



10th World PetroCoal Congress-2020

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Our lifestyle is unsustainable



Over-exploitation of natural resources



Markets ignored costs of planet and people



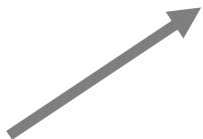
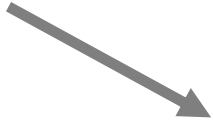
Environment destruction & degradation



Adoption failure of circular-economy;
accelerated resource depletion

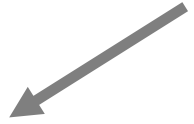
Major threats to sustainability

CO₂ and other GHG emissions



Natural capital degradation

2



Impact of climate change



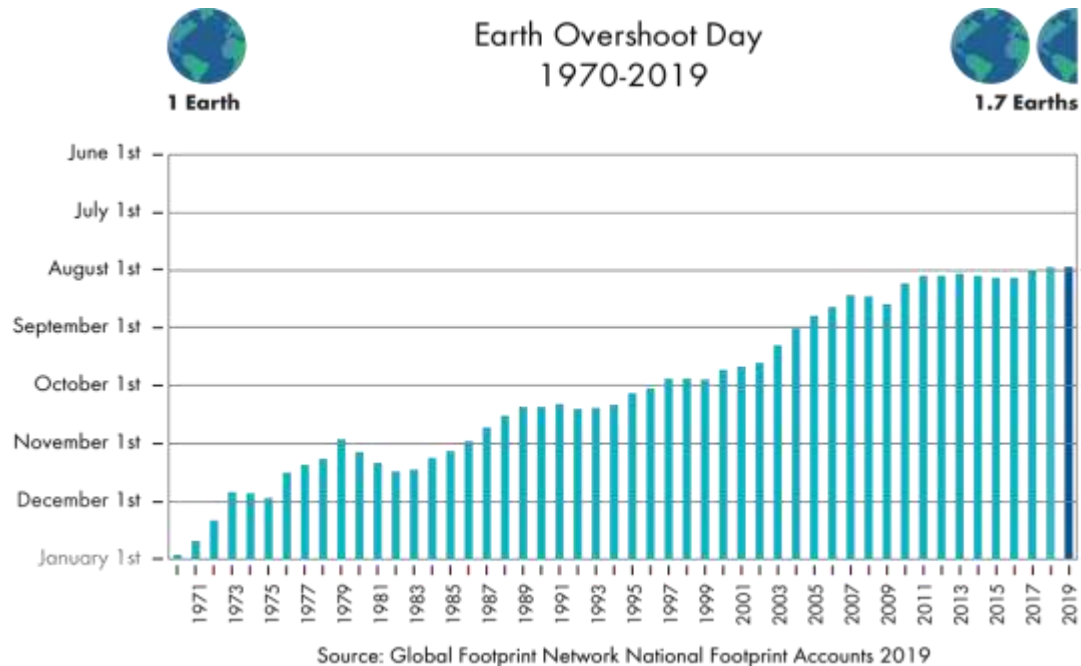
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Water scarcity

4



Earth overshootday



- 1970 – 29th December
- 1980 – 4th November
- 1990 – 11th October
- 2000 – 23rd September
- 2010 – 7th August
- 2019 – 29th July

Earth Overshoot Day 2019 is the Earliest Ever

The day when humanity exhausts its nature budget for the year, i.e. the day when annual ecological footprint of humans becomes greater than the planet's overall bio-capacity or the planet's ability to regenerate the losses encountered during the year.

Carbon emissions

Global GHG Emissions in 2018: 55.3 GtCO₂e (including agriculture & land use change)

Source : UNEP

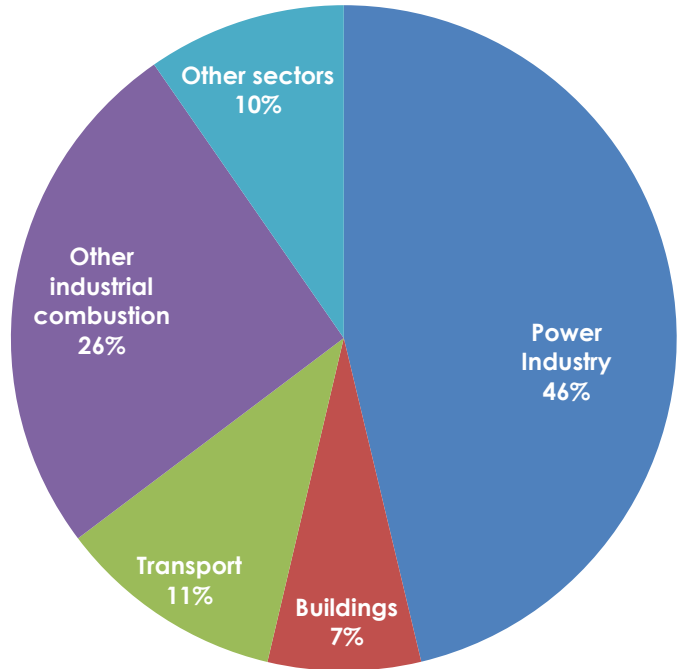
Global Energy Emissions, 2018 : 33.89 GtCO₂e (Energy related emissions)

Source : BP Stat 2019

India's emissions: Sector-wise

India : Energy Related Emissions 2018
Total : 2.48 billion tCO₂e
(7.3 % of Global)

Source : BP Stat 2019



Source : EU-EDGAR

Emissions gap by 2030

Today we still have the chance to limit global temperatures to 1.5°C. While there will still be climate impacts at 1.5°C, this is the level scientists say is associated with less devastating impacts than higher levels of global warming. Every fraction of additional warming beyond 1.5°C will result in increasingly severe and expensive impacts.

