



# 2G Bio-Ethanol Refinery Project, Bargarh, Odisha

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EU-India Advance Biofuel Conference



## Major JVs

BHART OMAN REFINERIES LTD.
PETRONET LNG LTD.
INDRAPRASTHA GAS LTD.
CENTRAL UP GAS LTD.
MAHARASHTRA NATURAL GAS LTD.
SABARMATI GAS LTD.
PETRONET CCK LTD.
MUMBAI AVIATION FUEL FACILITY LTD.
DELHI AVIATION FUEL FACILITY PVT LTD.
MATRIX BHARAT PTE LTD.
HARIDWAR NATURAL GAS PVT. LTD.
BHARAT STAR SERVICES PVT. LTD.
FINO PAYTECH LTD.

#275 ranking on Fortune  
2019 global list

Turnover  
\$47,020 million

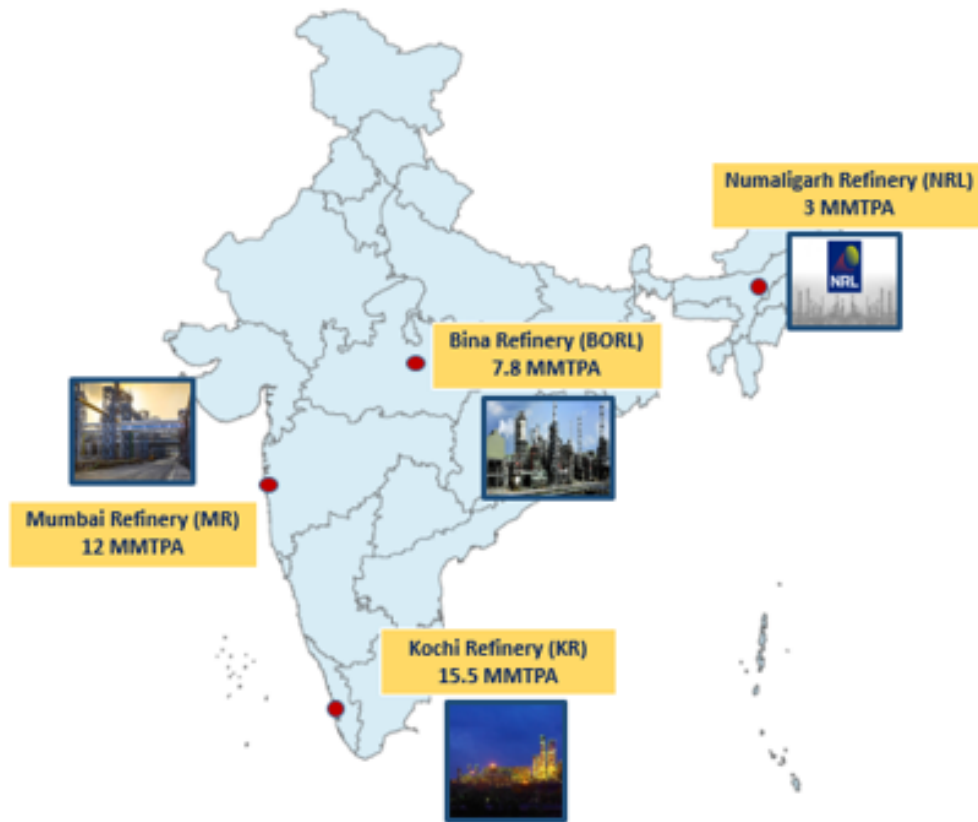
15% of the India's refining capacity  
(38.3 MMTPA)

Domestic market share of 21%  
during FY2018-19

Strong Workforce  
~12000



# BPCL REFINERIES IN INDIA



- Set up in 1955
- 12 MMTPA



- Set up in 1963
- 15.5 MMTPA



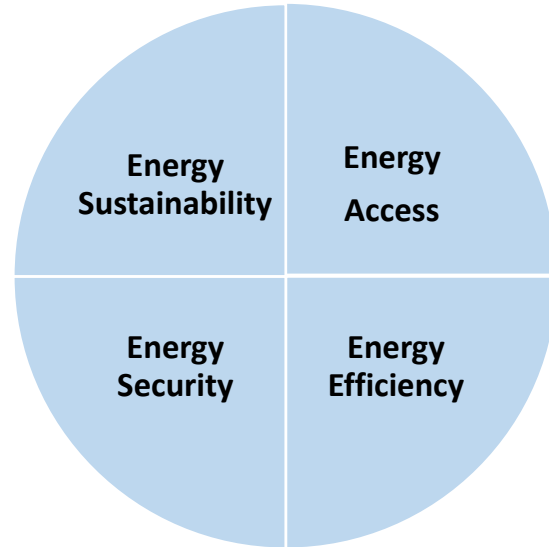
- Set up in 2009
- 7.8 MMTPA
- 50% holding



