



TAPPI Professional Development Course  
***Designing the Forest Biorefinery***  
TAPPI Training Room, Norcross, GA  
16-20 May 2011

## Overview

The TAPPI Biorefinery course will seek to provide the knowledge and tools for **forest industry leaders and management, leading technology providers and industry consultants** to develop biorefinery strategies and better understand emerging biorefinery technologies and their design/implementation in a business strategy.

In this course, leading biorefinery strategists and designers from across North America will present knowledge and know-how regarding **biorefinery design**. The course has been organized specifically to target **forestry company decision-making**, and will address a wide range of key issues for biorefinery strategy and design. The course format will encourage exchange between participants. In groups, participants will develop a **business plan and the accompanying technology strategy that serves the business strategy**. 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. During the Wednesday evening, there will be dinner and a panel discussion and exchange around the topic ***Choosing Your Biorefinery Strategy and Making Money***.

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**Who Should Attend?**

This is a critical time for the biorefinery development in the forestry sector. Corporate executives, mill management, leading equipment suppliers and consultants are aware of what the biorefinery potentially offers. However there is an important need for identifying viable implementation strategies. There is no silver bullet biorefinery solution, and many questions must be addressed by companies considering successful biorefinery implementation. Some important questions are

- Which biorefinery products (wood pellets, biofuels, or biochemicals...) will provide sustainably good margins over the long term?
- Which emerging biorefinery processes are the most promising for making these products?
- 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 best use 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? What is the profitability of a pulp mill integrated with a biorefinery process, compared to one that is not integrated?
- What might be the role of government policy relative to key issues such as stumpage fees, biorefinery capital cost reduction, and other incentives such as greenhouse gas reduction policy?

This course is intended for corporate personnel in forestry companies who wish to become more knowledgeable about biorefinery implementation strategy and design methods, as well as mill managers and technical staff who seek to identify and select the best biorefinery strategy at the mill level. This course will also seek to provide knowledge for biorefinery technology providers and consultants to assist them in developing biorefinery strategies, and better understand emerging biorefinery technologies and their design/implementation in a business strategy.



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## Course outline

### Sunday Evening 15 May

Welcome reception

### Monday 16 May

#### Biorefinery Strategy and Design - Overview

- |               |                                                                                                       |
|---------------|-------------------------------------------------------------------------------------------------------|
| 08h00 – 08h30 | Introductions<br><i>Paul Stuart - Ecole Polytechnique (Montreal QC)</i>                               |
| 08h30 – 09h45 | Overview of Biorefinery Strategy and Design<br><i>Paul Stuart - Ecole Polytechnique (Montreal QC)</i> |
| 09h45 – 10h15 | Coffee Break                                                                                          |

#### Biorefinery Product Design

- |               |                                                                                                                                              |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 10h15 – 11h00 | Designing Biorefinery Product Portfolio Diversification<br><i>Virginie Chambost – EnVertis Inc. (Montreal QC)</i>                            |
| 11h00 – 14h45 | Designing a Market Competitive Product Portfolio<br><i>Virginie Chambost - EnVertis Inc. (Montreal QC)</i>                                   |
| 12h00 – 13h00 | Lunch                                                                                                                                        |
| 13h00 – 14h45 | Value Propositioning Techniques for Selecting Biorefinery Products<br><i>Chris Gaston and Andrew Goodison – FPInnovations (Vancouver BC)</i> |



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14h45 – 15h15	Coffee Break
15h15 – 15h45	Strategic Biorefinery Partnerships <i>Virginie Chambost - Ecole Polytechnique</i>
15h45 – 16h45	Developing a Biorefinery Business Plan <i>Virginie Chambost - EnVertis Inc. (Montreal QC)</i>
16h45 – 17h30	Introduction and discussion of team projects <i>Course Faculty</i>



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## Tuesday 17 May

### Biorefinery Processes

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|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08h00 – 09h00 | Pretreatment of Lignocellulosic Material<br><i>Adriaan van Heiningen – University of Maine (Orono ME)</i>                                                                                                   |
| 09h00 – 09h45 | Biochemical Conversion<br><i>Shijie Liu, SUNY-ESF (Syracuse NY)</i>                                                                                                                                         |
| 09h45 – 10h15 | Coffee Break                                                                                                                                                                                                |
| 10h15 – 12h00 | The Sugar Platform<br><i>J.Y. Zhu – USDA Forest Service (Madison WI)</i>                                                                                                                                    |
| 12h00 – 13h00 | Lunch                                                                                                                                                                                                       |
| 13h00 – 14h00 | Repurposing Pulp and Paper Mills to the Production of Bioethanol<br>Using Novel Green Liquor Treatments and the Kraft Pulping Process<br><i>Hasan Jameel – North Carolina State University (Raleigh NC)</i> |
| 14h00 – 14h45 | Hot Water Extraction of Woody Biomass<br><i>Thomas Amidon – SUNY-ESF (Syracuse NY)</i>                                                                                                                      |
| 14h45 – 15h15 | Coffee Break                                                                                                                                                                                                |
| 15h15 – 17h30 | Thermochemical Conversion of Biomass to Liquid Fuels and Chemicals<br><i>Jim Frederick – Table Mountain Consulting (Golden CO)</i>                                                                          |



