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SESSION 1A
Feedstock Supply and Logistics

Introduction to Session 1A

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Using biomass as a source of energy and chemicals presents challenges in sourcing, moving and processing the biomass, and in using the products. Session 1A of the *27th Symposium on Biotechnology for Fuels and Chemicals* illustrates the range of research across this broad spectrum.

Three articles from this session address biomass availability: is there enough biomass to make a meaningful impact in a new energy economy? Haq and Easterly look at the availability of agricultural residues across the United States, and Shahbazi and Li focus more narrowly on whether there is a sustainable source of crop residues to support bioethanol in the State of North Carolina. Mabee and his coworkers report on biomass reserves in Canada, including both agricultural and woody biomass. In general, we can extrapolate that availability is not a limiting factor: there are abundant residues that can feed biomass processes.

Transportation of biomass is a critical cost factor because biomass has both a lower energy density (MJ/kg) than fossil fuels and a lower bulk density (kg/cubic meter). One article from this session by Mahmudi and Flynn takes a detailed look at the relative economics of rail vs truck transport, and in particular, focuses on the extra cost incurred when biomass is unloaded from a truck and trans-shipped by rail. A second article by Kumar, Sokhansanj, and Flynn develops a methodology to rank the relative merits of alternatives to collect and transport biomass when multiple criteria form the basis of selection, for example cost and environmental or community impact.

Separation and characterization of fractions of biomass and it processed products is another area of active research. Akin and his coworkers have studied corn stover fractions in detail, characterizing their chemical composition and structure. Phenols are a troublesome byproduct in many biomass processing schemes, and das Neves and his coworkers report on the removal of phenolic residues by biofiltration methods.

Three process-oriented articles came from this session. Olsson and her coworkers report on separate enzymatic hydrolysis and fermentation of wheat hemicellulose and compare it with combining these steps simultaneously. Mabee and his coworkers report on developments in converting softwood biomass, e.g., from pine and spruce, into ethanol, overcoming problems of more refractory composition of the biomass. And, Raffelt and his coworkers report on a two-step processing of biomass in which a pyrolysed slurry is produced in distributed centers and the slurry is then transported to a central large gasifier. These articles illustrate the broad range of processes under active consideration by researchers.

Finally, Jeong and Park look at the emissions profile from using rapeseed methyl esters, i.e., bio-oil, as a diesel fuel.

Together, this session's articles reflect the broad range of technical research issues that arise from sourcing, transporting and processing biomass to energy and chemicals.