- Set up in 1999
- 3 MMTPA
- 61.65 % holding

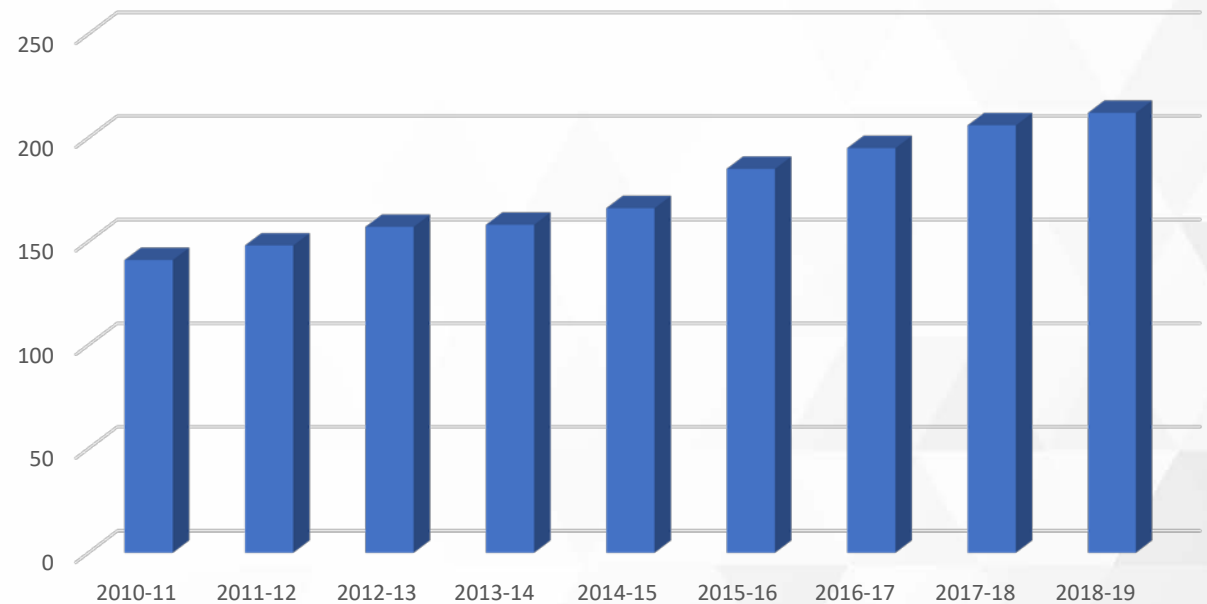


## National Vision on energy



- ❖ Aligning with the vision of Nation to enhance energy security and reduce import bill
- ❖ Reduction of GHG Emissions as signatory of Paris Convention on Climate Change

## Petroleum Products Consumption India (MMT)



**India's Petroleum Products consumption in 2018-19 ~ 212 MMT**



# Timeline of Biofuels Policies in India



## 2003 Ethanol Blending Petrol (EBP) Programme

- ❑ OMCs required to blend 10% Ethanol in petrol

## 2009 National Biofuel Policy 2009

- ❑ Indicative target of 20% blending of bio-Ethanol in petrol and 20% blending of biodiesel by 2017
- ❑ Focus on - Plantation of non-edible oil bearing plants, the setting up of oil expelling/extraction and processing units for production of bio-diesel was proposed.

