De-Carbonization through Circular Bio Economy

praj

Innovate • Integrate • Deliver

Praj Industries Ltd. is India's leading company in industrial biotechnology, globally known for its TEMPO (Technology, Engineering, Manufacturing, Project management, Operations) capabilities.

For over three decades, the company has focused on environment, energy and farm-to-fuel technology solutions. True to its vision of making the world a better place, Praj continues to pursue sustainable decarbonization through circular bioeconomy by deploying its proprietary biofuel technology solutions.

Bio-mobility™ and Bio-Prism™ are the mainstays of Praj's contribution to the global Bioeconomy. The Bio-Mobility™ platform offers technology solutions globally to produce renewable transportation fuel across land. sea and air modes. The company's Bio-Prism™ portfolio comprising solutions for renewable chemicals and materials, promises sustainability, while reimagining nature.

Praj's diverse portfolio comprises Bio-energy plants, Zero liquid discharge plants, Critical process equipment & skids for oil & gas industries, Breweries and High purity water systems.

Praj Matrix, the state-of-the-art R&D facility, forms the backbone for the company's endeavours towards a clean energy-based bioeconomy.

The company has over 750 customer references in more than 75 countries across 5 continents.

Praj is ranked 8th in the list of Top 50 Hottest companies in Advanced Bioeconomy in 2019 released by the industry's leading publication Biofuels Digest, USA. It is the first and only Asian company to make it in the top 10. By virtue of its pioneering work in the biofuels industry globally, Praj was recognized as one of the Asia's Greatest Brand of 2018 by URS media & PwC.

Bioenergy Businesses

First Generation Bioethanol Technology (1G)

Praj has a deep understanding of processes to transform first generation agrifeedstock (sugars found in sugarcane juice and molasses, and starchy grains and tubers) into bioethanol. The company's focus on innovation has led to several patented technologies which result in -

- Product and co-product maximization.
- Flexibility to produce multiple products.
- Reduction in energy and water footprint.
- Meeting environmental norms.

praj | Bioenergy Plant

enfinity™

Lignocellulosic Ethanol Technology (2G)

Praj offers end to end solutions to set up bio-refineries based on its proprietary enfinity™ - 2G lignocellulosic ethanol technology. A bio-refinery produces bioethanol and renewable chemicals by processing a wide range of agri-residue such as rice straw, wheat straw, bagasse, corn stover and corn cobs, soft wood and empty fruit bunches.

As part of commercialising enfinity™ , Praj has successfully set up an integrated demonstration facility (12 MT/day) in India in 2017. Domain experts including senior executives from global oil majors have witnessed performance of the facility and validated the technology.

enfinity™ technology is currently being deployed at four commercial scale bio-refineries in India.

With a pool of qualified professionals and technology know-how, Praj is geared to handle O&M - maintenance of biorefineries

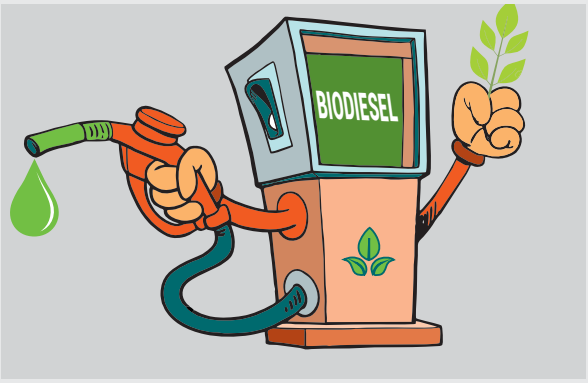
Renewable Natural Gas Technology

Praj has developed and commercialised its proprietary renewable gas technology, RenGas™, commissioning over 40 plants in India.

Salient features of the technology include -

- Highest yielding RenGas technology:
  - Biomass >400 m3/MT
  - Press Mud > 130m3/MT
- Unique microbial cultures reducing CBG operating cost by 30%.
- Proprietary PFR digester for >75% degradation.
- Digestate processing into value added manure with organic certificates.
- Advanced cost effective biogas cleaning techniques to give pure methane.

RenGas™



Ecodiezel™

Bio-diesel Technology

Praj has developed Ecodiezel enzymatic technology to produce biodiesel from feedstock such as used cooking oil, palm fatty acid, palm stearin, tallow, etc.

Ecodiezel™ replaces conventional chemical catalytic method of producing biodiesel and meets Indian and European fuel standards. It not only offers flexibility of feedstock but also has lower cost of operations, resulting in projects that are more profitable.

Sustainable Aviation Fuel Technology

Praj offers complete end to end solutions to produce sustainable aviation fuel (SAF). synthesized paraffinic kerosene (SPK) based on ASTM approved alcohol -to-jet (ATJ) pathway, in collaboration with Gevo, Inc, USA.

The Praj-Gevo innovative process uses iso-butanol produced from renewable sources (e.g. Sugars, Starch & Biomass) as feedstock to produce SAF. Iso-octane is another high value co-product used as fuel for formula one racing.

