

TAPPI Professional Development Course  
***Designing the Forest Biorefinery***

*In conjunction with the TAPPI IBBC Conference  
Hyatt Regency Atlanta – 30 October to 1 November 2015*

## **Don't Miss It!**

The TAPPI Biorefinery Design course is being offered immediately following the TAPPI 2015 International Bioenergy & Bioproducts Conference: a 2½-day course starting at noon on Friday 30 October, and ending 6pm Sunday 1 November. The course targets **forestry company biorefinery decision-making**, and will address a wide range of key issues for biorefinery strategy and design. The theme of Day 1 is **Biorefinery Fundamentals: Science and Innovation**, the Day 2 theme is **Setting Biorefinery Strategy**, and the Day 3 theme is **Biorefinery Techno-Economics and Case Studies**.

## **Course Leader**

The Course Leader will be Paul Stuart, Professor of Chemical Engineering at École Polytechnique of the University of Montreal, and Principal at EnVertis Consultants – who has led similar courses in Vancouver Canada (with PAPTAC) and Green Bay Wisconsin (with TAPPI) and Stockholm Sweden (with NWBC).

## **World-Class Faculty**

Expert faculty from across Europe, North America and around-the-globe will share their experience, including numerous industry case studies. The syllabus evolves between course offerings, as the industry advances with biorefinery experiences and implementations.

## **A Unique Syllabus**

This is a critical time for the biorefinery development in the forestry sector – companies are at different points in setting their strategies, and a wide range of promising biorefinery product-process options are possible. What is the best solution for your company, and how can technologies be systematically evaluated for competitive advantage? There is no silver bullet, and many questions must be addressed by companies considering biorefinery implementation.

This course will seek to address some of these questions, including for example:

- Which biorefinery products will provide sustainably good margins over the long term? Which emerging biorefinery processes are the most promising for making these products?
- What is an appropriate manner to implement lignin precipitation, and build a product portfolio of added-value products over time?
- What are process efficiencies and operating costs today, and what might they be in 5 years from now after the process technologies have matured?
- How do we create competitive advantage through existing mill infrastructure when implementing the biorefinery?
- Can we implement the biorefinery, and at the same time lower the unit costs of our wood, pulp and paper products?

The course format is designed to encourage exchange between instructors and participants. The emphasis on the course is not to present a series of potential biorefinery technologies, however exchanges on the **strengths and weaknesses of specific technology strategies** will be encouraged. The biorefinery course seeks to bring together **forest industry leaders and management, leading technology providers and industry consultants** to share their experience in developing biorefinery strategies, in order to better understand emerging biorefinery technologies and their design/implementation within business strategies.

## Who Should Attend?

This course is intended for (a) corporate personnel in forestry companies who wish to become more knowledgeable about biorefinery implementation strategy and design methods, as well as (b) mill managers and technical staff who seek to identify and select the best biorefinery strategy at the mill level. The course also seeks to provide knowledge for biorefinery technology providers and consultants to assist them in understanding how biorefinery evaluations can take place, and better understand the range of emerging biorefinery technologies and their design/implementation in a forest company business plan.

## Course Outline

### Day 1: Biorefinery Fundamentals: Science and Innovation

Friday 30 October 2015

- 12h00 – 12h30      Welcome and Round Table Introductions  
*Paul Stuart – École Polytechnique and EnVertis Consulting (Montréal QC)*
- 12h30 – 14h00      Innovation Management for the Biorefinery  
*Jean Hamel – FPInnovations (Pointe-Claire QC)*
- 14h00 – 14h45      Chemical and Physical Characterization of Wood for the Biorefinery  
*Adriaan van Heiningen – University of Maine (Orono ME)*
- 14h45 – 15h15      Networking Break**
- 15h15 – 16h00      Wood Pulping and Biorefinery Processes  
*Adriaan van Heiningen – University of Maine (Orono ME)*
- 16h00 – 17h30      Biorefinery Development and Implementation  
*Tom Browne - FPInnovations (Pointe-Claire QC)*
- 17h30 – 18h15      Cellulose NanoCrystals – Their Possible Role in the Biorefinery  
*Richard Berry - CelluForce (Montréal QC)*

