WELCOME

Biofuels in India

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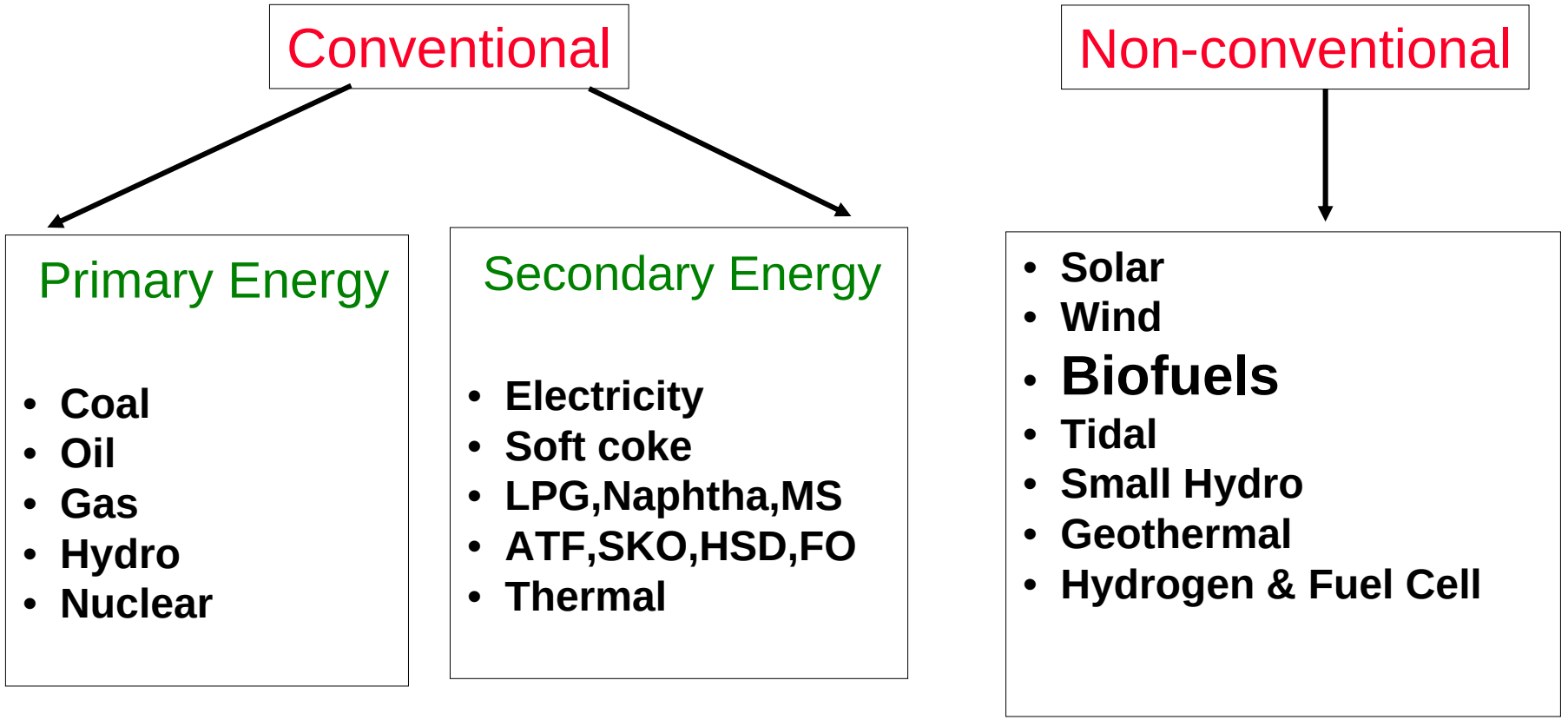
Commercial Energy Sources



Global Primary Energy Reserves

Coal

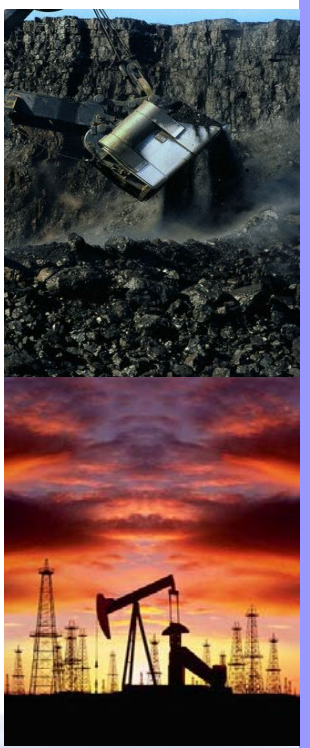
- Global Coal reserve : 909 billion tonnes (6,06,000 MTOE)
- US has largest share : 27.1%, 2nd Russia (17.3%)
- India :10.2 %

