with the overall goal of National Energy Security. Disconnection will also ensure that the Prime Minister is able to monitor the work of NESA on a day to day basis and give it the necessary guidance.

- Connections to the democratic institutions: Unlike the National Security Council which is the only other body which can be compared to the proposed NESA the

NESA has its work mostly in the public domain. Its mandate is also a public role therefore it is essential that there is a parliamentary mechanism to ensure some kind of a parliamentary accountability of the NESA. This would also be required because the financial and policy footprint of the NESA would be quite large and under the rubric of 'basic features of Indian Constitution' it will be essential to have a check and balance mechanism for this potential super ministry. It is therefore proposed that a Parliamentary Standing Committee be constituted on the subject of National Energy Security. While deliberating on questions of Energy Security, the Parliamentary Standing Committee would also monitor the working of the NESA on a regular basis in the same way as the other Standing Committees take stock of the work of the Ministries.

The preceding paragraphs have outlined the administrative structure and the necessary connections to set up the NESA. From previous experience in the Government of India (for example setting up of the National Security Council) we may safely say that if approved setting up the NESA would require a period of about six months to one year. This would include the time required to get the necessary legislatory approval and make the required statutory modifications.

6.4 Analysis of Policy Failures in Reference to NESA

This section analyzes previous policy failures and shows that how NESA would have reacted in such conditions**.**

6.4.1: General Analysis of India's policy documents with respect to NESA

6.4.1.1 Hydrocarbon Vision 2025

We may use the India Hydrocarbon Vision 2025 as one of the basic documents to assess the performance of the oil and gas governance in India. This document is analogous to the Energy Strategy Document of Russia and Japan. Both these latter documents were earmarked for the year 2030, which is not very different from our own Hydrocarbon Vision 2025 dateline.

It may be noted that the India Hydrocarbon Vision mentions five goals as the outcome of a successful implementation of the policy. These goals are as follows (Commission P. , Hydrocarbon Vision 2025, 2007) :

1. To assure *energy security* by achieving self-reliance through increased indigenous production and investment in equity oil abroad.
2. To enhance quality of life by progressively improving *product standards* to ensure a cleaner and greener India. .
3. To develop hydrocarbon sector as a *globally competitive industry* which could be benchmarked against the best in the world through technology upgradation and capacity building in all facets of the industry.
4. To have *a free market* and promote healthy competition among players and improve the customer service.
5. To ensure *oil security* for the country keeping in view strategic and defence considerations.

In addition to these five overarching goals, the document also lists various medium term and long term goals for the oil and gas sector in India. These goals have been charted separately under the following categories:

1. Exploration and Production Sector
2. External policy & Oil Security
3. Natural Gas
4. Refining & Marketing
5. Tariff and Pricing
6. Restructuring and Disinvestment

6.4.1.2 Integrated Energy Policy for Oil and Gas Sector

The IEP gives several prescriptions for improving the performance of India's oil and gas sector towards securing India's energy future. After the Hydrocarbon Vision 2025, this document is almost the only other official policy statement on the oil and gas sector, attempting to address the question of India's energy security. The prescriptions of the IEP are given broadly under the titles of:

- Pricing of petroleum products
- Petroleum & Natural Gas Regulation
- Subsidy
- Reserve Enhancement and Competition
- Strategic Reserves
- Natural Gas Allocation and Pricing
- Gas Pipeline Network
- Using gas abroad

Broadly speaking there is a thematic continuity between the Hydrocarbon Vision and the IEP in the sense that the emphasis is on market driven reforms of the oil and gas industry, while doing so in a manner which reflects the socio-economic realities of the Indian economy. One notable difference is in the field of the strategic reserves, which is explicitly mentioned in the IEP. However a major thrust of both these documents is on the issue of pricing of petro-products, taxation and subsidies. A detailed description of the existing situation on these subjects has been given elsewhere in this thesis. Here we will briefly discuss the policy aspects of the subject, from the perspective of the IEP and the Hydrocarbon Vision.

As on first fortnight of March, 2010, the share of custom duty, excise duty and Sales/VAT taxes on petrol and diesel in Delhi are 51.47% and 30.24% respectively (EIA,

Indian Energy Data, Statistics and Analysis, 2011). Further, the contribution to Central Government exchequer by petroleum sector during 2008-09 was Rs.93,513 crores and a subsidy of Rs.74,002 crores was provided by the Government which was 79% of petroleum sector's contribution to the Central Government exchequer (PPAC, Petroleum Prices & Under-recoveries , 2011). This subsidy amount was 27% and 35% during 2006-07 and 2007-08 respectively and for the year 2009-10 (April-December) it is reported to be only 25% (provisional) (PPAC, Petroleum Prices & Under-recoveries , 2011). Given the fact that a part of the revenue generated from the petroleum sector is being given back as subsidy by the Government to control the price of petroleum products, there is frequently a demand that the Government should consider to rationalize the Central taxes to give relief to the common man, especially under conditions of inflation. The prices of petroleum products vary in different parts of the country due to variation in Sale Tax/Vat imposed by different State Governments which are in the range of 18% (Orissa) to 33% (Andhra Pradesh). All State Governments should ideally moderate the Sales Tax/Vat to a uniform rate on the petroleum products to mitigate the burden on the consumers of petroleum products.

The IEP position on this issue is that until such time as when full competition is introduced at refinery gate and retail level, the pricing mechanism should be one that mimics competition (see description of Rangarajan committee et al else where). Protection to the domestic economy may be provided by mechanisms like allowing price adjustments based on lagging 1-3 month average prices, long-term supply contracts linked to a variety of more stable energy price indices, adjustment of the ad-valorem taxes and levies in a revenue neutral manner to cushion the price rise for the consumer. Differential prices are allowed to reflect supply costs. Subsidy is recommended only for remote area residents, strategic consumption or lifeline energy needs.

