PEOPLE

Stepping towards circular bioeconomy

Shrikant Wale, Delivery Head, Praj Industries in conversation with Manufacturing Today shares how Praj is developing the Bio-Prism portfolio which includes technologies for the production of renewable chemicals and materials.

by **Sujatha Vishnuraj** May 1, 2022

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Shrikant Wale, Delivery Head, Praj Industries

Praj Industries is one of India's most accomplished industrial biotech companies. Its most significant business is that it offers end-to-end technology and infrastructure solutions for the production of ethanol. Praj envisions to be a key stakeholder in the Indian government's E20 vision – to achieve a 20% ethanol blending target by 2025. It offers technology solutions globally to produce renewable transportation fuel, thus ensuring sustainable decarbonization through a circular bioeconomy.

Being a climate action company, Praj understands the need to accelerate ethanol blending and the consequent environmental, social and economic impact that it can have on our country. Keeping this in mind, Praj has developed multiple IPs that help in addressing the questions related to ethanol blending and help companies fast track their ethanol production and blending processes.

Shrikant Wale, Delivery Head, Praj Industries in conversation with Manufacturing Today shares how Praj is developing the Bio-Prism portfolio which includes technologies for the production of renewable chemicals and materials.

How is Praj Industries contributing toward sustainable development?
Sustainability is a core value at Praj. We have a strong conviction about the Bioeconomy as one of the very effective and efficient drivers of sustainable development in India.

Bioeconomy in simple terms is a knowledge economy that uses renewable natural resources to produce food, energy, products, and services. Bioeconomy utilizes biological resources, available in abundance to generate wealth from waste.

In the bioeconomy space, Praj has pioneered the basket of innovative technology solutions in the form of Bio-Mobility and Bio-Prism. Bio-Mobility, a platform of biofuels facilitates decarbonization in the transportation sector, whereas Bio-Prism portfolio of technology solutions in renewable chemicals & materials facilitates carbon recycling with no or minimal addition of new carbon in the atmosphere.

Decarbonization as well as carbon recycling help in minimizing the carbon footprint and therefore greenhouse gas emissions that are regarded as a major contributor to climate change.

Does Praj offer any solutions around wastewater management? If yes, please elaborate
Praj has been at the forefront in offering the most techno-commercially viable Technologies based on the principle of 3Rs – Reduce, Recycle and Reuse. Water and Wastewater treatment are key to the sustainability of life, and we strive to innovate to enhance responsible water usage.

With more than 1000 customer references all over the world, Praj has a deep understanding of industrial processes and effluents. Depending on customer requirements Praj offers a range of solutions such as recycle & reuse, evaporation & crystallization in designing ZLD systems. A ZLD system implies that practically no liquid waste goes outside the boundaries of the process plants. Evaporation is heavily energy-intensive and with Praj's unique heat integration technologies, the total energy requirements can be reduced drastically to suit the industry norms.

Through our offerings, Ultra-Filtration, Nano-Filtration and Reverse Osmosis plants, up to 95% effluent recycling can be achieved. Our Zero Liquid Discharge and recovery systems provide an efficient way to treat industrial waste. The unique patented Solvent Recovery Systems provides complex effluent treatment solutions. Our rich experience in the operation & maintenance of several complex water & wastewater treatment systems help us provide total water treatment solutions and be the first choice among our esteemed customers.

How important are biofuels when it comes to achieving India's climate mission?

In a world threatened by climate change, the drive towards an environmentally friendly economy is not an option, it is an obligation. It would be an eye-opening experience to understand how the bioeconomy facilitates sustainable climate action and we all can be a part of these efforts.

Biofuels are made from different biobased resources such as sugary starchy, and cellulosic feedstock. Ethanol when blended with petrol, acts as an oxygenating agent and ensures effective combustion of fuel. This results in lower carbon emissions as well as particulate matters being thrown into the environment and facilitates decarbonization of the transportation sector.

Carbon neutral cycles triggered by the combustion of biofuels also help curtail health hazards attributable to the air pollution due to the burning of agri residues and emissions from fossil fuel combustion.

Energy is an important driving force for the industrial and economic growth of any nation. Although it's gradually changing fossil resources continue to dominate the global energy landscape. The need of the hour is that more and more nations should embrace the usage of sustainable alternatives to fossil fuels – Biofuels and reap its enormous benefits.

India's endeavours in bioeconomy auger well in helping fulfil Panchamrit agenda- a roadmap for Race to Zero, announced by Prime Minister during COP26 Summit at Glasgow. India has also announced to achieve the Carbon Neutrality target by the year 2070.

What is the role of ethanol in reducing dependence on fossil fuel?
Ethanol has similar properties to petrol and can easily be blended into petrol. Hence ethanol blending can directly result in a reduction in the requirement for imported fossil fuels. As ethanol is produced using biobased resources that are available in abundance in the country, its use directly results in FOREX savings and acts as an economic enabler for the country's growth.

Understanding the role of ethanol, The Government of India has released the 'Roadmap for Ethanol Blending in India 2020-25' in June 2021 setting a target to achieve E20 blending by 2025.

The policy aims to reduce the dependency on mineral oil imports by 40% by the end of 2030. It entails increasing domestic production of mineral oil, expanding access to non-traditional/renewable energy resources, enforcing stringent guidelines for energy efficiency, and also providing consumers with cost-effective alternatives. In 2020-21, India's net petroleum imports totalled 185 Mt at a cost of US $ 551 billion. E20 program would save Rs 30,000 crore of foreign exchange per year for India.

