Drafted September 2009 and verbally approved by Zia Haq in November 2009 as reflecting DOE aspirations.[i]

LUC Modeling Objectives and User Requirements

The Energy Independence and Security Act (EISA, December 2007) established a new U.S. Renewable Fuels Standard including requirement for analysis of lifecycle impacts of energy that are to include "aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land-use changes), as determined by the Environmental Protection Agency (EPA) Administrator, related to the full fuel lifecycle." The EISA Target of 36 billion gallons of biofuels by 2022 has implications for land use and for "land-use change." To investigate those implications, DOE (a primary "user" for the improved model) has proposed the following user requirements and objectives:

- Global analysis that incorporates local/regional level detail and data
- Incorporates linkages among related sectors (minimum of agriculture including livestock, energy, forestry)
- Geo-spatially referenced (permitting down- and up- scaling)
- Ability to back-cast and forecast
- Incorporate economic and social aspects of land-use change
- Ability to generate policy-based scenarios and sensitivity studies
- Ability to discern and allocate relative values of cause-and-effect among the different drivers of land-use change
- Ability to incorporate different feedstocks, conversion technology pathways, and land-use data
- Transparent, peer-reviewed, and integrated with KDF
- Eventually documented and available in public domain
- Incorporate high resolutions land cover/land use data (e.g. 30m x 30m)

Documenting model assumptions, sensitivities, uncertainties, and limitations based on publicly available data and model code is also a key part of the scoping process designed to improve the modeling framework.[ii] There are many deficiencies in the existing data on global land cover. The limitations are even greater for data on land uses and land-use changes over time. Therefore, an effective effort will need to identify data gaps and efforts needed to develop the needed database to fully specify the proposed modeling framework. The functional schema of the model will need to reflect processes that take advantage of improving data sets over time.

The approach and modeling framework should permit comparisons between different fuel options, different crop placement designs, and/or different agricultural rotations and production systems that include bioenergy as primary and/or secondary products. Additional questions to be addressed by the scoping process for an improved modeling framework include:[iii]

- Which drivers of land-use change should be integrated into the models? include:

- How to define land-use classifications most relevant for bioenergy land-use change modeling?
- Which future scenarios should be added to models?
- What land-use and land-cover data are needed to support the models?
- How to incorporate relevant spatial information on the land-use change impacts of biofuels with economic and other models?
- How and at what resolution/precision should those data be collected?
- How should the measurements and data be structured?
- How should data from disparate sources be managed and distributed?
- How much would it cost to acquire the data?
- Who could partner in this process? Who else should invest in data collection?

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[i] From: Kline, Keith L.
Sent: Monday, October 26, 2009 3:28 PM
To: 'Haq, Zia'; 'Goss Eng, Alison'
Subject: Analysis Task 6214G: LUC Model User Requirements

Hello Zia and Alison,

Attached please find draft proposed user requirements and key questions to be addressed in the Subject FY2010 task to develop the scope for an improved LUC modeling framework. These user requirements were based on DOE presentations on this topic, Vonore workshop results and our initial team meetings on this task.

[ii] This is a potentially large and continuous task given that new models, approaches and assumptions are emerging constantly.

[iii] Questions here are based on the results of the Land-Use Change & Bioenergy Workshop held in Vonore, TN in May, 2009