In reality, the issue of rationalization of taxes has been repeatedly handled by the Ministry of Finance, Department of Revenue. As a result, the tax structure on Petrol and Diesel extant today has been formulated based on the recommendations of Rangarajan Committee and has been revisited during the last Budget 2010-11, considering the

necessity of fiscal consolidation. The need to rationalize/reduce Sales Tax/VAT on the petroleum products was taken up with the Chief Ministers of all States as well as the Empowered Committee of State Finance Ministers. As per the recommendation of the Empowered Committee of State Finance Ministers, Petrol and Diesel have been kept outside the purview of VAT, and the uniform floor rate for these two items is 20% except for North Eastern States and J&K, where the same is 12.5%. States are free to fix sales tax rate above the floor rate.

There is therefore nothing much in the matter of taxation that the proposed NESA can undertake, except building consensus towards reform. The actual work of reform has to be undertaken by the nodal ministries. However some of the IEP suggestions, like that of price adjustments based on lagging 1-3 month average prices, or developing long-term supply contracts linked to a variety of more stable energy price indices are subjects that need sustained policy research work, and capacity development in the OMCs. This is an area where the NESA can definitely do some work.

On the subject of petroleum and natural gas regulation, the IEP advocated the an independent body to regulate upstream allotment and exploitation of hydrocarbons, and something similar downstream to foster competition. However, the current PNGRB is however a far cry from this goal, as it is constituted as a body tasked with the development of infrastructure and its optimum utilization, and that too limited to the field of gas. Amongst its major responsibilities include the development of CGD and Local area gas networks and authorization of common/contract carrier pipelines. Given the requirement that the gas networks in the existing 41 cities have to be ramped up to 250 cities in the next ten years (in the scenario of ever increasing gas imports) and a woefully inadequate pipeline infrastructure, the work of the PNGRB is very fraught with responsibility. It has also in addition to this load of work, been beset with staffing and manpower problems. Therefore there is a very real possibility that in the short to medium term the PNGRB will not live up to its role of upstream-cum-downstream regulator, unless major reforms are put in place.

The proposed NESA is a step in that direction. Eventually some sort of a system where two regulators, one for oil and one for gas, or one for upstream and one for downstream, is likely to develop in the Indian context. Since we have bodies like the DGH which already have a significant exposure to NELP related policy and regulatory work, DGH can eventually be developed as the upstream regulator and PNGRB can be developed into an exclusive downstream regulator, with the NESA (competition and regulation division) acting as a link between the two. This sort of an arrangement has been suggested by the IEP as well when it states that " … On the upstream side, Directorate General Hydrocarbons (DGH), an arm of the Ministry, oversees allocation and exploitation of oil & gas reserves and enforces profit sharing with exploration & production companies. The current arrangement needs to be strengthened and made independent...". It will therefore be the role of the NESA to provide the necessary institutional linkage between upstream and downstream from the perspective of national energy security.

The IEP states very clearly that we need to focus on reserve enhancement both in crude oil and in natural gas. This includes accelerated assessments of reservoirs/basins, encouraging foreign participation and implementing common carrier principles. The policy framework for reservoir exploration is the NELP, which has been described in detail elsewhere. The policy failures and how NESA may correct this is included in a separate section below on upstream policy. On the issue of implementing common carrier principles, it may be said that as of now, only PNGRB seems to be moving towards it in the downstream sector. For full implementation of common carrier principles, the industry will need to mature out of the administered price mechanisms and subsidy regime, and regulatory reforms have to be undertaken to put in a place a rigorous regulatory regime. As has been described above, it will therefore need a strong PNGRB, a strong DGH and a strong linking NESA to successfully implement this aspect of the IEP recommendation.

The IEP mentions the need to maintain 90 days of strategic crude. As detailed elsewhere we have undertaken cavern storage of around 9-10 days worth of imports. The IEP

suggests that we may consider having options with nearby stocks like those maintained in Singapore to bridge the difference and also to increase the effectiveness. One of the failures of the IEP is to outline a clear strategy on utilization of strategic crude or the operation of the strategic reserves. It is assumed that operational control will be under the MoPNG working along with ISPRL.

The NESA proposes that the ISPRL be brought under the control of the Directorate of Strategy and Emergency. It would then be able to work in conjunction with the Emergency Response Division of the NESA. This will enable more institutional and more professional handling of the issue of strategic response. Were we to continue with the existing model of MoPNG/ISPRL, for the handling of emergency response, MoPNG would have to interact with Ministry of External Affairs, Ministry of Defence, PMO, National Security Advisor etc to work out a coordinated response. This would mean copious amounts of coordination with adhocism arising out of it all. In direct contrast, NESA/emergency response Division would be able to single handedly respond to the situation, with the added advantage that it would be an institutional and professional body in this situation.

6.4.2: Case-study based Discussion of Policy Failures and NESA

6.4.2.1 Consistent Shortfall in Production of Oil and Gas

Statement of the problem: It has been recently noted that there has been a consistent shortfall in achieving the oil production targets by major upstream PSU ONGC and the Private/Joint V companies in the last 3 years. Against the production targets (MMT) of 27.160, 27.054 and 26.950, the achievement by ONGC had been only 25.944, 25.367 and 25.764 respectively during the years 2007-08, 2008-09 and 2009-10 (Tungatkar, 2011). In case of private companies the shortfalls were more significant as against production target (MMT) of 5.15, 5.26 and 5.52 during the last 3 years, the achievement had been 5.08, 4.57 and 4.76 (upto Feb. 2010) only. It may be noted that for 2010-11 and 2012, the targets for private companies have been significantly enhanced to 11.32 MMT and 12.00 MMT (Tungatkar, 2011). As regards, gas production though ONGC and OIL have been more or less able to achieve the targets, there was a significant shortfall

in achieving targets by private companies. Against a target of 12.59 BCM the actual achievement had been 8.09 BCM and the target for the year 2009-10 was unlikely to be achieved with 19.35 BCM of natural gas produced upto February 2010 against the target of 25.43 BCM (MOPNG, 2007).

