

**Scaling-Up Bio-Diesel Blending With High-Speed Diesel by Exploring New Feedstock to Substitute the Growing Demand of Fossil Fuel to Ensure a Greener Planet**

Shantanu Gupta

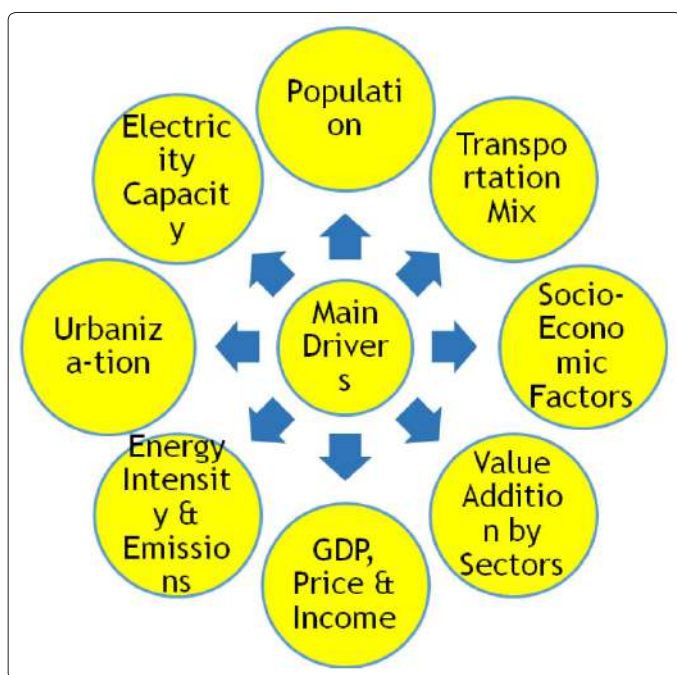
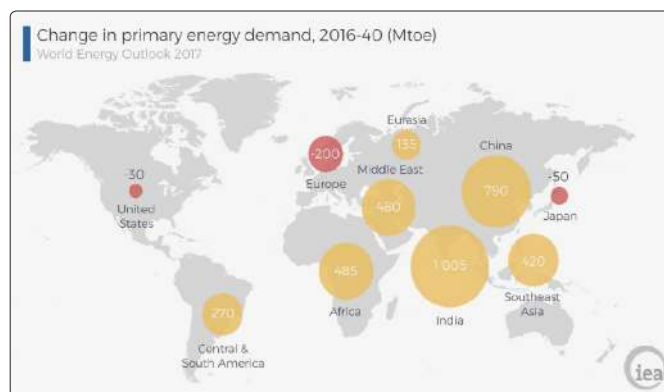
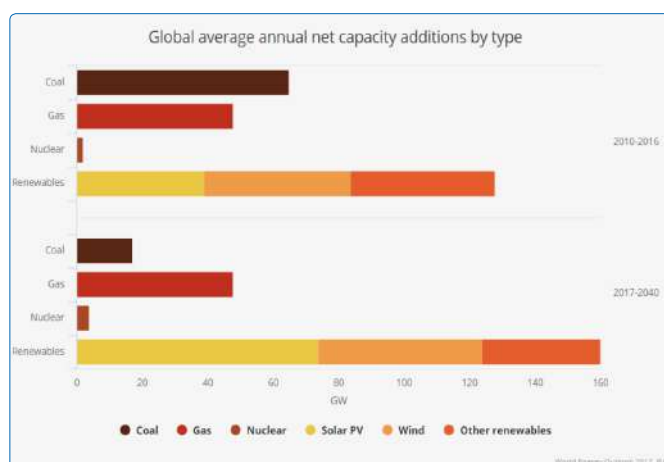
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**Bio Diesel Programme in India**

- 2002 - “Mission on Biodiesel” launched by Planning Commission
- 2005 - MoP&NG announced Biodiesel Purchase Policy
- 2009 - National Policy on Bio-fuels by MNRE also covered Biodiesel
- National Biodiesel Mission approach
- Non-edible feedstock (mainly Jatropha) to avoid conflict of Fuel Vs Food Security OMCs to purchase Bio-diesel (B100) on a uniform declared price for blending (@ 5% with HSD) at identified 20 purchase centres.
- However, no Biodiesel could be procured till 2014.
- Aug 2015 - Direct procurement of Bio-diesel allowed for bulk consumer. Retailing of HSD blended with Biodiesel (B5) started.

