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IREDA NEWS is an official publication of Indian Renewable Energy Development Agency (IREDA) under the Ministry of New and Renewable Energy, brought out quarterly. It seeks to disseminate information about the activities of IREDA in promoting the use of renewable energy technologies, devices, processes, energy efficiency and conservation besides generating awareness among all concerned about the potential of new and renewable energy sources (NRSE). It also seeks to serve as a medium of interaction between IREDA and its clients and between all those interested in promising NRSE.

The views expressed in the articles are those of the authors and do not necessarily reflect those of IREDA.



भारत में नवीकरणीय ऊर्जा के विकास के लिए IREDA एक प्रमुख संस्था है। यह नवीकरणीय ऊर्जा के विकास को प्रोत्साहित करने के लिए विभिन्न कार्यक्रमों का आयोजन करती है। IREDA नवीकरणीय ऊर्जा के विकास को प्रोत्साहित करने के लिए विभिन्न कार्यक्रमों का आयोजन करती है। IREDA नवीकरणीय ऊर्जा के विकास को प्रोत्साहित करने के लिए विभिन्न कार्यक्रमों का आयोजन करती है।

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From the Editor

The 2006 Stern Report acknowledges human induced climate change is threatening the basic elements of life for people – access to water, food production, health, use of land and the environment. For many countries, dealing with its potentially disastrous impact is becoming increasingly urgent.

Clean Development Mechanism (CDM) was one of the instruments established in response to Kyoto Protocol requirements for the abatement of anthropogenic greenhouse gas emissions combined with sustainable development. For a developing country like India, CDM is the opportunity for developing a market for low-carbon, high-efficiency goods and services.

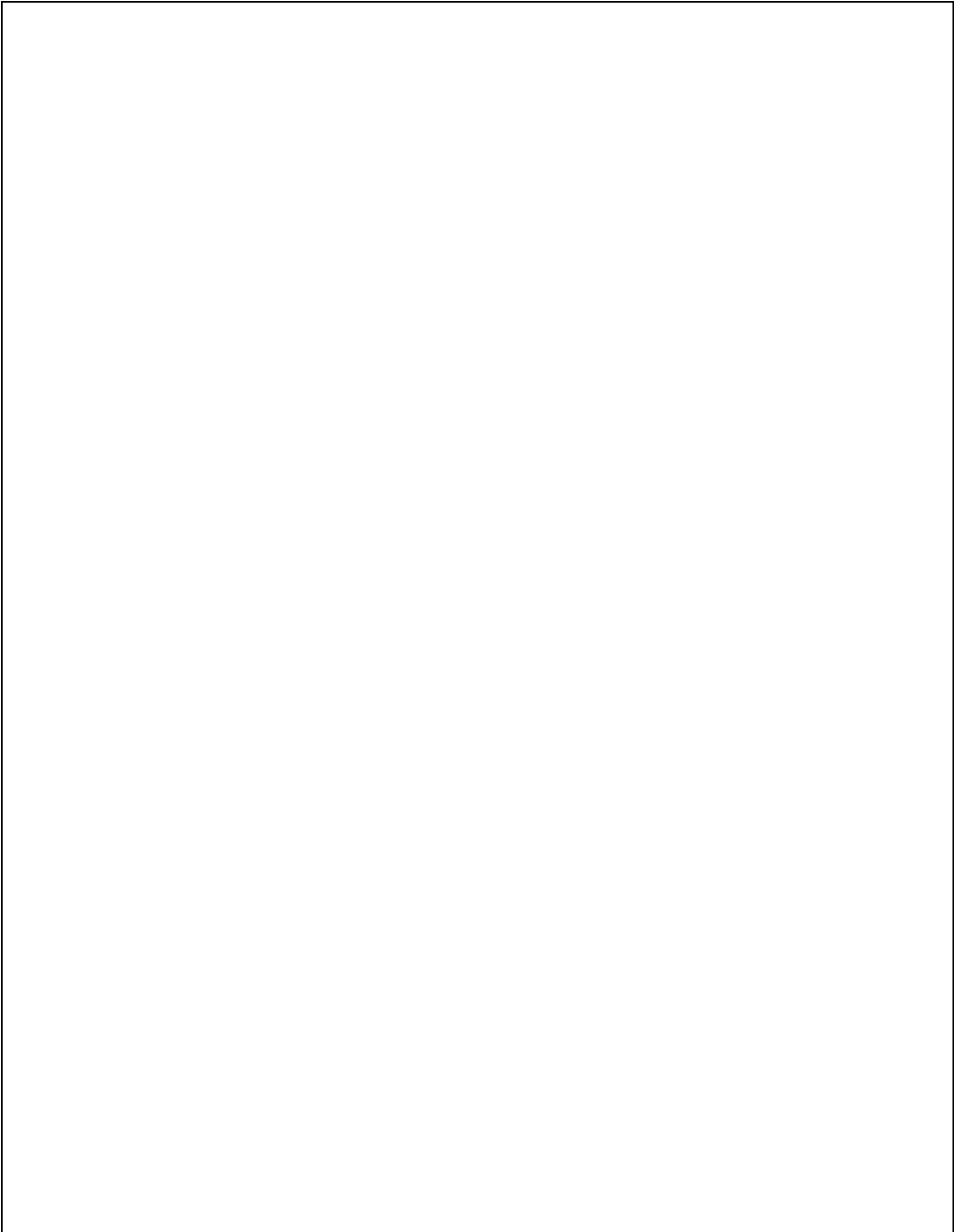
The Integrated Energy Policy forecasts Coal as India's most important energy source till 2031-32 and possibly beyond. In this scenario we need to pursue clean coal technologies, use of renewable energy and other strategies that maximize energy efficiency and conservation. To reduce CO₂ emissions much greater effort is due from the Power Sector in all areas including Generation, Transmission and end –use. It is high time that the Indian power sector rises to the occasion and takes full advantage of the benefits available under CDM like those being enjoyed by the refrigeration industry for mitigating chlorofluorocarbons (CFCs).

Kyoto Protocol places binding commitments on developed countries to reduce their greenhouse emissions to 5.2% below their 1990 level by 2012 without any bindings on developing countries. But, recent discussions within UN Framework Convention on Climate Change (UNFCCC) have focused on binding commitments on rapidly developing countries (such as Brazil, China and India) to reduce their greenhouse gas emissions. India's opposition to such a debate comes from a 2005 report by New Delhi-based The Energy and Resources Institute that estimate Indian emissions would rise only from 0.9 tonnes per capita in 2000 to 1.6 tonnes per capita by 2030 as compared to emissions of 3.62 tonnes CO₂ per capita projected for developed countries.

While global greenhouse gas emissions are rising and the earth is getting warmer, India has been making the right moves in the "business-as-usual" scenario by enacting the Energy Conservation Act 2001, Electricity Act 2003 and the National Auto-fuels Policy and by driving renewable energy capacity addition to new heights. Proposed launch of a National Mission on Biodiesel would be yet another step in the right direction.

India needs to move from a defensive to a proactive stance. We are not oblivious to our global responsibility, but rather are being pragmatic about how much can be done in view of the numerous other challenges at home. While we hold our sovereign right to choose our growth path, driving it efficiently with the future well in sight is well within our command.

Debashish Majumdar
Debashish Majumdar





IREDA WELCOMES ITS NEW CHAIRMAN

Shri Debashish Majumdar, (born 12th February, 1954) is a professional Engineer and holds a B.Tech Degree in Electrical Engineering (1976) from the Indian Institute of Technology, Delhi. Shri Majumdar has worked in both private and public sector and has rich experience of more than 31 years in the field of renewable energy and energy efficiency.

Shri Majumdar has been with the Indian Renewable Energy Development Agency Limited (IREDA) for over nine years and on June 26, 2007 he took over charge from Shri V. Subramanian as its Chairman & Managing Director. IREDA is a unique financial institution set up by the Government of India for financing projects related to renewable energy and energy efficiency on a commercial basis. Currently he is spearheading promotion and development of renewable energy and energy efficiency projects in the private sector through appropriate financing mechanisms.

IREDA, its Board of Directors, Officers and other Staff thank Shri Subramanian for his valuable guidance and directions during his tenure as Chairman of the Company and welcome Shri Majumdar as our new Chairman. We look forward to his valued guidance and directions to take IREDA to new heights through shared goals and endeavours.



Shri Debashish Majumdar, then MD, IREDA addressing the Seminar on Renewable Energy Sources: Opportunity to Indian Industry at New Delhi. Seated on the dais are Shri S.K. Agrawal, Chairman Indian Chemical Council (ICC), Shri V. Subramanian, Secretary, MNRE and Shri S.N. Singh, past President ICC

SECRETARY, MNRE INAUGURATES SEMINAR AT NEW DELHI

The Indian Chemical Council (ICC) organised a Seminar on Renewable Energy Sources: Opportunity to Indian Industry at New Delhi on February 9, 2007. The seminar was sponsored by IREDA and was inaugurated by Shri V. Subramanian, Secretary, Ministry of New and Renewable Energy.

In his inaugural address Shri V. Subramanian said that the opportunity for using renewable energy technologies for use by industry across the country is immense and MNRE has put in place schemes and incentives for the promotion of such technologies by the domestic, industrial and institutional sectors. The potential for energy savings is the highest in industry, he said. The Secretary said that it is imperative upon industry to take up the challenge of reducing energy consumption by improving efficiency and using renewable energy.

Shri Debashish Majumdar in his address to the seminar spoke of the fiscal and financial incentives that are place by the government. He enlightened the participants of the various lending schemes that IREDA has for different renewable energy sectors and the different end-user groups. He spoke of the many challenges industry faces and how IREDA's financing schemes are specifically designed to suit needs of its customers. The challenge, Shri Majumdar said, was to spread the message and enthuse entrepreneurs to adopt renewable energy technologies in their industry wherever possible.

BUILDING INFRASTRUCTURE: CHALLENGES & OPPORTUNITIES

Manmohan Singh *

I am very pleased to be here today to inaugurate this conference on the challenges and opportunities of building infrastructure in India. The theme of this conference is extremely relevant to the economic future of our nation and I believe that it will afford an opportunity for a wide range of participants to appreciate the challenges and opportunities in India's infrastructure sectors.

India's economic performance in the past few years – particularly in the last three years - has been commendable on many counts. Economic growth has accelerated and we are now averaging an annual growth in excess of 8%. A fascinating story is unfolding and the entire world is watching with wonder the emergence of India as a major economic force. However, this growth has not been without limitations. Many marginalised sections of society and large segments of the farming community have not benefited from this growth process. We need a faster and more inclusive growth process. Both objectives present challenges, but both are achievable through sustained effort. Our government is investing intensively in the social and welfare sectors so as to improve the capabilities of our people to make them active participants in the evolving growth story.

While a growth rate averaging 8% is certainly a matter of satisfaction, I do believe we can do even better. If we have to make a decisive impact on poverty and provide productive employment for our young population, we must further accelerate the pace of growth to 9–10%. The broad goal of the Eleventh Plan will be to achieve this objective.

A growth rate in the vicinity of 10% is not impossible to achieve. Most independent observers believe that the Indian economy has the potential to grow at this rate. But, this will not happen automatically. We will

need to run hard just to stay where we are. Maintaining a growth rate of 8% would need continual improvements in our policy regime. To raise it further would require sustained efforts to boost our agricultural and manufacturing growth. Most importantly, our growth potential will be realized only if we can ensure that our infrastructure does not become a severe handicap. The quality and capacity of our infrastructure is certainly a matter of concern to one and all. We must deal with this deficit.

Infrastructure development requires huge resources. The Planning Commission has estimated that investment in infrastructure - defined broadly to include road, rail, air and water transport, electric power, telecommunications, water supply and irrigation - will need to be of the order of about Rs. 14,50,000 crore or US\$ 320 billion during the 11th Plan period. This is a requirement of an immense magnitude.

Not all of this investment can come from public resources. As I had said earlier, this is a time when we must expand investment in the social sectors. They will be a priority charge on the Government's own resources as they are not amenable to private investment in a big way. If this is so, the public resources available for investment in physical infrastructure will be limited, and certainly far short of what is needed to meet our growth ambitions. Hence, it is imperative that we explore avenues for increasing investment in infrastructure through a combination of public investment, public private partnerships and occasionally, exclusive private investments wherever feasible.

Among these, the PPP approach is best suited for the infrastructure sector. It supplements scarce public resources, creates a more competitive environment and helps to improve efficiencies and reduce costs. Our experience shows that competition and PPPs can help in improving infrastructure. The opening of the telecoms sector is a case in point. Opening up the sector has led to massive investments and expansion in supply

* Prime Minister of India, New Delhi

Inaugural Address at Conference on Building Infrastructure: Challenges & Opportunities on October 7, 2006 at New Delhi

coupled with improvement in quality. The target of 15% teledensity set for the year 2010 will be realised this year itself. Further, the cost of service today is lower than that in any other country in the world. Similarly, competition in the aviation sector has resulted in the creation of new capacities and much greater choice for travellers. The annual growth in air traffic has been in excess of 20% and fares have dropped significantly. Even in the road sector, PPPs have demonstrated their efficacy wherever they have been used such as on the Jaipur-Kishengarh highway.

While these are important advantages, it must also be recognised that attracting private capital through the PPP or any other route is neither easy nor automatic. A key pre-requisite is to lay down a policy framework that assures a fair return for investors provided they attain reasonable levels of efficiency. But the policy must also protect the interests of users, especially the poor. PPPs are useful only if they assure quality supply at reasonable cost.

Balancing all these interests is difficult. But it needs to be done. Tariffs and service quality need to be regulated and consumer access protected. Since a large part of investor risk stems from uncertainty about government actions, we must ensure clarity in the policy and regulatory framework that governs private participation in any area. Sanctity of contracts must be observed, and dispute resolution mechanisms need to be speedy and effective. There must also be assurance of a level playing field amongst competing suppliers, a consideration which becomes very important when private suppliers operate in competition with public sector suppliers as is the case in telecommunications, air travel, the power sector and railways. All this requires the establishment of independent regulatory bodies with an appeal mechanism. These are difficult but relevant issues and we must flex our minds to arrive at arrangements that suit our requirements.

An alternative to independent regulation is regulation through contracts which transparently detail the rights and obligations of all parties and rely on robust competitive bidding for award of concessions. The Model Concession Agreement route which is being used in the highway sector follows this approach. While flexibility in MCAs is needed to address project-specific requirements,

standardisation leads to greater certainty, broad public acceptability and reduction in transaction costs and time. I believe that in future, PPP projects should be awarded on the basis of transparent competitive bidding with a standard concession agreement to the extent possible.

There are some areas in infrastructure where the externalities caused by projects cannot be captured by project revenues alone. Such projects, which are marginally viable or unviable, can be made financially attractive through a grant. The Government has created a Viability Gap Funding arrangement for such projects in the infrastructure sector through a window in the Finance Ministry with a time-bound decision making process. I am told that several proposals for Viability Gap Funding have already been received from many states and I expect that this window will be effectively used to leverage private investment into infrastructure across the country. The Government has also set up the India Infrastructure Finance Company in order to provide long-term debt which is presently not available to project promoters.

In a federal country like ours, building world-class infrastructure is critically dependent on the cooperation and support of State Governments on many aspects such as law and order; land acquisition; rehabilitation and resettlement; shifting of utilities; and forest and environment clearances. I am happy to learn that several State Governments are actively participating in this conference. I hope they will find it useful to hear from the Central Ministries the practices being developed to promote PPP projects in a transparent, efficient manner. The Finance Ministry and the Planning Commission are actively engaged with state governments to help them in managing the PPP process. I would urge the states to intensify their efforts to build quality infrastructure so that the pace of investment and growth in their states is accelerated.

Our government is paying focused attention to infrastructure through a Committee on Infrastructure which meets regularly to discuss and finalise policy initiatives. It has developed a sound framework for PPPs in infrastructure sectors including roads, railroads, ports and airports with sector-wise programmes and financing plans. You will hear more about these from my colleagues who will be addressing you later in the day.

Our government has made substantial headway in giving a push to all areas of infrastructure. In the roads sector, the four-laning of the Golden Quadrilateral has not only been nearly completed, but a program for six-laning the entire Golden Quadrilateral on a BOT basis has been approved. This alone would cost over Rs 40,000 crores of which only 15% would come from budgetary support. A program for developing 1,000 km of expressways has also been initiated. We anticipate investments of Rs. 220,000 crore by 2012 in the modernisation and upgrading of highways in the country.

I am particularly happy to say that the Indian Railways have achieved a remarkable turnaround in the last financial year, aided by higher efficiency and tariff rationalization. They are preparing an ambitious investment program of over Rs. 300,000 crore of which almost 40% is expected to come from the private sector through PPPs. Private container trains, dedicated freight corridors, development and modernization of stations, setting up logistics parks and warehousing are all areas expecting significant private participation.

In civil aviation, a financing plan for airport infrastructure has been developed, which envisages a total investment of Rs. 40,000 crore in the sector by 2012. In addition to upgrading and modernizing Delhi and Mumbai airports and setting up greenfield airports at Bangalore and Hyderabad through private developers, other greenfield airports have also been identified for development by private entities. A plan for the development of 35 non-metro airports by AAI has been approved. A new civil aviation policy will be announced soon.

Building on the successful experience with private operation of berths at major ports, the government is planning to develop 76 new berths by 2012 of which 53 are to be undertaken through PPPs. An investment program of Rs. 50,000 crore by 2012 is envisaged, in which PPPs are expected to play a dominant role.

I am very concerned about the persisting problems in the power sector. We cannot hope to be an economic powerhouse if a basic service like provision of reliable electricity is not assured. Power shortages in most parts of the country have not been alleviated

to the desired extent and the financial viability of this sector as a whole continues to be fragile with our SEBs making huge losses. The bane of power sector seems to be the high transmission and distribution losses which account for almost 40% of the electricity produced. No civilized society nor a functioning commercial entity can sustain losses on such a scale. No matter what reform model we adopt, until these losses are checked, we may not be able to turn around the power sector. I would urge State Governments to take campaign-type measures to reduce T&D losses in a time-bound manner. Simultaneously, we must take steps to increase generation capacity. While significant capacity continues to be added in the Central sector, I would urge the State Governments and the private sector to intensify their efforts in this direction. We must also open up the power sector to competition as that would not only provide choice to consumers but also bring efficiency and cost reduction. Moreover, enabling power producers to sell directly to bulk consumers will help create a market that would accelerate investments in generation capacity.

In the coming weeks and months, we will be finalising the remaining elements of the policy, regulatory and institutional framework for PPPs in infrastructure. In keeping with our philosophy of openness and interest in ensuring that this framework reflects the wisdom of all stakeholders, we will continue to hold consultations on key issues as they emerge. I urge you to participate actively in these consultations. I hope this conference, which I consider extremely relevant for addressing the investment needs of our nation's infrastructure, all success.

Thank you.

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CDM – AN OPPORTUNITY FOR INDIA TO PROMOTE RENEWABLES

Pradeep Chaturvedi *

Renewable sources of energy make a strong case for low GHG emitting sources, and therefore need a positive and favoured policy push. Investments are always difficult for promoting renewables. CDM is a pathway that allows raising upfront investment capital through market mechanism. The environmental benignness has made renewables an attractive option over the longer time horizon.

The climate change is a global environmental issue, and different countries bear different levels of responsibility for increases in atmospheric GHG concentrations. Therefore UNFCCC has evolved a mechanism for differentiated responsibility to keep the GHG emissions at a certain predetermined levels. Clean Development Mechanism, in different forms, is an effort for market based trading so that the organization in Annexe I countries can trade the carbon credits from other countries who have achieved the same by following the path of development that has resulted in emissions reductions because of the alternative mode of development.

IMPACT OF CLIMATE CHANGE

Recent findings have corroborated the assumptions of scientists on global warming. Data presented in IPCC Fourth Assessment Report established beyond doubt that scientific facts are indisputable.

The Working Group –I of the IPCC Fourth Assessment Report describes progress in understanding of the human and natural drivers of climate change, observed climate change, climate processes and attribution, and estimates of projected future climate change. It builds upon past IPCC assessments and incorporates new findings from the past six years of research. Climate change in IPCC usages refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage

differs from that in the United Nation's Framework Convention on Climate Change, where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

The Working Group has observed that the global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activity since 1750 and now far exceeds pre-industrial values determined from ice cores spanning many thousands of years. The global increases in carbon dioxide concentrations are due primarily to fossil fuel use and land use change, while those of methane and nitrous oxide are primarily due to agriculture. Annual fossil carbon dioxide emissions increased from an average of 6.4 GtC/year in the 1990s to 7.2 GtC/year in 2002-2005. Carbon dioxide emissions associated with land use change are estimated to be 1.6 GtC/year over the 1990s, although these estimates have a large uncertainty. The global atmospheric concentration of methane has increased from a pre-industrial value of about 715 ppb to 1732 ppb in the early 1990s and was 1774 ppb in 2005. It is very likely that the observed increase in methane concentration is due to anthropogenic activities, predominantly agriculture and fossil fuel usage, but relevant contribution from different source types are not well determined. The global atmospheric nitrous oxide concentration increased from a pre-industrial value of about 270 ppb 319 ppb in 2005. The growth rate has been approximately constant since 1980. More than a third of all nitrous oxide emissions are anthropogenic and are primarily due to agriculture

For the next two decades, a warming of about 0.2 °C per decade is projected for a range of emission scenario. Even if the concentration of all greenhouse gases and aerosols had been kept constant at year 2000 level, a further warming of about 0.1 °C per decade would be expected. Since, IPCC's first report in 1990,

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assessed projections have suggested global average temperature increases of about 0.15 °C and 0.3 °C per decade for 1990 to 2005. This can now be compared with observed values of about 0.2 deg C per decade, strengthening confidence in near term projections.

