

Summary:

**Biomass Research & Development
Technical Advisory Committee
Meeting**

November 20, 2001

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MEETING SUMMARY

PURPOSE

On November 20th, 2001 a Biomass Research and Development Technical Advisory Committee (Committee) meeting was held at the U.S. Department of Energy Forrestal building in Washington D.C. The Committee was established by the Biomass R&D Act of 2000 (R&D Act). The R&D Act's mandates include advising the Secretary of Energy and the Secretary of Agriculture, facilitating consultations and partnerships, and evaluating and performing strategic planning. This meeting was the last of four Committee meetings held during the 2001 calendar year. Throughout the year, the Committee worked to develop recommendations that would be submitted to the Secretaries of Energy and Agriculture in accordance with the R&D Act. The Committee members came to this meeting with the intent of finalizing and approving a complete version of the recommendations developed in previous meetings. The following provides a summary of the meeting's discussions.

INTRODUCTION

Douglas Kaempf, Designated Federal Officer of the Committee, welcomed everyone to the Committee meeting and summarized the agenda items.

Jack Huttner, Committee Co-Chair, opened the floor to any Committee members with concerns regarding the content of the agenda. No concerns were voiced.

Dale Bryk inquired about the Farm Bill and asked for updated information. Ron Buckhalt and Roger Conway of the U.S. Department of Agriculture gave a brief overview of the contents but emphasized that the bill is far from the final stages.

PREAMBLE DISCUSSION

Glenn English and Jack Huttner led the preamble discussion. Prior to the meeting some concerns about the overall focus of the draft recommendations had been raised. In response, the Committee chairs added a discussion on the potential addition of a preamble to the current draft to the meeting agenda.

David Morris began the discussion by expressing the following concerns:

- The report is narrowly focused and only represents a slice of DOE programs.
- There is a lack of information to back-up the recommendations.
- The recommendations do not represent the goals of the Committee.
- The structuring of recommendations into subcommittee sections has caused fragmentation.

- Ethanol is not adequately represented in the recommendations.

Upon being asked for specific ways to improve the recommendations, Mr. Morris agreed with the possibility of creating a preamble to the recommendations. This preamble would serve to clarify the issues where the Committee saw the need for future explanation. The Committee discussion on Mr. Morris's comments concluded with the general sense that the current product was as complete as possible in the given timeframe. Mr. Morris later offered to address his concerns in a minority opinion.

The Committee discussed whether the scheduled afternoon agenda item Future Activities might alleviate some of the concerns that Mr. Morris raised, and whether it should be moved to the morning session of the agenda as a result. The agenda was not reorganized; instead Committee Co-chair Jack Huttner gave a brief overview of the afternoon's agenda so that the Committee members could consider those issues while discussing the draft recommendations paper.

The consensus, summarized by Robert Dorsch, was that this report could serve as a first effort with the understanding that the Committee intended to improve upon it in the future. The Committee Co-chairs concurred that Congress can appreciate the fact that this recommendations paper is the first document within a five-year Committee effort, and thus should be seen as a beginning. However, it should respond to the questions put to the Committee by Congress and should ultimately be the complete thoughts of the entire Committee.

Additional Committee discussions generated a number of comments from individual Committee members. Many of these comments could be addressed in the preamble. The comments included:

- Larry Walker – This report could benefit from an improved representation of science and technology across various programs in the report, and an improved treatment of synergistic issues that cross all of the programs.
- David Morris – In order to show expectations for the years to come, sections should be added concerning
 1. the situation and development of science and technology 20 years ago, and;
 2. how money spent on R&D led to improvements.
- Robert Dorsch - The report did not have a common sense of purpose.
- Steve Gatto – There is redundancy between the subcommittee reports.
- Carolyn Fritz - A discussion on earmarks and their potential affect on achieving goals should also be included in the preamble.
- Robert Dorsch – Raised the concern of whether figure estimates and negative comments should be included in the subcommittee recommendations.
- Loyd Forrest – Asked whether the report should include non-R&D recommendations since the goal of the Committee is to provide R&D recommendations. The discussion of this question included opinions on both sides. It was suggested that the recommendations be limited to R&D and another Committee be formed to specifically look at policy issues. This issue was

resolved with Steve Gatto's suggestion that the preamble should clearly state the mission of the Committee and then emphasize that other issues that will have an affect on the mission are also included. Mr. English clarified that R&D is the main focus of the recommendations, but the Committee's recommendations may also address other issues outside R&D that might help to accomplish the goals of the Committee.

