



Report  
on

**BIODIESEL  
SUMMIT**

“A Discussion Forum  
for Biodiesel Stakeholders”



Integrated Research and Action for Development  
New Delhi



### ***A 'think tank' that works with 'action tanks'***

Set up by eminent persons in 2002 as a fully autonomous advanced research Institute in New Delhi. IRADe aims to combine research, action and training programmes and policy analysis in various themes for the purpose of comprehensive policy advocacy.

#### **The objectives of the Institute are:**

- To develop understanding that integrates multi-stakeholder perspectives concerning issues of development.
- To develop capacities among professionals for multi-disciplinary multi-stakeholder policy analysis.
- To promote a wider consensus through research and analysis on effective policies among stakeholders and policy makers.
- To promote implementation of ideas on development at the local and global levels.
- To provide research support to developing countries to negotiate international agreements better.

#### **Focal Areas**

- Energy systems, policy and planning
- Natural resources and environment management
- Infrastructure , industry and institutions
- Rural and urban areas
- Global and local issues especially poverty alleviation programmes
- Climate change and Clean Development Mechanism

#### **Activities**

IRADe continue to work at a large scale than before and has increased its visibility by growing the activities of the institute in **four distinct areas viz., Research, Action oriented projects, Policy analysis, Advocacy and Dissemination and Training, Seminars and Workshops.**

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In a short span of time, IRADe has started achieved fruitful working relationships with Government, non government and multilateral agencies such as Planning Commission of India, Ministry of Power, Ministry of Environment and Forests (MoEF), Ministry of External Affairs (MEA), Technology Information Forecasting and Assessment Council (TIFAC), Petroleum Federation of India (Petrofed India), Self Employed Women's Association (SEWA), Winrock International India, WISIONS Wuppertal Institute for Climate, Environment and Energy, Global Environment Facility Small Grants Programme (GEF-SDP), Energia International Netherlands, Stanford University USA, United Nations Environment Programme (UNEP) Geneva, South Asia Network of Economic Institutes (SANEI) as well as private sector such as Pricewaterhouse Coopers (PwC) New Delhi and Reliance Industries Ltd.

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**BIODIESEL**

**SUMMIT:**

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## Foreword



**W**e are delighted to present the summit report for **Biodiesel Summit: “A Discussion Forum for Biodiesel Stakeholders”**. IRADe is involved in multi activities role for biodiesel development at state and national level. Therefore, we felt a need for this summit to bring stakeholders from various quarters of biodiesel system. One of the ideas is also to take a review of numerous ongoing initiatives and learn from them.

The summit brought high level officials from the Ministry of Petroleum, the Planning Commission, Ministry of New and Renewable Energy (MNRE), Ministry of Rural development (MORD), Ministry of Panchayati Raj and state bodies, government agencies, public and private sector on biodiesel for delivery of equitable and accessible biodiesel policy.

Government of India has initiated the National Mission on biodiesel and also declared the Biodiesel Purchase Policy in 2005. Several states, government organisations, public and private sector companies have entered in the business of oilseeds plants cultivation, oil extraction and processing. Various institutions, agencies, government organisations, public and private sector companies are also engaged in biodiesel promotion, production and its end uses. Besides this, Non Government Organisations are also engaged in promoting biodiesel for social and environmental point of view. Government of India targets to replace the 5 % of total High Speed Diesel demand with biodiesel. There are many stakeholders involved in biodiesel development namely cultivators, oil extractors, and processing units, oil marketing companies and end users. There is an element of risk for all stakeholders as there is hardly any past experience of Jatropha as a commercial crop and biodiesel production at commercial level. The summit provided a rare opportunity to all stakeholders to interact with policy makers form all related ministries. We acknowledge the support of a large number of officials from government, public sector, multilateral organisations and non-government organisations and sponsors of the event. IRADe thanks all the chairpersons, panelists, sponsors, session co-coordinators, rapporteurs and friends who volunteered to give valuable help.

The support of Ministry of New and Renewable Energy, Ministry of Petroleum and Natural Gas, and Ministry of Rural development was appreciable in success of the summit.

**Dr. Jyoti Parikh**  
**Executive Director**  
**IRADe**  
**March 2007**

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# Purpose of Biodiesel Summit

The month of January 2007 witnessed a landmark event in the Biodiesel Summit: “A Discussion Forum for Biodiesel Stakeholders” organized by IRADe which brought major stakeholders and participants across the country. It provided new insights into the Biodiesel Development in India. Currently there are many issues and concerns still to be resolved. Not much progress has been made to develop and better utilize of available resources to obtain liquid energy. Interfaces among various components of biodiesel system viz. oil seeds production, processing, marketing, finance and end uses need to be discussed for effective formulation of policy and roadmap to get the practical result. Wide ranging participation of well known experts led to information sharing, capacity building and awareness creation through this summit. The focus of Biodiesel Summit was to bring together stakeholders active in the biodiesel system to assess the potential, to review progress, to identify barriers to growth, to promote biodiesel friendly policies by various organisations and examine prospects in terms of rural employment creation, energy security and climate change mitigation. The purpose of the summit was following:

- To discuss the equitable and accessible biodiesel policy.
- To provide technical know-how for commercial cultivation of oilseeds crops and biodiesel processing.
- To ensure energy security and climate change mitigation.
- To gather opinions of stakeholders, government representatives, and other business entity with an objective of concluding “consensus and differences.”
- To establish liaison and linkages among all stakeholders.
- To provide technical know-how for commercial cultivation of oilseeds crops and biodiesel processing.
- To function as an information hub

# Programme at a Glance

29th January 2007		VENUE: Hotel Le Meridien, New Delhi	
<b>INAUGURAL</b> (10:00-11:00 A.M.)	<b>Overview of Indian Initiatives</b> (11:15 A.M. - 1:15 P.M.)	<b>Oilseeds Cultivation and Sustainable Development</b> (2:15-3:45 P.M.)	<b>Opportunities and Challenges in Biodiesel Processing</b> (4:00-5:00 P.M.)
<b>Welcome and Introduction</b> Dr. Jyoti Parikh, ED, IRADe, New Delhi	<b>Chair</b> Dr. S.K.Chopra, Principal Advisor and Special Secretary, MNRE	<b>Chair</b> Dr. Subhash Pani, Secretary, Ministry of Rural Development	<b>Chair</b> Mr. Arjun Arora, DG, Petrofed, New Delhi
<b>Special Address</b> Mr. Sam Bob, ED, PCRA, New Delhi	<b>Panelists</b> Mr. R.K. Dua, Director (Coord. & HR) PCRA, New Delhi	<b>Co-Chair</b> Dr. Jyoti Parikh, ED, IRADe	<b>Panelists</b> Dr. L.M.Das, Professor, Center for Energy Studies, IIT Delhi
<b>Chair Inaugural Session</b> Dr. Subhash Pani, Secretary, Ministry of Rural Development, Gol	<b>Panelists</b> Mr. Kanishka Negi, Programme Officer, SPWD, Udaipur Mr. A.K.Lohia, General Secretary, Uttranchal Biofuel Development Board, Dehradun	<b>Panelists</b> Dr. R.P.S.Yadav, State Co-ordinator, IFFDC, Udaipur Dr. Renu Swaroop, Advisor, Department of Biotechnology, Gol Dr. H.M.Behl, Scientist G, NBRI, Lucknow Dr. Brahma Singh, President, Secretariat, OSD, Horticulture, New Delhi	<b>Panelists</b> Mr. A.M. Deshpandey, Director, Garware Polyester Ltd, New Delhi Mr. A.K.Goel, Director (P.S), PCRA, New Delhi
<b>Inaugural Address</b> Dr. Kirit Parikh, Member, Planning Commission, Gol			
<b>Vote Of Thanks</b> Dr. Amit Walia, Consultant, IRADe, New Delhi			

Tea break: 11:00 11:15 A.M.

Lunch break: 1:15 2:15 P.M.

