

Bio-energy

Newsletter

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Dear readers,

We are happy to share the sixth issue of the Bio-energy Newsletter with you.

As keen followers of the global ethanol market, you must be aware that it is projected to reach USD 54.63 billion tonnes by 2026, exhibiting a CAGR of 1.15% during the forecast period. The increasing demand for environment-friendly biofuels and fuel additives to reduce greenhouse gas emission is expected to propel growth of the ethanol market. Several countries have stepped up efforts to increase the share of renewable energy in their energy portfolio.

In India, thanks to the new policies introduced by the central and state governments, the bio-energy business has been growing with existing customers and acquiring new customers.

However, the declining production of agricultural raw material leading to rising raw material prices continues to be one of the major factors restraining growth of the global and Indian ethanol market. Research and development focusing on production of ethanol from secondary sources is therefore becoming increasingly important.

Despite challenges, Praj continues to offer pioneering new technologies and solutions to enhance efficiency, conserve resources and improve profitability of its customers.

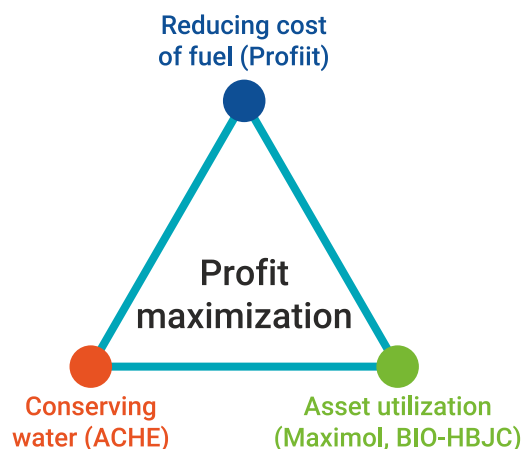
You will be pleased to know that Enfinity- our 2nd generation ethanol production technology- was awarded the prestigious Golden Peacock Eco-Innovation Award, 2019 in the Engineering sector.

This issue focusses on the myriad solutions we offer customers who face challenges of high operating expenses, energy intensiveness and water scarcity. Praj has developed efficient technologies to tackle these situations effectively.

- Profiit: is a zero liquid discharge solution for molasses-based ethanol plants that significantly improves operational efficiency and profitability.
- Air cooled heat exchangers in distillery plants have reduced the consumption of water in the cooling process by up to 80%, and integrating Mechanical Vapor Compression (MVR) has reduced the water footprint even further.



- The industry is favouring ethanol production from sugarcane juice and Praj is proud to have worked on the first project in India which successfully produces ethanol from sugar syrup.
- Maximol a innovative bed booster technology increases production capacity of existing MSDH plant upto 30%.



Benefits of Praj's technology-led solutions

All in all, Praj endeavours to fulfil customer requirements and provide energy efficient proven technologies. We look forward to your support and faith in our capabilities and expertise.

We are open to suggestions, ideas and discussions for your requirements. Feel free to contact us at info@praj.net.

Yours truly,
Atul Mulay
President— Bio-energy Business

PROFIIT: Incineration technology with lowest OPEX

Process Optimized Flexible Integrated Incineration Technology (PROFIIT) helps distilleries create sustainable processes and makes their business more profitable. This technology is the result of Praj's extensive research in integrating processes with incineration technology, in partnership with Thermax Ltd. Profiit helps customers to not only tackle the problem of waste generated during process but also helps their business achieve sustainable profitable growth.

Spent wash in distilleries are currently incinerated in boilers which impact operational efficiency and profitability. It consumes supporting fuel, involves high OPEX, has low efficiency and generates high ash which cannot be easily disposed. Profiit overcomes these problems, with additional advantages such as-

1. Reduction in support fuel for incineration boiler.

Fuel	Conventional incineration boiler technology	Profiit incineration technology	Savings with Profiit incineration technology
Coal	80-85 TPD	24-25 TPD	56-60 TPD
Bagasse	120-140 TPD	40-45 TPD	80-95 TPD
Rice Husk	90-95 TPD	28-30 TPD	62-65 TPD

Note: Figures above represent performance of a 100 KLPD plant. They are based on certain assumptions and are subjected to vary based on specific case. GCV considered for concentrated spent wash is 2100 Kg/kcal, for Coal is 3800 Kcal/Kg, for Bagasse is 2200 Kcal/Kg and for Rice Husk is 3200 Kcal/Kg.

