Technology Assessment for Utilization of Washington State Biomass

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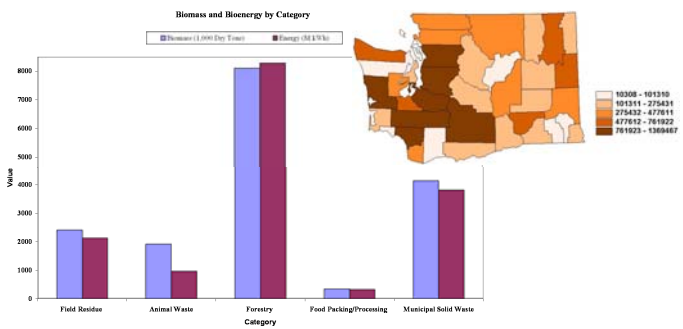
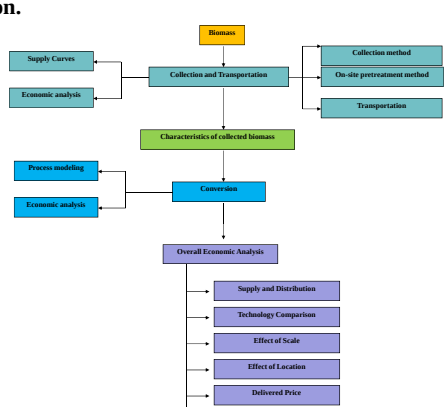
Introduction

Ecology and WSU partnered on a 2005 study entitled "Biomass Inventory and Bioenergy Assessment". This report was a first-cut at determining the type, amount and location of under-utilized biomass within the state, for the purpose of moving 'beyond waste' and utilizing organics for energy, fuel, fertilizer and chemical uses. In 2007 a second phase was initiated and tasked with (1) characterizing the biomass in regard to chemical composition, (2) generating feedstock supply and distribution cost-curves, (3) developing process cost models for three biomass conversion technologies, and (4) developing economic conclusions from the data.



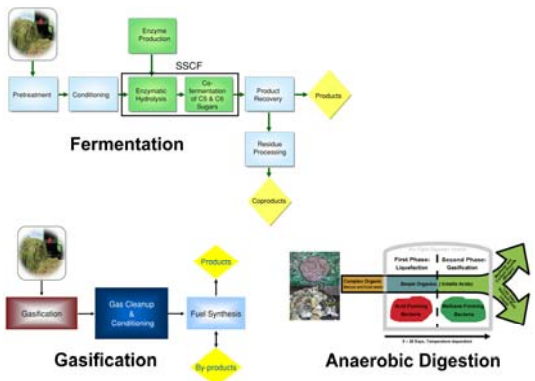
Methodology

The approach to the research was to separate the project into three tasks: (1) supply and distribution, (2) process cost modeling, and (3) integrated economic analysis. An additional task was undertaken to characterize all of the studied feedstocks in regard to chemical composition.



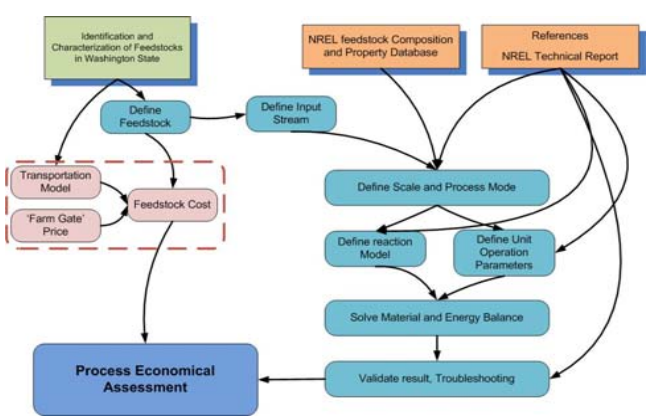
Research Matrix

Field and forest residue as well as manures, food waste and woody MSW were researched against three platform conversion technologies with economic analysis done at various scales across four central process points: Longview, Ferndale, Ellensburg, and Spokane.

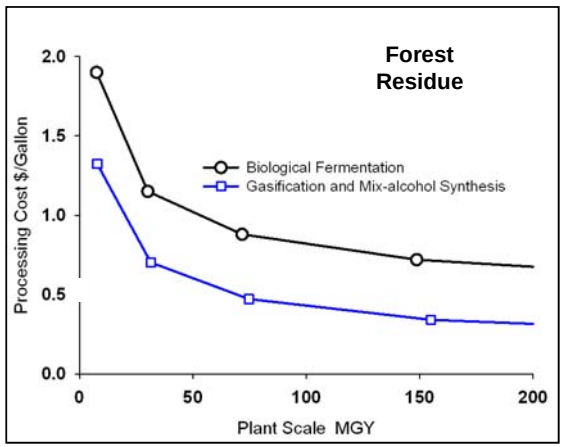


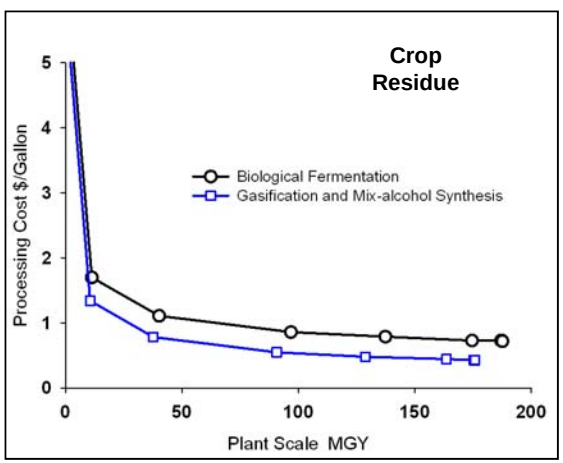
Process Cost Modeling

The models were typical system simulations with steady state inputs and outputs. Referenced parameters were used within a Matlab platform, which was chosen for its inherent flexibility. Process models were developed for the three targeted conversion technologies: (1) biological fermentation, (2) gasification to mixed alcohols, and (3) anaerobic digestion.



Conclusion





- Graphs of various and combined costs were developed to show the effect of technology, plant-size, and location to name but a few. Graphs comparing fermentation against gasification for both field and forest residue are given as an example.
- Among the four locations selected, Ellensburg appears best suited for production of biofuel from lignocellulosic material.
- 100-150 MGY plant-size is a general tipping-point in regard to lowering processing costs.

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