*** Oil**

- Global Oil reserve : 1208 billion bbls (1,65,000 MMT)
- Saudi Arabia has largest share : 22%,
- India : 5.7 billion bbls (800 MMT)

#Gas

- Global Gas reserve : 181.46 TCM (1,62,00 MTOE)
- Russia has largest share : 26.3%,
- India : 1.1 TCM (990MTOE)



Source : *BP statistical Review, end 2006

Share of Non-commercial Energy

	1953 - 54	1980 - 81	2001 - 02	2011 - 12
%Share	71	52	32	23..5
Mtoe	64.13	108.48	139.02	170.25

- The decreasing share of non-commercial energy indicates increasing URBANISATION / INDUSTRIALISATION
- Urban population has increased from 15% in 1970 to 30% in 2005 and likely to be 50% in 2025
- The data indicates that with increasing urbanization the share of traditional biomass-based fuels (fuel wood, crop residues, and animal dung) is decreasing.

Primary Commercial Energy Consumption (in MMtoE)

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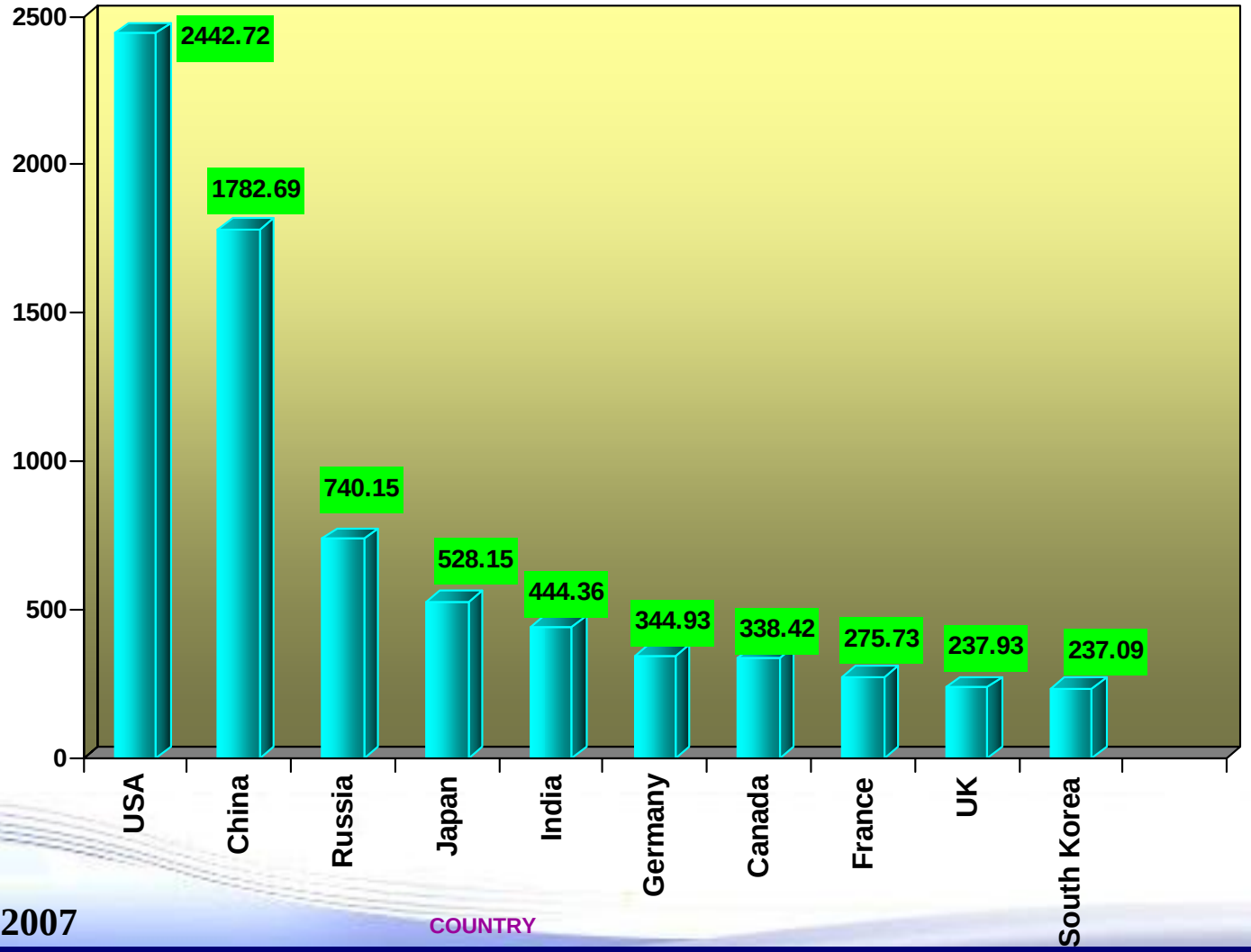
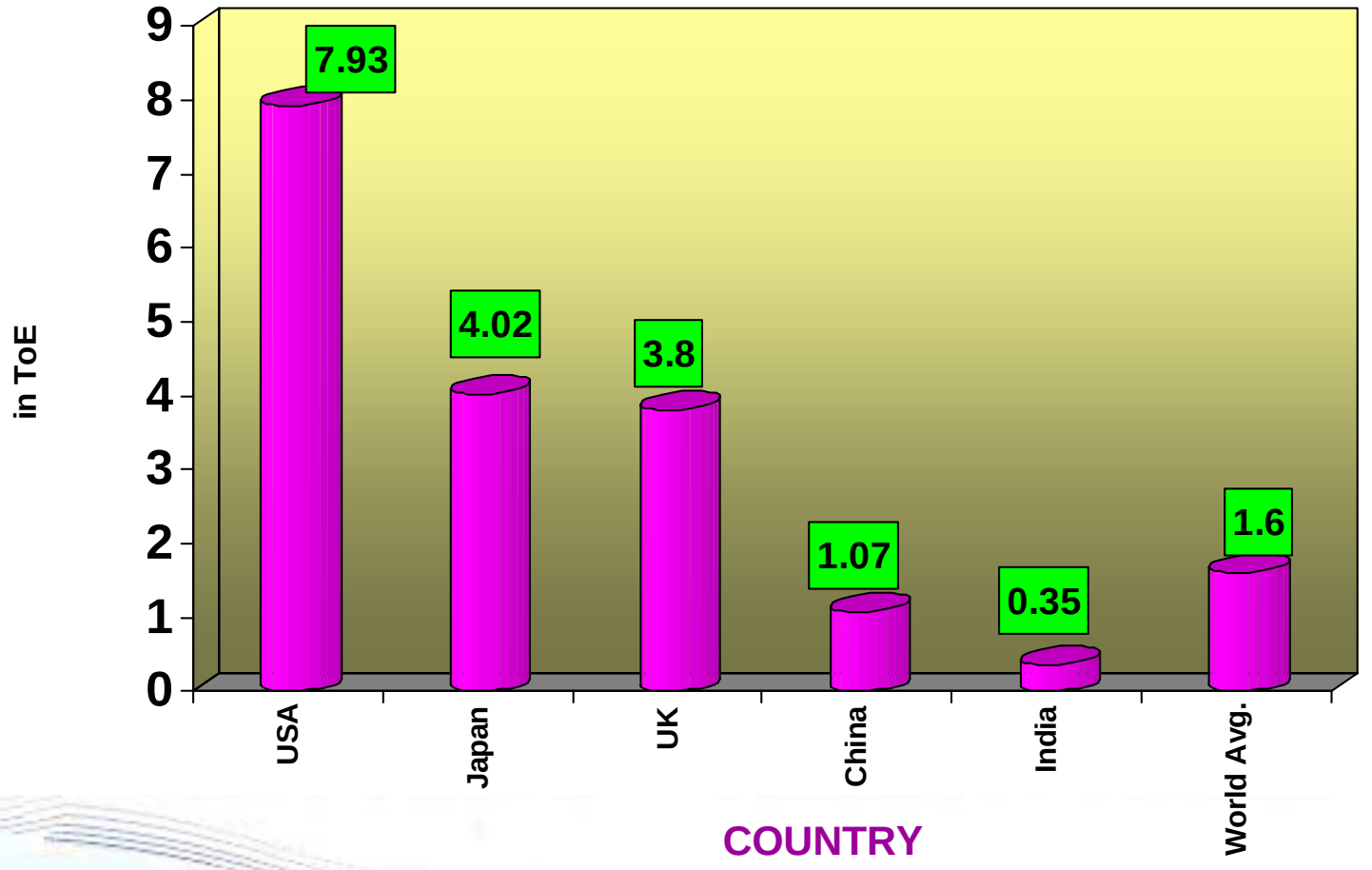
COUNTRY DATA



Source : end 2007

Per Capita Energy Consumption (Primary Commercial Energy)

