



Using Ecosystem Services to Build a Hardwood Biofuels Program

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Feedstock



Conversion



Sustainability



Education



Extension

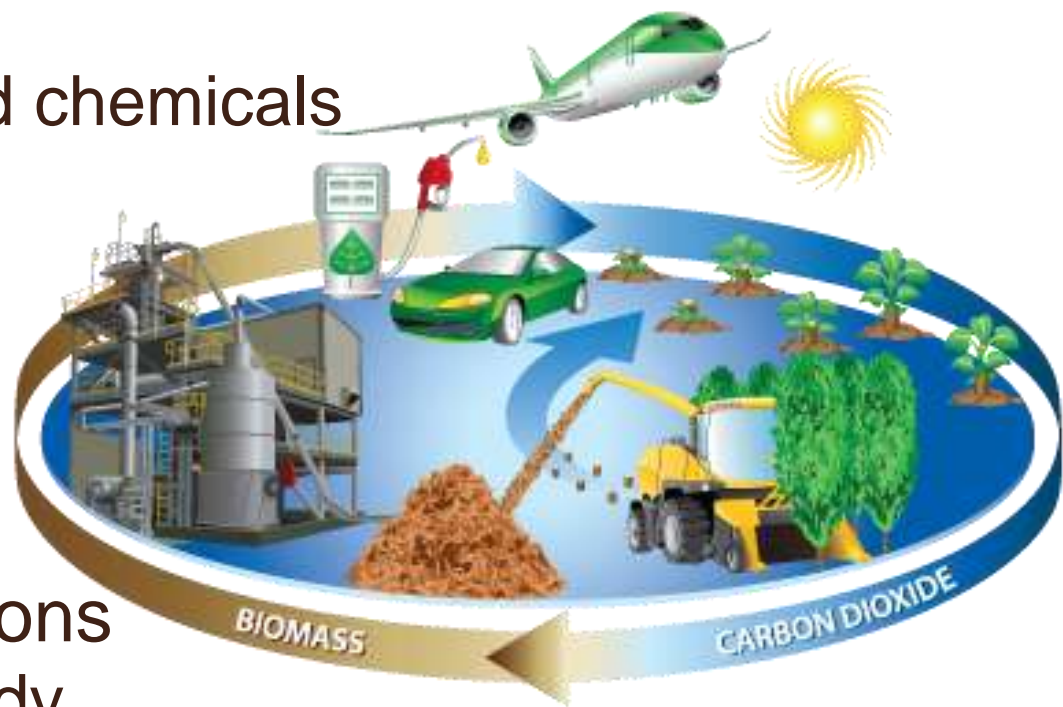


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Today's Poplar Talk

- 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



