Request for Information (RFI) DE-FOA-0001615: Cellulosic Sugar and Lignin Production Capabilities

Description: The U.S. Department of Energy (DOE) seeks input from industry, academia, national laboratories and other biofuels and bioproducts stakeholders to identify existing capabilities to produce lignocellulosic sugars and lignin for use by the research community.

Purpose: The purpose of this RFI is to develop a comprehensive list of suppliers who are willing and able to produce and sell cellulosic sugar and/or lignin for use by the research community.

Request for Information Response Guidelines
Responses to this RFI must be submitted electronically to **sugarandlignin@ee.doe.gov** no later than 5:00pm (ET) on August 24, 2016. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e.,zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, and no more than 5 pages in length, 12 point font, 1 inch margins.

Request for Information Categories and Questions

- Company / institution name: FPInnovations
- Company / institution contact: Zhirun Yuan
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About TMP-Bio technology:

The TMP-Bio technology developed by FPInnovations converts wood chips to a sugar stream and a hydrolysis lignin (H-Lignin) stream. Compared to existing pulping processes that convert wood chips to paper-making pulps, no pulp is produced in this process. As a result, it is not an add-on addition to an existing pulp mill, which would be at risk of closure if the pulp mill closed; it is a standalone process that does not rely on the existence of an existing pulp mill to continue production. (It will, however, benefit from co-locating with an existing pulp mill to share access to utilities such as effluent treatment, steam and power, wood handling and shipping logistics, etc.).

Compared with existing biomass to sugar processes, TMP-Bio includes a pretreatment stage that produces a biomass stream that is easily hydrolysed to clean, fermentable sugars. This is due to a unique combination of mechanical action and mild chemical treatment, both of which limit the generation of inhibitors such as acetic acid, furfural or others. Finally, the mild conditions lead to a sulfur-free, high-quality, light colored H-lignin co-product which is close to native lignin in terms of chemical structure.

Category 1: Lignocellulosic Sugars

You may respond to as many or as few questions as you wish. **BETO is requesting NON-PROPRIETARY information only**:

Question 1: To which types of research entities are you willing and able to sell your lignocellulosic sugar (e.g., university researchers, national laboratories, industry/private sector)? Are there any types of research entities to whom you are not willing and able to sell your lignocellulosic sugar?

- Samples available to partners on a case by case basis, with a Material Transfer Agreement

Question 2: What are the maximum and minimum quantities of lignocellulosic sugar you are willing and able to sell (kg)?

- Samples up to 500 kg available

Question 3: What is the sugar concentration in your product?

- 10-14% for sugar as produced or ~40% concentrated sugar

Question 4: What physical form do you sell your sugars (e.g., solid or liquid)?

- Liquid

Question 5: How do you package your lignocellulosic sugars for shipping? Do you ship in bulk?

- Flexible / depends on quantity, smaller samples in bottles and pails, larger samples in barrels

Question 6: What type(s) of biomass do you use to produce lignocellulosic sugar?

- Hardwoods

Question 7: What process do you use to produce lignocellulosic sugar?

- TMP-Bio process – FPInnovations' proprietary technology

Question 8: What details of the scale of your process are you willing to share (e.g. batch and/or continuous/ volumetric productivity)?

- Cellulosic sugar from pilot scale quantities

Question 9: What is the typical composition of your sugar stream (e.g., glucose, galactose, mannose, xylose, arabinose) and what is the purity?

- Mixed sugars with glucose/xylose ratio from 3-10. It also contains small amount of other sugars (galactose, mannose, and arabinose). Very clean sugar stream without the need for purification.

Question 10: Do you routinely test your cellulosic sugar for consistency within and between lots and between feedstocks (if applicable)?

- Yes. sugar concentration and quality are consistent

Question 11: What impurities are present in your lignocellulosic sugar process and what testing do you perform to determine the presence of impurities?

- Metal ions like sodium and calcium are present in sugar. However, the sugars can be directly fermented to ethanol, butanol, lactic acid and succinic acid without any further purification and processing.

Question 12: Does your process include a purification step?

- No

Question 13: What is the highest concentration in grams/Liter you can provide?

- 100-140g/L as produced or ~400g/L concentrated sugar can be provided

Question 14: Have you examined the impacts of transport and storage on sugar degradation? If so, can you please provide any relevant (non-proprietary) details of these impacts?

- Concentrated sugar is stable in transportation. Precautions in shipping temperature must be taken when shipping sugar as produced (Conc.10-14%)

Question 15: What additional information are you willing and able to provide to the research community about your lignocellulosic sugar? Please provide any nonproprietary cost information you are willing to share.

Question 16: Into what markets do you typically sell your lignocellulosic sugar? What is a typical application for your lignocellulosic sugar?

- Biochemical and biofuel via fermentation pathway. Ethanol, butanol, lactic acid and succinic acid have been tested.