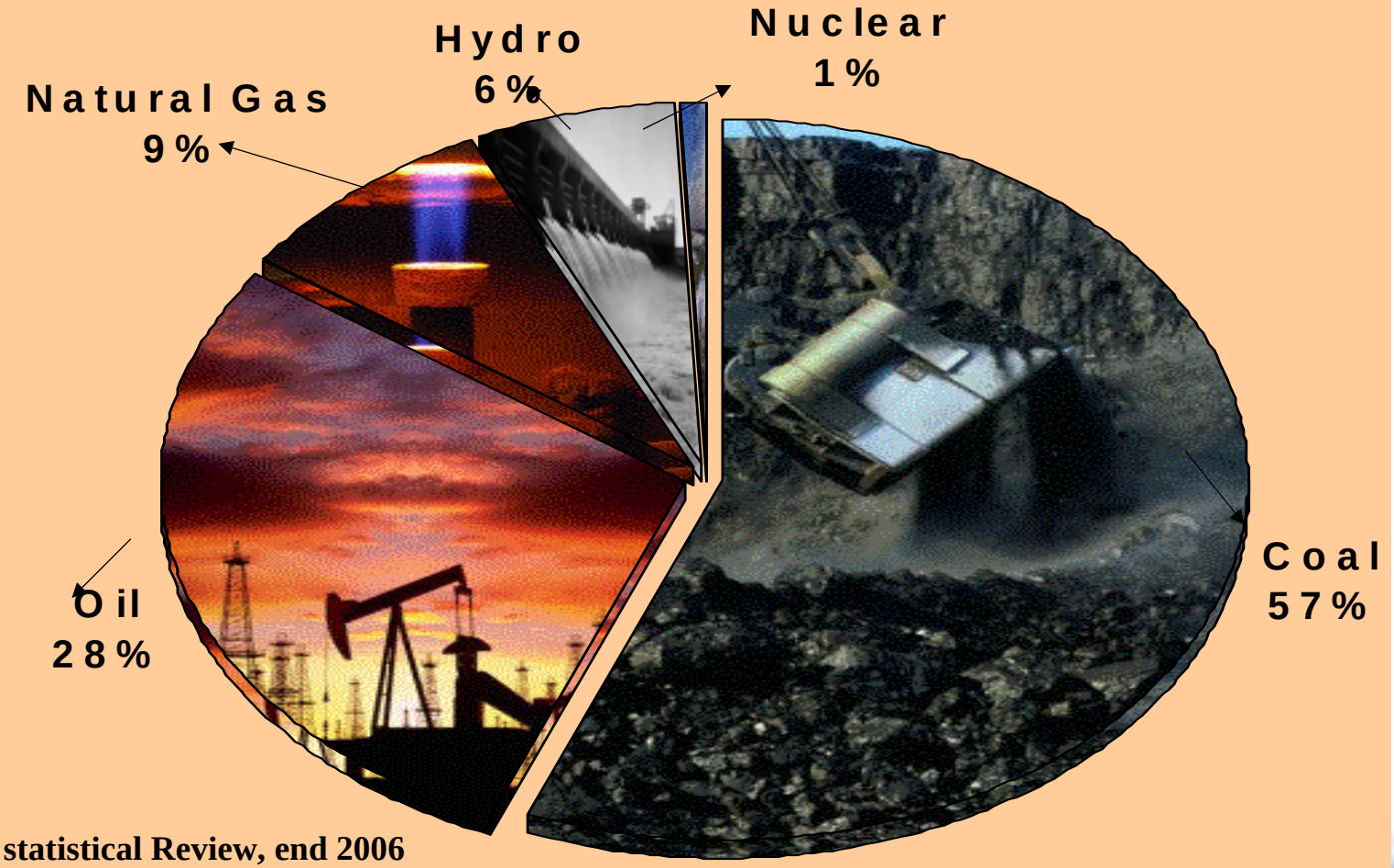
E N D 2 0 0 4



Source : PPAC ready reckoner,01.04.06

INDIA, ENERGY MIX PATTERN

Consumption in end 2007 – 444 MMToE



Source : *BP statistical Review, end 2006

Sectoral Energy Consumption v/s Contribution to GDP

Sector	Consumption	@Contribution
Industry	41%	26%
Agriculture & Fisheries	7%	19%
Commercial* & Services	42%	55%

@Source : mospi.nic.in,

Energy demand Vs GDP Growth

With sustained GDP growth of around 9 % per annum, India's energy consumption at a conservative estimate will increase @ 5% per annum. At this rate the demand for energy will continue to soar and by 2020, India could emerge as the third largest consumer of energy after US and China.

Need for alternative fuels

- Oil import dependence - **> 73%**
- Increase in international oil prices

What are alternate energy sources

- **Broadly speaking, alternate energy sources include renewable and non-renewable energy sources.**
- **These sources include Solar, Biomass, Wind, Wave Tidal and Hydro.**
- **Further Biomass sources include Ethanol, Bio-Diesel, Fuel Wood, Crop residue, Dung, etc.**
- **Although renewables account for more than 27% of total primary energy consumption in India, their share in the commercial primary energy is about 2%.**

Bio Fuels

Renewable Fuels from biological sources.