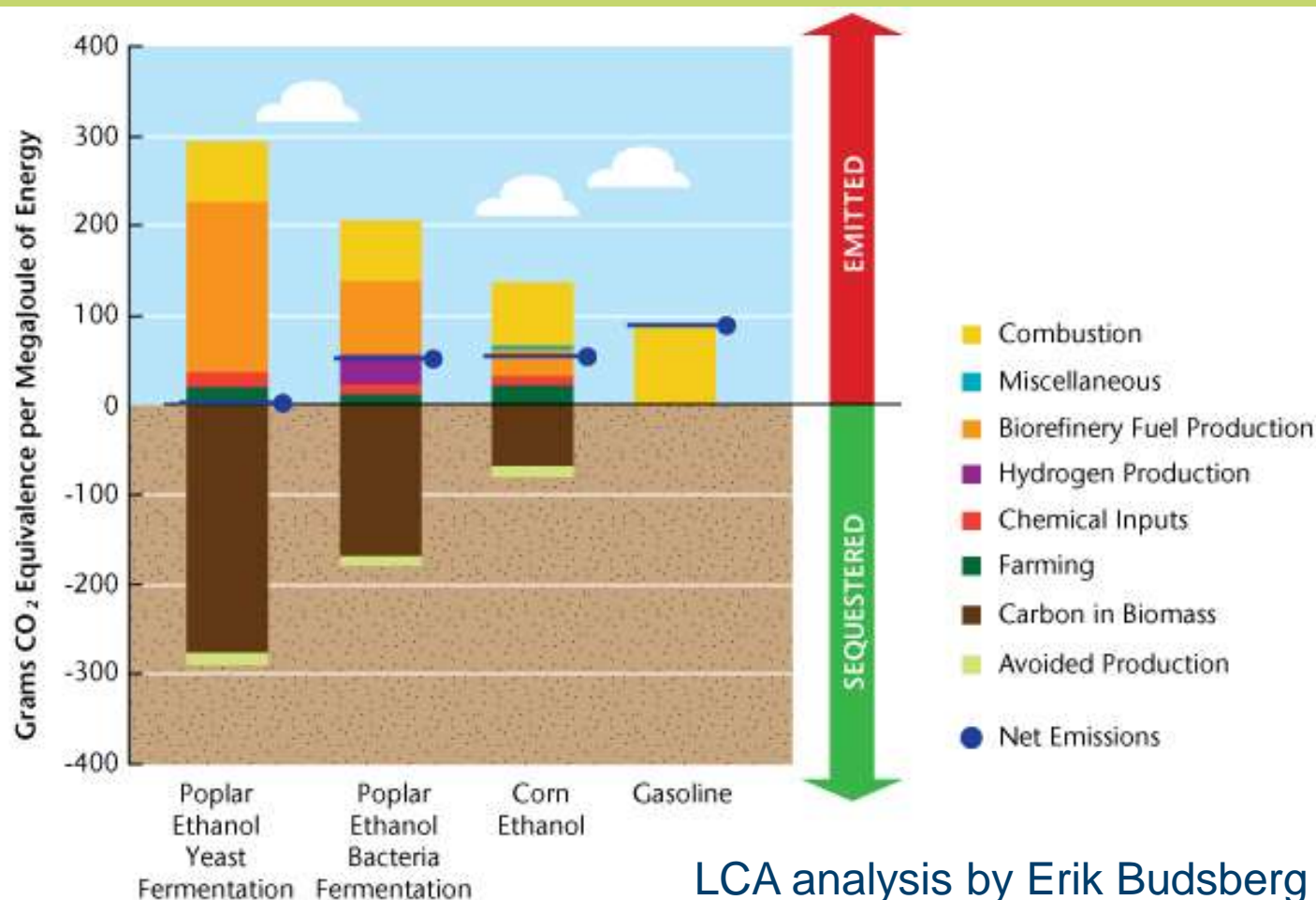
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Carbon Benefits from Poplar Ethanol



LCA analysis by Erik Budsberg at UW



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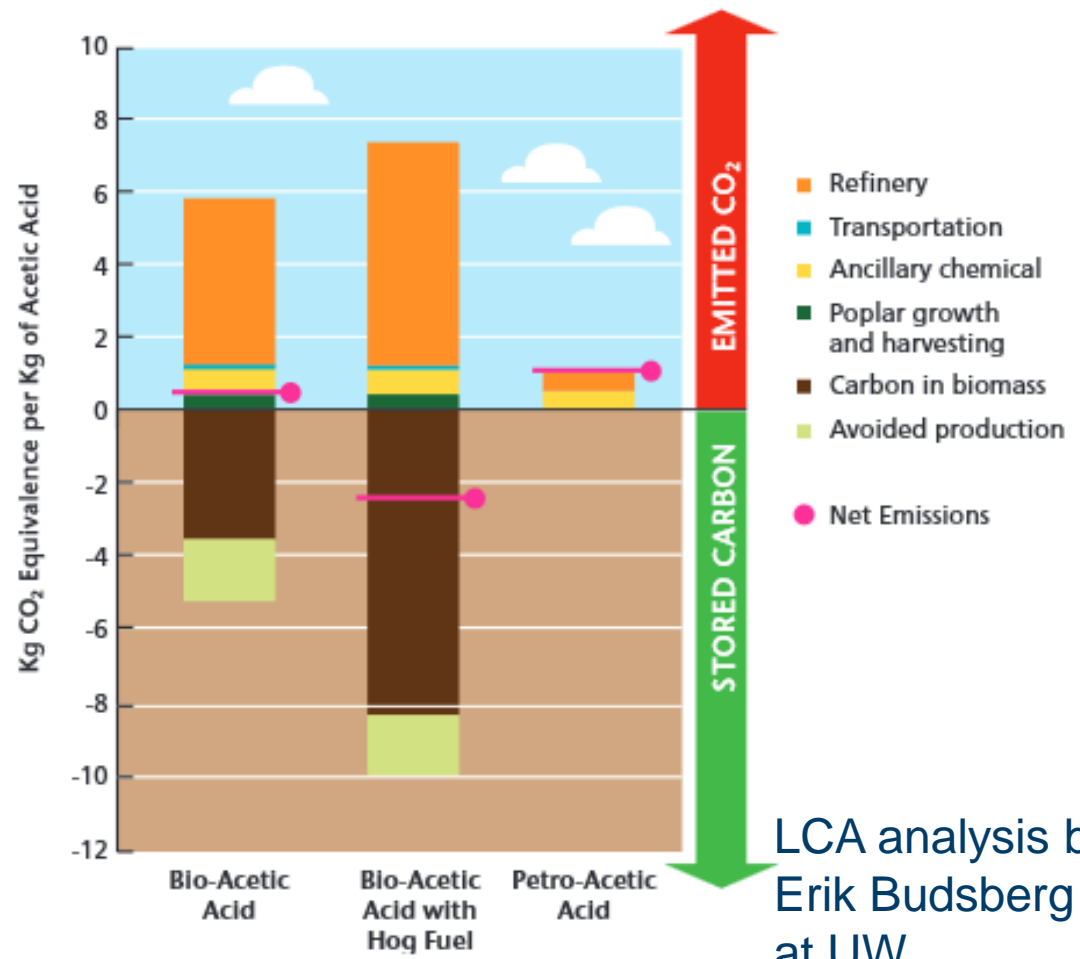
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Carbon Benefits from Bio-based Chemicals



