



Ref. No.: ABRPL/EOI/Enzyme

Date: 11.07.2019

**Expression of Interest (EOI) for manufacture and supply of Enzyme for production of cellulosic ethanol at Numaligarh, Assam**

Assam Bio Refinery Private Limited (ABRPL) intends to invite Expression of Interest (EOI) from interested Domestic/International manufacturers of enzymes for production of cellulosic ethanol and supply of the same on a long term basis for the bio ethanol plant being developed by ABRPL at Numaligarh, Assam.

The bidder/companies shall manufacture and supply enzymes as per the preliminary scope of work identified as below:

1. Objective of EOI:

- a. ABRPL intends to invite Expression of Interest from prospective manufacturers to manufacture and supply requisite quantity of suitable enzymes at Numaligarh, Assam.
- b. Enzyme is the key raw material for cellulosic bio ethanol production and the amount required depends upon enzyme composition and performance and it differs from one manufacturer to another.
- c. ABRPL, through this EOI intends to collect information about feasibility and availability of requisite Enzyme so as to ensure long term supply of the same in a sustainable way for the proposed bio refinery plant.

2. About Assam Bio Refinery Private Limited:

Assam Bio Refinery Private Limited (ABRPL or Company), is a Joint Venture (JV) Company between Numaligarh Refinery Limited (NRL), Chempolis OY, Finland and Fortum 3 B.V. Netherlands. The Company proposes to produce eco-friendly bio-ethanol, acetic acid and furfural/furfuryl alcohol from bamboo biomass. The project targets at larger production of sustainable bio-fuels in India to reduce India's dependence on imported petroleum. The bio-refinery will be based on Chempolis' 2nd generation bio-refining technology, which enables selective fractionation of biomass and co-production of multiple products in a sustainable way.

3. Background:

In 2008, Government of India announced its national policy on Bio fuels mandating a phase wise implementation of the program of ethanol blending in petrol in various states to the tune of 5%. However, due to shortage of ethanol, the program hadn't had much success. Learning from the past experiences, demand & supply status, government has revamped the program and has come out with National Policy on Bio fuels – 2018, wherein an indicative target of 20% ethanol blending in Petrol is proposed by 2030. Moreover, government is encouraging production of ethanol derived from multiple feedstock, second generation ethanol technologies and its commercialization.



#### 4. Implementation Model:

- a. ABRPL shall invite bids from prospective Enzyme manufacturers who are willing to develop and supply enzyme for the bio refinery plant in Numaligarh, Assam.
- b. Bidders will have to send the liquid enzyme sample as per storage conditions provided to Chempolis Oy, Oulu, Finland to evaluate suitability with the cellulose substrate, if it has not been done earlier.
- c. Enzyme to be supplied should conform to the baseline technical parameters as per Annexure A.
- d. The suitable Enzyme manufacturers will have to submit minimum Enzyme use Cost (EUC) reduction targets i.e. Cost of Enzyme per unit of ethanol produced after considering per unit price of enzyme and dosage requirement for the production target of ethanol.
- e. The EUC target shall be based on the optimization work to be carried out by the manufacturer within the given timelines. The Optimization work shall include, but not limited to, the following aspects:
  - i. Selection of best suited enzymatic activities for the specific substrate
  - ii. Improvement of the enzymes in the selected cocktail
  - iii. Developing new enzymes to the selected cocktail
  - iv. Improvement of the production strains
  - v. Optimization of the product formulation
  - vi. Optimal logistics and transportation solutions
  - vii. Onsite manufacturing capital and operational costs.
- f. Enzyme manufacturer(s) will also have to specify the time and cost required to develop and demonstrate the optimized (tailor made) enzyme for the given specific substrate.
- g. Enzyme manufacturers will also have to specify the lead time for delivery (except for onsite manufacturing) with at least the following details of transportation:
  - i. Delivery format – weight and type of tank
  - ii. Method of transportation – Rail, Ship, Truck etc.
  - iii. Manufacturing location
  - iv. Storage parameters while in transit
  - v. Storage parameters while at site
  - vi. Recycling or reverse transportation methodology of empty tanks.
  - vii. Total shelf life of the product
- h. Technical and financial capability, EUC target, ability to demonstrate EUC target within given time and cost, manufacturing and transportation business solutions, shall form the basis of Enzyme manufacturer(s) selection by ABRPL.