- **Biodiesel**
- **Biopetrol**
- **Biogas**
- **Biomass**

Biofuels and their Potential

- Ethanol & Biodiesel are potential automotive fuel blends
- India has strong agro-based economy
- It is one of the major sugarcane producer
- Ethanol production through molasses route is economically viable
- India has 60 million Ha of wasteland, out of which 30 million Ha is suitable for Jatropha/Karanj cultivation
- Jatropha/Karanj are most suitable non-edible TBO for biodiesel feedstock

Work allocation on Biofuels

- **As per allocation of business rules, the work distribution on Biofuels has been clarified in July 2006 by the Cabinet Secretariat as per the following details:**

Work allocation on Biofuels

(i) Ministry of Agriculture and Cooperation

- **Production of plant material**
- **Development of nurseries and plantations for bio-fuels including coordination with other Ministries or Departments in this regard**

Department of Agricultural Research and Education

- **Research and Development on production and improvement of bio-fuels plants**

Work allocation on Biofuels

(ii) Ministry of New & Renewable Energy :

- National Policy on Bio-fuels
- Research, development and demonstration on transport, stationary and other applications of bio-fuels
- Setting up of a National Bio-fuel Development Board and strengthening the existing institutional mechanism
- Overall coordination concerning bio-fuels

Work allocation on Biofuels

(iii) Ministry of Petroleum and Natural Gas

- **Blending and blending prescriptions for bio-fuels including laying down the standards for such blending**
- **Marketing, distribution and retailing of bio-fuels and its blended products**

Work allocation on Biofuels

(iv) Ministry of Rural Development

National Mission on Bio-fuels

- **Bio-fuel plant production, propagation and commercial plantation of bio-fuel plants under various schemes of the Ministry of Rural Development in consultation with the Ministry of Agriculture and the Ministry of Panchayati Raj**
- **Identification of non-forest land wastelands in consultation with the State Governments, the Ministry of Agriculture and the Ministry of Panchayati Raj for bio-fuel plant production**

Ethanol Blended Petrol (EBP) Program

Purpose:

- Reduce dependence on imported oil
- Encourage indigenous sources of renewable energy
- Provide support to the sugarcane growing farmers

Ethanol Blended Petrol (EBP) Program

- India is the largest producer of sugarcane and sugar in the world.
- Around 5 million hectares of area is under sugarcane cultivation producing around 300 MMT of sugarcane @ 60 tonnes per hectares.
- Present production capacity of alcohol is more than 2000 million litres.
- Gasoline consumption during the year 2007-08 is around 11MMT. This way 5% blending of ethanol will require 550 million litres and 10% blending will require 1100 million litres of alcohol.

Ethanol Blended Petrol (EBP) Program

- After meeting industrial, portable and other uses, surplus stocks to meet 5% blending is available and with added capacities going on stream, 10% blending programme can be taken up.
- Upto 10% ethanol blending in gasoline, no changes in engine or carburetor required. In Brazil, 20-24% ethanol is blended in gasoline and in US, 10% ethanol produced from maize is blended.
- For blending of ethanol in petrol, ethanol should be anhydrous around 99.4%.

Ethanol Blended Petrol (EBP) Program

In the year 2000-01, the government once again examined the possibility of blending ethanol with petrol in view of the following factors: -

- Increasing atmospheric pollution mainly due to release of hazardous gases by increasing vehicular population and judicial intervention to correct the situation.
- Increasing dependence on high cost of imported crude oil and consequential inflationary pressure on the economy.

Ethanol Blended Petrol (EBP) Program

- The likely high cost of achieving Euro-II, Euro-III and Euro-IV standards estimated at over 12 billion dollars.
- Ratification of Kyoto Protocol by India, committing itself to prevent environmental degradation.

Accordingly, the Government constituted two high level committees- one under the chairmanship of Dr. R.A. Mashelkar and the other in the PM's Secretariat on whose recommendations, the ethanol programme restarted.

Ethanol Blended Programme (EBP)

In December 2001, the Minister for MOP&NG announced in Indian parliament. Government's decision to implement the mixed fuel programme with ethanol in two phases.

- Accordingly, MOP&NG issued notification dt. 12.9.02 for mandatory supply of 5% EBP in 9 majors sugar producing States & 4 contiguous Union Territories w.e.f. 2003.
- However, the program could be implemented in a staggered manner because Ethanol was not available in a consistent manner & at reasonable price.

Ethanol Blended Programme (EBP)

- Amending Notification issued on 27.10.04 making sale of EBP mandatory in 10 States & 3 Union Territories subject to certain conditions relating to ethanol price and availability.
- The programme could not make much head way.
- ISMA and other ethanol manufacturers assured adequate availability and supply of ethanol on a sustained basis for EBP.
- New notification issued on 20.09.06 to cover the entire country under 5% EBP Programme except North East States, J&K, A&N Islands and Lakshadweep w.e.f. 1.11.06 subject to the commercial viability of such blending.