ONGC's crude oil production from onshore areas is marginally declining. The reasons for less crude oil production are mainly due to decline in base production in Assam Asset and increase in water cut in major matured fields of Ankleshwar & Ahmedabad Asset and less gain from EOR/IOR activities in fields elsewhere. Most of the producing fields in Onshore area are old & mature and presently major producing fields, Kalol, Jhalora, Nawagam, Viraj, Sanand, Sobhasan, Jotana, Santhal, Ankleshwar etc. in Gujarat and Lakwa, Geleki, Rudrasagar in Assam have crossed their plateau period of production and entered the natural decline phase (a natural process in the production life of oil fields). **This is a various serious situation in India today : 85% of onshore crude oil production comes from 13 major fields and 19 medium fields and average age of these fields is about 30 yrs** (MoPNG, 2008)**.** Further, no major / large discovery has been made by ONGC in its onshore areas in last two decades and the discoveries made are either small pool or marginal in nature. Since 2000, ONGC has already identified and initiated IOR/EOR schemes in the 11 major onshore fields i.e. Kalol, Sanand, Gandhar, North Kadi, Sobhasan, Jotana, Santhal, Balol, Lakwa-Lakhmani, Geleki and Rudrasagar to be implemented in stages through 13 schemes. ONGC in its onshore areas is adopting various proven new technologies suited for improving oil and gas production from existing fields. Further renowned service providers and world renowned domain experts are engaged for application of latest technologies in onshore fields. This is a subject where **the proposed NESA can intervene positively and assist though its Directorate of Technology Research and Funding, and also through its Directorate of Energy Policy (through international cooperation).**

The oil/condensate production performance of Mumbai Offshore & East Coast in last 03 years, has also shown a shortfall with respect to 11th plan targets. Most of the shortfalls have been attributed to delays in operationalising platforms, technical problems or

management issues. While these are issues which need to be dealt with at the Company level, a falling output nevertheless has an impact on the national energy security scenario. While there seems to be no particular role for the NESA in these kinds of situations, one may still say that these reasons need to be highlighted and brought into attention of the policymakers, so that the appropriate corrective actions may be taken.

As far as Oil India Limited (OIL) is concerned, crude oil and natural gas production by OIL has been in increasing trend. Incidentally, OIL recorded the highest ever production, both crude oil and natural gas, during the year 2009-10.

Amongst the efforts made by ONGC to improve oil and gas production are: adopting various proven new technologies like Extended Reach Drilling (ERD), Micro-biological Enhanced oil recovery (MEOR), Wax Deposition Prevention (WDP), massive hydro fracturing for enhancement of production from tight formations and activation of new completions through surge plug, quick silver technology, Pressure Xpress (XPT) to improve well productivity and reduce operational risk. At the same time it is undertaking projects like targeting small fields for additional development, and engaging international experts for providing best in class services and technology. **These are areas where the NESA may play a positive role through its Directorate of Energy Policy and Directorate of Technology Research and Funding.**

6.4.2.2 NELP and its Implementation

Oil and Natural Gas Corporation Limited (Company) has been carrying out activities relating to exploration and production of hydrocarbon since 1956. Upto 1998, the Company was offered exploratory blocks on 'nomination basis' and was allowed to apply to the Ministry of Petroleum and Natural Gas (MoPNG) for grant of Petroleum Exploration Licence (PEL) in respect of the blocks and, hence, these blocks were called nomination blocks. To accelerate the exploration of hydrocarbon resources in the Indian sedimentary basins, the MoPNG in 1999 implemented the New Exploration Licensing Policy (NELP) through the Directorate General of Hydrocarbons (DGH) by offering the exploratory blocks to private as well as foreign players. Between 1999 and 2006, 50

shallow water blocks (water depth upto 400 metres) in five sedimentary basins were offered under NELP I to VI rounds to private as well as public companies including joint ventures. Main features of Nomination blocks and NELP blocks can be understood as follows:

Nomination blocks

Upto 1998, ONGC was offered exploratory blocks on 'nomination basis' and was allowed to apply to the Ministry of Petroleum and Natural Gas (MOPNG) for grant of Petroleum Exploration License (PEL) in respect of the offshore blocks and, hence, these blocks were called as nomination blocks. Thereafter, Ministry of Petroleum and Natural Gas (MOPNG) amended its policy in March 2002 and directed that the PEL would not be extended beyond the current re-grant cycle. The re-grant of Petroleum Exploration Licence (PEL) was given for four years with an extension of fifth year subject to surrender of 25 per cent of the original PEL area held by the Company. Sixth and seventh year extension is granted for pursuing the lead of hydrocarbon reserves with a condition that maximum area retained cannot exceed 50 per cent of the original PEL area. No re-grant would be available after completion of current grant cycle where neither leads have been obtained nor discovery has been made.