## 2018 National Biofuel Policy 2018

- ❑ Target/timelines were revised due to issues on feasibility
- ❑ 20% blending of bio-ethanol in petrol & 5% blending of biodiesel in diesel by 2030
- ❑ Focus shifted to Advanced Biofuels- Second Generation (2G) Ethanol, Used Cooking Oil to Biodiesel and other 'Waste to Fuel' Technologies

## 2020 Advanced Biofuel Blending Obligations

- ❑ Draft Mandate for Advanced Biofuel Blending Obligations is under discussion



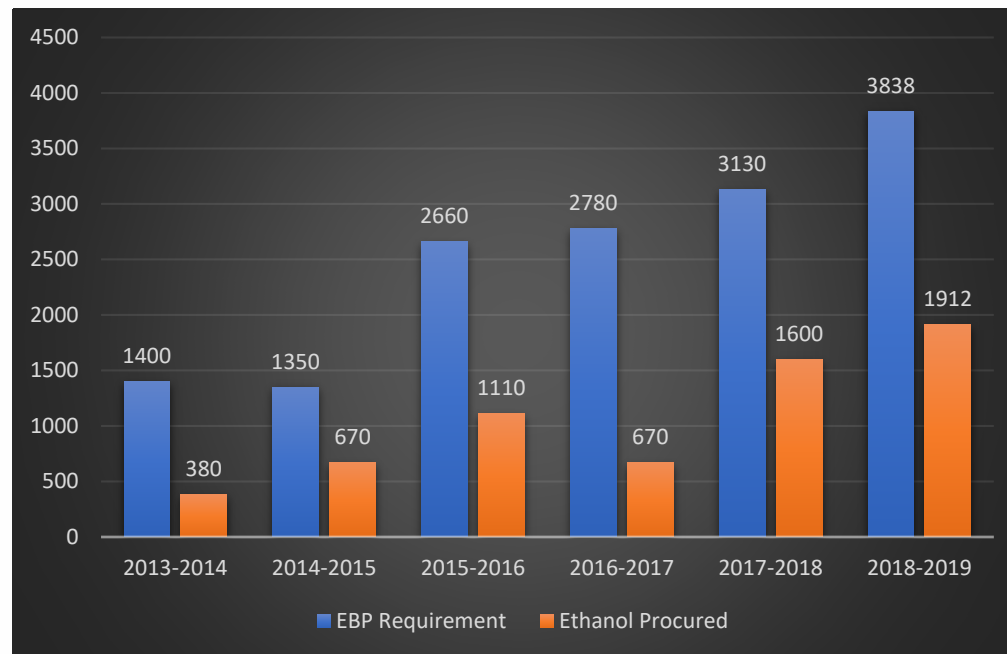


# Ethanol Blending Program in India

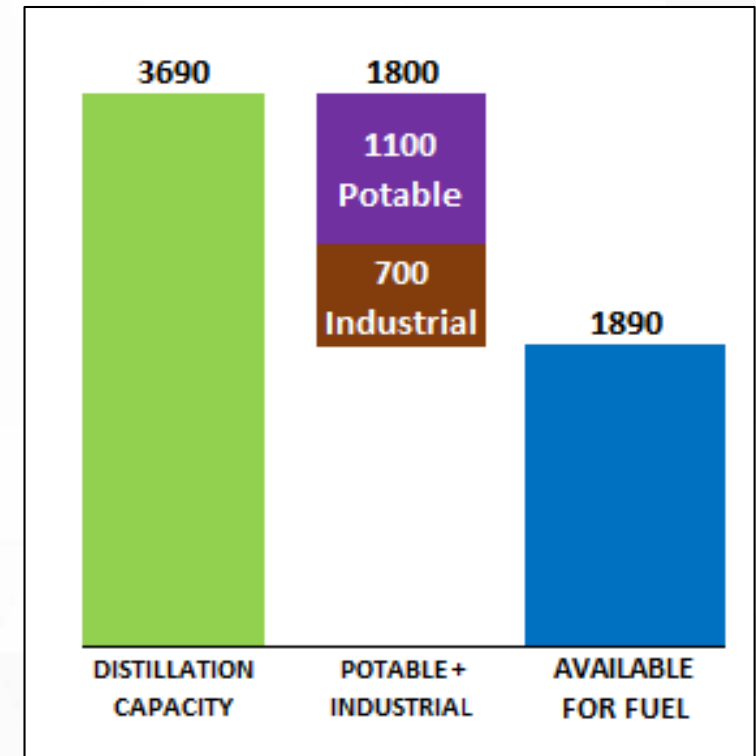


- Currently Ethanol blending percentage is around 4%.
- 4500 mn litres of Ethanol is required to meet blending requirement in 2022 (10% blending).