Tea break: 3:45 4:00 P.M

<b>VENUE: Hotel Le Meridien, New Delhi</b>		
<b>30th January 2007</b>	<b>Biodiesel, Byproducts and End Uses (11:15 A.M. - 1:00 P.M.)</b>	<b>Policy Framework and Roadmap on Biodiesel &amp; Valedictory Session (2:00 - 4:00 P.M.)</b>
<p><b>Socio-Economic, Financial and Environmental Issues (10:00 - 11:00 A.M.)</b></p> <p><b>Chair</b></p> <ul style="list-style-type: none"> <li>Mr. M.K.Khanna, Additional Secretary, Ministry of Panchayati Raj, Gol</li> </ul> <p><b>Panelists</b></p> <ul style="list-style-type: none"> <li>Mr. B.V.Rao, G.M.(Biodiesel) IREDA</li> <li>Mr. K.Amannarayana, Deputy Commissioner, Chitradurg District, Karnataka</li> <li>Mr. Sudarshan Srinivasan, G.M, Dhirubhai Ambani Life Science Center, Navi Mumbai</li> <li>Mr. Shrikant Panigrahi, Chairman, Indian Society of Remote Sensing, Delhi Chapter</li> </ul>	<p><b>Chair</b></p> <p>Mr. Anil Razdan, Add. Secretary of Ministry of Petroleum &amp; Natural Gas, Gol</p> <p><b>Co-Chair</b></p> <p>Mr. M.B.Lal, CMD, HPCL</p> <p><b>Panelists</b></p> <ul style="list-style-type: none"> <li>Mr. Dilip Chenov, DG, SIAM, New Delhi</li> <li>Mr.R.K.Malhotra, G.M, IOCL(R&amp;D) , Fridabad</li> <li>Mr. S. Sivasubramanian, G.M. Marketing, Wartsila NSD India Ltd, Chennai</li> <li>Dr. Mathew Abraham, GM, Mahindra &amp; Mahindra Ltd, Nashik</li> <li>Mr. Anirudh Gautam, Director, Engine Development, RDSO, Lucknow</li> </ul>	<p><b>Policy Framework and Roadmap:</b></p> <p><b>Chair:</b></p> <p>Dr. Renuka Viswanathan, Secretary, Co-ordination, Ministry of Rural Development, Gol</p> <ul style="list-style-type: none"> <li><b>Comments</b></li> <li>Mr.S.P.Sethi, Principal Advisor, Planning Commission, Gol</li> </ul> <ul style="list-style-type: none"> <li><b>Summary of Summit</b></li> <li>Dr. Jyoti Parikh, ED, IRADe, New Delhi</li> <li><b>Open Discussion</b></li> </ul> <p><b>Valedictory Session:</b></p> <ul style="list-style-type: none"> <li><b>Valedictory Address</b></li> <li>Dr. Kirit Parikh, Member Planning Commission, Gol</li> </ul>

Tea break: 11:00 - 11:15 A.M

Lunch Break: 1:00 2:00 P.M.

# Welcome Speech

## Welcome Speech by Dr. Jyoti Parikh, ED, IRADe

It is my great pleasure to welcome you all at this important event that brings together stakeholders of biodiesel. Biodiesel has emerged as an alternate fuel to substitute diesel and can be blended with diesel. It is renewable, uses domestic resources, supports domestic agriculture, industry and decreases dependence on oil import while reduce emissions from conventional diesel and provide opportunities for carbon credit. It can also provide local energy security at village level. Government of India has initiated the National Mission on Biodiesel and also declared the Biodiesel Purchase Policy in 2005. Several states, government organizations, public and private sector companies and NGOs have entered in the business of oilseeds plants cultivation, oil extraction, processing, promotion and end uses. Also the government of India hopes to replace 5 % of total High Speed Diesel demand with biodiesel by 2012. There are many stakeholders involved in biodiesel development namely cultivators, oil extractors, and processing units, oil marketing companies and end users. There is an element of risk for all stakeholders as there is hardly any past experience of Jatropha as a commercial crop and biodiesel production at commercial level. The summit will provide a rare opportunity to all stakeholders to interact with policy makers from all related ministries.

Establishing biodiesel development as a viable option is not going to be a cakewalk. We are aware of difficulties ahead of us but that should not stop us from putting efforts. Even if 2 % energy in India can be met from bio-diesel, it will be as much contribution as what is provided by say nuclear, wind or solar after decades of state support. Even the established i.e. conventional energy sometimes faces numerous difficulties as far as scaling up for the next decade is concerned. Therefore, we need to pursue and remove roadblocks, of course, after thorough analysis and rigorous monitoring. Certainly there are risks but note that every year dry oil wells cost \$100 to \$ 150 million to the country. That type of investments and expenditure per year done in biodiesel will benefit farmers.

Once again, I thank and welcome, all of you for your participating and supporting us generously. I hope you find the experience rewarding.

# Inaugural Address



*"Inaugural Session chaired by Dr. Subhash Pani, Secretary, Ministry of Rural Development, GoI"*

## **Inaugural address delivered by Dr. Kirit Parikh, Member, Planning Commission, GoI**

The importance of bio-diesel arises from India's growing energy needs. We expect our total energy consumption will increase around 8% to 10% from 415 mtoe today to 1800 to 2000 million tonnes of oil equivalent (mtoe) by 2031. Similarly our oil requirement will also increase from 120 million tonnes (mt) to anywhere between 350 to 500 mts. in 25 years. This is likely to raise our oil import dependence from 70% today to more than 90%. Clearly our concern for energy security would increase.

We can improve our energy security in a number of ways. The threat to energy security is of two kinds: First, there is supply risk. Even if we are willing and able to pay for it, oil may not be available because of embargos or due to disruption or war in the oil exporting countries, etc. Second, we may face market risk where the price of oil suddenly increases and its economic consequences may be significant. With our comfortable stock of foreign exchange last year, we were able to deal with this market risk without any large secondary impact on the economy. We can also improve our energy security by increasing domestic supply. This can be done by exploration and development of new oil fields as also by developing oil substitutes, which can be produced domestically or can be imported from countries other than those from which we import oil. Bio-diesel provides such an alternative where we can grow our own oil to substitute diesel. Even if we produce bio-diesel by importing vegetable oil, we will diversify our sources of imported oil and increase energy security. To produce bio-diesel domestically, we need to produce edible or non-edible oil seeds within the country.

The attraction of Jatropha is that it is a non-edible oil tree that can grow on wasteland. The first step then is to create plantations of such oil trees. The main difficulty in creating such plantations is the uncertainty concerning the yield of oilseeds that we can get from Jatropha plantations.

The question is how to realize this potential of bio-diesel. Let us look at the interests of the major stakeholders. First, we look at the farmer. He/she would ask the question whether growing Jatropha is the best use of his/her land. Does it give good income? What is the opportunity cost of using the land? This of-course depends on the yield of Jatropha that one can get and also the possibilities of inter cropping that exists. It will also depend on the cost of plantations and the inputs needed.

Look at the viewpoint of the industry that sets up trans-esterification plant. It would want a steady supply of seeds. It would want the seeds at a price that would make it possible for it to sell diesel at competitive price and it would want a secure demand either from local users or from oil companies. The competitiveness of oil can be improved by subsidies or by prescribing purchase price and by giving tax incentives. Nonetheless there are limits to which such incentives can be provided. As far as oil companies are concerned they would want that the purchase price of bio-diesel does not put any financial burden on them and that blending requirements and possibilities are clearly defined. It would also want that the quality of bio-diesel is satisfactory and that tasting facilities are available.

From the point of view of the government, it has also a number of objectives. It wants to create rural employment and also wants to provide energy security. These two objectives may involve trade offs and one has to find ways to reconcile them. Given that there is uncertainty on the yields, how should the government proceed? First of all we should promote R&D to increase yield and develop new planting material that gives high yields. Development of planting material however will take about 5 years and may take another 5 years to get seeds from plantations based on new materials. This raises the question as to what should we do now?

Clearly, we could use the employment creation potential by creating Jatropha plantations with existing materials on wasteland owned by the community or by the government. We may use funds from NREGP (National Rural Employment Guarantee Programme), import cheap vegetable oils such as palm oil if it is available in the international market or import residual oil from vegetable oil refining with low-tariff for use as a feedstock to produce bio-diesel in the short run, adopt mechanism by which investors can be attracted to set up bio-diesel facilities without waiting for domestic plantations to start yielding enough seeds and create plantations, which will provide employment to farmers.

Making success of a large-scale bio-diesel programme involves many stakeholders and their concerns need to be integrated in designing a successful policy framework. This summit thus can provide valuable guidance in defining a roadmap for the bio-diesel programme in the country.

# Vote of Thanks

## **Vote of thanks delivered by Dr. Amit Walia, Summit Co-ordinator, IRADe**

Dr Kirit Parikh, Member Planning Commission, Dr Subash Pani, Secretary, Ministry of Rural Development, Mr. Sam Bob, Executive Director, Petroleum Conservation Research Association, Dr. Jyoti Parikh, Executive Director, IRADe, our most valued guests, ladies and gentlemen, it is my great privilege and honor to extend a vote of thanks on this momentous occasion. The very presence of Dr Kirit Parikh, Member Planning Commission despite of his extremely busy schedule is a reflection of the importance that is attached to the commitment of the government to biodiesel development. On behalf of IRADe and myself and as well as all the stakeholders of biodiesel, I extend to you a very hearty vote of thanks for gracing the function and sharing with this august audience your vision on biodiesel development in India.

I would like to convey our sincere thanks to Dr Subash Pani, Secretary, Ministry of Rural Development for accepting our invitation at very short interval to chair inaugural session and delivering an enlightening speech.

We are extremely grateful to Mr. Sam Bob, ED, PCRA not only for his gracious presence and views but also for inviting IRADe to join hands with PCRA for organising this event to consider with Oil and Gas Conservation Fortnight. His colleague at PCRA, Shri A.K. Goel has also prompted us to hold this event. We are, in fact, highly encouraged by the message of Hon'ble Minister for Petroleum and Natural Gas, Mr. Murli Deora, who couldn't make his presence here amongst us due to certain urgencies. We thank you very much Sir. My thanks to all the chairs and panelists who have been kind enough to be with us to share their perception on the subject. I am sure that the deliberations will help crystallise the thought process on this subject. I also thank all the distinguished invitees present here for accepting our invitation.