1.5°C

Scientists agree that to get on track to limit global temperature rise to 1.5°C, emissions must drop rapidly to 25 gigatons by 2030.

25 Gt

Our challenge: based on today's commitments, emissions are on track to reach 56 Gt CO₂e by 2030, over twice what they should be.

56 Gt

This figure is our global solution. Collectively, if commitments, policies and action can deliver a 7.6% emissions reduction every year between 2020 and 2030, we CAN limit global warming to 1.5°C.

7.6%

1.5°C: Action required

By 2030, emissions would need to be 25 per cent and 55 per cent lower than in 2018 to limiting global warming to below 2°C and 1.5°C respectively.

Longer the action delayed, greater the emission cuts required

Base year	Average emission cut required per year till 2030
	1.5°C
2010	3.3%
2020	7.6%
2025	15.5%

Today, even the most ambitious national climate action plans are far short of a 7.6% reduction.

The world now needs a **five-fold increase** in collective current commitments.

Sustainable Development Goals

On 25 September 2015, the 193 countries of the UN General Assembly adopted the 2030 Development Agenda titled "Transforming our world: the 2030 Agenda for Sustainable Development".



Fighting climate change on a national level



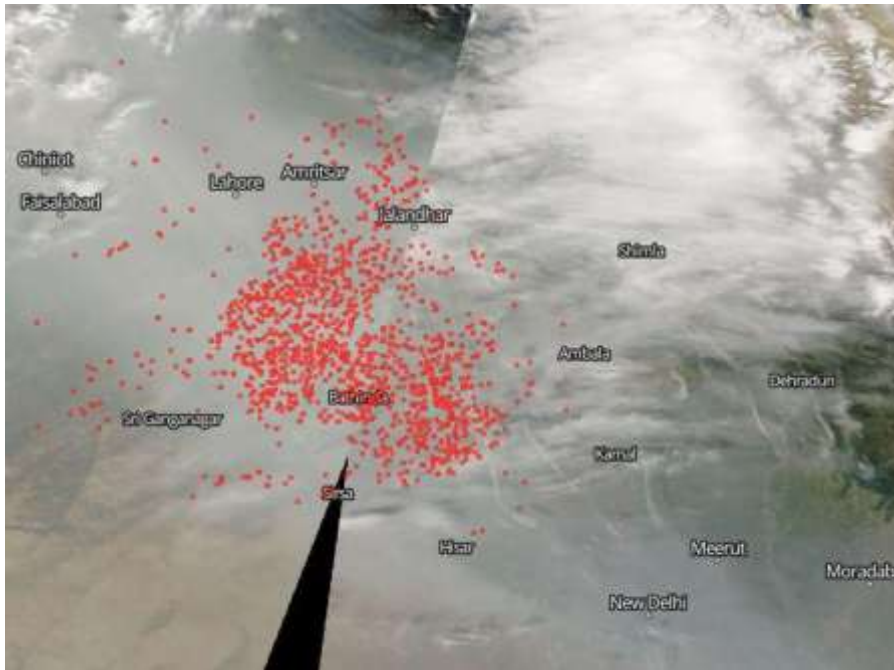
Targets Intended Nationally Determined

Contributions (INDC):

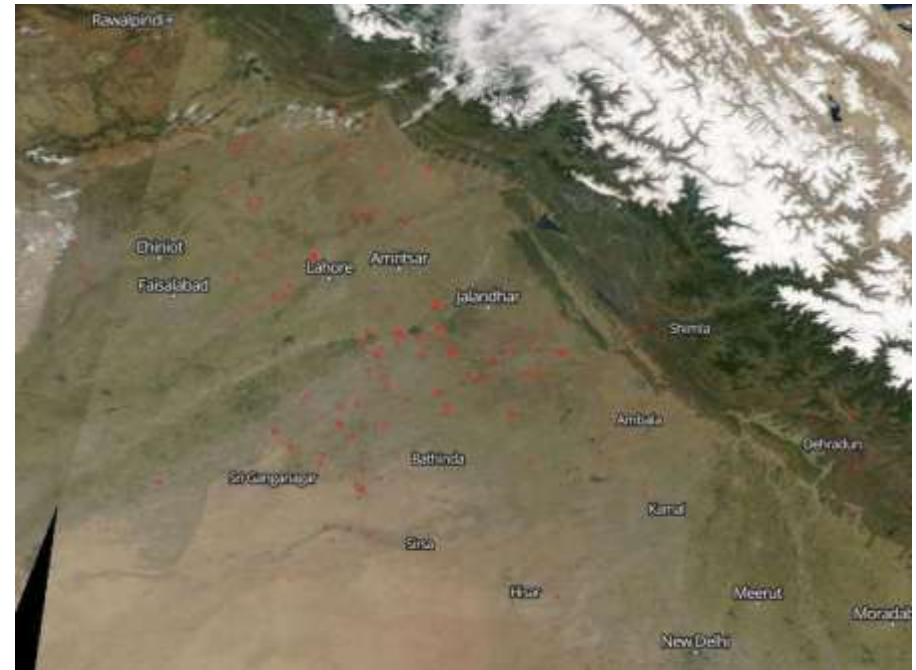
- Emissions intensity reduction : 33 - 35% by 2030 from 2005 level (emission intensity of GDP)
- Non-fossil fuel share of cumulative power generation capacity to be 40% by 2030
- Forest and tree cover: 2.5 -3 billion tonnes of CO₂e (additional carbon sink) by 2030

