

Incorporating Bioenergy into Sustainable Landscape Designs

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June 2014

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<http://www.ornl.gov/sci/ees/cbes/>



First BETO Workshop on Landscape Design New Bern, North Carolina, March 4-6, 2014

- How a landscape design approach
 - Might focus on bioenergy production systems
 - Integrate it into other components of the land, environment and socioeconomic system.
- Tangible actions that can enable and expand sustainable development of the bioeconomy
- Southeast US opportunities using woody materials
- Workshop agenda, participant list, tour guide, & presentations at <http://web.ornl.gov/sci/ees/cbes/workshop.shtml>.





Consider bioenergy within system as an opportunity to design landscapes that add value



Landscape design is a plan for resource allocation.

- Suggest a way to manage for more sustainable provisions of bioenergy and other services
- Takes context, trends and current conditions into consideration



Negative impacts of bioenergy can be avoided or reduced by attention to three principles:

1. Conserve priority ecosystem and social services
2. Consider local context
3. Monitor effects of concern and adjust plans to improve performance over time



Landscape design approach for bioenergy should be applied to particular contexts

- Set goals
 - Involve key stakeholders
 - Develop consensus approach
- Consider constraints
- Address wastes and other opportunities
- Evaluate and apply solutions
- Monitor for adaptive management



Pressures and incentives for landscape design

- Legal demands or regulations
- Customer requirements or specifications
- Stakeholder concerns
- Competitive advantage
- Environmental and social pressure groups
- Reputation loss



Obstacles to developing and deploying landscape design

- Landowner rights
- Traditional practices
- Up front planning required
- Coordination complexity/effort
- Higher initial costs



