

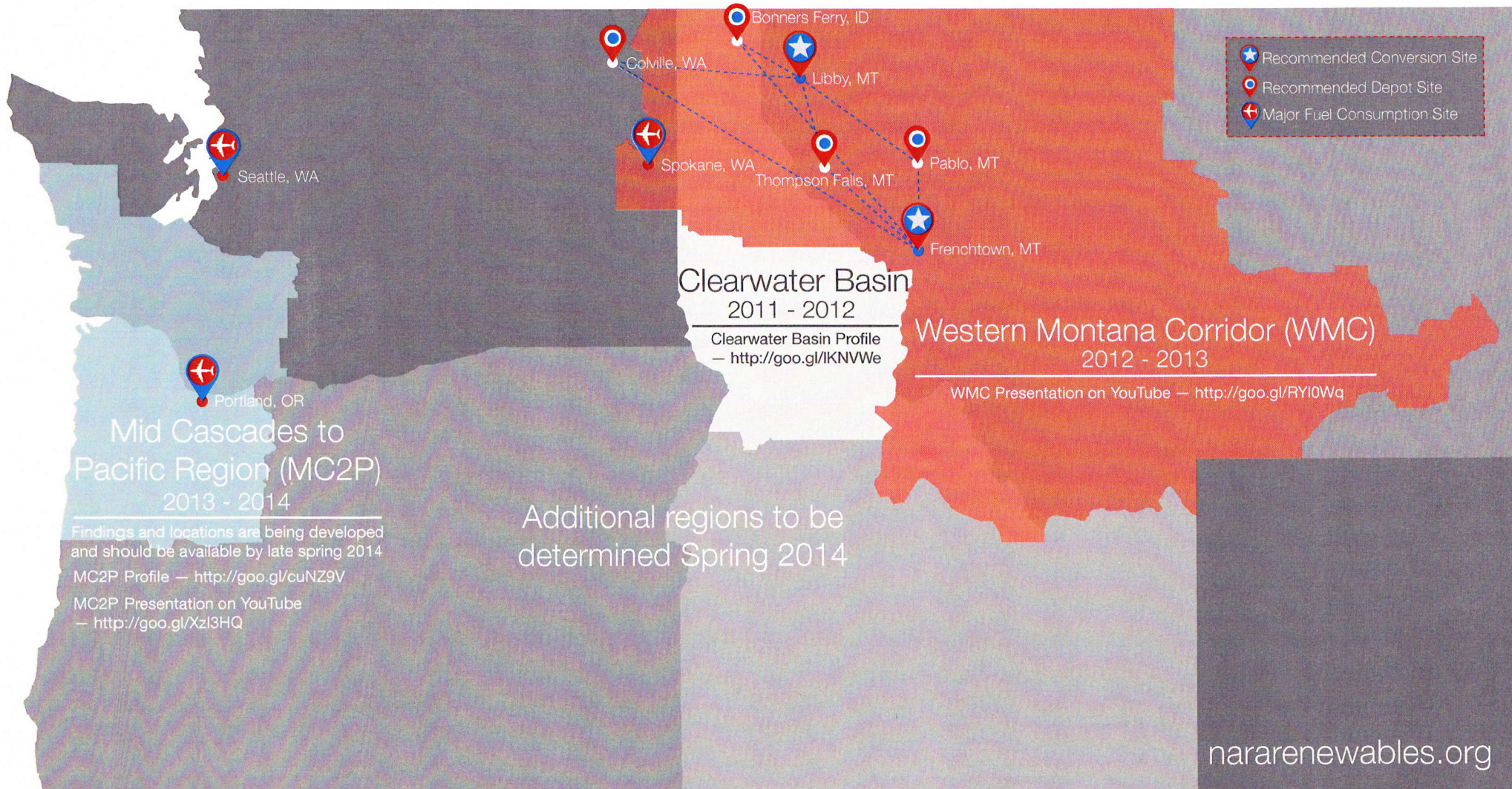


# WOOD TO WING



## Forest Residuals to Biofuel Supply Chains in the Pacific Northwest

Applying research-based findings, NARA and regional stakeholders identify conversion and depot sites in the Pacific Northwest. These site locations provide the best opportunity for economic, social and environmental success to develop a forest residuals to biofuel and co-products industry.