The Fourth Assessment Report makes it clear that the impacts of future climate change will be mixed across regions. For increase in global mean temperature of less than 1-3°C above 1990 levels, some impacts are projected to produce benefits in some places and some sectors; and produce costs in other places and other sectors. It is, however, projected that some low latitude and polar regions will experience net costs even for small increases in temperature. It is very likely that all regions will experience either declines in net benefits or increases in net costs for increases in temperature greater than about 2-3°C. These observations confirm evidence reported in the Third Assessment that, while developing countries are expected to experience larger percentage losses, global mean losses could be 1 to 5% GDP for 4 °C of warming.'

It has been observed that the global warming tends to reduce landless ocean uptake of atmospheric carbon dioxide, and thereby increasing the fraction of anthropogenic emissions to the emission in the atmosphere.

ADAPTABILITY AND MITIGATION EFFORTS

The Working Group-II Report of the IPCC's Fourth Assessment on impacts, adaptation and vulnerability has reflected that the "impacts of climate change will vary regionally but, aggregated and discounted to the present, they are very likely to impose net annual costs, which will increase over time as global temperatures increase".

Limits to Human Response to Climate Change: Report has made some interesting observations on current knowledge about responding to climate change, in terms of adaptation and mitigation measures. This is as follows:

- Some adaptation is occurring now, to observed and

projected future climate change but on a limited basis.

- Adaptation will be necessary to address impacts resulting from the warming which is already unavoidable due to past emissions.
- A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required to reduce vulnerability to future climate change. There are barriers, limits and costs, but these are not fully understood.
- Vulnerability to climate change can be exacerbated by the presence of other stresses.
- Future vulnerability depends not only on climate change but also on development pathway.
- Sustainable development can reduce vulnerability to climate change, and climate change could impede nations' abilities to achieve sustainable development pathways.
- Many impacts can be avoided, reduced or delayed by mitigation.
- A portfolio of adaptation and mitigation measures can diminish the risks associated with climate change.

The concept of 'mitigation potential' has been developed to assess the scale of GHG reductions that could be made, relative to the emission baselines, for a given level of carbon price (expressed in cost per unit of carbon dioxide equivalent emissions avoided or reduced). Mitigation potential is further differentiated in terms of 'market potential' and 'economic potential'.

Market potential is the mitigation potential based on private costs and private discount rates, which might be expected to occur under forecast market conditions, including policies and measures currently in place, noting that barriers limit actual uptake.

Economic potential is the mitigation potential, which takes into account social costs and benefits and social discount rates, assuming that the market efficiency

is improved by policies and measures and barriers are removed.

Studies of market potentials are normally used to inform the policy makers about mitigation potential with existing policies and barriers, while studies of economic potential are used to show what might be achieved if appropriate and additional policies are put into place to remove barriers and include social costs of benefits. The economic potential is therefore generally greater than the market potential.

Many estimates of aggregate net economic costs of damage from climate change across the globe (i.e., the social cost of carbon (SCC), expressed in terms of future net benefits and costs that are discounted to the present) are now available. Peer-reviewed estimates of the SCC for 2005 have an average value of US\$ 112 per tonne of carbon (tC) (i.e. US\$ 43 per tonne of carbon dioxide) but the range around this mean is large. For example, in a survey of 100 estimates, the values ran from US\$ 10 per tonne of carbon (US\$ 3 per tonne of carbon dioxide) up to US\$ 350/tC (US\$ 95 per tonne of carbon dioxide)

The large ranges of SCC are due in the large part to differences in assumptions regarding climate sensitivity, response lags, the treatment of risk and equity, economic and non-economic impacts, the inclusion of potentially catastrophic losses and discount rates. It is very likely that globally aggregated figures underestimate the damage costs because they cannot include many non-quantifiable impacts. Taken as a whole, the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time.

Different assessments have been reflected depending on who has made the assessment and under what conditions. Whereas the IPCC's Fourth Survey Report by its Working Group II has focused on damage costs of up to 30% on the overall socio-economic fabric of the most vulnerable countries, the assessment of other experts varies drastically, anywhere from 5% to 30%. The much talked about Stern Review estimates the overall cost of climate change to amount to losing 5% or more of the world's GDP annually. If a wider range of risks or impacts are considered, the damage

cost could be 20% of the global GDP. All these experts focus on the need for early action.

It is virtually certain that aggregate estimates of costs mask significant differences in impacts across sectors, regions, countries, and populations. In some locations and amongst some groups of people with high exposure, high sensitivity, and/or low adaptive capacity, net costs will be significantly larger than the global aggregate.

Clean Development Mechanism - An Instrument for Improving Energy Efficiency and Switching to Renewable Sources of Energy

Some of the Indian companies are already planning in terms of climate change processes and what can be done in a country which has made no commitments. India has farsighted corporate that have taken voluntary action. Upfront comes ITC Ltd, which is the first company in India to have become carbon positive during the year 2006 by undertaking several energy conservation measures, usage of carbon neutral fuels, and carbon sequestration through large scale agro forestry programmes. ITC is also water positive and is moving towards attaining zero solid waste status. (This refers to the status at the end of 2006). ITC is not the only company to do so, but is the first with validated and registered results. An important aspect to notice is that all the actions have involved use of renewable source of energy

Improving energy efficiency and switching over to the renewable sources of energy is one route, which permits the existing businesses to continue their progress at desired level in a green manner. The Bureau of Energy Efficiency in India has estimated that the market potential in energy efficiency, energy conservation and demand side management is over US\$ 2 billion a year (barely \$ 400 million are captured). Many of the renewable energy supporters, specially the group that is working under WREN (India) Network, believe that the business potential could be anywhere over US\$ 5 billion a year.

India is under real pressure to reduce its emissions levels. Voluntary Emission Reductions is a good route

to make this beginning. Though it is not obligatory, but advantageous and beneficial to India to follow this path, if in the process of containing its emissions India is also compensated for the additional cost involved. India acceded to the Kyoto Protocol on August 26, 2002. Subsequently the Government of India set up the National Clean Development Mechanism Authority, with its office in the Ministry of Environment and Forests

The Ministry of Environment and Forests, which houses CDM Authority of India, has released data of potential created by the CDM projects in the pipeline which is shown in **Table 1**.

The measure of improvement for cleaning up the environment is now being reflected in terms of tonnes of carbon or carbon dioxide. The UN Framework Convention on Climate change has made it mandatory that any carbon saving in the developing world, which can be traded with the developed world, has to be duly validated through Certified Emissions Reductions (CER). The company in the developing world can then sell these certificates to any entity from the developed world, which has a target to attain. This trading can be done at a mutually agreeable price. The developed world entity gets to offset its target against the CER. Members of the EU Carbon Exchange has invested in a number of companies. Indian enterprises have already committed investment to generate more than 379 million CERs. Worldwide investments have been made

that will generate 1.9 billion CERs by 2012. These investments would reduce the carbon load by 1.9 billion tonnes; Indian CERs are selling in the international markets right now at a range of US\$ 5 to 10 each (at 2006 price). They are low priced than some other countries. Internationally there is a growing futures market in it. Banking companies and insurance groups are keenly involved. It is a bit premature for a sustainable market and a matured market in carbon trading. Many a skeptics look at the reduction in carbon emissions being quoted without transparency and substantial proof of resulting sustainable development. At the same time the results are also being reported to have been distorted by the local laws. At the same time vulnerability is another important factor controlling the price of CERs.

CARBON TRADING HAS GOOD POTENTIAL

Carbon trading has led to carbon trading exchanges being established in EU and USA; and also online carbon trading has been promoted by Asia Carbon Trading Network in Asia. Leading Indian industries both from the public as well as the private sector have become interested in this process of carbon trading. Carbon Trading Exchanges offer an opportunity for the buyer to search for the lowest cost CER purchase to fulfill his obligation. Asia Carbon Network has initiated the project more favourable to those who are selling CERs. However, all present exchanges were

TABLE 1: IN THE PIPELINE

Sector	No.of Projects	Investment (Rs. Cr.)	CERs expected till 2012
Energy Efficiency	171	15,648	113,830,347
Fuel Switching	34	10,274	50,683,375
Industrial Process	35	814	97,529,358
Municipal Solid Waste	8	281	3,988,041
Renewable	156	15,321	54,557,324
Renewable (biomass)	187	7,511	58,661,525
Total	591	49,849	397,249,970

Source: Ministry of Environment and Forests, Govt. of India, New Delhi

launched to serve Annexe I countries only. There is an urgent need to start India Carbon Exchange to bring benefits to India and other developing countries in Asia. Reliance, ITC, TATAs and NTPC are some of the companies that are seeing in the forefront as regards the clean development mechanism.

INVESTORS FOCUS ON CARBON TRADING

Investments of around Rs 50,000 crores have been made on this new carbon commodity market. China and India are the two partners in arms to take the most benefit of this carbon market. More and more international funding agencies are now looking towards supporting the companies, which have commitments towards carbon mitigation and adaptation. The Times of India has reported that The Carbon Disclosure Project (CDP), a UK charity representing the world's largest investor coalition, comprising a group of 284 institutional investors, has prepared a questionnaire and sent to 2400 companies listed on the Bombay Stock Exchange. The investors include ABN Amro Bank, Development Bank of Japan, Goldman Sachs, HSBC Holdings, Morgan Stanley, Old Mutual, Rabo Bank, UBS Global Asset Management etc. The group represents

institutional investors controlling a corpus of US \$ 41 trillion. The survey deals with various issues of GHG emissions and preparedness to tackle climate change. It is expected that the boardrooms of the top Indian companies will certainly look at this issue seriously. The survey seeks to assess potential risk and opportunities relating to climate change for global businesses. This is certainly a bold step to identify the corporate involvement in countering climate change.

CONCLUSION

The concluding paragraph of the Expert Committee Report on Integrated Energy Policy would be most appropriate to conclude this paper:

'India recognizes the possibilities of selling GHG emission reductions. We should choose options that permit doing so at a later date when it is found to be attractive. In any case, for us the imperative is to push energy efficiency, promote modern renewables, develop new technologies that augment our energy supply such as in-situ coal gasification that also provides scope for carbon capture, and emphasise nuclear power. All of these will automatically help reduce the GHG emissions.' □

PM to Urban Ministry: Tap our green transport projects for carbon credits

Prime Minister Manmohan Singh wants the Ministry of Urban Development to identify government-sponsored public transport projects which could earn carbon credits for the country. As a first step, his office has identified the Mass Bus Rapid Transport projects in Bhopal and Indore which could earn carbon credits under the Clean Development Mechanism. (Clean Development Mechanism is an arrangement under the Kyoto Protocol that allows developed countries to invest in emission-reducing projects in developing countries as the cost of cutting one unit of carbon emission is much more in developed countries).

"It is requested that suitable action may kindly be taken in this matter," says a letter from the Prime Minister's Office sent late last month.

India is the second largest claimant of carbon credits but the entire claim is in the private sector. India Inc earned Rs 1,500 crore last year by selling carbon credits to developed-country clients. This is a fraction of the Rs 18,000 crore experts estimate will be India's share in global carbon trading by 2012. The PMO's recipe is that the MoUD either co-opt an official from the Environment Ministry into the project-sanctioning authority or develop a suitable template to guide project promoters in earning the green credits. The PMO's idea has triggered a scheme that could make public transport projects the biggest claimant of carbon credits. The MoUD is rejigging a 1988 scheme on urban transport planning to improve mobility and reduce pollution levels in all cities.

Though still preliminary, the Rs 152-crore Scheme for Urban Transport Planning would provide financial assistance to states for traffic and transport studies with extra money for urban transport projects that would be developed via public-private partnerships. The Centre would bear 80 per cent of the study cost with the state bridging the rest. In case of urban transport projects, the Centre's renewed contribution would be 50 per cent with the rest borne by the city development authority or the state, and the project developer.

Campaigns will be launched to encourage individuals and communities to adopt 'Green Travel Habits' to make travel less polluting and damaging.

AFRICA'S FORESTS CAN BUFFER CLIMATE CHANGE

Lidia Brito *

The G8 summit in 2005 focused on Africa and climate change because the two issues are linked: Africa is particularly vulnerable to the effects of climate change and therefore must be supported to adapt to it.

Adaptation to climate change is critical worldwide, but nowhere as much as in Africa, where exposure to natural disasters is higher than in most other regions.

Aside from adaptation, Africa can also play a role in mitigating climate change through more sustainable forest and land management. Rural populations from Africa have the capacity to compete and export greenhouse-gas emission-reduction credits generated by forestry and agriculture activities that improve their livelihoods, ameliorate local environmental problems and increase communities' ability to cope with climate change.

However, in order to fulfill that promise, the industrialized world must give Africa a chance through the emerging international carbon market.

The best approach would be for Europe, Japan and Canada to buy certificates of biological carbon sequestration from Africa as part of their efforts to meet their obligations under the Kyoto Protocol.

Under the Clean Development Mechanism (CDM) of the Kyoto Protocol, industrialized countries (so-called "Annex I countries") have the right to purchase certificates of carbon sequestration from reforestation projects undertaken in developing countries and use these certificates to offset up to 1 percent of their 1990 greenhouse-gas emissions from industry, transport and housing.

Although this represents a small fraction of the effort needed from industrialized countries to fulfill the Kyoto Protocol's goals by 2012, it would help significantly in

improving forest and land use in Africa.

Europe, in particular, can demonstrate its commitment to mitigating climate change and promoting economic development in Africa by filling its 1 percent quota of credits from reforestation projects. This requires modifying some of the rules governing its own internal carbon market, the EU Emission Trading Scheme (EU ETS).

Under current EU ETS rules, carbon credits generated by forestry projects undertaken in the CDM have no value, despite their obvious climate, environmental and social benefits. This is because the so-called "linking directive" — the regulation authorizing EU firms to import Certified Emission Reductions from CDM projects — bans credits from any forestry project.

Unsurprisingly, no European firm is interested in purchasing such credits. Even European governments, which are not tied by the EU ETS ban, purchase very few.

The EU ETS' exclusion of carbon credits from forestry projects will remain in force at least until 2008, with the question of whether to include them subsequently set to be revisited next year. The European Commission will submit a report for consideration by the European Parliament and the Council of Ministers by June 30 next year.

Preserving the European bias against credits from forest projects is not justified, as positive experience emerging from the first land-use projects will show.

In the Doha trade negotiations, industrialized nations accepted the need to liberalize their agricultural markets by reducing subsidies to domestic producers and tariff barriers on agricultural imports.

So why not liberalize the carbon market as well — a move that would help, not hurt, domestic producers?

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It would also help if all the parties to the Kyoto Protocol amended the post-2012 CDM rules. In particular, three changes are necessary: the relaxation of the 1 percent rule, the expansion of eligibility criteria to include more than just reforestation and the removal of the 60-year replacement rule, which mandates the replacement of temporary with permanent credits after 60 years, regardless of the state of the underlying forests.

The first change would enable Annex I countries to satisfy a greater share of their increasing climate responsibilities using credits from land-use projects implemented in non-Annex I countries. The second change would allow forestry and land-use projects that

are eligible to issue carbon credits to include such activities as re-vegetation, forest restoration and improved agricultural management.

The third change would eliminate a perverse rule, by which parties to CDM contracts can liquidate forests to buy replacement credits.

The responsibility for reforming the emerging carbon market does not lie solely with the North.

All parties to the Kyoto Protocol, including African nations, have a unique opportunity to influence the post-2012 debate and defend the inclusion of land-use projects in the emerging carbon market. □

India Inc tops charts with 53% of global carbon credits demand – Wealth from Waste: Earned Rs 1,500 cr last year by selling to developed country clients

Having cornered more than half of the global total in tradable certified emission reduction (CERs) this month, India's dominance in carbon trading under the clean development mechanism (CDM) of the UN Convention on Climate Change (UNFCCC) is beginning to influence business dynamics in the country.

India isn't obliged to cut emissions, as its energy consumption is low. While this may change 10 years from now, companies are jumping on the CER bandwagon. Enterprises are adopting cleaner, sustainable technologies. In some cases, as reported by this newspaper, revenues from waste exceed those from the main business.

"We have been educating associations, NGOs, individual companies about the significance of CDM. It's a win-win proposition and all should take benefit of it," says R.K. Sethi, director-climate change, Ministry of Environment and Forests.

Adds Sudipta Das, partner-risk and business solution, Ernst and Young: "Initially managements were not willing to invest money and time as they weren't sure of the potential. Then we joined hands with CII, FICCI, and other associations for an awareness drive. Apart from the pre-identified CDM projects, we also brushed up those that companies conceived, to make them feasible and clear the scrutiny of validators." The result: India Inc pocketed Rs 1,500 crore last year just by selling carbon credits to developed-country clients. This is a fraction of the Rs 18,000 crore experts estimate will be India's share in global carbon trading by 2012. In the pipeline are projects that would create upto 306 million tradable CERs. Analysts claim if more companies absorb clean technologies, total CERs with India could touch 500 million.

Though small compared to the Chinese total, the lead has been heartening for industry, government and experts alike. "Though China has an edge over the longer term, we were proactive with initiatives that popularised the concept resulting in faster processing and sanction," says Sethi. As head of the Indian Designated National Authority (DNA), Sethi oversees verification and sanction of feasible and sustainable CDM projects.

Of the 391 projects sanctioned, the UNFCCC has registered 114 from India, the highest for any country. In its efforts at popularising the concept, the government has got support from the German Ministry of Economic Cooperation and Development through the Indo-German Energy Programme. Waiting in the aisles is a mix of central and state PSUs like ONGC, GACL, and private companies like Reliance.

Small entrepreneurs with creative projects are also lining up. The list of CDM projects approved by the Indian CDM authority makes for interesting reading. A project in an Andhra Pradesh village plans to produce 3 MW power from chicken droppings. Another is to produce 1.5 MW from rice husk. These projects qualify for CDM as they save on fossil fuels that would have otherwise gone into the production of that much power. To be feasible, a CDM project should cut down emissions (using clean technology), or replace carbon in nature (using renewable energy resources).

According to UNFCCC, the leaders of tomorrow will be China, Brazil and then India. While China at 40.7% has the highest 'expected average annual CERs from registered projects by host party' of more than 37 million, Brazil with almost 15 million is a distant second with 16.3%. India's average annual CERs stand at 12.6% or 11.5 million.

AFFORDABILITY OF SOLAR PV IN INDIA – ISSUES RELATED TO FEED-IN TARIFF

SYS Chodagam Rao *

Will Solar PV be ever capable of meeting global energy demand? Can an emerging market like India afford SPV? Would it be affordable by mass-market without any subsidy from the Government?

Well, for the first question, the ready answer is “YES”. The earth receives ~ 4×10^{24} J/year of solar energy. Thus even with a low efficiency solar conversion of 10%, one needs to cover only 0.1% of earth’s surface with solar panels to meet the global energy demand! Sun is perpetual source of energy and fortunately, India, due to its geographic location enjoys an abundant sunshine for most part of the year. So, in theory, India could meet all its energy needs just by tapping this source.

Coming to question of affordability and mass-marketability, the answer unfortunately is still a big “NO”. But it is possible to achieve. While the technology is proven, the barrier for affordability today is the higher initial cost & capital investment. While high capital investment is the only hurdle, it is far outweighed by significant benefits like no recurring expenses like fuel, operation and maintenance costs as compared to other technologies. Solar PV generation is noise less and generates no pollutants.

Transportation and distribution losses are near zero, as it can be installed and energy can be generated close to the end user. This can be produced anywhere on the earth – it only requires brightness from the Sun.

While Solar PV systems built with newer technologies like thin film silicon, CIGS & CDTe costs less as compared to the crystalline technology, and the overall costs are still not affordable in comparison to conventional energy sources. To make any technology affordable, efficiencies and productivity gains due to

economies of scale need to come into play. Unless mass production takes place, cost will not come down significantly and mass production can only take place if it’s affordable by common man, comparable to the existing sources of energy. This is like the proverbial “chicken and egg” situation which needs special mention.

Hence Solar PV, like any other technology, needs external support at these early stages to achieve the critical mass and attain self-sufficiency. One form of such support - is the support from the Government by way of subsidies, which by the way have been prevalent in India from the last 10 – 15 years. But due to limited subsidies available on year to year basis, the implementation is limited to that extent only.

However, if we make this as open market without depending on subsidies, the Solar PV would become affordable. And also, technology growth, like anywhere else in the world, should first take place in the urban areas, where people could afford higher costs without any subsidies and could then slowly get into villages and remotest corners, as costs come down.

COMPARISON OF SOLAR PV AGAINST CONVENTIONAL DIESEL POWER GENERATION.

It could be seen that for a life cycle cost of 20 years (that’s what Solar PV is being guaranteed world wide) the KWH cost (Unit cost) for the Diesel power is of the order of Rs.28, where as for the Solar PV it is Rs.18. Is it not surprising? Yes, it is so, if one does the detailed calculations for 500 KWH generation per day (as a set example only) using Solar PV & Diesel generators is given in **Table 1**.

