Proposed 60 KLPD Grain Based Distillery
At sr. no. 126,127&110 Village Kadwa-Mhalungi, Tal. Dindori, Dist. Nashik, Maharashtra

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1. Executive summary
Pernod Ricard India Private Limited (PRIPL) is proposing 60 KLPD grain based distillery due to emerging market demand. Grain requirement for the proposed project will be 160 MT/day. The area around distillery grows bajara, sorghum and paddy the raw material is available from the nearby area.

2. Introduction
2.1 Project proponent
Pernod Ricard is the world’s leader in the wines and premium spirits industry. It operates in more than 85 affiliates and 100 production sites. Pernod Ricard has chosen to focus on sustainable growth through a large portfolio of international brands and a high-end strategy, known as Premiumisation.

Pernod Ricard India Private Limited (PRIPL) proposes new 60 KLPD grain distillery plant at village Kadwa-Mhalungi, Tal.Dindori, Dist. Nashik, Maharashtra. Due to emerging market of extra neutral alcohol in the state of Maharashtra and the potable market in the adjoining states it is proposed to establish new distillery.

2.2 Nature of the project
Proposed production of 60 KLPD distilleries will be based on grain as the basic raw materials. Other raw material will be used as grains, enzymes, yeast, water, antifoam agents, caustic lye and HCl etc. The distillery proposes to achieve zero discharge by decantation, multi effect evaporation followed by DWGS dryer and the entire spent wash shall be used to achieve zero discharge.

2.3 Need of the Project
Alcohol production in the country has been lagging behind around 1500-1700 million liters per annum. Ethyl alcohol, alcohol, ethanol, spirit, denatured spirit, etc. these are various descriptions for this agriculture-based product. It is a globally traded commodity, and finds its way in pharmaceutical and chemical industries, across the world.

The use of agro-based alcohol for manufacture of industrial chemicals and fuel ethanol depends upon the crude oil prices. The recent trend of increase in the crude oil prices shows possibilities of greater use of agro based alcohol for various applications. This clearly indicates that all over the globe there will be tremendous demand for agro-based alcohol for industrial as well fuel purpose. The company proposes to manufacture ENA, rectified spirit, Technical alcohol from grains like sorghum, bajra, broken rice, etc.
2.4 Demand and supply gap

Alcohol has assumed very important place in the country’s economy. It is a vital raw material for a number of chemicals. It has been a source of a large amount of revenue by way of excise duty levied by the Govt. on alcoholic liquors. It has a potential as fuel in the form of power alcohol for blending with petrol & Diesel. Also, the fermentation alcohol has great demand in countries like Japan, U.S.A., Canada, Sri Lanka etc. as the synthetic alcohol produced by these countries, from naphtha of petroleum crude, is not useful for beverages.

The present availability of alcohol cannot meet the entire demand. The alcohol industry situation in India is characterized by continued demand supply gap, despite capacity additions over the years. Quantitative information for demand and supply gap for the alcohol is given in Table 1.

Table 1: Demand and supply gap

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Year</th>
<th>Alcohol production from</th>
<th>Total production</th>
<th>Total demand</th>
<th>Short fall</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2011-12</td>
<td>1677 55 30</td>
<td>1762</td>
<td>3123</td>
<td>1361</td>
</tr>
<tr>
<td>2.</td>
<td>2012-13</td>
<td>1719 185 60</td>
<td>1964</td>
<td>3312</td>
<td>1348</td>
</tr>
<tr>
<td>3.</td>
<td>2013-14</td>
<td>1823 370 90</td>
<td>2283</td>
<td>3515</td>
<td>1231</td>
</tr>
<tr>
<td>4.</td>
<td>2014-15</td>
<td>1934 740 120</td>
<td>2794</td>
<td>3731</td>
<td>937</td>
</tr>
<tr>
<td>5.</td>
<td>2015-16</td>
<td>2052 1300 150</td>
<td>3502</td>
<td>3964</td>
<td>462</td>
</tr>
</tbody>
</table>

2.5 Import V/s Indigenous generation

India has more than 300 distilleries, with a production capacity of about 3.2 billion liters of rectified spirit per year, almost all of which is produced from sugar molasses, and not from sugar juice, food grains or other cellulose feed stocks. The government's ethanol policy has led to over 110 distilleries modifying their plants to include ethanol production with the total ethanol production capacity of 1.3 billion liters per year. The current ethanol production capacity is enough to meet the estimated ethanol demand for the five percent blending ratio with gasoline. However, for a ten percent ethanol blending program, current ethanol production capacities will need to be enhanced by expanding the number and capacities of molasses-based ethanol plants and by setting up sugarcane juice-based ethanol production units.