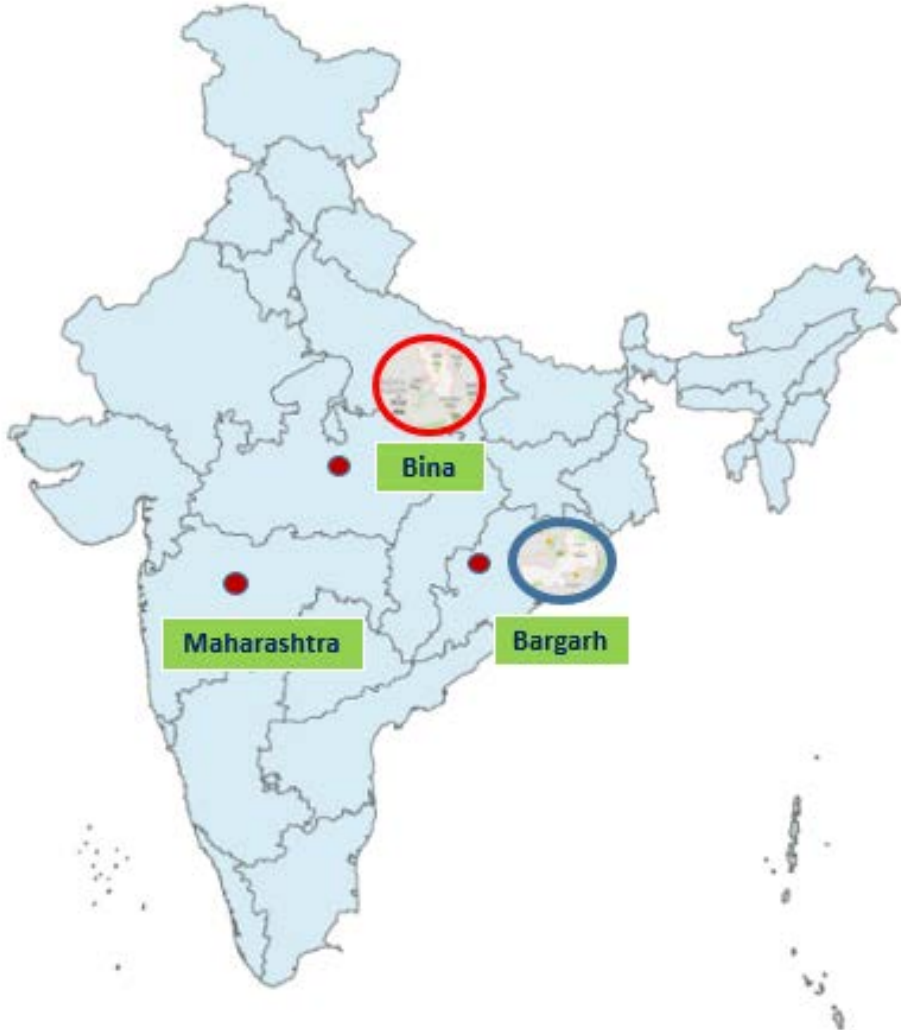
*Ethanol requirements and procurement by OMCs (mn. Ltr.)*



*Available C molasses based Ethanol capacity in India (mn. Ltr.)*



# BPCL'S PROPOSED 2G ETHANOL BIO-REFINERIES



<b>Location</b>	Baulsingha Village, Bargarh District, <b>Odisha</b>	Bina, Sagar District, <b>Madhya Pradesh</b>	<b>Maharashtra</b>
<b>Feedstock</b>	Rice Straw	Soya Stalk/ Wheat Straw	Rice Straw
<b>Project Status</b>	Execution stage	Awaiting Environmental clearance	Location to be finalized
<b>Output</b>	30 million litres 2G Ethanol per annum (100 KLPD)		



# Status: 2G Bio-Ethanol Refinery Project, Bargarh, Odisha



- ❖ Feedstock:
  - ✓ **Rice Straw – 488 Mt/day (12% Moisture)**
- ❖ Capacity:
  - ✓ **Approx. 100 KLPD Ethanol**
- ❖ Technology:
  - ✓ **Enzymatic Hydrolysis**
- ❖ Approved Project Cost:
  - ✓ **INR 1607 Crore (US\$ 226 million)**



- ❖ Location:
  - ✓ **Baulsingha Village, Bhatli Tehsil, Bargarh District, Odisha.**



**Licensor**

M/s Praj Industries Limited (PIL)



**PMC**

M/s Toyo Engineering India Pvt. Ltd. (TEIPL)



**LSTK**

M/s TATA Projects Ltd.