Assumptions for the calculations are –

- 5% annual inflation in fuel cost and O&M costs.

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TABLE 1

Item Description	SolarPV with Battery	Percentage of total cost	Diesel Generator	Percentage of total cost
Initial Costs:				
Total Capital Investment in Lakhs of Rupees	528.35	94	99.32	11%
Recurring Costs:				
O & M in Lakhs of Rupees	33.07	6	93.18	10%
Fuel cost in Lakhs of Rs.	—	—	712.25	79%
Total Cost	561.42	100	904.75	100%
Total Generation in Million Units	3.121	—	3.285	—
Average Cost per Unit Rs.	18	—	28	—

- Diesel Generator and battery are replaced every six years.
- SPV generation is at 90% of initial power rating for the first 10 years and thereafter it is 80% of the initial power ratings.

Similarly, if the fuel price is Rs.36 (current market rate), the break even for the initial investment would be of the order of 11 years and if the fuel cost is around Rs.15 (a very unlikely situation), the break even would never occur with the 20 year life cycle cost. Similarly if the fuel cost is assumed to be Rs.50 (a more realistic scenario), the break even period would be within 7 to 8 years.

STEPS TO MAKE SOLAR PV AFFORDABLE

World-over, Government support by way of feed-in-tariff subsidy, has proven to be a successful model in making PV more affordable and develop a wider user base. Energy generated by individual solar installations is fed into electricity grid and consumers are given a credit for every unit of energy fed into the central grid. In India, while fixed/variable feed in tariffs are available for wind, hydro, biomass etc. from the state electricity boards, no such tariff is available for the Solar Power. To arrive at this feed in tariff for Indian scenario, examples from other markets could be used (**refer Table 2**). A good starting point to fix this feed-in-tariff rate could also be the comparative costs associated with diesel power generation and solar PV power generation.

In India, we have two application scenarios —

- a) Use the energy while it is produced directly by the load, (feed into the grid or use the power in the day time without storage); or
- b) Store the energy during day time when it is produced and use it in the nighttime when power is typically not available. More applicable in places like remote villages or islands where there is no grid connection and energy is generated through Diesel Generators.

In addition to feed-in-tariff support, Government could also offer its support in many other ways —

- (a) Create domestic market for on-grid PV applications (On-grid market accounts for >80% of the global PV market).
- (b) Energy laws similar to other developed market: essential for opening up the on-grid market for PV in India.
- (c) Provide Carbon Credits to the industry
- (d) Establish accreditation centres affiliated with global standards for certification of PV product
- (e) Support Industry-Academia partnerships for undertaking focussed R&D projects in the new technology areas

TABLE 2

EXISTING FEED IN TARIFF IN OTHER COUNTRIES AND THE PROPOSED FEED IN TARIFF IN INDIA FOR VARIOUS APPLICATIONS.

Country	Tariff	Photovoltaic Renewable Tariffs in US\$/kWh	
		Program Size	Contract No. of Years
California	\$0.500	3,000 MW	—
France (Proposed)	\$0.379	500 MW	20
Germany	\$0.654	No Limit	20
Italy	\$0.562	500 MW	—
Ontario	\$0.369	No Limit	20
Portugal	\$0.360	—	12
Spain <50 MW	\$0.426	400 MW	>25
India (Proposed)- Grid Interactive	Rs.20/\$0.45	No Limit	20
India (Proposed) - Free field & Off-grid applications with Battery	Rs.25/\$0.55	No Limit	20
India (Proposed)- roof top Grid Interactive	Rs.30/\$0.65	No Limit	20

(f) Encourage banks & financial institutes to disburse loans for PV projects

While Government measures would definitely help make PV affordable to a large extent, Solar PV manufacturers can also contribute in creative ways like

- (a) Build, Operate, Lease & Transfer the PV Power Plants;
- (b) Share the Capital Expenses with end users
- (c) Share the Feed in tariff as agreed to above in the same proportion
- (d) Enter into long term Power Purchase Agreements with Corporate/Govt bodies to sustain the market scenario.

CONCLUSION

For fast growing markets like India, energy demand will always exceed available supply. Dependence on volatile external sources of supply is always a high-risk situation. Solar PV can be an effective medium to help

close this gap and enable India to be energy self-reliant.

Solar PV is one of the cleanest and abundantly available energy sources, but it comes with a higher price tag. To make PV more affordable, an immediate step could be to fix the feed in tariffs higher than other conventional energy generations and allow PV to get into on-grid application. □

The Sun radiates 1 PW (petawatt), or 10¹⁴ kWh, of energy every hour; only 3% of this energy is converted into wind energy and just 3% of this wind energy can meet the global power demand today

CONSULTANT'S PERSPECTIVE OF CDM

A.Mohan Reddy *

Parties of the United Nations Framework Convention on Climate Change (UNFCCC) adopted the Kyoto Protocol in December 1997. The Protocol set legally binding numerical targets for the reduction of greenhouse gas (GHG) emissions on industrialized countries, known as Annex I parties. Each country has been assigned individual emission limitations or reduction commitments, so as to reduce the total GHG emission by at least 5% below the 1990 level during the commitment period from 2008 to 2012.

The Clean Development Mechanism (CDM) is one of the mechanisms outlined in the Kyoto Protocol. Under the CDM, industrialized countries can implement GHG mitigation projects in developing countries, known as Non-Annex I countries, so that they achieve Certified Emission Reduction (CER) based on the emission reduction accomplished by the projects. They could count CERs as complementary GHG emission reduction achievements to fulfill their own target. Since such projects in developing countries cost less than domestic measures, industrialized countries get an opportunity to reduce GHG emission more cost-effectively. On the other hand, developing countries also benefit in as much as they can use the CDM to obtain financial resources and state-of-the-art technology.

CDM projects and the resultant carbon credits is relatively a new phenomenon. Very few entrepreneurs are aware of this concept. Even those who are aware of this concept know very little. It is essentially the Consultants who educate the entrepreneurs and hand-hold them till the project gets registered and in a number of cases even after. It is doubtful whether the concept would have caught on and become as popular as it is now, but for the Consultants. It is against this background that this article assumes significance.

This article is divided into three parts. First of these deals with CDM projects with particular reference to

India. The role played by the Consultants form the subject matter of second part. And the third part is devoted to a discussion on the problems encountered by the Consultants. The article concludes with what could be done to make India a leader in the CDM projects

CDM PROJECTS

CDM market is growing in leaps and bounds. The global carbon market tripled within one year from USD 10 billions in 2005 to USD 30 billion in 2006¹. Even this estimate is considered as conservative. Reports reveal that project based activities such as Clean Development Mechanism and Joint Implementation Projects accounted for almost USD 5 billion in 2006 which is again twice the value traded in the previous year. Therefore, carbon market is one that cannot be ignored by any agency concerned with global warming and more particularly the financial institutions, who fund CDM projects.

Kyoto Protocol, which was signed in 1997, was approved in February, 2005. From then onwards, the entrepreneurs all over the world have realized the possibility of undertaking CDM projects, which were otherwise unviable or less viable. Once the methodology was published by UNFCCC, Consultants began to identify opportunities for projects in their respective countries and started educating the entrepreneurs, prepared the Project Design Documents (PDDs) and commenced registration of CDM projects for carbon credits. As per UNFCCC, world over 693 projects have been registered with Executive Board of CDM till 8th June, 2007 and about 1600 projects are in the pipeline with an estimated potential of over 2 billion CERs. Of the 693 projects registered so far, India's share has been 258, i.e., about 37%.

The first Indian project to get registered was Gujarat Flourochemicals Ltd., Vadodara, which got registered with CDM Executive Board in March 2005. From then

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on, there has been a steady growth in the number of projects registered with UNFCCC. Till 8th June, 2007, 258 projects have been registered and number of projects are in the pipeline. A State-wise distribution of projects registered till June 8, 2007 is given in **Table 1**.

Projects registered from India cover a wide range of sectors; Among them, renewable energy played a dominant portion as shown in **Table 2**.

CONSULTANT'S ROLE IN DEVELOPING CDM PROJECTS

Consultants' have been playing a significant role in the promotion of CDM among Indian developers. The steady increase in the flow of projects for CDM in India could not have happened but for the role of consultants.

TABLE 1: STATE-WISE DISTRIBUTION OF CDM PROJECTS REGISTERED WITH UNFCCC

STATE	NUMBER
Chattisgarh	21
Rajasthan	26
Andhra Pradesh	34
Uttar Pradesh	22
Uttaranchal	3
Haryana	2
Himachal Pradesh	10
Goa	1
Gujarat	19
Karnataka	30
Jharkhand	1
Maharashtra	27
Orissa	8
Punjab	18
Tamilnadu	18
Madhya Pradesh	5
Unallocated	2
Pondicherry	1
West Bengal	10
Total	258

Source: Derived from UNFCCC statistics

TABLE 2: SECTOR-WISE DISTRIBUTION OF CDM PROJECTS REGISTERED WITH UNFCCC

Biomass	47
Hydro	32
Wind	34
Solar	1
Co-generation - Bagasse	18
Co-generation - Biomass	7
Biogas	1
Cement – blending	24
Cement – usage of alternate fuels	3
Waste heat recovery	30
Fuel Switch	10
Methane Recovery	6
HFCs	4
Natural Gas grid connected power plant	1
Other energy efficiency projects	40
Total	258

Source: Derived from UNFCCC statistics

When the CDM came into existence, there were not many players advising CDM issues. There were hardly half a dozen Consultants in the field. But, with active role played by institutions like GTZ ADB and similar agencies who took up capacity building programmes in a big way, there has been some growth in the number of players. Nevertheless, even today the market is dominated by multinational accounting firms and to a small extent by home grown Consultants. Consultants apart, there have been some instances of some of the industrial houses setting up separate CDM cells to take care of the group's projects. But the numbers are very limited.

The Consultant's role in the CDM projects can be broadly divided into four, viz.,

- Identification
- Development
- Post registration monitoring
- Sale of CERs

Identification

A Consultant has to first identify the sectors eligible for registration as CDM project activity within the rules of CDM as prescribed by CDM Executive Board. All projects reducing emission in principle may be categorized as CDM projects, but they have to fulfill the strict criteria fixed by the EB to be eligible for registration. This is generally known as Additionality Test. Tools have been developed by the EB for demonstration of Additionality. Unless the project meets the Additionality Test it cannot be brought under CDM project. This is the first challenge of the Consultant. He² has to examine the project activity and screen the same based on the prescribed criteria before advising the proponent to take the project forward for registration. He must also ensure that the project proponent has reckoned the CDM revenue during the planning stage of the project activity itself and that the emission reductions expected to be achieved by the project activity is sizable compared to the costs involved for development. The project activity can be developed for CDM only when it passes through the initial screening test,. The 'pre assessment role' of the Consultant is very significant as it ensures that uneconomical and ineligible projects are not developed and in the process time of project proponent as well as the Consultant is not wasted.

Development

Once the project activity passes the screening test, the Consultant is required to develop the project for CDM. He has to prepare the Project Design Document for validation, co-ordinate with validator till the validator gives the validation opinion, approach the Designated National Authority (DNA) along with the representative of the project proponent for making a presentation before the DNA for 'host country approval'. Thus, in the development stage, Consultant's role extends up to the registration of the project with CDM Executive Board.

Post registration

After the project is registered the Consultant may be required to guide the project proponent in establishing the required monitoring systems to enable

the validator to verify emission reductions achieved by the project activity, once the project commences operation.

Selling of CERs

Invariably, the project proponents avail of the services of Consultant to get a fair market price for the CERs. Sale of CERs is an important aspect in the whole CDM cycle, because unless the project proponent gets a fair price for the CERs, the efforts are not worth the cost Incurred by the project proponent. Buyers offer different structures, such as fixed price, floating price or combination of fixed and floating price etc. With number of buyers approaching the project proponent and confuse them with different proposals, it becomes necessary for the Consultant to play a significant role in protecting the interest of the project proponent.

PROBLEMS ENCOUNTERED BY THE CONSULTANTS

In discharging his task, the Consultants invariably faces a number of challenges. The challenges become all the more complicated as CDM is a complicated process and the project proponents' and other players' knowledge base is very limited Thus, the Consultant not only has to perform his task as mentioned above, but in the process also educate the project proponents so that the questions they ask and the documents they furnish are relevant. Based on the experience, broadly four different problems can be identified, viz.,

- Lack of awareness
- Half baked knowledge
- Non-availability of trained staff and
- Unreasonable proposals

Lack of awareness

The concept is relatively new and very few are aware of this concept. Even among those, who have some knowledge on this subject, the knowledge base is either inadequate or superficial. Thus, there is general lack of awareness among the Indian developers on CDM.

Though several knowledge building programmes have been undertaken by various agencies, these programmes have been restricted to metros only. Therefore, information on CDM in general, the eligibility criteria, the procedures, the costs involved and the carbon market in particular, are nothing more than Latin and Greek to many developers in India. Hence, the first challenge to the Consultant is to educate the project proponent about the basics, the procedure, the expenses involved and the benefits expected to be derived from registration of the project activity as CDM project. This educating process takes considerable time of the Consultant. Instances are not rare to come across, where the project proponents shy away from taking decisions when they are informed of the cost involved in developing the CDM project. In such situations, it is the trust the project proponent has on the Consultant, that plays an important role.

Half baked knowledge

While the lack of knowledge is one extreme, half baked knowledge of some project proponents is the other extreme. Consultants do at times encounter problem, wherein the project proponent comes out with a very high expectation on CER price.. The market for carbon credits is volatile and depends on several factors such as EU allowance price, the political considerations which decide the demand for carbon credits, volume of CERs, desperation of the buyer etc. among others. Either due to lack of knowledge or due to wrong advice given by other Consultants, many project proponents believe that they should get a price for CER equivalent to EU allowance price, which is not the case in real practice. Under such scenario, the Consultant has to educate the project proponent on the carbon market and its functioning.

Non-availability of trained staff and attrition

PDD preparation is a tough task. To take up this task, the Consultant should have staff with multi-disciplinary grounding, i.e., knowledge on technology, finance, economics etc. to understand the project and prepare the PDD. As CDM itself is a new concept, not many trained people are available in the market. As the flow of projects is quite substantial and the number

of people with reasonable knowledge is limited, there has been severe attrition of staff. Such attrition of trained staff adversely affects the Consultant's ability to deliver the service within a reasonable time.

Unreasonable Proposals

Some of the project proponents in the private sector and generally most of the project proponents in public sector stipulate some unrealistic conditions. They require the Consultant to take up the assignment on pure success basis, meaning that the Consultant will not be paid any fees for the service rendered till they realize revenue from CER sales. An extreme version of this unfair practice is where the project proponents insist on the Consultant bearing the cost of validation and registration with a proviso that the Consultant would get a share in the CER sale revenue as and when the project commences operation and generates CERs. Such unreasonable conditions places a lot of problems for the Consultant and leaves a big dent in his resources, particularly for small Consultants. Cases are also not rare to come across, where the project proponents stipulate unreasonable conditions for eligibility, such as "consultants should have handled 75 projects" for eligibility for participation. Such conditions tend to favour only multi national consultants and in the process drive away the home-grown Consultants, irrespective of their knowledge base and success ratio.

LOOKING AHEAD

It hardly needs to be emphasized that the Consultants play an important role in CDM activity. In fact, it might not be an exaggeration if it is stated that market is driven by the Consultants. Some of the problems faced by the Consultants are temporary in nature, but some could be sorted out by the stakeholders. A case in point is the problem faced by the Consultants due to unreasonable proposal put forth by some of the project proponents.

It goes without saying that the CDM revenue not only ensures the project becomes more viable but also endows the financial institution with additional security (by having a lien on it). The IRR of the project goes up by anywhere between 2% to 5% during the loan amortization period. The DSCR of the project also improves considerably.

Since financial institutions are one of the beneficiaries of CDM revenue, they could play major role in the development of CDM projects. The projects originate in financial institutions, in the sense that but for their financial assistance project activity could not have become a reality. While appraising the project itself, if the financial institutions could educate the project proponents about the CDM benefits and take care of Additionality requirement, the job of the Consultant would become much easier.

Financial institutions could take up a sort of screening to ascertain the eligibility of the project and the project proponent would get more confidence and would be willing to take the risk of investing in CDM activity, if he gets an opinion from the financial institution.

Likewise, while estimating the preliminary and pre-operative expenses, the financial institutions could make a provision for CDM consultancy, validation and registration so that the project proponent is well informed about the expenditure he had to incur to get the additional cash flow. This would enable the

Consultant to claim his fee and deliver top quality service without facing uncertainty.

PDD is a specialized document and requires different knowledge base. It has to be handled only by those Consultants who have the requisite expertise and knowledge.

By virtue of the fact that these Consultants are private firms, they work with zeal and commitment to ensure that the project gets registered and in the process, the project proponent, financial institution and the country benefit.

Given a proper encouragement and support, the Consultants could ensure the Country becomes the leader in CDM project activity.

FOOTNOTES

¹ World Bank, Carbon Finance, May 2007

² For the sake of convenience, the article uses male gender. This should not be construed as gender bias of the author

GOVT LOOKS TO CASH IN ON CARBON CREDIT BIZ

NEW DELHI: All buildings and infrastructure projects will have to comply with the Clean Development Mechanism (CDM) to claim carbon credits under the Kyoto Protocol.

Taking a lead in carbon credit business under the protocol, the urban development ministry has set up a high-powered committee under urban development secretary M Ramachandran for availing carbon credit under the CDM mechanism relating to energy efficient buildings, mass rapid transportation, solid waste management and sewerage treatment.

The unique initiative could mop up investment for India, considering the booming business in carbon credits where the projects can get funds from developed countries for using green technologies.

The ministry has also co-opted an official from the environment ministry into the Central Sanctioning and Monitoring Committee which gives final approval to projects under Jawaharlal Nehru National Urban Renewal Mission. This will ensure that projects with clean technology get final clearance which, in turn, can be traded by the ministry through carbon credit mechanism. The ministry has also decided to revise JNNURM guidelines to this effect.

Confirming the ministry's move, Savitur Prasad, director and member secretary of the committee said: "Normally, infrastructure projects are financially not viable or self-sustaining, especially sewerage and solid waste management. The possibility of availing carbon credit in these projects not only ensures that the best of technology will be used but projects will also be financially remunerative.

"This will be a step in direction of providing international standard projects meeting best of specifications. And by putting enabling clause in JNNURM guidelines will increase efficiency and productivity of the projects,"he added.

Source: http://timesofindia.indiatimes.com/India/Govt_looks_to_cash_in_on_carbon_credit_biz/rssarticleshow/2070491.cms

HYDROGEN: UNLIMITED SUSTAINABLE NATURAL ENERGY SOURCE

Vilas Muttemwar *

Hydrogen holds the promise to provide clean, reliable and sustainable energy for meeting growing energy needs for transportation and power generation. Hydrogen can be used directly as a fuel in internal combustion engines. It can also be used in fuel cells to generate electricity for stationary, portable and transport applications. Hydrogen is environmentally benign. It has the potential to replace liquid fossil fuels in the future.

Shri Vilas Muttemwar gave the Presidential address at the National Hydrogen Energy Road Map: Opportunities for Public – Private Partnership (PPP) held at New Delhi. The following is the text of the address.

"I am happy to be here with you on the occasion of the Conclave on 'National Hydrogen Energy Road Map: Opportunities for Public – Private Partnership (PPP)'. I heartily welcome you all to the Conclave and Exhibition on Hydrogen Energy on behalf of my Ministry.

India today has among the largest programmes on renewable energy technologies in the world. The total power generating capacity in the country as on March, 2007 was about 1,33,000 MW. Renewable power generating capacity is about 10,252 MW, contributing to about 8% of the installed power generating capacity. Among renewable power technologies, the major contributions are from wind power (7092 MW), small hydro power (1976 MW) and bio-energy (1187 MW). In addition, 155 MW off-grid distributed renewable power capacity have been set up. The Ministry of New and Renewable Energy is confident of achieving over 10% of the total installed power generating capacity in the country by 2012 from renewable power.

Further, about 10 lakh solar photovoltaic systems are being used for domestic lighting purposes. More than 5,000 villages are being given light through solar

** Presidential Address of Shri Vilas Muttemwar, Minister of New and Renewable Energy at Conclave on "National Hydrogen Energy Road Map: Opportunities for Public – Private Partnership (PPP)"*

energy, out of which 3,600 villages and hamlets are those which cannot be electrified through the grid and have been provided with solar home lights. About 19 lakh square meter area has been covered under solar thermal systems. About 40 lakh biogas plants have been installed throughout the country. India is second in terms of installation of biogas plants, fourth in terms of wind power installed capacity and seventh in terms of solar cells production in the world.

Renewable energy, which is carbon free, is the ultimate answer to the problem of climate change and global warming. We all are experiencing the adverse effects of environmental pollution and excessive emissions of greenhouse gases, which include untimely rain, increase in temperature, decrease in snowfall and melting of glaciers etc. The recent Fourth Report by IPCC on mitigation has brought out the urgent need to accelerate development of new sources of renewable energy. These include among others frontier clean energy technologies like bio-fuels, hydrogen energy and fuel cells, which would lead us to the ultimate carbon free economy. The Name of my Ministry has been recently changed to "Ministry of New and Renewable Energy" to bring out the thrust being given to such new and renewable energy technologies.