2.6 Employment generation (Direct & Indirect)

The total man power required for the proposed distillery is around 150 nos.
3. Project description

3.1 Type of the Project
The proposed based on fermentation of grain starch for producing rectified spirit/ENA/technical alcohol.

3.2 Location of the project
The project is located at sr. no. 126,127, 110 Kadwa Mhalungi, post Valkhed, Tal. Dindori, Dist. Nashik, Maharashtra.

Figure 1: Location map of the proposed project

3.3 Details of the alternate sites
No alternate sites have been examined.
3.4 Size or magnitude of operation
The company proposes 60 KLPD distillery to manufacture ENA, rectified spirit, technical alcohol from grains like sorghum, bajra, broken rice etc. The products and by-products considered for manufacture are as given below,

- Rectified Spirit/ impure spirit/ENA/ technical alcohol/ Fusel oil
- DWGS/ (distilleries wet grain with soluble) / DDGS (distilleries dry grain with solubles)

3.5 Manufacturing process details
The distillery will use grains as raw material in the production of rectified spirit. The process description of alcohol production in using grain as raw materials is as follows,

3.5.1 Milling and flour handling
The incoming grain is first cleaned with the help of de-stoner and magnetic separators to remove stones and other material which may damage the hammers during milling. The grain is fed to hammer mill in controlled manner. In milling grains are crushed to flour of uniform size. Oversized screening rejects are segregated with the help of vibratory screen. These are taken to coarse bin before sending it to mill again. Intermediate hopper is provided for buffer capacity for flour storage. The flour is transferring to the mixing tank for slurry preparation process.

3.5.2 Slurry preparation/liquefaction
Slurry from pre-masher is taken to slurry cum liquefaction tank where both steam & liquefying enzyme are added. The mixture of slurry and steam is then provided with the desired retention time at a given flow rate. The cooking process, accomplished in the above manner, converts the slurry into a hydrated, sterilized suspension and is therefore susceptible to enzyme for liquefaction. Liquefied mash is cooled in slurry cooler and transferred to fermentation section.

The complete reaction of conversion of starch into ethanol can be represented as follows,
3.5.3 Sacharification and fermentation

**Yeast Propagation**
Yeast seed material is prepared in water cooled vessels by inoculating sterilized mash with active dry yeast. Optimum temperature is maintained by cooling water. The contents of the yeast vessel are then transferred to pre-fermentors. The pre-fermentors are filled with mash and loaded with contents of the yeast. The prefermentor contents are transferred to the main fermenters.

**Fermentation**
The purpose of fermentation is to convert the fermentable substrate into alcohol. To prepare the mash for fermentation, it may have to be diluted with water. The pH of the mash is adjusted to about 5.0 accomplished primarily by recycled slops (which also provides for nutrients) and by the addition of acid. Yeast is available in sufficient quantity to initiate fermentation rapidly and complete it in 54 to 60 hours. Significant heat release takes place during fermentation. This is removed by forced circulation cooling in external heat exchangers to maintain an optimum temperature of 30°C. The re-circulating pumps also serve to empty the fermentors into beer well. After the fermentors are emptied, they are cleaned with water and caustic solutions and sterilized for the next batch. The carbon dioxide evolved during the process is scrubbed to prevent ethanol emissions by process water, which is taken to beer well. The flow diagram of process description of grain spirit production is shown in Fig. 2.

**Wash to Extra Neutral Alcohol – MPR - Multipressure Distillation**
The distillation scheme consists of seven columns namely

1. Degasifying-cum-analyzer column- Operation under vacuum
2. Pre-rectification- Operation under vacuum
3. Exhaust column- Operation under vacuum
4. Extractive Distillation Column-Operation under pressure
5. Rectifier-cum- Exhaust column- Operated under pressure
6. Recovery/Fused Oil Column- Operated under pressure
7. Simmering Column- Operated under atmospheric or vacuum

The Fermented wash is preheated in a fermented wash pre heater and fed to the analyzer column. The vapors of the analyzer are fed to pre-rectifier column. Bottom liquid from pre-rectifier column is fed to stripper column. Impure spirit and fusel oil liquid streams from various columns are introduced in recovery
column for processing. Steam is supplied at the bottom of R/E column re-boiler, simmering column re-boiler & direct steam sparging is done in the recovery column.

For the ENA production top product of pre-rectifier is fed to purifier column whereas bottom liquid is fed to impure spirit purification column. Technical alcohol from the top of purifier column as well as fusel oil draws from pre-rectifier & R/E is fed to recovery. Final technical alcohol cut is taken from the top of impure spirit purification column whereas ENA is drawn from the bottom of the simmering column.

