

**Biomass Research & Development  
Technical Advisory Committee**

**April 1-2, 2010**

*Meeting Summary*

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## List of Acronyms

Committee - Biomass Research and Development Technical Advisory Committee  
Board - Biomass Research and Development Board  
DOE - U.S. Department of Energy  
USDA - U.S. Department of Agriculture  
Giant Reed - *Arundo donax*  
ARPA-E - Advanced Research Projects Agency – Energy  
EPA - Environmental Protection Agency  
RFS - Renewable Fuel Standard  
Biomass Act - Biomass R&D Act of 2000  
Farm Bill - Food, Conservation, and Energy Act of 2008  
FOA - Funding Opportunity Announcement  
MSW - Municipal Solid Waste  
IBR - Integrated Biorefinery  
EISA - Energy Independence and Security Act  
BCAP - Biomass Crop Assistance Program  
Recovery Act - American Recovery and Reinvestment Act of 2009  
FAA- Federal Aviation Administration  
DOD - Department of Defense  
FFV - Flex Fuel Vehicles  
OMB - Office of Management and Budget  
ARS - Agriculture Research Service  
CRP - Conservation Reserve Program  
IFA - International Fertilizer Industry Association  
NAREEE - National Agricultural Research, Extension, Education, and Economic

## I. Purpose

On April 1-2, 2010, in Arlington, Virginia the Biomass Research and Development Technical Advisory Committee (Committee) held its first quarterly meeting of calendar year 2010. The purpose of the meeting was to receive updates and discuss recent activities of the Biomass Research and Development (Board), the U.S. Department of Energy (DOE), and the U.S. Department of Agriculture (USDA). The Committee also heard presentations regarding the use of *Arundo donax* (Giant Reed) as a dedicated energy crop, an overview of the Advanced Research Projects Agency – Energy (ARPA-E), and an update on the Environmental Protection Agency (EPA) Renewable Fuel Standard (RFS) rulemaking. In addition, the Technical Advisory Committee Subcommittees provided report-outs from each of their breakout meetings. Subcommittees focused on: feedstocks, conversion, infrastructure, and sustainability.

A list of attendees is provided in Attachment A and the meeting agenda is provided in Attachment B. Meeting presentations can be viewed online at <http://biomass.govtools.us> (click on “Publications”).

**Background:** The Committee was established by the Biomass R&D Act of 2000 (Biomass Act) which was repealed and replaced by Section 9008 of the Food, Conservation, and Energy Act of 2008 (Farm Bill). The Biomass R&D Board was established under the Biomass Act to coordinate activities across the Federal agencies. The Committee is tasked with advising the Board as well as the Secretary of Energy and the Secretary of Agriculture on the direction of biomass research and development.

## II. DOE Update

*Laura McCann, Biomass Program, U.S. Department of Energy*

Laura McCann provided an update on the recent activities of DOE’s Biomass Program. Over the months since the last Committee meeting, the Biomass Program announced awards for three solicitations – the Integrated Pilot-Scale or Demonstration-Scale Biorefinery for Advanced Biofuels, Ethanol Blends Infrastructure and Outreach, and Algal and Advanced Biofuels. In addition, a new interactive map with Integrated Biorefinery Project locations is featured on the Biomass Program website and can be found here: [http://www1.eere.energy.gov/biomass/integrated\\_biorefineries.html](http://www1.eere.energy.gov/biomass/integrated_biorefineries.html).

There are a number of upcoming funding opportunities at DOE including a possible opportunity from the Biomass Program on Sustainable Feedstock Production. This Funding Opportunity Announcement (FOA) would include watershed-scale trials, landscape design, optimization of environmental, economic, and social sustainability and productivity, and consideration of agricultural residues, perennial and annual herbaceous energy crops, woody energy crops, and sorted municipal solid waste (MSW).

The Committee asked a number of questions related to the DOE funded Integrated Biorefinery (IBR) projects. David Bransby asked about the matching fund requirements

after hearing that BlueFire Ethanol did not have the necessary funding to complete the construction of their IBR. He was under the impression that receiving an award was contingent on being able to provide the appropriate matching funds. Valri Lightner, Deployment Team Leader for the Biomass Program, explained that no IBR is given the complete award upfront, but that there is a go/no go decision made before a project's second phase. Typically a Phase I award assists with completing engineering and environmental design whereas Phase II is usually the construction phase.

In fact all the DOE funded commercial scale-up IBRs are taking more time to complete their designs and are generally moving at a slower pace than those at demonstration-scale. For BlueFire specifically it was decided during Phase I that a risk assessment should be completed and a risk mitigation plan developed due to a lack of sufficient piloting. Although, additional piloting has slowed the process down, the information has proven to be useful.