➤ Land Acquisition – <b>Completed</b>	●
➤ Licensor selection- <b>Completed</b>	●
➤ Final Basic Engineering Design Package (BEDP) – <b>Completed</b>	●
➤ Environmental Clearance – <b>Completed</b>	●
➤ Award of PMC contract - <b>Completed</b>	●
➤ Order placement of proprietary items - <b>Completed</b>	●
➤ Award of LSTK package – December 2019 - <b>Completed</b>	●
➤ Expected / Scheduled Date of Mechanical Completion of Project – March 2022	●

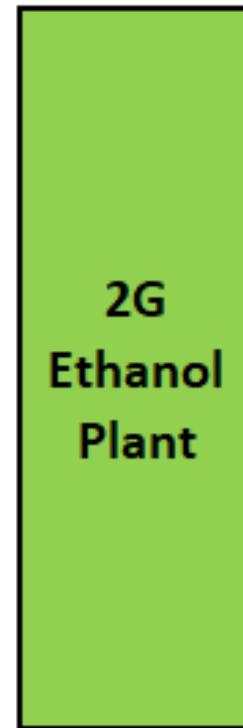


# Overall Mass Balance



Feed Biomass (Rice Straw) 488

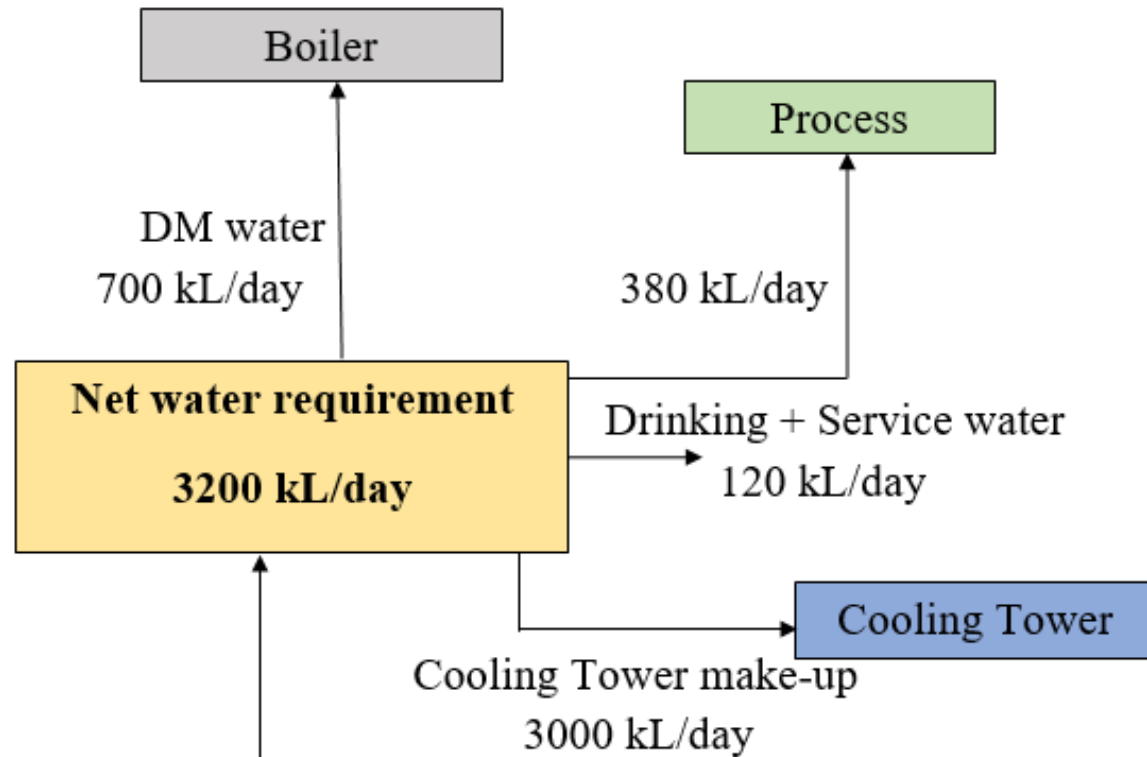
Chemicals/ Enzymes/ Yeast/  
Nutrients, Steam, Water etc.



