

BC Coastal Hem-Fir Initiative – 2012/13

Project Title	Pyrolysis of Coastal Forest Residues
Project Number	B.04
Project Leader	Doug Singbeil
Project Team	Doug Bull, WenLi Duo
Total Budget	\$100,000

Need(s)

- Fast pyrolysis is a biomass conversion process relatively new and not well understood by forestry sector companies. The conversion process has strong potential to add value by introducing new products and market opportunities. Opportunities include the production of valuable green chemicals, in addition to combustion/engine fuels from forest biomasses.
- Coastal biomass is often contaminated with residual salts from ocean exposure. Preliminary trials have shown that yield of pyrolysis oil is significantly reduced in salt-contaminated biomass. More detailed studies are required to determine how best to mitigate the effects before demonstration or commercial plants can be constructed.
- Clarity about attributes and properties of products derived from pyrolysis of biomass. Properties of pyrolysis oils and chars differ substantially depending on the specific technology by which they are produced.

Objectives & Approach

- Mass and energy balance studies will continue from the fast pyrolysis trials completed from the 2011-2012 trials. The fate of non-process elements, particularly mineral salts will be further traced and quantified in continuing work.
- Extensive analysis of the generated pyrolysis oil will occur, specifically looking for high value green chemicals which could be extracted. Markets will be investigated for other high value products, as well as finding addition to identified applications for the char.
- Investigation into applications and markets where fossil fuels can be displaced by the use of pyrolysis products will be studied. One such application is the use of char and/or pyrolysis oil in cement kilns to off-set some coal use.
- Further pyrolysis trials are expected as opportunities emerge. This will be guided by the findings from our pyrolysis trials completed in 2011-2012. Some of these trials may occur within the pilot scale fast pyrolysis reaction planned to be sited within the FPIInnovations lab.

Benefits

Economics of making pyrolysis oil are dependent on identifying and recovering high value marketable products from biomass. An initial literature review of chemicals within pyrolysis oil indicates that chemicals having a value from \$180-\$340 per tonne of dry wood exist. The extent to which these chemicals can be extracted and isolated remains to be quantified.

Project Tasks and Outputs

Tasks / Outputs	Expected Delivery Date
Extensive characterization of pyrolysis oil & char completed.	July 2012
Additional small scale char and/or pyrolysis oil combustion trials conducted.	December 2012
Report on technical-economic analyses with profitability quantified.	January 2013
Lab attempts to extract & isolate select chemicals. Report on isolated chemicals.	February 2013

Status and Major Accomplishments – Previous year

- Many sets of experimental pyrolysis trials run on three different BC coastal biomass species.
- Complete pyrolysis gas analytical analysis performed.
- Initial pyrolysis oil and char analytical analyses performed.

Performance Measures

Key Success Factor	Key Performance Indicator	Target	How the outcome of the Project supports the Program objectives
Characterization of pyrolysis oil & char completed.	Detailed data set obtained.	Identify 5 chemicals with total value >\$200/t dry feedstock	Data is needed to support commercialization of technology
Technical-economic analyses	Completed report with profitability quantified (in conjunction with lab work).	One report	Outlines the economic viability & sensitivity of the fast pyrolysis process for commercial endeavors within Canada.
Lab attempts to extract & isolate select chemicals.	Attempts to recover chemicals demonstrated & reported upon.	One report on isolated chemicals	Lab testing is required to set expectations of realistic chemical recovery yields.
Additional small scale char and/or pyrolysis oil trials.	Trials completed.	Two trials	Build on database of attributes of pyrolysis oils and chars from different processes

Communication Strategy for Information Dissemination

Results will be disseminated in the form of written reports (at least two to be written). In addition, presentations will be made at conferences and discussions will be held with representatives from member companies and community groups as opportunities arise.

Collaboration – Research Partners

- CANMET Energy, Bell's Corner
- UBC