After an analysis of the design is completed by an independent engineer, some negotiation typically happens with the IBR. In order to go from Phase I to Phase II the IBR must have secured financing and is included as part of the go/no go decision. BlueFire demonstrated an ability to provide the appropriate funding match in their project proposal, but due to the economic downturn that funding has been diminished. DOE is assisting BlueFire in trying to come up with the match before distributing their Phase II award. Range Fuels is the only commercial scale IBR that has moved to Phase II (they received a DOE loan guarantee and a DOE grant). POET has a conditional award based on financing and pilot studies and it could be late FY 2010 before the condition is lifted. The Biomass Program, along with an independent engineer and risk assessment team is in the process of conducting extensive reviews of all the projects to understand what stage each project is at.

In addition, DOE is working to make adjustments to the merit review process in order to ensure innovative ideas are being funded. The goal is to reshape and refocus so that the DOE selection process is more transparent.

Jim Martin asked how many total IBRs DOE is currently funding. There are 27 facilities and all are producing fuels. Mr. Martin followed up to ask, in addition, to fuels, how many are producing value-added products or biopower? All of the IBRs produce co-products, although, fuel has to be their primary product.

### **III. USDA Update**

*Bill Hagy, Bioenergy Program, Rural Development, U.S. Department of Agriculture*

Bill Hagy gave the Committee an update on recent activities at USDA. In February, the President announced his vision for increasing the use of biofuels. A number of steps were outlined to help achieve this goal including:

- Comprehensive Strategy (enhance American energy independence, foundation for a new clean economy, and new industries and jobs)

- Biofuels Interagency Working Group Report (Growing America’s Fuels)
- Roadmap for accomplishing 36 billion gallons of biofuels by 2022
- Leveraging resources to support 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generation renewable fuels
- Reduce financial risk to farmers, ranchers, and forest land owners to invest (BCAP proposed rule)

In addition, Mr. Hagy discussed the difference between the definition of renewable fuels in the Energy Independence and Security Act (EISA) and the 2008 Farm Bill. The Farm Bill recognizes woody biomass coming from public lands, whereas, EISA does not. The USDA is working to mitigate those definitions since both are mandated requirements.

During the discussion on Farm Bill Programs, Ed White asked about the limited eligibility under Section 9003 the Biorefinery Assistance Program. The Biorefinery Assistance Program provides loan guarantees up to \$250 million for the development, construction and retrofitting of commercial scale bio-refineries. Currently, the eligibility is limited to rural areas and must be majority owned by U.S. citizens. USDA is currently seeking comments on this rule and encouraged everyone to submit their concerns and suggestions. Mr. Hagy also mentioned that USDA is trying to adopt more uniform standards across the entire agency.

Jim Martin requested to know what qualifies as an existing refinery. The refinery must have been operational before passage of the June 2008 Farm Bill in order to be eligible for a grant to re-tool the biorefinery to replace fossil fuels sources with biomass feedstock for the heat and power demands of the biorefinery. The biorefinery must then produce an advanced biofuel or power.

## **IV. Advanced Research Projects Agency – Energy Overview**

*Chad Haynes, Associate, Booz Allen Hamilton & ARPA-E Consultant*

Chad Haynes provided an overview of the Advanced Research Projects Agency – Energy (ARPA-E) and discussed the biomass investments they have made. ARPA-E stemmed from a report by the National Academies in 2006 called “Rising Above the Gathering Storm.” Congress authorized the Agency during passage of the America COMPETES Act of 2007 and the agency was then funded by the American Recovery and Reinvestment Act of 2009 (Recovery Act).

The ARPA-E Mission is to:

- Enhance U.S. economic security by identifying technologies with the potential to substantially reduce energy imports from foreign sources; cut energy-related greenhouse gas emissions; and improve efficiency across the energy spectrum.
- Ensure the U.S. remains a technological and economic leader in developing and deploying advanced energy technologies

ARPA-E was created with a vision to bridge gaps in the energy innovation pipeline. The agency is focused on seeking high impact science and engineering projects, managing high technical risk, accelerating the translation of science to markets, and prototyping.

In April 2009, ARPA-E announced their first Funding Opportunity Announcement (FOA) for all energy technologies. 3,700 concept papers were received and 37 projects were ultimately selected for a total award amount of \$151 million with a minimum 20% cost-share. Of those 37 projects, five were biomass related.

The five biomass projects selected targeted critical aspects of the biomass energy supply chain. Three addressed sustainability challenges including: land and resource competition, market impacts (food and feed), environmental impacts (nitrogen, etc.), and economic viability/parity with traditional fuels. In addition, two projects were selected to address pre-treatment challenges. Despite cost reductions, pre-treatment cost is expected to remain at 30% as preprocessing is harmful to downstream biochemical processing.

All 37 projects are underway and site visits have been conducted. The awards are not grants; they are research or technology agreements and require heavy government involvement.

David Bransby congratulated ARPA-E on their achievement and wanted to know what kind of success rate they have in mind, success meaning commercialization. ARPA-E is hoping for a 10-20% success rate.

