SYNERGY

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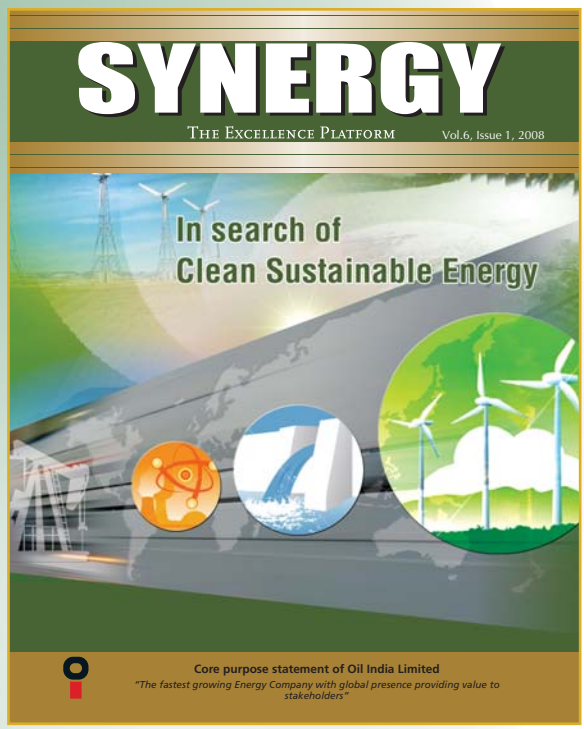
"The fastest growing Energy Company with global presence providing value to stakeholders"



Team Synergy

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OIL THROUGH THE AGES

347 A.D.	Oil wells are drilled in China up to 800 feet deep using bits attached to bamboo poles.
1264	Mining of seep oil in medieval Persia witnessed by Marco Polo on his travels through Baku.
1500	Seep oil collected in the Carpathian Mountains of Poland is used to light street lamps.
1594	Oil wells are hand dug at Baku, Persia up to 35 meters (115 feet) deep.
1735	Oil sands are mined and the oil extracted at Pechelbronn field in Alsace, France.
1815	Oil is produced in United States as an undesirable by-product from brine wells in Pennsylvania.
1848	First modern oil well is drilled in Asia, on the Aspheron Peninsula north-east of Baku, by Russian engineer F.N. Semyenov.
1849	Distillation of kerosene from oil by Canadian geologist Dr. Abraham Gesner. Kerosene eventually replaces whale oil as the illuminant of choice and creates a new market for crude oil.
1850	Oil from hand-dug pits in California at Los Angeles is distilled to produce lamp oil by General Andreas Pico.
1854	First oil wells in Europe are drilled 30- to 50-meters deep at Bóbrka, Poland by Ignacy Lukasiewicz.
1854	Natural Gas from a water well in Stockton, California is used to light the Stockton courthouse.
1857	Michael Dietz invents a kerosene lamp that forces whale oil lamps off the market.
1858	First oil well in North America is drilled in Ontario, Canada.
1859	First oil well in United States is drilled 69 feet deep at Titusville, Pennsylvania by Colonel Edwin Drake.

CONTENTS

These articles are the personal views of the authors. They do not in any way reflect the views of OIL's management.

Editorial

Dear Readers,

The sudden surge in the price of crude oil has delivered a rude shock to the economy around the world. Prices have hit the roof and the wild swings in the prices have mauled the markets worldwide. The situation now is quite similar to the 1970s when the oil prices had increased fourfold, seriously plunging the world in turmoil. Many countries suffered badly. This time too it is the same and the common people can feel the pain. Prices of commodities have shot upwards. Dearer oil price is also pushing inflation up. But one question arises here. How long can the government insulate the consumers from the "Oil Shocks"?

Several factors can be contributing to the surge in the price. The volatility in oil prices could be outcome of widening gap between demand-supply gap, players controlling production and supply, and the fact that production is peaking. Some say that this may be triggered by speculative activity also.

Whatever the reason, it is bad for the common man and this is a wake up call for Governments. We have to use fuel conservatively and more efforts should now be put in developing alternate fuels. One of the major consumers of oil is the transport sector. In India every day thousands of new cars hit the road adding to more consumption. An energy policy which cuts down consumption, and, one which fuels research in developing new sources of energy is the need of the hour.

The good news on the other hand is that crude prices have started coming down and some analysts predict that it will further come down as other alternate sources of energy will contribute more at the current levels of crude price.

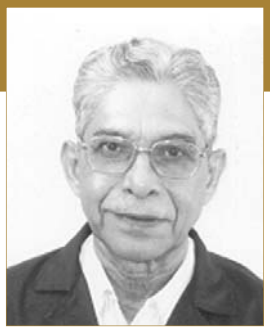
In this issue we have articles which I hope you will enjoy reading. I would like to thank the authors of the articles for their contribution, and as always, wish some feed back from our readers.

Wishing you all happy reading!

Editor
SYNERGY

Ethics – Corporate, Military and Personal

By: Maj. Gen. S. C. N. Jatar, Retd



Maj. Gen. S.C.N Jatar, BE (Civil), is a FIE, MICA, a former Indian Army Officer and was the Chairman & MD of Oil India Ltd. He is presently a Consultant to ICICI Bank (Upstream operations, Oil & Natural Gas), Director, Prize Petroleum Ltd. (ICICI Bank nominee), Director, NOCIL (ICICI Bank nominee), Director, Videocon International Limited, Member, Arbitration Panel of the Institution of Engineers, Member, Steering Committee of National Gas Hydrates Programme, etc. He was also a Consultant with Hindustan Petroleum Corporation Ltd., Project Advisor, Standing Conference of Public Enterprises, Member, Governing Board, Pune Stock Exchange, Managing Director, Garware Shipping Corporation Ltd., President (Co-ordination) RPG Petrochem Ltd., Chairman, Standing Conference of Public Enterprises (SCOPE) and Chairman & MD, ONGC Videsh Ltd. (Schedule 'A').

It was in early 1958, when I was a young officer at the Bombay Sappers Centre that my Commandant, Colonel Joseph Victor Peter Braganza, checked me for having come on a Lambretta scooter to the office. I was in time, was immaculately turned out; then why was the Commandant ticking me off? He said, "Young man, when the Commandant comes on a bicycle, you have no business to come on a scooter. That is not good ethics". Later, in 1963, after the Chinese war, my field company was on construction of prefabricated huts for the soldiers on UP-Tibet border. My Commander Engineers called me one fine day and demanded a transistor set, which was the rage those days. When I looked thoroughly lost, the Commander said, "Listen you fool. Don't you know how to arrange for a transistor when you are in charge of such large works? When my face showed utter bewilderment, he said, "Just call your contractor and ask for a transistor and I bet he will provide a set post haste"! I have since been through many dilemmas in my career, every time wondering about the meaning of ethics. Ethics is a difficult subject. I have tried to put down an anthology of my thoughts of the last 50 years aided by some research.

Introduction

A soldier's honour code is perhaps the oldest instance of a structured code of conduct in leadership, management and governance. The primary purpose of military academies is, "… to provide the nation with leaders of character who serve the common defence." (West Point, USA) The National Defence Academy has an elaborate 'Honour Code', which expects the cadet to be truthful, trustworthy, honest and forthright under all circumstances. A cadet is not to lie, cheat or steal nor mislead or deceive anyone. The West Point adds; "or tolerate those who do". There has to be zero tolerance for lack of character and of integrity, whether with oneself or with others with whom one comes in contact.

Part of the speech made by Field Marshal Sir Philip Chetwode during the inauguration (on 10th Dec 1932) has come to be the Credo of the Indian Military Academy. Written in golden letters on the dais wall, resonating ever since its utterance in the minds and the hearts of the alumni, it represents the essence that goes into the making of the officer corps of the Indian Army:

"The safety, honour and welfare of your country come first, always and every time. The honour, welfare and comfort of the men you command come next. Your own ease, comfort and safety come last, always and every time."

Corporate ethics has been the topic of discussion for over 15 years now. Cadbury Committee in the UK set out its recommendations for acceptance by listed companies for the year ending on or after 31 December 1992. UK listed companies accepted these recommendations, which are since in force. From February 2004, the new provisions of Clause 49 of the listing agreement and contemporary practices of good corporate governance provide that Indian companies shall have a code of conduct for all members of the board of directors and senior management personnel.

Ethics, a major branch of philosophy, encompasses right conduct and good life. It is significantly broader than the common conception of analyzing right and wrong. A central aspect of ethics is "the good life", which is held by many philosophers to be more important than moral conduct. The major problem is the discovery of the summum bonum, the greatest good. The right act is the one causing the greatest good and the immoral act as the one impeding it.[1]

Ethics and morals are respectively akin to theory and practice. Ethics denotes the theory of right action and the greater good, while morals indicate their practice. Moral has a dual meaning. The first indicates a person's comprehension of morality and his capacity to put it into practice. In this meaning, the antonym

[1] *http://en.wikipedia.org/*

is "amoral", indicating an inability to distinguish between right and wrong. The second denotes the active practice of those values. In this sense, the antonym is "immoral", referring to actions that violate ethical principles. Personal ethics signifies a moral code applicable to individuals, while social ethics means moral theory applied to groups. Social ethics can be synonymous with social and political philosophy, in as much as it is the foundation of a good society or state. Ethics is not limited to specific acts and defined moral codes, but encompasses the whole of moral ideals and behaviours, a person's philosophy of life.[2]

We hear of frauds and scandals every day not only in the corporate world but also in other facets of life. Lately the armed forces too figure frequently in this category. There is a clear erosion of ethical standards.

"Trees Die from the Top"

In the corporate world, the open market is divinity, the consumer is sovereign and the bottom line is monetary profit. Money power and muscle power appear complementary. The antiquated Indian legal system has an adverse effect on social ethos. Many of our younger generation now feel that it is necessary to be unethical and evade the law to reach high places. They feel that scholastic excellence is unnecessary to lead a satisfying life because net working and muscle power fetch everything that one needs in life. A situation has come when we tend to label a person with lack of ethics as a 'go-getter'. Peter Drucker had observed, "Trees die from the top, i.e., from the boards down" or from generals downwards in the Army! Trees also breathe through their leaves, which spread lower down, meaning unethical practices percolate down!

Centrality of Ethics in Governance & Leadership

Corporate governance seeks to recommend and establish a control system and structure for the boards, by which companies carry out decision-making processes with high degree of accountability to the stakeholders. Corporate governance is thus far more comprehensive and process driven. The cutting edge for ensuring good governance is an enabling value-frame and sensitivity to ethics. Ethics thus becomes central to the process of governance. Good institutional beliefs or value statements do little by themselves. Mixing religion with ethics also does not serve the purpose. A strategic approach at the super structure and practical functioning through human resource intervention is necessary. Ethics is to good leadership, governance and management; what blood is to the body.

Ethical Institutions are also well governed

While mere value statements are of no avail, sensitisation on aspects of ethics has increased better self-governance, transparency in actions and long-term corporate performance.

Top-ranked companies in the world (Fortune 100) are those, which highly value ethical conduct. DePaul University, Chicago, has come up with conclusive evidence to show that companies that make a public commitment to ethics achieve significantly higher performance standards than those that do not. Stern Stewart analysis of Market Value Added, the Fortune magazine analysis of the most admired companies and the rankings of Business Week in the US also confirm this phenomenon3.

Companies such as Johnson & Johnson at the time of the now famous Tylenol scare, have shown the manner in which sensitisation to ethics has helped the company. Contrarily, the international case studies of Ford's "pinto", the cigarette manufactures' controversy; Nestlé's baby food in Africa; the oil companies' dilemma in the erstwhile South African situation: etc. are worthy of deeper study. The Indian case studies have not been very prominent in publicity but a few case-examples span both the public and private sectors and concern under invoicing of exports, avoidance of excise levy through queer interpretation, environmental degradation by gaining time through frivolous legal action, changes in accounting systems to show profits, etc,. There are also instances of adherence to environmental standards under most difficult conditions; aggressive canvassing for corporate ethics through internal communication, and questioning, giving scope to the collectives to raise ethical concerns. Tata Group and Wipro had beliefs circulated throughout the companies well before Clause 49 of the listing agreement came into being.

The Military Honour Code

Subordinates are to obey the orders of superiors in the armed forces in war on pain of death. The armed forces, therefore, represent an environment in which values of honour, integrity, courage, and loyalty matter more than in any other profession. A military officer is as good as his word. The emphasis is always on the importance of being able to trust the word of

[2] *http://en.wikipedia.org/*
[3] *Gupta Dipankar, "A little ethics can be dangerous", Business India, 5-18 Feb. 01*

your colleagues, superiors and subordinates. The central theme thus always is not to tattle tale, not to tell lies, always to speak the truth, and stand by your word. Gen. Macarthur, as a cadet, at the West Point was on the verge of rustication because he would not tattle tale.

The My Lai incident during the Viet Nam War brought the honour code of the US Army under severe strain. Maj. Gen. Samuel Koster, Commanding the US Division, which included the platoon led by Lt. William Kelly at My Lai, resigned when accused of lying and of taking part in the campaign to cover up the facts about the massacre at My Lai. The US Army demoted Koster, censured, and retired him in disgrace. West Point too came under a cloud a few years ago. The scandal involved the honour code, which states, with neither equivocation nor mercy, "A cadet will not lie, cheat or steal, or tolerate those who do." The toleration clause includes those who know that others have cheated but have not turned them in. For those found guilty, there is only one punishment, quick and automatic dismissal from West Point.