Ethanol Blended Petrol (EBP) Program

- India is currently passing through a glut situation. ISMA wants 10% blending selectively for Metros & other Cities (not State-wise basis) to make impact on environment.
- 10% Ethanol blending through an amendment to IS-2796:2008 has been approved. Gazzete notification likely by April 2008.
- BIS notification on specifications of 10% ethanol blend to be issued by April 2008.
- Serious concern raised by Auto industry using 10% ethanol blended petrol in old vehicles.
- MOP&NG notification on 10% blending of ethanol likely to take time.

Ethanol Blended Petrol (EBP) Program

State Taxation Issues

- **Despite very clear court rulings distinguishing the role of State Governments relating to potable and industrial alcohol, and limiting their role vis-à-vis the latter, the State Governments have been :**
  - **Imposing lot of licensing and procedural requirements on industrial units producing industrial alcohol**
  - **Levying a plethora of taxes and**
  - **Restricting inter-state movement of the product.**

Ethanol Blended Petrol (EBP) Program

- **Ministry has taken up with the States to ensure that no procedural restrictions on the industries relating to production / manufacture / storage / transportation / distribution / sale of ethanol meant for doping in petrol are put so that the implementation of the EBP progamme is not jeopardized.**

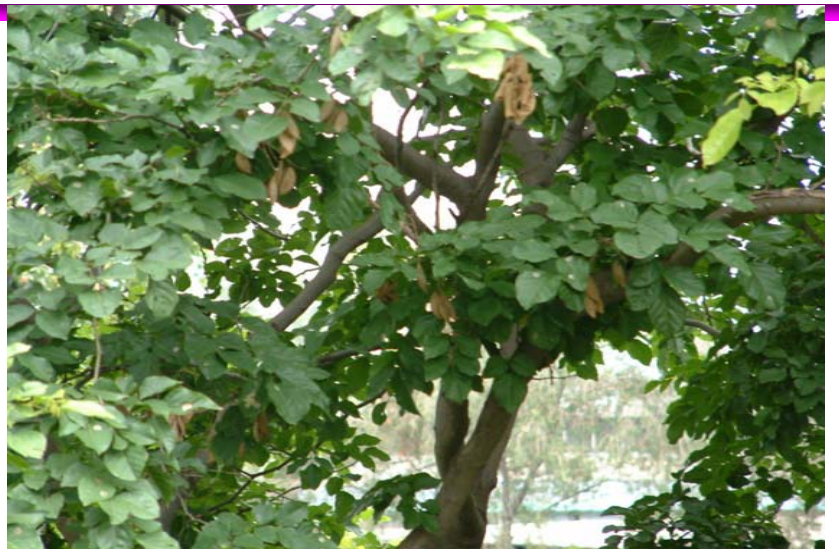
Biodiesel – Indian scenario

- A Committee was set up under the Chairmanship of Dr. D.N. Tiwari, former Member, Planning Commission on "Development of Bio fuels".
- In its report dated April, 2003,the committee had recommended launching of a National Mission on Bio-Diesel.
- The proposed National Mission inter-alia envisaged large scale plantation of Jatropha Curcas for generating the environment friendly fuel which can be blended with diesel.
- As stated earlier, the Ministry of Rural Development has been made the nodal Ministry to implement the National Mission on Bio-diesel.

Biodiesel Demand

YEAR	Projected Diesel Demand (MMT)	Bio-Diesel @ 5% (MMT)	Area for 5% Mha	Bio-Diesel @10% (MMT)	Area for 10% (Mha)	Bio-Diesel @ 20% (MMT)	Area for @20% (Mha)
2011-12	66.90	3.35	2.79	6.69	5.58	13.38	11.19
2012-15	80.00	4.00	4.88	8.00	9.60	16.00	19.21

Best suited raw Material for biodiesel production in India



Jatropha (Ratanjot)

It's a Shrub
Height: 6 – 8 ft
Life : 40 – 50 yrs

Karanj

It's a Tree
Height: 15 - 20 ft
Life : over 100 yrs

Both these plants grow all over India

Jatropha Cultivation

Climate

Best adopted to arid & semiarid conditions

Can withstand severe heat and grows well in warmer areas

Quality of the soil

Sandy well-drained soil with good aeration

Watering

Usually not required in areas having annual rainfalls of ~ 600 mm

Inter cropping

Shade-loving herbal plants can be exploited

BIODIESEL PRODUCTION

- **Main Steps:**

1. Oil Pretreatment

- Removal of water
- Removal of free acids (it should be <2%)

2. Mixing of Methanol and catalyst

- Dry caustic as catalyst
- Avoid large lumps
- Methanol used in excess (depends on free fatty acid contents)
- Exothermic reaction
- Takes 20 - 25 minutes

3. Reactor

- Charge the catalyst dissolved in methonal to reactor having oil
- Temperature of 65^{o}C for 2 hours
- Vigorous agitation