I must mention our deep sense of appreciation to the sponsor of the event MNRE, Gol and Assam Company Ltd. and co-sponsors PCRA, HPCL, ONGC, Wartsila NSD India Ltd, BPCL and support received from Tina Oils and Chemicals Ltd and Garware Polyester Ltd.

I am also very grateful to all the staff members of Hotel Le Meridien and other contractors for their logistic and support. An event of this dimension cannot happen overnight. The wheels start rolling months in advance. It requires meticulous planning and execution and an eye for details. We are fortunate enough to have valuable guidance and unstinted support of Dr. Jyoti Parikh, ED, IRADe and to be backed by a team of very motivated and dedicated colleagues. I cannot thank every one enough for the involvement they have shown and willingness they have expressed to take on the completion of tasks beyond their comfort zone.

**Thank you once again and may I request you all to join us for tea outside the hall!**

## Messages



**Mr. Murli Deora, Minister,  
Ministry of Petroleum and Natural Gas, GoI**

I greet the organisers, Integrated Research and Action for Development (IRADe) at the suggestion of Petroleum Conservation Research Association for organising such an event on a very relevant topic of Biodiesel. This programme would certainly help a great deal to provide a platform to share the latest developments in the field of biofuels especially related to Govt. policies, actual production, usage and R&D efforts. Addressing these aspects would greatly facilitate further promotion of biofuels. Diesel is a non-renewable fossil fuel, which is not going to last forever. Biodiesel is one such renewable source, which can be used as a diesel substitute in the existing infrastructure. It can be made from any edible or non-edible vegetable oil. Development of biodiesel as an alternative and renewable source of energy for transportation sector has become critical in the national effort towards maximum self-reliance, which is the corner stone of our energy security. Large-scale plantation of *Jatropha* for production of biodiesel is strategic for India's energy security as well as poverty alleviation. State governments, multinational companies and corporates are investing heavily in their attempt to promote *Jatropha* plantation all over the country.

Advantages of biodiesel lie in its renewability, ensuring energy security and clean environment. Further, biodiesel industry will lead to utilization of rural wasteland and generation of employment for rural masses. When biodiesel displaces petro diesel, it significantly reduces harmful emissions and thus global warming. When plants like *Jatropha*, *pongamia* etc grow, they absorb carbon dioxide from air to make the stems, roots, leaves and seeds. When biodiesel burns, it produces carbon dioxide but the cycle does not add to the net concentration of carbon dioxide of the atmosphere as the oil seed crop absorbs carbon dioxide during photosynthesis. It also reduces emissions of tailpipe particulate matter, unburnt hydrocarbons and carbon monoxide. Emissions benefits occur because Biodiesel contains about 11% oxygen by weight, which allows the fuel to burn more efficiently.

Biodiesel can be stored, and used in transportation just like petro diesel. India is spending heavy amount of foreign exchange for import of crude oil, which is increasing exponentially with each passing year. *Jatropha curcas* has been identified for India as the most suitable Tree Borne Oilseed (TBO) for production of bio-diesel both in view of its non-edible nature and its presence throughout the country.

The capacity of *Jatropha curcas* to rehabilitate degraded land, from which the poor mostly derive their sustenance, by improving land's water retention capacity, makes it additionally suitable for up-

gradation of land resources. *Jatropha* starts bearing fruits in the 2<sup>nd</sup> or 3<sup>rd</sup> year of its plantation and produces harvestable yields from 5<sup>th</sup> year when optimum yield of about 1.5 to 2.5 kg per tree can be harvested. The percentage of oil in *Jatropha* seeds varies from 30 to 40 percent. Presently, in some Indian villages, farmers are extracting oil from *Jatropha* seeds and after settling and decanting it, they are mixing the filtered oil with diesel fuel. Although, so far the farmers have not observed any damage to their machinery, yet this remains to be studied in a more systematic way. However, it is advisable to convert the oil into biodiesel through trans-esterification process. This reaction is relatively simple and does not require any exotic material. While large plants for trans-esterification of oil to produce Biodiesel are useful for centralized production of bio-diesel, smaller plants of capacity 10 to 20 lts per day may be started at village level as Cottage Industry for local use. While raw materials used worldwide for production of biodiesel are: Rapeseed, Sunflower, Soyabean, Palm oil etc., Ratanjot i.e. *Jatropha* and Karanj are the raw materials of choice for India.

Ministry of Petroleum and Natural Gas has already announced 'Biodiesel Purchase Policy' on 9th October 2005 under which all the biodiesel produced in the country meeting BIS specifications would be purchased by the Public Sector Oil Companies. Twenty different locations all over the country have already been earmarked and notified for this purpose. Number of these locations would be increased as the production of biodiesel in the country increases. 'Biodiesel Purchase Policy' has been announced so that producers have assured market for Biodiesel. Networking and sharing of information in the field of biodiesel needs to be strengthened. Ministry of Rural Development, Ministry of Renewable Energy Sources, Ministry of Agriculture, Ministry of Petroleum & Natural Gas, Planning Commission, NABARD, PCRA and oil companies have to work in close coordination to make the program successful. Biodiesel blends have been extensively used by Indian Oil Corporation in Haryana Roadways buses and Railways on trial basis. Hindustan Petroleum Corporation Limited (HPCL) is also carrying out field trials on biodiesel in association with BEST, Mumbai. Successful trials have also been carried out in Gujarat State Road Transport buses and it has been established that up to 20% biodiesel can be blended with petrodiesel without any engine modification. I am sure; programs like this would go a long way in improving country's energy security and reduce our dependence on oil imports.

Biofuels deserve to be given national importance and we need to grow more and more biofuel crops such as *Jatropha*, Karanj etc. We have 60 Million hectares of wasteland, which could be tapped effectively for plantation of oil seed bearing trees. In the process, we also fulfil social obligations of rural employment generation and increasing the green cover.

It is our proactive actions that will determine the energy future of our coming generations. We must choose the energy alternatives best suited to our country. I am sure that very soon we will be farming diesel instead of digging it. The biodiesel program involves many stakeholders and unless the interest and concerns of all of them are taken care of it cannot succeed. I hope that this summit would go a long way in bringing various stakeholders together and defining an effective strategy for promotion of biodiesel in the country. I extend my best wishes to the organisers for the success of this conference.



**Mr. V. Subramanian, Secretary,  
Ministry of New and Renewable Energy, GoI**

I am happy to know that Integrated Research and Action for Development (IRADe), New Delhi, is organizing Biodiesel Summit: “A Discussion Forum for Biodiesel Stakeholders” from 29<sup>th</sup> to 30<sup>th</sup> January 2007. I understand, the summit will bring various stakeholders of biodiesel together to raise their concerns and directly interact with high-level officials from various Ministries and Government bodies.

Ensuring energy security is a challenge faced by major nations of the world, including India, today. Biodiesel, a renewable energy solution, is emerging as an alternate to high-speed diesel, besides providing employment opportunities to millions of people. Biodiesel has ignited the imagination of many experts, decision makers, both in the public and private sectors in India.

I am sure that the deliberations at the summit would provide valuable insight into various issues relating to biodiesel. I am keen that a road map for biodiesel development in India should emerge, so that we meet the strategic and economic goal of providing sustained energy supply to the country. I congratulate the organizers and experts my best wishes for the success of the Biodiesel Summit.

# Session Deliberations

## Overview of Indian Initiatives

29<sup>th</sup> January, Session I



In the opening remarks **Dr. S. K. Chopra**, Principal Advisor & Special Secretary, MNRE, GOI and chairperson of session overviewed the endeavours by different stakeholders for biodiesel development and facilitated the fruitful discussion on Indian initiatives for biodiesel business in India. He highlighted the government approach, initiatives and barriers of this sunrise industry.

**Dr. R. K. Dua**, Director, PCRA, focused on biofuel as a lifeline of India's energy security.

Mr. Dua persuaded on policy makers and industrialists to search domestic renewable source of energy to lessen the dependence and reducing the import bill. He covered topics such as formation of initial corpus fund, taxation policy, best agronomic practice, R&D, bank loan, information dissemination, pursuing CDM projects, monitoring of area under Jatropha plantation, developing commercially viable industrial models, and training should be in place to boost the efforts on biodiesel development.

PCRA has put a lot of efforts to accelerate the biodiesel production in India. He recommended the followings:

- Tie-up with NEDFI ((North East Development Financial Institution).
- Education Campaign
- Capacity Building
- Information dissemination at national and international level.

**Mr. Kanishk Negi**, Programme Officer, from Society for Promotion of Wastelands Development, Udaipur highlighted some constraints and suggested the ways to overcome it. He expressed major apprehensions about lack of clarity on quality parameters and pricing of oilseeds, risk of produce being sourced to European market in light of increasing demand and legislation there, no definite information on procurement channel, forward linkages, impact of land bank on marginal sections who use common lands for grazing and also non-availability of collection centers. The concern over viability of commercial production of jatropha and selection of wastelands for it. As wastelands require more inputs, it may render the venture financially unviable due to procurement price set by government and price of diesel. On the other hand if the well off land is taken for plantation then there is risk of higher opportunity cost. This is a major dilemma faced by promoters of jatropha. He emphasised on micro level planning so as to identify optimal utilization of land combined with promotional activities like training to farmers, village meetings with farmers and entrepreneurs. Also ways needed to be found to inculcate biofuels in the life support systems of poor to reduce dependency on external markets.

