

Bioenergy, Sustainability, and Land-Use Change Report Oak Ridge National Laboratory (ORNL) March 2015

Publications

Dale VH, RA Efroymson, KL Kline, and M Davitt. (In press) A framework for selecting indicators of bioenergy sustainability. *Biofuels, Bioproducts & Biorefining*.

Pollesch N, VH Dale (2015) Applications of aggregation theory to sustainability assessment. *Ecological Economics* 114: 117-127.

ORNL Presentations:

March 2-5 - Natalie Griffiths gave an overview talk on the short-rotation woody biomass sustainability project at the Interagency Conference for Research in the Watersheds meeting in Charleston, SC.

2-year old loblolly pine trees growing at the Savannah River Site for the short-rotation woody biomass sustainability project.



March 23 – Esther Parish provided a webinar to several members of North Carolina State University's (NCSU's) Lifecycle Analysis (LCA) Group in order to describe the multi-attribute decision support system (MADSS) tool that ORNL recently developed for the Vonore, Tennessee case study of switchgrass-to-ethanol production and to demonstrate the DEXi software used to build the MADSS. Steve Kelley of the NCSU LCA group requested this webinar on behalf of new PhD student, Robert Radics, who is planning to assess the overall sustainability of wood and torrefied pellets versus coal.

March 23-27 – Several ORNL researchers participated in the Department of Energy's BioEnergy Technologies Office (BETO) 2015 Project Peer Review in Alexandria, Virginia. The following presentations were made:

- *Renewable Hydrogen Production from Biomass Pyrolysis Aqueous Phase* by Abhijeet Borole
- *Bio-Oil Upgrading with Novel, Low-Cost Catalysts* by Jae-Soon Choi
- *Bioenergy Sustainability: How to Define and Measure It* by Virginia Dale
- *Sustainable Development of Algae for Biofuel* by Virginia Dale and Matt Langholtz (for Rebecca Efroymson)
- *Direct Catalytic Upgrading of Current Dilute Alcohol Fermentation Streams to Hydrocarbons for Fungible Fuels* by Brian Davison
- *Short Rotation Woody Biomass Sustainability* by Natalie Griffiths and Rhett Jackson
- *Synthetic Metabolic Pathways for Bioconversion of Lignin Derivatives to Biofuels* by Adam Guss
- *Advanced Membrane Separations to Improve Efficiency of Thermochemical Conversion* by Michael Hu
- *Forecasting Water Quality and Biodiversity* by Yetta Jager
- *Biomass-Derived Pyrolysis Oils Corrosion Studies* by Jim Keiser

- *Addressing Global Barriers to Growth of the U.S. Bioeconomy* by Keith Kline
- *Supply Forecasts and Analysis* by Matt Langholtz
- *Biofuels National Strategic Benefits Analysis* by Paul Leiby
- *Bioenergy Knowledge Discovery Framework* by Aaron Myers
- *Global Feedstock Supply Modeling and Land Use* by Gbadebo Oladosu
- *Land-Use Change Data and Analysis* by Nagendra Singh
- *Combustion Materials Durability Relationships for Improved Low-Cost Clean Cookstoves* by Tim Theiss
- *Increasing Biofuel Deployment and Utilization through Development of Renewable Super Premium* by Michael Wang, Bob McCormick and Tim Theiss
- *Fire Standards, Codes and Prevention in IBRs* by Erin Webb
- *Feedstock Supply Modeling* by Erin Webb
- BETO Review Projects in which Erin Webb is involved:
 - *Development and Deployment of a Short-Rota on Woody Crops Harvesting System Based on a Case New Holland Forage Harvester and SRC Woody Crop Header* – By Tim Volk
 - *Design and Demonstration of an Advanced Agricultural Feedstock Supply System for Lignocellulosic Bioenergy Production* – By Kevin Comer
 - *Development of a Bulk-Format System to Harvest, Handle, Store and Deliver High Tonnage, Low-Moisture Switchgrass Feedstock* – By Sam Jackson

CBES FORUM

At the March 4th forum Nate Pollesch, Ph.D candidate in the Department of Mathematics at the University of Tennessee – Knoxville, presented his work on mathematical and statistical tools to aid in assessment and sustainable management of bioenergy production systems. His presentation was titled Bioenergy Sustainability Assessment: Mathematical approaches to protocol development.



Other ORNL Activities:

ORNL (Keith Kline, Maggie Davis) supported the Project Committee developing ISO 13065 “Sustainability Criteria for Bioenergy” to complete a Final Draft International Standard. This iteration will be distributed to all International Organization for Standardization (ISO)-members in early June and, if approved, the final Standard will be published later this year.

March 30 –April 17 – Anna Duden is visiting ORNL from Utrecht University to work on sustainability aspects of woody biomass from the southeastern US for pellet production.

Davis and Kline are working with ISO colleagues on a manuscript describing how “indirect effects” are handled in this standard and the rationale behind the decisions.

Upcoming ORNL Visits/Events:

April 6 – 17 – Steef Hanssen from Utrecht University will be visiting ORNL to work on his

Masters dissertation research entitled: “The effect of biophysical and forest management variables on carbon payback times of wood pellets from the South-Eastern US used for bioenergy in Europe.”

April 17 - Yetta Jager has been invited to give a presentation to the National Science Foundation Scholars, "Preparation of Data Driven Mathematical Scientists for the Workforce" at the East Tennessee State University titled “Biomass, Birds, and Better Water: Virtual tools illuminate pathways toward a sustainable bioeconomy”

May 17-21 - Natalie Griffiths will give a talk on “Effects of short-rotation pine management for bioenergy on water quality in the southeastern United States” at the Society for Freshwater Science conference in Milwaukee, May 17-21.

June 15-17 - Virginia Dale will give a talk on “Approach for sustainability assessment of southeast pellet production” at the Forestry Technical Session at the 2015 Southern Regional Meeting of the National Council for Air and Stream Improvement (NCASI) in Greenville, SC

June 23-24 – Tim Theiss, Virginia Dale, and others plan to attend the “DOE Bioenergy 2015: Opportunities in a Changing Energy Landscape” conference in Washington, D.C.

June 24 - A work session is being organized with the American Society for Testing and Materials (ASTM) International Committee E48.80 for a new standard relevant to sustainability concepts, definitions and assessment of energy and industrial chemicals from biomass. See the ASTM website: <http://myastm.astm.org> to register for the June meeting. Contact Maggie Davis or Keith Kline for more information.

July 5-11 – Virginia Dale plans to attend the 9th International Association of Landscape Ecology (IALE) World Congress in Portland, Oregon, and will present an invited talk on “Ecological implications of energy use: a focus on scale” in the John A. Wiens Symposium on Spatial Scaling in Ecology.

August 8-14 – Virginia Dale plans to attend the 2015 Ecological Society of America (ESA) Annual Meeting and give an invited talk. Keith Kline will also present on a landscape design approach for assessing trade-offs and sustainability of woody biomass production from forests in the Southeastern United States. This meeting is taking place in Baltimore, Maryland.

October 26-29 – Virginia Dale plans to participate in the International Energy Agency (IEA) Bioenergy Conference 2015 in Berlin, Germany.