

## Sustainability in Wood-Using Sectors: A Student Perspective

*In late July 2009, a team of Georgia Tech professors, graduate students, and a high school science teacher left Atlanta to visit leading Portuguese universities and a paper research institute to discuss current and future practices on sustainable wood utilization.*

*This column is guest-edited by **Matyas Kosa**, one of the students who participated in this trip.*

**M**ost of today's problems, challenges, and solutions are global in nature. Exchanging experiences and thoughts between students, researchers, and academics from different countries can accelerate the process of reaching common goals. In the case of sustainability, these exchanges bear enormous importance.

Our seminar series began in Covilhã, Portugal, at the University of Beira Interior (UBI), where Dr. Ragauskas from IPST at Georgia Tech talked about the future of biorefineries in the U.S. including the reasons for their existence and fast development in recent years. Diminishing fossil fuel resources, increased greenhouse gas emissions, and the desire for energy independence drive renewable biofuels research. Dr. Ragauskas emphasized that these issues can bring two extra advantages: new employment opportunities, and the chance to enhance the economy. According to Dr. Ragauskas, by 2030 the U.S. would like to substitute 30% of its fossil fuel use with biofuels made from the one billion tons of biomass that can be used for their production without affecting food/feed resources. Ongoing research and demonstration plant-scale experi-

ments have shown promising results. A main drawback in developing any technology is the recalcitrance of biomass, and for this reason many national laboratories, universities, and research institutes have worked together to divide the research into three stages: biomass formation and modification, characterization and modeling, and biomass deconstruction and conversion.

Leaving UBI, we visited RAIZ (Institute of Forest and Paper Research) in Aveiro. RAIZ scientist Gabriel Sousa highlighted the need for innovative forest biorefinery technologies that can be integrated into modern kraft pulp mills. Dr. Jose Luis Amaral, technical director of RAIZ, summarized their research on every area connected with paper industry. We visited a model eucalyptus plantation and later toured Soporcel's mill in Figueira da Foz. This mill is working solely with eucalyptus producing really high quality paper that is in demand in the international markets. The mill uses only 2/3rd of the energy it produces, mainly from burning bark and lignin, and they sell the rest as electrical energy. During our tour we had a great discussion about paper companies, their environmental responsibilities and ques-

tions about planned future changes.

At the University of Aveiro (UA), our host was Dr. Carlos Pascoal Neto, who is the head of the Department of Chemistry. His research group works in areas like composites, ceramics, macromolecules, and lignocellulosics. The scope of their lignocellulose research can be divided into two main tasks: chemistry and structure of lignocellulosics, and conversion of lignocellulosics to new biomaterials.

The last stop of our visit was the Chemical Engineering Department of the University of Coimbra (UC), one of the oldest universities of Europe, to meet Dr. Paulo Ferreira. His department's research interests include the final bleaching stages of E. globulus pulps, analyzing flow behaviors and rheology of pulp fiber suspensions with or without different flocculation agents. They also do work related to polyoxometalates used in paper surface modifications, wood-PVC composites, polymeric nano and micro composites.

From the students' perspective, it was amazing to see researchers work together toward understanding the chemistry of lignocellulosics and their efficient conversion to new biomaterials and biofuels. It was also a great experience to see how the different groups agreed on the fundamental directions toward both biomaterials and biofuels, and above all to learn about the myriad ideas directed at developing sustainable green technologies to redefine the forest products industry. **TJ**