**Mr. A.K.Lohia**, General Secretary, Uttranchal Biofuel Development Board, gave an overview of the activities and success of board, a state level nodal agency on public private partnership basis (PPP) for facilitating biofuel plantation and co-ordination of research activities in the state. The adoption of Public, Private, Van Panchayat Partnership (PPPP) concept for implementation of biofuel mission from plantation to guaranteed buyback of the seeds and its processing contributed very fruitful results. Under **Uttarakhand model**, plantations are being established on degraded community forestland. The beneficiaries of Van Panchayats are engaged in establishing plantation, payment for the wage supplement and local transportation are being made directly to beneficiaries through cheques. Ownership of the produce collected shall be of the Van Panchayats & beneficiaries will have collection rights. He stated that by bringing 02 lakh ha wasteland under Jatropha plantation would create one-lakh jobs and it will induct Rs. 180 crores/ year in state rural economy.

## Oilseeds Cultivation and Sustainable Development

29<sup>th</sup> January, Session 2



The session was chaired by **Dr. Jyoti Parikh**, ED, IRADe, New Delhi. She stressed on sustainable development through creating opportunities for oil seeds cultivations, processing and bringing them to the end consumers with the focus on rural development.

**Dr. Renu Swarup**, Adviser, Department of Biotechnology, Govt mentioned that the critical issues of self-sufficiency in energy supply for growing economy and role of biotechnology are crucial in overall development of biodiesel. **Jatropha grows widely but selection based on yield and oil content is critical for the development of this sector.** Systematic study on screening and selection has just been initiated. Generally seeds are used for Jatropha plantation but multiplication through seed leads to variability. **It is therefore important to develop macro and micro propagation technologies for large scale multiplication of superior material.** Field trials based on agroclimatic conditions are essential.

She suggested future strategies should be focused on:

- a) Countrywide selection, characterisation, collection and conservation of superior material
- b) Complete characterization of germplasm, development of a national database
- c) Concerted R&D and tree improvement programme
- d) A national certification programme to ensure quality of raw material
- e) Developing nurseries for supply of quality material
- f) Organised plantation of superior material
- g) Involvement of SHG, Cooperatives and Farmers network to be involved

- h) Proper linkage to ensure end-to-end approach.
- i) Linking seed collection with extraction, processing and refining units
- j) Participation of stakeholders is essential to ensure successful implementation of the National Mission

**Dr. R. P. S. Yadav**, State Coordinator, IFFDC, Udaipur, emphasized on IFFDC Cooperative Model for large-scale adoption in the area of Jatropha plantation and sustainable livelihood enhancement. The objective of such model is primarily for wasteland development and socio-economic upliftment of rural community. He explained the **major problems encountered in convincing farmers to undertake Jatropha:**

- a) Longer gestation period of 4-5 years.
- b) Fodder problem as Jatropha can't be consumed by animals. This is due to closer spacing (2X2 M) and its toxic nature suppresses grass production.
- c) Impact of monoculture on soil health and water balance.
- d) Oil extraction unit is required for diesel extraction and for all these funds are not easily available.

**Dr. H. M. Behl**, Ex. Scientist of National Botanical Research Institute, Lucknow emphasized coordinated efforts to make Jatropha a successful feedstock. He emphasized need to raise quality nursery stocks by selecting superior clones, incorporation of aggressive and selected VAM strains and other bio-fertilizers. It is critical that tested and healthy seeds; or clones from healthy and high yielding trees are used as nursery stocks. Clonal orchards and seed orchards should be raised to have a continuous supply of quality planting material. Jatropha will be planted in different states where soil may be degraded due to different factors such as salinity, alkalinity, aridity, toxicity due to excess or deficiency of particular elements; or mining etc. Accordingly tailored practices involving nutritional and irrigation management need to be developed with model plantation farms at each of the difficult sites. Partnerships of NGOs for implementation; Private companies for buy back and processing of oil; government agencies for policy support and coordinating land management; and banks including NABARD for extending loans is crucial for developing Jatropha as "energy crop" in the country.

**Dr. Brahma Singh**, OSD, Horticultuure, Rashtrapati Bhawan, highlighted the initiatives taken by Rashtrapati Bhawan. He discussed major issues like yield per hectare, cost of cultivation, rate of return of Jatropha cultivation and measures to increase productivity. He also talked about the opportunities to explore value addition for the usages of biodiesel byproducts.

## Opportunities and Challenges in Biodiesel Processing

29<sup>th</sup> January, Session 3



**Mr. Arjun Arora, Director General, Petrofed, New Delhi** chaired this session and overviewed the opportunities and challenges faced by industry and individual business entity. He emphasized that there is a need to develop soft technology at a cheaper cost for a mass promotion. Sharing of technical know-how from international players would be helpful.

**Professor Dr. L.M.Das, Center for Energy Study, IIT Delhi,** discussed the current status of processing technology, problems associated and end uses of biodiesel. He explained that the biodiesel is suitable for existing diesel engines without major hardware modifications. Viscosity of biodiesel is a major stumbling block for engine performance. Vegetable oil clogging of fuel lines, carbonization of injectors, lube oil contamination, poor ignition and combustion due to improper atomization are the major problems associated with the use of biodiesel. He suggested that the quality of fuel for durability, oxidation problems during storage and understanding fundamental chemistry of biodiesel require intensive research study.

**Mr. A.K.Goel, Director (PS), PCRA, New Delhi** emphasized the need of collaboration and coordination among agricultural universities, various departments including panchayati raj institutes research agencies and organisations, seeds trader, byproduct users, NGOs, biofuel development board, equipment manufacturers and farmers for the implementation of national mission of biodiesel.

**Dr. A. M. Deshpande, Director, Garware Polyester Ltd.** mentioned that biodiesel could be produced from using a variety of raw materials like sunflower, canola, crude palm oil, mustard seeds, Karanj, Jatropha etc. He presented very valid points like payback period of Jatropha plantation as it takes 5-7 years to mature, inadequacy of purchase price of biodiesel announced by government insufficient to recover the cost of production. He stressed upon allowing import of non-edible oils at reduced import duties to utilize the big processing capacities set by biodiesel producers and indigenously produced biodiesel till the availability of an intermittent feedstock supply from local sources.

## Socio-Economic, Financial and Environmental Issues

30th January, Session I



**Mr. M.K.Khanna**, Additional Secretary, Ministry of Panchayati Raj chaired the session. He explained that due to poor financial status, the farmers need to be encouraged for bringing rural community towards seeds procurement, cultivation, processing. Logistic problems in rural area discourage stakeholders to come forward. These might be overcome by coordination among gram panchayat, district head, financial institution and farmers associations.

**Mr. K. Amaranarayana**, Deputy Commissioner, Chitradurga District, Karnataka told the success story of the distressed district in promoting biofuel plantation. Biodiesel plantation emerged as a most suitable solution in this agrarian economy and distressed district. Wide range of discussions with farmers, stakeholders and consultations from the line departments, initiatives from the social forestry, agriculture and horticulture departments and support of gram panchayat were necessary.

**Mr. Sudarshan Srinivasan**, GM, Reliance Industries Ltd, Mumbai explained the Reliance model of Jatropha plantation with the support of NGOs and farmers. He explained understanding of Jatropha agronomy, lack of quality manpower, sustaining farmers' interest and loyalty for long gestation period as major challenges. He emphasized on institutional building and strengthening for the sustainability of plantation business. The Reliance has its primary focus on cultivation of Jatropha under rainfed conditions, and views its approach as a strategy to blend Jatropha into the existing farming system as an additional income proposition for marginal farmers, and thus strengthen their livelihood resources.

**Mr. B.V. Rao**, G.M, (Biodiesel), IREDA recommended to form panchayat funding institution to encourage and motivate small and medium entrepreneurs. Marginal farmers are very reluctant to adapt new changes due to insecurity of financial health. There should be a provision of insurance scheme to cover their risk.

**Dr. Srikanta. K. Panigrahi**, Chairman, Indian Society of Remote Sensing, Delhi Chapter, highlighted the adverse impact of climate changes due to unsustainable energy consumption and associated emissions of greenhouse gases into the atmosphere. Several methodologies have been proposed to mitigate emissions from burning of fossil fuels out of which, one of the potential options is switching fossil fuels to environment friendly tree based oils (TBOs). He emphasized the carbon trading potentials for biodiesel from TBOs in India. He briefly outlined the procedure for a project to earn carbon credits for additional sources of revenue under CDM.