Products made from
poplar-based acetic acid



LCA analysis by
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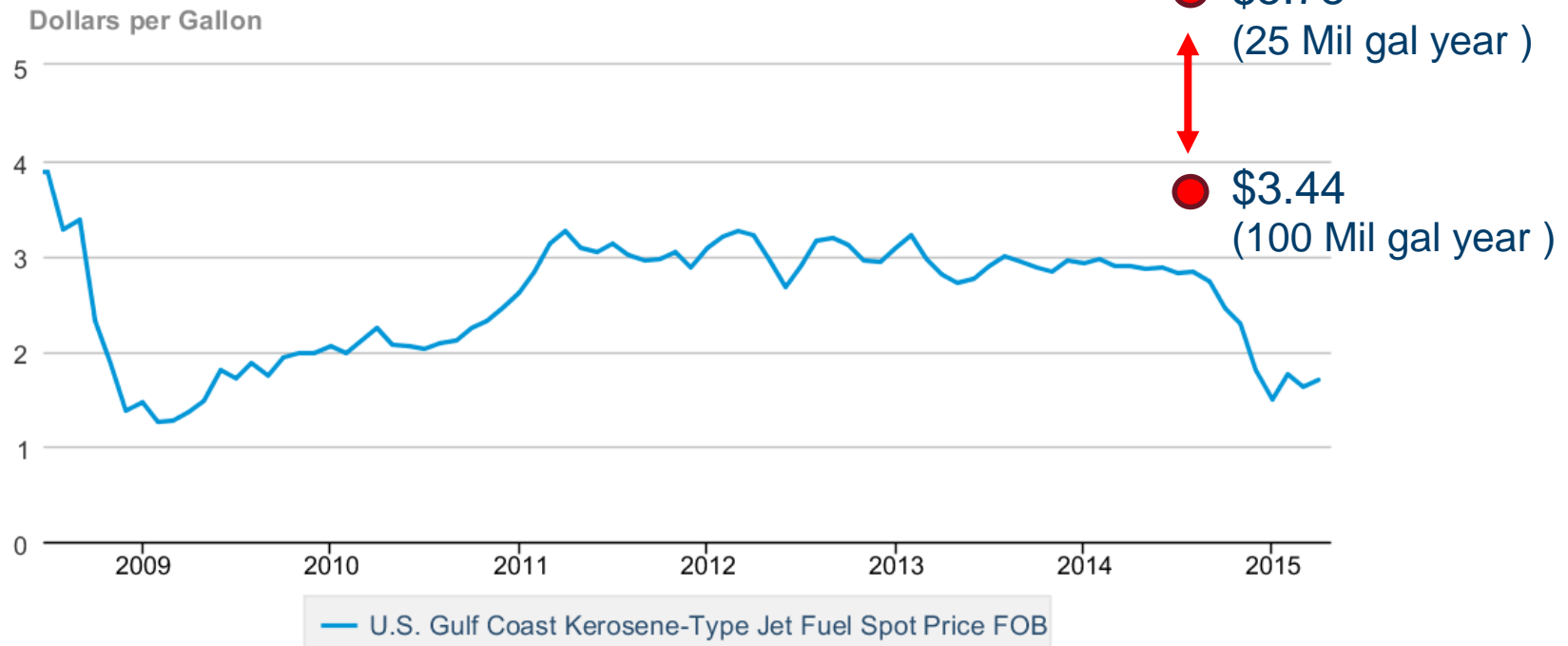