Source : India's INDC

Crop burning in India



1st November 2018



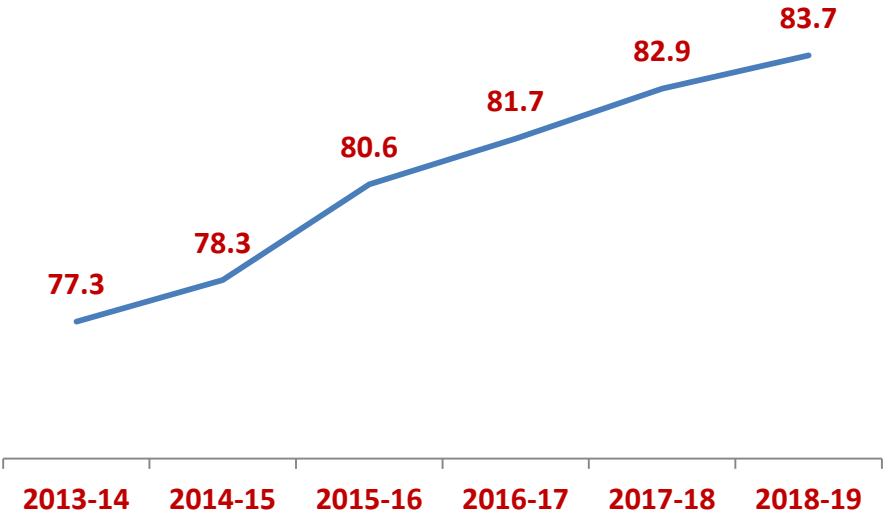
26th May 2019

- Majority of the Paddy Straw is burned in the fields.
 - Total dry biomass generated : 682 MMT
 - Total surplus crop residue : 179 MMT
 - Total crop residue burned : 140 MMT

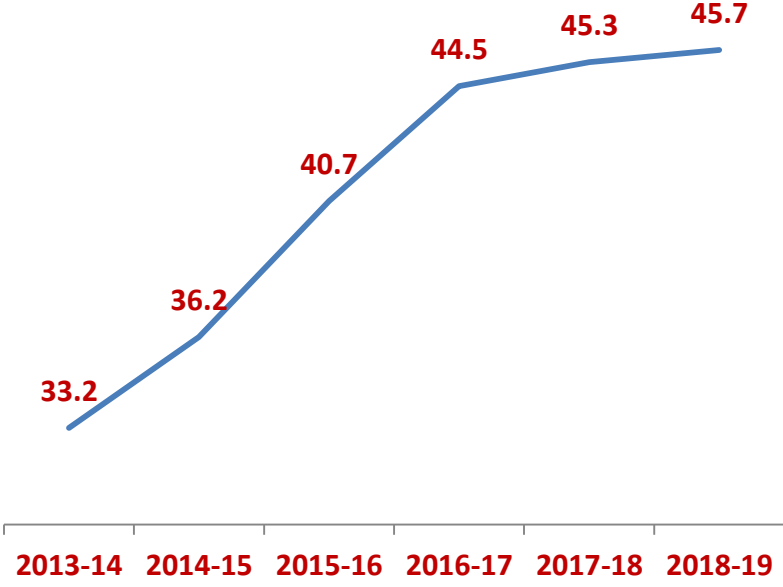
Crops burned during Winter & Summer

Import dependence

Import dependency in Crude (%)
(based on consumption)



Import dependency in Natural Gas (%)

