

Bioenergy, Sustainability, and Land-Use Change Report Oak Ridge National Laboratory (ORNL) March 2017

Publications

- Dale VH, Keith L Kline, Esther S. Parish, Annette L. Cowie, Robert Emory, Robert W. Malmshemer, Raphael Slade, C.T. (Tat) Smith, T. Bently Wigley, Niclas Scott Bentsen, Göran Berndes, Pierre Bernier, Miguel Brandão, Helena Chum, Rocio Diaz-Chavez, Gustaf Egnell, Leif Gustavsson, Jörg Schweinle, Inge Stupak, Paul Trianosky, Arnaldo Walter, Carly Whittaker, Mark Brown, George Chescheir, Ioannis Dimitriou, Caspar Donnison, Alison Goss Eng, Kevin P. Hoyt, Jennifer C. Jenkins, Kristen Johnson, Charles A. Levesque, Victoria Lockhart, M. Cristina Negri, Jami E. Nettles, and Maria Wellisch (In press) Status and prospects for renewable energy using wood pellets from the southeastern United States. *GCB Bioenergy*. *GCB Bioenergy* doi: 10.1111/gcbb.12445.
- Dale VH and KL Kline. 2017. Interactive Posters: A valuable means for enhancing communication and learning about productive paths toward sustainable bioenergy. *Biofuels, Bioprod. Bioref.* 11:243-246. DOI: 10.1002/bbb.1753 <http://onlinelibrary.wiley.com/doi/10.1002/bbb.1753/epdf>
- Parish, ES, Dale VH, Tobin E, Kline KL (In review) Use of Forest Inventory and Analysis (FIA) data to analyze timberland conditions in the vicinity of two ports in the Southeastern United States. *Forest Ecology and Management, Data in Brief. Forest Ecology and Management*.

Presentations

Mar. 6-9: Reports were presented on several ORNL projects that are supported by DOE's Bioenergy Technologies Office (BETO) at the 2017 Project Review in Denver, Colorado

- March 6
 - Bioenergy Sustainability: How to Define and Measure It – Virginia Dale
 - Fire Standards Codes and Prevention in Integrated Biorefineries – Erin Webb
 - 2016 Billion-Ton Report, Vol 2: Environmental Sustainability Effects of Select Scenarios from Vol 1 – Rebecca Efrogmson
 - Sustainable Development of Algae for Biofuel – Rebecca Efrogmson
 - Forecasting Water Quality and Biodiversity – Yetta Jager
 - Agile Biomanufacturing Foundry – Nathan Hillson
 - Supply Forecasts and Analysis – Matt Langholtz
 - Bioenergy Knowledge Discovery Framework – Aaron Myers
 - Separations Consortium – Jennifer Dunn
- March 7
 - ChemCatBio Overview – Joshua Schaidle
 - Catalytic Upgrading of Biochemical Intermediates – Richard Elander
 - Fast Pyrolysis and Upgrading – Alan Zacher
 - Biofuels National Strategic Benefits Analysis – Paul Leiby and Rocio Uria Martin
 - Synthetic Metabolic Pathways for Bioconversion of Lignin Derivatives to Biofuels – Adam Guss
 - Advanced Catalyst Synthesis and Characterization – Susan Habas
 - Bioeconomy Analysis – Laurence Eaton
 - Computational Consortium for Physics and Chemistry – James Parks
 - Melt-Stable Engineered Lignin Thermoplastic: A printable Resin – Amit Naskar