[nararenewables.org](http://nararenewables.org)



NARA is led by Washington State University and supported by the Agriculture and Food Research Initiative Competitive Grant no. 2011-68005-30416 from the USDA National Institute of Food and Agriculture.

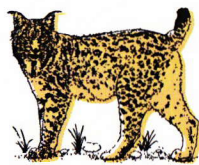


# WOOD TO WING

Measuring the environmental impact of converting forest residuals into bio-jet fuel and other co-products.

Converting forest residuals into chemical products such as bio-jet fuel is anticipated to provide numerous benefits to society. As biofuels displace fossil fuels, U.S. energy independence is strengthened and net carbon emissions are reduced. A novel use for forest residuals can stimulate rural economic development and reduce fuel loads in the forest.

There are, of course, legitimate concerns to how this industry will affect forest ecosystems, water and air quality. The NARA project funds research to investigate these concerns and provide research-based analyses and conclusions so that regional stakeholders and society can make informed decisions.



## WILDLIFE

Models are being developed to estimate the potential impact of forest residual removal on vertebrate abundance.

<http://goo.gl/ibJQRe>



## AIR QUALITY

NARA is completing a "Life Cycle Analysis" that compares petroleum-based jet-fuel to forest residual-based blended jet-fuel for greenhouse gas emissions, ozone depletion, and smog emissions.

<http://goo.gl/90JQIZ> <http://goo.gl/pYAYLD>

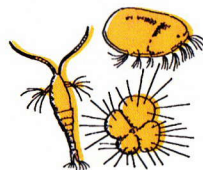


## WATER QUALITY

Models to predict water quality, quantity, and the effects on stream channels under various residual harvest scenarios are being developed.

<http://goo.gl/4GuwmU>

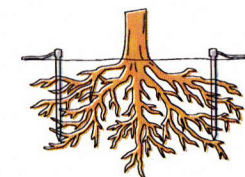
## ENVIRONMENTAL IMPACT ASSESSMENTS



## MICROFAUNA

NARA researchers are collecting and examining microbial communities at test spots to understand the effects of forest residual removal and harvesting on microfauna.

<http://goo.gl/RgrOS3>



## SOIL NUTRIENTS

NARA is funding research that develops effective models and methods to ensure that soil nutrient pools remain sustainable in working forests when limited forest residuals are removed.