Our Ministry has been appointed as the nodal Ministry for the overall coordination of the National Bio-fuel Programme which spans several Ministries, Departments and Agencies. A Draft National Bio-fuel Policy has been prepared by our Ministry which is under active consideration of the Government.

While Bio-fuels will provide short-term and even medium-term answer in alleviating the problem of climate change and provide energy security, the long-term answer has been recognized the world over, to come from Hydrogen which is being also called the freedom fuel for the future. India has been actively involved in hydrogen research and development for more than two decades through academic institutions,

universities, research & development institutions and industry. My Ministry has undertaken a broad-based programme for research, development and demonstration on different aspects of hydrogen energy, including its production, storage and applications as a fuel in automobiles and for power generation.

Our efforts have been mainly devoted towards the development of hydrogen fueled engines for two and three wheelers; and small scale power generation by modifying existing petrol engines; solid state materials for hydrogen storage, renewable energy methods for production of hydrogen using solar, biomass, biological, photolytic and photo-electro-chemical routes, among others. Our metal hydride research on solid state storage of hydrogen has received international recognition. Several leading research groups in our country are working on different types of fuel cells, reformers, hydrogen sensors, membranes etc. Polymer electrolyte membrane fuel cell based UPS systems and fuel cell-battery hybrid vehicle have been developed and demonstrated. Phosphoric acid fuel cell based power packs have also been developed and demonstrated.

Recognizing the importance of hydrogen as a green future fuel, the Ministry set up a National Hydrogen Energy Board in October, 2003 for accelerating the development and commercialization in this sector. The Board has distinguished members from Government, research and academic institutions, industry, experts and eminent public figures. The Board set up a Steering Group under the Chairmanship of Shri Ratan Tata to prepare a National Hydrogen Energy Road Map. The National Hydrogen Energy Road Map prepared by this group lays down the pathway for the development of hydrogen energy infrastructure in the country, including introduction of hydrogen fueled vehicles by 2020. The Road Map was approved by the National Hydrogen Energy Board on January 16, 2006.

The National Hydrogen Energy Road Map has proposed two major committed initiatives i.e. Green Transport (Initiative for Future Transport - GIFT) and Green Power Generation (Green Initiative for Power Generation - GIP). Under the initiative on transport sector, efforts are aimed at developing and demonstrating hydrogen powered IC engine and fuel cell based vehicles ranging from small two/three

wheelers to heavy vehicles through different phases of development. The Road Map envisages that by 2020 about 1 million hydrogen fuelled vehicles, of which about 75% of vehicles are expected to be two and three wheelers and the rest cars, taxis and buses, would be plying on the Indian Roads.

Under the initiative on power generation, efforts would be directed towards developing and demonstrating hydrogen powered IC engine/turbine and fuel cell based decentralized power generating systems of aggregate capacity of 1000 MW by 2020.

As visualized in the National Hydrogen Energy Road Map, Public-Private Partnership will form the basis for developing a vibrant industrial base in the country, covering various aspects of hydrogen and fuel cell technologies. These include hydrogen production, its storage, transport and delivery, materials, components, equipment and applications of hydrogen energy and relevant safety, standards, codes and regulations.

My Ministry is coordinating with various stakeholders, including Ministries/Agencies, organizations in the public and private sector for the systematic implementation of the National Hydrogen Energy Road Map. We are closely working with the private sector in India, and especially with the automobile industry as well as engine manufactures and other concerned Industry groups in this task. Some of the projects suggested in the Road Map have already been undertaken and others are in the process.

A project for setting up a hydrogen dispensing station at New Delhi is being implemented jointly by the Ministry in collaboration with the Indian Oil Corporation Limited, a public sector oil company. The dispensing station is expected to be operational by March, 2008. Another demonstration project is being taken up for introduction of H-CNG blends in existing CNG Vehicles, between the Ministry and the Society of Indian Automobile Manufacturers (SIAM). The project would be of two years duration and is the first public-private partnership project in this new clean energy technology area. The project aims at the introduction of H-CNG blend as a fuel in buses, cars and three wheelers, involving five leading Indian automobile manufacturers.



Hydrogen dispensing station run by Indian Oil Corporation at New Delhi

I am happy to inform you that my Ministry has taken steps to set up a State of Art - National Hydrogen Energy and Fuel Cell Centre for dedicated R&D efforts on different aspects of hydrogen and fuel cell technologies at the Solar Energy Center of the Ministry at Gwalpahari in Gurgaon, Haryana. This Centre will coordinate research, development, demonstration, testing and other scientific activities on hydrogen and fuel cells.

In addition, the Ministry is supporting research and development and demonstration projects in research and academic institutions in the country in hydrogen energy and fuel cell technologies, besides setting up of projects in Mission Mode, as recommended in the National Hydrogen Energy Road Map.

While our Ministry, as well as other concerned Ministries and Departments in the Government, and

leading Agencies like Indian Oil Corporation have taken up several projects at the R&D and demonstration stage, we still have a long way to go, if we have to keep in step with the rapid developments taking place in these new and emerging areas in the advanced countries and other leading developing countries such as China and Brazil. The Government must work together hand in hand along with R&D and academic institutions besides investors, market developers and financial institutions and take up coordinated research and development, demonstration and commercialization activities on various components of the total hydrogen system.

While Government has to play leadership role in the development of this frontier technology area, active involvement and leadership of industry is urgently needed, which would include their technical and financial participation in research and development and demonstration projects and capacity building efforts. The Indian industry should consider their investment in the hydrogen energy economy as an investment for their future sustainability, as is being done by leading petroleum, power and auto companies in the advanced countries. We must find ways for working together for pre-competitive research, technology demonstration and creation of niche markets through properly designed public--private partnership programmes. Through such programmes we can create a common pool of knowledge and technology base, which can then be converted into competitive commercial products by industry as part of their own corporate efforts.

I would request the distinguished participants in this Conclave, including industry leaders, eminent scientists, experts and decision makers in the Government/private sector to guide us as how we can overcome the perceived barriers in this new sector and evolve the path for the accelerated commercialization of hydrogen energy technologies for ushering in the new sustainable hydrogen economy.

We are committed to making India a leader in hydrogen energy and we can only achieve this cherished goal through public - private partnership for implementing the national hydrogen energy programme in Mission Mode.

I wish the Conclave all success.

VILLAGE EMPOWERED: RURAL BIO-ENERGY PRODUCTION AS A BUNDLED CDM PROJECT

M. P. Singh and Geetika Kalha *

BACKGROUND

Conventional sources of energy are not only depleting but also generating GHGs. These gases are causing irrevocable damage to the climate on this planet. The Kyoto protocol has been set up to reduce the emission of these harmful gases and to encourage renewable energy usage. This Protocol offers, through CDM, tradable Carbon Credits to developing countries. The value of these Carbon Credits is market driven and is sharply rising, thus making an effort to reduce emission becomes increasingly economically attractive.

Switching from fossil fuels to fuels based on renewable sources (e.g. biofuels), is the effort of all countries. Production of bio-fuels has shifted the focus to the village. The massive scope of producing bio-diesel and its socio-economic implications has been very widely discussed. These will not be reported here. A detailed analysis of impact of the Clean Development Mechanism under the Kyoto Protocol, however, needs to be worked out. This is important as activities throughout the cycle of biodiesel manufacture, i.e. from afforestation to the ultimate usage, are eligible for the credits. There is also the need to study the contribution of byproducts, as they can also produce bio-fuel.

This paper argues that merely planting of *Jatropha* for producing biodiesel, by itself is not a sound strategy, as it does not take the advantage of the full potential of CDM and, consequently the potential returns to the farmer and the village. If the strategy to switch to biodiesel is to succeed, it has to form part of the total CDM package that can be made available to the village.

Only by the means suggested in this paper, does the plantation and processing of *Jatropha* prevent

leakage, become economically viable and at the same time provide for energy and sanitation to the village.

Biofuel has to be seen, not in isolation but as part of a total environment/energy management system at the micro level.

BIOENERGY PROGRAMME IN INDIA

Renewable energy programmes in India have been in vogue since 1970's, however, the biomass energy programme has gained emphasis since the inception of the CDM under the Kyoto Protocol. Bioenergy plantations are now being considered as viable options to meet the rural energy demands and simultaneously reduce the emissions of GHGs.

Biomass based renewable energy

The biomass based renewable source of energy, when produced in an efficient and sustainable manner has various environmental and social benefits. The ultimate use of bioenergy plantations can be for:

1. Direct utilisation of biomass as fuel
2. Conversion of woody biomass to energy through controlled combustion.
3. Biofuels to produce convenient and less polluting fuels such as biodiesel *whilst continuing to provide use of biomass for carbon mitigation.*
4. Methane gas reclamation from leafy, crop waste and vegetable waste biomass through Biomethanation.

Point no. 1 is not in the scope of this article.

Point no. 2 is touched only from the CDM (as applied to afforestation and reforestation) point of view

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Point no. 3 is the most widely talked of aspect in recent years and much work has been done in this direction. This paper attempts to touch upon hitherto untouched aspects, which render the whole activity more economically feasible. The advantage, thus gained, is shown to have absorbed an additional Rs.3 per Kg. of oilseed suggested for the farmer.

Point no. 4 is central to all wastes generated in the process of agriculture, forestry and agro-forestry. In the present context, and in the context of Carbon Credits, the biomass wastes within the project boundary and because of the project are *negativities*. These wastes can be treated to prevent methane gas escape or to harness methane gas. This, when seen together with sanitation projects being taken up in rural areas, becomes a major source of energy. Further benefits of Carbon Credits as a result of methane capture and later power generation have been suggested and the advantage has been translated to numbers. The suggested integrated process provides energy, to the, sanitation, health and an overall better quality of life to the village.

THE BIODIESEL PATH

Since detailed calculations on bio-diesel are available, based on various trials at all levels, this has been taken as the central path of this paper. The value of byproducts in the bio-diesel process has been explored and the hidden contributions have been suggested in the main costing which proves that the fixation of Rs. 25/- per litre of bio-diesel by the Ministry of Petroleum is a critical beginning.

The calculations of cost/benefit to farmers are based on use of wasteland. Yields have been taken from a project appraisal by NABARD.

No recommendations have been made for agro-forestry with *Jatropha* on existing land under cultivation. The yields on such lands would be higher. This paper is an attempt to show that the situation is not as optimistic as it was made out to be in 2003. Neither is it as bad as some cynics would project it to be. It is a national necessity to develop alternates to fossil fuels and with the additional factors, suggested in this paper it provides food for thought for people interested in diversifying into alternative crops.

THE BIO-DIESEL PRODUCTION

The following are the stages of bio-diesel production:

- a. Afforestation & Reforestation with *Jatropha C.*
- b. Oil extraction from seed.
- c. Trans-esterification

Afforestation & Reforestation

As per COP 7 (2001) through COP 10 (Feb. 2005), afforestation and reforestation are the only eligible land use activities in the CDM. The definitions of forest for this purpose is:

- Forest is a minimum area of land of 0.05-1.0 hectares
- with tree crown cover of more than 10-30 per cent
- with trees with the potential to reach a minimum height of 2-5 meters at maturity in situ.

Special provisions are provided for small scale afforestation & reforestation projects. Many small scale projects can also be bundled (UNFCCC), so that the fixed costs of registration can be spread out.

The CDM Impact On Afforestation & Reforestation

The first phase of CDM until the year 2012 is open to reforestation and afforestation projects in developing countries as defined in the CDM guidelines and modalities and procedures finalized at COP 9 & COP 10 for such projects. The main criteria to be met by projects include meeting benchmarks of additionality (ie on top of business as usual scenario), permanence of emission reductions achieved and no leakage (ie ensuring that emissions achieved at one location are not emitted elsewhere).

“Small-scale afforestation and reforestation project activities under the CDM” are those that are expected to result in net anthropogenic greenhouse gas removals by sinks of less than 8 kilotonnes of CO₂ per year and

are developed or implemented by low-income communities and individuals as determined by the host party. If a small-scale afforestation or reforestation project activity under the CDM results in net anthropogenic greenhouse gas removals by sinks greater than 8 kilotonnes of CO₂ per year, the excess removals will not be eligible for the issuance of tCERs or ICERs. **(UNFCCC)**.

The key features as per the definition are:

- The projects should sequester up to 8 kilotonnes of carbon annually.
- They are implemented by low income communities.
- There is scope for bundling of projects of similar nature so that cumulatively the units sequester up to 8 kilotonnes of carbon.

Assuming an average productivity of 5 tons/ha, the area required for bundled small scale CDM projects would range between 250 to 400 ha, varying with species and plant density. The energy plantations of *Jatropha* would be principally eligible under this category of CDM projects. **(Hooda & Rawat, 2004)**. At the current rate of exchange of CERs (As per Business Standard Sept. 8, 2005, the rate is \$10/tCO₂e) this translates into \$ 80,000 per annum, which means \$ 800,000 (Rs. 360 lacs) over a 10 year period. Taking the worst case scenario, that is size of project as 400 Ha, we have CDM credit amounting to \$ 2000/ha or Rs.90,000/ha. This is nearly 3.5 times the total cost of cultivation on one Ha of wasteland.

The above is a broad example, however, each project would be calculated as per its „*Net anthropogenic GHG removals by sinks*”, which would be „*Actual net GHG removals by sinks*” minus „*Baseline net GHG removals by sinks*”, minus „*Leakage*”.

This means that the Government needs to:

- Facilitate the bundling of small forestation projects so that the total net GHG removal is just under 8 kilotonnes per annum (definition given above).
- Finalize the carbon stocks of the areas at the time in the past arrived at by definitions of afforestation

and reforestation and estimate the baseline net removals.

- Ensure that the credits accruing thus, are transferred to the small farmer via the guarantee of pay back of loan refinanced by banks like NABARD etc.

Cost of *Jatropha Curcas* Cultivation in One Hectare Waste Land

Placed below (Table 1a) is the traditional costing of a *jatropha* plantation, giving the farmer inadequate and unattractive returns. It provides, to the farmer, a sale price of only Rs. 5 per Kg. of seed. This shows that the farmer has to spend nearly Rs.25, 000 in the first three years, without any accruals. Though the table contains a cost of Rs. 1000/- for intercropping, the later tables on accrual and cost benefit analysis do not take into account any intercropping.

Table 1(b) gives the projected annual yield of one hectare. And table 1(c) gives the cost benefit analysis.

The argument of the authors is that the system can afford to pay a higher price to the farmer.

The assumptions are:

Espacement:	3 M x 2 M
Avg. Wage Rate:	Rs.50/MD
No. of Trees/HA:	1666
Casualty Replacement:	10%
Survival/HA:	1500 Nos.

This shows that the farmer has to spend nearly Rs.25, 000 in the first three years

The above tables, drawn up in 2004, show that the farmer gets an income of Rs.18750 in the 8th year, without taking into account any income from intercropping. *We also notice that the net benefit to him is negative in the first three years.*

Giving More To The Farmer

If however, we calculate the effect of CDM on afforestation/ reforestation under the Kyoto protocol and interpolate the advantage in the cost-benefit chart,

TABLE 1(A) TRADITIONAL COST OF JATROPHA CURCUS CULTIVATION PER HECTARE WASTE LAND (SEEDING)

S. No.	Particulars of Works	Unit	Cost (Rs. Per Year)			Total (Rs.)
			1	2	3	
1.	Site preparation	10MD	500	-	-	500
2.	Initial ploughing for 6 Hrs	100/Hr	600	-	-	600
3.	Intercropping	Rs. 1000	1000	-	-	1000
4.	Alighment & staking	5 MD	250	-	-	250
5.	Digging of pits (45 cm ³) & refilling @50 pits/MD & 150 pits/MD	33/11 MD	1650	550	-	2200
6.	Cost of FYM @2 Kg/pit	Rs. 150/ton	500	-	-	500
7.	Cost of fertilizer @ 250gm/plant	Rs. 2000	2000	2000	2000	6000
8.	Cost of plants including transport (1666, 166 nos.)	Rs. 3/plant	4998	498	-	5496
9.	Cost of planting & replanting @ 100 plants Per MD	16 & 5 MD	250	-	-	1050
10.	Weeding, soil working, application of Fertilizer etc. (3,2,1)	10 MD/work	1500	1000	500	3000
11.	Plant protection measures	LS	100	100	100	300
12.	Pruning	20 MD	1000	1000	1000	3000
13.	Sub Total	Rs.	14898	5398	3600	23896
14.	Contingencies	5%	744	270	180	1145
15.	Grand Total	-	15642	5668	3780	25090

Source: Karmakar & Haque (2004)

TABLE 1(B) YIELD AND INCOME PER HECTARE OF JATROPHA CULTIVATION OF WASTELAND

Year	Seed per Tree	No. of Trees	Seed (kg)	Price per kg	Income (Rs)
3	0.50	1500	750	5	3750
4	0.50	1500	750	5	3750
5	1.00	1500	1500	5	7500
6	1.50	1500	2250	5	11250
7	2.00	1500	3000	5	15000
8	2.50	1500	3750	5	18750

Source: Karmakar & Haque (2004)

giving the farmer advance from his own potential credits against the CERs earned.

Then recalculate the economics of Jatropha cultivation, assuming a sale price of Rs. 8 per Kg., The result is a better and more attractive deal for the farmer.

TABLE 1(C) ECONOMICS OF JATROPHA CULTIVATION IN ONE HECTARE OF WASTELAND

Year	1	2	3	4	5	6	7	8
Cost	15643	5668	3780					
Benefits	-	-	3750	3750	7500	11250	15000	18750
Net Benefit	-15643	-5668	-30	3750	7500	11250	15000	18750

Source: Karmakar & Haque (2004)

Interpolation of Enhanced Price and CDM Effect of Afforestation

It is suggested here that the sale price of seed for the farmer be taken as Rs.8 per Kg. The additional Rs.3/- can be made up in the next two stages of the Bio-diesel manufacturing process by taking into account the positive impact of additionalities and further CDM credits.

Total CDM Benefit of Rs. 90,000, proposed as advance to the farmer @ 2yrs “Credits in the 1st yr. 2yrs” Credits in the 2nd and one yrs CDM each in the next 6 yrs. This ensures returns from the year one.

If the government advances the AR benefits as suggested, the farmer does not have to wait three years to get financial returns from the afforestation. The CDM credits can be given in advance and the farmer earns steadily each year. The government would, of course, have to identify afforestation and reforestation projects and deal with them accordingly. Small scale projects will have to be so bundled so that the collective net anthropogenic GHG removal by the sink is just about 8 Kilo tons.

For purposes of CDM, AR activity should be de-linked from the rest of the bio-diesel production cycle. However, the observations & recommendations of the Meth Panel, in the case of the first biodiesel project, submitted to UNFCCC, should be kept in mind. Emissions of N²O from fertilizer need to be preferably avoided or accounted for. FYM used should not have been the result of piling up of biomass but should be after subjecting the biomass to controlled digestion and methane capture.

Oil Extraction & Transesterification

The following sections deal with the next two stages of the biodiesel cycle. Table 2 gives a combined costing of oil extraction and trans-esterification of an existing

TABLE 2 COSTING OF OIL EXTRACTION AND TRANS-ESTERIFICATION: BY M/S GUJRAT OLEO CHEM. LTD

Oil recoverable per Ton of Seed (based on reported 33-50% oil contents)	0.333
Cost of Seeds Rs. per Ton (based on discussions at NABARD)	4000
Crushing and refining Rs. per Ton (Industrial average cost of crushing)	600
A. Cost Oil Rs. per Ton	13814
B. Processing Charges to Biodiesel (at our plant in operation)	10000
Total Cost per ton of Biodiesel A+B	23814
Source: Chaturvedi (2004)	

unit. In table 3 & 4, the two processes are separated. Table 3 deals with oil extraction with the following additions:

- Interpolation of the enhanced price of seeds.
- De-oiled cake has been shown to have been subjected to Biomethanation and the value of methane so recovered, added. Meth Panel (UNFCCC) recommends this in the case of CDM project identification no. NM0108.
- *No CDM credit has been taken for methane captured during oil extraction, however, the credits accruing due to the utilization of the methane for electricity generation, have been evaluated earlier.*
- An allowance has been made for the profit margin to the oil expelling unit. Its sale price (purchase price of Esterification unit) has been accordingly enhanced.
- A provision has been made for transportation cost from oil extraction unit to the biodiesel plant.
- As stated above, the purchase price has been enhanced.

Existing Costing of Oil Extatrtraction and Transesterification

To start with, a costing presented by M/s Gujrat Oleo Chem Limited, a company manufacturing biodiesel is placed below. This costing takes Rs. 4/- per Kg. as the purchase price of seed.

As mentioned above, if the by-products are re-evaluated, it is possible to give the farmer a higher price for the seeds.

The advantage of methanation of the de-oiled cake has more than offset the additional cost of seeds paid to the farmer. Therefore, with the farmer getting Rs.8/- per Kg., the oil extraction unit getting its due profit, the Bio-diesel can still be manufactured at a cost of Rs. 25/-.The calculation of methane capture is done on the basis of information given by M/s Mojj Engineering Systems Ltd. Through Jayant Pavgi (2004).