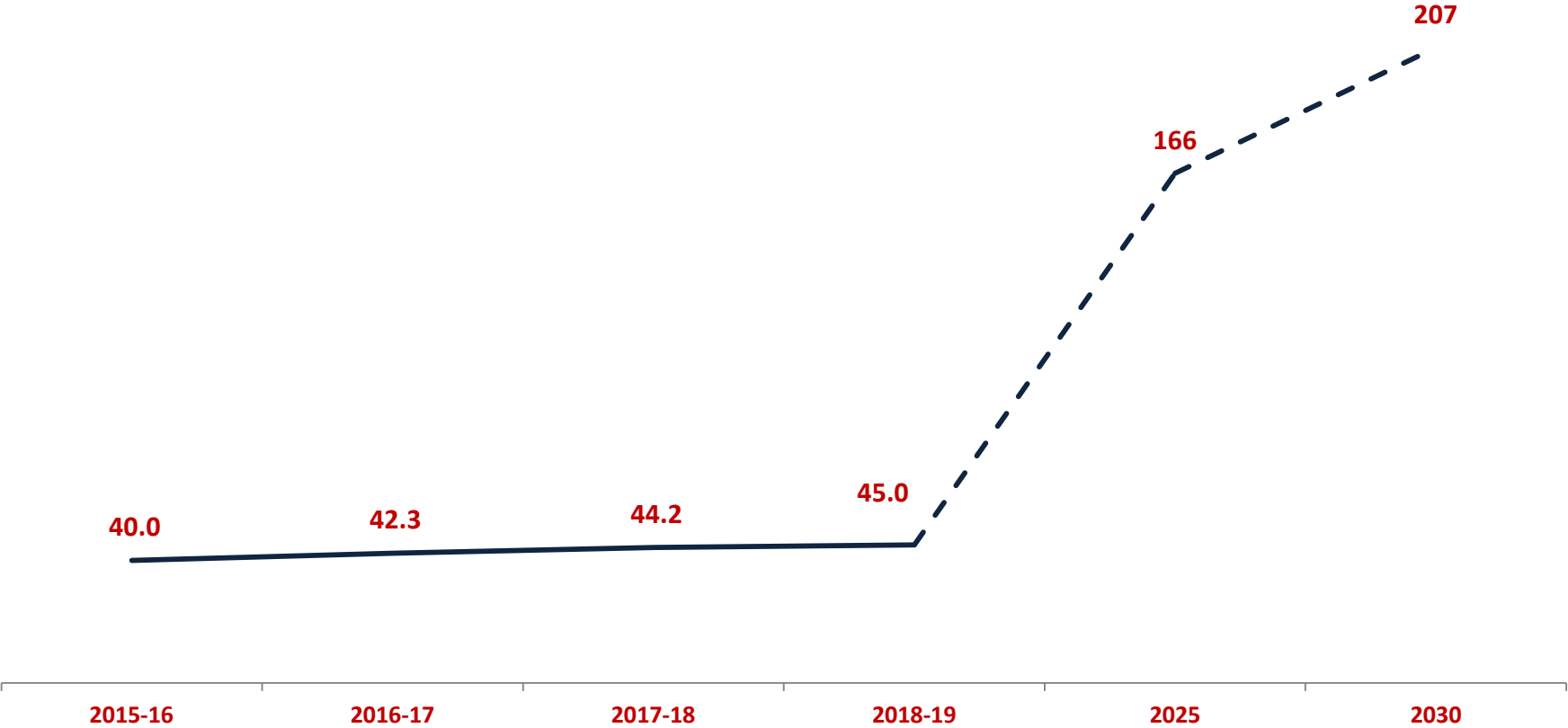


India – placed most vulnerably among major countries

Import dependence expected to rise to 92% by 2040

Natural Gas Consumption - India

In Million tonnes



~50% imported - Production of CBG can reduce imports of LNG

Source: PPAC for current data and PNGRB for projections

India's National Policy on Biofuels 2018



An indicative target of **20%** blending of ethanol in petrol and **5%** blending of biodiesel in diesel is proposed by 2030.



With a thrust on **Advanced Biofuels**, the Policy indicates a viability gap funding scheme for **2G ethanol Bio refineries** of **Rs.5000 crore in 6 years** in addition to additional tax incentives, higher purchase price as compared to **1G biofuels**.



Categorization of Biofuels into **Basic Biofuels** - First generation(1G) Bioethanol & biodiesel and "**Advanced Biofuels**" - Second Generation(2G) ethanol, drop-in fuels, **algae based** Third Generation(3G) Biofuels.



Increase scope of raw material for ethanol procurement by encouraging Intermediate (**B-Molasses**), Sugarcane Juice, other Sugar containing materials and damaged as well as surplus food grains.



Develop **National Biomass repository** by conducting appraisal of biomass across the Country.



Bio diesel production to be encouraged from non edible oilseeds, **used cooking oil**, short gestation crops and development of supply chain mechanisms.



Thrust on **research, development and demonstration** in the field of **Biofuel feedstock** production, advanced conversion technologies from identified feedstock.



Setting up of National **Biofuel coordination committee (NBCC)** under **Ministry of Petroleum & Natural Gas** and Working Group on Biofuels.

Categorization of Bio-fuels

Traditional Bio-Fuels

1G Ethanol (from molasses)

Bio-Diesel

Advanced Bio-Fuels

Bio-CNG

UCO based Biodiesel

Drop-in fuels

3G Bio-fuels (algae-based)

2G Ethanol (from ligno-cellulose)

Bio-Methanol

Di-Methyl Ether (DME)

Bio-Hydrogen

Biofuel economy of Rs. 1 lakh cr by 2023-24 (Industry)

Bio-fuel Source	Projected Quantity	Value of Bio-fuels Produced	Value of fuel to be replaced
		Rs. crore	Rs. crore
1G Ethanol	4670 TKL	21,200	35,000
2G Ethanol	400 TKL	2,340	3,000
3G Ethanol	33 TKL	200	250
Waste to Alcohols	100 TKL	600	750
Bio-Diesel	1000 TKL	5,000	6,500
CBG	15 MMT	83,000	1,35,000
Total		1,12,340	1,80,500

Blending

1. Ethanol Blending upto 2023-24 : 13%
2. Bio-diesel Blending upto 2023-24 : 0.7%
3. CBG shall form 9% of Natural Gas Consumption in 2023-24

Principles

1. 1G : Extensive discussion with Indian Sugar Mills Association for proposed plan of new distillery and augmentation of capacity to arrive at the ethanol availability projections.
2. 2G : 12 nos. of 2G Ethanol Plants of capacity 100 KLPD each planned on Industry basis by 2023.
3. 3G : 1 no. 3G Ethanol Plant of capacity 100 KLPD planned in Panipat Refinery by IOCL.
4. Waste to Alcohols : 3 Plants of capacity 100 KLPD planned by IOCL.
5. Bio-diesel : EOI for Used Cooking Oil based Biodiesel in line with SATAT model being floated on industry basis.
6. SATAT : 5000 Plants by 2023-24 of capacity 15 MMTPA of CBG.

