

Risks & Opportunities for Biofuels in Developing Countries

- The Case for India



WINROCK
INTERNATIONAL
INDIA

Presentation Contents

- ❖ **Energy security concerns - the status / problem staring India**
- ❖ **The role of biofuels in addressing the issue of energy security**
- ❖ **Present status**
- ❖ **Sustainability issues-the lesser known factors**



Energy Security Concerns

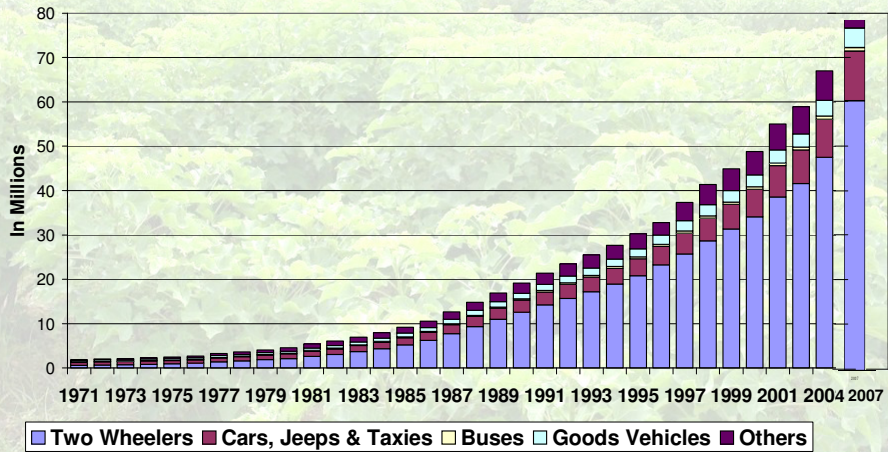
The Status / Problem Staring India

- ❖ **Transport sector**
 - ❖ **Rural energy access**
-

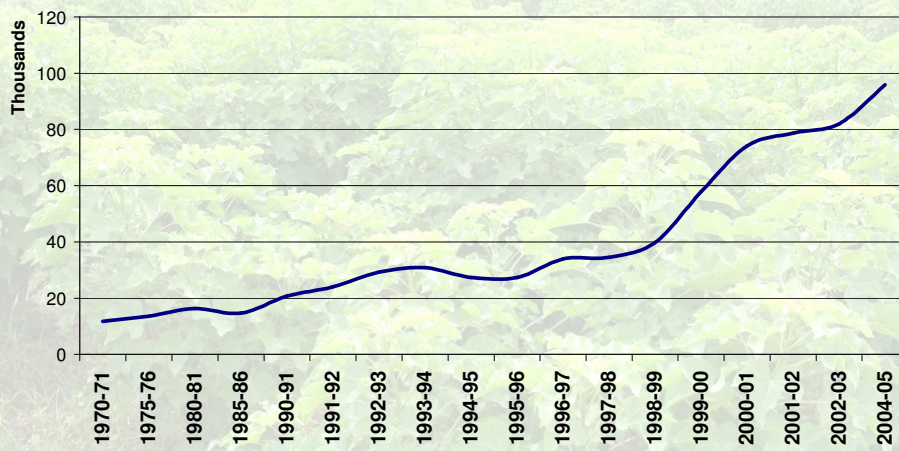


Energy security concerns in the transportation sector

Vehicular Growth In India



Net Import of Crude Oil

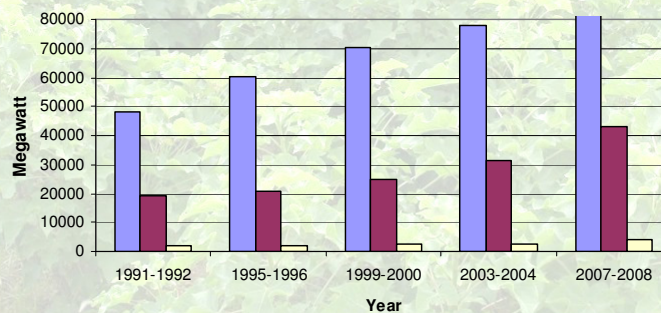


Energy security concerns in the area of improving rural energy access

Growth in the Electricity Sector in India

- ❖ Total power generation capacity in 1947- 1362 MW
- ❖ Generation capacity as on Jan 2008 – 141.08 GW

Growth in Installed generation capacity (MW)