TABLE 3 JATROPHA OIL EXPELLING COST AFTER METHANE RECOVERY

Item	Qty (kg)	Rate (Rs)	Cost (Rs)	Sale (Rs)
Seed	100	8	800.00	
Cost of Expelling	100	1	100.00	
Total per 100kg of seed			900.00	
By-Products				
De-oiled Cake	70			
Bio-Gas from Cake	35			
Plant Nutrient Concentrate	35			
Cost of Methanation @ Re1/Kg	70	1	70.00	
Sale of By-Products				
Biogas(Kg) (60kg/100kg cake)	35			
Methane @80% of bio-gas	28	15		420.00
Leftover matter (70-35)	35			
Total cost of Oil/ Income			970.00	476.00
Net Cost of 30 kg Oil			494.00	
Net Cost of 33 litres Oil			494.00	
Cost per Litre of Oil			14.97	
Profit per Litre Oil			1.50	
Sale Price of Oil			16.50	

The Ministry of Petroleum has fixed the purchase price of bio-diesel at Rs.25/-. Keeping in view the overall impact on the economy as well as the other social benefits as also the uncertainty of the price of fossil fuels, this price needs to be revised upwards.

Application to Energy Generated using Methane Captured during Oil Extration

In table 3 above Methane has been shown to have been captured. Normally, Methane capture is an activity that merits Carbon Credits. However, in the present case it is assumed that even if this capture was not done, no methane would have been emitted. Therefore, no net reduction in emission is achieved. Therefore, *Methane credits have not been taken into account as it is assumed to be a Bussiness As Usual (BAU) Scenario.*

However, we propose that the methane so generated be harnessed, within the project cycle, to generate electricity, either for the grid or for captive consumption.

TABLE 4: COST OF TRANSESTRIFICATION

Item	Qty (Litre)	Rate (Rs/Lit)	Cost (Rs)	Sale (Rs)
Cost of Oil	100	16.50	1650.00	
Transportation	100	0.50	50.00	
Trans-estrification charges	100	10.00	1000.00	
By product Glycerol	20			
Sale of Glycerol	20	10.00		200.00
Total Cost and Total Sale			2700.00	200.00
Net Cost of Biodiesel/Litre				25.00

CDM credits can be obtained under a bundled small scale project by generating electricity and replacing the usual source of power.

A 1 TPD oil extraction plant can produce 2100 kg of deoiled cake in a day. (@700Kg./ton of seed), which means 840 Kgs of Methane will be captured

This is capable of generating 80 KW (0.08MW) in a day running 24 hours.

At 80% efficiency, this translates into (0.08MW*365days*24h*0.80) = 560MWh per annum

Carbon emission of replaced electricity = mixed cycle (CEF=0.4kgCO₂e/KWh)

$$= 0.4tCO_2/MWh$$

Carbon Credit 560MWh/annum*0.4tCO₂/MWh = 224 tCO₂

At current rate (\$10 per tCO₂) this comes to \$2240 that is Rs.100, 800 per annum

At a production of 300 kilo litres per annum this credit works out to (100800/300) Rs.336 per Kilo litre. **That is about Rs. 0.34 per Litre of oil extracted or Rs. 0.36/litre bio-diesel.**

Post Production CDM application to Biodiesel

This credit should be available to the agency that actually replaces the fossil fuel with Bio-Diesel, such as IOC, Railways, road transport Cos., Power generation

etc. Subject to the valuation/ prevention of leakage at all stages of the project from afforestation to actual usage, the credits are calculated as under.

Emission factor for Diesel is 3.2 Kg. CO₂/L (IPCC)

Bio Diesel gives a reduction of 78%

Hence, reduction in emission is 2.50 Kg. CO₂/L or 250 Kg/KL or 0.250 t/KL biodiesel

1 t CO₂ is reduced by 0.4 KL of biodiesel

In other words, 0.4 KL of biodiesel earns 1CER

At current exchange rates, 0.4 KL of BD earns \$10 or Rs. 450

1 Litre of BD will earn Rs.1.13

Calculations of CDM done on the basis of "Effect of CDM on Bio-diesel: Rana (2004)" and also from paper by Panigrahi (2004).

Since the manufacturer has no control over its ultimate utilization a methodology needs to be evolved to enable the organizations/ parties actually controlling the use of biodiesel, and who are able to quantify the reduction in emissions. The question of accounting for the use of biodiesel outside the country has also been brought up by the Meth Panel, CDM, UNFCCC, while dealing with NM0108.

LEAKAGE & AVOIDABLE EMISSIONS IN THE MANUFACTURING CHAIN

If emission reduction achieved at one place results in increased emission in another, outside the project boundary, it is termed as leakage. Here we have termed losses within the project boundary as negativities.

The AR activity itself can cause unwanted and avoidable emissions. Examples:

- Emission from N-fertilizers used in the cultivation. The use of these fertilizers should either be avoided in the project or properly accounted for.

- Decaying biomass (leaves, fruit pulp etc.) and cow dung emit methane. Instead of piling up such biomass, biomethanation should be used to capture and harness the methane.

- Wrong sourcing of FYM: FYM sourced from an open air composting site can & should be avoided. The final residue after methane recovery described above, should be used as organic fertilizer.

- Building the manufacturing facility on a potential AR site is a leakage. Location of these facilities should not be on such sites.

We, thus, see that Methane (GWP 21) recovery can have a huge socio-economic impact on village. Discussed below is,

- a. Avoidance of methane generation through controlled combustion.
- b. Avoidance of methane and Nitrous Oxide emission by altering the cultivation methods currently adopted for paddy.
- c. Integrated Recovery of Methane in the rural scenario through biomethanation along with other biowastes, including wet garbage, dung, & even wastewater.

AVOIDANCE OF METHANE PRODUCTION FROM BIOMASS DECAY THROUGH CONTROLLED COMBUSTION

This category (controlled combustion) does not capture methane, it avoids its release. This would come under small scale project category IIIe for purposes of CDM.

The baseline calculation for a given mix of Biomass mix, which is to be combusted, is done as per formulas and factors laid down by **IPCC**.

If a mixed biomass from a rural area is assumed to be 20 Ton/day, the base line emission of 4.02 t CO₂e per day. The Carbon Credits entitlement would depend on how much less Carbon Dioxide is emitted during controlled combustion of the 20 ton mixed biomass.

Combustion is not the best method to adopt, unless the waste is not very easily biodegradable. It may be desirable to go in for biomethanation wherever possible. The simple reason is that methane recovered has more options of use and the residue in the process is a very valuable soil conditioner.

INTEGRATED METHANE RECOVERY FROM TOTAL WASTE BIOMASS (AGROFORESTRY, KITCHEN AND COW DUNG) AND VILLAGE WASTEWATER:

As discussed, ecological advantages of agro-forestry are negated if the biomass waste is allowed to decay and release methane gas into the atmosphere. Decay and burning of biomass can result in unwanted emissions within the project boundaries. The following calculations will clearly show that waste can be effectively treated in a biomethanation reactor more gainfully than the controlled combustion above. The only limiting factor is the ease or otherwise of fermentation of certain types of bio-wastes.

A lot of work has been done at Indian Institute of Science towards designing biomethanation reactors that can tackle mixed feedstock of waste material for methanation.

Now that the application of the fermenter has widened, there is no need to mix fresh water with cow dung for bio-gas. A village has a lot of bio mass waste, apart from cow dung. The UASB reactor has been suitably modified and can produce a higher percentage of bio-gas, using mixed feed stock. Tailor made solutions need to be designed for different areas.

CONCLUSION

The Clean Development Mechanism forms a very important part of the total cycle of producing biodiesel. It is applicable, in some form or the other, to all stages of the production as well as post production utilization. The benefits, via tradable Carbon Credits, can be given to all the contributors to the effort of production as well as the users of biodiesel.

The value of these credits is market driven. The seriousness of the developed world is evident from the

steep rise in the value of CERs in the International market. The calculations in this paper have been done taking \$ 10/- CER, which is rising and is estimated to touch \$45 by 2007.

Bundling of small scale projects needs to be facilitated by the government. Separate bundles will have to be made of individual steps in the production cycle. We can have:

- A bundle of small scale AR projects, within limits as discussed.
- A bundle of Methane Capture from deoiled cake and subsequent power generation projects.
- A bundle of projects involving diversification from Rice cultivation (Avoidance of methane and N₂O emission).
- A bundle of integrated solid waste management (waste to energy) projects. Credits for managing the degradable waste generated by the AR activity itself may not be claimed but this would ensure the avoidance of the negativities so arising. Credits for other ingredients of the solid waste so treated would be available.
- Credits for fuel substitution, bundled small scale projects in some cases and stand alone in other cases, depending on the scale of operation.
- Integration of village sanitation projects with the entire biomethanation programme.

There is an involvement of several departments in the handling of the various facets of the biodiesel production cycle. The way things stand today, all this cannot be achieved as there is a total lack of co-ordination between the responsible arms of the Govt. A truly integrated approach will have to be followed to achieve all this.

Perhaps a Special Purpose Vehicle may have to be designed to oversee the coordination between the various departments.

Once this is achieved, it would ensure that the farmer gets a good deal, the village gets a better

Case Study from proposed facility in Kishengarh village at Chandigarh

The CDM impact of Methane recovery

The authors have, on behalf of the Village Life Improvement Foundation, upon request from the Government, had given a proposal for treatment of biomass waste along with wastewater at village Kishengarh, Chandigarh. The mixed waste consists of:

Kitchen waste from a population of 20000 = 2 tons
Cow dung from 500 cattle = 6 tons
Fruit and vegetable market waste = 12 tons
Wastewater from 20000 population @100lpd = 2 mld
Expected Biogas Recovery from the biomass mix per day = 1000 cum = 0.6 tons
Methane component in this biogas @60% 0.36tons
Baseline: 100% discharge of methane to atmosphere.
Methane available for credit @ 100% = 0.36 tons (A)

However, 2 mld wastewater is going for aerobic treatment.
Biogas recovery expected from wastewater = 450 cum = 0.25 tons
Methane Content @ 60% = 0.15 tons
Baseline: Due to aerobic treatment now 60%
Methane available for credit @60% = 0.09 tons (B)
Total methane credit per day {(A)+(B)} = 0.45 tons
Total Methane credit per annum = 164.5 tons
GWP of Methane = 21
GWP of methane combustion = 3
CER = $164.5 \times (21-3)$
= 2961 tCO₂/annum
At the current exchange rate this comes to USD 29610 or Rs.13,32, 000/annum

CDM Impact of power generation from methane captured

As per UNFCCC guidelines, if the methane captured in a project is further used to generate electricity used in place of electricity generated by fossil fuels, Carbon Credits can be claimed under the same project.

The methane calculated above is capable of generating 100 KW (0.1MW) in a day running 24 hours.

At 80% efficiency, this translates into $(0.1\text{MW} \times 365\text{days} \times 24\text{h} \times 0.80) = 700 \text{ MWh}$ per annum

Carbon emission of replaced electricity = mixed cycle (CEF=0.4kgCO₂e/KWh)
= 0.4tCO₂/MWh

Carbon Credit $700\text{MWh}/\text{annum} \times 0.4\text{tCO}_2/\text{MWh} = 280 \text{ tCO}_2$

At current rate (\$10per tCO₂) this comes to \$2800 that is Rs. 1, 26,000 per annum.

The baseline scenario in the case of Methane capture is that in the absence of this project all the methane would be sent to the atmosphere due to decay, as there is no municipal rule set in Rural areas.

The above calculation does not include the cost of dung and the sale accruals of:

- Two tons of high quality organic Fertiliser that will be produced/sold every day.
- 60 KW (1440 units) of electricity per day.
- Currently, the administration is spending Rs. 1,50, 000 per month on transportation of the vegetable waste to the dumping site. Most of that will be saved as the proposed treatment is near the vegetable waste source.

The paragraphs above clearly indicate that once biodiesel production takes off, the treatment of wastes caused and byproducts produced as a result would become mandatory. Biomethanation of bio-wastes would become mandatory. Combining this with rural sanitation processes will render sanitation a gainful proposition monetarily.

environment and the process of making biodieseld becomes more cost effective.

Emissions and Abrupt Climate Change: Positive Options & Robust Policy” at Paris.

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CARBON TRADING SIMPLY EXPLAINED

How does carbon trading work? Does it really help tackle climate change? Isn't it all just smoke and mirrors? Is the Kyoto Protocol doing any good?

As the evidence for global warming mounts, scientists tell us more of the drastic climatic changes we can expect and pressure for economic measures to rein in greenhouse emissions heightens, questions such as these are increasingly being asked.

The short answer is that carbon trading, under the Kyoto Protocol and in voluntary markets is starting to work to reduce emissions. But there are certainly some problems and inefficiencies that have hampered efforts to bed down schemes in the early years.

Let's start with the basics of how a greenhouse-gas emissions market, or carbon trading, is designed to work.

TARGETS

The idea is that, first, governments set annual targets for the reduction of greenhouse gas emissions for industry, and perhaps agriculture, in their countries. These targets, or caps, limit overall emissions to a set level, measured in millions of tonnes.

Second, the overall target amount is divided up among all the major emitters in the economy so that each industry sector, and then each factory or plant within each sector, knows how many tonnes it can emit each year.

Emission permits, or allowances, are issued to cover these amounts. Each permit confers the right to emit one tonne of carbon dioxide, or the global warming equivalent in other greenhouse gases, into the atmosphere. Then, a trading scheme is applied which establishes a market for these permits, allowing emitters and financial players to buy and sell them.

TRADING

This is "emissions trading" and gives emitters

flexibility in how they meet their individual targets. Instead of having one rigid emissions limit to stick to, and a fine if they exceed it, emitters can choose to emit more than their target and buy the excess allowances of another emitter which does not need all its permits.

The system therefore also encourages companies to beat their targets and lower their emissions as much as possible – the more permits they don't use, the more money they can make from selling that excess.

In this way, a market ensures that the overall national target for reducing emissions is met because there is only a finite and limited number of permits on issue. But how the target is met varies with flexibility given to emitters to ease the overall burden on industry and the economy.

OFFSETS

To make it even more flexible, most emissions trading schemes also offer trade in a second type of instrument, offsets or carbon credits. As well as buying the excess permits of others, emitters can also pay someone else outside the scheme to cut their emissions instead. If it is cheaper to pay someone in China to plant a forest to absorb carbon dioxide, or a factory in India to install clean technology to cut its emissions of greenhouse gases, then doing so under an approved method will generate carbon credits. Again, one credit equals one tonne of emissions saved. These credits can then count towards the emitter's target back home.

The use of offsets recognises that all emissions go into the one atmosphere, and that it is not as important where emissions are cut as that they are cut somewhere. But the use of offsets is usually limited to a small proportion, often 5 to 10 per cent, of the overall emissions target to ensure that emitters are making a significant contribution to controlling their own emissions and are not just buying their way out of their obligations.

This two-fold system of “carbon trading” is seen by many as the most flexible and cost-effective way of lowering greenhouse emissions so that over coming decades the world can stabilise the concentration of greenhouse gases in the atmosphere and limit global warming at levels that will not cause catastrophic climate change.

Of course, it relies on a number of things to work:

- Accurate measurement of existing and future emissions at a local, national and eventually global level
- All nations, especially the industrialised countries which have long had high emissions, committing to emissions reduction targets
- Proper verification of carbon offset projects to ensure that emissions reductions have taken place, have done so directly because of an offset agreement and the resulting emission savings are only counted once

So that’s the theory, now for the practical.

VERDICT

Some opponents of carbon markets say they just don’t work in practice. It’s true to say that there are flaws and teething problems in the way carbon markets are working in their early, formative years. But an objective analysis would show that despite these glitches there is evidence that carbon markets can and are working.

With the commitment period of the Kyoto Protocol (2008-2012) yet to begin, there are as yet only two significant legally-binding carbon markets in full operation – the EU’s ETS and Kyoto’s main offsets scheme, the Clean Development Mechanism (CDM). But already 770 million tonnes of emission reductions are underway under the CDM. Between 1.5 and 2 billion tonnes of emission savings are expected to be delivered in all by the end of the Kyoto commitment period in 2012, all monitored and verified according to strict rules laid down by the UN.

The EU Emissions Trading Scheme is as yet the only major scheme of its type in operation although many are being planned in US states, Canada, Japan, Australia and New Zealand. The EU ETS has almost completed its trial phase ahead of the Kyoto period. This trial phase has not led to cuts in emissions because allocations to factories were not tight enough.

The allocations now being made for the next phase, the crucial Kyoto phase, indicate that European industry will have to cut its emissions by almost 10 per cent compared to what it wanted to emit under its original plans.

In May 2007, a group of environmental economists published an independent study of the EU ETS in the Review of Environmental Economics and Policy, concluding that the scheme was reducing emissions and was “by far the most significant accomplishment in climate policy to date” worldwide.

VOLUNTARY

Voluntary markets, mainly dealing in offsets, are another story and have attracted criticism for the lack of verification of actual emission cuts. In some cases, these concerns are entirely valid. These markets cater for companies, organisations and individuals who decide of their own accord to offset their emissions. Because this is not part of a compulsory scheme imposed by government, there is generally no authority regulating standards for projects generating carbon offset credits.

It is clear that in some cases firms offering carbon credits have taken money for credits where the emission reductions are dubious.

Regulation will grow in the voluntary market and indeed there are already reputable international accreditation schemes which voluntary buyers of offset credits should look out for. The Swiss-based Gold Standard and Voluntary Carbon Standard, backed by a large group of international aid and environmental organisations, is perhaps the best, and provides third party verification of emission reduction claims from projects. The Chicago Climate Exchange ensures verification of offsets traded through it, while more accreditation schemes are popping up around the world. □

Source: Carbon News and Info

ENERGY EFFICIENCY PROJECTS, CDM AND CLIMATE CHANGE MITIGATION OPPORTUNITIES

Koshy Cherail *

Energy Efficiency (EE) Energy efficiency market represent a significant untapped potential for mitigation of GHG and climate change. However, when these are put up as CDM projects, the criteria of defining baselines and additionality and common practice, relating to EE projects, make it almost impossible to register them as a CDM projects. Why are some of the most effective and successful EE projects ineligible for CDM benefits?

When EE projects are implemented in a systematic manner adhering to globally accepted guidelines and protocols, the door is opened for quicker identification and implementation of CDM projects which earn the additional revenue streams.

What do energy efficiency projects signify in CDM terms? According to CDM project developers, less than 2% of CERs in the CDM pipeline are from Energy Efficiency, and EE opportunities account for an estimated two-thirds of potential emission reductions. Significantly, two-thirds of the growth in energy consumption over the next decade will occur predominantly in developing countries.

Therefore, EE projects are sure to emerge as focal area in the near future.

BENCHMARKING INDIA'S ENERGY CONSUMPTION

India ranks 5th globally in primary energy consumption, and accounts for about 3.5% of global commercial energy demand (2003). The country's per capita primary energy consumption is 439 kg of oil equivalent (kgoe) compared to world average of 1688 kgoe. Similarly, per capita electricity consumption is about 615 kWh (20% of world average in 2005), and is expected to grow to 1,000 kWh/year by 2012.

Power generation capacity in India which today stands at around 1,35,000 (June 30, 2007, MOP) in the organized sector and about 160,000 MW, if all captive generation is included), is expected to rise to 800,000 MW by 2031-32.

Considering the costs involved in making available this additional power, adding 1 MW of power generation

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capacity, on the one hand, at current rates would cost approximately Rs 4 crore/ MW (~\$ 1.0 million/MW), while on the other hand, saving each MW of energy requires less than Rs1 crore/MW (US\$ 0.22/MW) only.

KEY INITIATIVES TAKEN BY THE GOVERNMENT TO SUPPORT ENERGY EFFICIENCY IN INDIA

One of the most important step by the government to support EE has been the enactment of the Energy Conservation Act which was passed in 2001. In addition, the Bureau of Energy Efficiency (BEE) has

EE Market in India

- * Utilities
 - * Generation
 - * Distribution
- * Industry
 - * Large energy intensive
 - * SME-energy intensive
 - * Cottage-energy intensive
- * Buildings
 - * Commercial incl. Offices
 - * Recreational incl. Malls
 - * Hotels & Hospitals
 - * Residential
- * Municipal
- * Agricultural
- * Transportation – Mass & Urban, Others

**GHG Mitigation or
Emission Reduction Projects**

**OFFER
MUCH GREATER
OPPORTUNITIES
THAN
CDM
Projects**

EE Market Potential (EE Investment Rs1 cr/MW)

Market Type	Investment Potential (Billion Rs.)	Energy Savings (MWhr)	Energy Savings (MW)
Industrial	121	49.00 mn	7000
Generic Energy Efficiency	42	23.70	3400
Process Energy Efficiency	79	25.30	3600
Commercial	5.69	1.71 mn	553
Government Owned			
Offices	3.40	0.76 mn	360
Hospitals	0.85	0.87 mn	140
Private Owned Hotels	1.44	0.18	53
Municipal	13.00	3.70 mn	1688
Total	140 bn	54.40 mn	9240

been set up to coordinate the national programme on Energy Efficiency. BEE has identified high energy consumers - the Designated Consumers - 9 key sectors which contribute to a major share of energy consumption.

BEE has also set up a system for Accreditation of Energy Auditors and Managers.

The Central Government has identified nodal agencies or Designated Agencies in different States to implement the EC Act (2001). Different states have taken initiatives for awareness creation in Energy Efficiency, and a few have developed plans to implement DSM programme.