NELP blocks

The Companies/JVs, while bidding for the NELP blocks submit Phase-wise minimum work programme (MWP) which is included in the Production Sharing Contracts (PSCs). The MWP consists of commitments made by the bidder for each block in terms of extent of surveys to be conducted and wells to be drilled within seven years, divided into three Phases. In the event of non-fulfillment of the MWP for any Phase, the Company can be granted first extension not exceeding six months without penalty. Further extensions, however, are granted as per the Extension Policy of 2006 which envisage furnishing of a bank guarantee equal to the cost of unfinished MWP besides payment of liquidated damages at the rate of 10 per cent and 30 per cent of the cost of unfinished MWP for second and third extensions (six months each) respectively. No

extension is allowed beyond 18 months and the extended period of a particular Phase is subtracted from the subsequent Phase of the exploration. In case no discovery is made, the block has to be surrendered.

In between, the MOPNG had also introduced an optional scheme known as Merger Policy 2007 for NELP III and IV blocks to address the unforeseen situation on non availability of offshore rigs in the international market. Any evaluation of the NELP efforts should ask the following questions:

- Whether adequate exploratory efforts were made for nomination blocks?
- Whether the requisite governmental clearances were secured in time and all statutory requirements were met?
- Whether the targeted reserve accretion was indeed achieved?
- If the Minimum Work Programme (MWP) commitments made in the Production Sharing Contracts (PSCs) of NELP blocks were fulfilled within the prescribed time?
- If adequate and timely acquisition, processing and interpretation (API) of data was done efficiently and suitable locations identified?
- If ONGC was able to hire and deploy adequate drilling resources in time for fulfilling the drilling targets?

If we analyse the performance of ONGC for the period 2004-08 (for which complete data is available), we see that the company was active in 37 shallow water blocks comprising of 21 nomination blocks and 16 NELP blocks. A Performance Audit conducted by CAG in 2010-11 revealed that there were “systemic and compliance deficiencies”, and “delays/failures in carrying out acquisition, processing and interpretation (API) of seismic data, delayed tendering, mismatch in planning of exploration activities including drilling of wells which resulted in unfruitful expenditure

(Rs. 2,136.45 crore) and avoidable expenditure (Rs. 94.67 crore) besides entailing liability for payment of liquidated damages (Rs. 252.20 crore)".

For example, in nearly half of the NELP blocks, ONGC took between 8 to 12 months just to complete the Environment Impact Assessment (EIA) studies. This in turn had adverse impact on timely API of seismic data. In addition, the pace of completion of API was also very slow in a number of blocks with the result that exploration commitments in the nomination as well as the NELP blocks could not be completed in time. The slow pace coupled with the mismatch between rig deployment plan and availability/deployment of rigs affected in fulfilling the drilling commitments. This had cascading adverse impact as exploration blocks had to be surrendered after incurring substantial expenditure.

There was no reserve accretion in any of the 16 NELP blocks as all the wells drilled were found to be dry, forcing ONGC to surrender 10 of the 16 NELP blocks after incurring substantial expenditure of Rs. 1,461.36 crores. This was despite the fact that the Company had bid for the blocks after analyzing their prospects.

6.4.2.2.1 Case Study

Some of the inefficiencies of the fragmentary approach in India to energy security may be illustrated by one of the cases of ONGC Block C-OS-X. The Company had acquired C-OS-X block (area 1,155 SKM) in Cauvery offshore for four years in January 1998. Against the commitment of 'acquisition, processing and interpretation' of 700 LKM of 2D data and drilling of four wells, the Company could acquire only 566 LKM of 2D data. Thereafter, no wells were drilled since Tamil Nadu Government (Forest Department) had denied (January 2002) permission for drilling of wells as the area fell within 'Gulf of Mannar Biosphere Reserve' water portion. Subsequently, the Company obtained (May 2004) re-grant from MoPNG for an area of 866 SKM for another four years till December 2007. However, the MOEF denied permission even after active pursuance by the MoPNG for this case. ONGC had therefore no option but to surrender the block. There is some justification in the ONGC argument that awarding of the block and subsequent re-grant by MoPNG for the same implied that exploration activities could be carried out in

the area subject to fulfillment of necessary obligations/commitments. However, it is also a pertinent point that both the MoPNG as well as ONGC failed to ascertain whether the block was within the notified biosphere area at the time of initial grant. Even after noticing in January 2002 that the block was located in biosphere area and not fit for undertaking petroleum exploration activities, MoPNG made a re-grant in 2002 of the block. This resulted in unfruitful expenditure.

It illustrates very clearly the need for coordination at the national level by the agency like the NESA for getting rid of such fragmentary decision making. Such cases could be handled by the Projects Division of the Directorate of Energy Markets of the NESA, as it would essentially involve coordination between various ministries and regulatory bodies. Besides saving money and time, it would also be able to free up resources which can then be deployed elsewhere. It will however need special definition to declare that exploratory activities under NELP may also be considered as 'projects' for purpose of assistance by this Division.

6.4.2.3 API of data and problems

Another major problem facing the upstream sector in India is in the field of API (Acquisition, processing and interpretation) of seismic data, and the Minimum Work Programme (MWP) as mandated by the NELP. Geophysical survey - the prime activity in exploration of hydrocarbons is carried out both in nomination and NELP blocks wherein 2D and 3D seismic data is acquired, processed and interpreted for analysing hydrocarbon accumulations. Prospects are thereby generated for release of locations for drilling of wells. Acquisition, processing and interpretation (API) of seismic data is a crucial activity in petroleum exploration process as subsequent exploration activities for achievement of MWP/work commitments in the exploratory blocks depend on timely completion of API of the data and results thereof. API cycle includes planning also and the cycle ranges between three and ten months in offshore. As per existing norms of the NELP, API , along with drilling exploratory wells is done in Phase I. However, due to delays, very often, the companies are not able to complete the works in time. According to CAG figures, the actual time taken by ONGC varied from 20 to 53 months in case of

nomination blocks and from 19 to 37 months in case of NELP blocks. This often results in surrendering of the blocks. The following case studies will illustrate how this problems plays out in real life, and how we may solve this problem by proper implementation of the mandate of the NESA.