Ethics is Grey

Ethics is a difficult subject, which needs much training, much more reflection and even more positive determination. Ethics has not been a part of our formal management education or in civilian or defence training institutions and has not received the attention in human resource development that it deserves. We often tend to confuse ethics with religious dictum and law. Appropriate attention to this soft issue becomes very important to ensure evident behaviours that would pursue institutional well-being and society's welfare. Where the tasks are standardised, the process defined and the input and output largely transparent, the scope for non-conformity with society's expectations is that much lower. Ethics is a grey area and represents the dilemmas that most of us face in our working lives. These dilemmas loom larger in higher positions. As an individual reaches policy levels, fuzziness creeps in and discretions in behavioural choices increase. The top managements are constantly dealing with issues, which could be controversial in their impact. Every decision is a trade-off – short term with the long term; expressing differences versus showing indifference; succumbing to external & internal pressures and risking one's extrinsic rewards versus standing firm, compromising ethical principles for the perceived greater good, and so on. In the oil industry, one often lands in a quandary when there are demands to cut down the budget on exploration and increase expenditure on development to meet government production targets. Similarly, there is often pressure to 'over-produce' a field (with consequent damage to it) rather than adhering to the optimum production profile. In most cases, it is sacrificing the long-term greater good to short-term lesser benefit. The raison d'être is to seek personal glory in one's tenure by 'pleasing the boss'.

Ethics and Law

Ethics seeks to address questions such as how a moral outcome can be achieved in a specific situation (applied ethics), how moral values should be determined (normative ethics) and what morals people actually abide by (descriptive ethics). It also addresses the fundamental nature of ethics or morality itself, including whether it has any objective justification (meta-ethics), and how moral capacity or moral agency develops and what its nature is (moral psychology).[4] Traditions, beliefs, customs, and religion are special to one's family, social/religious sect, community, caste, etc. Thus, it may be irreligious for a Hindu to eat beef or a Muslim to drink alcohol in an official party, but it is not unethical. Ethics is beyond law. Ethics pre-supposes conformity with law and is often concerned with what could be legal but yet unethical. Thus, tailor-making job specifications to suit particular individuals, misguiding stakeholders through unrealistic forecasts, and postponing critical decisions for extraneous reasons, may not be illegal but are certainly unethical. Doing down fellow professionals, either in public or private, may not be illegal but is unethical. Recently, the

[4] *http://en.wikipedia.org/wiki/Morals*

Maharashtra Government has decided to sell a 208-km stretch of a major river – the Nira and the Deogarh dam on it – to the highest private bidder.[5] The project involves completion of the Nira-Deogarh project to irrigate farmland for which the State does not have Rs. 1000 crores to complete the project. The developer/consortium will recover investment through levy of water charges for irrigation and domestic use. Water is a people's basic right. Is it ethical for some one to profit from it?

However, illegalities are always unethical. Fudging range classification results or hiding malaria cases to please one's seniors under the garb of loyalty to the seniors is both illegal and unethical. The common defence is that the commanding officer is the 'ma-baap' and hence his desire is an order forgetting that such fudging is most unfair to the soldier both in peace and in battle. There are many instances where one is not sure of the legality or ethicality. One has to live with one's conscience and take a call e.g. claiming one's entitlements without actually using them (travel, furnishings, servants, house rent, etc). Ethics, thus, goes far beyond structure, systems and legal provisions. It has intimate relationship with professionalism and personal values.

Great Causes and Great Compromises

"Great causes accommodate great compromises".[6] However, the accommodation is always at the cost of ethics. Take for example funding for elections in a democracy. While democracy is a great cause, the funded politician either gets obligated to return the favour or has to make enough money illegally to make up the borrowed funds. Another example is of advertising in the open market economy of products having adverse effect on the fragile minds of women, e.g. advertisement of lightening of complexion is of a serious psycho-sociological concern because it smacks of colour discrimination. Again, competitiveness results in scandals, such as accepting an office-for-profit, which might not have remuneration but has vast powers to misuse. This encourages patronage and institutionalises actions such as 'putting in a word', 'net-working', 'pull', etc, especially for jobs to top civil and defence personnel after retirement. In all these cases, ethics gets no recognition.

Ethics and Professionals

Professionals, both military and civil, derive their authority basically from their knowledge and skills. The knowledge worker, according to Peter Drucker has mobility and

[5] *Datta, Saikat, "Rs. 1000 Crore? The River is yours", Outlook, 17 December 2007*
[6] *Gandhi, Gopal Krisha, "Simply Not Done", Outlook, 17 December 2007*

does not derive his strength from the organisation. In fact, the organisation derives its authority and strength from professionals. Professionals do not merely follow the decision-making criteria assumed within the organisation but seek to influence them. Professionals develop a set of values, which are unique and they are more attuned among themselves than among the other employees of their organisations. Generally, the professionals rank their professional values higher than those of the organisation in which they are serving. This is how the concept of professional integrity has come in. The integrity of the profession thus takes precedence over the interest of the organisation. This is something over which we have to ponder. There is often a clash between the integrity of the profession and the interest of the organisation. There are examples e.g. misuse of Supply & Services Imprest by employing porters as cooks and orderlies, re-appropriating Field Practice & Training Grant for erecting structures solely for the benefit of the officers, etc. An interesting incident was one of my employers stating in the letter to the government that Phillips possessed dual technology to vary the proportion of ethylene and propylene in a naphtha cracker project. In fact, Phillips then did not have the technology but my employer insisted that I include it in the letter to the government to meet with the government regulations. What does one do in such a case when the boss says, "Do not worry; the government will cooperate!" It is obviously unprofessional and unethical to sign such a letter.

The following are the distinctive attributes of a professional, most of which fit the military professional also:

- A commitment to a profession, which has a set of normative and behavioural expectations,
- Specialised education and training of substantial duration,
- Membership of an association comprising of similarly trained and practicing individuals for the purpose of protecting and enhancing the interest of the profession, and
- A service orientation keeping in view the requirement of the stakeholders, the society and finally of the country:

Thus, the marketing and advertising professionals have a code (the advertising companies are liable to be 'black-balled'); the chartered accountants have it as also the HR professionals, the cost accountants, the chemical engineers, the lawyers and so on. It is for this reason, that several professional associations such as those of the management accountants, financial analysts, human resources specialists, behaviour scientists, psychiatrists, medical professionals, engineers etc., have been taking a closer look at their current codes and improving their content as well as communication strategies. There is of course a credibility gap in concept and implementation. While these associations lay down codes of conduct, fees, etc, it is not always that they take rectifying actions in case of violations. In the services, there is no central 'associations' to ensure adherence to honour codes because uniformed services perhaps look with suspicion at all 'collectives', 'associations' and 'unions', which are debarred legally. The Army engineers have an Institution of Military Engineers, which does not specifically address itself to honour codes.

In the Army, there are strong ties between and serving and the retired soldiers. There are re-unions once in four years, approved by the government. However, I doubt if the topic of honour codes gets any importance.

Some Examples of Honour Codes

At the NDA & IMA, there is an honour code with an Academy Honour Board and an Academy Honour Committee for implementation. Reports suggest that the system is dormant. As the Honour Code requires implementation from top down, it is necessary that the military adopts a strategic approach at the super structure and practical functioning through human resource intervention.

WIPRO has an elaborate literature on 'beliefs'. In brief, the beliefs are:

- Respect the individual,
- Achieve and maintain a position of leadership in each of the businesses,
- Govern individual and company relationships with the highest standards of conduct and integrity,
- Serve internal and external customers through defect-free products, services and processes.

As a rule, directors and senior managers are to avoid conducting company's business with a relative or any person or firm, company, association in which the relative or other person is associated in a significant role. The definition of 'relative' is in the company's act. On a study of the corporate governance code of conduct of a few companies, one finds some common features:

- Insider trading and commercial confidentiality,
- Acceptance of gifts or favours from the company or its clients,
- Transparent and ethical conduct,
- Full, fair, accurate, sensible, timely and meaningful disclosures,
- Compliance of applicable laws, rules and regulations,
- Addressing misuse or misapplication of company's assets and resources,
- Fair and equitable treatment and accountability to all the stakeholders (customers, shareholders, employees and the society),
- Negative ethos to define precisely, 'what we shall not do', e.g. violate local laws, dilute moral standards, engage in unethical practices, engage with anti-social elements tell lies or tattle-tale or tolerate these traits in others, etc.

General Propositions on Ethics

Some useful propositions by Lacznaik on Ethics are as follows:

- Ethical conflicts and choices are inherent in all decision-making,
- Proper ethical behaviour exists on a plane above the law. The law merely specifies the lowest common denominator of acceptable behaviour,
- There is no single satisfactory standard of ethical action agreeable to everyone that an officer or a manager can use to make specific operational decisions,
- The discussion of cases or of situations having ethical implications in the profession can make officers and managers more ethically sensitive.
- There are diverse and sometimes conflicting determinants of ethical actions,
- These stem primarily from the individual, from the organisation, from professional norms, and from the values of the society,
- Individual values are the final standard, although not necessarily the determining reason for ethical behaviour,
- Consensus regarding what constitutes proper ethical behaviour in a decision-making situation diminishes as the level of analysis proceeds from the abstract to specific,
- Top management sets the moral tone of an institution,
- The lower the organisational level of a professional, the greater the perceived pressure to act unethically,
- Individual officers and managers perceive themselves as more ethical than their colleagues,
- Effective codes of ethics should contain meaningful and clearly stated provisions, along with enforced sanctions for non-compliance,
- Employees must have a non-punitive, fail-safe mechanism for reporting ethical abuses in the organisation,
- Every organisation should appoint a top-level officer, manager or director to be responsible for acting as an ethical advocate in the organisation.

Trusteeship in Boards

The directors of the board or the higher command in the armed forces are those esteemed individuals with whom the collective human and material wealth is vested, and in whom the employees' future is reposed and institutional survival trusted. In a Gandhian sense, these individuals are repositories of professional skills and values. They are also truly the trustees of human welfare. This authority needs to be exercised with a high degree of sensitivity arising out of consciousness regarding ones' professional obligations and intellectual capability to analyse the trades-off.

Why do People take Unethical Decisions?

Research has indicated that apart from lack of training and sensitivity to ethics there are five major rationalisations often used while committing unethical actions (inaction could also be an unethical act):

- The action is within reasonable ethical limits,
- The action is in the best interest of the organisation,
- He/she is expected to act in that manner by superiors,
- The action will never be found out or publicised,
- The action may be condoned and may even be protected.

Institutionalising Ethics

There are several methods suggested for institutionalising ethics, of which, the following are the more important:

- Appointment of an ethics committee, comprising of a few members of the board or management or both,
- Appointing an ethics counsellor who is the most acceptable, approachable and credible member of the top management or an advisor,
- Adoption of a code of value statement/ethics statement:

Sensitisation

The evidence so far suggests that sensitisation to ethics does not happen through sermons but is to be achieved through a carefully designed anecdotal process, combining the deeper issues of institutional conduct, the demands of professionalism and most importantly, an awareness regarding personal goals and values. It is possible and necessary to launch a major country wide project on ethics training through innovative and cost effective communication strategies and aimed at all employees including the directors on the board and top ranks from the military and civil services. This sensitisation project will lend the sufficiency dimension to the governance process.

Conclusion

It is apt to sum up this article on Ethics by stating that all successful organisations have achieved high ethical standards and that the cutting edge for ensuring good governance is an enabling value-frame and sensitivity to ethics. A strategic approach at the super structure and practical functioning through human resource intervention is necessary.

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Note:

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- The author is also deeply indebted to the authors of The Code of Best Practice from the Cadbury Committee Report, BHP, Videocon Industries, Ingersoll-Rand, and Wipro.

Energy Security and the National Interest

By: Dr R K Pachauri, Director-General, The Energy & Resources Institute (TERI)

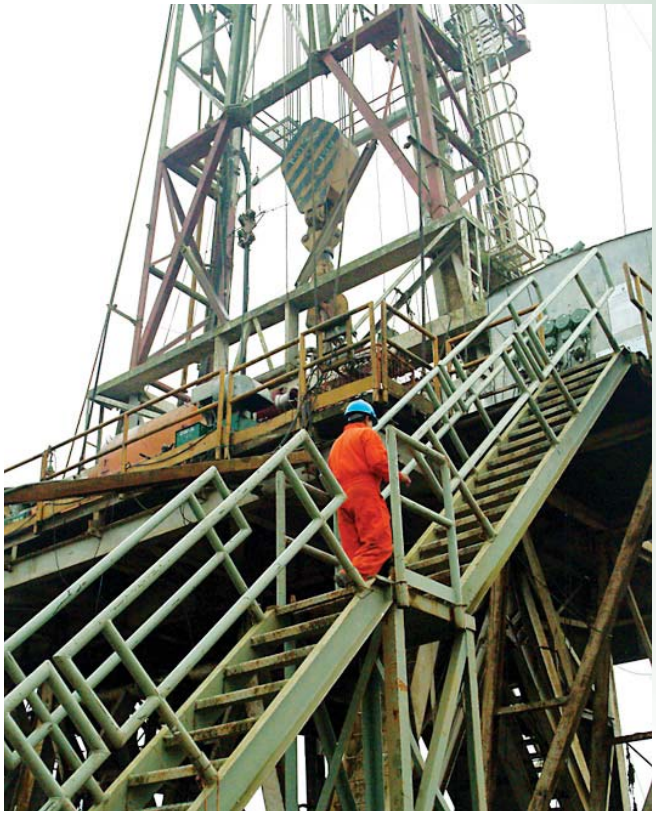
Dr Rajendra K Pachauri assumed his current responsibilities as the Chief Executive of TERI (The Energy and Resources Institute) in 1981, first as Director and, since April 2001, as Director-General. In April 2002, Dr Pachauri was elected the Chairman of the Intergovernmental Panel on Climate Change, established by the World Meteorological Organization and the United Nations Environment Programme in 1988. IPCC along with former Vice President Al Gore has been awarded the "Nobel Peace Prize" for the year 2007. He has been active in several international forums dealing with the subject of climate change and its policy dimensions. He was conferred with the "Padma Vibhushan", second highest civilian award, for his services in the field of science and engineering in January 2008 by the President of India. To acknowledge his immense contributions to the field of environment, he was awarded the Padma Bhushan by the President of India in January 2001. He was also bestowed the "Officier De La Légion D'Honneur" by the Government of France in 2006.