## Biodiesel, Byproducts and End Uses

30th January, Session 2



**Mr. Anil Razdan**, Additional Secretary of Ministry of Petroleum and Natural Gas, GOI chaired this session and briefed about the partly developed biodiesel business in India. He emphasized to grow more jatropha plants and develop it at a larger scale to reduce the dependency on foreign nations for oil import. He emphasized to put all efforts to develop renewable energy towards energy security as a future solution of energy crisis.

“Let the Oil be Green” was the opinion of **Mr. M.B.Lal, CMD, HPCL**, who co-chaired the session. India can be a self sufficient in biodiesel reserve. Need is to exploit available resources that can lead to energy security and sustainable livelihood and justify with ensuring continuous supply of biodiesel through seeds procurement which is a main challenge for policy makers, integration of existing refineries with biodiesel processing and enhancing byproduct usages. Oil companies have also taken such initiatives to promote biodiesel business.

**Mr. Dilip Chenoy**, Director General, Society of Indian Automobile Manufacturers, New Delhi expressed his concern for air pollution due to rapid urbanizations and poor management of in-use vehicle which gives an opportunity of introduction of alternative fuel technology. Biodiesel policy should be implemented in medium time frame because fuel availability, safety consideration, operating range, cost of fuel and vehicle, infrastructure for handling and distribution can't be resolved in a day. Some negative aspects of biodiesel create apprehensions among processors as it may cause damage to rubber and other component, there can be reduction in fuel economy and power for pure biodiesel, biodiesel thickens at low temperature so using it in cold climate especially in winter require some special system.

**Dr. Mathew Abraham**, GM, Mahindra and Mahindra (M&M), Nashik, highlighted the endeavours taken by M&M for the end use of biodiesel in automotive vehicles. He described that the chemical characteristics of biodiesel affect durability & performance of engine in the long run. For example, if the acid value, moisture content and oxidation stability parameters of the fuel exceeds the prescribed limits, ageing starts and biodiesel degrades to the point where it is out of specifications and affects critical fuel injection parts. Ignoring the control of these properties is a cause of worry to original equipment manufacturers.

**Mr. S. Sivasubramanian**, G.M, Marketing, Wartsila NSD India Ltd discussed the new concept of power generation from straight vegetable oil (Jatropha oil) and its distribution system called distributed power generation. The objective of this concept to generate power close to load center with high efficiency and on cogeneration basis. It has a shorter value chain and farmers get full value chain benefits by overall development provided by reliable rural power. He explained the benefits of SVO power generation are assured and long-term off take of seeds, strength of long term public private association (PPA), sustainable solution for distributed power/rural cluster power, equitable economic growth, renewable and environment friendly power.

**Mr. Anirudh Gautam**, Director, Engine Development, RDSO, Lucknow discussed the policy map of Indian Railways for biofuel development. Since Indian Railways is the single largest consumer of diesel oil (2 billion liters per year), it has the potential to advance the full supply chain of biofuels in India by making a switch to biodiesel and its blends. Even a 20% switch to biodiesel by IR shall require about 400 million liters of biodiesel by a single user and thus propel all the components of the supply chain, i.e. the agricultural sector, the logistics and the Industry towards large scale biodiesel production. This would fit in with the plan of the Government of India to advocate use of biodiesel in the country. Important considerations for Indian Railways are appropriate fiscal and financial policies by the Government of India, in form of tax, customs & excise benefits, subsidies etc. to make use of biodiesel an attractive proposition as has been done in Europe and other countries. Coupled with this is the requirement of speeding up the process of creation of a National Biofuels Board with adequate financial, executive and legislative powers with sufficient representation from the Ministry of Railways. IR needs to carry out the well to wheel cost analysis for use of biodiesel as a traction fuel in order to optimise the process and reduce the costs. It is also required to characterise the various Indian Feedstocks based biodiesel on the rail traction engines, work on which has already been started by RDSO at Lucknow.

**Mr. R. K. Malhotra**, GM, R&D, IOCL, highlighted the emergence of generation biofuel. The first generation biodiesel activities are going on and it needs to be transformed into second generation biofuel through up-gradation of existing technology and introducing of new technology. Second generation biofuel would have zero emission and requires a host of technical support like pretreatment, fermentation, hydrolysis of lignocellulosic, materials to produce ethanol, gasification, pyrolysis, cofiring, direct fire combustion.

## Policy Framework and Roadmap on Biodiesel & Valedictory Session

30th January, Session 3



**Dr. Renuka Vishwanathan**, Secretary, Coordination, Ministry of Rural Development was the chairperson of the session. She strongly favoured solving critical issues of mandatory of blending of biodiesel in fossil fuel. There is a need to develop various cultivation models like low cost farming model including Jatropha based agroforestry system at state and national level. She also recommended providing subsidies to the marginal farmers and tax incentives to stakeholders.

Comments were given by **Mr. S. P. Sethi**, Principal Advisor, Planning Commission, in the last session. He emphasized to ensure two important concerns for rural people before embracing on any major bioenergy programme. The first one is food security and the other is water security. He highlighted some action plans towards success of biodiesel mission.

- Support plantations of Jatropha, Karanj and other similar species, with incentives as suggested above.
- Since the end objective is to promote bio-diesel, significant research is still needed to establish viable germ plasms and genotypes for bio-fuel plantations, it is recommended that the parallel route based on industrial oils be pursued immediately through a reduction in import duty to 5% for high FFA vegetable oils for conversion to bio-diesel.
- Trans-esterification facilities set up by importers of industrial oils may also be given tradable tax rebate certificates (TTRCs).
- Encourage direct and local sale of bio-diesel where feasible. This can begin with the metro towns.
- As a green fuel make bio-diesel free of taxes and levies charged on fossil fuel-based diesel.
- Bio-diesel and/or blends of bio-diesel should be sold with full disclosure and priced differently from pure fossil fuel based diesel thereby passing the benefits of the proposed fiscal regime to the consumer.

**Dr. Jyoti Parikh**, ED, IRADe presented the roadmap for biodiesel developments in India. She focused the barriers and gaps existing in each component of comprehensive biodiesel system i.e. oil seeds production, processing of oil, marketing and end uses and suggested the procedures to overcome these. She presented the current scenario and trends in biodiesel market and suggested policy framework for health growth of biodiesel market. She emphasized on Public Private Partnership, involvement of Panchayati Raj Institutions and biotechnological interventions to improve yield and oil contents etc. as major steps to boost the production of biodiesel. She initiated open discussions on policy framework and road map for biodiesel, which was participated by all present there.

The emerging recommendations and roadmap are consolidated at the end of this report.

# Valedictory Address

**Dr. Kirit Parikh**, Member, Planning Commission, GOI delivered the valedictory address. He highlighted the number of important and critical aspects of biodiesel development in India. He expressed the uncertainties of existing policy framework and roadmap that are critical to success of biodiesel mission in India. Poor quality of land and food security of the schedule cast and tribal people in rural area are big hurdle because of non-recovery of their opportunity cost. He suggested fixing minimum support price of seeds to cover their opportunity cost. The potential of carbon credit opportunity in biodiesel development is new to stakeholders so there is a need to establish knowledge process outsourcing system. He discussed major aspects of entire value chain of biodiesel system. Some of them are as follow:

- How to increase the yield per hectare and revenue generated by the land for farmers.
- Improve the energy security through sufficient supply and minimizing market risk.
- Opportunity cost of land in regard of social and private concern and import of residual oil and cheap vegetable oil with low tariff for the use as a feedstock.
- Government should take proactive social responsibility. The need in rural management is very critical for number of stakeholders.
- Specification, uniformity across country, full use of feedstock, research and development of integrated circuit engine, smooth functioning of transesterification plants, usage of private, public and cooperative lands and vertical integration system by oil companies are areas of concerns.
- To link up the energy plantation activities with other on going welfare programme of the government is required. Uncertainties of time framework, priorities, and role of industries, government and other stakeholders create lots of challenges in meeting the ultimate goal that need to deal through collective action.

In his concluding remarks he focused on certain models that were presented.

- **Uttarakhand Model:** This model was aimed at employment generation for poor households by using public/ common land for energy plantation.
- **Railway Model:** Use of available land resources for energy plantation to supplement the fuel requirement. In this regard, we should be at consensus to achieve certain level of targeted self-sufficiency in energy sector.
- **Distribution Generation Model:** It addresses some specification/ model testing facilities available to deal with all kind of raw material.
- **Cooperative Model:** It cannot be useful only in promoting energy plantation programme but help in equitable distribution benefits among the farmers.

# Challenges for Biodiesel Programme in India : Roadmap and Steps Ahead

After two days of rigorous discussions, stakeholders gathered at the summit and noted the strengths, weaknesses, opportunities and threats (SWOT) of the biodiesel system. They expressed strong interest to formulate a roadmap and setting benchmarks that would lead to sustainable growth, energy security and community welfare. Various stakeholders involved in biodiesel development that covered cultivation, processing, extraction and end-users tried to find out the answers to some basic questions like:

**How do we fill gaps of data and information and work towards addressing key concern areas, how to increase yields of oilseeds, where is the suitable land available, how to work with rural panchayat, where and how to set up extraction facilities, what are fuel collection models for raw oil, what mix of cooperatives corporations and panchayat farming can be expected, what end uses are most suitable given the constraint in seed availability, seasonality and others?**

## Background:

In a multistakeholder system, it is essential that each stakeholder is independently viable either commercially or through financial incentives. Each stakeholder has to deliver the inputs to the next stakeholder within their feasibility range. Each stakeholder has a benchmark that they use for opportunity costs. A private farmer may maximize profit per hectare that she will get from other crops say Rs 20,000/ha. The extraction and processing unit will maximize return on their investment at a market rate and the oil companies use the crude oil price as a benchmark if left to themselves. The forest department will compare it to the revenue received including from other non-timber forest products. Panchayat would assess alternative uses for its land.