6.4.2.3.1 Case Study 2

B-142 nomination block was granted to ONGC in April 1991. after the first re-grant till 2002, ONGC obtained second re-grant for four years and planned for acquisition of 3D data in 2004-05. However, the data was acquired only during 2006-07 by deploying the advanced Q-marine technology. Thereafter, one location was released for drilling a well B-17-B on 4 February 2008. However, by the time the floater rig necessary for the well could be deployed, fifth year of the re-grant had been reached and the re-grant period expired. On the request, the MoPNG agreed for extension upto 21 December 2008. As an anticlimax, the well drilled was found to be dry! As there was no discovery in the current regrant cycle ONGC had to surrender the block on the direction of DGH. It may be thus seen that ONGC took more than three years (April 2003 to 2007) in interpretation and re-processing of 2D data which eventually resulted in surrender of the block. Even after the deployment of advanced Q marine technology, it did not prioritise in the deployment of this, and thus could not identify and drill any other location in the block during the re-grant period of five years to pursue the leads.

Similarly, Kutch I A&B block was granted in 1998 to ONGC for four years upto 5 June 2002 followed by two extensions of one year each. On the basis of hydrocarbon leads obtained in an adjoining block where a gas well produced encouraging amounts of gas, ONGC carried out interpretation and reinterpretation of the existing 2D data in Kutch I A&B block during 1998-2003. However it took four years in acquiring 2D long offset data to explore the strata in this block. In view of slow progress of the exploratory efforts, the Company could not generate prospect in the block even after retaining the block for more than 10 years. In a similar case, two blocks, KK-OSN-2001/2 and KK-OSN-2001/3, were awarded to ONGC under NELP-III round in 2003. However, ONGC did not make any

efforts to induct the necessary technology for API till September 2007 when it awarded a contract for induction of 2D long offset seismic data technology.

Whether it be Q marine technology or long offset data technology, the underlying shortcoming in the performance of ONGC remains the same, namely, the inability to deploy latest technology in time, or at an early stage, leading to large delays in the API and exploration, and therefore, under the existing provisions in the NELP, leading to relinquishing the awarded blocks. This situation is unacceptable under the existing imperatives of national energy security. In case of new technology, it is essential to test its efficacy by initially deploying in areas where conventional surveys have been done or discoveries had been made. The effectiveness of such technology can be established only after a certain period of time. There is therefore a need for identifying such technology on a periodic and continuous basis and introduce them into our E&P ecosystem, so that we do not face such delays. Currently this does not happen, as such a technology hunt is not the mandate of either the MoPNG or any of the research institutes, since these technologies are often proprietary and quite advanced. Therefore ONGC and similar E&P players in India have to depend on foreign inputs in this case, which is subject to the contracting process and consequent delays. Therefore it is suggested that the Directorate of Technology Research and Funding of the NESA would be admirably placed to fulfill this role. As mentioned earlier, this directorate of the NESA would be essentially taking off with the OIDB funding as its core, and develop its own mandate to develop and deploy technology. As of now, most of the OIDB activities have been towards funding downstream research, refinery improvement projects etc. It is proposed that the NESA may evolve its own rules so that it may be possible to purchase and subsidise if required such E&P technology on a priority basis. These may then be provided to the E&P players in India. These technologies could cover upstream domains like API, EOR/IOR etc, as well as the more conventional downstream technologies which have been funded by OIDB. NESA might also consider setting up an SPV at a later stage to specially deploy advanced oil and gas technologies on a PPP model, so that eventually it will improve the quality of Indian contracting and sub-contracting in the E&P area.

6.4.2.4 Rigs and Related Services

Another problem that has been observed that there are significant delays in signing of RDPs (rig deployment plan) and SLAs (service level agreement) in the process of E&P. As per current practice, Annual Plan (AP) of ONGC specifies the drilling targets for each basin. Annual Plan includes the number of locations to be drilled along with drilling meterage. On the basis of the AP, rig deployment plan (RDP) is prepared for each basin taking into account the MWP/work commitments in NELP/nomination blocks and availability of suitable drilling rigs. The RDP is signed between the Head- Drilling Services and the concerned Basin Manager so as to ensure availability of services as scheduled. To achieve the drilling targets, the Basin enters into service level agreement (SLA) with the service providers' viz. Drilling Services, Cementing Services, Logistic Services, Well Services, Mud Services, etc. for planned mobilisation of drilling resources. It has been seen that there was substantial shortfall in drilling activities. **As against 128 locations and 130 locations planned for drilling as per AP and RDP respectively, only 76 locations were drilled, thereby resulting in a shortfall of 41 per cent in drilling.** The operational requirements of offshore installations and rigs of ONGC are met by a fleet of 59 (31 owned and 28 hired) offshore supply vessels (OSVs). The OSVs undertake supply duties (supply of cargo, equipment, water, fuel etc) rig towing, anchor laying, transport of crew, inter-field transfer of men and material, fire fighting and standby duties. The O&M contract for its owned OSVs has been given to SICAL Logistics (17 Samudrika series OSVs) and HAL Offshore (14 Sindhu series OSVs) for a period of three years. The OSV, Samudrika-10, after being put in operation had capsized in July 2007. Consequently, the Directorate General of Shipping (DGS) reviewed all the other 30 OSVs and observed that the OSVs were being operated without valid statutory certificates and, therefore, withdrew in July 2007, the Document of Compliance (DOC) of both SICAL and HAL. Thus, all the 30 OSVs were on downtime since July 2007 and as of May 2009 only 19 (14 Samudrika and 5 Sindhu series OSVs) were back in operation. **The short supply of the OSVs resulted in idling of 27 chartered and owned rigs for a total of 27,875 hours (1,161 days) from July 2007 to May 2009. The loss due to idling of rigs on account of non availability of OSVs was Rs.576.29 crore.** This is however purely a one of incident,

which is a failure of the Company to effectively oversee the operations of OSVs by the O&M operators. Nevertheless it serves to illustrate the need for good business practices to be followed and implemented by the industry.