Eric Larson wanted to better understand the process for coordinating ARPA-E work. The Agency works closely with DOE Programs including Office of Science and the Biomass Program. They have started working with the Federal Aviation Administration (FAA) and the Department of Defense (DOD). Laura McCann also mentioned that ARPA-E meets with the Biomass Program prior to selections being made and vice versa.

## **V. Biomass Research and Development Board**

*Dallas Tonsager, Under Secretary for Rural Development, USDA*

*Steven Koonin, Under Secretary for Science, DOE*

Under Secretary Tonsager shared his background and thoughts on what's facing the biomass industry. During the financing of early ethanol projects, farmers had a compelling desire to be financially successful and funded many ethanol projects themselves. Farmers created the ethanol industry out of a sense of self determination, after the huge challenges of the 1980's they wanted to create their own industry. Does the same passion exist for the new generations of fuels? Looking at second and third generation fuels, farmers are not quite as desperate as they were during first generation fuels development. Producers want to know why they should replace their corn crop with a bioenergy crop. Similarly, a lender is going to get into this industry for economic reasons. The ag economy does not have the same kind of motivation it did when ethanol came around.

Right now, we are facing a confidence building exercise in order to gain greater financial support from the private industry. There are two ways to get through the valley of death – public or private. USDA wants producers to be invested in the plant similar to how the ethanol industry was built. The Agency is interested in looking at what the desired outcome is and working their way backwards – from a built commercial plant to start-up. USDA is willing to take up to 80% of the risk. Under Secretary Tonsager has found that lenders are still not willing to fund projects; it's part of the economic reality of what has happened over the last year, and some of the enthusiasm has dropped since ethanol became so widely popular.

**David Bransby:** *You mentioned you will take 80% risk, would you be willing to go to 100%?*

**US Tonsager:** *We can't do that. The agency is limited to 90% by statute, but Office of Management and Budget (OMB) further constrains us to 80%. How OMB assesses loan guarantees is very disadvantageous against our budget authority due to OMB concerns about risk.*

**Read Smith:** *I've heard concerns from venture capitalists about how we are progressing through second and third generation biofuels. It feels like we are skipping a few steps and going straight to fifth generation and that's making venture capitalists nervous.*

**US Tonsager:** *I can understand that. It's difficult to predict whether you should buy the existing product now with technology improving so rapidly.*

**David Bransby:** *You can get a loan from a bank easier than you can get a loan guarantee.*

**US Tonsager:** *It's a confidence building matter. We were able to get ethanol to a clearly understood process, the risk was well defined, and the money was invested. We would like to repeat that process where the economics work, the projects go forward and the rural community can invest/participate as well. USDA has some work to do on the loan guarantee process. The Agency receives a lot of pressure from OMB. Sometimes we get gun shy about risk if Congress is telling us we are losing too much. The losses that occurred in the very early stages of ethanol 30 years ago are still examined by OMB today.*

**Jim Matheson:** *What if there was more risk and you covered less? Equity will follow capital risk. Other items that would help: pricing carbon, life cycle analysis and creating tax incentives for investors. The opportunity for innovation is the interface between public and private.*

**US Tonsager:** *The government's role is to be there up front at the beginning. The government should not be investing year after year.*

**Jim Martin:** *Can we better engage with a more defined supply and demand system – an ability to distinguish between various bioenergy crops – switchgrass, wood, etc.*

**US Tonsager:** *I found the panel on biopower at the Biomass 2010 conference intriguing on this subject. There are places where biomass makes good economic sense. Part of the*



*mission of the Rural Utility Service is to look at this. You may want to discuss markets with the Commodity Futures Trading Commission. Early in ethanol there were contracts to deliver the corn. The farmers are not excited enough to want to commit to those kind of contracts right now.*

**Gil Gutknecht:** *Coal is priced on a British thermal unit (Btu) basis. We need a more uniform measure of Btu content for biomass, including variability. The utility industry wants more predictability when purchasing biomass, something Btu could provide. The Biomass industry needs weights and measures – a way to make it into a commodity. A lot of this comes down to transportation and what makes sense. Providing uniformity on how we measure, how we price, and how we count – that is something that the government can help us with.*

**US Tonsager:** *We need to localize it and understand the economic advantages for each plant – to ensure that plants are built where they should be. Advantages lean toward the location, even if there are some disadvantages. Btu would be a fundamental argument and should be straight forward to measure.*

**Gil Gutknecht:** *My observation is that Btu is not very straight forward.*

**US Tonsager:** *It is very challenging to determine the value of Btu. Producers value their biomass much differently than others. It's tough to get farmers to change, especially when they have a capital investment in one kind of equipment and they need another kind, not including the loss of the farm safety net – crop payments and insurance.*

Under Secretary Koonin talked about a number of different areas DOE would like to see the Board focus on over the next couple of years including:

- Genetic improvement of biomass feedstocks
- Logistical efficiency – improve the ability to move biomass more efficiently and look at in field conversion possibilities.
- Discussions regarding the optimum use of biomass resources for: liquid fuels, power for electricity generation, chemicals and products.
- Sustainability issues should focus on system-wide inputs such as nutrients and water.