- March 8
 - Land-Use Change Data and Analysis – Nagendra Singh
 - Collaborations to Assess Land Effects of Bioenergy – Keith Kline
 - Biomass-Derived Pyrolysis Oil Corrosion Studies – James Keiser
 - Short-Rotation Woody Biomass Sustainability – Natalie Griffiths
 - Feedstock Supply Modeling – Erin Webb
 - Advanced Membrane Separations To Improve Efficiency of Thermochemical conversion – Michael Hu
 - Renewable Carbon Fibers Consortium – Adam Bratis
 - One-Step High-Yield Production of Fungible Gasoline, Diesel, and Jet Fuel Blend Stocks from Ethanol without Added Hydrogen – Vertimass, LLC – John Hannon
 - Renewable Hydrogen Production from Biomass Pyrolysis Aqueous Phase – Abhijeet Borole
- March 9
 - Enabling Sustainable Landscape Design for Continual Improvement of Operating Bioenergy Supply Systems – Kevin Comer
 - Short-Rotation Woody Biomass Sustainability – Natalie Griffiths
 - A Hybrid Catalytic Route to Fuels from Biomass syngas – Lanza Tach, Inc. – Sara Ye
 - Feedstock Supply Modeling – Erin Webb
 - Resource Assessment of Sustainable Biomass through Forest Restoration – Mark Wigmosta

Mar. 10: Esther Parish presented career path/job requirements to Roane County High School students through a Freshmen Career Event sponsored by the Rotary/Interact Club.

Mar. 13: Virginia Dale spoke on “Incorporating Bioenergy into Sustainable Landscape Design” at The Great Experiment Conference in Knoxville, Tennessee. The conference focused on work conducted in developing the science for a Tennessee Biofuels Industry.

Mar. 20-24: ORNL worked with International Research Center for Maize and Wheat (CIMMYT-Mexico) to help CIMMYT and the Consortium of International Agricultural Research Centers (CGIAR, a global agricultural research partnership) advance “From sustainable intensification of cropping systems to sustainable farming systems and landscapes” (project title) by applying approaches developed with DOE-BETO support for more sustainable biomass production systems and landscape design.

Mar. 21: Presentations were given by Virginia Dale, Keith Kline and Sarah Eichler Inwood in Mexico on “Progress toward Sustainable Farming Systems and Landscapes at the CIMMYT headquarters.”

Mar. 31: Latha Baskaran passed her final oral examination covering the dissertation and course program (or “dissertation defense” for short). Her thesis is titled “Effects of switchgrass-related land-use changes on aquatic macroinvertebrates.” Her doctoral committee includes Drs. Carol Harden, Shih-Lung Shaw, Virginia Dale (ORNL), and Liem Tran (Chair).

Other ORNL Activities

Mar. 22-23: Virginia Dale, Keith Kline and Sarah Eichler Inwood participated in Wheat Wheat in Obregon, Mexico and then gave a presentation on “Sustainable Farming Systems and Landscapes in the Yaqui Valley to the Sonoran Technical Institute (ITSON-CIIBAA).”



Mar. 28: ORNL hosted a workshop on Visualizing Progress toward Bioenergy Sustainability. Mike Hilliard, Esther Parish, Keith Kline and Virginia Dale are developing a tool to support visualization of complex

information. The workshop was a chance for interested stakeholders to give input into development of the tool and provide offer a first glimpse into the workings of the tool.

BioSTAR, the Bioenergy Sustainability Target Assessment Resource, is a visualization tool being developed by researchers at Oak Ridge National Laboratory (ORNL). BioSTAR was the focus of a workshop held on March 28, 2017, at the ORNL National Transportation Research Center. Scientists from Idaho National Laboratory, Argonne National Laboratory, the National Renewable Energy Laboratory and ORNL as well as a local farmer, farm extension agent, industry representatives, and scientists from The University of Tennessee, Pennsylvania State University, and the State University of New York gathered to discuss the next steps in the development of this prototype visualization tool. The workshop provided an opportunity for hands-on exploration of how the tool can ultimately be used to address research and management questions. BioSTAR pulls together the social, environmental, and economic aspects of progress toward bioenergy sustainability in a way that allows users to form integrated understanding of potential tradeoffs and benefits in different bioenergy systems around the United States.