SATAT Programme

- **Sustainable Alternative Towards Affordable Transportation (SATAT) launched on 1.10.2018**



**5000 CBG Plants
by 2023**



15 MMT of CBG

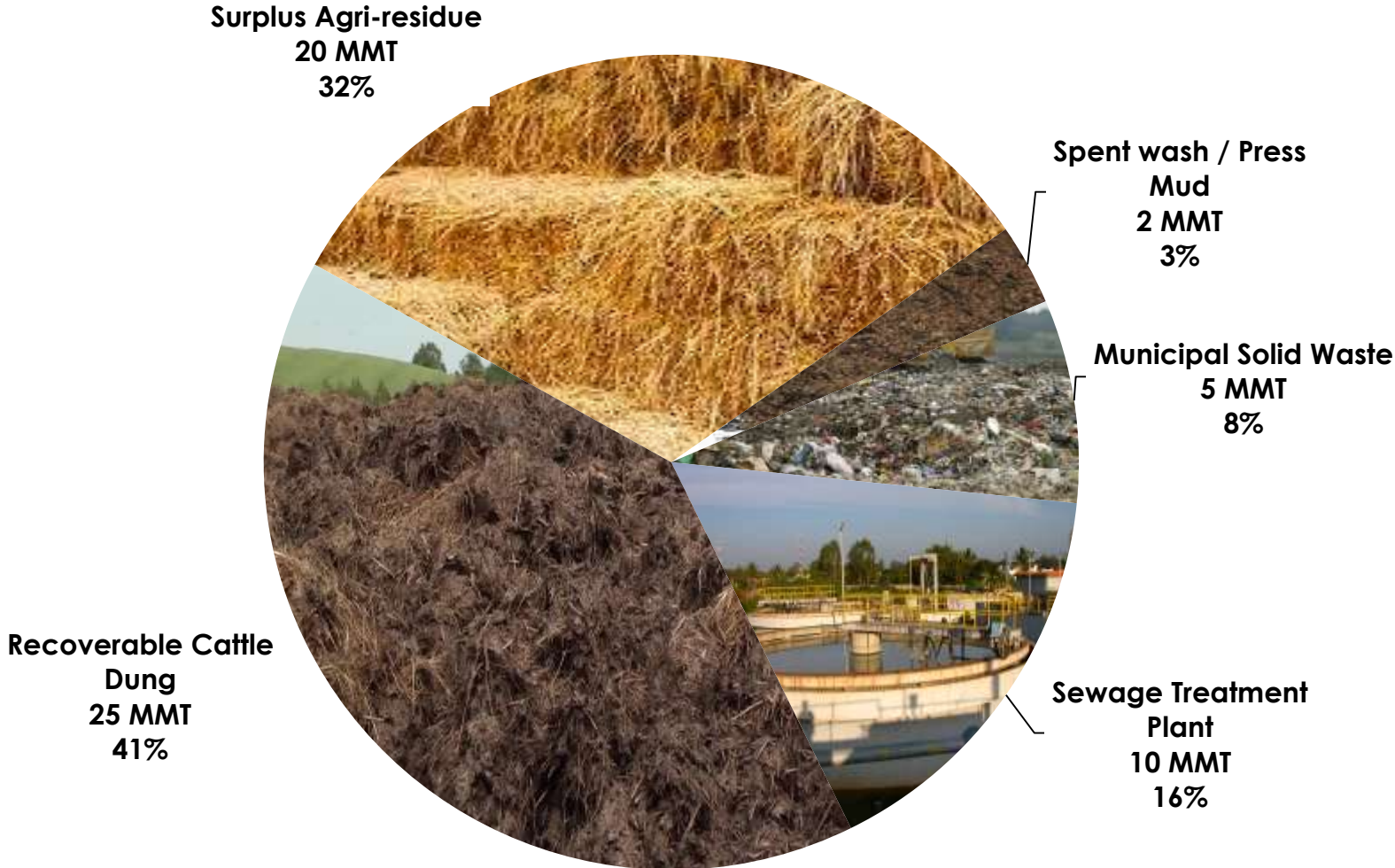


50 MMT of Bio-Manure

- **Capital investment of Rs 1,75,000 Crore**
- **OMCs invited Expression of Interest for production & supply of CBG to OMCs across India**

Fulfils all 4 pillars of our vision of India's energy future – energy access, energy efficiency, energy sustainability and energy security.

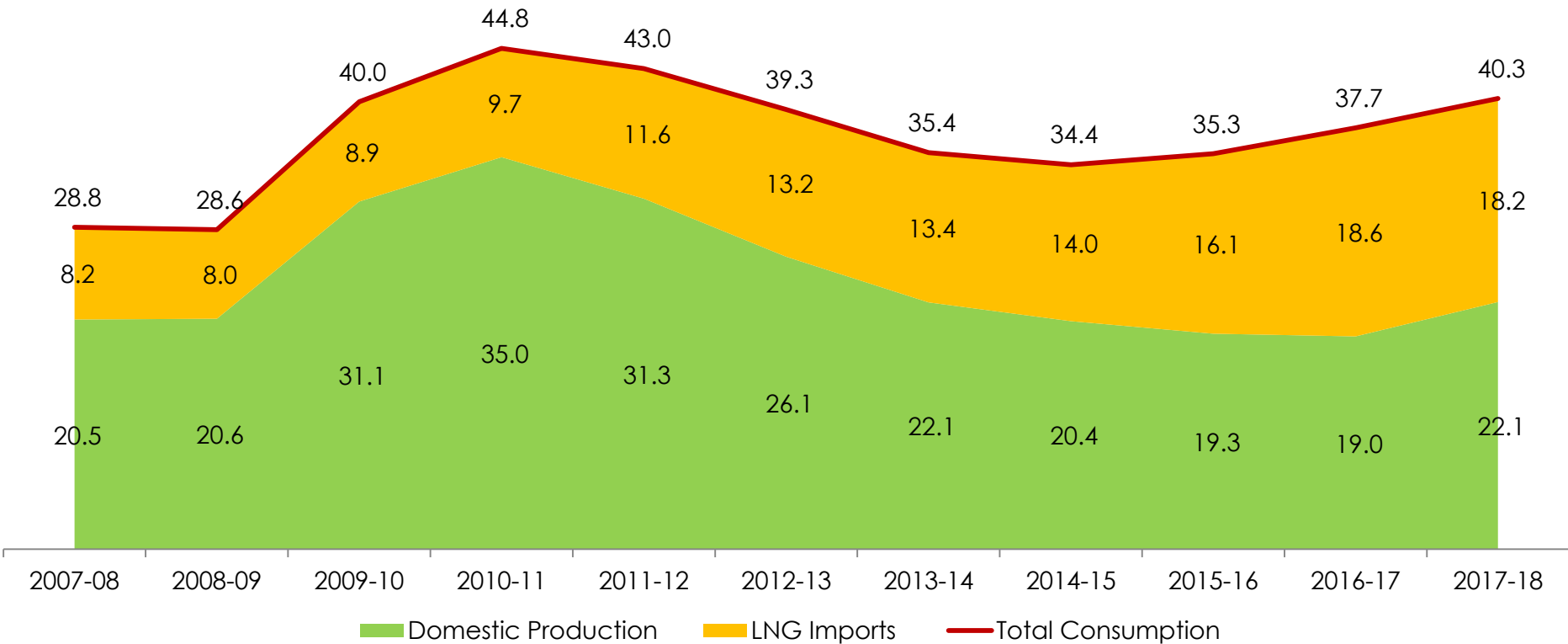
Compressed Bio-Gas (CBG) Sources in India