**Key Energy Drivers****World Energy Scenario – Change in Primary Demand****World Energy – Capacity Additions**

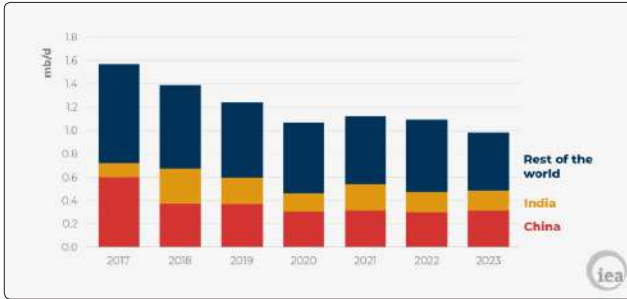
Global economy growing at an average rate of 3.4% per year. Largest contribution to demand growth – almost 30% – comes from India, whose share of global energy use rises to 11% by 2040.

The growth in global energy demand was concentrated in Asia, with China and India together representing more than 40% of the increase. Energy demand in all advanced economies contributed more than

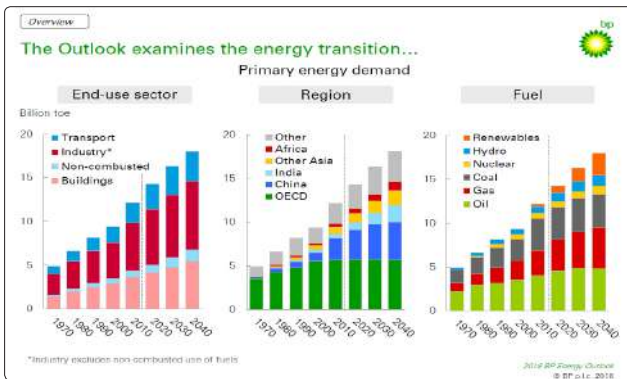
20% of global energy demand growth, although their share in total energy use continued to fall.

## Energy Transition – Socio-Economic System Structure and Outlook

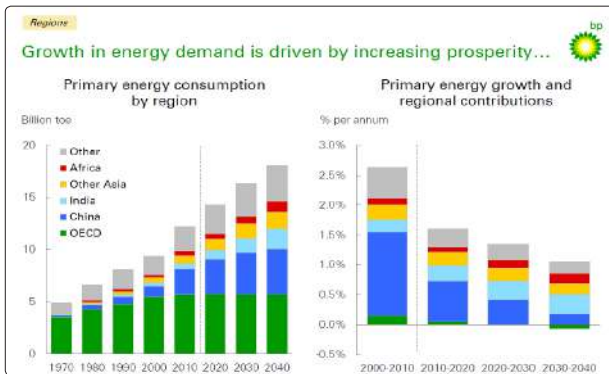
### World Oil Demand Growth (Year - On – Year Change)



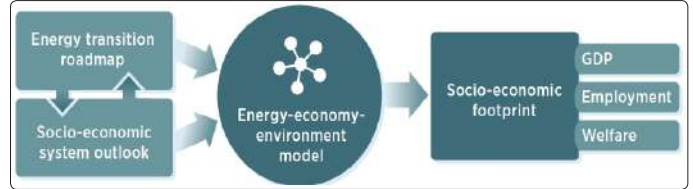
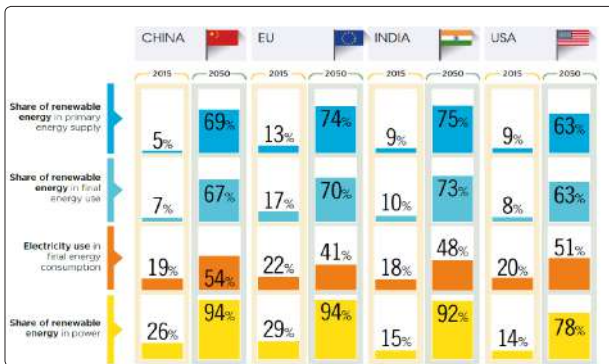
### Primary Energy Demand