Commencing his career with the Diesel Locomotive Works, Varanasi, where he held several managerial positions, Dr Pachauri joined the North Carolina State University in Raleigh, USA, where he obtained an MS in industrial engineering in 1972, a Ph.D. in industrial engineering and a Ph.D. in economics. He also served as Assistant Professor (August 1974-May 1975) and Visiting Faculty Member (Summer 1976 and 1977) in the Department of Economics and Business. He has also authored 23 books and several papers and articles.

It is reported that a century ago Lord Selborne, the first lord of the Admiralty in Britain contemptuously dismissed the possibility of fueling the British navy with any source of energy other than coal, which Britain had in great abundance. He is reported to have said "the substitution of oil for coal is impossible because oil does not exist in this world in sufficient quantities". It was seven years later that a young Member of Parliament named Winston Churchill was appointed first lord and charged with the responsibility of establishing superiority of the British naval force over the growing power of the German navy. Churchill visualized that a switch to oil would increase ship speed and reduce the time for refueling, which would provide a strategic advantage. Hence, the British navy very soon embarked on building a fleet that consumed oil instead of coal. This was a strategic choice, which proved crucial in Britain's victory over Germany in the two World Wars of the 20th century. Two important lessons can be derived from this brief anecdote. Firstly, enlightened energy choices promote the economic interest of a nation and certainly its military and strategic objectives. Secondly, energy policy, as this choice reveals, is not merely an issue of taking decisions on the supply side, but also in restructuring demand for a preferred fuel through the exercise of forward vision.

The growing abundance of oil supply throughout the 20th century and the control exercised by developed countries over global oil reserves were of critical importance in setting a global trend. Accordingly, the entire transport fleet of the US and the spatial dispersion of work places and residential areas were influenced directly by the expectation of continuing supply of cheap oil. Today, the US consumes almost 20 million barrel of oil a day with growing dependence on imports against the reality of declining domestic supply. The rest of the world has by-and-large followed the American dream of ownership and intensive use of the private automobile. It is only in the last 30 years or so that Europe and Japan have made a major departure from the American pattern of transport through substantial investments in public transport systems, particularly in the railways for intercity and other mass transit systems for intra-city travel. These nations, therefore, are far less vulnerable to disruptions in oil supply or sudden increase in prices of oil in the global market than is the US.

India inherited a modern and extensive railway system at the time of independence, and while economic development certainly required the growth and development of a modern highway system, it would have been prudent to bring about an integrated growth of transport infrastructure which enhanced the strength of the railways with roadways as a feeder system. Unfortunately, the decline in efficiency of the Indian Railways and inability to modernize rapidly have resulted in a substantial shift of the share of transport, both passenger and freight, from rail to road. This is clearly against the objectives of energy security for India, because the road transport system depends



totally on liquid fuels, increasing India's vulnerability to sudden price increases in the global oil market. Overall, the Indian economy has become increasingly oil intensive and remains largely inefficient in the use of energy.

How can we then attain security of energy supply? Firstly, there is no shortcut to greater exploration for hydrocarbon resources both in this country as well as in other prospects to which we may gain access in other countries. Secondly, a restructuring of energy demand is essential, including strengthening of the Indian Railways through a more dynamic management structure and greater emphasis on technological upgradation. The building sector in India, in particular, remains highly energy intensive, a condition which will worsen with higher incomes, expanding population, particularly in urban areas, and a total disregard for energy efficient design and construction, the prime fault for which lies with the government.

There is also a growing need for diversification of energy supply, with greater emphasis on using renewable forms of energy, such as wind, solar and biomass, particularly agricultural residues and biofuel crops. TERI is engaged in research on the entire cycle of growth, conversion and utilization of biodiesel from the plant Jatropha, which can grow extensively on wasteland in this country. The neglect of solar water heating in homes and commercial establishments shows a policy distortion, which needs urgent correction. At the same time, given our vast resources of coal, there is need for developing coal gasification technology, because this would reduce energy consumption for transportation of coal, and at the same time improve the efficiency of power generation as against the current practice of burning coal in power plants.

The cost of inaction on the energy security front would not only sap India's economic strength, but would also make us the victim of constrained foreign policy choices that may go against our national interest. The current structure of government, unfortunately, appears incapable of tackling the complex and integrated nature of the energy challenge. Since we have a Prime Minister who understands these issues fully, one hopes that he would be able to bring about a substantial change not only in the structure of policy formulation in the energy sector but also in its process, which would require much greater support from institutions outside the government.

N.B.: *This article was published by DNA, Mumbai*

Address by CMD, OIL, Shri M.R.Pasrija at the India Oil & Gas Summit, New Delhi organized by Indian Chamber of Commerce, Kolkata, in March, 2008

Ladies & Gentleman.

It is indeed an honor to be present here in the midst of this august gathering. I am here today to share with you my view of our industry - one that is clearly optimistic and which sees a bright future of the oil industry. I believe that the oil & gas industry will grow, and that innovations and technology will provide us tools to meet the growing energy needs of the growing economy. But there are many challenges to be met along the way if we are to fulfill the country's aspirations for a better quality of life. The main challenges will be (i) to meet the explosive increase in the global energy demand, (ii) to search for hydrocarbons in logistically difficult areas, (iii) keep the cost of energy production low and finally (iv) to attract substantial and steady flow of capital in search for hydrocarbons.

Oil and gas forms a major part of the primary energy supply in the country. With a population of over 1100 million, driven by the demand in electricity generation, industry and transportation, the annual crude oil demand is expected to reach 244 mmt by 2010 and 370 mmt by 2020. The natural gas consumption is expected to touch about 2.8 TCF in 2010 and 5 TCF in 2020. This will lead to an ever increasing dependence on imports which could become as high over 90% by 2020. Added to this, there is a risk that India could be vulnerable to interruption of gas and oil flows from politically unstable areas. This makes our job – people of oil and gas industry more challenging. We have to enhance the indigenous crude oil and natural gas production at very fast pace to bridge the gap between the indigenous production and likely demand. In India, we can see two distinct areas of technological challenges.

India has estimated total hydrocarbon resources of the order of 28 billion tonnes of oil and oil equivalent gas. Out of which in-place 8.99 billion tonnes and ultimate reserves of 3.37 billion tonnes only have been established. Based on the prognostication of the oil and gas reserves there might be still large amount of reserves, but, these reserves will be more difficult to access and will require innovative technology. Such reserves may be lying in deeper and hostile waters and frontier basins. These reserves are more difficult to explore, develop and produce and will require major technological advances in large numbers of disciplines. India also has a host of matured oil and gas blocks characterized by ageing large fields and ever declining size of new fields to be discovered or developed.

Here I would like to read an interesting quote by Parke. A. Dickey –

"We usually find oil in new places with old ideas. Sometimes, we also find oil in an old place with a new idea, but seldom do we find much oil in an old place with an old idea. Several times in the past, we had thought that we were running out of oil, whereas we were actually running out of ideas"

A time has come for us to take stock of the existing technology and look at the technologies that need to be developed and applied to unlock these difficult reserves and revitalize and redevelop ageing fields. These technological advances will accelerate the pace of exploration, new discoveries, and enhancement of production which will benefit all the stakeholders of the industries including Government and oil companies. A focused and synergetic approach is required to face the challenges in E & P.

In the last six rounds of NELP, PSCs for 162 Blocks have been signed.

Substantial work is going on in the NELP round acreages and these should show good results in the near future. Heart warming discoveries in the east coast of India have given lot of hope and encouragement for deep water exploration, which need to be enhanced at a very fast pace so that time between discovery and production can be reduced.

Global statistics today show that out of the new reserves added, 75% reserves addition comes from improved reservoir management, whereas 25% comes from exploration. The existing fields need to be applied with the new technologies for better reservoir management and we will have to put efforts for higher rate of recovery, say about 50% for oil and 75% for gas.

Seismic Survey in Progress in Libya in OIL's Block 86

As of date in the country, the reserve to production ratio is hovering around 19% for oil and 28% for gas. Using new technology for IOR such as 3D seismic, 4D seismic sequence stratigraphy, petrophysical analysis, better reservoir characterization , horizontal well drilling, multilateral drilling, drain holes, reservoir simulation etc, we can aim to bring down R/P ratio for oil at least 14-15.

In India, there are a number of oil and gas fields which are generally overlooked, very often, due to pressure to produce from larger and easy to produce fields. Steps have been taken in the past to attract foreign oil companies to participate for enhancement of oil production for small fields, and with the price of crude oil hovering around US$ 100/bbl, it is now commercially viable to produce from such fields.

India will need to discover more indigenous oil and gas at very fast pace to meet the impending challenges. Based on the prognosticated reserve assessments, still large amount of hydrocarbon reserves are to be discovered in the country. A synergetic multi-pronged approach including intensification of exploration, particularly in deep water areas & frontier basins, revitalizing of old fields and better reservoir management is to be applied to improve the indigenous oil and natural gas production. Cost effective new technologies in all activities viz. exploration, drilling, development, production etc. are going to play very important role in the discovery of future oil and gas. Last but not least, high level of cooperation between the operators is going to play a significant role in cost effective, efficient and fast track result in exploration and production.

"Don't equate activity with efficiency. You are paying your key people to see the big picture. Don't let them get bogged down in a lot of meaningless meetings and paper shuffling. Announce a Friday afternoon off once in a while. Cancel a Monday morning meeting or two. Tell the cast of characters you'd like them to spend the amount of time normally spent preparing for attending the meeting at their desks, simply thinking about an original idea."

— Harvey Mackay

Global Energy Security: Treats and Challenges

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She has her Master of International Relations from School of International Studies, Jawaharlal Nehru University. She has also Master of Business Management (International Marketing) from Tarbiat Modares University, Iran. She served in the Iranian Ministry of Petroleum as a researcher in Petroenergy Information Network, 2001-2004. Ms. Vakhshouri served also in the National Iranian Oil Company (NIOC International) as Market Analyst, 2004-2005. She has a special interest in oil industry and attended and presented papers at various national and international seminars relating to oil and energy. Ms. Vakhshouri has edited various articles in which she focuses on energy and oil industry. Her current research interests and specialization includes energy and security.

Ms Vakhshouri wrote this article when crude oil was hovering around US# 130/bbl.

Energy as the most important production factor plays a great role in different aspects of the life. For many decades till recent years energy security is seen as an issue of industrial energy consumers. It was translated and interpreted as the on time, affordable, continuous and reliable supply of energy (especially oil) to their economy.[1] This is a unilateral approach toward energy security.

According to the 2007 BP statistical review, oil constituted around 37 percent of global energy consumption in 2006 followed by coal (27 percent) and natural gas (24 percent).[2] Furthermore, the transport and aviation sectors, the lifelines of any modern economy, are still totally depending on oil where no other fuels have been able to make progress.3 Around 98 percent of the energy used for road and air transport is based on fuels derived from oil.[4] Given the essential role of energy to world economic growth and indeed to contemporary civilization, from transportation to health care delivery and food production, and the huge financial cost required to sustain timely provision of energy, it is understandable why there is so much concern about energy security.

Realization of booms and recessions in oil markets revealed the main cause of instability and cyclical behavior in oil market. Huge investment in 1980s and creation of considerable excess capacity led to lower oil prices, lower profitability and higher opportunity costs for producers. Low profitability in the upstream caused less investment and accordingly creation of imbalances between oil supply and demand and a non-stabilized oil market.[5]

The Concept of Energy Security

The energy literature and numerous statements by officials of oil-producing and oil-consuming countries indicate that the concept of energy security is elusive. Definitions of energy security range from uninterrupted oil supplies to the physical security of energy facilities to support for bio-fuels and renewable energy resources. Historically, experts and politicians referred to "security of oil supplies" as "energy security". Only recently policy makers started worrying about the security of natural gas and LNG supplies.[6]

The current global energy security system has emerged largely in response to the 1973 oil embargo. Since then, it has evolved slowly and is based on: coordination on sharing oil supplies and oil stocks in cases of emergency and disruption; pursuing policies of energy conservation and promoting efficiency measures; monitoring and analyzing the oil market; increased transparency in the oil market data; and, more recently, engaging in constructive dialogue with oil producers.[7]

Unlike the 1970s when oil dominated the energy policy debate, the concept of energy security has broadened to include the security of other sources of energy such as gas

1 Mazraati Mohammad, Two faces of energy security: Energy Supply and Demand, The 12th IIES international oil and gas conference, Development in geopolitics of energy; the role of natural gas, December 9-10, 2007, Tehran, Iran
2 BP statistical review,2007
3 Vakhshouri Sara. Energy Security and Middle East Dilemma, Energy Spectrum, Iran, Vol.1, No 6, Sep 2007
4 Ibid
5 Ibid
6 Alhajji A.F., What Is Energy Security? Definitions and Concepts, Middle East Economic Survey, VOL. L, No 45, 5-November-2007
7 Fattouh Bassam, How Secure Are Middle East Oil Supplies?, Oxford Institute for Energy Studies, September 2007

and electricity.[8] In this respect, oil is by far the most tradable fuel and therefore presents fewer problems in terms of security when compared to other less tradable fuels.[9] Energy security has also become intertwined with environmental concerns which place restrictions on the choice of future fuels. Despite these new aspects of energy security, oil still occupies a central location in the policy debate. This is expected, although the importance of oil as a percentage of GDP has declined in most developed countries in the last thirty years but it still constitutes the world's most important source of energy.[10]

Energy Security and Energy Crisis

To gain a deeper understanding of energy security, it might help to understand the relationship among energy security, energy crisis, and the various threats to energy security.[11] Energy insecurity does not mean energy crisis, and it does not necessarily lead to an energy crisis. The existence of threats to energy security increases the risk of an energy crisis, but does not necessarily lead to one.