Engineering Businesses

Praj's engineering businesses comprises Critical Process Equipment & Skids, Brewery plants and Waste water treatment solutions.

Critical Process Equipment & Skids

Praj's Critical Process Equipment & Skids business vertical serves vital sectors like Oil & Gas, Refineries, Petrochemicals, Fertilizer etc. We offer a range of static equipment like pressure vessels, reactors, shell and tube heat exchangers,columns and other proprietary equipment as per the client design. We also undertake end-to-end projects for modular process skids and packages.

We support our clients with FEA (Finite Element Analysis), Process & Thermal Design and Piping Design & Stress Analysis, and design skids using softwares like Plant 4D and PDMS. Our emphasis on quality and response time makes us a trusted partner for EP companies and MNCs involved in global sourcing.

Praj's world class manufacturing infrastructure comprising strategically located facilities with global accreditations enables us to deliver reliable and high quality equipment to our customers.

praj | Critical Process Equipment & Skids

Brewery plants

Brewing beer is as much a science as it is an art. The Brewery Group integrates hygienic engineering with consistency in plant performance and cost effectiveness for the perfect beer.

From pre-feasibility to complete plant, technical audits to balancing equipment, Praj measures up to the exacting demands of breweries in various regions. The Brewery business vertical of Praj has references with the top global brewers. And follows stringent international design standards like DIN 8777, MEBAK and EBC amongst others. Praj has introduced many innovative solutions in the industry from heat recovery system to ecomBoiler, an energy efficient wort boiler.

praj | Brewery Plant

Wastewater treatment plants

Our pursuit of sustainability is evident in our solutions for complex industrial water & wastewater treatment. The solution for water scarcity and environment conservation lies in reducing water usage, recovery and recycling water wherever possible

Praj offers integrated energy-efficient solutions for effluent recycling and zero liquid discharge for various industrial applications. Our strong experience of treating the most challenging wastewater enables us to offer highly optimized systems with lower footprints and optimized operating costs.

praj | Environment Solutions

HiPurity Business

Praj HiPurity Systems Limited (a wholly owned subsidiary) provides value added solutions to the pharmaceuticals, biotechnology and the wellness industry.

These industries have stringent demands on design, engineering and quality standards set by international authorities like ISPE, cGMP or ASME BPE.

Praj HiPurity Systems offers end-to-end, integrated solutions such as water treatment solutions, modular process systems, wastewater treatment solutions and process engineering & design capability to ensure superior service to clients.

With over 400 references and a close association with industries that spans more than two decades, Praj HiPurity's understanding of customer requirements particularly from the regulatory perspective, add value to our solutions.

praj | HiPurity Systems

Praj Matrix - The R&D Center

Praj Matrix, the innovation engine for Praj, is a state-of-the-art facility certified by the Govt of India's Dept of Scientific and Industrial Research. It is equipped with 16 laboratories for molecular biology, microbiology and bioprocess technology, process engineering & scale-up, and chemical sciences.

More than 90 technologists are engaged in research in areas such as protein engineering, protein production, strain development, and the development of fermentation processes using bacterial, yeast and fungal platforms.

The Center has more than 80 national and international patents to its credit.

Matrix's main area of focus is renewable chemicals & materials, enzyme production and biofuels.

On the back of a formidable track record of its Bio-Mobility™ platform for renewable transportation fuel globally, Praj entered the Renewable Chemicals and Materials (RCM) industry through its newly launched Bio-Prism™ portfolio. Praj's interest in RCM stems from its philosophy of 'sustainable decarbonisation through circular economy'. Bio-Prism™ portfolio comprises a basket of technologies for production a variety of bio-industrial products, including bio plastics as a priority, along with cellulose-lignin refinery products and specialty products.

Leveraging the ability of Praj to scale up and commercialize different technologies, Praj Matrix is poised to play a key role in sustainable and profitable growth of Praj.

praj | Matrix
R & D Center

Resources

Praj's business lines are supported by its world-class manufacturing infrastructure. It has four manufacturing facilities in India. All facilities have the capability to manufacture equipment in compliance with the most stringent requirements of various countries viz. CE, EN, DOSH, MOM, GOST – TR. The facilities are also ISO 9001 - 2008 and ASME (U, U2, R, H, S) certified. The company has international-standard manufacturing facilities accredited with ASME U and H stamps and ISO 9001-2008 certification located in Pune & Wada in Maharashtra, Kandla in Gujarat.

Commitment to a sustainable community

Praj Foundation, the company's CSR arm is aligned to Praj's vision of making the world a better place through its efforts in water conservation, skill-based education and preventive healthcare for women, in rural Maharashtra, India.

By way of monetary support, planning, implementation and maintenance, the foundation assists locals in recharging groundwater, desilting streams, and conserving water through micro irrigation practices. The foundation helps secondary school children develop technology skills focussed on energy and environment, agriculture and animal husbandry, food processing and healthcare. It also encourages women to grow their own nutrition gardens, sell surplus produce and adopt healthy lifestyles.

Praj Worldwide

India | Thailand I USA

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