The roadmap given below comprises of suggestions on policy, technical, financial, R&D, institutional and environmental fronts and highlights gaps in each component of biodiesel system. The roadmap also presents the apprehensions expressed by participants during the summit. Large enough production of oil seeds is not yet recorded and many uncertainties remain. Therefore this roadmap would require frequent reviews and monitoring. Biodiesel system is a multistakeholder system that comprises of four steps, cultivation of oilseeds, biodiesel processing, biodiesel marketing and end use practices. Clarity needs to emerge if biodiesel is to be fuel for transportation, or niche fuel for rural development, livelihood and fuel security at local level or both.

The strategies are given in 5 sections below.

## I. Cultivation of Oilseeds

### I.1. Land allocation:

Various state governments have come up with land allocation policy for *Jatropha* cultivation on wasteland but forest department has not revealed any such programme. So-called “wasteland” has ownership problem and are often used as pasture land or community purposes. Each state can

identify land under the category of wasteland that can be leased for Jatropha plantation and running of biodiesel based processing units. Government land can be leased to private parties for cultivation and processing. Land allocation should be arranged under various categories. For example, small land amounts upto say 200 ha can be leased with collector's permission at panchayat or district level; for land more than say 200 ha state govt. permission may be required. Apart from that there should exist the annual lease rent system under which annual lease rent can be increased with time beginning at a low level, e.g. say 1st year-Rs.100/ha; 2nd year-Rs.225/ha; 6th&7th year-Rs.500/ha; 8th year onward-Rs.1000/ha. There is a need to establish waste land allotment framework alongwith infra-structure for utilisation of waste land. Corporate sector may like to go in for commercial plantations with high inputs and therefore, high yields. Management of road network, railway line and private land can be encouraged to plant as a hedghe plants. There should be some criterion of land availability like

- Annual rainfall should exceed 600mm
- The pH of soil should be less than 9
- Temperature should not fall below 0oC.
- The slope of land should not exceed 30°
- The land should not be waterlogged
- The land should not be barren rocky/stony

### **1.2. Coordination with Local Bodies for Nursery Raising:**

The life of plantation is about 30 to 35 years. Therefore, it is essential that the planting material used has high yield potential. NOVOD Board should expand its action rapidly and cover most of the states including four NE states. The institutions and locations at which nurseries may be set up should be decided in consultation with NOVOD/Department of Biotechnology/Forest Department and may also include other institutions and organisations under the central and state governments such as agricultural farms, or progressive farmers.

### **1.3. Institutional Mechanism for Raising Plantations:**

For raising plantation on forestland through JFM Societies/Committees, state forest department (SFD) may have to play a significant role in formation and monitoring the functioning of JFM society/committee. SFD has degraded forests where new plants are needed. SFDs have no such previous experience in most of the states and need social scientists to form and monitor JFM societies. SFDs in states need to be strengthened as they generally face shortage of personnel even for their routine jobs. Rural employment guarantee schemes can be used.

Inclusion of the role of panchayati raj institutes (PRI) is necessary in national mission on biodiesel. Panchayat can consult the village people about the best use of land and mode of income generation for village directly or by self help groups. NGOs should also be involved to promote self help groups or directly undertake plantation activities. Active involvement of PRI as the pivot of the programme needs to be recognised to ensure the success. Since the community land are used for community purpose under the supervision of PRI, notably the gram sabha, identification of beneficiaries for taking up Jatropha cultivation by the identified poor can be done by PRI.

At the same time, self help groups (SHGs) and forestry cooperatives could be promoted to undertake the plantation activities. The successful primary farm forestry cooperative Society (PFFCS) model of Indian Farm Forestry Development Cooperative Ltd. (IFFDC) by which mass afforestation was done on nearly 25,000 ha area in the states of U.P., Rajasthan and M.P could be adopted for *Jatropha* plantation on wasteland.

#### **1.4. Yield Data:**

The low yields and high opportunity costs are the key reasons for failures. Low yields going down as far as “no fruits found for harvest” at all on 1500 ha reforested area, to “100 kg seeds/ha” on farmland and “200g/plant” after 10 years of growth. The highest yield found reported in practice was 0.75 2 kg/tree, yet agriculture research centers promise high yield upto 5 t/ha with oil content of 50%. So with present rainfed planting practices a figure of less than 1 ton seed/ha appears more realistic than almost 5t/ha assumed, in official documents, real oil yield is also 25% rather than 34%. There are reports of oil trees uprooted on a large scale by farmers due to poor returns on more than 50,000 acres. It is necessary to get a realistic picture on potential yields to avoid future frustration in particular of farmers, who sometimes invest their own land, labour and monetary resources.

#### **1.5. Lack of Authenticated Information on Cost of Establishment:**

Investment figures for the first year range from Rs.12000/ha to Rs.20180/ha. Data for subsequent years are yet unsubstantiated. A series of multi-locational trials under different agro-climatic conditions are required to establish authentic data on yield estimates and economics of production. We need to consider the best agronomy practices alongwith the requirement of fertilizer, irrigation inputs and insect pesticides. Reliable information exchange is needed.

#### **1.6. High Initial Seed demand:**

Initial high seed demand for planting material that spurts occasionally a high seed price of Rs.18 per kg or more attracting small farmers. This market scenario should be understood clearly as temporary phenomenon by marginal farmers to avoid putting arable land under *Jatropha* cultivation. Such prices are quite unsustainable for the entire system to function.

#### **1.7. Minimum Support Price (MSP) for oil seeder with Buy Back Guarantee:**

Cultivators need to be ensured the minimum seed price. Initiation of buy back programme of seeds will help to provide continuous supply of seeds. The price should not be too low for viability for cultivation and processing units and should not be too high. State government should come forward along with state forest development departments to guarantee the buy back of all *Jatropha* seeds at an optimum price.

#### **1.8. Subsidies for Plantation:**

It is essential that poor farmers should be protected from the risks involved in investing in seeds plantation. Provision of interest free loan and crop insurance scheme would encourage farmers to allocate land for years regardless of other opportunities that may arise. Financial agency with help of insurance regulatory body should come forward to facilitate insurance scheme for biodiesel cultivator and related stakeholders.

## **Biodiesel Processing**

### **2.1. Entrepreneurship Promotion and Private Sector Participation:**

For the development and promotion of biodiesel, it is imperative to seek investment from private entrepreneurs. To attract investment from them, policies need to be formulated in such a way that renders some incentives to them to invest and undertake risk.

### **2.2. Management of Byproducts**

The activity of oil extraction is expected to be financially self-supporting especially, if byproducts (straw, Oil Cake, Glycerol etc) management can generate value addition. For example, glycerin (glycerol) can be used to make soap, paint and used in food industry, chemicals, explosive etc. Market has to be developed for them and sales tax on biodiesel byproducts can be waived. Transforming biodiesel byproduct into valuable product entails huge potential of integrated and diverse business opportunities.

### **2.3. Tax Policies:**

Oil marketing companies who will blend biodiesel may also require financial incentives as they ensure supply with stipulated quality by testing and take various types of risks e.g. the market price of diesel maybe less than the price of biodiesel. In order to make production and market that is self-sustaining in long run, central government needs to exempt biodiesel from central excise duty which it has proposed to do in the budget for financial year 2007-2008.

### **2.4. Extraction and Trans-esterification:**

The issues that need further investigation are development of indigenous technology at small scale to produce quality biodiesel, reducing cost of processing and catalyst etc. Various issues concerning byproduct utilization such as, toxicity of seed cake optimal use of seed cake as manure and animal feed need to be investigated. It is also of vital importance to develop more effective catalysts, which reduce the process time. Catalysts are very important as they can make the process faster and smoother.

### **2.5. Developing Biorefinery Concept:**

The concept of biorefinery should be introduced while processing Jatropha oil. It will result into value realization of byproducts and hence reduce the cost of production.

## **3 Biodiesel Marketing**

The import of waste oil and non-edible oil at reduced import duties may be allowed to biodiesel producers for stipulated periods till the supply of seeds on sustainable basis is established. It could be linked with mandatory backward linkages to produce oilseeds indigenously to support local farmers and wastelands developments. The purchase price of biodiesel announced currently at Rs. 26.5/liter is not adequate to meet its costs because of intermittent feedstocks supply and under utilisation of capacities of processing units. Initially high price could be given in order to kick start the process, which may be gradually reduced. Another key issue is quality variations in distribution system. This can be solved by good house keeping by distributors and fuel quality monitoring systems by the governments.