An energy crisis is "a situation in which the nation suffers from disruption of energy supplies accompanied by rapidly increasing prices that threaten economic and national security"[12], the most valid example is the extraordinary hike of today oil price which now is above US$ 130 per barrel. Energy crisis has two elements: a decline in GDP growth, usually a recession, and a threat to national security.[13] While the first element is very clear and can be measured, it is difficult to determine the second or to measure it. Does a threat to national security means a reduction of energy supplies needed to fight a war or defend a country against foreign aggression? Or does it mean restrictions on foreign policy options? For instance the US considers any decrease in oil exports that limits US foreign policy options to be a threat to national security.[14]

The concept of energy security remains unclear even if we strip it of its national security dimension. Some experts define energy security as a "reliable and adequate supply of energy at reasonable prices."[15] The term "adequate supplies" is very clear: it means "uninterrupted supplies." But what are "reasonable prices"? Are they from the consumers' point of view or producers' point of view? In fact, the only way that reasonable prices can enhance energy security is when they are high enough to guarantee adequate return on investment for oil producers and low enough to stimulate economic growth in the oil consuming countries. Low oil prices are as dangerous to energy security as high prices.

Experts who believe that market forces are the best guarantee for achieving energy security say that considerations of reasonable prices should not be part of the equation, especially given that prices, high or low, are the results of these forces. In fact, it is unclear how "reasonable prices" can enhance energy security when most OECD countries impose hefty taxes on petroleum products.[16]

Thus, the only clear dimension of energy security is the economic dimension. But what about the other dimensions? Can the principles of energy security that various OECD countries employ help us understand the concept of energy security? Almost all industrial countries, especially the US, base their energy policies on four principles:

- Diversity of energy supplies
- Diversity of oil imports
- Reduced dependence on West Asian oil
- Low oil price volatility

The above principles show that policy makers have historically limited the concept of energy security to oil. This should not come as a surprise since oil is the most tradable energy resource. However, the increased trade in natural gas and LNG has already brought those two commodities into recent discussions of energy security, especially after the cut-off of Russian natural gas to Europe and the expected increase in LNG trade.

Treats to Energy Security

Access to cheap energy has become essential to the functioning of modern economies. However, the uneven distribution of energy supplies among countries, and the critical need to widely access energy resources, has lead to significant vulnerabilities. Threats to global energy security include political instability of energy producing countries, underinvestment in the petroleum industry, competition over energy sources and the possibility of attacks on supply infrastructure and uncertainty of the flow of export.

- Political Instability

Crude oil prices behave much as any other commodity with wide price swings in times of shortage or oversupply. The crude oil price cycle may extend over several years responding to changes in demand as well as OPEC and non-OPEC supply.

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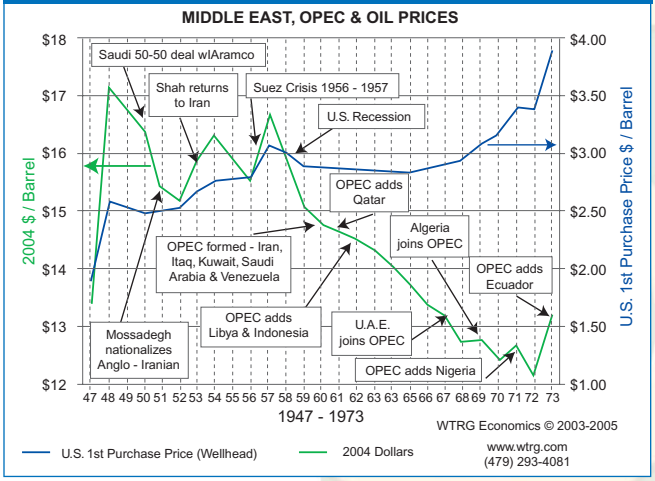
[8] *Gandhi, Gopal Krisha, "Simply Not Done", Outlook, 17 December 2007*
[9] *Vakhshouri Sara, Energy Security, Emerging Challenges. Strategic Affairs, India, July 2007*
[10] *Ibid*
[11] *Vakhshouri Sara, Energy Security and Middle East Dilemma, Energy Spectrum, Iran, Vol.1, No 6, Sep 2007*
[12] *Williams, James and Alhajji A F, "Parallels with earlier energy crises underscore US vulnerability to oil supply shocks today?" ,Oil and Gas Journal, Vol 101, No 5, February 2003.*
[13] *Yergin Daniel, 2007, the fundamentals of energy security, CERA special report*
[14] *Alhajji A.F, What Is Energy Security? Definitions and Concepts, Middle East Economic Survey, VOL. L, No 45, 5-November-2007*
[15] *See, for example, "RIS Background Paper on India's Energy Security" conducted by the Center for Research and Information System for Developing Countries, an Indian government backed organization.*
[16] *Alhajji A.F, What Is Energy Security? Definitions and Concepts, Middle East Economic Survey, VOL. L, No 45, 5-November-2007*

Crude Oil prices ranged between $2.50 and $3.00 from 1948 through the end of the 1960s. The price oil rose from $2.50 in 1948 to about $3.00 in 1957. When viewed in 2004 dollars an entirely different story emerges with crude oil prices fluctuating $15 to $17 during the same period. The apparent 20% price increase was just keeping up with inflation.[17]

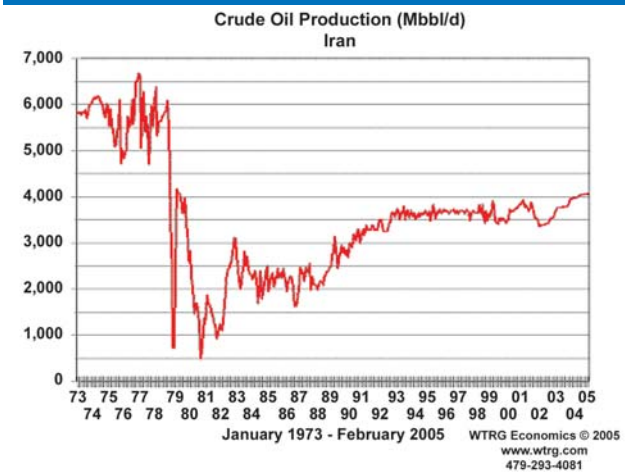
From 1958 to 1970 prices were stable at about $3.00 per barrel, but in real terms the price of crude oil declined from above $16 to below $13 per barrel.[18] The decline in the price of crude when adjusted for inflation was amplified for the international producer in 1971 and 1972 by the weakness of the US dollar.

Middle East, OPEC and Oil Prices 1947-1973[19]

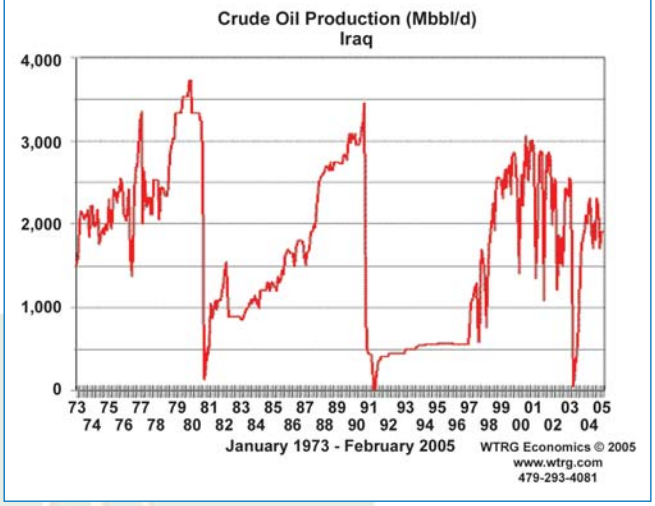


In the last 50 years or so, the Middle East has witnessed many devastating wars: the 1956 Suez Canal war; the 1967 and 1973 Arab–Israeli wars; the Iraq imposed war against Iran in the 1980s; the Iraqi invasion of Kuwait in 1990; and most recently the US and British invasion of Iraq.

Iran Oil production 1973-2005[20]



Iraq Oil production 1973-2005[21]



The impact of wars and civil conflicts on oil supplies is twofold. First, it usually results in medium- to long-term supply losses as it reduces the ability of the country to produce and export oil. Second, it affects the long-term productive capacity of countries by hindering investment. The US invasion of Iraq is a prime example of these impacts. In 2003 many oil experts, both Iraqi and non-Iraqi, expected that production would return to its pre-Kuwait invasion level of 3.5 mb/d one or two years after the US invasion of Iraq. Other more optimistic observers projected that sanctions-free Iraq could increase its production capacity 'beyond' 8 mb/d, competing with or even replacing Saudi Arabia's prominent position in the oil industry. The reality, however, has been quite different. Four years after the invasion, the security situation is yet to be stabilized and Iraqi oil production has not exceeded 2.2 mb/d with exports not exceeding 1.6 mb/d. The best scenario now is one in which Iraq maintains its current production of 2–2.2 mb/d. Most importantly, the future of Iraq as one entity is highly in doubt.

The Iraqi case shows that wars and civil disputes do not only result in short-term loss of oil supplies but also affect the long-term productive capacity by preventing maintenance and hindering investment.

Underinvestment

The issue of underinvestment in the oil sector has become central to the energy policy debate.[22] The main fear is that the necessary investment in the oil sector would not be forthcoming

[17] *Vakhshouri Sara, Treats to Energy Security, Strategic Affairs, India., March 2008*
[18] *Ibid*
[19] *Energy Information Administration (EIA)*
[20] *Ibid*
[21] *Ibid*
[22] *Fattouh B, Mabro R. 2006. The Under-Investment Problem in the Oil Sector. In Oil in the 21st Century. Mabro R (ed). Oxford: Oxford University Press.*

and supply would then fall short of demand. Given that most of the oil reserves are in the Middle East, the issue of investment in the oil sectors of the region receives special attention. Many international organizations such as the IEA and EIA project that most of the increase in global demand for oil would be met by OPEC and especially the Middle East producers within OPEC. This would require that these Middle East oil exporters increase their investment. The IEA projected a rise in on Middle East and North Africa (MENA) oil production from the 2004 level of 29 mb/d to 33 mb/d in 2010 and 50 mb/d in 2030 in the reference scenario.[23] In this scenario, Saudi Arabia will remain the largest supplier, increasing its output from 10.4 mb/d in 2004 to 11.9 mb/d in 2010 and over 18 mb/d in 2030. The IEA predicts that the MENA share of world oil production would increase from 35% in 2004 to 44% in 2030 with four countries (Iraq, Kuwait, the UAE and Libya) increasing their shares.[24]

The IEA warns that this requires doubling of annual upstream investment in MENA which may not take place because MENA governments could choose deliberately to develop production capacity more slowly…or external factors such as capital shortages could prevent producers from investing as much in expanding capacity as they would like".[25] Many factors explain why Middle East oil exporters have not invested in the past and are currently reluctant to undertake rapid and large expansion programs despite the rise in the oil price. The most important factors are discussed in the following.

The large spare capacity and the oil price decline in the 1980s and most of the 1990s threw the industry into deep recession, reduced the attractiveness of existing investment plans and adversely affected the incentive to invest. This was accompanied by widespread demand pessimism and exaggerated expectations of non- OPEC supply. Geopolitics has also prevented capacity expansion in many members of OPEC. For example, the Iran–Iraq war, the Iraqi invasion of Kuwait, the US invasion of Iraq and the lack of security and instability that followed has prevented these countries from undertaking the necessary investment in their oil sectors.

Economic sanctions against Iran, Libya and Iraq limited the access to technology and foreign capital and hindered capacity expansion.

Flow of Export

The double dependence on oil and stable oil prices implies that oil exporters possess a very powerful weapon with which they can 'blackmail' oil- importing governments in order to obtain political objectives. This argument may suggest a lack of understanding of the nature of the market. Not only can the oil weapon prove costly for the country using it, but restricting oil exports would most often be ineffective and counterproductive.

To begin with, the oil weapon cannot be targeted against a specific country or group of countries. This is due to the nature

of the market where oil is easily and widely traded. Countries that are not blacklisted can obtain oil and then re-export it to countries under the embargo. Adelman makes this point forcefully when he argues that "whether a supplier loves or hates a customer (or vice versa) does not matter because, in the world oil market, a seller cannot isolate any customer and a buyer cannot isolate any supplier. But conventional wisdom… is that Middle Eastern nations wield an 'oil weapon' that they can use to punish the United States or any other nation."[26]

For the oil embargo to be effective, it should therefore mean a total cutback of global oil supplies. If the loss of oil due to the embargo is counteracted by increases in supplies from somewhere else, the embargo should have a temporary effect on oil market supplies or prices. It would only benefit other producers that have the ability to fill the shortfall. Hence, the effectiveness of an oil weapon depends to a large extent on whether market conditions are tight and the ability to

[23] *IEA, 2005*
[24] *Ibid0*
[25] *IEA, World Energy Outlook, 2005*
[26] *Adelman M. 2004. The Real Oil Problem. Regulation, 27(1) 16–21.*

convince or pressure other producers to also implement supply cuts- something which is very difficult. Disagreement on oil embargos and export cuts is the norm rather than the exception. An agreement on export cuts has only occurred once in 1973, when a large group of Arab producers decided to cut exports to countries.