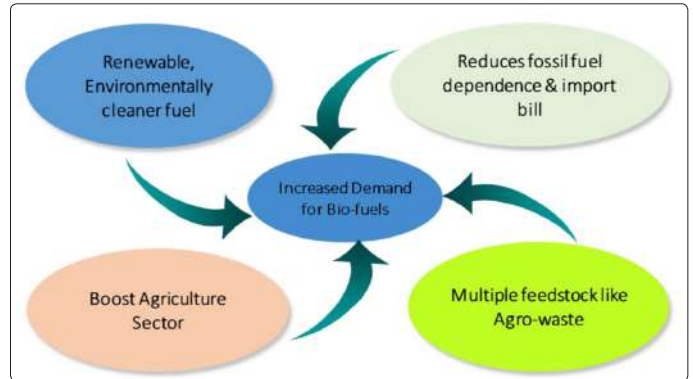
### Primary Energy Demand - Regionwise Key



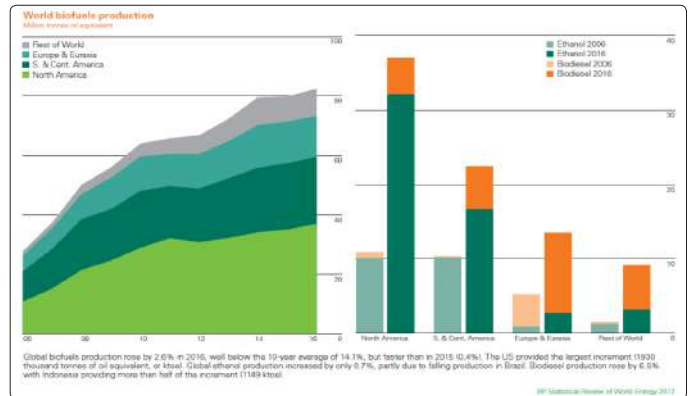
### Key Indicators Relevant To Energy Transition



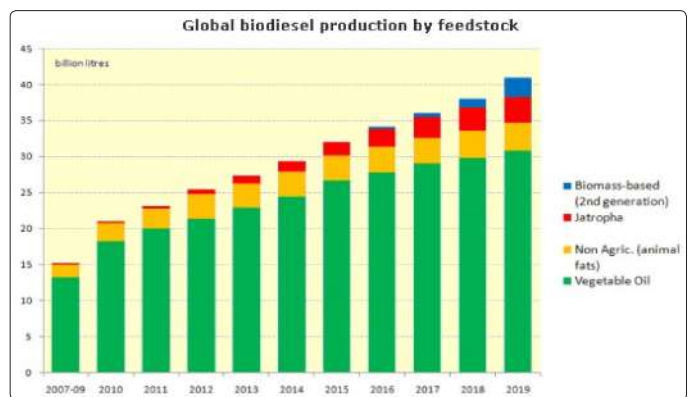
### Beyond Fossil Fuels - Bio fuel Perspective



### World Bio-fuels production



### Bio-Diesel Production from various feed stocks







opportunities in a sustainable way. Simultaneously, the policy will also encourage the application of advance technologies for generation of bio-fuels.

### Goal of the Policy

To achieve indicative target of 20% blending of ethanol in petrol and 5% blending of biodiesel in diesel by 2030. This goal is to be achieved by prioritising following actions:

- reinforcing ongoing ethanol/biodiesel supplies through increasing domestic production
- setting up Second Generation (2G) bio refineries
- development of new feedstock for bio-fuels
- Development of new technologies for conversion to bio-fuels.
- Creating suitable environment for bio-fuels and its integration with the main fuels.

### The Categorisation of Bio-fuels include

- Bioethanol (from sugar/starch containing biomass & cellulosic feedstock)
- Biodiesel (from non-edible vegetable oils, acid oil, used cooking oil or animal fat and bio-oil)
- Advanced biofuels (from ligno-cellulosic feedstock & non-food crops, 2G, 3G biofuels, bioCNG, bio-methanol )
- Drop-in fuels (from biomass agri-residues, MSW, Plastic waste, Industrial waste etc)
- Bio-CNG (purified form of bio-gas from agricultural waste, animal dung, food waste, MSW)

Policy emphasizes development of domestic Bio-fuel Industry and feedstock. However, depending upon availability of domestic feedstock and blending requirement, import of feedstock for production of bio diesel would be permitted to the extent necessary.

### Financial and Fiscal Incentives by GO

- Extending financial incentives including viability gap funding, subsidies and grant for Bio-fuels.
- Incentivizing the nascent “Advanced Biofuel” industry with fiscal incentives in the form of tax credits, advance depreciation on plant expenditure, differential pricing vis-à-vis 1G Ethanol, Viability Gap Funding (VGF) etc. for encouraging stakeholders.
- Exploring the Opportunities of generating carbon credits for the savings on CO2 emissions on the account of bio-fuel feedstock generation and use of biofuels, in pure or blended form.
- Funding & Financial Assistance by way of Soft loans through National Bank for Agriculture & Rural Development (NABARD) and other Public Sector Banks.

