

Meeting Summary:

**Biomass Research & Development
Technical Advisory Committee**

February 25-26, 2009

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I. Purpose

On February 25-26, 2009, the Biomass Research and Development Technical Advisory Committee (Committee) held its first quarterly meeting of calendar year 2009. The purpose of the meeting was to receive updates and discuss recent activities of the Biomass Research and Development Board (Board), the U.S. Department of Energy (DOE), and the U.S. Department of Agriculture (USDA). The Committee also heard presentations regarding the European perspective of the biofuels industry, enzymatic breakthroughs for ethanol conversion, feedstock logistics, and cellulosic ethanol developments and cellulosic ethanol commercialization. In addition, the Technical Advisory Committee Subcommittees provided report-outs from each of those breakout meetings. Subcommittees focused on: 1) feedstocks; 2) conversion; 3) infrastructure and end use; and 4) sustainability and environment, health and safety. The one and a half-day meeting was held in San Antonio, Texas.

Background: The Committee was established by the Biomass R&D Act of 2000 (Biomass Act) which was repealed and replaced by the Food, Conservation, and Energy Act of 2008. The Biomass R&D Board was established under the same act to coordinate activities across the Federal agencies. The Committee is tasked with advising the Secretary of Energy and the Secretary of Agriculture on the direction of biomass research and development.

A list of attendees is provided in Attachment A. The agenda is provided in Attachment B. Meeting presentations are provided online at <http://biomass.govtools.us>.

II. Welcome and Introduction of New Members

Committee Co-Chair Gil Gutknecht welcomed everyone to the first quarterly Biomass Research and Development Technical Advisory Committee Meeting of 2009. New members of the Committee then introduced themselves. New members include:

- David Bransby, Auburn University
- Pamela Reilly Contag, Cygnet Biofuels
- Dermot Hayes, Iowa State University
- Craig Kvien, University of Georgia
- James Mann, Arborgen
- Jim Matheson, Flagship Ventures
- Michael Powelson, The Nature Conservancy
- Glenn Prickett, Conservation International
- David Vander Griend, ICM

III. European Perspective of the Biofuels Industry

Robert Vierhout, Secretary General, European Bioethanol Fuel Association, eBIO

Mr. Vierhout presented to the Committee the European perspective of the biofuels industry. His presentation covered a range of topics, including views on ethanol, biodiesel, policy and the outlook for biofuels in the region. Gil Gutknecht kicked off the question period by asking what the costs were to produce ethanol in the EU compared to Brazil and the United States. It turns out Brazil is the cheapest, then the US, with the EU being the most expensive. EU governments do not subsidize ethanol production to offset the less expensive imports from Brazil. Some countries import ethanol for fuel almost exclusively from Brazil. Countries that have strict ethanol import rules do not or only marginally import from Brazil.

The EU adopted six laws in December 2008 one of which changed fuel quality standards so that 10 percent of bioethanol by volume can now be blended, but when asked if Germany had a 10 percent blending requirement Mr. Vierhout responded that they do not, nor do many other EU countries. France will most likely be the first to adopt the new EU law and others are following. Germany however decided to ask the oil and car companies whether or not such a blending law should be adopted. Although oil companies agreed to the 10 percent blending of ethanol, car manufacturers did not. Nevertheless, Mr. Vierhout expects E10 blending will come to Germany within the next few years.

A main concern of the Committee was the emerging issue of indirect land use, and why the EU will not produce a report on it until 2010. The Committee requested to know who was carrying out the report and why it was going to take so long. Mr. Vierhout responded by saying that the EU has several departments working on the problem. Industry is also researching this area and is trying to integrate their findings into the technology and processes required to produce biofuels. Mr. Vierhout expects a proposal to change the current EU indirect land use law by the end of the year, resulting in a fair and more flexible system.

The Committee was interested in whether proposed definitions of sustainability would preclude the EU meeting its renewable fuels targets and what feedstocks will be used to achieve it. Mr. Vierhout responded by stating that sugar beets and cereal grains will contribute to ethanol, but that biodiesel would be more difficult to utilize as they can only use rape seed or sunflower oil. Mr. Vierhout expects Flex Fuel Vehicles (FFVs) to stay a niche market in Europe. Although second generation biofuels are generating a lot of discussion, he thinks Europe will resort to US technologies as America is further ahead.

The Committee inquired as to whether Mr. Vierhout thought EU imposed anti-dumping duties for biodiesel would be temporary or permanent. He answered by saying that these duties are not easy to excise as it is difficult to prove whether or not dumping is taking place. Still, he predicts it will likely only be a temporary measure as it won't make sense over the long term (Under EU law countervailing duties can be applied initially for 6 months to be extended for maximum 5 years need be).