Total Bio-CNG potential: 62 MMT

Natural Gas Consumption - India

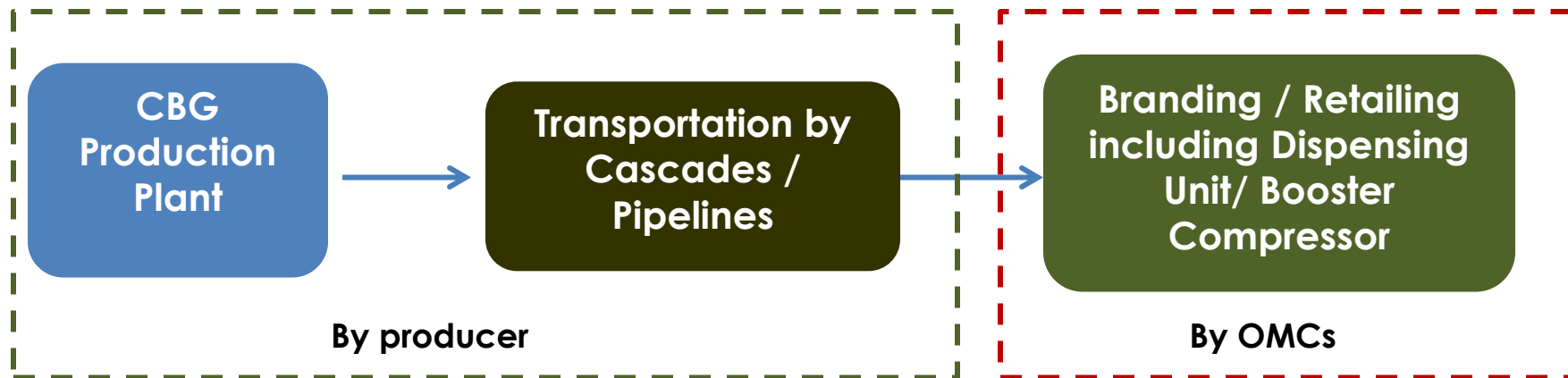
In Million tonnes



~50% imported - Production of Bio-CNG can reduce imports of LNG

Source: PPAC, March'18
Note : 1 MMTOE is 0.82 MMT of LNG

Business Model & Pricing



Pricing Framework of CBG

(to be retailed through OMCs / fixed for three years from 1.10.2018)

Item	Unit	Price
Basic Price of CBG meeting IS 16087 : 2016 standard, compressed at 250 bar and delivered at OMC Retail Outlet in cascades	Rs./kg	46.00
GST at 5%	Rs./kg	2.30
Total supply price (incl. taxes) to be paid to party	Rs./kg	48.30

Socio-Economic Benefits

- Reduction in import dependence
 - Investment in setting up of Plants, CBG Transport and Retailing Infrastructure
 - Employment Generation
 - Skill development across the value chain
 - Value creation in Rural Economy through employment and entrepreneurship
 - Boost to engineering Industries through 'Make in India' for all major equipments
-

Environmental Benefits

- As per international carbon accounting, CBG has zero associated carbon emissions,
- CBG is green substitute for Fossil fuel
- Reduction in emissions due to crop burning.
 - Burning of 1 tonne of Paddy Straw releases
 - 1.5 tonne of CO₂
 - 60 kg of CO
 - 200 kg of ash and many other pollutants
- Reduction in landfill emissions due to municipal and sewage waste

Sale of CBG

- **Noble Exchange Environment Solutions Pune LLP.**

- Location : Pune, Maharashtra
- RO : ABC Fuel Station
- Sale initiated on : 5.9.2019



- **Spectrum Renewable Energy Pvt. Ltd.**

- Location : Warna, Kolhapur, Maharashtra
- RO : Sri Krishna Saraswati Agency, Pargaon, Kolhapur
- Sale initiated on : 12.9.2019



1G Ethanol - EBP Programme (Industry basis)

Ethanol Supply Year	2017-18	2018-19	2019-20	2020-21	2021-22
Targeted Ethanol Blending (percentage)	3.80%	6.00%	7.00%	8.50%	10.00%
Ethanol Quantity Required (crore litre)	141	225	260	335	420
Ethanol Quantity Supplied (crore litre)	150.5	188.57	14.92*		
Blending %age achieved	4.24%	5.00%	3.37%	-	-