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Challenge 1: Economics

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



*7% discount rate
and \$80 per dry
ton feedstock



THOMSON REUTERS



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Challenge 2: *Where do we get the feedstock?*

Landowners

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

- \$\$\$
- Land and Water



Clarksburg, CA Landowners



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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.



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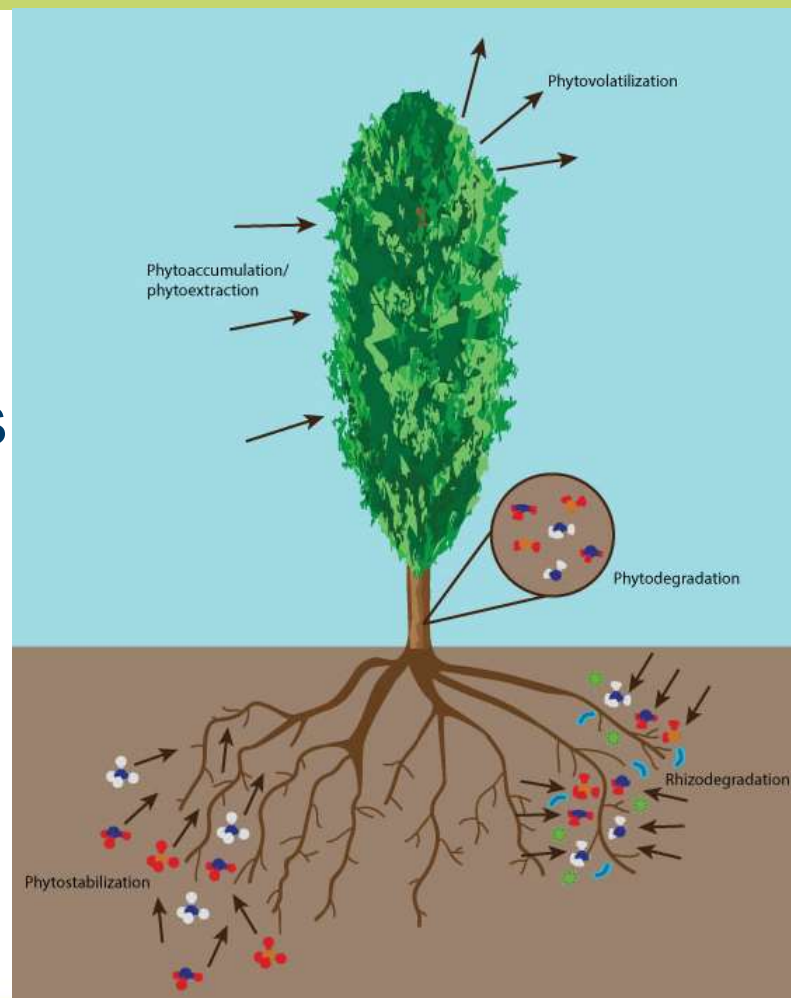


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Contaminants Removed by Poplars