IV. SunOpta Cellulosic Ethanol Developments

Murray Burke, President, SunOpta Cellulosic Ethanol Developments

The SunOpta team, headed by Murray Burke, gave a presentation detailing their company's developments. They stressed that not only do they want to be a producer of cellulosic ethanol, but also want to be profitable. They provided an estimated return of about \$25 million per year. They also reported an operational plant converting corn stover to fuel in Northern China.

The Committee was particularly interested in how SunOpta is proving profitable and how revenue will increase. Mr. Burke is expecting 50 percent cost reductions in areas like fiber (taking tree bark etc.) and enzyme costs. He was not sure when this cost reduction will occur.

V. Feedstock Logistics

J. Richard Hess, Ph.D., Idaho National Laboratory

Mr. Hess gave a technical presentation on the state of technology for feedstock logistics, uniform format supply system designs to achieve cost and volume targets, and technical work to achieve supply system design targets (using corn stover as an example). Following Mr. Hess' presentation, a question was raised about how realistic feedstock costs within his model were. Mr. Hess responded by claiming that the costs improve over time as more is known. Materials need to be densified in order to make feedstock logistics economically viable. One major goal of the process would be to achieve a higher bulk and even energy densities.

Jim Martin followed by questioning whether this analysis will allow for the utilization of the same transport system already used for grain. Mr. Hess responded by saying that while cellulosic materials will be different than grain, similar to all grains handling through a common infrastructure, the goal is to develop uniform cellulosic materials that can be handled by the same grain handling infrastructure even though the materials themselves differ.

A question was then asked whether there was a feedstock logistics model for woody crops. Mr. Hess said that a parallel system would be used for wood chips/pellets and a woody supply system design is currently under development at INL in collaboration with USDA and university forest industry experts. This woody design will be based on existing state of technologies, including wood chip and wood pellets systems, that are common throughout the US and Canada.

Mr. Hess closed by stating that as harvesting and collection systems improve, harvest efficiency (i.e., recoverable yield) will also improve because at this time losses from these harvest and collection processes are high.

VI. National Agricultural Research, Extension, Education, and Economics (NAREEE) Update

Carol Keiser Long, Chair, National Agricultural Research, Extension, Education, and Economics (NAREEE) Committee

The National Agricultural Research, Extension, Education, and Economics (NAREEE) Committee has been charged with studying the scope and effectiveness of research within the USDA Research, Education and Economics (REE) mission area. A preliminary review was presented in 2008 in Washington, DC and Carol Keiser Long, Chair of the NAREEE Renewable Energy Committee, took the time to share some of that report with the Committee. However, the report is still in draft form and had not been submitted to the Secretary of Agriculture at the time of this meeting.

VII. Cellulose Ethanol Commercialization

William Schafer, Senior Vice President, Range Fuels, Inc.

William Schafer presented the Range Fuels “Path to Success,” 1) a proven conversion process, 2) an abundant, sustainable and cost effective supply of feedstock, 3) accessible biofuels markets, 4) legislative and regulatory support and clarity, and 5) a sustainable system.

Once the floor was opened for questions the Committee inquired how much water Range Fuels’ method used. According to Mr. Schafer, this depended on the phase, but the ultimate goal was to only use a gallon of water for every gallon of ethanol produced.

The Committee questioned Mr. Schafer on what other feedstocks Range Fuels might be considering. During Phase 1 it will be wood chips, but Mr. Schafer said the company would potentially be moving to other crops in subsequent phases and believes there is great potential for woody and herbaceous biomass.

VIII. Enzymatic Breakthroughs

Landon Steele, Director, Program Management, Biorefinery Group, Genencor - a Danisco Division

Landon Steele presented Genencor’s aims and accomplishments, most notably their current sale of actual commercial products, including the first product ever commercialized for cellulosic ethanol – Accellerase. While the cost of enzyme used varies considerably depending on the process used, currently the cost of the enzyme per gallon of ethanol produced under the best case scenarios is projected to be under a dollar with an ultimate goal of 15-20 cents per gallon. These costs will become much clearer shortly as pilot and demo plants now under construction start running.

The Committee was interested in Ms. Steele's comment that enzymes are more robust among multiple feedstocks and asked about the range in which they are able to operate. Ms. Steele is very encouraged with the enzyme's feedstock flexibility, but says there is a need for aggressive front-end pretreatment. The better the pretreatment, the more consistently different feedstocks respond to enzyme hydrolysis.

When asked about licensing production on-site, Ms. Steele admitted this was very challenging, and still in the process of being developed. Initially, Genencor will be centrally producing and shipping the enzymes but in the future believes that enzyme production on-site will be attractive for large scale operations.