**David Vander Griend:** *A primary concern for the industry is access to a market for biofuels. With the 10% blend wall, so few flex fuel vehicles (FFVs), and E85 refueling stations, investors need to know that there will be a reliable market for biofuels.*

**US Koonin:** *The RFS is intended to establish and guarantee the existence of that market. We also have the DOE Loan Guarantee Program. We're also trying to push drop-in fuels that will be more compatible with the existing infrastructure. We recognize that we need to take steps to increase investor confidence in the public sector.*

**Gil Gutknecht:** *A lot of discussion focuses on the price of oil and its impact on biofuels. What about the price of natural gas – it's a clean fuel and we have a transportation network already in place?*

**US Koonin:** *I would like to point out that many of the new technologies for extracting natural gas from shale, including hydraulic fracturing, are products of DOE funding and*

*research since the 1970s. But I agree about gas prices, it is a big and unappreciated factor. In the power sector, cheap gas does a lot and affects a lot. Nuclear is not viable with gas prices less than \$7.*

**Jim Martin:** *We often talk about sustainability, but really economic sustainability is the critical issue. How are we going to make the biomass industry economically viable? Biochemicals and products are really a key part of that; they can be far more valuable than fuels or power. IBR facilities that produce chemicals will make liquid fuels more viable.*

**US Koonin:** *I agree that we have to focus on the competitive advantages for the US economy. The problem is it's difficult to scale up the production of chemicals and products; you can only find real demand volumes for fuels and power.*

**Jim Matheson:** *What role do you see for electrification, batteries vs. liquid biofuels?*

**US Koonin:** *It's tough to beat the energy density of liquid hydrocarbons. I don't see a huge market for batteries or electric vehicles, in the near-term.*

## **VI. Panel: *Arundo donax* Alternative Feedstock?**

*Panel Chair: David Bransby, Auburn University*

*Panel Members: Peter Chanin, White Technology LLC*

*Peter Gillies, TreeFree Biomass Solutions*

*John Lydon, USDA*

The purpose of the panel was to alert the Committee on opportunities offered by *Arundo donax* (Giant Reed), as a dedicated biomass crop and seek input from the Committee on how to proceed with development and commercialization of Giant Reed.

*David Bransby, Auburn University*

Giant Reed is native to India, but widely spread throughout the tropics, sub-tropics and Mediterranean regions of the world. It is a sterile plant, produces no viable seed, but does produce flowers. It needs to be established by vegetative propagation, produces large, but short rhizomes, requires well drained soils, is capable of very high yields, and can be controlled with Roundup.

Research at Auburn University started in 1999. It included yield of California Giant Reed versus Alabama Giant Reed, cutting frequency, effects of rainfall on yield, observations regarding invasiveness, and soil carbon sequestration. It was determined that it is very important to cut during the fall/winter period. There is still research that needs to be conducted to determine: low cost propagation procedures, genetic improvements, the roles of endophyte and microrrhiza, harvesting technologies, development of effective regulation and control metrics, and further development of uses.

Mr. Bransby believes that Giant Reed offers substantial opportunities and advantages over other biomass crops and if properly regulated poses virtually no threat of becoming invasive.

Eric Larson asked about carbon storage in the ground. David Bransby replied that there is 40 dry tons of biomass in the rhizomes per acre. This is a measurement of what has been planted over ten years, roughly half of which is carbon.

*Peter Chanin, White Technology LLC*

Peter Chanin discussed the research and development efforts of White Technology LLC with Giant Reed as a dedicated biomass crop. White Technology capabilities include:

- Laboratory Plant Production
- Greenhouse Nursery Plant Preparation
- Farm Services (Permit, Soil Testing & Site Preparation, Planting, Crop Monitoring, Harvest Services, Transportation to Biomass Facility)

White Technologies also has exclusive license for a patented micropropagation technology process which can:

- Trigger and utilize the regenerative nature of plants
- Produce millions of plants for large scale farming of biomass
- Provide an alternative to intensive rhizome planting

Planting Giant Reed plantlets is similar to planting tomatoes. If you're using a specialized planter, you can plant 30-40 acres a day. It is carbon neutral when used as a biomass material. Giant Reed serves as a carbon sink and photo-reactor, breaking down soil pollutants. It is low budget and low maintenance. In addition, it is extremely cost competitive with coal and natural gas. There are a number of challenges including:

- mass production of plantlets
- transportation of low density material, and
- perceived invasiveness.

Giant Reed is considered a noxious weed in Texas, California, and Nevada, and lacks support at the National level.