<http://goo.gl/RDasmB> <http://goo.gl/Jm25RC>

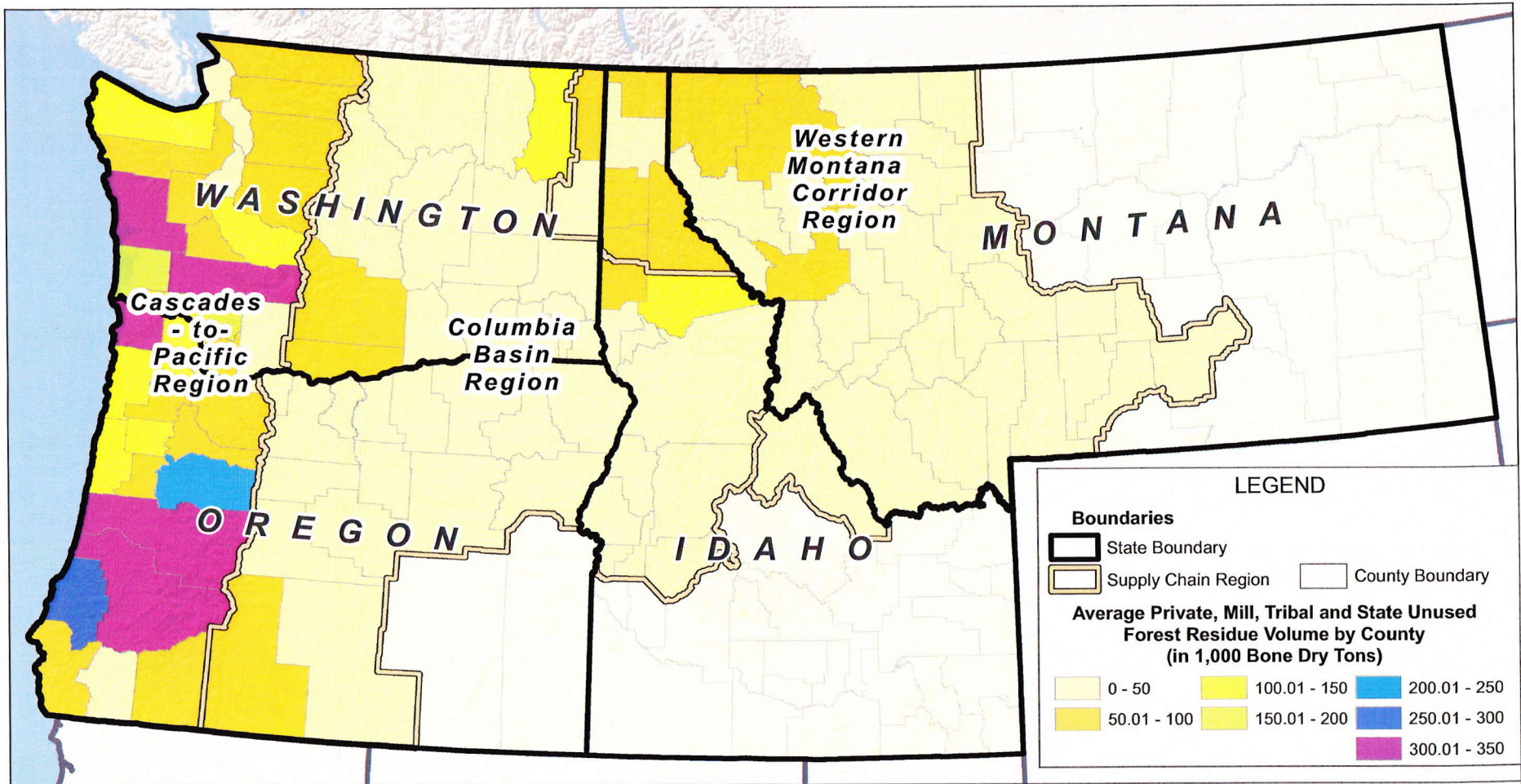
NARA

Northwest Advanced Renewables Alliance

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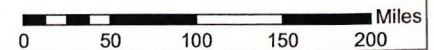
## Available Forest Residuals



NOTE: The county-level unused forest residuals volumes are calculated by taking the average of each state's county-level BBER-TPO data recorded over the past decade. See below for the years of record. The volumes represent unused forest residuals from tribal, State, and private lands, including mill residues.

**Years Used for State Forest Harvest Volume Averaging:**

Oregon -- 2003, 2008      Washington -- 2002, 2010  
 Montana -- 2004, 2009      Idaho -- 2001, 2006, 2011



For more information, please visit:  
[www.nararenewables.org](http://www.nararenewables.org)

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### Forest Residues



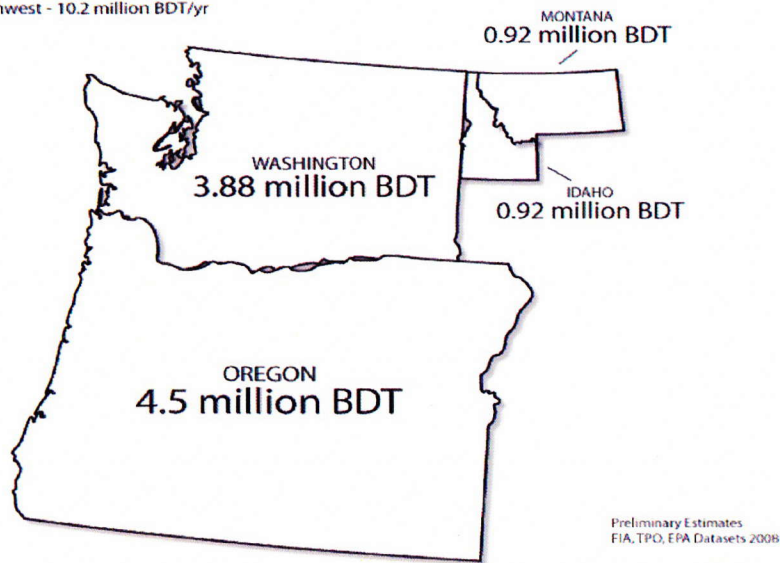
Treetops and branches remaining on the ground after forest operations or accumulated as a result of natural disturbances such as storm, fire, insects and diseases.