The Committee was also interested in how long it takes to create different versions of enzymes. Ms. Steele responded that even though enzyme development is continuously advancing at a faster rate, enzymes are very complex. The challenge is genetically engineering one component that synergistically works with several others. Some simpler enzyme products can go from discovery to commercialization in 18 months; current cellulosic enzyme R&D goals working on several enzymes simultaneously are based on a four year plan.

IX. Department of Energy (DOE) Update

Valri Lightner, Acting Program Manager, Biomass Program, U.S. Department of Energy

Valri Lightner presented to the Committee updates within DOE and then opened the floor to questions. Most questions revolved around the American Recovery and Reinvestment Act (Recovery). Ms. Lightner answered the Committee that she will hopefully know more about the bill's repercussions by the June 2-3 meeting of the Committee.

It was asked whether there will be an increase on the percentage of loan guarantee within the Recovery. Ms. Lightner was not sure, but expressed her doubts that the percentage would increase from its current level of 80%.

The Committee also inquired as to how long it will take DOE to spend its \$800 million allotment from the Recovery. Ms. Lightner expected it would be spent within 5 years, although it would be obligated to various entities within 18 months.

X. U.S. Department of Agriculture (USDA) Update

Robert Fireovid, REE, U.S. Department of Agriculture

Robert Fireovid, the new USDA liaison serving the Committee, updated the Committee on USDA activities; after which he opened the floor to questions.

The Committee was interested in the Biomass Crop Assistance Program, in particular about its treatment of perennial feedstocks. Mr. Fireovid informed them that the USDA Farm Service Agency (FSA) is writing up rules for perennial feedstocks and hopes to

have this rule completed by the 2010 growing season. When asked if there would an opportunity for outside input regarding this rule, Mr. Fireovid was uncertain, but would report back to the Committee once he had an answer.

The Committee also inquired as to the timeline for Rural Energy for America Program. Mr. Fireovid informed them that it is delayed due to the loan guarantee work. The National Academy of Sciences Biofuel Study was supposed to be contracted by Jan 1, 2009 but this has also been delayed.

XI. Subcommittee Report-Outs

The four Subcommittees of the Biomass R&D Technical Advisory Committee were tasked with responding to specific questions developed by the Biomass R&D Board. The Subcommittee report outs consisted of a summary of their responses to these questions. Full answers to these questions for each Subcommittee can be found online at <http://biomass.govtools.us>.

A. Infrastructure and End Use

Mark Maher, General Motors

The Infrastructure Subcommittee's report out centered around the disconnect between the location of FFVs and the availability of E85 fuel (largely absent outside the northern Midwest). They were also struck by the fact that DOE's biofuels education solicitation is only \$1.8 million and recommended it be much larger.

B. Feedstocks

*Rodney Williamson, Iowa Corn Promotion Board and
Ed White, State University of New York*

Many of the Feedstocks Subcommittee recommendations followed Richard Hess' earlier "Feedstock Logistics" presentation. One suggestion from the Subcommittee was for a renewable reserve accounting system for biomass. Richard Hamilton explained that this would be a financial mechanism to account for renewability similar to today's oil reserve. By calling it a renewable reserve it could act as an indicator showing how much fuel the industry could produce based on the resources they have.

Ralph Cavalieri suggested the Subcommittee identify regional components as a key issue and that DOE/USDA could encourage local universities to partner with local companies to research local feedstocks.

The Feedstocks Subcommittee will be holding a public conference call with the full Committee to report out on the Board Interagency Working Group questions not provided at this meeting. Results from that report out as well as answers to the questions at this meeting can be found online at biomass.govtools.us.

C. Conversion

Eric Larson, Princeton University

Eric Larson, co-chair of the Conversion Subcommittee, detailed his group's answers to the Board Conversion Interagency Working Group's conversion-specific questions. Question 4 was not understood by the Subcommittee and was not answered. There were no questions or comments from the full Committee.

D. Sustainability, Environment, Health and Safety

Jim Martin, Omni Tech International

The Biomass R&D Board did not submit questions to the Sustainability, Environment, Health and Safety Subcommittee. The Subcommittee made a request for the Departments to do an indirect land use study as currently it is poorly understood.

XII. Closing Comments

Henson Moore, Committee Co-Chair, laid forth the observation that the Board's questions were not all technical R&D and that the intent of the Committee is to be focused on R&D. He also looks forward to the discussions of federal budgets at the next meeting that will include a breakdown of R&D dollars over the past few years to see the trends given that advising the Board on R&D is the Committee's role. Gil Gutknecht echoed this, expressing his frustration concerning how hard it is to understand how much research money is spent without seeing the budget of who and what areas are receiving money.

Valri Lightner reminded the Committee that the June meeting will include ethics training.

The Committee decided to move the September meeting from Washington, DC to Pittsburgh, PA to include a tour of Coskata's pilot plant in operation.