*Figures up to 13.01.2020

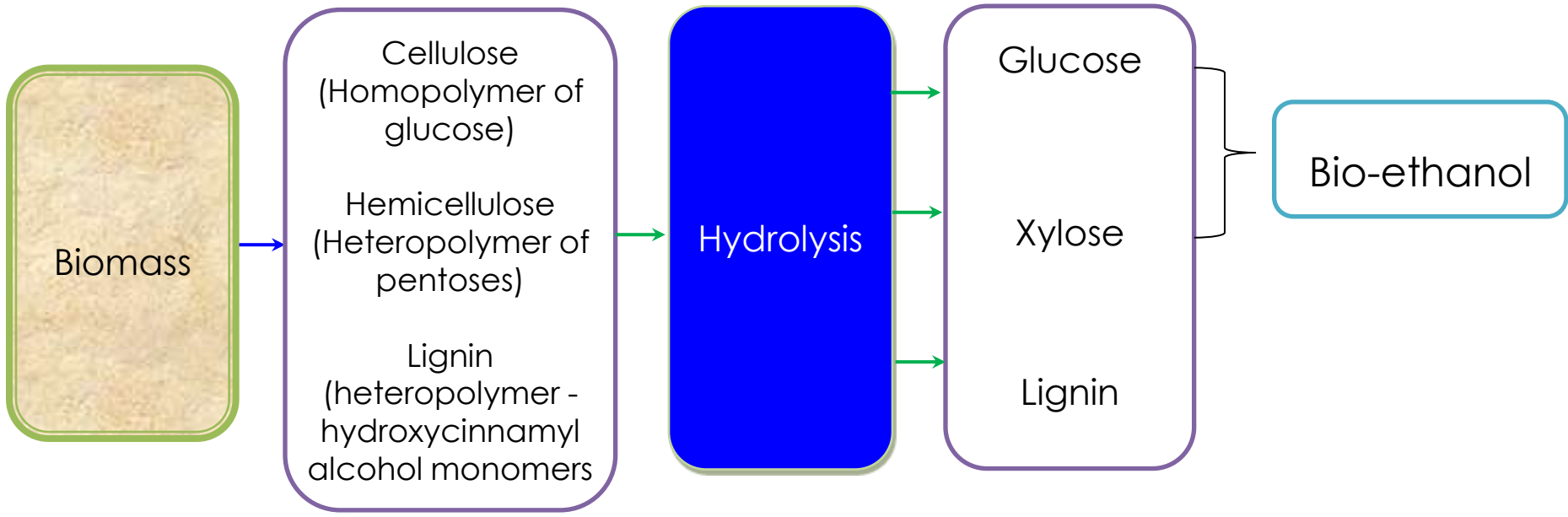
Policy indicates target of 20% blending of ethanol in petrol by 2030

Highest quantity of ethanol agreements signed during 2018-19 under the EBP Programme

In ESY 2019-20 no Ethanol Allocation received of State Odisha, Rajasthan , West Bengal, Jharkhand, Kerela and NE states . Time period 01.12.2019 to 13.01.2020 the prorata shortfall is 1.15 cr litre Industry basis

Considering the allocation received the Expected Ethanol Blending Industry wise will be 3.5 % by the end of ESY.

Ligno-cellulosic 2G Ethanol



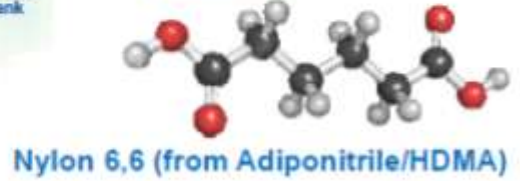
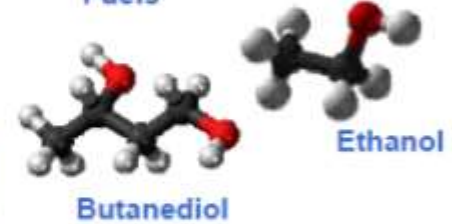
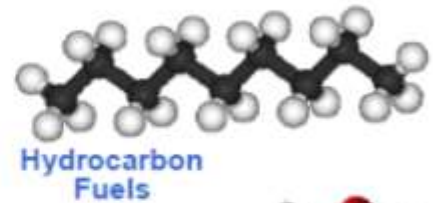
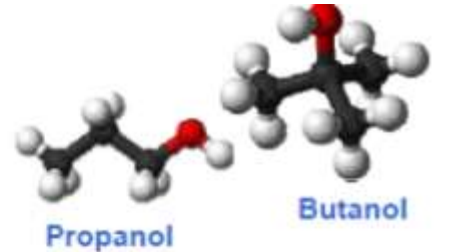
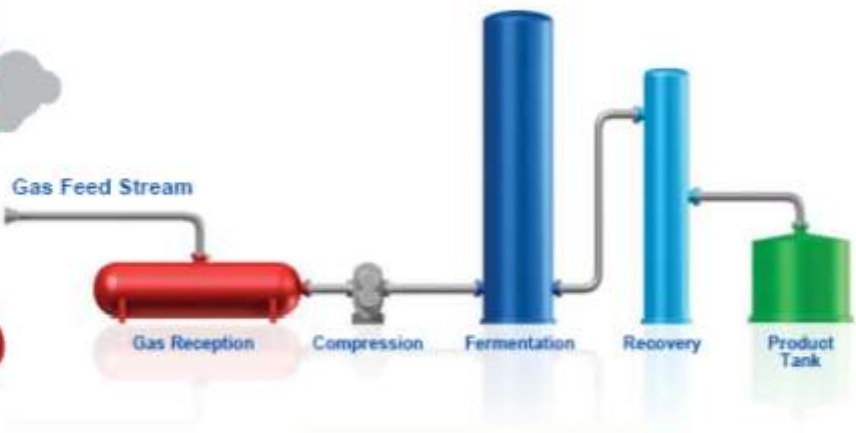
Plants of 100 KLPD each at Panipat (Haryana), Gorakhpur (UP) & Dahej (Gujarat)

