Using Ecosystem Services to Build a Hardwood Biofuels Program

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Today’s Poplar Talk

- About AHB
  - Renewable fuels and chemicals
  - Poplar biomass

- Challenges
  - Price of oil
  - Growers

- Environmental Solutions
  - Hayden, ID case study

- Road ahead
AHB Renewable Fuels and Chemicals

Renewable Transportation Fuels
- Cellulosic Ethanol
- Drop-In Biofuels
  - Biojet Fuel
  - Biogasoline
  - Renewable Diesel

Biochemicals
- Acetic Acid
- Ethyl Acetate
- Ethylene
Poplar Bioenergy Crops

- Ideally
  - Non-irrigated land
  - Marginal land
  - Near other feedstock sources
Why poplar?

- Fastest growing tree in temperate region
- Long history of PNW poplar cultivation
- Jefferson, OR: September 15, 2015 – 2 seasons of growth after first harvest
- Great conversion compatibility
Poplar Production Cycle
Carbon Benefits from Poplar Ethanol

LCA analysis by Erik Budsberg at UW

[Image of a bar chart showing carbon benefits from different sources of ethanol]
Carbon Benefits from Bio-based Chemicals

Products made from poplar-based acetic acid

LCA analysis by Erik Budsberg at UW
Challenge 1: Economics

U.S. Gulf Coast Kerosene-Type Jet Fuel Spot Price FOB

- Biojet*
  - $5.78
  - (25 Mil gal year)
  - $3.44
  - (100 Mil gal year)

*7% discount rate and $80 per dry ton feedstock
Challenge 2: *Where do we get the feedstock?*

How important are profit, risk, tradition, soil preservation, land conservation, and water quality in making cropping decisions?

- $$$
- Land and Water

Clarksburg, CA Landowners
Solution: Ecosystem Services

Poplar for Environmental Uses

Biocycle Farm near Eugene, OR
Nearly 400 acres of poplars fertilized with biosolids and irrigated with recycled wastewater.
Contaminants Removed by Poplars

- **Nutrients**
  - Nitrogen,
  - Phosphorus
- **Heavy metals**
- **Polycyclic aromatic hydrocarbons**
- **Numerous organic chemicals**
- **Hormonally active compounds**
  - Estrogens
  - Androgen
Hayden, Idaho Area Case Study

- A biorefinery that produces acetic acid
- Makes productive use of wastewater as irrigation.
- Utilize the wheat straw from local agriculture.

Work by Nathan Parker at Arizona State
Opportunities for Using Wastewater

24 WWTP within 75 miles of Hayden

~70 million gallons of water treated per day
Idaho case study shows reduced feedstock cost by 25% and total production cost by 12%.
Poplar and Willow Roadmap

- Benefits
- Barriers
- Potential
- Solutions
PNW Water Treatment Facilities

Work by Luke Rogers at UW

Publicly Owned Treatment Works

- Highly Suitable without Irrigation
- Highly Suitable with Irrigation
Poplar and Willow Environmental Plantings

Goal: Biomass for renewable and sustainable fuels and products