

## **Integrated biomass technologies: A potential path to a sustainable global economy**

Jerrold E. Winandy  
Principal  
Winandy & Associates, LLC  
Mazomanie, Wisconsin, USA

New exciting high-value bio-based consumer and construction products from wood, forest- and agricultural-residues, and other bio-based materials opportunities are being developed. These technologies enable us to meet growing global energy needs and goals for sustainable development. In addition to traditional value-added bio-based products, such as lumber, paper, paperboard, and composites, opportunities are now on the horizon for biorefining to produce electricity, transportation fuels, chemical feedstocks, syn-gas, and nanocrystalline cellulose. In the near future, nanocrystalline cellulose that may be produced as a residual from the biorefining process, may likely compete with carbon fiber, and be used to manufacture innovative high-strength biocomposites. The holistic view of how to achieve high-value materials with enhanced performance properties from renewable resources is called “*Integrated Biomass Technologies.*” This “integrated” concept promotes the use of sustainable, bio-based, environmentally-neutral (or even beneficial) technologies to meet global demands for building and materials end uses, chemicals and energy. This concept supports and provides a systematic approach for maximizing value, performance, resource sustainability, and improving profitability in the agriculture and forest products industries.