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 Title: **Research Staff, Environmental Sciences & Ctr BioEnergy Sustainability**
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Education:

PhD: MS: **Env. Education** BS: **Energy & Environment, NRM**

General Areas of Expertise:

Approaches to support sustainable development, renewable energy

Short Bio:

Keith is a senior researcher in the Environmental Sciences Division at ORNL and a 'joint faculty' at the University of Tennessee's Bredesen Center for Interdisciplinary Research and Graduate Education. Between 1980 and 2008, Keith lived and worked in developing nations supporting rural development programs to improve land management for agriculture and ecosystem services. Current research supports the Department of Energy to assess national and international effects associated with the development of domestic renewable energy resources. Special interests: Land-Use Change (and ILUC), and involving stakeholders in developing plans to integrate and adapt renewable energy technologies into more sustainable production systems

Five Representative Publications:

- Kline, K. L., Msangi, S., Dale, V. H., Woods, J., Souza, GM., et al., (2017) Reconciling food security and bioenergy: priorities for action. *GCB Bioenergy*, 9: 557-576. doi:10.1111/gcbb.12366 <http://onlinelibrary.wiley.com/doi/10.1111/gcbb.12366/full>
- Kline KL, Davis M, Dunn J, Eaton L, Efraymson RA. "Land Allocation and Management: Understanding Land-Use Change (LUC) Implications under BT16 Scenarios" https://energy.gov/sites/prod/files/2017/01/f34/2016_billion_ton_report_volume_2_chapter_3.zip
- Kline KL, Dale VH, Lee R, Leiby P (2009) In Defense of Biofuels, Done Right. *Issues Science & Tech* 25(3):75-84. <http://issues.org/25-3/kline/>
- Kline KL, Mayer AL, Martinelli FS, Medeiros R, Oliveira COF, et al., (2016) Bioenergy and biodiversity: Key lessons from the Pan American region. *Environmental Management* 56: 1377-1396. DOI: 10.1007/s00267-015-0559-0.
- Koponen K, Soimakallio S, Kline KL, Cowie A, Brandão M (In Press, 2017) Quantifying the climate effects of bioenergy - choice of reference system. *Renewable & Sustainable Energy Reviews*. 2017. doi.org/10.1016/j.rser.2017.05.292
- Singh, N., Kline, K. L., Efraymson, R. A., Bhaduri, B., & O'Banion, B. (2017). Uncertainty in Estimates of Bioenergy-Induced Land Use Change. In *Bioenergy and Land Use Change* (pp. 141-153). John Wiley & Sons, Inc. <https://doi.org/10.1002/9781119297376.ch10>

FEWESTERN Symposium 2017 Presentation Title and Abstract:

Title: Food and Fuel: when does land matter?
 The food-energy- water nexus is directly linked by land management. Land classification systems and models tend to over-simplify and omit the most important opportunities to build synergies via multiple-objective, multi-use planning. Understanding the complex interactions among food, bioenergy and sustainable resource management requires a focus on specific contextual problems and opportunities. The United Nations' 2030 Sustainable Development Goals place a high priority on food and energy security; bioenergy plays an important role in achieving both goals. We can enhance the resilience and adaptability of energy and food production systems and the coping mechanisms required in times of crisis. Priorities for achieving and documenting successful synergies between bioenergy and food security include the following: (1) clarifying communications with clear and consistent terms, (2) recognizing that food and bioenergy need not compete for land and, instead, should be integrated to improve resource management, (3) investing in technology, rural extension, and innovations to build capacity and infrastructure, (4) promoting stable prices that incentivize local production, (5) adopting flex crops that can provide food along with other products and services to society, and (6) engaging stakeholders to identify and assess specific opportunities to advance local goals. Systematic monitoring and analysis to support adaptive management and continual improvement are essential elements to build synergies and help society equitably meet growing demands for both food and energy.