3G Ethanol - Carbon Sequestration

Refinery Tail Gas to Ethanol Gas Fermentation Technology



Industrial off-gases



1st Plant in India being set up at Panipat Refinery of capacity 40 million litres of ethanol per annum

Plasma Gasification Technology

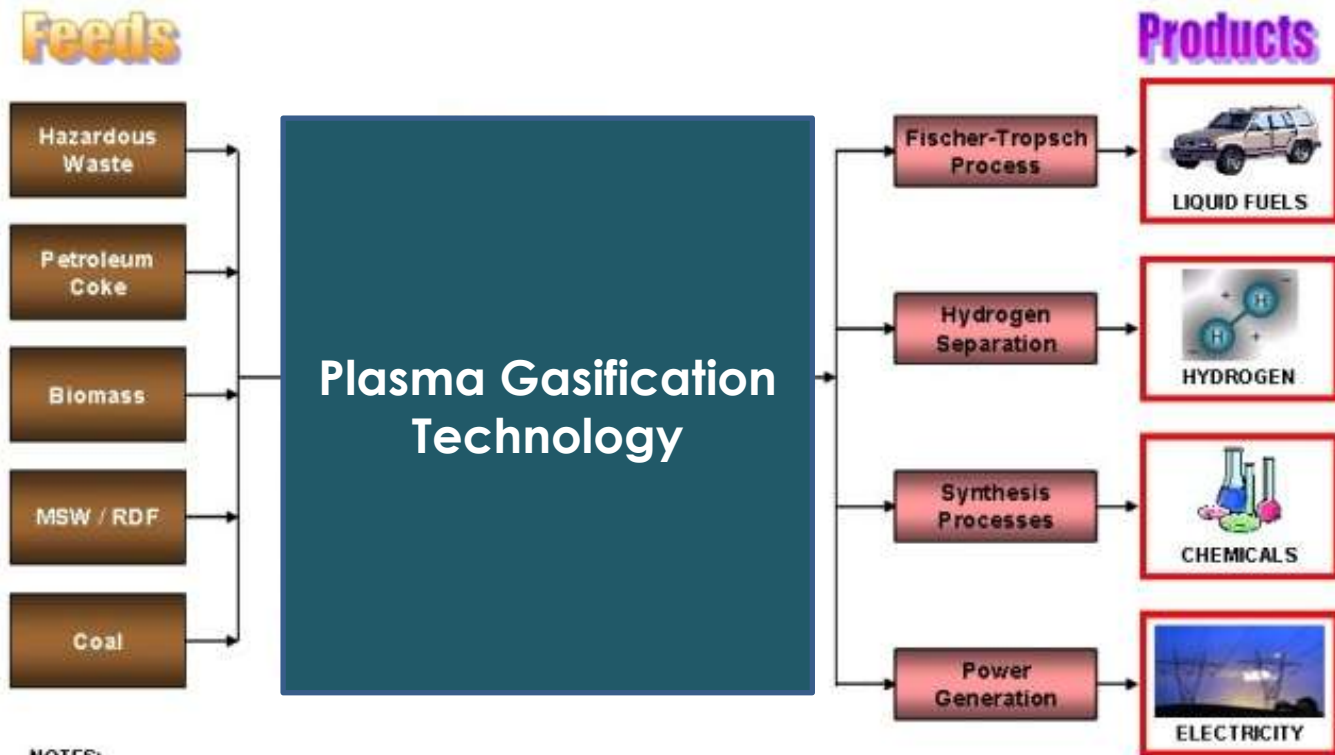
Input : Bio-mass / MSW

Process : Intense heat provided by a plasma torch and high temperatures

Output : Syngas

Product : Mixed alcohol (Ethanol / Propanol), Synthetic natural gas, Hydrogen

Capacity : 100 KLPD



NOTES:
MSW - Municipal Solid Waste
RDF - Refuse Derived Fuel

Biodiesel from Used Cooking Oil(UCO)

- Repurpose Used Cooking Oil (RUCO), is an initiative of Food Safety & Standards Authority of India (FSSAI). RUCO is an ecosystem that will enable the collection and conversion of UCO to biodiesel. Oil Marketing Companies are promoting this campaign of FSSAI.
- OMCs have floated Expression of Interest (EOI) for procurement of Biodiesel produced from UCO across 100 cities initially, on 10th August 2019. Eleven separate EOIs are being floated by OMCs , starting from 10th August 2019 to 9th September 2020.
- The purpose of inviting EOI is to encourage applicants to set up Biodiesel plants from Used Cooking Oil.
- Another 100 locations have been added in EOI floated on 10.10.19 thus making it 200 locations.

Biodiesel from Used Cooking Oil(UCO)

- Biodiesel Association of India & Food Safety and Standards Authority of India assessed the potential of UCO based Biodiesel as 222 crore litres per annum
- For the input of 10 tonnes of UCO, 9 tonnes of UCO based biodiesel can be produced
- Cost of setting up a 10 TPD Biodiesel Plant has been estimated at Rs 10 crore
- Capital investment of Rs 1,000 Crore is required for setting-up plants to a total capacity of 1000 TPD

Thank you...