#### 4. End Uses Practices

There is immediate need to conduct research trials on the use of Jatropha oil (without transesterification) for domestic use in stoves, lanterns and stationary equipments. Embarking R&D efforts on emission, fuel economy, storage duration without degradation, stability and material compatibility of biodiesel. The driveability and performance of engines with biodiesel also need to be further investigated. The automobile industry should also come up with guarantee that their vehicles can use biodiesel.

#### 5. Promotional Policies:

The government has a role in promoting biodiesel in four ways. Support organisations that work as facilitators, provide financial incentives, support research and development, and capacity building at various levels. There is no doubt that the biodiesel for direct use in the rural areas, especially remote areas, is a workable solution even today at low yield levels. All help should be given to the farmers to grow this fuel in their backyard. It should definitely be a part of the portfolio of options of rural energy. However, when it comes to competing with other transportation fuels at a large-scale of the order of several million tons, there are several considerations that lead to uncertainties. Because of all these uncertainties, excessive enthusiasms have been out of place and a lot more work is ahead. However, the pessimists may also like to remember that all other alternatives such as nuclear, renewables, fossil fuels and others also have uncertainties associated with them. Thus, difficulties have to be faced and firmly resolved with persistence and some approaches mentioned below.

##### 5.1. Interministerial Cooperation:

The success of biodiesel mission depends on the integrated coordination of all the concern ministries. It is seen that at various level of operation the course of action is delayed due to reasons like policy loopholes, lack of financial support, hierarchical structure and their complexities, time bounded activities etc. To overcome these hurdles, proper cooperation by information sharing among Ministries of Panchayati Raj, Rural Development, Finance, Environment and Forest and Petroleum & Natural Gas is required. The role of government is to facilitate the process.

##### 5.2. Support for Research and Development (R & D):

Biodiesel being a new concept in India needs more research and development to set standards, optimize inputs for production, reduce cost and to test its feasibility. The identification of potential institutes and designating these different tasks will result in increasing productivity and reducing disparity. *Since the end objective is to promote biodiesel and significant research is still needed to establish viable germ-plasms and genotypes for bio-fuel plantations*, complete characterization of germplasm and development of a national database are imperative.

- i) Cultivation and related aspects: There is need for research for screening and collection of superior germplasm, standardizing agro-techniques for different agro-climatic conditions, optimizing inputs etc. Concerted R&D in tree improvement programme is required.

In addition, one needs institutes that deal with energy economics and systems analysis that will constantly analyze the various aspects of the biodiesel sub-systems and the system as a whole with reference to other energy options as the biodiesel technologies evolve.

- ii) Task forces of research organisations at state level could be setup that can be facilitated by national biodiesel board.
- iii) Research is required for systematic state/region wise survey for identifying superior variety of tree borne oil seeds, development of improved variety of seeds and their multiplication and post harvest techniques of decortications for increasing oil extractability.
- iv) Biotechnology Research and Development for Advancement of Biodiesel system: Systematic collection of Jatropha seeds germplasm is required to investigate the genetic distinctness of seeds in the centre of origin and other regions. Investigation is also require for taxonomic status of existing plantations and the agronomic potential of other Jatropha species and non-edible oilseeds. We can initiate a selection/breeding programme with multilocation testing of promising provenances. There is a need to study on medical and insecticidal properties of seed components for development of byproducts.
- v) Exploring New Options: Most of the research works on Jatropha is confined only to yield oil and agronomy practices but biotic and abiotics stress that affect the plant have not been given due importance. Simultaneous research work is also needed. To find new raw materials like algae, fungi and second generation conversion method e.g. nano-technology are challenging to add value to existing biodiesel system. We also need to develop R&D programme for end users straight vegetable oil for stationary equipments, farm equipment, tractors, cooking and lighting.
- vi) Promotion: Mass awareness programmes are needed to promote Jatropha cultivation among farming community. Along with that, technical know-how on cultivation techniques should also be disseminated among cultivators.

### **5.3. Biodiesel Production: Corporate Social Responsibility (CSR):**

India faces social challenges of poverty, population growth, environmental degradation, and illiteracy just to name a few. Therefore, it is all the more imperative for Indian companies to be sensitised to CSR in the right perspective in order to facilitate and create an enabling environment for equitable partnership between the civil society and business.

The activities that could be taken up as a part of CSR activities by corporates in this area may be:

- (I) Plantation of Jatropha: Many corporates have huge area lying vacant in their premises. That could be utilised for Jatropha cultivation. Along with that, they could promote Jatropha cultivation on community land by financing it as grant.
- ( ) Training/Awareness Campaigns: Corporates can create awareness among villagers for cultivation of Jatropha and also organise meetings, trainings and demonstrations for community people.

### **5.4. Oil Seed import:**

It will take three to five years before substantial amounts of seeds are available till such time. Imports may be permitted for industry for limited period with a review clause to establish itself,

general public awareness and generating interest in the farmers. However, such import policy must be linked with some efforts domestically or eventual goal is increasing self sufficiency.

### **5.5. Setting up of a National Bio-fuel Development Board:**

The setting of National biofuel Development board will help in coordinating activities at national level. It will certainly boost the activities, flow of information, and develop a multi stakeholders approach for the feasibility of biodiesel. It may also give recognition to State Bio Fuel nodal agency to undertake activities on its behalf in respective states. The state level agency need to be given latest information and solution to the problems faced. Expertise and consultations can be given at field level.

### **5.6. Gradual Subsidy Reduction:**

Lack of a proper purchase policy leads to sporadic production of bio diesel, which further leads to disruption in supply chain. So, the supply chain does not get sufficient enough time to build up.

This in turn again leads to high selling prices and again the volumes get reduced. In the gradual subsidy reduction policy, if the prices declared can be higher in the beginning for a specified time frame and then reduced for the next specified time frame and again, reduced further and finally, the prices can settle to the minimum support price.

### **5.7. Promotion and Capacity Building:**

Training should be available for gram panchayats, elected representatives from village/taluka/district, government officers, rural youths, self-help groups, industrial entrepreneurs. Biodiesel promotion can be encouraged in North-East states through tie-up with NEDFI (North East Development Financial Institution). Education campaign and capacity building would also help in promoting biodiesel programme. It may comprise of developing films & brochures on biodiesel, launching TV and Radio programs, films/ literatures screened in Kisan Melas, exhibitions, driver training programs, sponsoring seminars etc.

Biodiesel programme should also be covered extensively in in-house monthly magazines and quarterly technical journals. Capacity building can be enhanced through cottage scale esterifier, training program on biodiesel trans-esterification process for women self help group in various states, programs arranged for ex-servicemen, internal and external faculties are require to impart training at its corporate office.

Entrepreneurs can be encouraged by single window clearance for project proposals, capital subsidy for establishing pilot plant, market for by products, marketing support through promotional programme for consumer awareness, R & D support to find out new applications of glycerin, priority sector status to be extended for granting loans, working capital and deciding on equity participation, tax incentives - excise, sales tax exemption.

## Biodiesel Summit 29<sup>th</sup> & 30<sup>th</sup> Jan' 07

### Participants

S.N.	Name	Designation	Organisation
<b>Speakers</b>			
1	Dr. Jyoti Parikh	Executive Director	IRADe, New Delhi
2	Dr. Kirit Parikh	Member	Planning Commission, Gol
3	Dr. Subhash Pani	Secretary	Ministry of Rural Development, Gol
4	Mr. Sam Bob	Executive Director	Petroleum Conservation Research Association (PCRA), New Delhi
5	Dr. Amit Walia	Consultant	IRADe , New Delhi
6	Dr. S.K.Chopra	Principal Advisor and Special Secretary	Ministry of New and Renewable Energy (MNRE), Gol
7	Mr. A.K.Lohia	Secretary	Uttranchal Biofuel Board, Dehradun
8	Mr. R.K. Dua	Director (Coord. & HR)	PCRA, New Delhi
9	Mr. Kanishka Negi	Programme Officer	Society for Promotion of Wastelands Development, Udaipur, Rajasthan
10	Dr. R.P.S.Yadav	State Co-ordinator	Indian Farm Forestry Development Cooperative Limited , Udaipur, Rajsthan
11	Dr. Renu Swaroop	Advisor	Department of Bio Technology, Gol
12	Dr. H.M.Behl	Ex. Scientist G	National Botanical Research Institute, Lucknow
13	Dr. Brahma Singh	OSD (Horticulture)	Rashtrapati Bhawan, New Delhi
14	Mr. Arjun K Arora	Director General	Petroleum Federation of India, New Delhi
15	Dr. L.M.Das	Professor	Indian Institute of Technology, New Delhi
16	Mr. A.M. Deshpande	Vice President	Garware Polyester Ltd., Nashik
17	Mr. Rajiv Seth	G.M (Co-ordination)	Garware Polyester Ltd., New Delhi
18	Mr. A.K.Goel	Director(PS)	PCRA, New Delhi
19	Mr. M.K.Khanna	Additional Secretary	Ministry of Panchayati Raj, Gol

