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Why Ensuring Adequate Biomass Supply is Fraught with Challenges

In recent years, biomass has emerged as a promising source of bioenergy, offering carbon neutral and sustainable energy. Sourcing and procurement of feedstock in India, however, presents unique challenges due to varying agricultural land, infrastructure constraints and economic conditions. Let's take a closer look.

Biomass can be processed into various forms of biofuels, each serving specific applications. Solid biofuels, such as briquettes and pellets, are commonly utilised in industries and power plants as eco-friendly substitutes for coal. Biofuels, such as biodiesel and bioethanol, are the liquid form of biofuels that are used as alternatives for blending with petrol and diesel in transportation. Compressed biogas (CBG) is a type of gasified biofuel that is created through anaerobic digestion and used in both industrial applications and as a clean fuel for transportation. Biofertilisers, the solid and liquid digestates, contain nutrients from biogas production, which are further used to increase agricultural productivity when applied back to the soil. All of these help save a significant amount of valuable foreign exchange as they offset the import of fossil fuels and chemical fertilisers to that extent.

Challenges in Sourcing Agricultural Biomass

Sustainability and quality issues : The key challenge faced here is the

mismatch of tenure. Agri residue is available seasonally and usually for a short time, while the applications where it gets consumed need a steady supply round the year. This poses a challenge in ensuring a stable and reliable supply throughout the year. The quality and composition of the raw materials can vary significantly and affect the efficiency and effectiveness of biomass-based products. Moisture in the biomass, impurities and contaminants, such as mud and stones, end up interfering with the processes and have an impact on the output.

logistics and infrastructure deficits : A consistent supply of biomass feedstock is complicated not only because of the seasonal availability of raw materials, but also due to lack of agri implements for evacuation of the agri residue from the farms. High transportation costs, and logistical difficulties, especially in rural areas, is another challenge. The logistical challenges of gathering raw biomass from scattered locations and transporting them to facilities can be expensive and difficult. Agricultural residues

in the farms have a very low bulk density (for storage or transportation) and thus they need some kind of densification on site before they can be economically transported. Therefore, equipment such as shredders, slashers and balers are necessary to prepare the residue in fields for transportation. Small land holding per farmer is another challenge for effective management of residue. Unfortunately, India lacks adequate infrastructure for processing, transporting and storing organics, which may lead to inefficient supply chains.

Financial obstacles and gaps in technical skills : This sector is generally underbanked and under financed, primarily due to the nature of the business. In the absence of a standard mechanism for valuation of the inventory, and the lack of credible organised players, many banks and institutions shy away from providing credit to the sector. Many farmers and rural enterprises lack the technical knowledge and abilities needed to effectively handle and process biomass. Furthermore, there is a financial gap since the high initial costs of investment

associated with biomass aggregation equipment limit their availability to capital. The fact that financial institutions are usually reluctant to finance these projects because of perceived risks and uncertainty only serves to aggravate the problem further.

Technological

constraints : Converting biomass into usable energy requires advanced technology and infrastructure. However, these resources are often expensive and inaccessible in regions where biomass is most plentiful. For example, currently, CBG production relies predominantly on five distinct feedstocks (animal waste, agricultural residue, press mud, organic waste from municipalities, and Napier grass). Most plants in India utilise single-source feedstocks due to the absence of economically viable mixed feedstock processing technology. This limitation hinders the ability to mitigate concerns regarding sourcing and shortages.

Solutions for Addressing Feedstock Sourcing Challenges

The biofuel sector has gained significant support through initiatives like Sustainable Alternative Towards Affordable Transportation (SATAT) and other policy initiatives by the government. As industry expands, building capacity via the participation of small and medium enterprises is crucial. Local biomass-driven facilities can make biofuel production feasible for small businesses,



promoting a diverse and resilient industry.

Implementing localised biomass collection and processing units can reduce transportation costs and ensure a steady supply. Forming cooperatives and partnerships can pool resources and share knowledge, enhancing the efficiency and sustainability of biomass supply chains. This approach also creates jobs in transportation, processing, and plant operations, strengthening rural economies.

Investing in farm equipment for handling residue by the local communities can significantly enhance biomass processing efficiency. Moreover, technology enablement to integrate every stakeholder of the supply chain from farmer to biofuel plant, seamlessly, increases productivity and brings scalability.

Ensuring Reliable Biomass Supply

We address these challenges by operating Biomass Banks, which are responsible for the collection, transportation, and storage of agricultural residues. These entities are enabled via a cloud-based digital platform that creates a reliable supply

chain for biofuels. Farmers can register their interest to sell agri-waste via a WhatsApp bot, simplifying the process of connecting the rural side to the industrial.

By integrating local farmers into the industrial supply chain, we increase the value of agricultural waste and help establish a circular economy. This model not only empowers farmers by providing additional income opportunities but also contributes to sustainable energy production.

Our approach focuses on fostering community participation and awareness regarding the economic benefits of selling agricultural waste. By collaborating with local stakeholders, we enhance trust and encourage sustainable practices.

An effective approach involving technological advancements, streamlined logistics, favourable policies, and collaboration among various parties is necessary to surmount challenges in the biomass supply chain. Creating integrated supply chains, investing in aggregation equipment and storage technology, and promoting community engagement can ensure a reliable and sustainable feedstock source for biomass energy production. As we overcome obstacles,

the possibility of using agricultural waste as a valuable source for creating biofuels with a dependable supply chain creation has been successfully demonstrated in several locations in India with Biomass Banks, offering a path to a greener, circular and more sustainable future. 