Ethanol	80
Tech. Alcohol	1.59
Fusel Oil	0.26
CO <sub>2</sub>	78
Lignin Cake	476
Conc. Syrup	182

All figures in MT/day





**The Plant is designed for  
Zero Liquid Discharge (ZLD)**

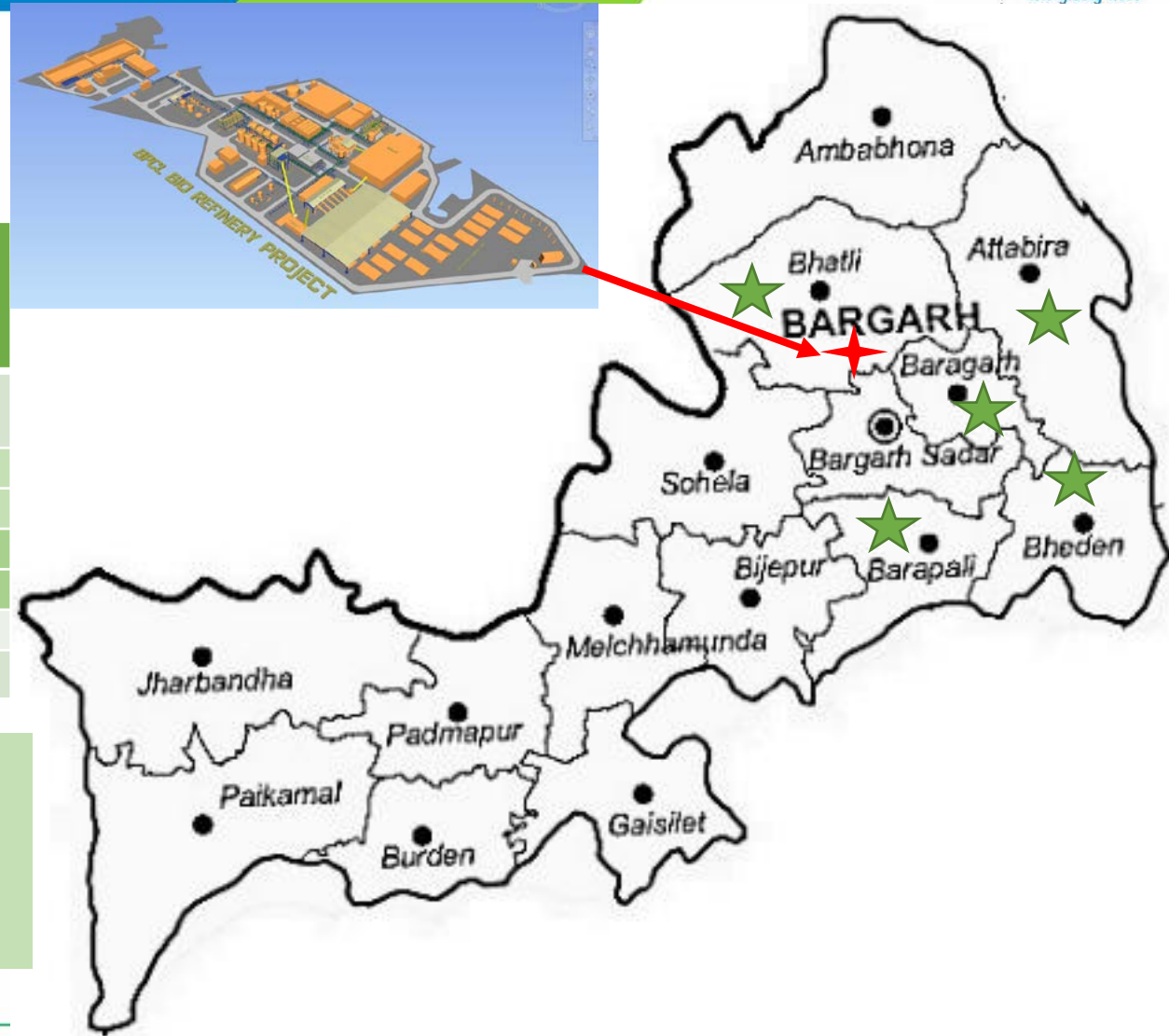
**Make-up Water Requirement to plant 3200 kL/day**



# Biomass Mapping



- Site is in Baulsingha village, Bhatli Tehsil, Bargarh District, Odisha.
- 11Km from Bargarh town and 7.8Km from Bhatli village.