Biodiesel - Lower Emissions

Biodiesel emissions compared to petro-diesel

Emission Type	Reduction (%)	
	B100	B20
CO	44	9
HC	68	14
PM	40	8
SOOT	50	20
PAH	80	13
NO_X	(+6)	(+1)
S	100	20

National Mission on Biodiesel

- The mission is implemented in two phases:

Phase-1: As Demonstration Project

Phase-2: As Self sustaining expansion of Biodiesel programme

- For launching the **Demonstration Project**, Jatropha cultivation in 4 lakh hectares of Forests & Non-Forest land especially in waste land is being carried out over 5 years period.
- The departmental Expenditure Finance Committee (EFC) has released Rs.49 crores for the programme in 9 States.

National Mission on Biodiesel

State wise Funds released for the Demonstration Project

State	Amount (Rs. in Lakh)
Chhattisgarh	1,350
Andhra Pradesh	1,075
Tamil Nadu	1,050
Gujarat	450
Tripura	300
Rajasthan	225
Himachal Pradesh	150
Assam	150
Sikkim	150
Total	4,900

MOP&NG Initiatives to promote Bio-diesel

Bio-diesel Purchase Policy

- **MOP&NG has announced Bio-diesel Purchase Policy in October 2005, effective 1.1.2006.**
- **This policy is a statement of intent for purchase of bio-diesel by the oil marketing companies**
- **Interested suppliers to be registered with the State Level Coordinators of Oil Companies**
- **Bio-diesel to be supplied at 20 Purchase centers of the public sector oil marketing companies (OMCs) identified all over the Country .**
- **Delivered price of the Bio-diesel to be revised every six months; the present price valid upto Dec'06 is Rs 26.50 per litre.**

BIODIESEL PURCHASE CENTRES

Sr.No	State	Location
1	Andhra Pradesh	Ghatkesar (HPC) (also for Jharkhand and Orissa states)
2	Chattisgarh	Mandirhasaud (HPC)
3	Delhi	Bijwasan (IOC)
4	Gujarat	Kandla (BPC)
5	Haryana	Rewari (IOC)
6	Karnataka	Devanagunthi (Bangalore) (IOC)
7		Mangalore (IOC)
8	Madhya Pradesh	Mangliagaon – Indore (IOC)
9	Maharastra	Manmad (BPC)
10		Borkhedi – Nagpur (BPC)
11		Loni (HPC)
12		Vashi (HPC)

Contd…

BIODIESEL PURCHASE CENTRES

Sr.No	State	Location
13	Punjab	Bhatinda (IOC)
14	Rajasthan	Sanganier-Jaipur (BPC)
15		Salawas (HPC)
16	Tamil Nadu	Korrukupet Chennai (IOC)
17		Narimanam (IBP)
18		Karur (BPC)
19	Uttar Pradesh	Panki (IOC) (also for Uttranchal State)
20		Amousi – Lucknow (IBP)