Energy Transportation

Supply of Crude oil from the well to the refinery and from there to the service station requires a complex transportation and storage system. Millions of barrels of oil are transported every day in tankers, pipelines and trucks. This transportation system has always been the Achilles heel of the oil industry. [27]

Tankers and pipelines are very vulnerable targets. Tankers are too slow and they don't have any protection and they have nowhere to hide. There are approximately 4,000 tankers plying the world's oceans.[28] Each of them can be attacked in the high seas or while passing through narrow straits. Geography forces the tankers carrying much of the world's oil supply to pass through one or more of three narrow straits -- the entrances to the Red Sea (Bab-el-Mandeb) and the Persian Gulf (Strait of Hormuz) and the Straits of Malacca between Indonesia and Malaysia. (A quarter of the world trade passes through the Straits of Malacca, including half of all sea shipments of oil bound for East Asia and two thirds of global liquefied natural gas shipments.)

Pipelines through which about 40% of world's oil flows, are no less vulnerable.19 They run over thousands of miles and across some of the most volatile areas in the world. A simple explosive device could puncture a pipeline deeming it non-operational. Due to their length, they are very difficult to protect.

Sanctions

In the long history of oil, unilateral and multilateral sanctions have been widely used against oil-exporting countries. The US has been the most active in using sanctions as a tool of foreign policy to induce change behavior in regimes.[30] The effect of sanctions depends on their type and oil market conditions. Multilateral sanctions under the United Nations could have negative influence on the security of supply as they have the effect of the oil exports from the targeted country. Multilateral sanctions adversely affect the country's productive capacity by limiting foreign investment and technology transfer in the oil sector.[31]

Unilateral sanctions, on the other hand, do not necessarily affect the flow of oil from the country under sanctions. This would cause some temporary inconvenience as the oil exporter establishes new trade partners and seeks new customers. In the short term, therefore, the impact of unilateral sanctions is rather limited. However, if unilateral sanctions are kept for a long time, they would ultimately affect the productive capacity of exporters. For instance, the Iran–Libya Sanction Act (ILSA) imposed by the US against Iran and Libya (it no longer applies to Libya) prohibited international oil companies from investing in the oil sectors of these countries, curtailing their long-term production capacity.

Conclusion

Energy security has repeatedly emerged as an issue of great importance, and it is so once again today with the unprecedented hike of oil price. But the subject now needs to be rethought, for what has been the paradigm of energy security for the past three decades is too limited and must be expanded to include many new factors.

Energy security is mostly refers to oil and gas security. Traditionally, energy security was considered as the aspiration of energy consumers to receive adequate energy at affordable price and at the right time. But the concept of energy security has changed nowadays. The current global energy security system has emerged largely in response to the 1973 oil embargo. Some experts define energy security as a "reliable and adequate supply of energy at reasonable prices." Energy security has also become intertwined with environmental concerns which place restrictions on the choice of future fuels.

Threats to global energy security include political instability of energy producing countries, underinvestment in the petroleum industry, competition over energy sources and the possibility of attacks on supply infrastructure and uncertainty of the flow of export.

[27] *Fattouh Bassam, How Secure Are Middle East Oil Supplies?, Oxford Institute for Energy Studies, September 2007*
[28] *Rodrigue J-P. 2004. Straits, Passages and Chokepoints: A Maritime Geostrategy of Petroleum Distribution. Les Cahiers de Geographie du Quebec.*
[29] *Fattouh Bassam, How Secure Are Middle East Oil Supplies?, Oxford Institute for Energy Studies, September 2007*
[30] *Canes, M. 1997. Impacts of Oil Sanctions in World Markets. American Petroleum Institute. Issue analysis, 101, December.*
[31] *Ibid*

Ethanol - best bet for India

By: Arun Kr.Singhal, Chief Editor, DEW Journal (www.dewjournal.com)

The fact that crude oil supplies are limited is accepted unanimously. Globally oil and gas have taken an important place as a vital component for economic growth and development of any country. Energy demand including petroleum is also set to rise. Developing countries like India and China are expected to account for the bulk of fresh demand. However, going by recent trends, the supply of crude oil doesn't seem to be keeping pace with the demand. According to some experts, we have already reached or are on the verge of 'peaking oil' after which the global oil production will stagnate and then decline. This, together with the continuing hike in oil price has renewed the search for alternatives to petroleum.

There are presently various alternative sources available like renewable energy (wind, solar, hydro and biomass), Coal Bed Methane, Compressed Natural Gas. In the long-term energy scenario, the transition to these energy sources is very crucial. These sources are environmentally friendly and have enormous potential. In some countries efforts have been intensified to accelerate the development for meeting the global energy needs with the gradual substitution of fossil fuels.

As of now, unconventional oil reserves like the Canadian oil sands and bio-fuels like ethanol are in the limelight. While these sources will satisfy a big chunk of the incremental demand for energy, they will still be a fraction of the conventional oil production.

Reserves of non-conventional oil are estimated to be far larger than crude oil reserves (about 6 trillion barrels - three times the reserves of conventional oil). The largest of the known heavy oil reserves are in Venezuela and Canada.

Biofuels like ethanol have been successful in countries like Brazil, Sweden and others. Ethanol is a byproduct of the sugar industry which is blended with petrol.

Other countries are either producing or using ethanol in large quantities or are providing incentives to expand ethanol production and use. Brazil and Sweden are using large quantities of ethanol as a fuel. Some Canadian provinces promote ethanol use as a fuel by offering subsidies of up to 45 cents per gallon of ethanol.

India is initiating the use of ethanol as an automotive fuel. A move has been made by distilleries in India to use surplus alcohol as a blending agent or an oxygenate in gasoline. Based on experiments by the Indian Institute of Petroleum, a 10 percent ethanol blend with gasoline and a 15 percent ethanol blend with diesel are being considered for use in vehicles in at least one state. In France, ethanol is produced from grapes that are of insufficient quality for wine production. Prompted by the increase in oil prices in the 1970s, Brazil introduced a program to produce ethanol for use in automobiles in order to reduce oil imports. Brazilian ethanol is made mainly from sugar cane. Pure ethanol (100% ethanol) is used in approximately 40 percent of the cars in Brazil. The remaining vehicles use blends of 24 percent ethanol with 76 percent gasoline. Brazil consumes nearly 4 billion gallons of ethanol annually. In addition to consumption, Brazil also exports ethanol to other countries.

Sweden has used ethanol in chemical production for many years. As a result, Sweden's crude oil consumption has been cut in half since 1980. During the same time period, the use of gasoline and diesel for transportation has also increased. Emissions have been reduced by placing catalytic converters in vehicle exhaust systems which decrease carbon monoxide, hydrocarbon, and nitrogen oxide emissions. To address global warming concerns, the amount of carbon dioxide produced while burning fossil fuels must be reduced. Ethanol-blended gasoline and ethanol-blended diesel are being considered as viable alternatives to further lower emission levels.

Ethanol is now becoming the biggest success story in most parts of the world as it, to a large extent, lessens the burden on petrol.

For India ethanol seems to be the best bet as it holds good potential given the fact that India has large-scale sugarcane cultivation. India's ethanol figures are also modest compared to

Brazil - 450 million gallons or around 11 million barrels. This is about 5 days of India's petroleum requirements.

Today energy security issues are on forefront for India. Currently, it imports over 70% of its fossil fuel requirements. With even 5% addition of ethanol to petrol, India should be able to save over 40 crore liters of petrol. Ethanol blending with petrol will hence help bridge the yawning demand- supply gap which in turn will help attain energy security for the country.

Permitting 10% of ethanol blending with petrol throughout the country without any further delay can lead to reduction of huge amount of foreign exchange. Currently only 5% of ethanol blending with petrol is done that to in few select States of the country which is totally insufficient to make a positive impact on curtailment in the oil import bill.

Ten percent ethanol blending with petrol can be affected without incorporating any modifications in vehicle engines, with slight modifications in them; this blending ratio could go up to 90 percent and savings can just be imagined. India should therefore allow liberal ethanol petrol blending.

In India, ethanol is primarily made from molasses, a bi product of sugar production from sugarcane. The sugar industry in India is the second largest processing industry after cotton textiles. There are over 350-400 factories with installed capacity of more than 20 million tones of sugar. Lately India has also started producing ethanol from sweet sorghum, a multipurpose crop having a great tolerance to a wide range of climatic and soil conditions. When compared to sugarcane it has a gestation period of around 100-150 days whereas sugarcane takes around 350-400 days.

The Nimbalkar Agricultural Research Institute, a non governmental organization has claimed to have developed a variety of sweet sorghum that produces 2-4 tonnes/ha/year and is capable of producing 2000-4000 liters of 95 percent alcohol (ethanol).

To supplement the internal sugarcane availability for ethanol production, India is now poised to make a go at acquiring sugarcane acreages overseas also. The idea is to put in place an assured supply of ethanol. Progressive use of this fuel will reduce the country's oil import bill by reducing dependence on imported crude.

In global scenario, Brazil is the largest sugarcane producer in the world and globally leading gasohol usage. It allows foreign ownership of sugarcane acreages, which are rain-fed and require little irrigation. The sugarcane farms are highly mechanized and have integrated sugar mills.

India is seeking Brazil's cooperation in the import of ethanol for blending locally with gasoline. It could also involve deals to boost Brazil's sale of ethanol to India. India has been trying to diversify its energy sources by investing in oil assets outside the country. It currently imports nearly three-fourths of its crude oil needs, mostly from the Middle East.

India and Brazil have held many rounds of talks on the issue. Brasilia indicated it does not have problem as of now with Indian oil firms acquiring sugarcane acreages, either on their own or in joint venture with Brazilian state firms. Several European firms have acquired acreages and taken up ethanol manufacturing for captive use in home country, which might prompt rethink on foreign ownership.

According to sources, existing tie-ups between Indian oil firms and Brazil's national hydrocarbons entity Petrobras can be expanded for canalizing ethanol from captive acreages in that country. ONGC Videsh, GAIL and refiner-marketer Bharat Petroleum have MoUs with Petrobras.

India largest private sector oil company, Reliance Industries is also gearing to set up a global scale ethanol facility in Brazil. The company is looking to buy thousands of hectares of land in Brazil on which it will grow sugar cane to produce ethanol. Brazil has on offer two billion hectares of developed agricultural land for any taker. Water is also available readily. So are state-of-the-art technologies for sugarcane cultivation, crushing, fermentation and distilling alcohol. So, there is no reason, when the going is so good, to limit any investment in ethanol here to something that will cater to just the Indian market. Reliance has always believed in capacities that make for global competitiveness. So it's just a matter of time before this particular investment materializes.

India currently has to import up to 30% of its requirement of industrial alcohol. Therefore, all talks of blending alcohol with petrol to reduce dependence on expensive petro-products are more of high-minded good intentions with little material basis. But that material basis can be built up in Brazil, where the cost of producing ethanol is one-third of that in India, mainly due to the plentiful availability of land.

Brazil has been running a large scale ethanol program for several years and over half of the cars in the country are of flex-fuel variety - meaning they can run either on ethanol or an ethanol-gasoline mix. Brazil has an edge over the rest of the world due to the cost of the raw material, sugar cane. In India, which is the next highest sugar cane producer in the world, price is quite competitive. Since Brazil divides sugar cane almost equally between sugar and alcohol, it can influence the rates of both commodities globally.

In 2005, the world ethanol production was just over 40 billion liters. This is expected to rise to just over 80 billion liters by 2010, which means a substantial addition to capabilities. It is believed that by 2010, fuel ethanol will represent 4% of global petrol consumption. Other large producers of ethanol include US, China and India.

Sugar companies like Bajaj Hindustan, Balrampur Chini Mills and Triveni Engineering account for most of ethanol production in India. At the current level of sugarcane production, ethanol production could be twice that figure. Ethanol is produced in India as a byproduct of the sugar industry. If sugarcane is used only for ethanol production, then at the current levels, about 3.5 tonnes of ethanol can be produced for every hectare of sugarcane cultivated. Industry sources say that either sugarcane price needs to be lower or ethanol price needs to be higher than what they are presently to be attractive.

Ethanol is being seen not just as an environment-friendly fuel additive to reduce emissions, but in these days of rising fossil fuel prices, it is also being considered critical to the country's energy security. This presents an opportunity for countries like India, dependent as they are on imported oil and have a large agricultural output.

All markets are showing growth, with the US expected to increase its ethanol production capacities at 20-30% annually. There are newer technologies and newer feedstocks with cellulosic biomass, currently under research and development. Soon, some of these will become commercially viable. But, the challenge is to make ethanol at an economically viable rate. There has been some success with different technologies at the laboratory level but at the commercial level, it is still to be proven.

On domestic front, India's Petroleum and Natural Gas Minister, Mr. Murli Deora has directed Oil Marketing Companies (OMCs) for early implementation of the Ethanol Blended Petrol (EBP) Programme on a national scale. In this connection, the process of procurement of ethanol by the OMCs through national competitive bidding has commenced as OMCs have begun issuing public notice for procurement of indigenous anhydrous ethanol in different States. The procurement of ethanol from the domestic market would help the sugarcane-growing farmers with better returns and supplement the availability of petroleum products in the country.

FAQ's - Fuel Ethanol

What is fuel ethanol?

Fuel ethanol or anhydrous alcohol is produced by dehydration of rectified spirit or extra neutral alcohol. Ethanol used as part of the fuel, by blending with petrol, for a motor vehicle is called fuel-ethanol.
How it is mixed in Petrol/Gasoline?

Ethanol could be blended in various proportions in petrol. Ethanol is usually added 5 to 10% by volume of petrol for such application. In Brazil, ethanol is added 24% by volume in gasoline (petrol).

How does it help in reducing pollution?