### Construction & Demolition (C&D)

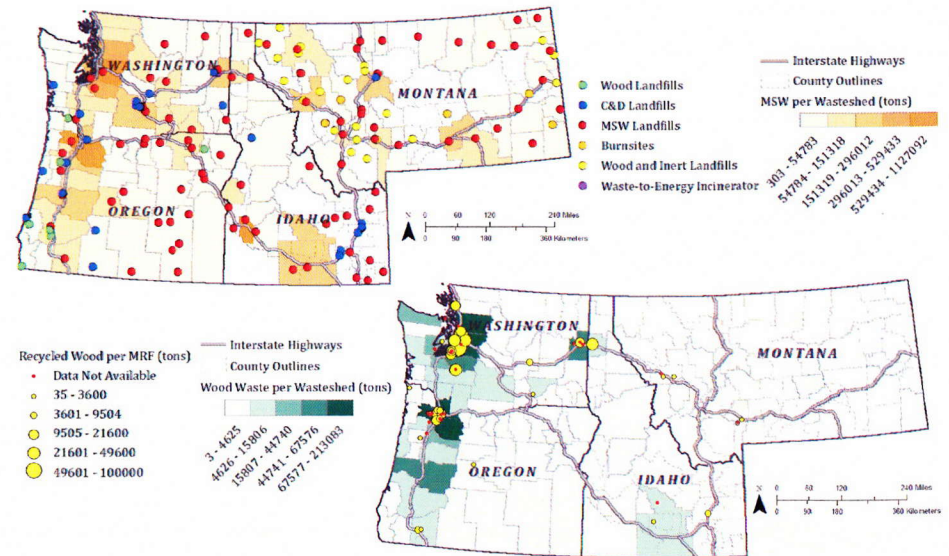


Nonhazardous painted, treated, and coated wood and wood products resulting from construction, remodeling, repair, or demolition of utilities, structures, and roads<sup>1</sup>.

Forest Residues - 2008  
Pacific Northwest - 10.2 million BDT/yr



### NARA Regional Waste Characterization Study

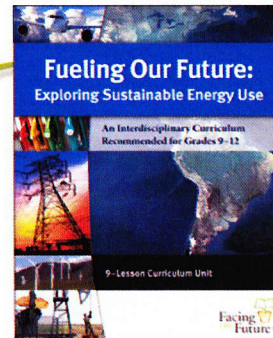


<sup>1</sup> <http://www.epa.state.il.us/small-business/construction-debris/>



## Bioenergy Literacy for Students

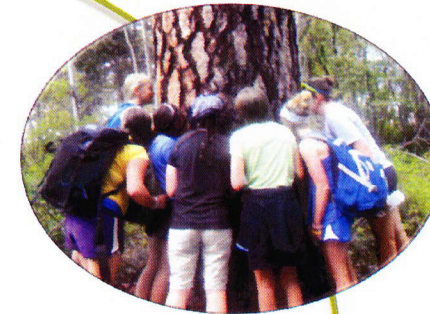
**Facing the Future:** A NW regional non-profit developing 6-12<sup>th</sup> grade inquiry-based curricula on biofuels development.  
[www.facingthefuture.org](http://www.facingthefuture.org)



**Imagine Tomorrow with BioFuels:**  
Engages high school students to create solutions for a developing biofuel industry.  
[imagine.wsu.edu](http://imagine.wsu.edu)



**MOSS:** Promotes biofuel literacy to K-12 students and teaching professionals.  
[www.uidaho.edu/cnr/moss](http://www.uidaho.edu/cnr/moss)



**BioFuels SURE:** Summer research experience for undergraduates aimed at giving them hands on skills in biofuels and bio-products research.  
[nararenewables.org/ed](http://nararenewables.org/ed)



### EDUCATING A FUTURE BIOFUEL WORKFORCE

**IDX:** A year long course for UI and WSU students providing supply chain analysis for an emerging wood to biofuels industry.  
[indexstudio.org](http://indexstudio.org)



**Salish Kootenai College:** This tribal university provides research opportunities tied to biofuels and bio-products from woody biomass.  
[www.sk.edu](http://www.sk.edu)



