Utilizing preprocessing to manage the variability of emerging biomass and waste materials for the bioeconomy

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The Biomass Feedstock National User Facility (BFNUF) at Idaho National Laboratory, established nearly a decade ago, plays a pivotal role in advancing the bioeconomy by addressing critical supply and logistics challenges associated with biomass and waste materials. Industry experience indicates that the variability in biomass and waste materials, along with material handling issues such as feeding and flowability, necessitates upstream management through effective preprocessing to prevent downstream inefficiencies. Recent enhancements at BFNUF include reconfigurable unit operations and sophisticated physical and chemical characterization tools focused on emerging biomass types and wastes. These upgrades facilitate the development of tailored preprocessing systems capable of fractional milling, targeted separations, and waste characterization using online sensors and AI-powered systems, as well as mechanical, thermal, and chemical decontamination processes. By integrating science-driven approaches with state-of-the-art analytic tools and specialized equipment, BFNUF empowers researchers and industry partners to better understand and manage the properties of feedstock materials, ultimately supporting the scalability of sustainable aviation fuel production. The BFNUF's contributions are instrumental in propelling the bioenergy and bio-product sectors forward, ensuring the bioeconomy’s growth and sustainability.