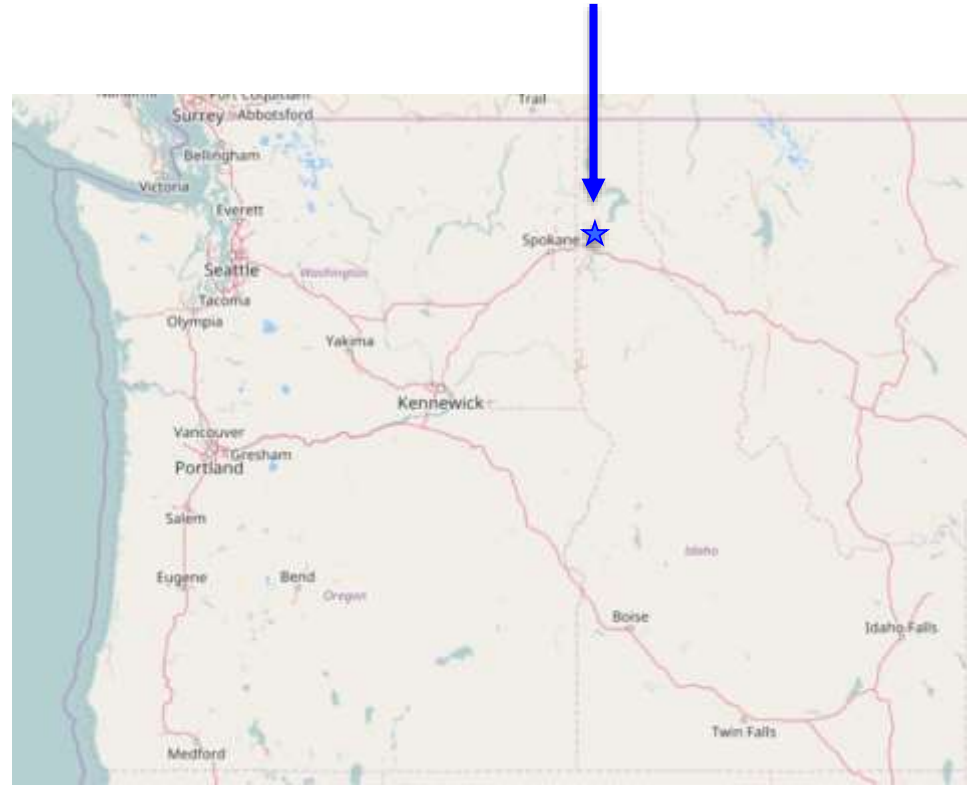
- Nutrients
 - Nitrogen,
 - Phosphorus
- Heavy metals
- Polycyclic aromatic hydrocarbons
- Numerous organic chemicals
- Hormonally active compounds
 - Estrogens
 - Androgen



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



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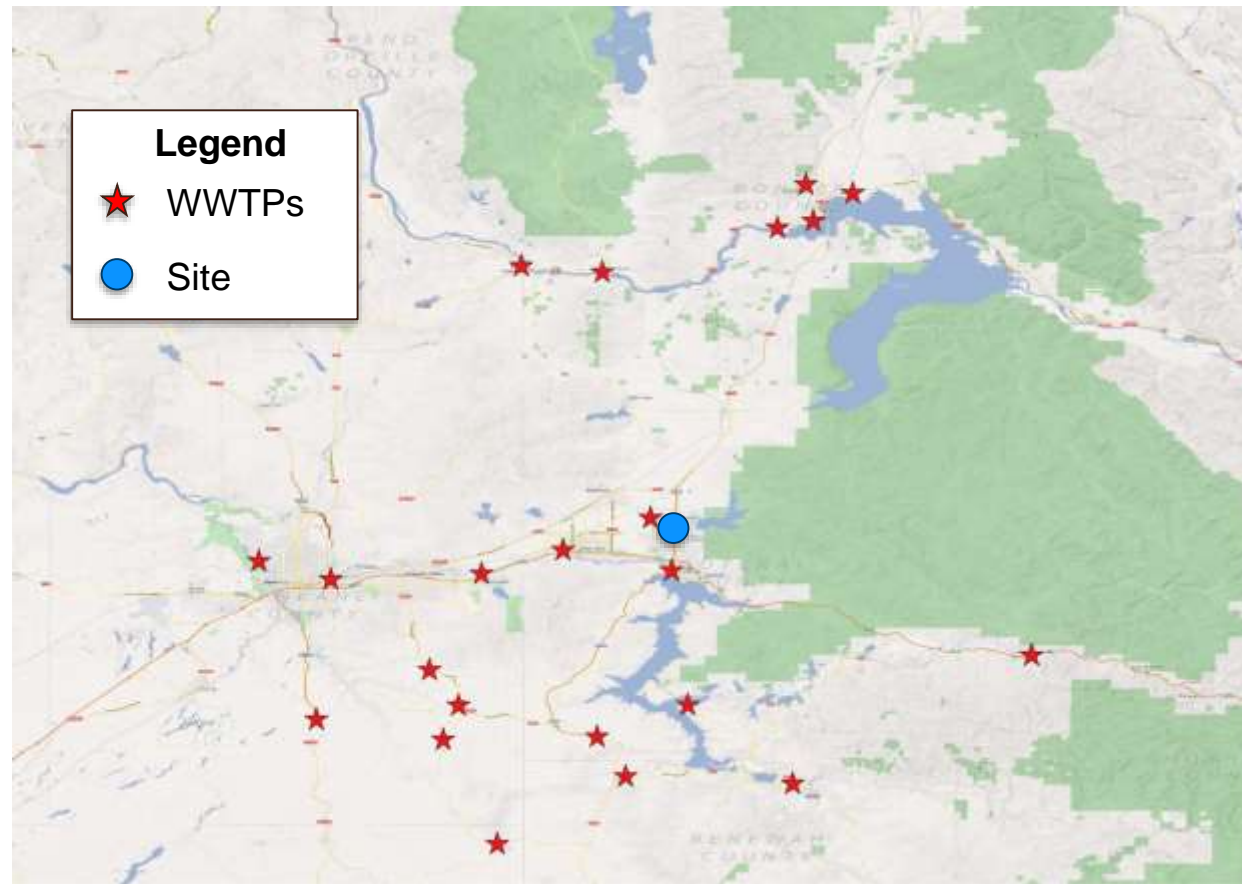
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Opportunities for Using Wastewater