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## Wednesday 18 May

### Biorefinery Technology Evaluation

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|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08h00 – 08h45 | Pulp Mill Based Biorefineries<br><i>Adriaan van Heiningen – University of Maine (Orono ME)</i>                                                                                     |
| 08h45 – 09h30 | Opportunities and Key Barriers for Biorefineries<br><i>Adriaan van Heiningen – University of Maine (Orono ME)</i>                                                                  |
| 09h30 – 10h00 | Biorefinery Technology Evaluation and Selection Criteria<br><i>Paul Stuart - Ecole Polytechnique (Montreal QC)</i>                                                                 |
| 10h00 – 10h30 | Coffee Break                                                                                                                                                                       |
| 10h30 – 11h15 | Economics of Commodity and Specialty Products from Biomass-Based Refineries<br><i>Tom Browne – FPInnovations (Pointe-Claire QC)</i>                                                |
| 11h15 – 12h15 | Integrated Technical and Economic Analysis of Bioenergy Plantations with Biofuel Conversion Technologies<br><i>Richard Phillips – North Carolina State University (Raleigh NC)</i> |
| 12h15 – 13h00 | Lunch                                                                                                                                                                              |

### Designing the Technology Strategy

- |               |                                                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------------------|
| 13h00 – 14h00 | Cellulosic Biofuels/Biochemical Activities in the U.S.<br><i>Ben Thorp – Bioenergy Deployment Consortium (Richmond VA)</i> |
|---------------|----------------------------------------------------------------------------------------------------------------------------|



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- 14h00 – 15h00 Lessons Learned: Project Independence Implementation at NewPage  
*Doug Freeman – NewPage (Wisconsin Rapids WI)*
- 15h00 – 15h30 Coffee Break
- 15h30 – 16h30 Capital Appropriation for Strategic Forest Biorefinery Retrofit Projects  
*Eemeli Hytönen - Ecole Polytechnique (Montreal QC) and VTT (Finland)*
- 16h30 – 17h30 Roundtable Discussion: Winning Conditions and Biorefinery Design  
*Ben Thorp – Bioenergy Deployment Consortium (Richmond VA)*
- 17h30 – 19h00 Dinner
- 19h00 – 20h30 ***Panel : Choosing Your Biorefinery Strategy and Making Money***

***Panel Host:*** Paul Stuart - Ecole Polytechnique (Montreal QC)

***Panel Participants:*** Invited Guests and Faculty



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**Thursday 19 May**

**Biorefinery Business Disruption**

08h00 – 08h45	Biorefinery Business Disruption Issues <i>Paul Stuart - Ecole Polytechnique (Montreal QC)</i>
08h45 – 09h45	Biorefinery Cost Integration Methodologies <i>Milan Korbel - Ecole Polytechnique (Montreal QC)</i>
09h45 – 10h15	Coffee Break
10h15 – 12h00	Value Chain Planning for Transformation into the Forest Biorefinery <i>Louis Patrick Dansereau – École Polytechnique (Montreal QC)</i>
12h00 – 13h00	Lunch





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**Policy and Environmental issues**

- |               |                                                                                                                                                                                         |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13h00 – 13h45 | The Forest products Industry at a Crossroads: Scenario Analysis of Portfolio Standards and Cap and Trade Policies<br><i>Marilyn Brown, Georgia Institute of Technology (Atlanta GA)</i> |
| 13h45 – 14h45 | Developing Appropriate Policy to support Biorefinery Development<br><i>Warren Mabee, Queen's University (Kingston ON)</i>                                                               |
| 14h45 – 15h15 | Coffee Break                                                                                                                                                                            |
| 15h15 – 17h00 | Sustainability and Biomass Utilization<br><i>Shijie Liu, SUNY-ESF (Syracuse NY)</i>                                                                                                     |
| 15h15 – 17h00 | Sustainability Assessment of Biorefinery Strategies<br><i>Shabnam Sanaei, Ecole Polytechnique (Montreal QC)</i>                                                                         |



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**Friday 20 May**

**Integrating the Biorefinery Technology and Lignin Products**

- |               |                                                                                                                                              |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 08h00 – 09h00 | Integrating Forest Biorefinery Technologies in Kraft Pulp Mills<br><i>Enrique Mateos-Espejel – FPInnovations (Pointe-Claire QC)</i>          |
| 09h00-09h45   | Lignin Chemistry, Recovery and Use I<br><i>Biljana Bujanovic – SUNY-ESF (Syracuse NY)</i>                                                    |
| 09h45 – 10h15 | Coffee Break                                                                                                                                 |
| 10h15-11h00   | Lignin Chemistry, Recovery and Use II<br><i>Lamfeddal Kouisni – FPInnovations (Pointe-Claire QC)</i>                                         |
| 11h00 – 11h15 | Class Photograph                                                                                                                             |
| 11h15 – 12h30 | Team Project Presentations and Discussion<br>Conference Wrap-Up and Final Comments<br><i>Paul Stuart - Ecole Polytechnique (Montreal QC)</i> |