Electricity Act 2003 and regulatory reforms have also promoted operational efficiency, as the state Utilities are being made more accountable through a process of unbundling the generation, transmission and distribution activities.

In the past two years, BEE has taken a further steps to broad-base EE. Standards and Labels have been notified for appliances such as, Refrigerators and Fluorescent Tube-lights to start with, and would be extended to others soon. Energy Conservation Building Codes have also been launched by the BEE in May 2007. BEE has initiated steps for reform of Government procurement system to include Energy Efficiency and life-cycle costs criteria.

NEW DIRECTIONS IN EE IN INDIA

Thrust in EE moving from Central Government to states level. As the basic legislative framework is now in place, there is a felt need that the approach to EE promotion should now shift from policy-driven to market-driven, by strengthening the system of incentives and penalties for energy conservation and efficiency.

Banks, one of the principal players in development of the Small and Medium Enterprises (SME) sector, are being sensitised to investment opportunities in energy efficiency. Multilateral and bilateral programmes now emphasise the involvement of Banks and Financial Institutions. However, these programmes need active involvement and support by the Energy Service providers and the EE consultants. Policy supports and incentives to strengthen this process would be of great value in accelerating the process. In the SME sector cluster-based approach to implement EE projects is seen as the best option to go forward. Lighting and HVAC projects hold a great promise. Such projects ensure early benefits to clients and to build credibility for the Service provider.

In order to generate interest from the SMEs and to develop and sustain the identified energy savings EE support should be coupled with expertise in core technology/ process improvement as a means to provide holistic support to the SMEs. There is an urgent need to adopt Monitoring and Verification systems and practices to record and report savings and enable wider replication of projects and benchmarking of EE savings.

SCALING UP EE OPPORTUNITIES

Large corporations need total energy management solutions, they are building up EE expertise internally to achieve this. It is now evident that networking among EE Consultants, Banks, Industry Associations and State Agencies, is the key to tapping the market for EE projects. Many of the projects launched by bilateral and multilateral donor programmes have begun to emphasise networking among key stakeholders.

Demand Side Management (DSM) offers new opportunities for Energy Service providers to work with reform-centered states and utilities in India. CDM

and Carbon Trading are the new drivers for EE in India, and there are great expectations of a significant influx of revenue streams in the near future. Adoption of international protocols and standards could speed up identification and implementation GHG mitigation projects.

SIZE OF THE EE MARKET

Market potential in EE (in capital and human resource investment terms) includes Energy Efficiency (EE) + Energy Conservation (EC) + Demand Side Management (DSM).

Even with a conservative estimates, the annual potential of EE+EC+DSM is at least= \$2,000 million. Of this less than \$400 million has been tapped.

However, this annual \$400 million investment market is financially very attractive, because they are measures with quick payback of under 2 yrs. These projects have an average financial internal rate of return (IRR) of over 30%.

SECTORS WITH EE AND DSM POTENTIAL

Based on quick estimates, **Buildings EE** may reduce energy consumption by 20% to 30% in 2 years. The **Designated Consumers** (energy intensive industries) may reduce energy consumption by 1% to 2% annually which adds up to about 20 to 35% over a 10 year period. **Power generation and distribution** may reduce primary energy consumption by 2% to 3% annually.

EE projects good for GHG Mitigation ... But for CDM?

Most of the present EE and DSM measures can be clearly identified as being good GHG mitigation projects but may not necessarily qualify as CDM projects to earn additional revenues, as they are:

- * Already financially very attractive
- * Routine measures and existing technology
- * Mostly good maintenance and housekeeping measures

- * Often too small as a single CDM project

Hence these project may not make it past the basic CDM criteria of additionality, sustainability and baselines, and common practice. However, they continue to be very good GHG mitigation projects and can earn Emission Reduction if they are implemented and monitored through systematic guidelines and protocols. This is where the present trend towards adoption of the IPMVP - the International Performance Monitoring and Verification Protocol - and the GHG Protocols can be a very timely and convenient means to strengthen the process. Growing number of companies and energy service providers are now looking at these systems to strengthen their business practices.

ENFORCEMENT OF EC ACT (2001)

Let us look at a scenario where provisions of the EC Act (2001) are fully enforced. When the EC Act was notified in 2001, over past 5 to 6 years many of its provisions are being made mandatory in a phased manner. Once the provisions of the Act are made mandatory, there will be at least 500 mandatory Energy Audit reports available annually.

At least 3,000 firms would need to prepare reports (voluntary compliance). These include large or very large energy intensive DCs (Steel, Cement, Power, Aluminium, Chlor Alkali, Fertilizer, Railway, Textile).

Each firm would be required to prepare 3-yr EE Business Plan. Out of these at least 5000 likely EE-measures annually at least 5% could be potential CDM projects.

The EE market is presently limited to projects with pay-back period of upto 2-years. There is thus an urgent need to develop incentives that extend the horizon to include projects of upto 7-years pay-back period.

Boosting CDM market through EE

Not only programmatic approach but also benchmarking of entire sectors are required. Hence there is a need for improved data reporting and analysis.

One of the important measures that can improve the situation is making available all Energy Audit reports

under EC Act on the BEE website as a pool of measures to identify potential CDM projects.

The other measure would be to View all 'EE' labeled and energy efficient household appliances and energy intensive equipment as a pool of measures.

A strong foundation in MandV systems and practices may assist replication of good project models. Need for an international standard or protocol for quantification GHG reductions.

- * Not only programmatic approach but also benchmarking of entire sectors – needs improved data reporting & analysis
- * Viewing all Energy Audit Reports under EC Act as a pool of measures to identify potential CDM projects
- * Viewing all 'EE' labeled appliances & energy intensive equipment as a pool of measures
- * A strong foundation in M&V systems & practices may assist replication of good projects

What the Utilities can do

As in most of the industrial countries there is a need to boost the Utility-driven market for EE services and DSM in India.

DSM in Buildings sector –an attractive first step in sector-wide EE implementation with good CDM potential.

- * Step up Utility-driven market for EE services & DSM in India, as in most of the developed countries
- * Buildings sector – attractive first step for DSM. With enforcement of Building Codes 25-40% reduction in energy consumn foreseen. Annual savings of about 1.7 billion units of electricity, in first year of implementation

ENERGY EFFICIENCY IN BUILDINGS

Energy Conservation Building Codes (ECBC) for new buildings has been launched in May 2007.

These building codes are to be made mandatory for commercial buildings with 500 kW connected load.

It aims to reduce annual energy consumption per sqm. floor area in commercial buildings from about 200 kWh today down to 120-160 kWh.

It si estimated that savings from ECBC alone would be approximately Rs 20,000 crore in avoided investment. In addition, expected reduction in energy consumption would be between 25% to 40% yielding annual savings of about 1.7 billion units of electricity in the first year of implementation itself.

VAST GHG MITIGATION POTENTIAL IN BUILDING SECTOR

Incorporating EE in GHG reduction

EE reduces emissions by lowering demand for fossil fuels in the production of electricity and/or thermal energy. So far, emissions reductions from EE projects were seen as a non-quantified benefit. However, with the onset of Emissions Trading and Environmental Market mechanisms there are new opportunities to integrate EE projects into the GHG reduction strategy and monetize the emission reduction benefits. It is also imperative that developmental efforts are needed to incorporate M&V systems to evaluate, monitor and certify GHG reductions from EE projects. A possible viable solution will be adopting the GHG Protocol?

The GHG Protocol

The GHG Protocol is a widely used international accounting tool for Governments and businesses to understand, quantify and manage GHG emissions. It is also a management tool for developing countries to help businesses compete in global marketplace and for Governments take informed decisions about climate change.

GHG Protocol Initiative (WRI-WBCSD 1998) is building capacity through partnerships with business, government and environmental groups in industrializing economies to build credible, effective programs to tackle climate change.

GHG Protocol has established successful partnerships in Mexico, Philippines, Brazil, South Korea, China and India (CII and TERI initial partners).

42 of world's largest Corps follow GHG Protocol standards. These include Alcoa, BASF, Bayer, BP, Caterpillar, Daimler Chrysler, DuPont, Exelon, FedEx, Ford, GE, GM, Georgia-Pacific, International Paper, PG&E, Royal Dutch Shell, Unilever, UPS, Volkswagen, and Weyerhaeuser

Large Indian Corporations have begun to adopt GHG accounting tools and have begun to report in their Corporate Sustainability Report. This is a positive step towards a future National Emission Trading market in India.

ISSUES IN VALUATION OF EE PROJECTS

Determining actual GHG reductions from EE projects/ programmes is complex as EE only indirectly reduces emissions at a power plant.

There are uncertainties in quantifying Emission Reduction value of CO₂ corresponding to energy use.

Secondary and unintended consequences of EE programs -

1. as energy use becomes more efficient and less costly - it may increase energy use or leave it unchanged as new uses take over
2. EE may lead to locational shift in production activity, hence on a national/ global scale no change in emissions

EE may lead to shift in fuel supply /demand options say from electricity to oil or gas which may have unexpected ER impact.

Some indirect benefits of EE/DSM programmes need to be quantified and evaluated such as reductions in pollutants and water savings.

WAY FORWARD

Energy Efficiency market is much greater and would

yield significant GHG benefits in the short to medium term.

International benchmarking systems and standards such as the IPMVP (M&V Protocol) must be adopted to document, analyse and report EE savings and benefits.

Improve the Monitoring and Verification systems and practices as a part of corporate

ENERGY MANAGEMENT PLANS.

Utility-driven DSM models are available in India sufficient experience is available in the form of pilot projects. These should be implemented on a wider scale for GHG mitigation.

GHG reporting based on GHG protocol should be incorporated as a part of Corporate Sustainability Report so that a realistic picture of Emission Reductions is available.

Initially CDM may be only a secondary or incidental benefit, but national capacity to identify and develop projects will be strengthened through effective identification and implementation of EE projects.

Setting up a National Carbon/ Emission Trading regime within India to facilitate quick realization of the Emission Reductions / Credits generated from GHG mitigation projects would pave the way for a stronger CDM environment.

When the capacity to identify and develop EE projects is strengthened then CDM projects too will be easier to identify and implement and CDM revenues will flow in. □

Improper selection of pumps can lead to large wastage of energy. A pump with 85 per cent efficiency at rated flow may have only 65 per cent efficiency at half the flow.

FREQUENTLY ASKED QUESTIONS ABOUT CDM

Centre for Science and Environment *

What is the Kyoto Protocol?

The Kyoto Protocol is a legally binding agreement that arose out of the UNFCCC to tackle climate change through a reduction of green house gas emissions. Countries (those listed in Annex I) are legally bound to reduce man-made green house gases emissions by approximately 5.2%. Individual countries have their own reduction targets outlined in Annex B of the Kyoto Protocol. The text of the protocol was adopted at the third conference of the parties to the UNFCCC in Kyoto, Japan, on 11 December 1997.

However the protocol suffered many years of delay. The United States and Australia two major green house gas emitters did not ratify the treaty.

The Protocol entered into force on February 15 2005 when Russia ratified the treaty.

What is the Clean Development Mechanism (CDM)?

CDM allows Annex I (industrialised) countries to meet their emission reduction targets by paying for green house gas emission reduction in non-Annex I (developing) countries.

Example (Figures are hypothetical):

A company in Brazil (a non Annex I country) switches from coal power to biomass. The CDM board certifies that by doing this the company has reduced Carbon dioxide emissions by 100,000 tonnes per year. It is issued with 100,000 CER's (Certified Emission Reductions). Under the Kyoto Protocol, the United Kingdom (an Annex I country) has to reduce its green house gas emissions by 1 million tonnes of carbon dioxide each year. If it purchases the 100,000 CER's from the Brazilian company, this target reduces from 1 million tonnes/year to 900,000 tonnes per year making the goal easier to achieve.

What is a CER?

CER's or Certified Emissions Reductions are a "certificate" just like a stock. A CER is given by the CDM Executive Board to projects in developing countries to certify they have reduced green house gas emissions by one tonne of carbon dioxide per year. For example, if a project generates energy using wind power instead of burning coal, it can save 50 tonnes of carbon dioxide per year. There it can claim 50 cers (as one cer is equivalent to one tonne of carbon dioxide reduced).

Developed countries buy CER's from developing countries under the cdm process to help them achieve their Kyoto targets.

In India income from CER's are not taxed. The Chinese government has decided to tax the revenue from projects.

What are the six green house gases under the Kyoto Protocol?

There are many gases that contribute to the green house effect. The Kyoto Protocol deals with six of them.

Gas	Global Warming Potential
Carbon dioxide (CO ₂)	1
Methane (CH ₄)	21
Nitrous oxide (N ₂ O)	310
Hydrofluorocarbons (HFCs)	140-11,700
Perfluorocarbons (PFCs)	7,000-9,200
Sulphur hexafluoride (SF ₆)	23,900

Source : IPCC Third Assessment Report. 2001 Climate Change : The Scientific Basis. Intergovernmental Panel on Climate Change

What is Global Warming Potential?

Green house gases affect global warming with varying intensities. This intensity is measured by the “global warming potential” of the gas. The global warming potential (GWP) of HFC-23 for example is 11,700. The GWP of carbon dioxide is one. One tonne of HFC-23 has 11,700 times more the green house effect that Carbon dioxide does. CER's are awarded based on the global warming potential of the gas.

CER's awarded = Tonnes of green house gas reduced X Global Warming Potential of the Gas

More information : http://www.grida.no/climate/ipcc_tar/wg1/247.htm

What are the Kyoto protocol's three flexibility mechanisms?

The Clean Development Mechanisms is one of three Kyoto protocol Flexibility mechanisms. The other two are **Joint Implementation** and **International Emissions Trading**. They help Annex I countries meet their emission reduction targets.

Joint Implementation?

Joint Implementation is like CDM but with projects in other Annex I countries instead of developing countries. Eastern European countries in Annex I such Bulgaria and Romania are likely to benefit from these projects and have already signed MOU's for their projects. These projects are competition for CDM and are expected to give CDM projects in developing countries a serious run for their money beginning 2008.

International Emissions trading?

Each Annex I country has a certain number of emission allowances (amount of carbon dioxide it can emit) in line with its Kyoto reduction targets. If a country's GHG emissions are below their emission allowances(i.e. meeting Kyoto targets) they can sell these allowances to other Annex I countries who are emitting above the allowance(i.e. not meeting their Kyoto targets).

What is the European Emission trading system (EU-ETS)?

In January 2005, several European sectors including energy, metals, minerals and pulp and paper came under EU Emissions trading directive which sets carbon dioxide gas emission limits. If a company emits lower than it's allowed limit, it may sell its extra allowance to other companies who are not meeting their targets.

The penalty for violation is 40 Euro for every tonne of Carbon dioxide over the limit, and a requirement to purchase the missing emission allowances. Starting 2008, this will be increased to 100 Euros. The law in the future may be extended to include the chemical, aluminium and transport sectors.

In October 2004, the EU adopted a “linking directive” that allows companies to buy CER's from the Kyoto CDM mechanism to meet EU-ETS emission allowances, thus making European industry take very strong notice of the CDM market. When a European company buys a CER, the company gets a EU emission reductions unit in exchange for surrendering the CER to the country government – which the country will use to offset it's Kyoto reduction targets.

Studies estimate the demand of CER's from European industry to be 102.20-288.5 million tonnes of CO2 per year in 2010. This demand will vary though depending on if the EU imposes limits on the number of CER's industry can buy.

What countries participate in CDM?

Countries listed in Annex I of the UNFCCC can purchase CDM credits. Non Annex-I countries can host CDM projects.

Annex I

Australia(Not ratified), Austria, Belgium, Bulgaria*, Canada, Croatia*, Czech Republic, Denmark, Estonia*, European Community, Finland, France, Germany, Greece, Hungary*, Iceland, Ireland, Italy, Japan, Latvia*, Liechtenstein, Lithuania*, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland*, Portugal, Romania*, Russian Federation, Slovakia*, Slovenia*,

Spain, Sweden, Switzerland, Ukraine*, United Kingdom and U.S.A (Not Ratified).

How do Annex I countries benefit from CDM?

All Annex-I countries (Except Belarus and Turkey) have legally binding green house gas emission reduction requirements under the Kyoto Protocol. The clean development mechanism is one of the “flexibility mechanisms” of the Protocol to help these countries meet these targets.

Instead of countries reducing emissions of their own companies, Annex I countries can “buy” emission reductions in non-Annex I countries. For example a CDM project such as a company switching fuels from coal to biomass results in a reduction of 100,000 tonnes of carbon dioxide per year in the atmosphere. If an Annex I country buys these credits, it can count them for its Kyoto reduction targets.

How do developing countries benefit from CDM?

The Kyoto Protocol (Article 12) states :

“The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments”

The idea was that developed countries get some flexibility in emission reductions in exchange for bring in investment in developing countries for projects and technologies that reduce green house gases.

International Buyers of CDM?

Country governments in Annex I are the ultimate beneficiaries of CER’s. However several private players are also involved in CDM, acting as brokers and intermediaries. Private funds that buy and sell CER’s are also active. The following table estimates the funds available to purchase carbon credits – which could come from CDM or from JI.

Multilateral Fund	Size funds (millions US\$)
World bank funds	408.6
WB Netherlands CDM facility	180
WB - Italian Carbon Fund	80
IFC Netherlands Carbon Facility	52.36
CAF - Netherlands Carbon Facility	47.6

Govt./local institution administered funds

Austrian JI/CDM program	257.04
KFW Carbon Fund	59.5
Swedish energy agency	25.12
Flemish Government JI/ CDM tender	83.3
Belgian JI/CDM tender	11.9
Finnish CDM/JI pilot tender	11.9
Rabobank-Dutch government CDM facility	10 mil. tonnes CO ₂

Private Funds

Japan Carbon Finance Ltd.	141.5
European Carbon Fund	124.95
GG-CAP Greenhouse Gas Credit Aggregation Pool	85.68
ICECAP	40-50

What makes a project eligible for CDM? What is additionality?

A project is eligible for CDM benefits if the project will result in a net decrease in green house gas emissions – this is called additionality.

For example a company can get CER’s if it installs a waste heat recovery boiler that saves energy. This is because reduced fuel use reduces the amount of carbon dioxide emitted.

Technically speaking a CDM project is additional if “anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity.”

However, if the developer has to undertake the project activity because of law, for example if the

industry is legally mandated to have a waste-heat recovery boiler, such a project is *generally* not eligible for CDM benefits.

In some cases however, if the law is shown to be “systematically not in force” or “non-compliance is widespread” in the country such a project can still be eligible.

National and local policies which are *not* legally binding do not nullify the project. For example a government wind energy promotion policy does not disqualify a wind farm from CDM.

If this criteria is fulfilled, then the developer follow two more steps :

- (1) Outline the alternatives to the CDM activity

The developer has to first outline what the possible outcomes of the project are if it doesn't get CDM benefits – so called “baseline” scenarios the associate green house gas emissions. It must then show that with the CDM project, greenhouse gas emissions are reduced. This reduction in emissions over the baseline, is the CER's that the project would generate.

- (2) Investment analysis.

Once the possible alternatives are outlined, and the CDM project is shown to have lower greenhouse gas emissions, the developer must show that CDM scenario satisfies is either: Not common practice in the region or sector. Is the least financially attractive option available

OR Faces “barriers” preventing implementation if the project was not registered as a CDM project such as either:

Financial : such an inability to get bank loans

Technological : lack of infrastructure for implementation or skills/labour to operate the technology.

“First of it's kind” : No project activity of it's type is operational in the region or country

What is a Baseline?

If a project gets 20,000 CER's it means that it's emissions are 20,000 tonnes of carbon dioxide less than a reference point called a baseline.

A baseline for a CDM project gives the greenhouse gases emissions that would have occurred in the absence of the proposed CDM project activity.

There are three approaches to establish baselines :

- 1 Existing actual or historical emissions, as applicable
- 2 Emission from a technology that represents an economically attractive course of action, taking into account barriers to investment
- 3 The average emissions of similar project activities undertaken in the previous five years, in similar social, economic, environmental and technological circumstances, and whose performance is among the top 20 per cent of their category.

At present, each project put forwards its own baseline, depending on the location of its operation, laws applicable to it and other factors. Projects, however, can borrow methodologies from other projects to develop a baseline.

What are the sustainable development criteria for CDM projects?

Sustainable development is a legal requirement of a CDM project. “It is the host party's (e.g. India's) prerogative to confirm whether a cdm mechanism project activity assists it in achieving sustainable development”.

Different countries have different sustainable development criteria. In India, clearance for sustainability is granted by the National CDM Authority (NCDMA) and is spearheaded by the Union ministry of environment and forests (MOEF).

The Indian NCDMA has the following sustainable development criteria:

Social well being: The project should lead to alleviation of poverty by generating additional employment, removal of social disparities and...leading to improvement in quality of life of people.

Economic well being: The project should bring in additional investment consistent with the needs of the people.

Environmental well being: This includes a discussion of impact of the project activity on resource sustainability and resource degradation...reduction of levels of pollution.

Technological well being: The activity should lead to transfer of environmentally safe and sound technologies that are comparable to best practices.

What are the procedures for small scale projects?