Use of ethanol in place of tetraethyl lead or MTBE which acts as anti-knocking agents will prevent dangerous and poisonous emissions containing lead or MTBE from petrol. Will I have to change the engine of my Car? Many states in the US have been using 10% ethanol blend in gasoline (petrol) for use in their cars. Brazil has been using up to 24 % ethanol in petrol. Engines of cars do not need any change to use petrol with up to 24 % ethanol in it.

Will the engine of my vehicle get damaged?

Ethanol has, apart from carbon and hydrogen, oxygen in it. This oxygen acts as oxygenating agent during combustion in the IC engine of petrol cars, two-wheelers and three wheelers thus preventing formation of carbon monoxide. Gasoline with ethanol as anti-knocking agent will not cause any damage to the engine.

Can it be used in Two-wheelers/Three wheelers without any change in vehicles? Yes! Of course you can use gasoline in Two-Wheelers/Three-Wheelers as a normal fuel without changing the engine or any other things.

What are the functions of fuel ethanol?

- Octane enhancement / anti-knocking agent
- Oxygenating agent
- Fuel extender / fuel replacement

Where it will be made available?

The oil Companies will blend the petrol/gasoline with fuel ethanol and this blended fuel will be made available through petrol/gas stations.

Can it be added in Diesel?

Ethanol is also added to diesel. Usually, 3% by volume is added. Tests have been conducted satisfactorily with up to 10% by volume addition.

Which are the other countries, which have promoted fuel ethanol?

Many states in the US have been using 10% ethanol blend in gasoline (petrol) for use in their cars. Brazil has been using up to 24 % ethanol in petrol. Engines of cars do not need any change to use petrol with up to 24 % ethanol in it. Fuel ethanol programs have now been initiated in countries like Australia, Nepal, Columbia, Poland, Sweden etc.

What is the experience of countries who have promoted fuel ethanol?

Reduced oil imports, improved trade balance, reduced reliance on imported oil, increased ethanol production, more cane price to farmers, direct and indirect job opportunities, saving fossil fuels are some of the experiences.

What is E85?

How do I know if my vehicle can use it? E85 is fuel comprised of 85% ethanol / 15% unleaded gasoline for use in Flexible Fuel Vehicles (FFVs). These vehicles are truly flexible in that their owners have a choice whether to use E85, any blend of ethanol upto 85% level, or straight unleaded gasoline. On some models this comes as an option, and on some if is a standard feature.

Can my vehicle run on E85 even if it is not an FFV?

If your vehicle is not an FFV, use of any higher ethanol percentage than 10% is not covered by warranty.

What is ethanol made from?

While 1/3rd of world ethanol production is from corn, the rest is produced from suger based raw material like sugarcane juice/ molasses or beet juice/molasses. There are other grains used in the production of ethanol which is rice, wheat, rye, dorghum or tubers like cassava / tapioca.

What is cellulosic ethanol?

Cellulosic biomass holds tremendous promise as a feedstock for ethanol production due to its widespread availability and potential for high fuel yields.

Examples of sources for celluosic ethanol include corn stover (the stalks and husks left over after harvest), wheat and barley straw, sugarcane or rice bagasse, sawdust, paper pulp, small diameter trees and dedicated energy crops such as switch grass and other fast growing grasses. Study is still going in making cellulosic ethanol more viable. Praj is engaged in preliminary study leading to lab scale R & D.

How cellulosic ethanol made?

As with producing ethanol from grain, processing cellulosic sources extracts the fermentable sugars from the feedstock for distillation into alcohol. Unlike in grain, the sugars in cellulose are locked in complex carbohydrates called polysaccharides, or long chains of simple sugars. Separating these complex structures into fermentable sugars is essential to the efficient and economical production of cellulosic ethanol.

Drilling in progress at Night in OIL's field in Assam.

Seismic Operations in Shakthi Block in Gabon

A Must Win War against Global Warming!!!

By: Tabrez Akhtar Ansari

Tabrez Akhtar Ansari had done B.Sc. (Engg) in Electrical from Aligarh Muslim University. He joined Electrical Engineering Department of Oil India Limited in 1999 as Executive Trainee. In 2005, he got selected in the very first batch from OIL for Executive Post Graduate Programme in Management (EPGPM), MDI, Gurgaon. He successfully completed EPGPM with the specialization in Marketing and Strategy. He had done a dissertation work on Clean Development Mechanism and OIL's role. He is currently working as Deputy Manager with Business Development (Global) Department of OIL and posted at NOIDA. Climate Change has been an area of interest for him and he believes that every individual can play a big role in mitigation efforts. He can be reached at tabrez@oilindia.in or akhtartabrez@gmail.com and can be called on +91-9899979876.

I am sure you must have heard about Global warming and emission trading a number of times. And a number of times you would not have gone through and would have over looked the articles on this topic which you would have noticed in newspapers with a thought of "not again". I consider myself fortunate enough to have been given a chance to work in this field for some time and develop a thought process to put my best efforts to make people aware of the effects of Global Warming. I would suggest you to never think "not again" again as this is the time for us to think and act.

The fact that Earth is getting warmer day by day is well established, but the reason(s) behind it have always been a matter of dispute amongst the scientists. The definition of the phenomenon of global warming varies across the scientific community. One school of thought says that it is the cyclic nature of mother earth, while the other gives credit to the some unexplainable phenomenon related to solar variation. But most of the scientists believe that it is the activities of mankind which is largely responsible for the rise in temperature.

For life to exist on earth, the temperature always plays a very important role. Sun throws its energy through radiation to the earth and the surface temperature of the earth rises. The surface reflects back the energy in the form of infrared radiation and there are few naturally occurring gases like Water Vapour, Carbon Di-Oxide and Ozone etc. which absorb this radiation and keep the atmosphere warm at an average of 60°F and make it possible for life to exist. The same gases are missing on Mars and the effect shows in the average temperature of Mars which is -27°F. This is because of "The Green House Effect".

We, at our wish, grow plants and trees faster using this "Green House Effect". You would have certainly noticed the Green Houses in botanical gardens you have visited. Naturally this effect has been a boon for life but when the concentration of the gases, which have this temperature absorbing quality, starts increasing in the atmosphere, the temperature of atmosphere also starts rising. When these gases are produced naturally, nature takes care of their concentration but when we start producing these gases uncontrollably then the imbalance occurs. On further deliberations scientists found six such gases which are produced by human activities and have this quality of absorbing temperature. The temperature records clearly show the rise on a positive slope during industrial revolution.

But the question is why should we worry about the earth getting warmer? Can it harm us? The answer is in affirmative and to explain the details it would take all the space allotted for the article. To name a few, it will have an adverse effect on ecosystem, glaciers, ocean currents, Sea level and spread of disease etc. The mitigation has to be started somewhere and who could be better than United Nations which started its efforts way back in 1972 by hosting first conference on Human Environment. With further analysis it was clear that human activities should be checked to control the emission of those six Green House Gases (GHGs), which are Carbon Di-Oxide (CO_2), Methane (CH_4), Nitrous Oxide (N_2O), Hydro Fluorocarbon (HFCs), Per Fluorocarbon (PFCs) and Sulphur Hexafluoride (SF_6). These gases are mainly produce by factories, transportation etc. which are nothing but activities of the greatest race on earth!!!

But who should be held responsible for this? How should it be reduced? These questions drove us to go deeper in to the facts and figures. In 1988, two bodies working under UN: United Nations Environment Programme (UNEP) and World Meteorological Organisation (WMO) jointly established the Intergovernmental Panel on Climate Change (IPCC) and almost all the countries became its member as concern over climate change had become a political issue by now. The purpose of the IPCC was to assess the state of knowledge on the various aspects of climate change including science, environment and socio-economic impacts and response strategies. The IPCC is recognized as the most authoritative scientific and technical voice on climate change, and its assessments had a profound influence on the negotiators of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol which came into existence in 1992 and 1997

respectively. UNFCCC had 179 countries as its member till 2007 and Kyoto Protocol made UNFCCC operational and legally binding on these countries.

In order to put a check on GHGs emission the first step is to quantify the GHGs emissions and know which country is producing how much and for that we need a scientifically backed common unit to quantify that emission. 1 ton of CO2 was chosen as the common unit and all the other remaining five GHGs were assigned a multiplication factor to convert them to tons equivalent of CO2 (Refer Table-1).

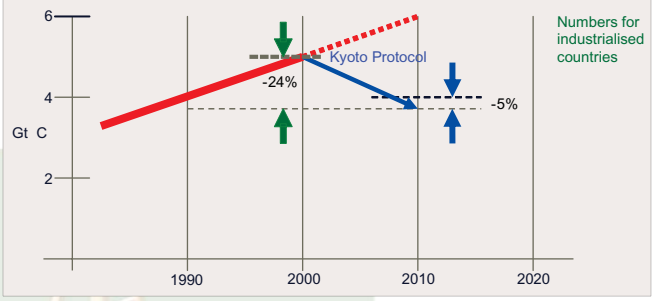
Table -1

Gas	Global Warming Potential
Carbon dioxide (CO2)	1
Methane (CH4)	21
Nitrous oxide (N2O)	310
Hydro fluorocarbons (HFCs)	140-11,700
Perfluorocarbons (PFCs)	7,000-9,200
Sulphur hexafluoride (SF6)	23,900

The list of the highest polluting countries includes even India and China. Although both are not considered as developed countries but their levels of emission brought them in the list of the countries emitting GHGs the most. The growth rate of the two is well above 7% which is quite high as compared to the world average. And as the theory of "industrialization, development and emission going hand in hand" stands true once again, this fact of high emission level can also be accepted with respect to the population both the countries have. But to check their growth by putting a check on their industrialization can never be justified. As UN also knew that putting restriction on the developing nations would be affecting their pace of growth and it would never be in favour of these nations.

UNFCCC and thus Kyoto Protocol came up with a solution. It suggested two list, one as Annexure I in UNFCCC (Annexure B in Kyoto Protocol) with developed and industrialized nation and the other with the rest of the developing and poor member countries where industrialization is either going on or beginning and all the checks and restrictions where decided to put on the first list. To fix a reference point to compare the emission for all the countries, it was decided to fix 1990 emission level to be the same. This was the biggest development with respect to the climate change mitigation efforts so far. Kyoto Protocol, named after the Japanese city where this was approved, created a level playing field for all the nations listed in Annex-I. It asked the developed countries, which were in Annex I of UNFCCC (Annex B of Kyoto Protocol), a target of 5.2% reduction in the emission level of 1990. It gives the time frame from 2008 to 2012 to achieve the above target. For most of the Annexure I countries this target became a highly difficult task as the base chosen was 1990 and this protocol was approved in 1997, countries kept on emitting more and more GHGs with the time and for most of developed countries which were already operating at a very high efficiency and high standard, had a tough task ahead of them (Fig-1) as the total emission to be reduced turned out to be a huge quantity with the 1990 as reference year.

Fig -1: Reduction Target by Kyoto Protocol (Giga tones of CO2 Eq. and Time line)



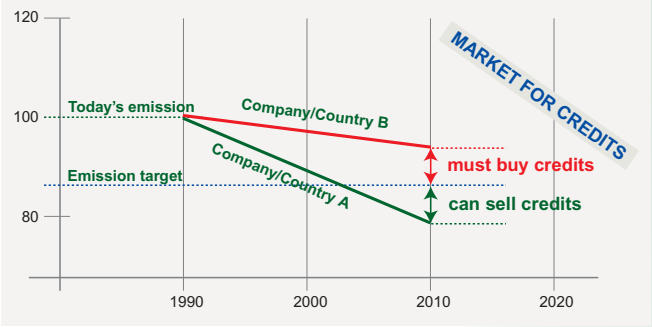
For example suppose country X, featuring in Annexure I as a developed country, was emitting Y tons equivalent of CO_2 in 1990. The target to achieve for this country would be to bring the emission level to (Y- 5.2% of Y) tons emission. Country X will have to reduce its emission level in the time frame of 2008-2012.

Kyoto Protocol again came to their rescue and overall suggested two ways to achieve their target, one by hard and the other by soft mechanism. Hard mechanism is nothing but to achieve the target either by closing their industries or by using another efficient way in their plants. The soft or flexible mechanism has three parts in it, one is Emission Trading (ET), second is Joint Implementation (JI) and the third called Clean Development Mechanism (CDM). In ET, if one country, from Annexure –I, achieves its target and reduces the emission beyond the target set by Kyoto Protocol, it can sell the extra reduction to the other countries in Annexure-I who need it or who are short of their target (Fig-2). JI is very similar to CDM and the only difference is in the parties involved. JI can take place between any two parties from Annex –I or B, while CDM can only take place when one non-annex country, i.e. developing country, is involved. But the basic trading, of the offset of emission or say reduction of emission, remains the same.

** We are talking about a trade of a quantity of Tons of CO2 equivalent which is reduced from the atmosphere by putting some extra effort be it money, technology or the practical idea. This offset or reduced quantity would have been emitted into the atmosphere without that extra effort in normal course.*

This is the time when every country be it developed or developing, should be roped in into this whole process of mitigation of Global Warming. With the objective to promote "sustainable development of host developing countries and cost-effective emission reductions for Annex I countries" this soft mechanism CDM was conceived.

