Biobased Energy Educational Material exchange System (BEEMS)

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ABSTRACT

Project members have noted that new courses related to biobased energy are being introduced regularly around the country. There are few resources adequately synthesizing information in this diverse and changing field. Compiling expertise and course materials from existing courses would help those instructors currently teaching courses, and those who will offer a new course at their institution. Team members are developing a biobased energy education material exchange system for faculty members to share course materials and encourage student interaction between institutions. Course materials such as PowerPoint slides, homework exercises, and examination problems will also be developed by the team. Thus far, the team has developed PowerPoint modules for eight (8) topics: biomass pretreatment, enzymatic conversion, biodiesel, sugar-based and starch-based ethanol, biobutanol, anaerobic digestion, biomass gasification, and biomass pyrolysis. More than 30 faculty members currently teaching biobased energy related courses are reviewing and using these modules in their classes. The following six (6) modules are under development: algae; liquefaction; physical, chemical, and structural properties; fermentation; microbial fuel cells; and feedstock logistics. We expect to have up to 50 faculty members using BEEMS for their bioenergy teaching. Hopefully, this program will reduce teaching preparation time by 50% via sharing of course materials; improve the quality of the biobased energy courses among the member universities, and increase student enrollment in such courses (up to 1,000 students enrolled annually in courses utilizing BEEMS).

Project Description

Purpose: Develop a biobased energy educational material exchange system for faculty members to share course materials and advocate student interaction among different institutions. Course materials such as PowerPoint slides, homework exercises, and examination problems will also be developed.

Audience: Faculty members who are teaching biobased energy related courses and their students including underrepresented groups and professionals who have interest in continual study in biobased energy will be impacted.

Products: This proposed project will provide a web-based course material exchange forum and biobased energy education materials (PowerPoint slides, homework exercises and examination problems).

Expected Outcomes/Impact:

- Up to 50 faculty members will use BEEMS materials to enhance teaching
- Participating faculty will reduce teaching preparation time by 50%
- Quality of the biobased courses among the member universities will increase
- Student enrollment in biobased energy related courses will increase (up to 1,000 students enrolled in courses utilizing BEEMS annually).

Core Team and Collaborating Institutions

Current Progress

Module Development

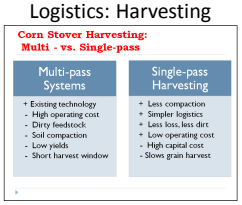
A. Feedstock		
A1	Feedstock logistics	S. W. Pryor
A2	Biomass properties	L. Wang
A3	Algae	W. Liao/Y. Li
B. Biological conversion		
B1*	Biomass pretreatment	J. Shi, D. B. Hodge, S. W. Pryor, Y. Li
B2*	Enzymatic conversion	D. Hodge, W. Liao , S. W. Pryor , Y. Li
B3	Fermentation	W. Liao
B4*	Biodiesel	S. W. Pryor, B. Brian He, J.H. Van Gerpen
B5*	Sugar and starch ethanol	S. W. Pryor, Y. Li, W. Liao, D. Hodge
B6*	Butanol (biomass)	N. Qureshi, A. P. Mariano, V. Singh, T. C. Ezeji
B7*	Anaerobic digestion	J. Shi, R. Zhang, W. Liao, C. L. Hansen, Y. Li
B8	Microbial fuel cell	A. Christy
C. Thermal conversion		
C1*	Gasification	L. Wang, A. Shahbazi
C2*	Pyrolysis	B. He
C3	Liquefaction	B. He
N. Additional Modules		
N1*	Syngas Fermentation	H. K. Atiyeh

Notes:

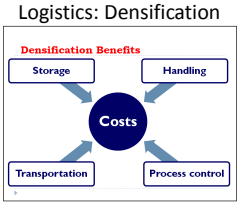
- * denotes modules released in January 2012 ; remainder will be released in August 2012.
- **BEEMS** is an established subcommittee of the American Society for Agricultural and Biological Engineers (ASABE) and meets annually at the ASABE Annual International Meeting
- **BEEMS** Forums are available at ASABE (www.ASABE.org) and BEEMS website (BEEMS.OSU.EDU)

Example Materials

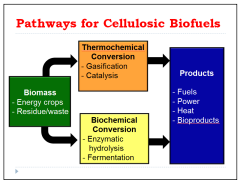
Logistics: Harvesting



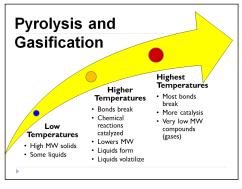
Logistics: Densification



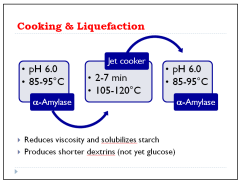
Conversion Platforms



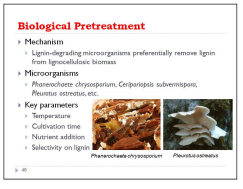
Gasification



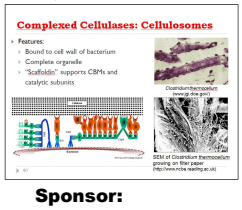
Starch Ethanol



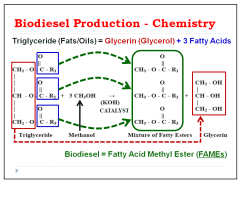
Pretreatment



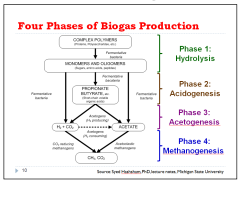
Enzymatic Conversion



Biodiesel



Anaerobic Digestion



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