It was also announced that the transition of Committee support from Carolyn Clark of BCS, Incorporated to T.J. Heibel, also from BCS, Incorporated would begin immediately following the February 25-26 meeting.

XIV. Public Comment

There were no public comments.

Attachment A: Biomass R&D Technical Advisory Committee Meeting Attendees

Co- Chairs	Affiliation	Attended?
Gil Gutknecht		YES
W. Henson Moore		YES

Members	Affiliation	Attended?
Robert Ames	Tyson Food, Inc	YES
William Berg	Dairyland Power Cooperative	YES
David Bransby	Auburn University	YES
Ralph Cavalieri	Washington State University	YES
Pamela Reilly Contag	Cygnnet Biofuels	YES
Bob Dinneen	Renewable Fuels Association	NO
Scott Faber	Food Products Association (GMA/FPA)	NO
Richard Hamilton	Ceres Inc.	YES
Douglas Hawkins	Rohm & Haas	NO
Dermot Hayes	Iowa State University	NO
E. Alan Kennett	Gay & Robinson Sugar	NO
Charles Kinoshita	University of Hawaii	YES
Craig Kvien	University of Georgia	YES
Eric Larson	Princeton University	YES
Jay Levenstein	Florida Department of Agriculture and Consumer Services	YES
Mark Maher	General Motors	YES
Timothy Maker	Biomass Energy Resource Center, Inc.	NO
James Mann	Arborgen	YES
Jim Martin	Omni Tech International	YES
Jim Matheson	Flagship Ventures	YES
Mary McBride	CoBank	YES
Shirley Neff	Association of Oil Pipe Lines	YES
Mitchell Peele	North Carolina Farm Bureau	YES
Michael Powelson	The Nature Conservancy	NO
Glenn Prickett	Conservation International	NO
Tom Simpson	Railway Supply Institute	NO
J. Read Smith	Agricultural Energy Work Group	YES
Richard Timmons	American Short Line and Regional Railroad Association	NO
David Vander Griend	ICM	YES
Edwin White	State University of New York	YES
Rodney Williamson	Iowa Corn Promotion Board	YES

Total – 23 of 33 members attended

Other Attendees

Valri Lightner
Robert Fireovid
Robert Vierhout
Murray Burke
J. Richard Hess, Ph.D.
Carol Keiser Long

William Schafer
Landon Steele
Carolyn Clark
T.J. Heibel
Carl Wolf

Affiliation

DOE
USDA
European Bioethanol Fuel Association
SunOpta Cellulosic Ethanol Developments
Idaho National Laboratory
National Agricultural Research, Extension,
Education, and Economics (NAREEE) Committee
Range Fuels, Inc.
Genencor
BCS, Inc.
BCS, Inc.
BCS, Inc.

Attachment B: Biomass R&D Technical Advisory Committee February 25-26, 2009 Meeting Agenda

Day 1:

February 25, 2009

Technical Advisory Committee Meeting

- 1:00 p.m. Welcome and Introduction of New Members
- 1:15 p.m. Presentation: European Perspective on Biofuels Industry
Robert Vierhout, Secretary General, European Bioethanol Fuel Association

Subcommittee/Interagency Working Group Break Out Meetings

- 2:00 p.m. Subcommittee Break Out Meetings
- 3:15 p.m. *Break*
- 5:30 p.m. Adjourn

Day 2:

February 26, 2009

- 8:00 a.m. – 8:30 a.m. *Breakfast (to be provided)*
- 8:30 a.m. – 9:00 a.m. Presentation: SunOpta Cellulosic Ethanol Developments
Murray Burke, SunOpta Bioprocess, Incorporated
- 9:00 a.m. – 9:45 a.m. Presentation: Feedstock Logistics
J. Richard Hess, Idaho National Laboratory
- 9:45 a.m. – 10:15 a.m. Presentation: DOE Update
Valri Lightner, Biomass Program, U.S. Department of Energy
- 10:15 a.m. – 10:30 a.m. *Break*

Day 2 (continued):

February 26, 2009

- 10:30 a.m. – 11:15 a.m. Presentation: Cellulose Ethanol Commercialization
William Schafer, Senior Vice President, Range Fuels, Inc
- 11:15 a.m. – 12:00 p.m. Presentation: Enzymatic Breakthroughs
*Landon Steele, Director, Program Management,
Biorefinery Group, Genencor A Danisco Division*
- 12:00 p.m. – 1:00 p.m. *Lunch*
- 1:00 p.m. – 1:45 p.m. Presentation: USDA Update
Robert Fireovid, REE, U.S. Department of Agriculture
- 1:45 p.m. – 3:15 p.m. Subcommittee Report Outs/FY2009 Annual
Recommendations
- 3:15 p.m. – 3:30 p.m. *Public Comment/ Adjourn*