Fig 2: Emission Trading

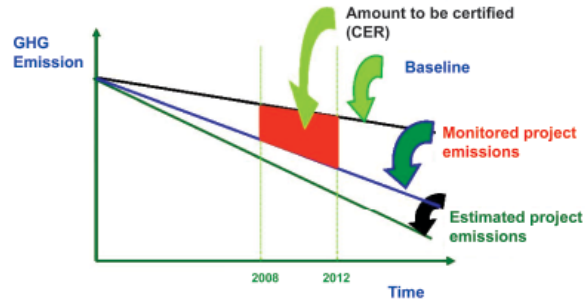


India has to play an important role here and this is one way which brings countries like India, China and Brazil etc into this whole process of mitigation. These developing countries are not given any reduction target to achieve but by engaging them to emission trading they would definitely be motivated for better practices and technologies. These countries are asked to participate voluntarily into the emission trading. These countries can sell those quantified emission reductions to any of the developed countries who need it. This reduction is achieved by putting some extra effort by which they reduce the emission of GHGs to the atmosphere. This creates an opportunity for companies in these countries to conceive costly energy efficient projects and even make money out of it by selling the reductions in emission which they achieve under CDM. UNFCCC provided definitions of layers to these processes of trading so as to put a check on the malpractice and frauds.

UNFCCC created an Executive Board (EB), which would certify and have a final say on these emission reductions before they are traded in the market. Every interested non-Annexure country is asked to appoint one government controlled agency, called Designated National Authority (DNA) to check the well defined requirements of project, the demonstration of additionality (i.e. something extra other than usual or normal course baseline) by the project and the sustainable development to be achieved with this project. The National CDM Authority under the Ministry of Environment and Forest has been given this responsibility in India. UNFCCC also selected external auditors, called Designated Operational Entity (DOE), who are well established auditors and experts in this field to validate and verify all the projects to come under CDM. The companies which can conceptualize and work over a project which can provide them emission reduction of GHGs from the baseline case, can get their project registered under the CDM by the Executive Board at UNFCCC and the quantified and certified emission reduction can be traded in the Carbon Market.

We compare the emission level by the project in two scenarios, one when the project is implemented and operated in the usual way or the baseline scenario and the other when the project is implemented and operated by putting some additional effort to reduce the emission from the baseline scenario. (Fig -3). We are talking about the difference in emissions of GHGs during the life of the project with and without that additional effort of better technology, efficient method of operation etc. That difference is to be quantified and certified by the EB for the purpose of trading. Companies need to submit a project development document (PDD), which has a fixed format and requirements, to DNA and to DOE. After checking the requirement meticulously and finding it conforming to all of them, DNA would approve the project. Meanwhile after finding it conforming the said requirement, DOE nominates the project to the EB for granting the approval for the project to be a project under CDM. Once the project is approved by EB, it has to be verified again by the DOE for the reality of reduction of emission. The project after getting verified of the expected reduction, the EB would issue a certificate mentioning the quantity for this Certified Emission Reductions (CER) with a time line in tune with the project and as per the choice of the company. The time line for the projects under CDM are of two type, one being seven (07) years with the option of two seven year extensions and other being one time ten (10) years certificate. The CERs, generated so, can be sold and bought in the Carbon Trading Markets and Exchanges. This whole process is quite lengthy one and it takes around 2- 18 months depending upon the kind of projects and a lot of other external factors. Refer Fig-4.

Fig -3: CERs and various emissions of a project under CDM

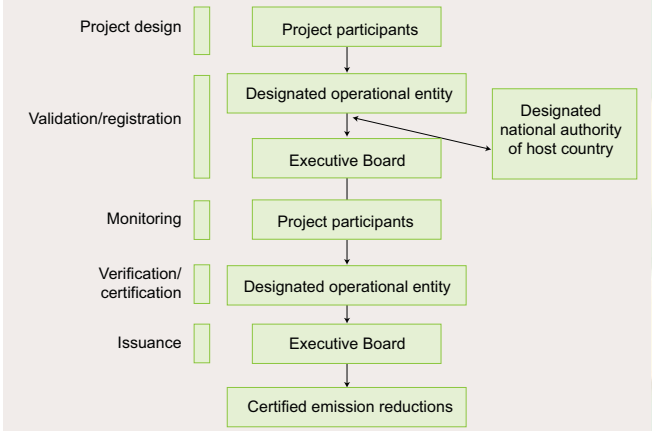


Talking about some statistics at the moment, India has got the best portfolio with respect to the diversity of the projects but China has the maximum CERs against its name. But again it is the beginning of a trade which had the transactions of more than US$ 3 Bn in 2006 and swelling regularly with the timeline of 2008 - 2012 nearing. With this huge amount there have been a lot of improvisations for the projects under CDM, mainly in the financial derivatives, mechanism, sponsorships and concepts.

** Carbon exchanges have really started working and these reductions are being traded as stocks on these exchanges. There are four different units being traded in the Carbon Market at the moment and CER is being one of the units. Other units are AAUs (Assigned Amount Units), ERUs (Emission Reduction Units) and Removal Units (RMUs). All the units are the reduction of one ton of CO2, but all are generated by different mechanism.*

The drivers for the Projects under CDM have mainly been the differential CO_2 Emissions abatement cost between developed and developing countries. As per one of the studies conducted, One ton of CO_2 equivalent reduction costs US$200 in USA and US$400 in Japan, while this reduction can be achieved in India just by US$25. This promises a huge flow of fund for Projects under CDM from developed countries to developing countries and this has been one of the reasons why few countries, USA being the biggest, have not ratified the Kyoto Protocol even after being a signatory to it and a member of UNFCCC. As ratifying it would mean its acceptance of the emission targets set by the protocol. Accepting this target would be a pretty costly affair for USA which is producing the highest quantity of GHGs in the world.

Fig -4: Process Diagram from CDM



This is also the right time for Oil India Limited to start its efforts for Projects under CDM. These projects would not only bring the best of the energy efficient technology in practice but it would project the company in its real self, one company which really cares and thinks about its environment. Projects under CDM are not only to make money and have better IRR for the project but they are for our future. We need to learn good practices and promote them and now when we have been given a chance we should not let it go.

But CDM is one way by which our company can show care for our mother earth. We, as an individual, can do our bit to fight this war of human race against Global Warming. We should really look into ourselves now, our habits, our style of working and our knowledge. By putting a little effort and just by being conscious, we can definitely bring a big change. We all should know our carbon footprints, which is a "measure of the impact human activities have on the environment in terms of the amount of greenhouse gases produced, measured in units of carbon dioxide" and try to reduce it as much as we can. There are a number of websites which help you to calculate and compare your carbon footprints with the global average. Per capita energy consumption has always been a measurement of how developed you are. But this can not be justified and if it is so than you are actually making this earth not a good place to live for our generations to come. Your energy consumption should be managed and minimized as much as possible. Energy generation emits GHGs and works in favour of Global Warming. This is nothing to do with comfort which you get by consuming energy, but this is to do with the management of the equipment, technology and habits which bring you that comfort. A "must visit" list of websites at the end of this article as List-1 is provided for you to know where you are wrong and what you should do.

It's the war in which each and every individual needs to play a role in and to know its sensitivity. The list of do's and don'ts can never be penned down fully, as we can adopt most of them just by being conscious and using our common sense. But there are some uncommon do's which we must start doing now, which are:

- Know your Carbon foot print
- Do everything which is possible to reduce your carbon foot print
- Use/buy equipments/gadgets with the energy logo on it and which are energy efficient (BEE Ratings in India)
- Buy seasonal vegetables/fruits only
- Avoid wastage of food, water and papers as far as possible.
- Avoid littering, segregate garbage and dispose it properly
- Plant at least one tree every year

Finally let's start thinking and let's find better ways to leave this beautiful earth as beautiful as we found it, and try to make it even better for the generations to come so as make life easier and healthier for them!!!

PS:

I thank the editor who gave me this opportunity to pen down a little something for synergy. While pondering on how to go about it, I thought not make it a technical critique which would make it tough for people not from this field to grasp. Therefore to put it across in a simple yet meaningful manner I decided to delve upon the basic responsibilities one should carry towards mother earth. I hope to have driven some value into the readers' mind. Please feel free to contact me for sharing any information that you find or clarification that you may need. You can mail me at tabrez@oilindia.in and/or akhtartabrez@gmail.com

List-1

List of websites which you must visit

1. www.carbonfootprint.com – for measuring your carbon footprints and offsetting it.
2. http://unfccc.int/ and
3. http://cdm.unfccc.int/index.html for getting to know the effort UNFCCC is putting and statistics of the trading.
4. http://www.ipcc.ch/, www.wmo.ch and www.unep.org for the research in the field of Global Warming.
5. http://cdmindia.nic.in/ for knowing the efforts of MoEF in India.
6. http://www.chicagoclimatex.com/ and http://www.ghgx.org/ to see how these carbon trading exchanges work.

Oil India Limited celebrates its Golden Jubilee Year

The oil industry in India has completed more than 120 years of successful operation. In September 1889, the first commercial oil well in India was successfully drilled in Assam in the North Eastern part of the country. The undaunted spirits of the pioneering oilmen ensured that the flame of oil exploration was carried forward. The country became independent in 1947 and just after six years of independence, in 1953, the first oil discovery of independent India was made at Nahorkatiya in Assam. And then Oil India Private Limited was incorporated on February 18, 1959 for the purpose of development and production of the discovered prospects and also to increase the pace of exploration in the Northeast India. That Oil India Private Ltd is now the Oil India Limited, the second national oil company in the E&P sector. Fifty glorious years have passed as oilmen march forward with resolve in search of new horizons.

A Brief History of Nahorkatiya Well No. 1

Assam became a prominent feature in the global hydrocarbon map with discovery of commercial hydrocarbon in Digboi in the year 1889. Even as Digboi oil field was being successfully developed, geological exploration was continuing in the foothill areas, where seepages through exposed rocks were visible and geological information bore holes (GIB) were drilled on a number of geologically interesting features.

Dignitaries at Nahorkatiya Well No. 1

OIL's Golden Jubilee Inaugural Function

Advances in geophysical prospecting methods is a continuous process and during the thirties, significant progress was made in this specialised field of exploration, particularly in seismic. Buoyed by such advances, in the year 1937, an important forward step was taken by the hydrocarbon explorers involved in discovery of Digboi oilfield. The Burmah Oil Company (BOC) jointly with British Petroleum (then Anglo Iranian Oil Co.) and Shell proposed to the Government of India that the three Companies should carry out a geophysical survey of all the important alluvial covered plains areas of India. The proposal was accepted.

In accordance with the terms of the geophysical license, the erstwhile Assam Oil Company begun a gravity and seismic survey over the alluvial covered areas in Upper Assam and seismic reflection survey was started by an American Company, Petty Geophysical Engineering Company in October 1938. The survey strongly suggested the presence of an anticlinal feature near Nahorkatiya and anticlinal features are generally considered highly favourable as hydrocarbon habitat. Here, at last, was a sub-alluvial structure worth testing for hydrocarbons. However, at this exciting stage, all prospecting work had to be suspended in view of a government-moratorium as a result of the outbreak of World War II.

Meanwhile, in the minds of the pioneering hydrocarbon explorers thoughts kept running back to the famous seismic high at Nahorkatiya. The expertise and technology were by then available to drill down to depths of 10,000 ft or more, which was the anticipated depth of the oil-bearing rocks. Finally on November 1, 1951 after memories of World War II started receding, the decision was taken to go ahead and drill "to investigate the stratigraphy, structure and fluid content of the sub surface rocks which indicated the seismic high at Nahorkatiya". It was undoubtedly one of the most momentous decisions in the history of the BOC and, as subsequent events proved, in the history of oil in India.

Slowly, the derrick rose skywards at the site of Nahorkatiya Well No. 1. The Driller in-charge was Thomas Arthur, mud chemist was N. N. Gogoi and the well-site geologist, C. R. Jagannathan who was to become the Chairman and Managing Director of Oil India Limited a quarter of a century later. At 17:15 hrs on 26 May 1952, Nahorkatiya Well No. 1 was formally spudded and drilled ahead to its final depth of 11,715 ft. on 18th May 1953, a total of 358 drilling days. Five sandstone reservoirs were encountered, all of them with evidence of hydrocarbon. Such evidence, however, ceased decisively below 10,210 ft. and so the well was plugged back to 10,220 ft. and the process of production testing initiated.

On 16 June 1953, the lowest reservoir was tested in the range 10,150 – 10,160 ft. Officers and men gazed eagerly at the discharge pipe with quickening pulses as the brownish water started spluttering. And then with a hiss and a roar the oil came in. The scene was transformed into one of incredible joy and gaiety. All the agonies of heat and dust and toil and controversy were forgotten as the black gold spewed forth at the rate of around 180 barrels of oil per day. And thus the sleepy little known semi town of Nahorkatiya, in the remote eastern corner of India, was catapulted into fame and on to the oil maps of the world and a new oilfield was born.

Statistically, this discovery well of Nahorkatiya oilfield has so far produced in excess of 4 million barrels of crude oil and nearly 26.44 billion standard cubic feet of natural gas. And more importantly the well continues to produce at a rate of around 100 barrels per day presently.

Mr. Laurie Noronha, one of the drillers of this well in the early fifties and who is now settled in Canada, visited us recently and when informed about this spectacular performance of NHK well No 1, this is what he had to say, "This is perhaps one of the best gifts God had given to the beautiful people from this region".

I consider somebody a good leader if they exhibit three things. One is strategic leadership, which simply means the ability to assess the big picture. The second is operational leadership. I expect our leaders to make things happen, serve our customers, have good processes, organize their own divisions properly and, most important, hit their numbers. And the third is people leadership, the ability to motivate, retain, recruit and develop people, to have both good and difficult performance dialogs, and to set high standards.

The other axis core to our culture is "red, rock solid and restless." Red stands for being passionate about your business, your job, your industry and your people. Rock solid means you've got to be dependable. If you say you will deliver something, you must deliver it. Restless is about innovation. You've got to be innovative. When I'm selecting the CEO, or the senior team for Germany, I ask myself, "Do these people have red, rock solid, restless, and are they strategic, operational and human?"