24 WWTP within
75 miles of Hayden

~70 million gallons
of water treated
per day



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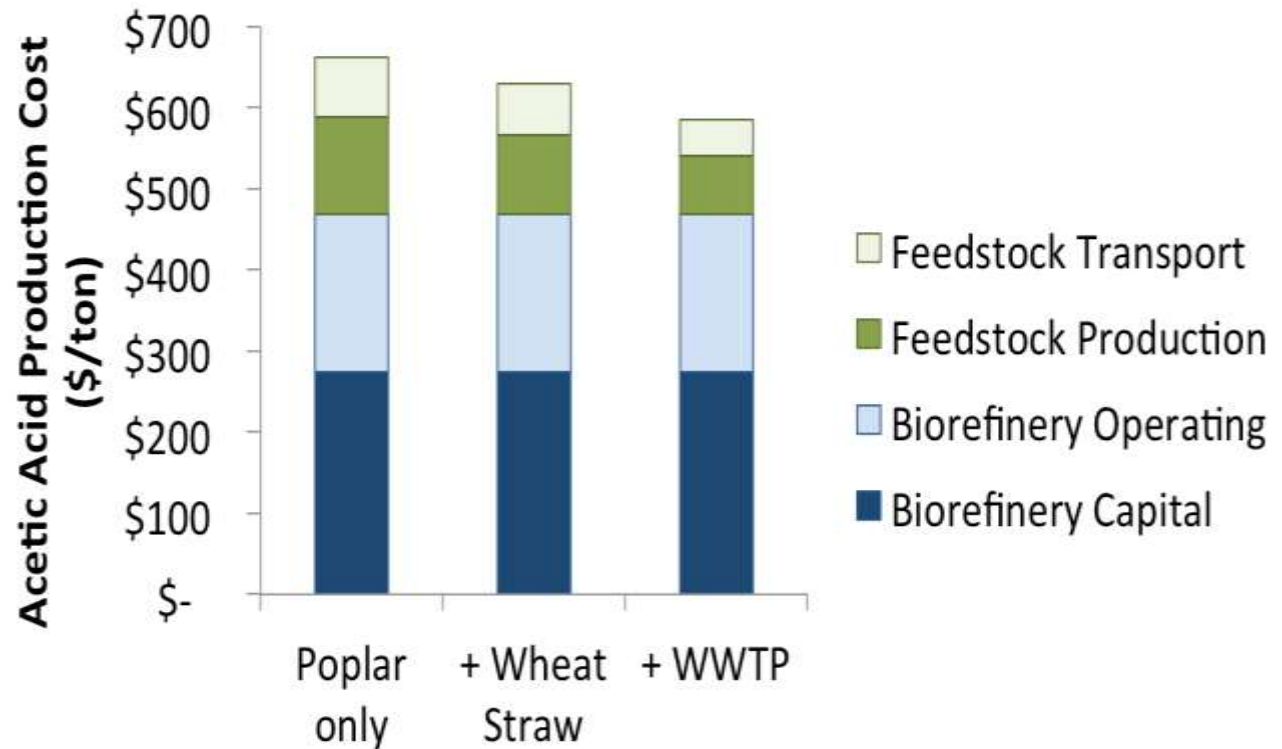
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Wastewater Improves Economics

Production Cost for Acetic Acid

Idaho case study shows reduced feedstock cost by 25% and total production cost by 12%.



