

Development of Second Generation Ethanol from Agriculture Bioresource

New Delhi, Nov 23: Department of Biotechnology, Ministry of Science and Technology, GoI and the Research and Development Centre, Indian Oil Corporation Limited, Faridabad, Haryana has established Bioenergy Research Centre (DBT-IOC Centre) for the development of advanced biofuels and value added chemicals. This is an excellent partnership Centre of Excellence supported by DBT and IOC. The Centre started functioning from May 2012. The center roped in various institutes like NREL, USA and Lund University, Sweden to develop second generation ethanol technology as these organizations are pioneers across the world in this area.

In the quest for an alternative source of transportation fuel due to dwindling fossil fuels and their adverse impact on the environment, a project was initiated jointly by the Department of Biotechnology, and Research and Development Centre, Indian Oil Corporation. The main objective was to develop a second generation ethanol process from agricultural residues like wheat straw, rice straw, bagasse, cotton stock, etc. at low cost. When the technology is commercialized over a period of time, it will be able to produce ethanol on a commercial scale. Ethanol is clean transportation fuel which will be produced indigenously and will address all the parameters of sustainability by improving the environment (preventing stubble burning), creating socio-economic benefits for the rural sector and helping the country to be self-reliant in energy.

A group of researchers started working in the laboratory with almost no prior experience in this area. Within a year, with the help of NREL, USA, a pilot plant having processing capacity of 250 kilograms per day was commissioned indigenously. An Expert Committee (Oversight Committee) of DBT has played a very vital role by assessing the progress and by providing valuable directions with regards to its commercial application and approach.



DBT-IOC Centre team conducted carbon mass balance; life cycle assessment and life cycle costing using this pilot plant in a span of about 4 years and the technology package is ready to scale at 10 tons per day processing unit. For this scale up project a land of about 14 hectares has been allotted by IOC in Mathura. Process design and engineering work are being developed by the IOC team.

An application has been filed by IOC for environment clearance for this project. Simultaneously, vendor development work is underway for the fabrication and integration of the plant. It is anticipated that this demo-scale plant of 10 tons biomass per day processing capacity will be functional by the end of 2022.

In the nutshell, the project was conceived and processes are being scaled up indigenously which itself explains a very successful and exemplary success story of the joint efforts made by the Department of Biotechnology, and the Research and Development Centre of Indian Oil Corporation Limited.

The DBT-IOC Technology process uses minimum quantities of chemicals to maximize sugars production. The unique SSCF process allows to maximize ethanol at reduced time and cost. Apart from this, technology uses indigenous enzyme cocktail which is a major Opex component in 2G ethanol cost. Once the technology is demonstrated at the 10 ton per day unit in Mathura it will be ready for deployment in the country contributing to Swachha Bharat & Atma Nirbhar Bharat.

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