2. Reduction in overall water consumption for distillery complex to 1-1.2 lit/lit of alcohol.
3. High quality ash generation.
4. Additional yield of up to 2-3 lit per ton of molasses.
5. Reduction in steam consumption by 15-20% making the distillery self-sufficient for steam and power.
6. Reduced OPEX due to reduction in CIP chemicals, acid, and cost of chemicals in process condensate treatment plant.
7. Reduced CAPEX due to low civil cost in fermentation, evaporation and process condensate treatment plant.



For more details, please contact us at vaibhavtiwari@praj.net

ACHE: Water conservation for distilleries



Evaporative cooling towers are conventionally used in distilleries which result in loss of water. By installing air cooled heat exchangers (ACHE) at Swaraj India Agro Ltd., Praj has helped conserve three litres fresh water per litre of alcohol produced.

As the best alternative to conventional cooling towers, ACHE

drastically reduces consumption by up to 75% as well as cost of pre and post treatment of water. Through process integration, this tool can be leveraged in brown field and green field distillery plants, and adapted to any ambient and humid conditions across the world.

Advantages

1. Consumes lesser soft water since there is zero evaporation and drift losses, and therefore does not require makeup water.
2. Lower operational expenditure (OPEX).
3. No blow down of water ensures recirculation of water quality and water conservation.
4. Saving in soft water reduces cost of procurement and treating raw water.
5. Reduces OPEX for maintenance of cooling towers and scaling in heat exchanger tubes.
6. Reduces cost of treating blow down water.

BIO-HBJC: Sustainable, reliable, round-the-year ethanol production

In India, sugar producers are experiencing turbulence due to high feedstock prices and controlled sugar sales. Govt therefore initiated the National Biofuels Policy 2018, a lifeline for the industry, that allows ethanol production from various sugar streams produced in sugar mills. This helps resolve issues related to excess sugar production and of liquidity crunch.

The sugar streams are typically diluted/ mixed juice/ syrup or in the form of B-heavy molasses. While the use of cane juice solves the problem of a sugar glut in the industry, it leads to other challenges such as-

- a) Results of implementation vary from factory to factory.
- b) Sugar mills operate seasonally in 3-5 months cycles. Storage of cane juice is a technical challenge and also not economically viable.
- c) Possibility of bacterial contamination during fermentation which could lead to loss of production yield and efficiency.
- d) High operating cost for low solid spent wash treatment when using B-heavy molasses.

With more than 15 years of experience in Bio-energy and treating various sugar streams in a sustainable and profitable manner, Praj has harnessed its technology to store diluted sugar streams.

BIO-HBJC is the result of its R&D efforts and bioprocess expertise. BIO-HBJC or High Brix Juice Concentrate has helped the sugar industry grow and sustain market pressure despite a volatile and uncertain environment. Praj has set up plants across the globe ranging from 60 KLPD to 600 KLPD using sugar syrup, B-heavy molasses and mixed juice as an independent stream or in combination with each other.

Benefits of Praj's BIO-HBJC technology

- a) Easy storage of sugar cane juice/syrup in concentrated form to help industry ensure year-round operation.
- b) No bacterial contamination to ensure reliable operation.
- c) Higher production yields.
- d) HTM's special yeast reduces the volume of effluent and treats spent wash at a lower operating cost, without affecting production yield and efficiency.
- e) Improvement of overall production yield by 0.5% in both feedstock (i.e. sugarcane juice and B-heavy molasses as compared with C-molasses).
- f) Lesser OPEX
- g) Zero liquid discharge (ZLD) system



Incauca S.A.



Bio-energy S.A.



Ingenio Risaralda S.A.