Figure 2: Process flow chart
3.6 Raw material requirement

The raw material requirement is given below,

Table 2: Raw materials

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Raw material</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Grains</td>
<td>160 MT/day</td>
</tr>
<tr>
<td>2.</td>
<td>Water</td>
<td>600 m³/day</td>
</tr>
<tr>
<td>3.</td>
<td>Electricity</td>
<td>1600 kW</td>
</tr>
<tr>
<td>4.</td>
<td>Agro waste</td>
<td>7 TPH</td>
</tr>
<tr>
<td>5.</td>
<td>Coal</td>
<td>3.5 TPH</td>
</tr>
<tr>
<td>6.</td>
<td>Steam</td>
<td>16 TPH</td>
</tr>
<tr>
<td>7.</td>
<td>Enzymes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Alpha Amylase</td>
<td>60 kg/day</td>
</tr>
<tr>
<td></td>
<td>- Amyoglucosidase</td>
<td>80 kg/day</td>
</tr>
<tr>
<td></td>
<td>- Neutrase</td>
<td>10 kg/day</td>
</tr>
<tr>
<td></td>
<td>- Viscozyme</td>
<td>20 kg/day</td>
</tr>
<tr>
<td>8.</td>
<td>Sodium Hydroxide</td>
<td>70 kg/day</td>
</tr>
<tr>
<td>9.</td>
<td>Antifoam Agent</td>
<td>200 Liter/day</td>
</tr>
<tr>
<td>10.</td>
<td>Sulphuric Acid</td>
<td>70 kg/day</td>
</tr>
<tr>
<td>11.</td>
<td>Urea with 46% Nitrogen</td>
<td>150 kg/day</td>
</tr>
<tr>
<td>12.</td>
<td>Dry Yeast</td>
<td>1 kg/KL of spirit produced</td>
</tr>
</tbody>
</table>

3.7 Resource Optimization / recycling and reuse

Spent wash generated during the process of fermentation, will be treated in multiple effective evaporators to concentrate the solids and concentrated syrup along with wet cake will be dried in dryer. This is known as distilleries dry grain with solubles (DDGS). This will be sold as cattle feed/poultry feed/ Fish/ prawn farms. The condensate generated during the process of multiple effective evaporators and drying will be reused in the process thus decreasing the net water requirement.

3.8 Project requirement

3.8.1 Availability of Water

Fresh Water requirement for the proposed project after recycle of process streams will be 600 m³/day. Water requirements for the proposed project will be met from Karanjwan Dam. Prior permission from the Irrigation Department is obtained for drawing water. A water storage tank will be proposed on site to ensure adequate water supply. Efforts will be taken to minimize & conserve water.
3.8.2 Power requirement
The power required for the industry is estimated to be 1600 KW. The power requirements will be met using the captive system 2.0 MW considered in new distillery proposal.

3.9 Quantity of wastes generation
3.9.1 Liquid Waste Generation
The spent wash from proposed grain distillery will be subjected to decantation to separate out wet cake and 9% w/w solid thin slope will be fed to evaporator. The thick syrup @ 35 % solids after the evaporation would then fed to DWGS drier to produce DDGS at 88-90% w/w solids which will be sold as cattle feed.

The boiler blow down, DM plant, softener regeneration water will be treated in a neutralization tank and after treatment it will be mixed with cooling tower blow down.

Process condensate from evaporation section will be partly recycled and balance will be treated in process condensate treatment plant and steam condensate will be recycled back to the boiler.

3.9.2 Solid Waste generation and management
The following will be the solid waste generation & disposal,

Figure 2: Effluent Treatment flow chart
**Proposed 60 KLPD grain based distillery**

**Prefeasibility report**

### Table 3: Solid waste generation and disposal

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Solid waste</th>
<th>Quantity</th>
<th>Disposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ETP sludge (wet/dry)</td>
<td>500 kg/day</td>
<td>Used as manure</td>
</tr>
<tr>
<td>2.</td>
<td>Boiler ash</td>
<td>25-30 TPD from coal</td>
<td>Ash generated will be sold to brick manufacturers</td>
</tr>
<tr>
<td>3.</td>
<td>DDGS/Wetcake</td>
<td>40-45 TPD/ 155-160 TPD</td>
<td>Will be sold as cattle feed / Fish feed</td>
</tr>
</tbody>
</table>

#### 3.10 Schematic representation of the feasibility drawing which give information of EIA purpose

![Schematic drawing](image)

#### 4.0 Site analysis

**4.1 Connectivity**

Details of connectivity towards proposed site is given below

<table>
<thead>
<tr>
<th>Mode</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road</td>
<td>Saputara- Nasik Road: 3.5 km</td>
</tr>
<tr>
<td>Railway</td>
<td>Nasik road railway station : 32.65 km</td>
</tr>
<tr>
<td>Air</td>
<td>Gandhi Nagar airport: 30.66 km</td>
</tr>
<tr>
<td>Nearest town/city</td>
<td>Dindori 5 km, Nashik 26.87 km</td>
</tr>
</tbody>
</table>

**4.2 Land form, land use and land ownership**

The total land is in possession with management. Land is use for industrial use, roughly plane with some scanty vegetation.