*Peter Gillies, TreeFree Biomass Solutions, Inc.*

TreeFree was founded in 1997 to research, enhance, and commercialize Giant Reed (*Arundo donax*). The company has experience propagating and planting, as well as removing Giant Reed for government and private enterprises. TreeFree has more worldwide patents filed, issued and pending for Giant Reed technologies than any other private company as of 2009.

TreeFree believes that this crop has the potential to provide the energy needed by all the biotechnologies we rely on to defeat global warming and our dependence on fossil energy. In addition, it has many environmental advantages including its high yield and ability to be grown on marginal land. The company estimates if 80 million acres were planted we could neutralize carbon emissions in the US. A few suggested action items include:

- develop and implement risk mitigation regulations and procedures,
- design a partnership for removal of unwanted reed, and

- coordinate research and removal with the federal government.

Michael Powelson asked the cost per acre for eradication. Peter Gillies indicated a range of \$5,000 - \$10,000 in California for the government to remove *Arundo donax*. The private sector has removed *Arundo donax* for \$2500 - \$5000. The USDA added that the government rate is higher because public dollars invested also include restoration for removing the Giant Reed.

TreeFree has conducted an extensive review of the literature on the commercial use and invasive nature of Giant Reed. The research supports TreeFree's observations after monitoring two multi-acre plots of Giant Reed, one for 12 years at Auburn University and one for five years at Washington State University. Outside of riparian systems, Giant Reed is not invasive. Almost any plant will be invasive in areas adjacent to streams and rivers that are prone to flooding.

*John Lydon, USDA*

John Lydon explained USDA's efforts on managing Giant Reed as an invasive species. The Agriculture Research Service (ARS) has a Crop Production and Protection program under which weed research is conducted in the National program Crop Protection and Quarantine (NP 304). Giant Reed, along with 30+ other species, is listed as a weed target. Research on invasive and agricultural weeds includes:

- Systematics and genetic characterization
- Herbicides (application, resistance, registration, degradation, natural products)
- Multi-tactic approaches (combinations of chemical, cultural, mechanical, and biological controls)
- Invasiveness (genomics, climate change, bioenergy crops)
- Biological controls (plant pathogens, insects, and the phylogenetics of the targets and agents)

Giant Reed invasions in the Southwest displace native species, alter critical habitats, exacerbate problems of limited water supplies, and are a National security issue along the Southern border. The Agency is working on a biological solution to control the Giant Reed in this area. A stem-boring wasp has been released and a scale insect that attacks Giant Reed rhizomes may soon be released. Other agents are under further evaluation for host specificity and efficacy.

After the presentations were complete, Gil Gutknecht asked about the feed value and whether any work had been done. USDA is not sure what's been done regarding the feed value of Giant Reed. Current ARS research on biofuel feedstocks does, however, include research on miscanthus; which includes assessing recently developed hybrids for adaptability to different climates and assessments of invasiveness when grown as a biofuel crop.

## **VII. Environmental Protection Agency Renewable Fuel Standard Rulemaking Update**

*Vincent Camebreco, Environmental Protection Specialist, Environmental Protection Agency*

Vincent Camebreco gave an update on the EPA's RFS Rulemaking effort. He discussed the key changes required by EISA, the 2010 standards, renewable biomass provisions, application of lifecycle results, and summary of impacts.

Every year, as an agency, EPA must set the RFS. Below are the adjusted 2010 standards.

- 12 billion gallons of Conventional Renewable Fuels
- 1.15 billion gallons of Biomass-Based Diesel (BBD)
- 6.5 million gallons of Cellulosic Biofuel (CB)
- 0.95 billion gallons of Advanced Biofuel (AB)
- 12.95 billion gallons of total Renewable Fuels (RF)

Based on peer review results as well as other comments received EPA has made several updates to their modeling since the NPRM analysis.

### **Updates to Domestic Agricultural Sector Modeling:**

- Incorporated forestry model results in our analysis
- Added new land classifications; cropland, cropland-pasture, rangeland, forest-pasture, forest, Conservation Reserve Program (CRP) land, developed land
- Reflected new data on projected switchgrass yields
- Updated N<sub>2</sub>O / soil carbon numbers
  - Worked with Colorado State University DAYCENT/CENTURY models to update factors

### **Updates to International Agricultural Sector Modeling:**

- Incorporated a Brazil module into the international model framework
  - Regional breakout of agriculture and pasture land
  - Includes pasture / cropland interactions
- Added price induced yield changes
  - This is based on work done by CARD at Missouri and Iowa State and has different factors by crop and by country (e.g., long term elasticity for the Corn Belt in the U.S. 0.07)
- Updated international agricultural GHG emission estimates based in part on new data from the International Fertilizer Industry Association (IFA)