Ingenio Mayagüez S.A.



Manuelita S.A.



Destileria Riopaila S.A.



Ing. Providencia S.A.

BIO-HBJC: Power of Seven in Colombia

Praj has more than 15 years experience in offering robust, efficient and proven solutions to produce ethanol from sugarcane juice/syrup.

MAXIMOL™: Increasing capacity of ethanol dehydration plants by 30%

Praj introduced MaxImol, a dehydration technology which increases the capacity of existing molecular sieve dehydration technology (MSDH) plants by 30%. Based on Ecomol technology, MaxImol provides upgraded features without additional CAPEX. The innovatively designed bed booster enhances the adsorption capacity of MSDH, thereby improving performance by 30%.

Highlights of technology

1. Operator friendly interphase to swiftly switch between existing Ecomol to MaxImol mode and vice-versa.
2. Proven and affordable.
3. Highly integrated to avoid operator intervention.
4. Quick and easy installation enabling immediate turnaround.
5. More than 50% of supplied energy can be recovered within the complex to reduce energy cost and reduction in GHG.
6. Increased capacity without incorporating additional vessels and valves to lower annual hardware maintenance.

Golden Peacock Award for 2G biomass to bioethanol technology



Praj was awarded the prestigious Golden Peacock Eco-Innovation Award, 2019 in the Engineering sector for 'Enfinity', its

second generation biomass to bioethanol technology. Praj accepted the trophy and certificate from Lt. Gen. J.S. Ahluwalia (Chairman, IOD) and Mr. R.V. Deshpande (Revenue Minister of Karnataka) at a glittering ceremony in Bengaluru on July 4, 2019.

The Golden Peacock Awards, established by the Institute of Directors, India in 1991, honours public, private and government enterprises that are committed to excellence and in meeting world-class quality standards. This year, the awards secretariat received 550 applications of which 312 were shortlisted through a three tier assessment process. The jury comprised environment, health & safety, energy and climate change experts, under the chairmanship of Justice (Dr.) Arijit Pasayat, former Judge, Supreme Court of India.

Based on Praj's successful technology demonstration, four oil marketing companies in India have selected Praj as a technology licensor and EPCM (Engineering, Procurement, Construction Management) provider.

President Kovind leads India's delegation visit to Bolivia & Chile



Praj was invited to be part of Indian business delegation accompanying Hon. President of India, Shri. Ram Nath Kovind during his maiden visit to Bolivia, Chile from 28th March to 1st April 2019. Meetings with Bolivian business delegates were organised by the Bolivian Chamber of Commerce (CAINCO) & President Morales of Bolivia at Hotel Camino Real in Santa Cruz De La Sierra.

During the keynote address, President Kovind assured the participants of the government's keen interest in collaborating with Bolivia in solar, wind and biofuel segments.

Surendra Kale, Joint GM from BDCI International division represented Praj as part of the delegation.

Praj participates in "Diversificacion 2019" in Havana, Cuba



Praj participated at the XV International Congress on Sugar and Sugarcane Derivatives (Diversificacion 2019) held at Hotel Nacional de Cuba from 24th to 28th June, 2019, in Havana.

Shantanu Jalgaonkar and Surendra Kale presented a technical paper and shared Praj's advances in alcohol production technology.

The team also explained Praj's offerings to Ms. Madhu Sethi, Indian Ambassador to Cuba and other business delegates who visited the exhibition.

Praj participates in Fuel Ethanol Workshop in Indianapolis, USA



Praj participated at the 35th Annual Fuel Ethanol Workshop and Expo at Indianapolis, USA from 10th to 12th June, 2019. Praj was silver level sponsor for the event.

Jayant Godbole, Shrikant Rathi and Prasanna Pai represented Praj at the event. At the conference, Shrikant presented a technical paper on 'Carbon footprint reduction' and Prasanna made a presentation on Praj's Corn fiber to ethanol technology'.

The expo was attended by over 1000 producers and suppliers. We received an overwhelming response from customers in USA, Canada, Brazil, Argentina and Central America.

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