— Arun Sarin

Leading from Behind

I got the [leading from behind] idea from reading Nelson Mandela. I was reading his autobiography, Long Walk to Freedom…and I came across a passage in which Mandela recalls how a leader of his tribe talked about leadership:

A leader, he said, is like a shepherd. He stays behind the flock, letting the most nimble go out ahead, whereupon the others follow, not realizing that all along they are being directed from behind.

To me, this take on the shepherd image embodies the kind of leader we increasingly need: someone who understands how to create a context or culture in which other people are willing and able to lead. This image of the shepherd behind his flock is an acknowledgment that leadership is a collective activity in which different people at different times depending on their strengths, or nimbleness come forward to move the group in the direction it needs to go. The metaphor also hints at the agility of a group that doesn't have to wait for and then respond to a command from the front. That kind of agility is more likely to be developed by a group when a leader conceives of her role as creating the opportunity for collective leadership, as opposed to merely setting direction.

I probably should emphasize that leading from behind is not about abrogating responsibility. After all, the shepherd makes sure that the flock stays together. He uses his staff to nudge and prod if the flock strays too far off the track or into danger. In fact, leading from behind is hard work and involves some crucial responsibilities and judgment calls: deciding whos in (and, just as important, whos not in) the group; articulating the values that will inform the group; developing the talents of members so that they can flourish in their roles; setting boundaries for the groups activities; and managing the tensions inherent in group life deciding, for example, when to be supportive and when to be confrontational, when to improvise and when to impose a structure.

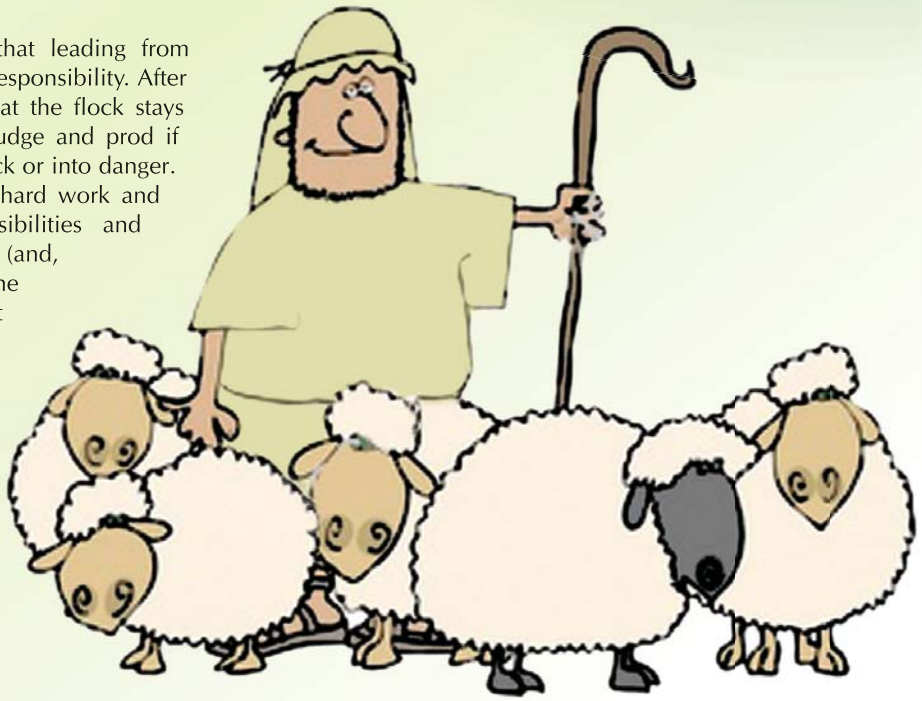
But keep in mind that leading from behind doesn't imply that everyone in the organization has equal talent or the right to lead at a given time. Talent or nimbleness, if you will is actually a function of context, which means that different individuals will come to the fore in different situations.

It's also crucial to understand that leading from behind isn't style reserved for the uninspiring or the indecisive. Many people who lead from behind are perfectly capable of leading from the front.

Clearly, many situations require leadership from the front. In crises, for example, an organization needs to react quickly, but if the people in it have not been prepared to do so collectively, a leader needs to step forward and tell them where they are going and how to get there.

The more you want to get the best out of a group by letting people use their own judgment and take risks, the more you want to lead from behind.

— Linda A. Hill



Important Data on Oil India Limited

Estimated Crude Oil Production During 11th Plan (2007-08 to 2011-12)						
	2007-08	2008-09	2009-10	2010-11	2011-12	Total
ONGC	27.16	28	29	28.53	27.37	140.06
OIL	3.5	3.55	3.75	3.91	4.3	18.99
Private/Joint Ventures	10.57	10.78	9.76	8.75	7.85	47.71
Total	41.23	42.33	42.49	41.19	39.51	206.76

**Quantity in Million Metric Tonnes (MMT)*

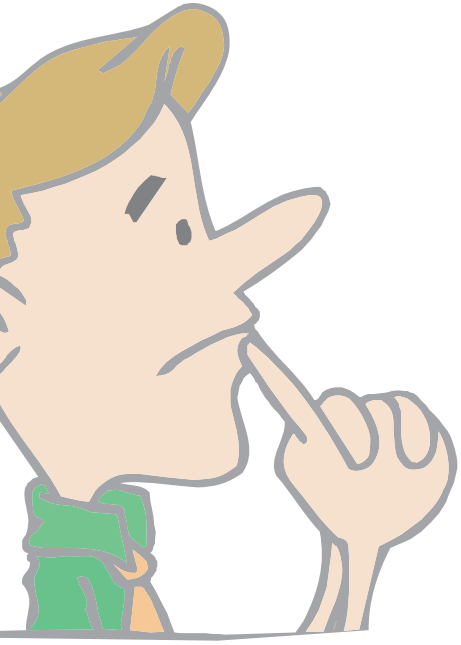
Estimated Crude Oil and Natural Gas Production from Overseas During 11th Plan (2007-08 to 2011-12)							
		2007-08	2008-09	2009-10	2010-11	2011-12	Total
Crude Oil Production (MMT)	OIL	0.25	0.5	1	1.53	1.6	4.88
	OVL	7.02	6.53	5.97	5.76	5.35	30.63
	Total	7.27	7.03	6.97	7.29	6.95	35.51
Natural Gas Production (BCM)	OVL	1.75	1.82	1.93	1.97	2.2	9.67

Estimated Natural Gas Production During 11th Plan (2007-08 to 2011-12)						
	2007-08	2008-09	2009-10	2010-11	2011-12	Total
ONGC	22.1	22.53	22.77	22.99	22	112.39
OIL	3.13	3.21	3.28	3.28	3.56	16.46
Private/Joint Ventures	8.55	22.55	29.41	28.77	37.67	126.95
Total	33.78	48.29	55.43	55.03	63.23	255.76
Total (MMSCMD)	92.2	132.3	152	150.7	167.4	694.6

** Quantity in Billion Cubic Metre (BCM)*

Industry-wise Natural Gas Demand (2007-12)					
	2007-08	2008-09	2009-10	2010-11	2011-12
Power	80	88	100	112	125
Fertilizer	40.82	42.65	52.25	79.36	79.36
City Gas	12.08	12.93	13.83	14.80	15.83
Industrial	15.00	16.05	17.17	18.38	19.66
Petrochemical/Refineries/ Internal Consumption	25.37	27.15	29.05	31.08	33.25
Sponge Iron/Steel	6.00	6.42	6.87	7.35	7.86
Total	179.27	193.19	219.16	262.96	280.98

**Figures in MMSCMD*



SYNERGY Q Mind Benders

Here is a quiz for our readers.
Send in your answers to the editor or e-mail them to: ajaini@oil.delhi.nic.in
3 winners will be given attractive prizes.

1. *IN PAKISTAN IT IS CALLED MEHERAN, WHAT IS IT CALLED IN INDIA ?*
2. *NAME THE WORLD'S FIRST BICYCLE BRAND*
3. *THIS BANK WAS ESTABLISHED IN LAHORE IN 1943 BY RAI BAHADUR LALA SOHAN LAL, WHO ALSO BECAME ITS FIRST CHAIRMAN. AFTER PARTITION, THE BANK'S REGISTERED OFFICE SHIFTED TO AMRITSAR. ITS CURRENT HEAD OFFICE IS IN NEW DELHI. CAN YOU NAME THIS BANK?*
4. *FOUNDED IN 1890, ITS PRODUCT TOOK A DISTINCTIVE TRIANGULAR SHAPE FROM 1909. IT IS NAMED NOT ONLY AFTER ITS FOUNDER, BUT ALSO FROM THE ITALIAN FOR "NOUGAT". IDENTIFY THE BRAND.*
5. *WHICH FOUNDER DESCRIBED HIS MANAGEMENT STYLE AS "MANAGEMENT BY WALKING AND FLYING AROUND"? HIS EMPLOYEES DESCRIBED HIS STYLE AS "MANAGEMENT BY WEARING YOU DOWN".*
6. *AFTER FAILING THE FIRST YEAR OF COLLEGE, HE RAN AWAY FROM HOME, AND AT 18, TOOK UP A JOB AS A CROP-SPRAYER ACROSS RURAL INDIA. HE FOUNDED AN AD AGENCY AND ALSO CO-FOUNDED INDIA'S FIRST PRIVATE TV CHANNEL. NAME HIM.*
7. *WHO IS THE FIRST TRAVEL AGENT WHO OFFERED TOURIST TRIPS BY AIR AND WHEN?*
8. *DURING THE 1920-30S WHICH COMPANY SOLD PRODUCTS UNDER THE BRAND NAMES BAKA, ROMA AND TABLE?*
9. *WHICH BRAND GETS ITS NAME FROM THE URDU PHRASE FOR ENLIGHTENMENT TO THE SOUL?*
10. *WHICH BRAND'S LOGO FIXED ON ITS APPARELS ALWAYS WEIGHS 0.38 GMS?*

Winners of Synergy- Vol. 5 Issue 1 Quiz are:

1. **Ms Chandra Mamtani**
   OSD, New Delhi
2. **Shri Rituparna Sarma**
   Deputy Manager (Admin), Kolkata
3. **Shri Radha Kishnan,**
   Supdt Secretarial Officer, New Delhi
4. **Shri Neeraj Bhardwaj,**
   Senior Asst, Noida

Congratulations to all the Winners *- Editorial Team*

Answers of the Synergy - Volume 5 Issue 1 Quiz are

1. *Which India born actress got her only acting Oscar in 1951, joining her husband Laurence Olivier to become the only married couple to receive lead acting awards?*
   Vivien Leigh
2. *Who captained the Australian team during the 'Bodyline' series in 1932?*
   William Maldon Woodfull, OBE
3. *In the seventeenth century what was the name given to the Mughal custom houses on the west coast of India*
   Khuski
4. *Which indian brand name, set up by the TATAs, gets its name from a Leon Delibes opera about an Indian Maiden called Lakshmi?*
   LAKME
5. *What trade organization was founded by a group of industrialists led by G.D.Birla and Purushottam Thakur Das in 1927?*
   FICCI (Federation of International Chambers and Commerce of India)
6. *When the Prince of Wales Museum started in 1922, the art collection of members of which business house was the first major acquisition of the museum?*
   TATAS
7. *Which Indian businessman entered into a collaboration with Carr Gordon and Princep to form India's first foreign collaboration in 1833?*
   Dwarka Nath Tagore

Details of Crude Oil Production (State wise) in 2007-08

Million Metric Tonne (MMT)

State/ Regions	ONGC	OIL	Pvt/JV Companies	Total
Offshore	17.994	-	4.895	22.889
Andhra Pradesh	0.28	-	-	0.28
Arunachal Pradesh	-	0.04	0.061	0.101
Assam	1.29	3.06	0.009	4.359
Gujarat	6.056	-	0.122	6.178
Tamil Nadu	0.299	-	-	0.299
Total	**25.919**	**3.1**	**5.087**	**34.106**

Details of Natural Gas Production (State-wise) in 2007-08

Billion Cubic Meter (BCM)

State/ Regions	ONGC	OIL	Pvt./JV Companies	Total
Offshore	16.459	-	6.861	23.32
Andhra Pradesh	1.567	-	-	1.567
Arunachal Pradesh	-	0.024	0.005	0.029
Assam	0.499	2.08	0.022	2.601
Gujarat	2.092	-	0.839	2.931
Rajasthan	0.016	0.239	-	0.255
Tamil Nadu	1.169	-	-	1.169
Tripura	0.533	-	-	0.533
Total	**22.335**	**2.343**	**7.727**	**32.405**

Crude Oil Imports in 2007-08

Month	Crude Oil Imports (MMT)		% Change in Imports	
	2006-2007	2007-2008	2007-08 over 2006-07	2007-08 over 2005-06
April	8.150	10.991	34.86	41.25
May	9.051	10.355	14.41	29.23
June	9.060	9.777	7.91	28.83
July	9.551	10.897	14.08	42.34
August	9.162	9.863	7.65	17.71
September	8.878	8.726	-1.71	3.56
October	9.923	10.039	1.17	27.98
November	9.686	9.158	5.43	18.80
December	10.313	11.400	10.54	29.05
January	9.351	10.039	7.36	11.28
February	9.088	9.962	9.62	10.46
March	10.289	10.465	1.71	15.42
Total	**111.502**	**121.672**	**9.12**	**22.40**

Refinery Production in 2007-2008

Month	Refinery Production (MMT)	% Change in Production over 2006-07
April	12.518	15.06
May	13.326	14.92
June	12.932	9.94
July	12.798	4.68
August	13.095	8.19
September	12.740	6.91
October	12.674	2.73
November	12.969	5.18
December	13.054	1.91
January	13.674	5.35
February	12.785	5.77
March	13.538	0.11
Total	**156.103**	**6.52**

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