Poplar and Willow Roadmap

 Benefits

 Barriers

 Potential

 Solutions



NEWBio



MWMC



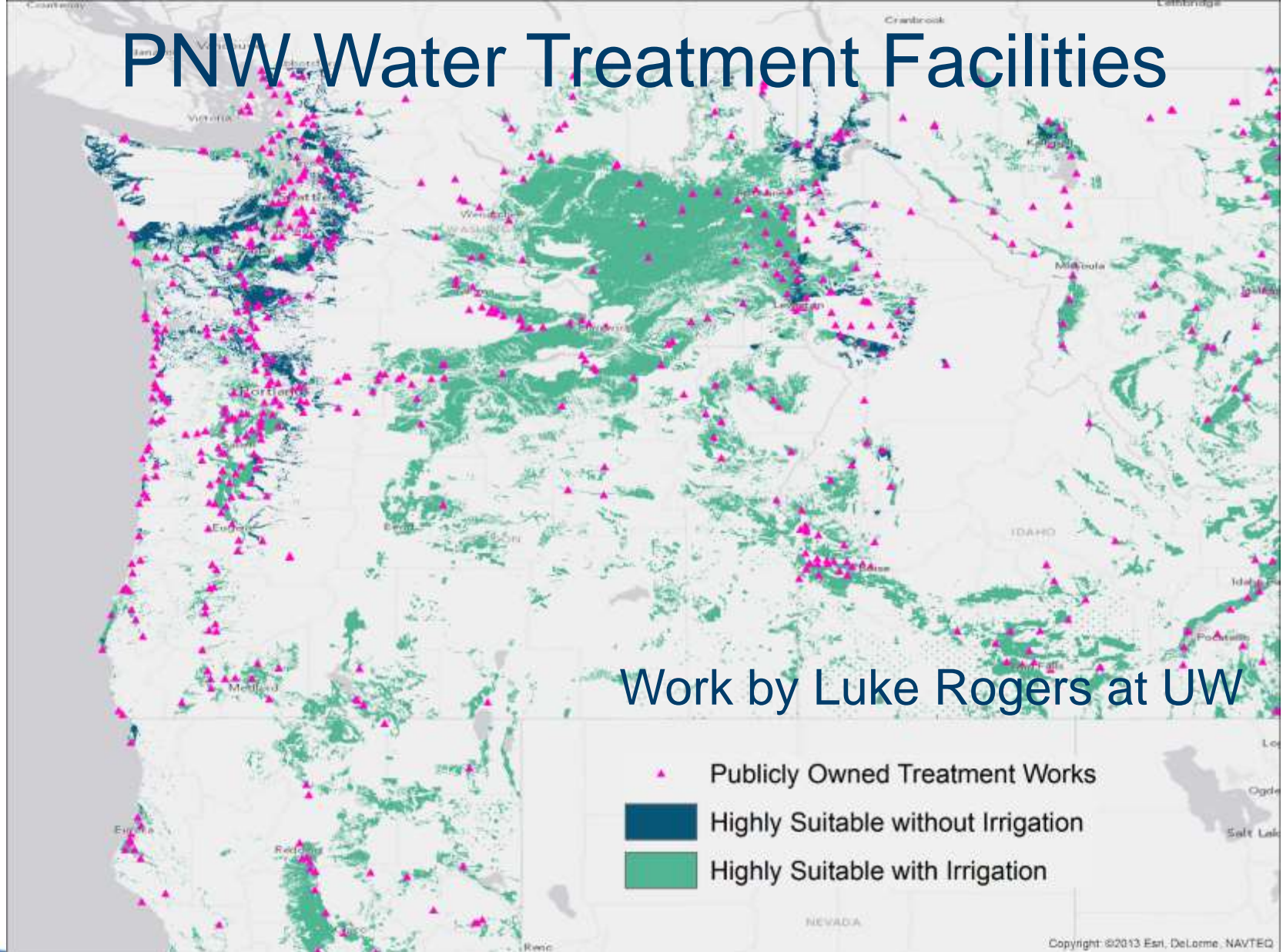
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PNW Water Treatment Facilities