**4.3 Topography**

The topography of the land is flat without any undulations.

**4.4 Existing land use pattern**

The existing land is industrial use land.

**4.5 Existing Infra structure**
Maximum resources like water, power and road connectivity are available.

4.6 Soil classification
The soil at the site is medium light brownish black soil.

4.7 Climate
The climate of Nashik district is characterized by general dryness throughout the year except during the south-west monsoon season. The maximum temperature in summer is 42.5°C and minimum temperature in winter is less than 5°C. Relative humidity ranges from 43% to 62%. The normal annual rainfall in the district varies from about 500 mm to 3400 mm.

4.8 Social infrastructure available
Social infrastructure like community center, hospital and electricity is available in Dindori.

5.0 Planning Brief
5.1 Planning Concept
The proposed grain based distillery will be manufacturing rectified spirit/ENA/absolute alcohol/ impure spirit viz. fermentation, multi pressure distillation, spent-wash evaporation through MEE and decanter. Concentrated spent wash called as DDGS and it will be used as cattle feed.

5.2 Population projection
The proposed activity will generate total 150 skilled and unskilled employee opportunities. No influx, migration of population is expected as labor shall be deployed from the local villages.

5.3 Land use planning
Total plot area available with existing distillery is 25 acre. Total build up area is 5700 m² and green belt area is 6845 m².

5.4 Amenities/Facilities
Facilities like canteen, rest rooms and recreation facilities will be provided for the proposed project.

6.0 Proposed infrastructure
6.1 Industrial area
The major plant & machinery required for the proposed project is as given below,

**List of machinery and equipment’s**

1. Grain Storage Section – Silo
2. Grain Handling Section
3. Liquefaction Section
4. Fermentation Section
5. Distillation Section
6. Steam Boiler with Accessories
7. Steam condensers
8. Air compressor
9. Storage section (Daily Receiver Section, Bulk Storage tanks)
10. Centrifugal Machines
11. DDGS Drying section
12. Multiple Effect Evaporation Section
13. Raw water treatment plant
14. R.O./DM Plant for boiler water
15. Fire protection equipment’s for entire plant
16. Weigh bridge
17. Water storage tanks
18. Electricals
19. Piping works
20. Lab equipment’s

**6.2 Residential area**

Facilities like canteen, rest room and indoor games facilities will be provided in the proposed project. Local labor from nearby villages will be hired in project activity.

**6.3 Green belt**

Total 6845 sq.m. (33% of total area) of Green belt will be developed in proposed project premises.

**6.4 Social Infrastructure**

Factory will identify the need of the villagers and execute the CSR activity.
6.5 Connectivity
Site is well connected with by state highway-22 (Dhule - Chalisgaon - Daulatabad) 10.73 km, Saputara – Nashik road 3.6 km, NH- 360 (Ganddevi-Chandwad) 14.33 km, National highway 3 (NH3- Mumbai-Agra) 22 KM away from the project site.

6.6 Drinking water management
Drinking water required for the workers will be met from Karanjwan Dam through proper water treatment system.

6.7 Sewerage system
Domestic waste water generated will be treated in septic tank via soak pit.

6.8 Industrial waste management
Spent wash will be passed through decanter and then the thin slop from decanter will be sent to Multiple Effect Evaporators (MEE) followed by Dryer. The dried solid product solid is known as DDGS and it will be used as feed for cattle feed/Poultry/fish.
Process condensate from evaporation section will be partly recycled and balance will be treated in process condensate treatment plant and steam condensate will be recycled back to the boiler, water treatment plant rejects will be treated in secondary effluent treatment plant. Spent lees recycled back in cooling tower make up water.

6.9 Solid waste management
Solid waste generation detains described earlier in 3.9.2, Table 3.

6.10 Power requirement & Supply / Source
Power requirement will be met through own 2.0 MW power plant.

7.0 Rehabilitation & resettlement plan
No rehabilitation or resettlement will occur. Hence no rehabilitation or resettlement plans.

8.0 Project schedule and cost estimate
The cost of project has been estimated at Rs. 100 crore, which comprises of civil construction, plant & machineries, misc. fixed assets, pre-operative expenses & margin money for working capital. A provision for
contingency has been made to take care of inflation and changes due to delays if any. Cost for environment management has been estimated to 2.59 crore.

9.0 Analysis of Proposal

A financial and social benefit has been considered while analyzing the proposal. The proposal is environmental compatible and will helps to people improving their financial status of the local people. Ancillary developmental activities like Cattle feed plants will be created due to the establishment of the proposed unit. Corporate Social Responsible (CSR) program shall be executed on need base.