### **Updates to Biofuel Processing in Both Domestic and International Agricultural Sector Modeling:**

- Built in corn fractionation pathway (w/ co-product markets, etc.)
- Adjusted DDG co-product replacement rates
  - Reflected results of new studies from Argonne and the University of Minnesota that indicate more efficient use of co-product
- Added biodiesel glycerin co-product credit
- Updated process energy use

### **Updates to Land Use Change Modeling:**

- Included more geographic coverage of satellite data from 35 countries in the NPRM to 160 countries in the FRM
- Used longer time coverage of satellite data – 2001-2007
- Used higher resolution satellite data from the latest MODIS V5 release, 500m2 resolution
  - Also augmented global satellite data with country / region specific data where available (e.g., data from Brazil on pasture intensification)

Finally, an overview of the impacts of the RFS-2 Program is listed below:

**Petroleum Consumption, Energy Security and Fuel Costs:**

- We estimate this program will replace about 7 percent of expected annual gasoline and diesel consumption in 2022
- Decrease oil imports by \$41.5 billion
- Result in additional energy security benefits of \$2.6 billion.

**Greenhouse Gas Emissions:**

- When fully implemented in 2022, renewable fuels are expected to reduce greenhouse gas emissions by 138 million metric tons – equivalent to the annual emissions of 27 million passenger vehicles.

**Agriculture Sector and Related Impacts:**

- In 2022, the increased use of renewable fuels is expected to expand the market for agricultural products such as corn and soybeans and open new markets for advanced biofuels – increasing net farm income by an estimated \$13 billion dollars in 2022.

**Emissions and Air Quality:**

- Increased use of renewable fuels will also impact emissions.
- Some emissions such as NO<sub>x</sub>, acetaldehyde, and ethanol are expected to increase and others such as benzene and carbon monoxide are expected to decrease.
- The impacts of these emissions on criteria air pollutants will vary from area to area.
- EISA directs the agency to further evaluate these potential impacts and to mitigate, to the extent possible, any adverse impacts.

Since not all feedstocks qualify as a renewable, Ed White asked if there were certain species of trees that count and others that do not. EPA is working on a pulpwood pathway to be included as part of a supplemental rulemaking. At this point, it is likely that EPA will not make a species determination as part of that.

Eric Larson asked about marginal lands and whether it qualified for use for feedstock production, for example, CRP land. CRP land does qualify as existing agricultural land from which planted crops and crop residue may be collected as long as it was enrolled in the CRP on December 19, 2007, and was non-forested on that date.

Eric Larson also asked about when there is co-products how does EPA provide credit. EPA takes credit for those feeding back into the market. For example, they do not split emissions with some going to ethanol and some DDG. They count for the benefit of those

products like DDG offsetting production of additional feed products and thus providing emissions benefits.

## **VIII. National Agricultural Research, Extension, Education and Economics Update**

*Carol Keiser Long, Chair, National Agricultural Research, Extension, Education, and Economics Committee*

Carol Keiser Long updated the Committee on recent activities of the National Agricultural Research, Extension, Education and Economics (NAREEE) Renewable Energy Committee. The NAREEE Renewable Energy Committee meeting was coordinated to meet at the same time and a number of Committee members were in attendance at the meeting and were introduced.

Currently, NAREEE intends to work on the following items:

- Examine land use economics and energy balances relating to feedstock production
- Disseminate information on current renewable energy technologies that will be economically beneficial to rural areas
- Improve agriculture statistical data collection internationally – an important issue to address to provide accurate information for the direct and indirect land use discussion
- Technology transfer – ensuring new technology is made available to stakeholders

## **IX. Coordination among Federal Advisory Committees**

*Full Committee Discussion*

The Committee held a discussion regarding coordination among Federal Advisory Committees. It was decided that the list would be narrowed to the top five that are the most relevant and presented for further discussion. At a minimum, the Committee intends to share their annual recommendations with these five and request theirs in return.

The Committee has a unique relationship with NAREEE. NAREEE is required to coordinate with the Committee in order to minimize duplicative recommendations and that is why frequent updates are provided between the two Federal Advisory Committees.

## **X. Coskata Facilities Video**

*Bill Roe, President and CEO, Coskata*

*Wes Bolsen, Chief Marketing Officer and Vice President Government Affairs, Coskata*

Bill Roe and Wes Bolsen gave an overview of Coskata including a video presentation showing a tour of their Integrated Biorefinery located outside Pittsburgh, PA. Coskata has a platform technology for the conversion of biomass and waste materials into fuels and

chemicals, initially utilizing their syngas fermentation technology for the production of cellulosic ethanol.

After the video, the Committee members asked a number of questions. David Branbly wanted to know the capacity of the plant. Mr. Roe answered that the integrated biorefinery was designed to produce approximately 30,000 gallons per year, but with surprising results in Coskata's syngas conversion efficiency, the plant is now able to produce almost twice that amount.