S r.	Name of Block	Paddy Area of cultivation (in Acres)			Straw/Biomass Production (in Tons)			Biomass Requirement for livestock (in tons)	Net surplus biomass (tons)
		KHARIF A	RABI B	TOTAL C	KHARIF D	RABI E	TOTAL F		
1	Bargarh	52405	39304	91709	95335	71501	166837	95639	71198
2	Bhatli	50200	25100	75300	78071	39036	117107	71366	45740
3	Bheden	67375	52553	119928	151028	117802	268829	76887	191942
4	Attabira	55800	44640	100440	125885	100708	226593	104262	122331
5	Barpalli	50815	35571	86386	72686	50880	123566	66168	57398
	Total	276595	197167	473762	523005	379926	902931	414323	488609

- India has two major cropping seasons:
  - Kharif: June- October; Rabi: November-March
- **Bargarh** and **Bhatli** blocks are within 15Km radius from the plant site.
- **Attabira** and **Bheden** are high productivity blocks in terms of grain and biomass (within 20Km radius).
- **Low Average Land holding of Farmers** in Bargarh (1-2 Acres)

**Note:** The Annual Biomass requirement of 2G Ethanol Bio-refinery in Bargarh is 2,10,000 Tonnes







- Boundary Wall and Site Grading activities has been completed
- Geo technical Survey at site in progress
- Double circuit Laying of 33 kV Power Line for 17 kms: Approvals in progress
- Laying of Water Supply Line from Bargarh Canal to Refinery site for 10 kms: Approvals in progress
- Procurement of Additional Land to meet 33% Green Belt Requirement is in progress
- Widening of roads for handling huge trucks and tractors movements (Around 200 vehicles per day)



# Traffic Management



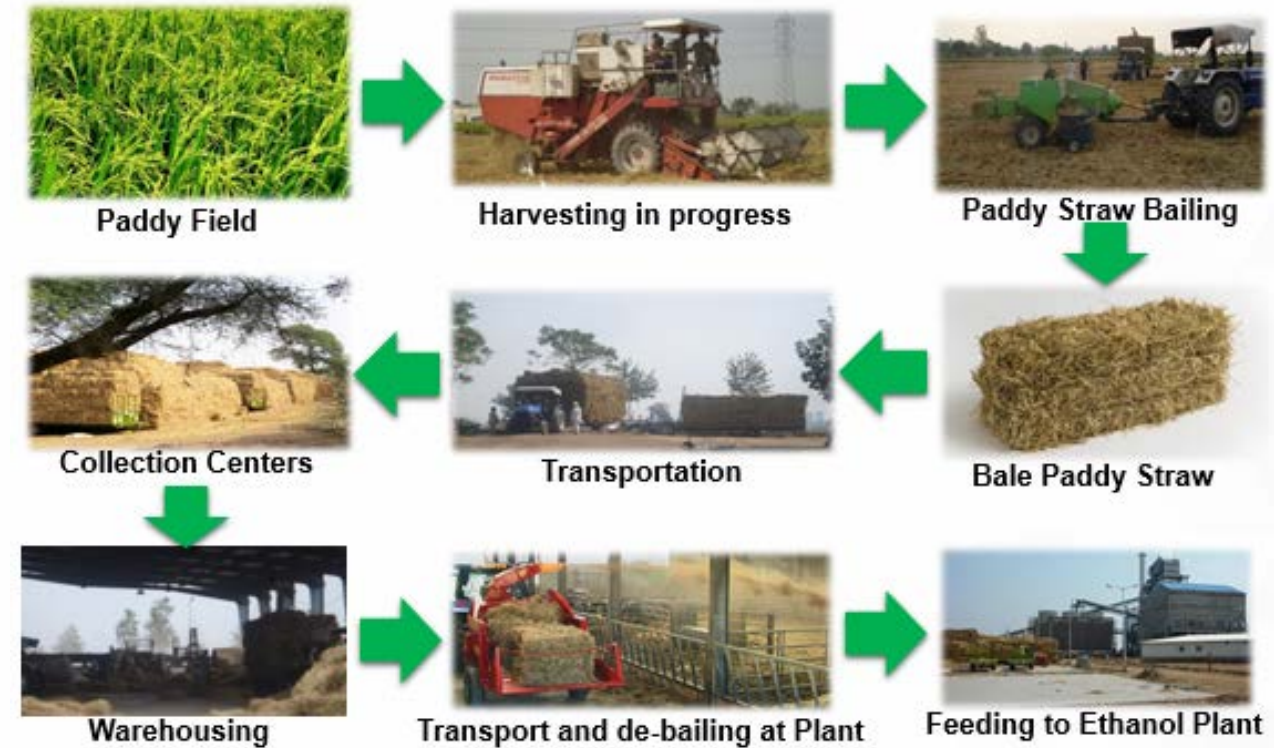
S.No	Product	Capacity of the truck/ tractor	No. of vehicles
1	Daily Biomass requirement	700 Tonnes	
2	No of trips with normal Tractor trailer for Biomass	2.5 T	280
3	No of trips with modified Tractor trailer for Biomass	4 T	175
4	Number of Ethanol trucks for 100 KL Ethanol produced	34 KL	3
5	Number of trucks for Ash disposal (Approx. 140 Tonnes)	4 T	35
6	Numer of tractor trailers for Mud disposal (Approx. 10 Tonnes)	4 T	3
7	Number of trucks for CO2 disposal (Approx. 50 Tonnes in liquified form)	10 T	5