## Day 2: Setting Biorefinery Strategy

Saturday 31 October 2015

**07h30 – 08h00      Coffee and Croissants**

08h00 – 08h15      Agenda for the Day  
*Paul Stuart – École Polytechnique and EnVertis Consulting (Montréal QC)*

08h15 – 09h45      Systematic Evaluation of the Forest Biorefinery  
*Paul Stuart – École Polytechnique and EnVertis Consulting (Montréal QC)*

**09h45 – 10h00      Networking Break**

10h00 – 10h45      Triaging Biorefinery Technologies at the Early Design Stage  
*Frédéric Clerc – EnVertis Consulting (Montréal QC)*

10h45 – 12h15      Defining Biorefinery Value Proposals at the Early Design Stage  
*Virginie Chambost – EnVertis Consulting (Montréal QC)*

**12h15 – 13h00      Lunch**

13h00 – 13h45      Value Prior to Pulping (VPP) - A Techno-Economic Analysis  
*Gopal Goyal – International Paper (Loveland OH)*

13h45 – 14h30      Phased Implementation of the Hemicellulose Extraction Biorefinery  
*Paul Stuart – École Polytechnique and EnVertis Consulting (Montréal QC)*

**14h30 – 15h00      Networking Break**

15h00 – 15h45      Evaluating Biorefinery Strategies Considering Risk and Sustainability  
*Shabnam Sanaei – Domtar (Montréal QC)*

15h45 – 17h15      The Biorefinery Concept  
*Peter Axegård – Innventia AB (Stockholm Sweden)*

17h15 – 18h00      Recap and Discussion  
*Panel Discussion*

## Day 3: Biorefinery Techno-Economics and Case Studies

### Sunday 1 November 2015

- 07h30 – 08h00**      **Coffee and Croissants**
- 08h00 – 08h15      Agenda for the Day  
*Paul Stuart – École Polytechnique and EnVertis Consulting (Montréal QC)*
- 08h15 – 09h45      The LignoBoost Process & Aspects on Lignin-Based Products  
*Per Tomani – Innventia AB (Stockholm Sweden)*
- 09h45 – 10h30      The LignoForce System™: A New Process for the Production of Kraft Lignin for High-Value Products  
*Lamfeddal Kouisni – FPInnovations (Pointe-Claire QC)*
- 10h30 – 10h45**      **Networking Break**
- 10h45 – 11h30      Project Independence: Case Study of the Strategy and Development of a Biorefinery Project  
*Doug Freeman – Verso Corporation (Escanaba MI)*
- 11h30 – 13h00      Biorefinery Technology Risk Management  
*Robert Trepte – AMEC Foster Wheeler (Atlanta GA)*
- 13h00 – 13h45**      **Lunch**
- 13h45 – 14h30      Lignin in Hot-Water Extraction of Xylan-Rich Lignocellulosics: Modifications, Extraction, and Potential Uses  
*Biljana Bujanovic, SUNY ESF (Syracuse NY)*
- 14h30 – 15h15      Enhancement of Hot Water Extraction with the Production of Furfural, Nano Cellulose and Higher Value Lignin  
*Thomas Amidon – SUNY ESF (Syracuse NY)*
- 15h15 – 16h00      Economics of Hardwood Biorefinery Based on Hot Water Extraction with Revenue Enhancing Products  
*Thomas Amidon – SUNY ESF (Syracuse NY)*
- 16h00 – 16h15**      **Networking Break**
- 16h15 – 17h00      Biobutanol from Lignocellulosics for Chemicals and Liquid Biofuels Production  
*Adriaan van Heiningen – University of Maine (Orono ME)*
- 17h00 – 17h45      Evolution of the Biofuels Market: The Biobutanol Case  
*Adriano Mariano – UNICAMP (Campinas Brazil)*
- 17h45 – 18h00      Closing Comments  
*Panel Discussion*