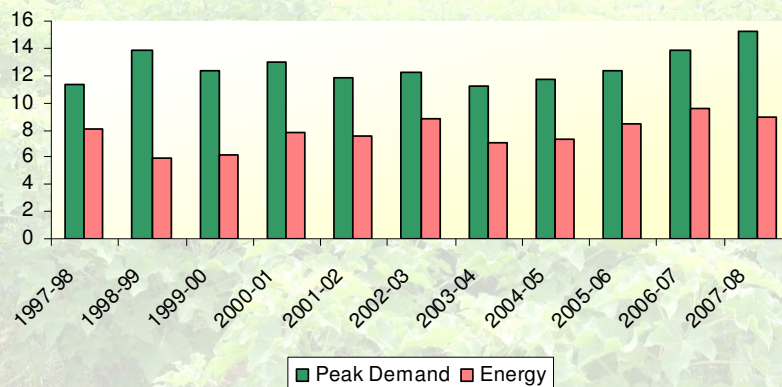
Contd../-

Growth in the Electricity Sector in India

- ❖ 3000 villages had access to electricity before 1947
- ❖ As on May 2006, 439,502 villages are electrified (representing 74% of the total 593,732 villages in India)

BUT...

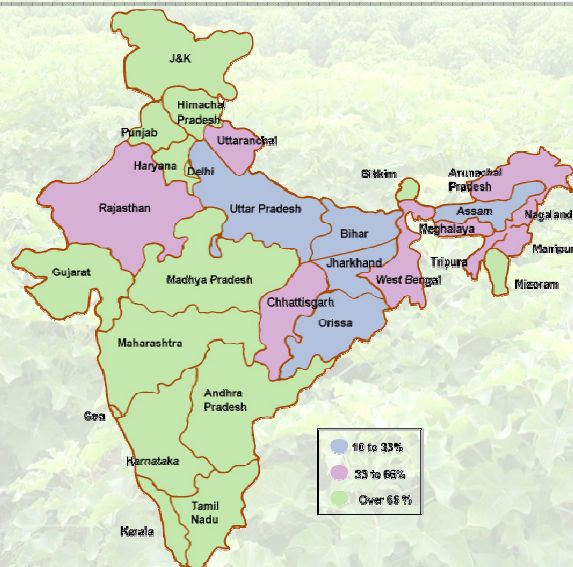
We face continued power shortages



And a long way to go to improve access to energy...

- ❖ Although 79% of villages are electrified, only 43.5% of households in and around these villages have access to electricity in their homes
- ❖ India's per capita electricity consumption of 615 KWh is among the lowest in the world

Percent of households having access to electricity



The role of Biofuels

- *Potential opportunities*

Lessening the Burden of Importing Crude

- ❖ Demand of petroleum products - 146 MMT
- ❖ Production of crude - 35 MMT
- ❖ Import of crude - 111 MMT

Import burden on crude

Year	Rs. (in crores)	Billion USD
2004-05	1,01,963	22.60
2005-06	1,50,557	34.10
2006-07	2,19,029	54.75

Electrification of rural houses by using straight Jatropha oil

– Some important numbers

Number of households	100
Demand per household (watts)	70
Hours of supplies per day	4
Total energy supplied / year (kWh)	10,220
SEGR of DG sets (kWh / Ltr.)	3.0
Oil required (Lt / yr.)	3,400
Seeds required (tonnes / yr.)	~15
Number of saplings	4,285* 30,000**

* Yield of 3.5 kg / tree / year

** Yield of .5 kg / tree / year

The Present Status

National Policy on Biofuels Released in October 2008

Vision:

Accelerated development and promotion of the cultivation, production and use of biofuels to increasingly substitute petrol and diesel for the transport and in stationary applications for energy security, climate change mitigation, apart from creating new employment opportunities and leading to environmentally sustainable development.

Contd../-

National Policy on Biofuels.....

Salient features

- ❖ **Target of 20% blending of biofuels by 2017**
- ❖ **To utilize only wastelands and degraded forest lands for cultivation of biofuel crops**
- ❖ **Cultivation / Plantation to be encouraged through a Minimum Support Price**
- ❖ **Appropriate financial and fiscal measures to be considered**

Contd..!/-

National Policy on Biofuels.....