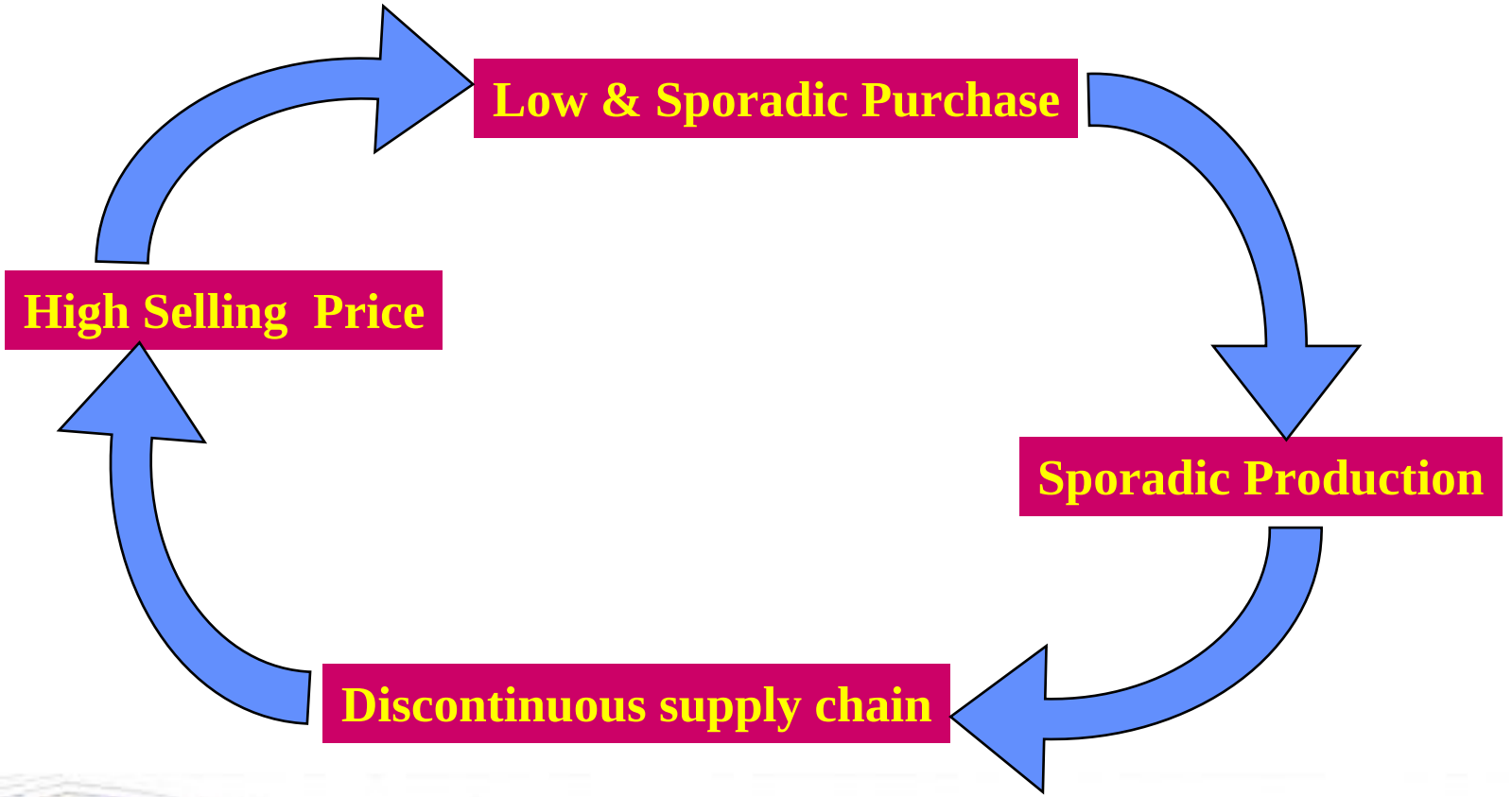
Procurement of Bio-diesel under Purchase Policy

- So far, none of the suppliers have registered with SLCs; OMCs have not been able to purchase any bio diesel at any of the identified locations.
- The production of non-edible oil seeds (like Jatropha, Pongamia, etc.) in India as of now is significantly low.
- Bio-diesel is likely to be cost effective with reference to petro-diesel after 2-3 years, since plantations of non-edible oil seeds trees like Jatropha, etc., have been taken up only in recent years on a significant scale and it takes 2-3 years for giving yield

Procurement of Bio-diesel under Purchase Policy

- **The limited quantities of bio-diesel, which have been made available to the OMCs for trial purpose were priced between Rs.35/- to Rs.52/litre**
- **Even if the excise duty and sales tax/VAT were to be completely waived off on bio-diesel, its delivered price at identified locations would still be much higher than present commercially viable price of Rs.26.50 per litre**

…A Major Gap & Adhocism in Supply Chain



Major Gap Areas

- Agronomy Gaps
- Policy related issues
- R&D Issues

Agronomy Gaps…..

Gap 1

- Systematic state/region wise survey for superior variety of TBOs
- Development of improved variety of seeds and their multiplication
- Accessible Cryo-preservation of seeds
- Involvement of SAUs for further multiplication and development
- Development of post harvest techniques of decortications and de-hulling for increasing oil extractability

Agronomy Gaps…..

Gap 2

- Monitoring area under Jatropha Cultivation for reserve acreage
  - This should be done on quarterly basis for every state

- Information sharing between Ministries of Panchayati Raj, Rural Development, New & Renewable Energy, Environment and Forest, P & N G etc.

Gap 3

- Training for:
  - Gram Panchayats
  - Elected representatives from Village/Taluka/District
  - Govt. officers
  - Rural youths
  - Self Help Groups
  - Industrial Entrepreneurs

Gaps

Policy related issues

- Integrated approach from Upstream to Downstream
- Buy back Guarantee and MSP
- Tax holiday
- Graded Subsidy
- Entrepreneurship promotion

R & D Issues

- **Development of improved variety of Jatropha seeds**
- **Improved decortication techniques**
- **Response of machines to non esterified vegetable oil as well as to B5, B10, B20, B50 or B100**
- **Development of more effective catalysts**
- **Development of Continuous Process Biodiesel plants**

Bio-diesel : Action Required

- **There is a need for coordinated action amongst different Ministries for making the Bio-diesel blending programme a success.**
- **Planning Commission /Ministry of Rural Development may ensure plantation of Jatropha / Karanja and production/availability of Bio-diesel for blending with diesel.**
- **MNRE coordinating the overall policy**

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THANK YOU