The simplified procedures aim to reduce the cost of applying for CDM approval. They apply to the following projects:

Renewable energy project activities with a maximum output capacity equivalent of up to 15 megawatts (or an appropriate equivalent)

Energy efficiency improvement project activities which reduce energy usage by up to 15 gigawatthours per year

Project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

If a proposed small-scale CDM project activity does not fall into any of the above categories, the project participants can request to the CDM Executive Board for approval of a new simplified baseline and/or monitoring plan developed.

The simplified modalities for these projects include:

Bundling of project activities during the following stages of project activity: preparing the project design document, validation, registration, monitoring, verification and certification

Simplification of baseline methodologies; for example, fuel switch projects are exempted from accounting for leakages (for instance, greenhouse gases being emitted from other activities of the projects) while formulating their baselines.

Simplification of monitoring plans, including simplified monitoring requirements, to reduce monitoring costs

Use of the same operational entity for validation, verification and certification.

Despite the CDM executive board propounding simplified modalities and procedures for small-scale clean projects, few exist, especially in India. The simplified modalities, mainly aimed at reducing the transaction cost, apply to the following type of projects: renewable energy project activities with a maximum output capacity equivalent of up to 15 megawatts (or an appropriate equivalent); energy efficiency improvement project activities which reduce energy consumption, on the supply and/or demand side, by up to the equivalent of 15 gigawatthours per year; and other project activities that both reduce anthropogenic emissions by sources and directly emit less than 15 kilotonnes of carbon dioxide equivalent annually.

What is the CDM Executive Board?

The Executive Board supervises the operation of CDM. It meets four or five times a year. The Board has final say on whether a project is approved or not and lays out procedures and guidelines for CDM. It is made of 10 members from countries part of the Kyoto protocol. Two from Annex I, Two from non annex I countries, one from small island developing states, and 1 from each of the 5 UN groupings. Director Climate Change Union ministry of environment and forests is currently concurrently a member of the CDM Executive Board.

What is a Designated Operational Entity(DOE)? Who are the 5 in India?

A Designated Operational Entity (DOE) is a company accredited by the CDM Executive Boards that checks whether projects are fulfilling CDM criteria. A

CDM project must be checked by two processes – Validation and Verification.

Validation is done once before initial project approval. Verification is done periodically after the project has been approved or registered.

A Designated Operational Entity (DOE) is accredited provisionally by the CDM Executive Board, until confirmed by the meeting of the Parties to the Kyoto Protocol. There are currently 11 does globally, and 5 represented in India.

Validation

Based on the project design document (PDD), the DOE will evaluate and validate the proposed cdm project, confirming :

1. Voluntary participation of parties
2. Comments by stakeholders have been invited
3. Project participants have submitted documentation on environmental impacts to the DOE
4. The project will result in reduction in greenhouse gas that are additional
5. A methodology has been adopted in accordance with CDM rules
6. Provisions for monitoring, verification and reporting are in accordance with CDM rules
7. The project complies with all other CDM rules

The DOE then issues a validation report, and requests the CDM Executive Board for registration of the project based on this report. The Project developer pays around 4-5 Lakh Rupees for this.

Verification

CDM project are monitored or “verified” after the project has been approved or registered by the CDM Executive Board. After the project has been registered by the Executive Board, the DOE periodically checks(usually once a year) whether emission reduction have actually taken place. It will then request that the

EB issue CER’s accordingly, based on this verification report.

It is only after verification that CER’s are actually delivered.

What is a Designated National Authority(DNA)?

India’s DNA is called the National CDM authority (NCDMA). The Structure of the NCDMA comprises Chairperson: Secretary (ministry of environment and forests, MOEF), Member-secretary: Director (climate change), MOEF, Members: Foreign secretary, Finance secretary, Secretary for industrial policy and promotion Secretary of the Ministry of non-conventional energy sources, Secretary of the power ministry, Secretary of the Planning Commission, Joint secretary (climate change), Ministry of environment and forests.

Why is Carbon dioxide worth 5-10 Euro in India and 20 Euro in Europe?

Today in the EU, companies buy carbon credits at 22 Euros per tonne of carbon dioxide. However, CER’s arising out of CDM have been sold for a pittance - for only 5-10 Euros. It isn’t clear why this price difference exists. Ishani Chattopadhyay, Director of EcoSecurities, India, a carbon credit trader that buys CER’s from India for sale in Annex I countries says firstly that CER’s and EU credits are different. The EU Credits give an automatic right to emit carbon dioxide because they are emissions allowances. CER’s are subject to verification by the UNFCCC. Second, there are country risks for operating in developing countries and dealing with small companies. Third there is no “stock exchange” for CER’s yet, since the first CER’s have only been issued for sale on October 20 2005. CER’s are bought and sold in private deals where prices are not revealed, so a fair price is difficult to arrive at. Mukul Sanwal of the UNFCCC agrees that greater transparency would improve the price. He also stresses though that it is a failure of the market systems in India is also depressing the price. “This is the same old commodities problem again”, says Sanwal referring to the situation where commodities like coffee are sold at subsistence levels in developing countries, yet earn huge windfalls for companies in the developed world. Developed countries are extracting the benefits of CDM." □

HISTORY OF CLEAN DEVELOPMENT MECHANISM

May 1992: UN Framework Convention on Climate Change (UNFCCC) The original goal of the convention was to stabilise greenhouse gas (GHG) emissions by Annex 1 countries (developed countries and those with economies in transition) at 1990 levels by 2000. It also included an idea of 'joint implementation' (JI) to reach this goal. Although different from both CDM and JI as it is known today, it was the first sign of an emissions trading scheme from which the CDM would later develop. 'JI' was originally proposed by Norway but it was the former Bush administration of the US that strongly proposed to incorporate this 'JI' in the UNFCCC at such an early stage. From now on, the stage was set for debate on ways for countries around the world to reduce, and help each other reduce, ghg emissions into the global commons. There are now 188 signatories to the UNFCCC plus the European Union.

March 1995 - First Conference of the Parties to the UNFCCC (COP-1) - Berlin. Negotiators decide to start 'activities implemented jointly' (AIJ), which would be a pilot phase of the US proposal of 'joint implementation.' Projects under AIJ would have to be: 1) additional to what would otherwise occur; 2) voluntary - credits gained from the pilot phase with 'aij' between annex 1 and non-annex 1 parties would not be seen as the fulfilment of the concurrent commitments of Annex 1 parties under Art. 4.2(b) of the UNFCCC - to return individually or jointly to 1990 levels. COP-1 decided to have a comprehensive review of the pilot phase no later than the year 2000.

May 1997 - Brazilian proposal for a 'Clean Development Fund' (CDF) released. Was based upon the principle of penalizing the non-complying Annex-1 countries and using a percentage of this financial penalty to compensate the non-Annex 1 countries who were mostly vulnerable to the vagaries of global climate change. It had a number of similarities to the present day CDM; but the biggest difference was that the CDF concept includes financial penalties

to Annex 1 parties for non-compliance. Annex 1 parties did not accept such a concept.

June 1997 - the US senate adopt the so-called Byrd-Hagel resolution. This stated that the Kyoto Protocol, or any subsequent international climate change agreement, should not "(a) mandate new commitments to limit or reduce ghg emissions for the Annex 1 Parties, unless the Protocol also mandates new specific scheduled commitments to limit or reduce ghg emissions for developing country Parties within the same compliance period, or (b) would result in serious harm to the economy of the US . . ." Under such domestic conditions, the only and ultimate instruments the Clinton/Gore administration could rely on - in order to agree on some quantified target - were the inclusion of market-based instruments such as emissions trading and joint implementation. This would mean they would be strong proponents of the idea during Kyoto.

December 1997 - COP3 - Kyoto, Japan - delegates agree to a Protocol to the UNFCCC (the Kyoto Protocol). This commits Annex 1 countries to achieve quantified emissions reduction targets, an average of 5.2% below 1990 levels between 2008-2012. The Protocol covers 6 greenhouse gases: Carbon dioxide (CO₂), Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulphur hexafluoride (SF₆). Three flexible mechanisms are included in the Protocol to assist in these reductions: an Emissions Trading System; Joint Implementation; and the CDM (which was included in the last minute through the final night, as the 'Kyoto surprise'). CDM filled the gap between Annex 1 and non-Annex 1 parties (the US' joint implementation, and the Brazilian CDF). The intrinsic nature of the mechanism is a win-win solution - fostered from the original concept in the convention - to help Annex 1 countries to reduce their emissions while at the same time promote sustainable development in the non-Annex 1 country. The innovative interpretation allows

the Brazilian CDF concept to be transformed into a *mechanism* promoting market-based investment, instead of penalizing the Annex 1 parties financially.

The Protocol would only come into force if it has been ratified by 55 parties to the unfccc, including industrialised countries responsible for at least 55 percent of the emissions of the industrialised countries in 1990.

June 1998 – Bonn, Germany – The subsidiary body for implementation (SBI) and the Subsidiary Body for Scientific and Technical Advice (SBSTA) – met to lay the ground for COP-4 scheduled for November. By now, 39 parties had signed the Kyoto protocol, those emitting 39 percent of all industrialised countries' emissions. The CDM agenda here was to rush through the rules and guidelines so that “real trading” could begin. When Australia mentioned, “scientific evidence indicates that actions by Annex 1 countries *alone* would be insufficient,” the US added that this was clearly due to the *small number* of parties involved. Responding to this, G-77 and China said that the second review by COP-4 must respect the unfccc mandate, and not be distracted by superfluous considerations of “new” commitments for developing countries.

What is interesting was the complete divorce of this political review process from the science of global change. The first review of the Kyoto Protocol was expected at best around 2004-2005, too late to link science with politics.

November 1998 – COP4 - Buenos Aires, Argentina – Buenos Aires Plan of Action. US-led developed countries try to ensure that ceilings on non-domestic emission curbs do not materialise. Buenos Aires Plan of Action includes deadlines on a number of issues: Financial mechanisms - which will assist the developing world to respond to the challenges related to climate change; Development and transfer of technologies; Rules governing the Kyoto Mechanisms with priority given to the Clean Development Mechanism.

November 2000 – COP6- The Hague, Netherlands – Talks fail miserably. The negotiations

with G-77 and China are deadlocked mainly over the issues of finance and technology transfer. US negotiators use trick and treat tactics to break down opposition of developing countries to CDM (promoting it as a synonym for overseas investment). Some southern negotiators are still picking holes in the various rules and definitions of CDM, while most parties wanted the trading mechanism to begin as fast as possible. What compromises will have to be made? The G-77 and China will also want the us to participate – but for another reason. Without the US, the largest buyer of emission credits, the trade under CDM is also expected to shrink.

2001 – March – US withdrawal from the Kyoto protocol – US maintains that it is not in its economic interest. To meet its Kyoto targets, the US would need to reduce its emissions by 33 percent over 1990 levels at the very least. For the protocol to now come into effect without the us, the eu will need Russia and the countries in transition and either Japan or Canada and Australia together to ratify. This pivotal position means that they have consistently managed to get concessions from developing countries and the eu, which are more interested in getting the protocol into force in the face of us opposition. The impact of the us withdrawal on CDM will be huge, with the world's largest polluter, and hence largest potential buyer of CERS's would no longer feature in the market.

June 2001 – Pronk proposals – Jan Pronk, Dutch Environment Minister. Releases proposals for COP-7 to try to get Japan on board, mainly with the inclusion and broadening of carbon ‘sinks’ under the protocol, which would allow Annex-1 an easy way of meeting their emissions targets. He also gives another sop to industrialised countries – by allowing them to accumulate surplus cers to meet reduction obligations in the second commitment period. This provision means industrialised countries can now buy emission reductions credits at throwaway prices from developing countries and bank them for future use. But developing countries, having sold cheap ways of reducing emissions, will be forced to take recourse to expensive methods when it is their turn to reduce in the future. The bottom line is that the many compromises will make the Kyoto protocol not even worth the paper it is written on. The Kyoto protocol is a grand fudge account where every

polluter is working overtime to make sure that it is business as usual, if not better. In all this, the role of the G-77 and China has been pathetic. They have shown little political sagacity in the negotiations. Instead, each COP sees this largest grouping of countries squabbling over funds and technology transfer – discussions in which they have never won anything, except for empty promises. This group of most vulnerable countries was ineffective at articulating its position.

July 2001 - COP-6 resumes - Bonn Germany- Environmentalists angry at the loophole on LULUCF (land-use, land-use change and forestry) put up placards on small bushes and potted plants in the conference centre saying, “do not touch. This is an Australian sink.”

US withdrawal has driven negotiations under the UNFCCC to a feverish pitch. The world now has two options – convolute the climate treaty to meet US demands (including the one that countries like China and India take on legally binding commitments), or go without the US, the world’s largest polluter.

EU at last decides to part ways with the US. Swedish prime minister and host Goeran Persson said that the EU would stick with the Kyoto treaty. “Kyoto is not meaningless without the US,” defended Persson, “because it is the first step.” All these countries want concessions in the use of sinks – using forests, grazing lands and croplands to sequester carbon dioxide to meet their commitments. Sinks have, therefore, become the battle ground to make or break the Kyoto pact. And each one of these countries is working hard to get the maximum concessions possible in this great bargain. Japan is key – Russia and Ukraine and the EU account for about 53 percent. It is the last two percent that is difficult.

October/November 2001 - COP-7 - The Marrakesh Accords: 170 countries agree on rules to implement the 1997 Kyoto protocol, but agreement has no teeth. The Accords set out building blocks for decisions under the Protocol and UNFCCC, including the flexibility mechanisms (CDM, Joint implementation and Emissions trading), and tries to build over the political agreement reached at Bonn in July. This marks the beginning of a new phase of action and implementation, if a little diluted. This should pave the

way for the ratification of the protocol before the end of 2002, a self-imposed deadline to ensure that nations have necessary policies and legislations in place to reduce emissions when the first five-year commitment period commences in 2008. Welcome decision was that industrialised countries would not be allowed to bank carbon dioxide credits generated through sinks’ activities to meet commitment periods.

The CDM takes on a new form. It now appears that a developing country can unilaterally start a project and sell credits to industrialised countries.

4 June 2002 - Japan ratifies the Kyoto Protocol – But with Japan on board, the agreement still only has support from countries responsible for 36% of gases. The US alone was worth 36.1% of ghg emissions in 1990. Kyoto, and CDM, are now a significant step closer to fruition - Two months earlier was the 10th anniversary of the UNFCCC.

October/November 2002 - COP-8 (New Delhi, India) Delhi Declarations. Informal discussions continue on developing countries future commitments. Discussions are once again postponed on a review of how adequately industrialised countries are dealing with climate change. CDM Executive Board set up at COP-7 presented its report to the conference, and formed the basis of discussions. An important outcome of COP-8 was to make the Kyoto Protocol’s CDM fully operational. The decision also adopted the simplified modalities and procedures for small-scale CDM project activities, which should mean that more apply, and paved the way for possible early approval of CDM activities.

December 2003 - COP-9 (Milan, Italy) – Parties agree on rules and procedures for the CDM Executive Board, and modalities and procedures for afforestation and reforestation (A&R) activities under the CDM. The COP decides that a CDM project activity starting between the date of adoption of decision on modalities and procedures for the CDM and the date of the first registration of a CDM project activity may use a crediting period starting before the date of its registration if the project activity is submitted for registration before 31 December 2005. This means that projects that have already begun may now apply as CDM projects.

June 2004 - Twentieth Session of the Subsidiary Bodies to the UN Framework Convention on Climate Change – Parties unable to resolve issues of bundling (clustering of small projects to decrease transaction costs), leakage (unintended consequences of activities leading to increasing emissions in an area outside the project boundary), definitions of low-income communities and monitoring.

The parties encourage the EB to continue to assess existing and new ways to ensure transparency; and recalls that the use of the ‘tool for the demonstration and assessment of additionality is not mandatory for project participants.

They also request the SBSTA, in collaboration with the EB, to develop a recommendation to cop/mop-1 relating to the implications of the implementation of CDM project activities for the achievement of the objectives of other environmental conventions and protocols, in particular the Montreal Protocol.

October 22 2004- Russia ratifies the Protocol. The Kyoto protocol can now be enforced and CDM is underway. Without the US and Russia, Annex 1 ratifications would only represent 47 percent of their emissions, and this is insufficient for entry into force. With Russia, it is now 64 percent.

27 October 2004 - EU linking directive with JI/CDM – This allows the conversion of CER’s into European Union Allowances (EUAS) thereby making companies in the EU a whole new set of buyers for CER’s. Previously, European companies would not have used CER’s. ERU’s from JI are allowed into the EU as of 2008 which means competition for CDM projects.

December 2004 – COP-10 (Buenos Aires, Argentina) –Parties gathered to complete the unfinished business from the Marrakesh accords. Nicknamed ‘the adaptation COP’. Adaptation - what we going to do once global warming happens – are the main focus of discussions. The fact that the COP is focused on what will happen when the Protocol that the Conference of the Parties rests on, does not work, does not bear well for CDM.

Feb 16 2005 – Kyoto protocol enters into force. The Executive Board can now start registering projects.

Oct 20, 2005 - The first CER’s are issued. “RIO BLANCO small hydro project”, Honduras receives 7,304 CER’s and “La Esperanza Hydroelectric Project”, Honduras receives 2,210 CER’s. □

Source: http://www.cseindia.org/programme/geg/cdm_timeline.htm

Bright ideas for energy efficiency

A changeover from incandescent light bulbs to energy-efficient compact fluorescent lamps (CFLs) has been aggressively promoted in recent years by climate change campaigners. Australia has officially announced the phasing out of incandescents by 2010 to achieve a reduction of about five million tonnes of greenhouse gas emissions a year. Canada has also decided to switch bulbs and the European Union may follow suit, as will some American States. Citizen sector campaigns to “ban the bulb” are becoming more vociferous. Although it has a poor record overall on climate change issues, India has also come up with a significant proposal to encourage the use of CFLs. It hopes to fund the plan through the Kyoto Protocol’s Clean Development Mechanism (CDM). The major barrier to wider adoption of CFLs is the high initial cost. The Power Ministry reasons that, by subsidising lamp manufacturers, the end price can be slashed to a tenth of what it is now, which is typically about Rs.100. Consumers, power producers, and the environment all stand to benefit from the reduced electricity use. The bulk of the manufacturing cost of CFLs is to be recovered using the CDM. Considering that there are about 900 million lighting points across the country and that the demand is rising fast, every measure that can reduce consumption is important. A good CFL uses a fourth of the energy an incandescent bulb does for comparable lighting levels and lasts longer.

Environmental concerns over the presence of a small amount of mercury in CFLs have created apprehension among some that burnt-out lamps pose a disposal hazard. The counter-view, which is perhaps stronger, is that more mercury is released into the atmosphere by burning coal in power plants than by the lamps. The answer therefore lies in upgrading waste management systems. The lack of political will at the Centre and in the States to enforce the Municipal Solid Waste Management Rules and the Hazardous Waste (Management and Handling) Rules is leading to serious pollution of the soil and water even now. In the case of CFLs, the issue of collection, transport, and disposal of waste can be resolved by including a small handling cost in the price of the lamps. The Centre is apparently considering such a recovery fee for the cheap CFL scheme. The models operating in the developed world for collection of end-of-life CFLs (and other electronics) at stores and convenient drop-off points in cities may be worth adopting. More immediately, the woefully inadequate municipal waste management systems need to be upgraded and the State pollution control boards made accountable for enforcement.

Source: <http://www.hindu.com/2007/06/28/stories/2007062854111000.htm>

ROBOBANK GOES GREEN, TARGETS CARBON CREDITS

After Al Gore's warning on impending "planetary emergency" and distressed penguins in "Happy Feet", there has been a growing groundswell among financial institutions to take action on handling climatic changes globally.

Rabobank International, which is investing 15 billion euros globally towards green loans, ethical investments and clean technology funds, is lining up a host of "green" products for the Indian market. The bank is looking at projects with leading Indian companies in the food, agri-business and renewable energy space.

This does not come as a surprise as estimates suggest that almost 70% of the world's supply of carbon credits from clean development mechanism (CDM) projects is expected from three countries — Brazil, China and India. Approximately 11.5 million carbon credits will be generated per year and it is estimated that India is on track to receive approximately \$46-172 million per annum (Rs 200-800 crore) from these projects.

"We have come up with specific investment funds to finance projects across the world. Last year, Rabobank contracted to buy 1.6 certified emission reductions from a leading poultry client in Chile. In 2007, the Commodities and Weather Derivatives Group

of the bank has started trading in verified emission reductions," Bart Jan Krouwel, managing director, corporate social responsibility, Rabobank International, said.

"In India opportunities are huge and both Rabobank and Rabo India Finance are pursuing a selective approach. We will endeavour to do a few carbon credit deals per year in our core competency sectors like food and agri-business and renewable energy", Krouwel said.

Rabo India Finance, the 100% subsidiary of Rabobank International which launched its credit products suite a few months back, is in discussions with a few companies to buy carbon credits. Its new offering, called credit wraps, introduced in India and other developing countries to select carbon credits projects apparently removes the risks perceived by many overseas buyers.

According to an official of Rabo India Finance, this product is likely to enhance the level of interest that foreign buyers show in India projects. "Another interesting trend is that the finance and technical functions of many Indian companies are developing greater knowledge of the area and we expect that this could lead to various instruments like hedging products", he said. □

CHINA AND INDIA SET TO TOP RENEWABLES TABLE

China and India are fast becoming the most attractive targets for those investing in wind power, a major renewables survey has found.