The following case study will make it clear as to how delays in rig deployments happen, leading to loss of money, time and resources, and what can be done to avoid such delays.

6.4.2.4.1 Case Study 3

The well, MN-OS-G, located in Mahanadi region was released on 16 August 2005 and was planned to be drilled by the rig 'Sagar Vijay' which was drilling locations in KG basin. Thereafter, the rig was to be sent for dry dock in November 2005. In the absence of rig 'Sagar Vijay', ONGC decided to drill the location by rig 'Nordic' which was released for the location on 23 February 2006. The rig, however, could move only on 21 May 2006 due to stuck up of leg. Meanwhile, due to disagreement with DGH regarding payment of monies for the extensions of exploration phase as per the Extension Policy of 2006, the Company postponed drilling of MN-OS-G location and decided to move the rig to KG basin to drill a new unplanned location YSAF. However, the decision of the Company to move the rig to YSAF was taken without assessing the suitability of the rig for its deployment. The rig was under movement from 3 June 2006 till receipt of soil investigation report (13 June 2006). Based on the soil investigation report, the surveyor rejected (15 June 2006) the proposal of deployment of the rig at YSAF. By the time, the Company had already incurred an expenditure of Rs. 23.53 crore on the movement of the rig to YSAF. Now, ONGC decided to move the rig back to the location MN-OS-G. This proposal was also not agreed to by the surveyor due to onset of monsoon and non availability of shelter location. The rig was again kept waiting (14 June 2006 to 20 June 2006) at an intermediate location. The Company decided (20 June 2006) to move the rig to another location GS-15-DA in the KG Basin. The rig was kept waiting at the intermediate location for 14 days (23 June to 6 July 2006) as the sea bed survey was in progress. As a result, the Company incurred an expenditure of Rs. 5.75 crore on idling of the rig. The Company could finally spud the location GS-15-DA on 25 August 2006.

Meanwhile, DGH informed (24 August 2006) regarding expiry of the contract (18 November 2005) and directed the Company to pay penalty equivalent to the cost of the unfinished work programme. To avoid relinquishment of the block, the Company paid the penalty of Rs. 19.48 crore towards extensions of exploration phase and moved the rig back to MNOS-G by temporarily abandoning the location GS-15-DA (5 September 2006). The location MN-OS-G was spudded on 25 November 2006 and drilling was completed on 9 February 2007!

There are several lessons that can be learnt from this experience. There is definitely a need to upgrade the quantities of rigs available as well as rig deployment in India. Improper planning in deployment of rig leads to oftentimes avoidable movement of the rig, and the only way out is to invest in more rigs, or to take efforts in rig deployment planning. One possible solution is that organizations like NESA should regularly monitor the rig deployment plans. This is a contentious problem, since it would mean micromanaging of affairs, and reduce the operational freedom of the operators. However, it is possible to develop a monitoring system (which does not have any regulatory connotations, in other words, only the deployment of rigs is monitored, and no permits etc are required to deploy rigs) which will give real-time information about rig deployment, and prevent such issues from arising. This may be placed within a cell in the Projects Division of NESA- Energy Markets Directorate. The purpose of this cell should be to look at the issue of rig/resource deployment in a holistic manner. For example, it may work to ensure timely signing of RDPs/SLAs, ensure availability of suitable rigs while finalizing the rig deployment plan, release the locations on time considering the commitments scheduled in the PSC, ensure reduction of non productive time by better coordination among the various service providers. While the onus of ensuring these kind of mandates lie squarely with ONGC, it would be useful for the Projects Division, NESA to monitor these activities and to develop some kind of a monitoring/reporting mechanism. As of now, these errors are discovered only in retrospect during performance audits, by which time much time, effort and resource have been already deployed. A monitoring/reporting mechanism would ensure that

these errors are discovered real time, thus providing a mechanism to correct and speed up the E&P process.

The drilling targets of ONGC & OIL have been underachieved in the past due to non-availability of drilling rigs both in onland and offshore areas. In case of ONGC, against the overall planned target of 383 wells during first three years of XI Plan, only 283 exploratory wells had been drilled till 1.1.2010. As against the target of 274 onland wells to be explored by ONGC during the first 3 years of the 11th Plan, only 201 wells could be explored as on 1.1.2010 and against the offshore exploratory targets of 109 wells the actuals are reported to 82. Similarly, OIL has drilled only 33 wells during the first three years of XI Plan. The Committee find that non-availability of drillings rigs had also adversely affected OIL‟s drilling programme as out of a total of 10 inhouse drilling rigs with OIL, refurbishment of 8 drilling rigs is reported to be in progress. Both ONGC and OIL have strived hard to overcome the shortage by deploying contractual rigs at the needed locations, but still they observe there has been a considerable Rig Months lost by ONGC due to idle time of rigs. The estimated cost charged in respect of idle time of rigs was stated to be Rs. 809.90 crores for the last 3 years. Given the global shortage of drilling rigs, it is required to make a proper assessment of the requirement of in-house/charted rigs in conformity with the physical targets set for exploration and development drilling. ONGC/OIL should strive to increase the number of in-house drilling rigs to reduce dependence on contractual rigs from the international market. Government is in the process of acquisition of 10 land rigs and 4 offshore rigs, which are at various stages of approval. This is an area where prompt action should be taken, and there would be a possible role for Projects Division, NESA to speed up procurement. Similar to technology procurement, government or the NESA may consider floating a SPV to speed up the process of acquisition of rigs. It is indeed a fact that while ONGC faces no problem on the rig front, OIL has a major problem with rigs, especially due to the old vintage of the rigs it has. NESA might work out a programme with OEM like BHEL to ramp up capacity for production/refurbishment of rigs so that there is no major problem faced in the future and dependency on the international market is reduced.