### Indian Perspective for Future Of Bio Diesel

Road transport sector accounts for 6.7% of India’s GDP (2.28 Trillion USD)

Currently, Diesel alone meets approx. 72% of fuel demand.

India being a Diesel economy, there is a dire need to reduce dependence on fossil fuels.

Parameter	Quantity Year 2017-18	Quantity by 2022 (expected)
Diesel consumption,	103330	123250
Biodiesel requirement @ 5% blending	5160	6160
Installed Capacity	1300	4100*

Available for Blending	80	3050*
Shortfall in Biodiesel availability	5080	3110

### SWOT Analysis of various Feed Stocks For Bio-diesel

Amongst the four materials such as Palm Stearin, Soya bean oil, Acid Oil and Used Cooking Oil,

Economics of Raw Material	Used Cooking Oil is the most economical for biodiesel production
Ease of Handling	Edible Oils & Stearin can be handled with ease compared to others
Collection challenges	UCO collection is the most difficult and highly labour intensive. Inbound Logistics cost is high
Cold Weather Operation	Palm Stearin, due to its high melting point, solidifies in resulting into operational problems

### Used Cooking Oil - Collection

#### Collection from Commercial Units:

- Can be collected in Bulk.
- May contain water & food particles
- Contains Animal fats
- High Free Fatty Acids (FFA)
- Lower Cost

#### Collection from Residential Units:

- Cannot be collected in large quantities.
- May contain water & food particles
- Low in Free Fatty Acids
- Highly variable Volume & quality
- Collection cost is high rather than raw material cost.

### Used Cooking Oil - Govt. Initiatives

- Used cooking oil will have multiple numbers of polarised compounds. It can lead to liver disease, blood pressure, Alzheimer’s like health problems.
- Hotels and food processing companies through agencies. Later, it will be taken to biofuel production plants.
- New amendment in the Food Safety and Standards Act (FSSAI) mandates that the Total Polarized Compound (TPC) value in edible oil must be less than 25%.

India is adopting “**Triple E**” strategy for UCO collection & conversion to bio-diesel.

**E – Education:** Educating both the consumers and food businesses about public health consequences of spoiled UCO.

**E - Enforcement:** amongst large food processing plants, restaurants and fast-food joints that are frying food in large quantities.

**E – Ecosystem:** for collection of Used Cooking Oil and producing biodiesel from it, used oil does not find its way back to food supply chain the through black market.

There is a potential of around 2.5 Billion USD per year from the bio-diesel companies using it as feedstock.

National Association of Street Vendors of India (NASVI) to roll out a massive awareness campaign among street food vendors about the adverse health effects of used cooking oil.

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Schedule 4 of Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 be amended to have following provisions-

- (i) All FBO's involved in frying of foods shall submit used oil disposal record to Foods Safety & Standards Authority of India (FSSAI).
  - (ii) Used oil should not be topped up with fresh oil.
- All India Food Processors Association (AIFPA) to work with the Biodiesel Association of India and to publish a newsletter on this issue.
  - FSSAI secretariat to include the tips for consumer awareness in Pink Book
  - It was decided that 50 companies may be identified by Biodiesel Association of India for collection of used oil, names of which may be communicated to Food Outlets, who will provide used cooking oil to them. Only these companies would be permitted to take used oil from the food outlets.

Government of India is taking initiative to make UCO based Biodiesel as alternate to fossil fuel and several policies are being drawn to ease out collection challenges. Shortly, PSU Oil Marketing Cos. will be floating tenders for procurement of biodiesel produced from UCO. This will usher in a new era in search of alternate fuel to fossil fuel in years to come to make Swachh Bharat (The Clean India)!

### Acknowledgements

1. Various policy of Government of India
2. Meetings , seminars etc.

### References

1. <https://www.iea.org/media/publications/weo/GRAPHchangeinprimaryenergydemand.png>
2. <https://www.iea.org/media/publications/oil/GRAPHworldoildemandgrowth.png>
3. 2007-2019. majority veggie oil, increasing non agric.
4. 2009-2019. increasing jatropa from 2012-2019, increasing biomass based 2016-2018.

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