For more information, please visit:  
[www.nararenewables.org](http://www.nararenewables.org)

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# NARA

Northwest Advanced Renewables Alliance

**NARA Website:**

<http://nararenewables.org/>



**NARA Newsletter:**

<http://nararenewables.org/news/newsletter>



**NARA Blog:**

<http://nararenewables.org/blog/>



**Stakeholder Signup:**

<http://nararenewables.org/content/article/47>



**NARA Cumulative report**

<http://nararenewables.org/2013-report/>



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# NARA






Northwest Advanced Renewables Alliance

[nararenewables.org](http://nararenewables.org)






Get Involved At: [nararenewables.org/or](http://nararenewables.org/or)

## TAKING WOOD TO NEW HEIGHTS

Led by Washington State University and funded by the USDA National Institute of Food and Agriculture, the Northwest Advanced Renewables Alliance (NARA) is helping to develop a sustainable industry in the Pacific Northwest that uses wood residuals to make biojet fuel and valuable co-products. The alliance includes public universities, government agencies, private industry and interested stakeholders and is tasked with delivering the following:

-  Sustainable aviation biofuel from woody biomass
-  Value-added polymer and carbon products from lignin
-  Regional supply chain coalitions
-  Rural economic development
-  Bioenergy literacy

### NARA: FIVE TEAMS

-  **Education:** Engage citizens, meet future workforce needs, enhance science literacy in biofuels, and help people understand how they're going to fit into the new energy economy.
-  **Sustainability Measurement:** Evaluate and assess environmental, social, and economic viability of the overall wood to biofuels supply chain, guiding the project as it goes forward.
-  **Feedstocks:** Take a multi-pronged approach for the development and sustainable production of feedstocks derived from forest residuals and construction and demolition wood waste.
-  **Conversion:** Provide a biomass-derived replacement for aviation biofuel and other petroleum-derived chemicals in a way that is economically and technologically feasible.
-  **Outreach:** Serve as a conduit between researchers and community stakeholders, helping to transfer the science and technology of biofuels and co-products to communities in the Northwest.

### AFFILIATED ORGANIZATIONS

- Catchlight Energy
- Compañía Logística de Hidrocarburos
- Cosmo Specialty Fibers
- Facing the Future
- Gevo, Inc.
- Montana State University
- Oregon State University
- Pennsylvania State University
- Salish Kootenai College
- Steadfast Management
- Thomas Spink International
- University of Idaho
- University of Minnesota
- University of Montana
- University of Utah
- University of Washington
- University of Wisconsin-Extension
- USFS - Forest Products Lab
- USFS - PNW Research Station
- Washington State University
- Western Washington University
- Weyerhaeuser

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February 2014





# Conference registration is open now!

[www.nararenewables.org/2014conference](http://www.nararenewables.org/2014conference)

## April 28 – 30, 2014

Red Lion Hotel Fifth Avenue | Seattle, Washington



# NORTHWEST WOOD-BASED BIOFUELS + CO-PRODUCTS CONFERENCE



PO Box 64522  
Pullman, WA 99164-5222

## NORTHWEST WOOD-BASED BIOFUELS + CO-PRODUCTS CONFERENCE

Bringing together the community of researchers, business leaders, government agencies, and economic development personnel to share and exchange research findings, ideas, and strategies for the common goal of sustainable development of wood-based bio-refineries for production of biofuels and co-products in the Pacific Northwest.

### Featured speakers...

- ▶ **Peter Goldmark**, Commissioner of Public Lands, Washington DNR
- ▶ **Carol Sim**, Environmental Affairs Director, Alaska Airlines
- ▶ **Bill Hermann, Gevan Mars, John Sessions, Peter Nyström**, and more on biomass processing, environmental sustainability, and co-products.
- ▶ **Blue Marble, Catchlight Energy, Cosmo Specialty Fibers, Ensyn, Greenwood Forest Resources, LignoTech USA, Mercurius Biofuels, Weyerhaeuser**, and more...

Photo by Steffen Mueller ([www.sxc.hu](http://www.sxc.hu))



### We are still accepting poster abstracts.

[www.nararenewables.org/2014conference/?page\\_id=131](http://www.nararenewables.org/2014conference/?page_id=131)



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