6.4.3: Role of NESA in Various Sectors of Oil and Gas

The Eleventh Plan envisaged an increase in primary energy availability (that is, from coal, lignite, crude oil, natural gas, hydropower, nuclear power, wind power, and non-commercial energy) at 6.4 per cent per year taking the total availability from 550 Mtoe in the terminal year of the Tenth Plan to 715 Mtoe in the terminal year of the Eleventh Plan. Present prospects make it evident that the actual growth in primary energy production will be lower than projected in most sub-sectors. The net effect will be an increase in the projected import dependence on both coal and crude oil. These developments highlight the urgency to maximize domestic production in the Twelfth Plan period and manage demand more effectively to increase energy security. It calls for concerted action on several fronts. The Integrated Energy Policy, which was approved by the Cabinet in 2009, had laid down an agenda for policy action in the major energy sectors. Implementation of this agenda would help push the energy sector towards greater economic rationality and financial viability while also promoting the objective of energy efficiency and energy security. However despite there being a 'unified' or 'integrated' energy policy, there have been short comings in achieving energy security, and therefore it is suggested that this critical gap can be bridged by adopting an unified energy administration as well. **This is where the role of an integrated energy policy and a unified energy administration may become critical and the most ideal solution.**

The central feature of the petroleum and natural gas sector is that domestic availability of oil resources is limited and rapid economic growth means that demand will rise rapidly. India's import dependence has, therefore, been rising and is currently 78 per

cent for oil. This is bound to increase in the future unless there is some unexpected domestic oil discovery. Such high import dependence inevitably raises concerns about energy security. Currently, the share of natural gas in the energy basket is only 12 per cent which is quite low compared with the global average of 24 per cent and efforts need to be made to increase this share progressively to 20 per cent. Large discoveries of natural gas resources in KG basin and creation of LNG import capacities in the country have been helpful in increasing the share of natural gas in energy basket permitting replacement of liquid fuels by natural gas in transport, power, fertilizer, petrochemicals, refineries, households and many other fuel intensive sectors.

The policy issues that needed to be addressed and identified as such in the Eleventh Plan are oil and gas security, pricing of petroleum products, pricing of domestically produced natural gas and its allocation, ensuring competition and open access in the pipeline transportation and distribution grid and conservation of petroleum products and natural gas. Some of the specific areas for action in the petroleum sector where NESA can play a significant role are discussed next.

6.4.3.1 Enhanced Exploration and Production of Domestic Oil and Gas

There has been a sharp increase in the exploration activity after the launch of the New Exploration Licensing Policy (NELP) in 1997–98. Only 50 per cent of the total sedimentary area has been explored, out of a total area of 3.14 million sq. km. in 26 sedimentary basins, including the deep water area of 1million sq km (BP, Statistical Review of World Energy, 2009). Expansion of domestic resources is being done through

award of NELP blocks to discover oil and gas reserves. So far, 203 blocks have been awarded, 70 blocks were offered under the NELP 8th round. Currently our reserve replacement ratio is 1.3, which is higher than the current production levels of ONGC and OIL.

How NESA can contribute: Enhanced exploration and development of oil and gas blocks through NELP is a continuous process. The Eleventh Plan envisaged bringing more and more acreage under exploration, especially those in the frontier areas/basins, adoption of state-of-the-art E&P technology, faster development of discovered reserves, and development of marginal fields and continuation of IOR and EOR schemes. But this did not happen possibly due to the gaps in policy making process as well as administrative in-coordination between the relevant agencies like DGH, moPNG, Ministry of Coal, scientific agencies, state level governments etc. by having an unified energy administration structure, it should be possible to take a holistic view of the E&P process, and how it dovetails with issues of technology acquisition and international cooperation. For example, Budget 2009–10 provided for tax holidays for the blocks offered under the 8th round NELP award. While this is a positive step, the allottees of previous rounds are also demanding similar benefits. The NESA can decide on an integrated energy security driven policy to the budget, rather than a finance ministry driven approach to the issue. Similarly, Drilling of horizontal wells and well stimulation technologies would continue to be the key to improved recoveries of oil and gas. New products and technologies would need to be developed not only for ensuring drilling of healthy wells but also for future interventions for corrective action (work-over) to

enhance the recovery of oil from various existing producing fields. This is precisely the kind of role conceptualized for NESA, which can plan out a timeline for the future interventions and the necessary international tie-ups necessary to achieve this. At present, there is no such process, and whatever little planning is happening is being undertaken in the corporate sector (and not in the government sector) which is naturally subject to pressures of finance and stock value, but not directed by considerations of energy security.