Gil Gutknecht asked about how the company has raised the capital to build the plant thus far. Coskata has raised more than \$70 million since it was formed in 2006 and has been completely privately financed. They have spent most of the \$70 million in build out of technical facilities.

Ed White asked if Coskata is using clean woodchips. The facility uses woodchips supplied from the same area that they intend to build a commercial plant in the Southeast. Unbarked wood can pose problems with some gasifiers, but is not the case in Coskata's design.

Eric Larson asked if there was any benefit to using oxygen instead of air. Coskata does use an oxygen enriched air to a slight advantage. They are still doing some testing; however, commercial designs have also included oxygen enhanced air.

Finally, Jay Levenstein wanted to know if they were to use multiple feedstocks, would they blend those feedstocks, or process them separately. A properly designed gasifier should give flexibility, however Coskata does not want to introduce a lot of variability, so they are striving to have a feedstock supply that's consistent and presents minimal variance in their run. You would either use campaigns or a blend – but you wouldn't do a little of this, a little of that in one run.

Coskata offered to host one of the next Committee meetings at their integrated biorefinery outside Pittsburgh, to see the facility first hand. The idea will be taken up during the scheduling of subsequent meetings.

## **XI. Subcommittee Report-Outs**

The four Subcommittees met to begin discussions regarding their 2010 recommendations to the Secretaries of Energy and Agriculture. The chair directed all the Subcommittees to identify the top 3-5 issues they would like to work on.

### **A. Feedstocks**

*Rodney Williamson, Iowa Corn Promotion Board*

Rodney Williamson, co-chair of the Feedstocks Subcommittee, presented draft recommendation ideas as discussed in the Subcommittee's breakout session. These recommendations concerned:



- RFS - Federal lands issue
- Algae as a Feedstock
- Food and Feed – greater emphasis on ensuring major row crops are included
- Feedstock research that examines carbon, conversion, regulatory, logistics/market
- Indirect Land Use
- MSW
- Market mechanisms for feedstocks

Most of these were included in the 2009 recommendations, the focus would be on updating and refining.

## **B. Conversion**

*Eric Larson, Princeton University*

Eric Larson, co-chair of the Conversion Subcommittee described some areas identified for 2010 recommendations. These include:

- International
  - Conduct a study/survey of conversion technologies worldwide to assess the position of the United States technology relative to other countries and to identify opportunities for leveraging promising technologies being developed elsewhere
- Designer Fuels (pass on to infrastructure)
  - Conduct research into the optimal blend of alcohols for infrastructure distribution, conventional vehicles, etc.
- More Pathways
  - Support EPA in conducting LCAs for more biofuel pathways (than those EPA has already done) so that technology developers for specific pathways can know whether theirs will qualify under the RFS.
- Thermochemical
  - Continued investment in thermochemical conversion processes.
- Merit Review Process
  - Conduct a review of the DOE and USDA merit review processes, and evaluate the pros/cons of a more unified (USDA + DOE) merit review process for the Biomass Research and Development Initiative (joint solicitation). The long-term goal of any modification to the review process that might result is to improve the success rates of funded projects.

## **C. Infrastructure and End Use**

*David Vander Griend, ICM*

David Vander Griend, co-chair of the Infrastructure Subcommittee presented their recommendations:

- Flex fuel vehicles
  - Market research as to why consumers choose FFVs worldwide
  - Research on the optimization of high (>30) ethanol blend capable vehicles

- Research on synergies between flex fuel vehicles and electric hybrid vehicles
- Concurrently the emissions certification would need to be adjusted to facilitate the results of the optimization study
- Blender Pumps
  - Add a consumer education and outreach portion to the 2009 recommendation on Ethanol Blender Pumps and Blend Impact on Infrastructure
- Feedstock Logistics/Market
  - While there are opportunities for research into feedstock harvesting, transportation, storage and handling the Committee must emphasize that access to the consumer is essential to the further growth of the biofuels industry

As part of the discussion, Pam Contag reminded the Committee that when we think about renewables, we need to think about how we are going to transport them and we need to better match up the timelines. Eric Larson agreed that sometimes we think of this as the ethanol downstream infrastructure Subcommittee. It's important to remember there are other options to examine.

Jim Martin agreed and thinks there are further opportunities in stationary power. He would like to know how much biomass is consumed to produce electric power and how those trends over the last 10 years compare to how much has been consumed for fuels. Laura McCann, from the Biomass Program, will assemble that information and provide it to the Committee at the next meeting.

## **D. Sustainability**

*Jim Martin, Omni Tech International*

Jim Martin, Chair of the Sustainability Subcommittee, discussed their key issues including:

- Market/Economic Sustainability
- Lifecycle Analysis
- Indirect Land Use in context of current petro systems
- Water Use/Quality
- Resource Conservation
- Sustainability Funding

After the presentation, the Committee discussed whether having cross-cutting issues waters down the recommendations. Laura McCann, with the Biomass Program, explained that the Committee should organize recommendations for where they fit best, and that there is no more or less emphasis placed on those under cross-cutting. She also encouraged the Committee to have specific recommendations because it really helps DOE and USDA implement them.