- ❖ **To support research, development and demonstration to cover all aspects of feedstock production and biofuel processing for various end-use applications**
- ❖ **National Biofuel Coordination Committee to be Chaired by the Prime Minister**
- ❖ **The Biofuel Steering Committee to be Chaired by the Cabinet Secretary**

Sustainability issues

-The Lesser Known Factors

Urgent need for

Detailed scientific analysis/assessment to address the following for comparing biofuel based energy systems with conventional / other alternate forms of energy;

- ❖ Environmental sustainability
- ❖ Technical sustainability
- ❖ Financial sustainability
- ❖ Social and Institutional sustainability

Environmental Sustainability

- ❖ **Undertake environmental due diligence through the LCA approach**
 - Biofuels vis-a-vis conventional / alternate fuel / alternate power pack for the transport sector
 - Biofuels vis-à-vis grid extension / alternate decentralized power packs for rural energy access
- ❖ **Estimation of GHG and local pollutants emission at different levels of aggregation for all the above options**
- ❖ **CDM ability of the various pathways**

Technical Sustainability

- ❖ Scientific estimation of available wasteland in India through GIS/ Remote Sensing
- ❖ Development of elite varieties and agronomic practices
- ❖ Research on biofuels byproducts usage/its toxicity
- ❖ Improving expelling efficiency

Availability of Wasteland

S. N.	States	Potential Area for Jatropha cultivation (Lakh ha.)	S. N.	States	Potential Area for Jatropha cultivation (Lakh ha.)
1.	Andhra Pradesh	43.96	12.	Manipur	12.62
2.	Arunachal Pradesh	9.97	13.	Meghalaya	9.37
3.	Assam	14.56	14.	Mizoram	4.07
4.	Bihar/Jharkhand	18.60	15.	Nagaland	8.40
5.	Goa	0.40	16.	Orissa	18.88
6.	Gujarat	28.71	17.	Punjab	1.06
7.	Haryana	2.62	18.	Rajasthan	56.88
8.	Karnataka	17.89	19.	Sikkim	2.13
9.	Kerala	1.00	20.	Tamil Nadu	17.95
10.	Madhya Pradesh/ Chhattisgarh	66.20	21.	Tripura	1.28
11.	Maharashtra	48.55	22.	Uttar Pradesh/ Uttanchal	12.14
			23.	West Bengal	2.58
				Grand Total	400.37* (40.03 mha)

Wasteland Availability

Source	Area (mha)	Estimate/scientific
National Commission on Agriculture (NCA-1976)	175.00	E
Directorate of Economics and Statistics, Department of Agriculture and Cooperation	38.40	E
Ministry of Agriculture (1982)	175.00	E
Department of Environment and Forests (B.B. Vohra)	95.00	E
National Wasteland Development Board (Ministry of Environment and Forests, 1985)	123.00	E
National Bureau of Soil Survey and Land Use Planning, ICAR-1994	187.00	E
Society for Promotion of Wasteland Development (SPWD-1984)	129.58	E
National Remote Sensing Agency (NRSA-2000)	63.85	S

Financial Sustainability

- ❖ **For biofuels as well as the alternate options, determine the envisaged cost of the entire supply chain (from production to distribution) including:**
 - The cost of production of the fuel
 - Infrastructure costs for its supply
 - Operational costs
- ❖ **Analyze financial implications of large scale usage of biofuels vis-à-vis alternate options**

Social & Institutional Sustainability

- ❖ Social Impact assessment for biofuel based systems
- ❖ Analysis of existing institutional set up regarding biofuel
- ❖ Design roadmap for mainstreaming biofuels

Need to develop a composite framework to aid decision making

(Example of village electrification)

Option	Score (in a scale of 1 to 5)							Over-all score	Ranking
	Capital cost (Rs. / kW) ¹		Generation cost (Rs. / kWh) ²		Environmental impact ³	Local ⁴ manageability & ease of operation	Enhancing ⁵ Livelihood opportunities		
	Rs/kW	Score	Rs/kWh	Score					
Biomass gasifier / DG sets	~ 78,000	3	2.25	4	2	2	4	15	3
SPV	~ 3,00,000	1	14.5	1	4	2	1	9	5
Biogas DG sets	~ 85,000	3	0.75	5	3	1	3	15	4
Biofuels DG sets	~ 20,000	5	10.75	2	3	3	5	18	2
Micro-hydel	~ 60,000	4	0.25	5	5	3	3	20	1

Conclusions

- ❖ **India is the first country in the world, trying to focus on *Jatropha Curcas* as the main feedstock for biofuel/ biodiesel production**
- ❖ **Very limited systematic research/ knowledge on the implications of their widespread usage**
- ❖ **Urgent need to scientifically analyze its various impacts on the environmental sustainability, as also on other sustainability pillars namely; technical, financial and institutional**
- ❖ **Urgent need to develop a decision making tool and sensitization of the Indian policy makers for transition to a biofuel based energy systems**