6.4.3.2 Acquisition of Equity in Oil and Gas Abroad

ONGC Videsh Limited (OVL) holds 40 assets overseas in 16 countries and produces about eight MMTPA of oil and gas. The exploration blocks being developed by OVL would further add to the production of oil and gas. At present, OVL, the front runner in this regard has a presence in 16 countries—Sudan, Syria, Vietnam, Myanmar, Brazil, Iraq, Cuba, Congo, Libya, Russia, Colombia, Venezuela, Egypt, Iran, and Nigeria and has 40 projects in hand. Other PSUs, such as IOCL, OIL, BPCL, and HPCL have also acquired some E&P assets abroad in the recent past. OVL had utilized 49.89 per cent of its Eleventh Plan outlay of Rs 45,334 crore up to June 2009.

How NESA can contribute: Enhancing efforts to acquire overseas oil and gas assets, sourcing of natural gas through LNG imports and pipelines is definitely a very significant method of enhancing our energy security. Currently there are the following deficiencies in this sector :

- There is no coordination between, say OVL trying for a stake in South Sudan, and lets say a firm trying to sell Indian software or IT products in that region. Such a

lack of 'cross-product value addition' reduces the attractiveness of OVLs efforts, while in the case of Chinese companies, this is not so, since they have huge cash kitties as well as diverse product portfolios. For example, it is not unheard of Chinese oil companies having a road construction company as well. NESA can help bridge this **'cross-product value deficiency'** in the sense that by virtue of its integrated approach, it will be able to formulate and bring together Indian companies working in similar geographical domains to add value to each others propositions.

- NESA can also contribute by reducing the time taken to arrive at decisions by Indian E&P companies in M&A decisions. Currently these are approved by a Committee of Secretaries mechanism, which further may be subject to other political pressures, and even time zone differences.

6.4.3.3 Development of Alternative Fuels

CBM, Gas Hydrates, Underground Coal Gasification, Ethanol for Blending with petrol and bio-diesel: Developing the full potential of CBM, shale gas, underground coal gas, gas hydrates, and biofuels is essential to reduce the import dependence of hydro carbons.

Here again NESA can play a very critical role by :

- Bringing to the fore the significance of these domains in the policy planning process
- Being a single nodal agency for these cross-sector fuels. For example, biofuels can come within the purview of both MNRE and MoPNG, and inevitably gets a back seat in both!

6.4.3.4 Developing Gas/LNG Import Infrastructure

The proposed major gas pipelines in the southern, eastern, and northern regions need to be completed at an early date in order to facilitate the completion of the national grid. Implementation of the projects is basically subject to frictions between various arms of the governments and the democratic process. **NESA can contribute by reducing such inefficiencies.**

- Reforms in Regulatory Regime, Pricing and Rationalization of Taxes

The Integrated Energy Policy approved by the government in December 2008 has made the following recommendations on strengthening the regulatory system in the oil and gas sector:

i. To ensure effective competition in the oil and gas **sector it is important to establish independent oversight of both upstream and downstream activities**. The role of the regulator in a competitive market is not to fi x prices but to ensure open access to common infrastructure and to regulate user charges for infrastructure, such as gas pipelines and port facilities. The regulator should also ensure that markets, such as those for city gas distribution, are not cornered to prevent competition. **The NESA could step in to fill this role.**

ii. On the upstream side, Directorate General of Hydrocarbons (DGH), an arm of the ministry, currently overseas allocation and exploitation of oil and gas reserves and enforces profit sharing with E&P companies. It is essential for DGH to be strengthened and made independent of the ministry. **As has been discussed elsewhere in the thesis,**

DGH functions could be subsumed under the NESA and be then independent of the administrative control of MoPNG. Currently the functioning of the DGH has two sets of functions which have a potential conflict: an upstream regulatory function and a function of advising the MoPNG. While in 1993 when the DGH was created, there was a certain lack of clarity in the role of the DGH, but now the time has come for clearly delineating the role of the DGH, and if possible isolating it from the MoPNG. Bringing it under the NESA is therefore the most practical solution. It can then continue to render both functions from an independent standpoint, which will not have a conflict of interest.

iii. The Petroleum and Natural Gas Regulatory Board (PNGRB), created by the government in 2007 to regulate downstream operations has initiated activities on grant of authorization for natural gas pipelines and city gas distribution systems. However, it is yet to be authorized to create full-scale competition for supply of petroleum products in the domestic market, as petroleum product prices are still controlled by the government and are yet to be notified to be handled by PNGRB. **A PNGRB functioning under the NESA would be able to get such authorizations simply by virtue of the fact that NESA would have such authorizations/competence to authorize. NESA would also have the necessary competence to make policies on the following in the interest of national energy security:**

- **Full price competition at refinery gate** and retail level aligning fuel prices with global trends

- **Phasing out subsidies** on domestic LPG and PDS kerosene
- **Unified State Taxes** and Removal of Tax Anomalies
- **Natural gas prices to market parity**
- **Infrastructure Development** (Strategic crude oil storage, Development of product pipelines, Marketing and distribution facilities, Development of natural gas pipelines etc)

6.5 Summary

In the section 6.1, author has explained the international governance with respect to well functioning bodies like OPEC, IEF & IEA. The systematic functioning of these agencies is somewhat similar to that of proposed NESA. In the later section 6.2, the author has explained the legal structures present in various administrative departments, ministries etc in India. Also, various models of administrations were explained in the same section to justify, if NESA is to be formed there would be no new but a different thing happening in the country. Section 6.3 talks about the proposed structure of NESA. As mentioned in the section, Locus of NESA in the Indian administrative structure is also given as; marking the governance hierarchy is an important task to be done before forming any such agency. In the last section, author has tried to test NESA's reaction in the retrospective cases of difficulties in the Oil & Gas sector in India. This section has been carried out with the help of certain case studies which proves that had NESA been in place, issues of this kind would have been dealt with more confidence & effectiveness.

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