## **XII. Public Comment**

Jef Sharp, Qteros, said that according to their calculations, meeting the RFS mandates for cellulosic ethanol will require building 500 biorefineries between now and 2022 – that’s almost 50 every year, and approximately one every week between now and 2022. All of the work you are doing is desperately needed by the industry and we wish to thank you for your hard work.

## **Attachment A: Committee Member Attendance—April 1-2, 2010 Meeting**

<b>Co- Chairs</b>	<b>Affiliation</b>	<b>Attended?</b>
Gil Gutknecht		YES

<b>Members</b>	<b>Affiliation</b>	<b>Attended?</b>
David Bransby	Auburn University	YES
Pamela Reilly Contag	Cygnnet Biofuels	YES
Bob Dinneen	Renewable Fuels Association	YES
Richard Hamilton	Ceres Inc.	NO
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	NO
Jim Martin	Omni Tech International	YES
Jim Matheson	Flagship Ventures	YES
Mitchell Peele	North Carolina Farm Bureau	YES
Michael Powelson	The Nature Conservancy	YES
J. Read Smith	Agricultural Energy Work Group	YES
David Vander Griend	ICM	YES
Edwin White	State University of New York	YES
Rodney Williamson	Iowa Corn Promotion Board	YES

**Total – 16 of 21 members attended**

## **Attachment B: Agenda—April 1-2, 2010 Meeting**

### **Day 1: Technical Advisory Committee Meeting:**

**April, 1 2010**

- 8:00 am – 8:30 am            *Breakfast (to be provided for Committee)*
- 8:30 am – 9:00 am           *Welcome*  
*Chair –Gil Gutknecht*
- 9:00 am – 9:30 am           Presentation: DOE Update on Biomass R&D Activities  
*Laura McCann, Biomass Program, U.S. Department of Energy*
- 9:30 am – 10:00 am         Presentation: USDA Update on Biomass R&D Activities  
*Bill Hagy, Rural Development, U.S. Department of Agriculture*
- 10:00 am – 10:15 am        *Break*
- 10:15 am – 11:15 am        Presentation: ARPA-E: Transformative Energy R&D  
*Chad Haynes, Associate, Booz Allen Hamilton & ARPA-E Consultant*
- 11:15 am – 12:00 am        Presentation: Update on Biomass R&D Board Activities  
*Board Co-chair Dallas Tonsager, USDA Under Secretary for Rural Development*
- 12:00 am – 1:00 pm         *Lunch (to be provided for Committee)*
- 1:00 pm – 3:00 pm           Panel: *Arundo donax* Alternative Feedstock?  
*Panel chair: David Bransby, Auburn University*  
*Panel Members:*  
*Peter Chanin and David Allen, White Technology LLC*  
*Peter Gillies and Dr. Renata Bura, TreeFree Biomass Solutions*  
*John Lydon, USDA*
- 3:00 pm – 3:15 pm           *Break*
- 3:15 pm – 4:15 pm           Presentation: EPA RFS Rulemaking Update  
*Sarah Dunham, U.S. Environmental Protection Agency*
- 4:15 pm – 4:30 pm           Presentation: NAREEE Update  
*Carol Keiser-Long, NAREEE Committee Chair*

4:30 pm – 5:00 pm                      Discussion: Coordination among Federal Advisory  
Committees

*Full Committee*

5:00 pm – 5:30 pm                      Presentation: Coskata Facilities Video  
*Wes Bolsen, Coskata*

5:30 pm                                      *Adjourn*

**Day 2:**

**April 2, 2010**

8:00 am – 8:30 am                      *Breakfast (to be provided for Committee)*

**Subcommittee Breakout Meetings**

8:30 am – 11:00 am                      Breakout: All Subcommittees  
*Feedstocks, Conversion, Infrastructure, and Sustainability,  
EH&S*

**Technical Advisory Committee Meeting**

11:00 am – 11:30 am                      Presentation: Update on Biomass R&D Board Activities  
*Board Co-chair Steve Koonin, DOE Under Secretary for  
Science*

11:30 am – 12:30 pm                      *Subcommittees put together their report-outs*

12:30 pm – 1:30 pm                      *Working Lunch (to be provided for Committee)*

12:30 pm – 2:30 pm                      Report Out: 2009 Committee Recommendations  
*Feedstocks, Conversion, Infrastructure, and Sustainability,  
EH&S*

2:30 pm – 2: 45 pm                      Discussion: Finalize 2010 Work Plan  
*Full Committee*

2:45 pm – 3:00 pm                      Public Comment

3:00 pm – 3:15 pm                      Closing Comments  
*Chair –Gil Gutknecht*

3:15 pm                                      *Adjourn*