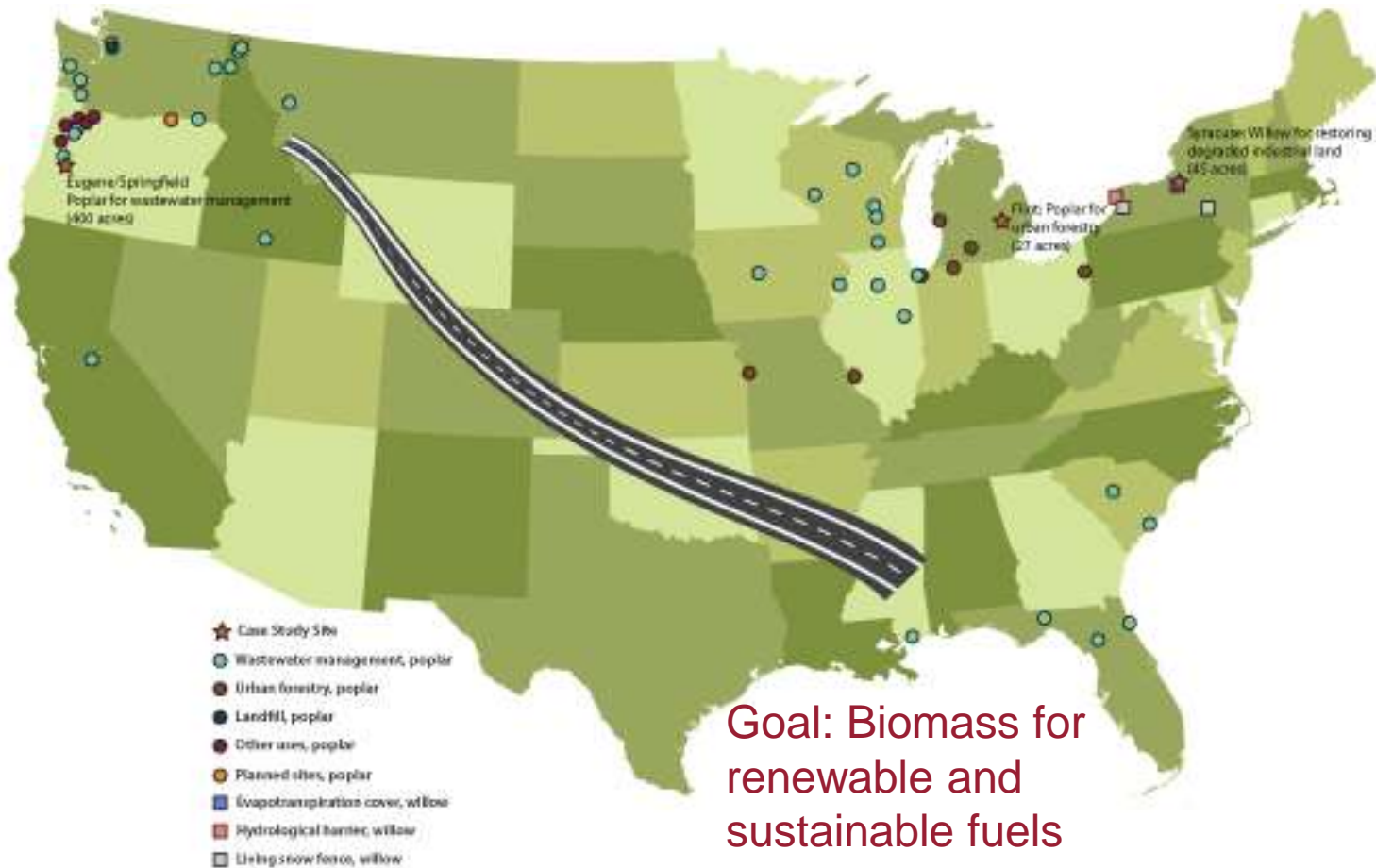
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Poplar and Willow Environmental Plantings



Goal: Biomass for
renewable and
sustainable fuels
and products



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Questions.....



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