5. Highlights of EOI

- a. **The bidders are required to submit their past credentials, brief concept note, manufacturing and supply plan based on the above, for the proposed supply of Enzyme to ABRPL's bio refinery plant at Numaligarh, Assam.**

6. Submission of EOI:

- I. Interested parties are required to submit information complete in all respects as per the enclosed format (Annexure-B). The furnished information shall be supported with relevant documents, if any.
- II. Prospective parties may submit their "Expression of Interest" duly signed as per Annexure B latest by 1<sup>st</sup> August'2019 in a sealed cover or {submitted through Email} to:

Assam Bio Refinery Private Limited  
Pankagnat, P.O. NRP Complex, Post Box-03  
Numaligarh, Dist. Golaghat, Assam  
Pin :785699  
[contact@abrpl.co.in](mailto:contact@abrpl.co.in)

- III. Subsequently, NRL may notify through its website about the discussions meeting with respect to the EOI.  
For any clarification, you are requested to contact 9435152160 or [contact@abrpl.co.in](mailto:contact@abrpl.co.in)

7. Disclaimer:

- I. ABRPL has issued this Expression of Interest with the best intention to identify the interested and eligible bidders and has no compulsions to enter into definitive contractual agreements. This EOI does not guarantee conversion of this EOI into any definitive contractual agreements.
- II. It is also agreed that ABRPL in its sole discretion, may reject any and all proposal made by respondent(s), may change the conditions relating to the EOI or cancel this EOI at any time without assigning any reason.
- III. Prospective respondent(s) acknowledge and agree that response to the EOI is purely voluntary action on their part and for any expenditure on this account shall be borne by the respondent(s).
- IV. ABRPL will have no obligation or liability to the respondent(s) in the event of cancellation of EOI.

Note: Respondents are requested to keep themselves updated with the website on regular basis for any addition / deletion / modification / clarification or notification in respect of this, at EOI stage. No separate notification will be issued in any other media.



## **ANNEXURE A – BASELINE TECHNICAL PARAMTERES**

<b><u>Sl. No.</u></b>	<b><u>Parameters</u></b>	<b><u>Value</u></b>
1	Design temperature (can be slightly adjusted if enzyme are working better in higher or lower temp), °C	55
2	Design pH (can be slightly adjusted if enzyme are working better in higher or lower pH),pH in NH3 environment	5
3	Dry matter consistency after feeding phase in reactor	15%
4	Hydrolysis reactor operating mass, t	2130
5	Hydrolysis time	90 hrs
6	Pulp dry matter in feeding stream, oven dry pulp	35%
7	Total flow of pulp in 35% dry matter to Hydrolyser Ton/hr	40.7
8	Total flow of bone dry Cellulose to hydrolyser Ton/hr	14.2
9	Total water flow with 35% dry matter pulp to Hydrolyzer, Ton/hr	26.5
10	Glucose yield target	90%



### **ANNEXURE B – DETAILS OF THE RESPONDENT**

<b>Sl. No.</b>	<b>Parameters</b>	<b>Details</b>
1	Name of the Company	
2	Country where the company is registered	
3	Address	
4	Contact Person: a. Name & Address b. Email id c. Phone no.	
5	Status of the Company a. Whether registered under the Companies Act 1956 or the Companies Act 2013 b. If not, Country of Incorporation	
6	Net Worth of the Company (as on 31/03/2019 or 31/03/2018 or closure of FY 18)	
7	Annual Turnover of the Company (as on 31/03/2019 or 31/03/2018 or closure of FY 18)	
8	Past experience in any Enzyme manufacturing	
	a. Total cumulative capacity of manufacturing (MT) per year	
	b. Current capacity utilisation in %	
	c. % output sold in India as on average of last 3 years	
	d. Type of Technology	
	e. Technology Licensor	
9	Past experience in 2G bio ethanol Enzyme manufacturing	
	a. Total cumulative capacity of manufacturing (MT) per year	
	b. Current capacity utilisation in %	
	c. % output sold in India as on average of last 3 years	
	d. Type of Technology	
	e. Technology Licensor	
10	Proposed manufacturing location for supply	
11	Proposed delivery location	
12	Delivery format – weight & type of tank?	
13	Willing to undertake onsite manufacturing? If yes, please mention minimum quantity requirement and timeline for the same.	
14	Details of base product suitable for baseline parameters as per Annexure A	
15	Attach brief manufacturing and supply plan for proposed supply of enzyme at Numaligarh, Assam	