China is particularly strong on wind power, according to the E&A survey

Within five years, the two Asian giants will join the US and India as the most attractive places to invest in renewables, the quarterly Ernst and Young Renewable Energy Country Attractiveness predicted.

The US currently tops the renewables investment table, with India following in second place and Spain in third.

China stayed in sixth place of the All Renewables Index but proved particularly strong in wind sector, where major new projects pushed it up from sixth to fifth place. The country already has 2.6GW in wind power capacity and is expected to overshoot its own goal of reaching 5GW by 2010. According to the Global Wind Energy Council (GWEC) Chinese wind power

capacity will reach 5GW by next year, and targets are likely to be increased substantially.

Progress on renewables in China is driven by large projects, such as the East China Sea Bridge offshore wind scheme set to provide 100MW of green electricity by 2009.

Continued investment in green energy projects should take it up to the top three of the index by 2012, however, E&Y predicted.

“Despite recent predictions by the International Energy Agency that China may overtake the US as the world’s biggest source of green house gasses within months, the Chinese Government is showing a commitment to renewable energy sources,” said Jonathan Johns, Ernst & Young’s head of renewable energy.

“Its investment in renewable energy is increasing at an impressive rate, with the annual installation of wind turbines more than doubling in the last 18 months.”

The US tops the index thanks to individual states setting renewables targets accompanied by incentives for investment.

“The US continues to be the global leader for investment in renewable energy, Jonathan Johns said.

“However, corporate and institutional investors have started to show a greater interest in China and India,

as their economies accelerate and legislative changes are introduced that help to foster renewable energy generation.”

The UN-led Clean Development Mechanism (CDM) also provides a steady stream of funding for renewables projects in the area - China received three-fifths of the \$4.8 billion in transfer payments to developing countries under the programme last year.

The UK, meanwhile, continued to slip down the table, finding itself in fifth place after it was overtaken by Germany where further support for offshore wind was added to the already strong solar and onshore wind sectors.

“The UK is rich in resource but less so in grid infrastructure,” Jonathan Johns said.

“Although the UK has an abundance of natural resource, it has not been as successful as it could have been in harvesting this energy.

“The forthcoming ROC banding review will be critical to the UK’s position,” he said. He believes that the UK heat and fuel sectors are unlikely to reach EU goals of 20% renewables by 2020 and will need to be compensated with green electricity targets well above 20%.

Newcomers to the index this year included Poland at 19th place, Brazil, Japan, New Zealand and Turkey. □

Source: http://www.edie.net/news/news_story.asp?id=13004

CER PRICES SOFTEN IN JUNE

Prices of Certified Emission Reductions (CERs) have fallen 15 per cent in June, tracking the slide in EUA prices over that time.

From a peak of nearly •17 in early June, the price of CERs on the growing secondary market with guaranteed delivery has slipped to •14.50 mark on July 3, as measured by the benchmark forward contract for

delivery of CERs in Dec 08 traded on the Nord Pool exchange. Dec 09s were trading around 20 cents higher.

The prices of secondary CERs are heavily linked to the price of EUAs, often traded not in their own price terms at all but as a percentage of the EUA price. The EU carbon market continues to be the major influence

on CER prices because it's by far the largest operating emissions trading market globally, and generating most of the CER demand.

While both CERs and EUAs are interchangeable in the EU ETS, each representing one tonne of CO₂e emissions, CERs have always traded at a discount. This price differential has widened in recent months and is currently around 68 per cent of the equivalent EUA price, according to Tradition Financial Services (TFS), down from 80 per cent or so early this year.

There are now 62 million CERs issued by the CDM executive board (CDM EB) from projects to cut emissions in the developing world, but the volume of secondary trade remains low. The delay in the launch of the UN's International Transaction Log (ITL) needed for the transfer of CERs across international borders severely hampers trade. The uncertainty over when it will be up and running, late this year or sometime in 2008, is the main reason for the price discount to EUAs.

The prices of CERs already issued but not supplied under any guaranteed futures contract is • 1 to • 2 lower, was estimated in the range of • 12 to • 13 in June.

The primary or 'offtake' market for CERs, those yet to be issued from current and future projects, is influenced by the secondary market, and in turn the EUA market, but not so heavily. Forward prices struck under emission reduction purchase agreements (ERPAs) for future CERs traverse a wide range depending on the country of origin, projects risks and the share of that risk between buyer and seller.

In the two leading host countries for CDM projects, China ERPAs are being struck in the • 8 to • 10 range while in India its more like • 11 to • 13.

Prices also depend on the risks of non-delivery and who between buyer and seller is wearing the risk. Risk of non delivery is often measured loosely by what stage the project is at and those at third party validation stage or before trading at • 9 to • 11 in early June and • 11 to • 13 after registration by the CDM EB. □

RUSSIA TAKES FIRST STEP INTO GLOBAL CARBON MARKET

Russia this week gave a surprise green light to carbon trading under the Kyoto Protocol to cut greenhouse gas emissions, but needs to start approving actual projects to unlock a multi-billion dollar market.

Russia is the single largest supplier of oil and gas to the European Union and also the world's third biggest emitter of greenhouse gases behind the United States and China.

As a big player in both energy and climate change, it is well-placed to cash in on the sale of emissions cuts, or carbon credits, to other industrialised countries, but has long delayed implementing the necessary rules.

Prime Minister Mikhail Fradkov signed a government decree on Monday defining guidelines.

"If there were 50 steps, we're at step 49," said

Arthur Houston, a Russia manager at London-listed carbon project developer Camco.

"Now we need to know the final text of the decree, on how to apply. We're expecting that to be posted on the Ministry of Economic Development and Trade website over the next week."

The government would post the final draft on Friday, said a westerner working in Russia's embryonic carbon trading industry, who declined to be named.

"This is the big one, it's what everyone's been waiting for for over a year and a half," said Abyd Karmali, a climate change consultant at ICF International.

Kyoto allows rich countries to meet caps on greenhouse gas emissions by investing in emissions-

cutting projects in other countries, part of a US\$30 billion global carbon market. That market is meant to target cheapest emissions cuts and so cut the cost of fighting climate change.

Russia could be a cheap source of credits for example by simply plugging holes in its vast network of gas pipelines, which currently leaks a potent greenhouse gas, methane. Russia could sell up to 500 million tonnes of emissions cuts in carbon dioxide equivalent by 2012, estimated Karmali, which would value the market at US\$5 billion, assuming current prices.

ACTION

Carbon project developer the Russian Carbon Fund put the market size at up to 350 million tonnes, and underlined the need for further details and operation in practice.

“This is an important step, it’s something the market’s been waiting for for some time, but one should not be fooled that it takes care of everything,” said Morten Prehn Sorensen, chief climate change officer at RCF.

“Details needs to be fleshed out, like where applications should be submitted. Markets will want to see it in operation and issued approvals.”

Russia also needs UN approval to trade carbon, expected by early next year, and has already ordered from French firm Seringas the necessary registry software to log transactions, Sorensen said.

But the carbon market needed to know when that registry would be up and running, said Shell’s Garth Edward.

“The government decision is the first step, now they need to operationalise that. The time frame for turning around applications is unclear,” Edward added.

Under the Kyoto Protocol industrialised countries can either buy carbon credits from developing countries, under the pact’s Clean Development Mechanism, or else from each other under Joint Implementation, as in the case of Russia. — Additional reporting by James Kilner in Moscow. □

Source: Reuters News Service

KAMALA GROUP, MPPL RENEWABLE ENERGY TEAM UP

In what is claimed to be the first of its kind initiative in the world, Mumbai-based Kamala Group has teamed up with the Bangalore-based MPPL Renewable Energy Private Ltd. to float a special purpose vehicle to set up a renewable energy special economic zone in Chengalpattu taluka in Kancheepuram district of Tamil Nadu. The special purpose vehicle (SPV) is christened as Future Energy Zone Private Ltd. (FEZ). Tamil Nadu Energy Development Agency (TEDA) will function as the nodal organisation and facilitate the implementation of the project.

A memorandum of understanding (MoU) in this regard between the State Government and the two promoters of SPV was signed at Chennai in the presence of the State Chief Minister, M. Karunanidhi. The proposed special economic zone is expected to provide direct jobs to 5,000 people and indirect

employment to another 10,000, says a release from the State Government. Addressing a press conference, K. Krishan, Chairman, MPPL Renewable Energy, said FEZ would see an investment of around Rs. 900 crore. On top of this, he anticipated an investment of another \$500 million to flow into the FEZ through manufacturing activities.

Mr. Krishan said the FEZ would require 215-270 hectares, which would be acquired from the market. Both he and R. B. Lad, Chairman of Kamala Group, did not foresee any hiccup in the land acquisition. To repeated questions, they made it clear that FEZ would acquire only dry land. The special economic zone would have two components — the manufacturing side and the R&D (research and development) portion. Mr. Krishan expected the industrial park to attract at least 30-40 companies. □

इरेडा में राजभाषा हिंदी से संबंधी गतिविधियाँ

भारतीय अक्षय ऊर्जा विकास संस्था सीमित (इरेडा) के कार्यालय में हिंदी की प्रगति की समीक्षा करने, हिंदी के प्रचार-प्रसार एवं विकास के लिए इरेडा की राजभाषा कार्यान्वयन समिति की बैठक प्रत्येक तिमाही में एक बार आयोजित की जाती है। इस बैठक में नवीन और नवीकरणीय ऊर्जा मंत्रालय की हिंदी सलाहकार समिति के एक गैर-सरकारी सदस्य को प्रेक्षक के रूप में क्रमवार आमंत्रित किया जाता है। अब तक के आयोजित इरेडा की राजभाषा कार्यान्वयन समिति की बैठकों में भाग लेने के लिए नवीन और नवीकरणीय ऊर्जा मंत्रालय की हिंदी सलाहकार समिति के निम्नलिखित गैर-सरकारी सदस्यगण क्रमशः श्री गोपाल कृष्ण फरलिया, श्री वी.आर. रात्ते, श्री पी.एल. कोठारी, श्री शीलेश शर्मा, श्री एस.एन. विनोद एवं श्री प्रकाश दुबे को आमंत्रित किया गया था। वित्तीय वर्ष 2007.08 की प्रथम बैठक में डॉ पांडे शशि भूषण शीतांशु को प्रेक्षक के रूप में आमंत्रित किया गया था। इस बैठक में विशेष आमंत्रित के रूप में श्री जे.एल.रेड्डी, सेवा निवृत्त रीडर (हिंदी), दिल्ली विश्वविद्यालय को आमंत्रित किया जाता है। इस बैठक के प्रमुख सदस्यगण श्री प्रेम सिंह, उप निदेशक (कार्यान्वयन) राजभाषा विभाग, गृह मंत्रालय, भारत सरकार तथा श्री दिनेश कुमार पाण्डेय, उप निदेशक (राजभाषा), नवीन और नवीकरणीय ऊर्जा मंत्रालय, भारत सरकार हैं।

श्री दिनेश कुमार पाण्डेय, उप निदेशक (राजभाषा), नवीन और नवीकरणीय ऊर्जा मंत्रालय को इरेडा की राजभाषा कार्यान्वयन समिति की बैठक में पहली बार उपस्थित होने पर समिति के



राजभाषा कार्यान्वयन समिति की बैठक के दौरान इरेडा में राजभाषा प्रगति पर चर्चा करते हुए श्री प्रेम सिंह, उप निदेशक (कार्यान्वयन), राजभाषा विभाग और श्री दिनेश कुमार पाण्डेय, उप निदेशक (राजभाषा), नवीन और नवीकरणीय ऊर्जा मंत्रालय



राजभाषा कार्यान्वयन समिति की बैठक में विचार-विमर्श करते हुए कार्यकारी अध्यक्ष एवं अन्य सदस्य-गण

अध्यक्ष महोदय द्वारा पुष्प-गुच्छ से स्वागत किया गया। इसके उपरांत राजभाषा हिंदी से संबंधित विभिन्न विषयों पर विचार-विमर्श किया गया।

राजभाषा नीति के अनुसार प्रत्येक सरकारी कार्यालयों में राजभाषा हिंदी से संबंधित प्रत्येक तिमाही में कम से कम एक कार्यशाला आयोजित करने का प्रावधान है। इसी क्रम में इरेडा कर्मियों को राजभाषा हिंदी के प्रति जागरूक बनाने, राजभाषा हिंदी में सरकारी कामकाज करने तथा राजभाषा हिंदी से संबंधित नीतियों के बारे में विस्तृत रूप से जानकारी देने के लिए दिनांक 16.05.2007 को इरेडा कार्यालय में राजभाषा नीति विषय पर एक कार्यशाला आयोजित की गई थी जिसका संचालन श्री सोम प्रकाश सेठी, पूर्व प्रमुख (राजभाषा) हड़को द्वारा किया गया था। इस कार्यशाला में विशेषज्ञों महोदय ने अपने अनुभवों के द्वारा राजभाषा हिंदी के संबंध में विस्तृत रूप से जानकारी प्रदान की। इस कार्यशाला में इरेडा अधिकारीगण ने बड़े उत्साहपूर्वक भाग लिया।

भारतीय अक्षय ऊर्जा विकास संस्था सीमित (इरेडा) कार्यालय के सभी अधिकारीगण तथा कर्मचारीगण कार्यालयी कार्यों को यथासंभव हिंदी में करने तथा राजभाषा हिंदी के प्रचार-प्रसार के लिए समर्पित हैं। इसी का परिणाम है कि वित्तीय वर्ष 2004.05 में इरेडा निष्पादन के लिए 'क' क्षेत्रा के लोक क्षेत्राक उद्यमों की श्रेणी में 'इंदिरा गांधी राजभाषा पुरस्कारों के तृतीय पुरस्कार' से सम्मानित किया गया है। □

MEETING ON WIND ENERGY INVESTMENTS IN GUJARAT

A Business meet on Wind Energy investments in Gujarat was organised by Federation of Indian Chambers of Commerce and Industry (FICCI) at Ahmedabad on 12 May 2007. The meet was supported by Indian Wind Energy Association and co-sponsored by IREDA.

The meet was held to look into the opportunities for wind energy investments in Gujarat. Policy issues concerning wind sector and the technical and financial issues needed to promote investments in wind energy were discussed among the delegates. More than 45 delegates took part in the deliberations from investors around the state of Gujarat.

In his address to the business meet Shri Anil Kane, President, InWEA said that the opportunity for investments in wind energy sector is very bright especially in the coastal states like Gujarat, Tamilnadu and Andhra Pradesh.

Shri A.A. Khatana, CGM (PTS), IREDA spoke of the various financial instruments that IREDA has put



Shri A.A Khatana, CGM (PTS), IREDA addressing the business meet on Wind Energy Investments in Gujarat

in place for promotion of wind sector investments. He also gave a detailed account of the fiscal and financial incentives to the sector that are in place for promoting the development of the sector. He highlighted some of the important issues by giving case studies to show how several corporates have turned to wind energy investments across the country. □

BUSINESS MEET ON ENERGY EFFICIENCY AND RENEWABLE ENERGY AT PUDUCHERRY

A Business Meet on Energy Efficiency and Renewable Energy was organised at Puducherry on June 22, 2007 by IT Power India Pvt. Ltd. The objective of the business meet was to highlight the various schemes and services available with IREDA for promoting RE technologies, which can be accessed by entrepreneurs.

The meet was started with Mr. Jean Philippe Puyravaud, CEO of ITPI welcoming all speakers and delegates and gave a brief account of the trends in energy, energy efficiency and renewable energy technologies.

There were several presentations made on various aspects of energy efficiency and renewable energy in the context of the meet. In the first presentation, Dr. C. Palaniappan, of PEN, covered aspects of solar air heating applications in agro and industrial processes. The main aspects of his talk centred on successful case studies from food processing and tea industries, development of PEN Solar Air Heating System and examples from PEN initiatives. He also said that SAHS does not make sense for the drying of bagasse since bagasse sells in the market for only Rs.0.50 per kg, which is too less to make it economically feasible for running a SAHS.

Shri T.R. Krishanswamy, Energren Power Ltd. spoke about biomass gasification and its application with respect to cost effectiveness. The genral discussion centred around advantages of biomass gasification, different technology aspects, areas of application and the economics. Shri Krishnaswamy explained that successful projects around the country have shown that they are not only feasible but commercially successful. He said that the technology is already established and practically possible to apply in any area. But the commercial and non-technical issues are more important and need to be sorted out before establishing such a system.

Shri K.S. Sridharan, former CGM (PTS) with IREDA and currently Consultant, ITPI made a presentation by introducing IREDA in detail to the participants. His presentation focussed on the financing schemes of IREDA and the financial norms for the same. He also gave a detailed sector-wise perspective with regards to existing IREDA lending operations. He also said that the banking and financing issues for biomass gasification projects are a matter of concern even today. He also informed that IREDA has restarted financing of Gasifier based proejects for thermal applications.

Shri Nalin Kanshal of Elpro Energy Dimensions spoke of the global energy scenario and the problem statement. He spoke in detail about the emergence and need for energy management with special reference to energy efficiency. The focus then shifted to the ESCO approach, from the definition to an ESCO project, the discussion covered every aspect of the ESCO cycle. Shri Kanshal spoke in detail about their project "Control and Monitoring of Street Lighting System of Ring Roads for Bangalore Development Authority", which is the first of its kind in Asia and the environmental benefits from this project.

Shri S. Karthikeyan of the CII Green Business Centre, Hyderabad spoke about how energy conservation can be a tool for improving competitiveness. He gave abrief description of the CII



Shri K.S Sridharan, Consultant ITPI making his presentation at the business meet at Puducherry

Sohrabji Godrej Green Business Centre, its features, the vision of GBC and its services. The discussion revolved around the energy consumption pattern in an energy intensive industry, the conservation potential, energy auditing and case studies to explain the energy savings by retrofitting buildings or modification of equipment in use. □



IREDA CHAIR PROFESSOR HONOURED

Prof H.P. Garg, IREDA Chair Professor at IIT Delhi was presented with the Shiksha Rattan Puraskar and a Certificate of Excellence by Dr. Bhishma Narain Singh, former Governor of Assam and Tamilnadu at a function in New Delhi on 12 July 2007

REPORT ON BIODIESEL SUMMIT

The Biodiesel Summit was organised by Integrated Research and Action for Development (IRADe), New Delhi at New Delhi on 29-30 January 2007. The Summit was organised to bring together stakeholders from various quarters of the biodiesel system, to review the ongoing initiatives and learn from them.

In his inaugural address Dr. Kirit Parikh, Member, Planning Commission, Govt. of India said that the importance of biodiesel arises from India's growing energy needs. He said that we can improve our energy security in a number of ways. We need to produce edible or non-edible oilseeds within the country and do all that can be done to realise the potential of biodiesel. We need to look at the interest of the farmer, especially the landless and poor who can gain from working on development of plant material, plantations and village industry.

In his message to the summit, Shri V. Subramanian, Secretary, MNRE said that biodiesel is emerging as an alternate to high speed diesel, besides providing employment opportunities to millions of people. It has ignited the imagination of many experts, decision makers, both in the public and private sectors in India, he said.

Shri A.K. Lohia of the Uttaranchal Biofuel Development Board spoke of the public-private-partnership model being applied in Uttaranchal for developing *Jatropha* plantations over 2 lakh hectares of degraded lands.

Dr. Renu Swarup, Advisor, Deptt. of Biotechnology said that there was urgent need to develop macro and micro propagation technologies for large scale multiplication of superior planting material. She also suggested appropriate field trials based on different agroclimatic conditions.

Dr. H.M. Behl of National Botanical Research Institute, Lucknow emphasized the need to develop quality nursery stocks by selecting superior clones.

Prof. L.M. Das of IIT Delhi discussed the current status of processing technology and end uses of biodiesel. Viscosity of biodiesel is the major stumbling block for engine performance. He suggested that the quality of fuel for durability, oxidation problems during storage and understanding fundamental chemistry of biodiesel require intensive research study.

Shri M.K. Khanna, Additional Secretary, Ministry of Panchayati Raj said that farmers need to be encouraged to bring the community towards seed procurement, cultivation, processing, etc. Logistical problems encountered in rural areas can be overcome by coordination among gram panchayats, district heads, financial institutions and farmers associations.

Shri Anirudh Gautam, Director, RDSO, Lucknow discussed the policy map of Indian Railways for biodiesel development. As the largest consumer of diesel oil it has the potential for huge savings. A 20% switch to biodiesel by the railways shall require about 400 million litres of biodiesel and thus can propel all the components in the supply chain.

Dr. Renuka Vishwanathan, Secretary, Ministry of Rural Development strongly favoured critical issues of mandatory blending of biodiesel in fossil fuel. She recommended providing subsidies to the marginal farmer and tax incentives to the stakeholders.

Dr. Jyoti Parikh presented the roadmap for biodiesel development in India. She focused on barriers and gaps in each component of the comprehensive biodiesel system. She emphasized on public private partnership, involvement of panchayati raj institutions and biotechnological interventions to improve yield and oil content and major steps to boost the production of biodiesel. She also recommended that biodiesel should be sold with full disclosure and priced differently from pure fossil fuel based diesel thereby passing the benefits of the proposed regime for biodiesel to the consumer. She proposed that direct and local sale of biodiesel should be encouraged. □