- A minimum of 135 tractors and 43 trucks are estimated to enter Plant site.
- A maximum of 213 tractors and 43 trucks are estimated to enter plant site.



# PILOT STUDY TO BENCHMARK PARAMETERS WHICH IMPACT BIOMASS COST

- ✓ Moisture content.
- ✓ Storage & Handling losses.
- ✓ Potential threats deteriorating Quality.
  - ✓ Decomposition
  - ✓ Auto-methanation
  - ✓ Rodent damage
- ✓ Vetting of costs involved.
- ✓ Optimising primary & secondary transportation.
- ✓ Experience building in Operations involved.



**Proposed Biomass Supply Chain Model**



# NEW ARENAS & OPPORTUNITIES



- ❑ Scalability Challenges
- ❑ High CAPEX
- ❑ High OPEX
- ❑ Limited Equipment Supply vendors
- ❑ Biomass Supply Chain Challenges

Execution Challenges

Technological Challenges

- ❖ Water allocation & consistent availability
- ❖ High generation of Ash/Mud/CO<sub>2</sub> leading to disposal challenges
- ❖ Lignin Valorization can improve commercial Viability.
- ❖ Production of Bio-chemicals will generate revenue
- ❖ *In-situ* Enzyme production may improve economics

Policy Challenges

Funding challenges

- ❑ VGF Policy (PM JI-VAN Yojana) is not binding on state government for funding of 20% project cost from State Government

- ❑ Biomass depots by State Agricultural Departments.
- ❑ An exclusive area of operation has to be demarcated and other Biomass based units or industries should not be allocated within atleast 50KM radius.
- ❑ Integration of 2G Ethanol plants with 1G Ethanol and/or CBG Plants.
- ❑ 2G Ethanol plants to be setup near existing refineries.





# Proposed future initiatives for Value addition



- ❑ **CO<sub>2</sub> Valorization:** Approx. 75 Tonnes per day of Raw CO<sub>2</sub> is generated.
  - ❖ Various options for CO<sub>2</sub> valorization like Liquefaction, conversion to chemicals, soda ash etc. is being explored
  
- ❑ **Ash Valorization:** Approx. 140 Tonnes per day of Ash shall be generated
  - ❖ Ash valorization by utilization in Fertilizer, cement industry, brick industry, etc. is being explored
  - ❖ Ash generated is high in Silica content (more than 50%): Scope for Silica Extraction
  
- ❑ **Integration with CBG Plant:** Setting up integrated CBG plant at site is being explored
  - ❖ Bargarh shall be CGD Location in 3-5 years.



# Site Progress





# Thank You