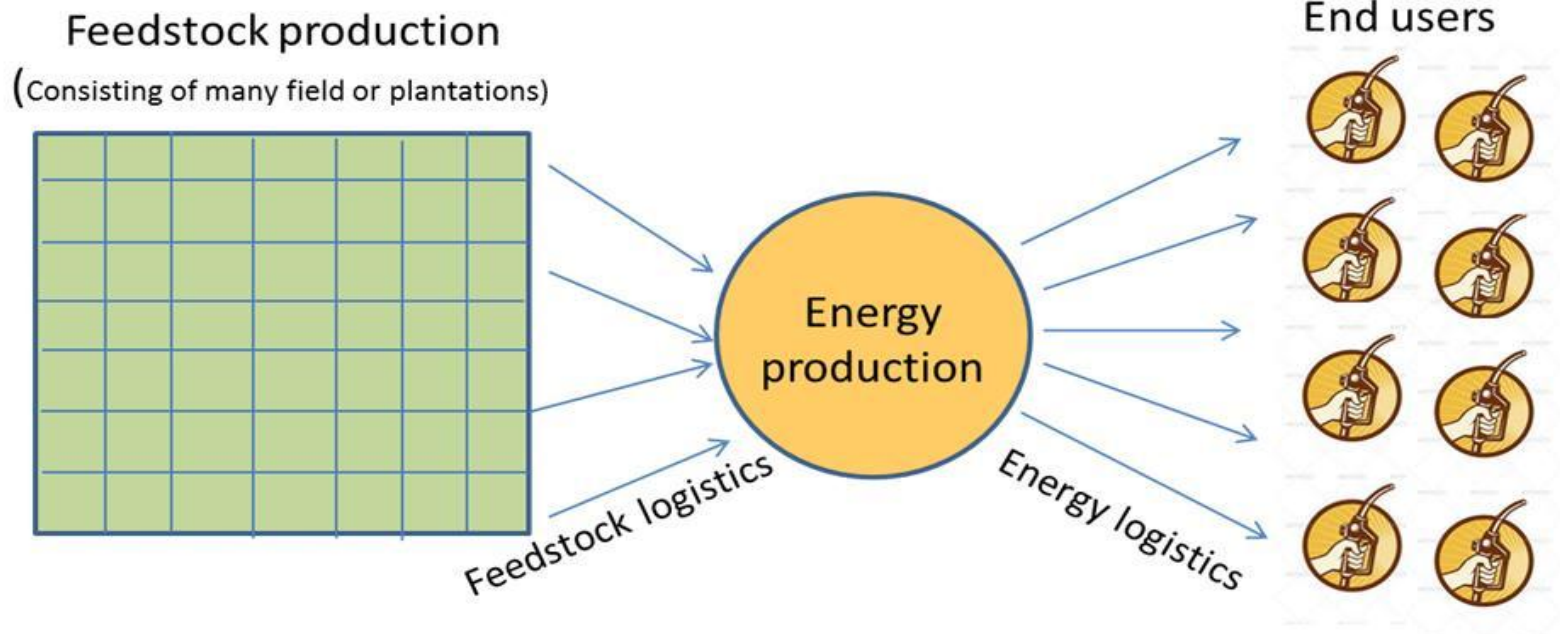
Recommended practices

- Stakeholder engagement throughout process
- Consider management options within the broader context
- Attention to site selection and environmental effects in the
 - location and selection of the feedstock
 - transport of feedstock to the refinery
 - refinery processing
 - final transport and dissemination of bioenergy.
- Monitoring and reporting of key measures of sustainability
- Attention to what is “doable”

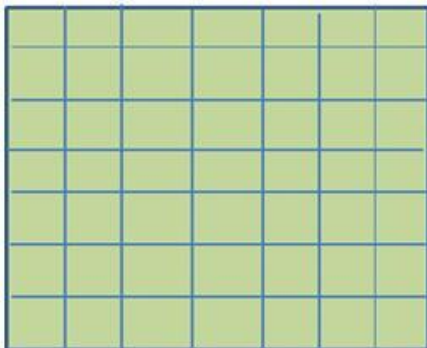


The scale of the bioenergy production system may be

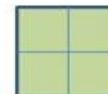
(A) The entire supply system



(B) Just one part of the supply system: e.g., feedstock production



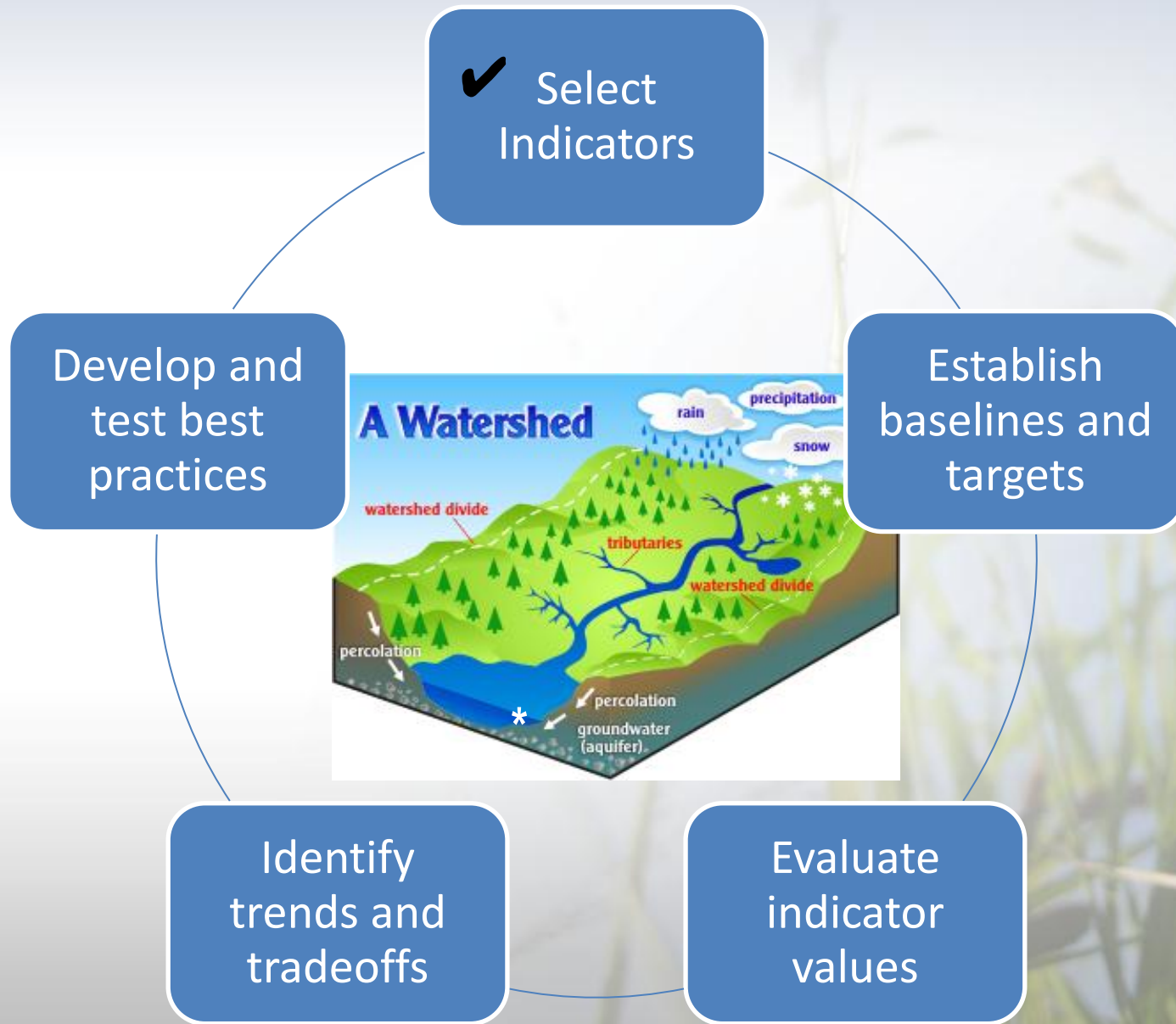
(C) A set from one part of the supply system: e.g., a few fields where energy crops are produced or residues are collected