With the inclusion of surplus grains as a feedstock for ethanol production in 2020 and government supporting policies like Sustainable Alternative Towards Affordable Transportation (SATAT), the future of ethanol blending programs has been fortified. Several other benefits include increased energy security, decreased carbon emissions, improved air quality, self-sufficiency, the use of damaged food grains, increased farmer incomes, job creation, and increased investment opportunities.

How is Praj contributing to the government's E20 mission? The potential of 2G ethanol in mitigating environmental hazards and reducing dependency on fossil fuels.
As a technology leader Praj has pioneered innovative solutions to produce ethanol from a variety of biobased feedstock. Praj has built capabilities across the value chain- from Concept to Commissioning and Care for Life to produce ethanol from sugary, starchy, and lignocellulosic feedstock

As a flagbearer of the ethanol industry, Praj is helping establish a resilient ecosystem of stakeholders including bio aggregators, ethanol producers and energy off-takers. As a global organization, Praj brings to the table, industry

best practices that have the capability to bring a positive change in the ethanol industry.

Praj solutions have helped minimize energy and carbon emissions while optimizing utility footprints to ensure the efficient and effective functioning of ethanol plants.

Praj is working closely with key stakeholders such as Auto OEMs, testing bodies, and leading educational institutions like IIT and regulators to accelerate the country's ethanol blending program.

Currently, Praj is on the threshold of commissioning Asia's largest bioethanol plant based on its proprietary 2G technology. 2nd generation ethanol that is produced from the lignocellulosic feedstock can achieve the highest carbon intensity reduction. The future of 2G ethanol technology in India appears very promising as it positively impacts the interest of stakeholders across the value chain delivering differentiated value. Biofuels produced from captive resources i.e. agri residues, facilitate energy self-reliance as it reduces dependency on the imported crude and associated forex bill. It also provides an additional revenue stream for farmers.

What are your plans going forward concerning green technologies?
Any nation's growth strategy is built on the strength of the resources it possesses. India is blessed with an abundant bio-based feedstock that it must leverage. Enough availability of sugary & starchy feedstocks along with crop residues & industrial wastes is a distinct advantage. Deploying biobased feedstock in the production of biofuels and biochemicals is helping the mainstream the Bioeconomy in India's growth story.

One of the unique aspects of India's growth story in biofuels is its strong capability in developing and deploying home-grown innovative technology solutions. Praj's success in the Bioeconomy is based on the bedrock of home-grown expertise in Feedstock – Technology- Product (F-T-P). Leveraging this strong foundation, Praj has pioneered a basket of innovative technology solutions in the form of Bio-Mobility and Bio-Prism. Bio-Mobility, a platform of biofuels facilitates decarbonization in the transportation sector, whereas Bio-Prism portfolio of technology solutions in renewable chemicals & materials enables carbon recycling.

While biofuels are an already established solution for decarbonization in surface mobility, we are experiencing strong traction ushering from the air as well as water transportation. Sustainable Aviation Fuel (SAF) and Marine Biofuels along with Bio-Hydrogen and Bio-Methanol comprise the Nex-Gen Fuels.

Today most of the chemicals and materials are derived from fossil sources which are neither eco-friendly nor biodegradable. Our Bio-Prism portfolio comprises a cluster of technologies to produce renewable chemicals & materials that promise sustainability like Bio-plastic, bio-bitumen, Hyaluronic acid, natural waxes, and antimicrobial peptides to name some.

A new wave is now ushering in the industrial revolution viz. Industry 5.0 V2. Bioeconomy is envisaged as an integral part of industry 5.0 acceding due importance to sustainability in all business endeavours. The emphasis is going to be on deeper penetration of green energy in the overall energy basket and adoption of green products & materials. This clearly demonstrates mainstreaming of the bioeconomy as part of the global economy.

What are the recent trends and technological advancements in bioenergy space?

Opportunities in the biofuel sector are abundant in India. The transportation fuel mix is undergoing a major transition by way of mainstreaming renewable low carbon biofuels. While biofuel usage in surface transportation has already gained momentum, its application in the aviation sector is about to take off. Also, the application of marine biofuels in water transportation is ushering on the horizon.

Previously ethanol production in India was limited to only three states, Maharashtra, Karnataka and Uttar Pradesh which are sugar belts. However now the government of India has allowed the use of excess grains for the production of ethanol which will enable ethanol production across the country. Many state governments are now coming up with policies to encourage ethanol production in their respective states.

Recently Praj launched a technology for the production of BIOSYRUP that allows year-round production of ethanol. Sugarcane juice/syrup is a perishable feedstock and cannot be stored for more than 24 hours. Praj has

developed a technology to process sugarcane syrup to produce BIOSYRUP® that can be stored throughout the year without any biodegradation or contamination. We believe BIOSYRUP- will be a Game-changer for the Sugar Industry and will help the country increase ethanol production beyond sugar season.

What are the challenges in the bioenergy sector and what needs to be done to overcome them?

The bioenergy sector in India has evolved significantly over the last few years. However, there are certain challenges that need to be taken care of to ensure the Bioenergy movement in India will sustain itself in the long run.

Sustained Policy support: India has taken various strategic interventions to boost ethanol production and consumption in the country. This needs to continue in future too. Ecosystem development: While the 1G ethanol ecosystem has been well established, development is still underway for the 2G ethanol and Compressed Bio Gas. Commissioning of initial commercial-scale CBG projects in immediate future may instil confidence in prospective developers, paving way for the realization of CBG plants.

Feedstock availability: uninterrupted supply of feedstock is critical for biofuel production to continue. Bad monsoon season can have some negative impact on the overall feedstock availability.

Overall, there are many positive developments in the bioenergy space in India. With increasing awareness about green products and a strong focus on inclusive growth, the future for bioenergy is very promising.

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