Upcoming ORNL Visits/Events

Apr. 8: Virginia Dale will participate in a panel discussion on non-academic careers for graduate students primarily in the Department of Ecology and Evolutionary Biology from the University of Tennessee, Knoxville. The goal of this event is to expose graduate students from a range of STEM fields to career opportunities available to them outside the traditional academic track. The panel will be diverse, with speakers representing careers in federal agencies, NGOs, National Labs, environmental consulting agencies, science policy/communication, industry, and zoos/arboreta.

Apr. 9-13: Esther Parish has been invited to present her research on wood pellet sustainability at the (US Regional Association of the International Association for Landscape Ecology meeting in Baltimore, Maryland: <http://usiale.org/baltimore2017/>). Her presentation will be part of a symposium entitled “Telecoupling people and landscapes among distant places around the world.”

Other ORNL presentations at the upcoming US IALE meeting are listed below.

- Keith Kline will speak on “Can sustainability standards and certification improve landscape outcomes?”
- Virginia will speak on “Bridging ecosystem services and sustainable bioenergy indicators with stakeholders.”



Apr. 10: Virginia Dale will speak on “Bridging Ecosystem Services and Sustainable Bioenergy Indicators with Stakeholders” at the 2017 International BIOMASS Conference & Expo in Minneapolis, Minnesota, as part of the pre-conference on “Emerging Biomass Feedstocks.”

Apr. 17: A virtual symposium was led by ORNL and DOE/BETO on the Billion Ton report: Volume 2, Environmental Effects of Select Scenarios from Volume 1. **Rebecca Efroymsen** is the lead ORNL staff on this activity and several other ORNL scientists are involved.

Apr. 18: Tim Theiss, Amit Naskar, Laurence Eaton, Natalie Griffiths, and Virginia Dale will participate in the USDA/DOE Bioeconomy Research Collaboration Meeting in Beltsville, Maryland.

May 18-20: Keith Kline and Virginia Dale will participate in a workshop organized by the IEA Bioenergy Intertask on Sustainability. They will speak on

- “Sustainable production of wood based bioenergy in the Southeastern US.”
- “Assessing progress toward sustainability of cellulosic-based bioenergy in the US.”

Aug. 6-11: Several ORNL scientist will participate in the upcoming annual meeting of the Ecological Society of America meeting in Portland.

- Virginia Dale organized a special session on Large Infrequent Disturbances for the Ecological Society of America meeting in Portland. Speakers are Monica Turner, Jerry Franklin, Ariel Lugo, and Ólafur Arnalds.
- Gangsheng Wang will present “Simulated Response of Avian Biodiversity to Biomass Production in the Conterminous United States” with coauthors Henriette Jager, Jasmine Kreig, Nathan Sutton, and Ingrid Busch.
- Keith Kline will present “Estimating land-use change effects associated with supplying a billion-ton U.S. bioeconomy.”
- Virginia Dale will present “Status and prospects for renewable energy using wood pellets from the southeastern United States.”
- Virginia Dale will help lead a field trip to Mount St. Helens on August 5.

Sept. 12-15: Virginia Dale was invited to give a presentation at the International Association for Landscape Ecology (IALE) 2017 European Congress in Ghent, Belgium, in a symposium on “Integrating renewable and non-renewable energy development with landscape service trade-offs.” She will speak on “Assessing Progress toward Sustainability of Bioenergy Systems.”

Sept. 18: Virginia Dale was invited by Felix Kienast to speak at the Landscape Ecology Group at the Swiss Federal Institute for Forest, Snow and Landscape Research.

Sept. 23–27: Y. Jager was invited to participate in a symposium highlighting authors in an upcoming Renewable Energy and Wildlife book to be published by Johns Hopkins Press in conjunction with The Wildlife Society. The Symposium is sponsored by the Renewable Energy Working Group of The Wildlife Society and will be held at the annual meeting in Albuquerque, NM.

Nov. 15-17: Latha Baskaran and Virginia Dale had their abstract accepted for presentation at the annual Society of American Foresters National Convention in Albuquerque, NM. The presentation is on “Framework to Identify Effects of Forest Management for Wood-based Pellets on Biodiversity.”

=====