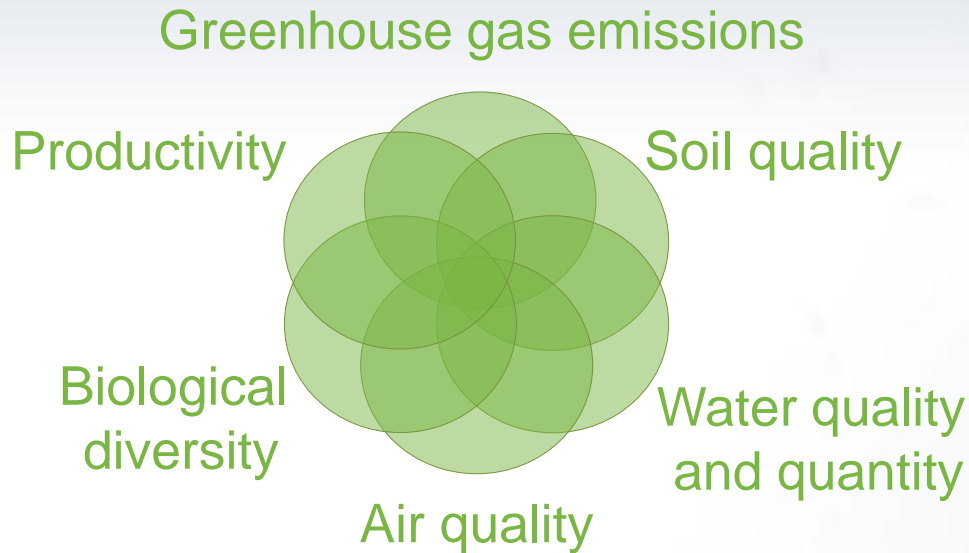
Some landscape design components for bioenergy sustainability that align with specific attributes (others are in workshop report).

Attribute	Landscape design components
Feedstock availability	Supply high
Demand for bioenergy	Demand high
Land ownership	Collaboration and communication challenges
Site specific concerns	Site-specific management
Local and regional coalitions	Facilitates communication
Economic conditions	Social services
Matching spatial opportunities with local services	Site-specific management
Bioenergy doesn't exist in a vacuum across the landscape	Integration of landscape objectives
History of disturbances	Site-specific considerations
Parks, protected areas, and hunting activities, military lands/federal presence	Need to define exclusion areas

DOE Approach to Assessing Bioenergy Sustainability



Categories for indicators of environmental and socioeconomic sustainability



McBride et al. (2011)
Ecological Indicators
11:1277-1289



Dale et al. (2013)
Ecological Indicators
26:87-102.

Recognize that measures and interpretations are context specific

Efroymsen et al. (2013) *Environmental Management* 51:291-306.

Landscape Design Involves Adapting Suite to Particular Contexts

- **Indicator set is a starting point for sake of efficiency and standardization**
 - Particular systems may require addition of other indicators
 - Budget may require subtraction of some indicators
 - Some indicators more important for different supply chain steps
- **Protocols must be context-specific**



Thank you!



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