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21	Mr. K. Amaranarayana	Deputy Commissioner	Chitradurg District, Karnataka
22	Mr. Shrikant Panigrahi	Chairman, Delhi Chapter	Indian Society of Remote Sensing, New Delhi
23	Mr. Anil Razdan	Add. Secretary	Ministry of Petroleum & Natural Gas, Gol
24	Mr. M.B.Lal	Chairman-cum- Managing Director	Hindustan Petroleum Corporation Ltd (HPCL), Mumbai
25	Mr. Dilip Chenoy	D.G	Society of Indian Automobile Manufacturers (SIAM), New Delhi
26	Mr. R.K.Malhotra	G.M.( R&D)	IOCL, Faridabad, Haryana
27	Mr. S. Sivasubramanian	G.M ( Power Plants Marketing)	Wartsila India Ltd, Chennai
28	Mr. Anirudh Gautam	Director	RDSO, Indian Railways, Lucknow
29	Dr. Renuka Viswanathan	Secretary (Co-ordination)	Ministry of Rural Development, Gol, New Delhi
30	Mr. S.P.Sethi	Principal Advisor	Planning Commission, Gol, New Delhi
31	Mr. R. Jagannathan		FAB CON Engineers Pvt. Ltd., Chennai.
32	Mr. Sudarshan Srinivasan	G.M ( Farm Advocacy)	Dhirubhai Ambani Life Science Centre, Navi Mumbai
33	Dr. Mathew Abraham	G.M	Mahindra & Mahindra Ltd, Nashik
<b>Delegates</b>			
34	Mr. Naveen Prasad	Special Assistant to Group Chairman	Assam Company Limited, Kolkata
35	Mrs. C. Das Gupta	Assistant to Group Chairman	Assam Company Limited, Kolkata
36	Mr. G. Baskaran	Dy. General Manager (R&D)	HPCL, New Delhi
37	Mr. M. P. Banghwal	Manager	Alt. Fuels (HPCL), Mumbai
38	Mr. J. M. Saklani		ONGC, New Delhi
39	Mr. S. B. Prasad		ONGC, New Delhi
40	Mr. Subodh Kumar		ONGC, New Delhi
41	Mr. Promod Kumar		ONGC, New Delhi
42	Dr. Ravindra Kumar	Sr. Research Officer (R & D)	IOCL, Faridabad, Haryana

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50	Mr. Himanshu Jain		PCRA, New Delhi
51	Ms. Neeta Bhatia		PCRA, New Delhi
52	Ms. Babita		PCRA, New Delhi
53	Mr. C I Joe		PCRA, New Delhi
54	Mr. Nagendra Chandurkar		PCRA, New Delhi
55	Mr. S K Gupta		PCRA, New Delhi
56	Mr. Ranjan Gowswami	Joint Director	PCRA, New Delhi
57	Mr. N Pawan Raj		PCRA, New Delhi
58	Mr. Ajit Kumar		PCRA, New Delhi
59	Dr. V.K. Sehgal	Dy. Director	PCRA, New Delhi
60	Mr. Kapil Mathur		PCRA, New Delhi
61	Mr. Sanjay Goel		PCRA, New Delhi
62	Mr. N K Bhargava		PCRA, New Delhi
63	Mr. Mukesh Shrivastava		PCRA, New Delhi
64	Mr. Vishal Anand		PCRA, New Delhi
65	Mr. Narendra Jha		PCRA, New Delhi
66	Mr. Amit Chhokar	Entrepreneur	Janakpuri, New Delhi
67	Ms. Bindu Sharma	Additional Commissioner (Panchayati Raj & Rural Development)	Hyderabad
68	Mr. Deepanwita Chattopadhyay	CEO	ICICI Bank, Hyderabad

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72	Mr. R. V Chavan	Trustee	Action for Agricultural Renewable, Pune
73	Mr. Rajesh Natarajan	Manager (R&D)	Mahle Filter Systems India Ltd, Pune
74	Mr. Rajpal Arora		Safe and Secure, New Delhi
75	Mr. Rajendra Singh		Indian Renewable Energy Development Agency Limited, New Delhi
76	Mr. Tushar Jain	Research Scholar	CTARA, IIT Mumbai
77	Mr. V Srinivasan	Business Development Manager	PSL Corrosion Control Services Ltd.
78	Mr. Arjun Punj	Senior Executive	PSL Corrosion Control Services Ltd.
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80	Mr. Gagan Sinha		Delton Cables Limited, New Delhi
81	Mr. T. Murlidhar	President (Technical)	Petroleum & Petro Chemical, Reliance Industries Limited, New Delhi
82	Mr. Pawan	Jr. Engineer (DPIP)	Biofuel Department, Govt. of Rajsthan
83	Dr. B. K. Mahendra	President	Mahendra Group, New Delhi
84	Mr. Damandeep Singh	Project Consultant	ERM India Pvt. Ltd, New Delhi
85	Ms. Lalita Balakrishnan	Member-in-Charge for Energy	All India Women's Conference, New Delhi
86	Mr. N N Gautam	Consultant	UNDP, New Delhi
87	Mr. Naresh Kaushik	Scientist	Regional Research Station, Bawal, Haryana
88	Dr. Rajpal Deshwal	Scientist	Regional Research Station, Bawal, Haryana
89	Mr. Parveen Dhamija	Scientist F	MNRE, New Delhi
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92	Mr. Amarjeet Singh	General Secretary	India Energy Forum, New Delhi
93	Mr. R. M. Sodhi	Convener (Oil and Gas Group)	India Energy Forum, New Delhi
94	Mr. S. K. Chowdhary		India Energy Forum, New Delhi
95	Mr. S. K. Luthra	Consultant	Ministry of Petroleum & Natural Gas, New Delhi
96	Mr. P. N. Mathur		Ministry of Agriculture, New Delhi
97	Mr. Prateek Tiwari		Ministry of Agriculture, New Delhi
98	Mr. S. N. Sharma	Former Director	Ministry of Industry, Gol, New Delhi
99	Mr. Dhiraj Kumar	Advisor (Biofuels)	Reliance Industries Limited, New Delhi
100	Mr. Atul Kumar Gupta	Ex. Chairman	FIEO (NR), New Delhi
101	Mr. Akash Mittal	Joint Managing Director	Payal International Ltd. New Delhi
102	Dr. Bimal Mawandia	CEO	Mawandia Biotech Pvt. Ltd., New Delhi
103	Mr. Vikas Mawandia		Mawandia Biotech Pvt. Ltd., New Delhi
104	Mr. P Mahindra	Sr. Vice President	Mahindra Group, New Delhi
105	Mr. Subhash Jain	Consultant (Corporate)	Mahindra Group, New Delhi
106	Dr. Meenakhi Munshi	Joint Director	Dept. of Biotechnology, Gol
107	Dr. S. D. Singh		Uttranchal Biofuel Board, Dehradun
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111	Mr. Pankaj K. Karn	Research Associate	IRADe, New Delhi
112	Ms. Vinika Koul	Research Assistant	IRADe, New Delhi
113	Ms. K. Swarna	Research Assistant	IRADe, New Delhi
114	Ms. Gurina Bajaj	Research Assistant	IRADe, New Delhi

## RURAL MICROENTERPRISE MODEL FOR BIO-FUEL EXTRACTION IN INDIA

IRADe is implementing a project entitled “Rural Microenterprise Model for Biofuel Extraction in India” in addition to policy analysis and techno-economic study with the support of Wuppertal Institute for Climate, Environment and Energy (WISION) through its Sustainable Energy Project Support (SEPS) programme. This project attempts to harness locally available Jatropha plantation by the Haryana Agriculture University to extract bio-fuel at village Bhadoj, Tehsil Bawal of Rewari District in Haryana state. The project will establish microenterprise model for biodiesel extraction from local available Jatropha seeds at village level.

### Specific Objectives of the Project

- To formulate microenterprise model for biomass based energy system at village level
- To extract fuel from oil seeds that provide alternative fuels in rural areas
- To provide sustainable livelihood options for women at village level
- To develop enterprise to process locally available Jatropha and other oilseeds
- To identify current activities in biomass based strategies for extraction, utilization and commercialization of oil



*Biodiesel Plantation, Bhadoj*

### Project Partners

Integrated Research and Action for Development (IRADe) is the implementing agency with the project partners namely the village Panchayats (Allawalpur, Gujjar Majri and Khijuri) and Regional Research Station, Bawal (technical support).



*Training Programme*

### Project Features

- **Cooperative Model-** Formation of Bawal Biodiesel Cooperative (BBC)
- **Involvement of Panchayati Raj Institutes** -Three village Panchayats are participating in project implementation
- **Capacity Building Activities** - Organizing of group discussions, awareness camps and training programmes
- **Participatory Approaches-**Management of Jatropha plantation and extraction unit by community people
- **Microenterprise model-** Development of payback mechanism, income generation activities
- **Replicability-** Model is replicable in other villages and at national level

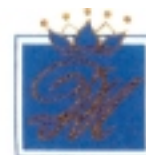
***The construction of building of extraction unit at village Bhadoj, Tehsil Bawal has been completed and oil extraction activities are expected to start in May 2007.***



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## Support



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