To summarize the Committee suggestions, Jack Huttner offered that the preamble would include the following:

- An overview of the Committee's history.
- A brief discussion on the policy and non-R&D issues included in the report.
- A discussion of crosscutting issues that were not fully addressed.
- Expectations for next year's draft including a critical assessment and budget recommendations.

He also stated that the preamble could be as detailed as the report itself and would serve to put a final wrap on the entire report.

PRESENTATION OF SUBCOMMITTEE R&D RECOMMENDATIONS

Fuels Subcommittee

Douglas Durante presented the Biofuels Subcommittee section of the Committee Recommendations.

In regards to the subcommittee recommendations, Mr. Durante emphasized that this report was meant to be an overall look, and the next report could include specifics. There was some discussion about the process that the subcommittee used to generate its recommendations, including a concern that some information was not included. The issue was resolved when Glenn English noted that the entire Committee had ample time to review the recommendations as a whole. In addition, Steve Gatto agreed to make available the specific budgetary recommendations that several members of the subcommittee had prepared. (Mr. Gatto later presented these funding recommendations, and the Committee agreed that these would be useful in the next version of the recommendations.)

As Mr. Durante went through the report, the Committee members discussed specific points for which they had individual questions or suggestions:

- Edan Prabhu - The first line of the Biofuels section states that biofuels includes solids, liquids and gas, but the paper only discusses liquids. He suggested that the language should be changed to only include liquids. The Committee approved this motion.

- After further Committee discussion on the definition of biofuels, the Committee agreed to use the definition of biomass provided in the Biomass R&D Act of 2000. The members also agreed to alter the text preceding the definition from “the Advisory Committee defines biofuels as...” to read, “the legislation defines biofuels as...”
- Loyd Forrest and David Morris – These members led a discussion on what the appropriate production target should be. The discussion included differences of opinion on the correct numbers for production and the best basis year with which to start. The Committee resolved to set the goal of tripling production by 2010 against 2000 levels.
- Loyd Forrest - The last sentence on page three should be changed to, “The forest products and agriculture industries also produce by-products and residue products that are commonly under-utilized or treated as waste.” The Committee approved the motion.
- Douglas Durante – The title “Mobile Equipment Fuel Use” should be changed to “Utilization”. The Committee approved the motion.
- Dale Bryk and Douglas Durante - These members led a discussion on how to handle the ethanol tax incentive. There was a conflict over whether the recommendations should explicitly endorse the ethanol tax incentive. Dale Bryk, Steve Gatto, Robert Dorsch, Loyd Forrest, Ron Heck, and Douglas Durante discussed possible ways to alter the language in the section. Steve Gatto suggested changing to language that recognized the benefits that the ethanol tax incentive has provided for industry along with the endorsement of financial incentives in general. The Committee agreed to language reading: “Current incentives, such as the ethanol tax incentive, have catalyzed the development of the fuels industry. In order to maintain the growth of the industry, financial incentives should continue and incentives for other fuels including biodiesel should be investigated.”

Power Subcommittee

John Wooten presented the Biopower Subcommittee recommendations.

Mr. Wooten began by noting that per the Committee’s decision in the fuels section, the definition of biopower should change from “the Advisory Committee defines biopower as...” to, “the legislation defines biopower as...” He noted that the goals section did not explicitly call out benefits to farmers. After discussing the issue the Committee came to the consensus that the second goal be amended to explicitly call out benefits to farmers, forestland owners, generators of biomass feedstocks, and rural development.

Mr. Wooten also reviewed the challenges section of the power subcommittee recommendations. He pointed out that it covers issues including decreasing capital costs, overcoming connection, siting and permitting issues, and reducing cost of delivery.

Mr. Wooten said that the subcommittee identified cofiring as the technology with the strongest near-term opportunity. He noted that the technology is currently available, but that there are limitations including the seasonal nature of the feedstock. He added that thermal gasification has the greatest potential for the future, however, it will likely not be commercially competitive until 2010. He also identified modular systems as one of the focal areas in the subcommittee's recommendations. They are especially important to reduce transportation costs.

Larry Walker initiated a discussion on the importance of improving on-site residue utilization as well as the need for additional research on fuel cells. The Committee resolved to add a 200kW size emphasis and an emphasis on fuel cells to the modular systems section of the report.

Products Subcommittee

Philip Shane presented the Biobased Products recommendations.

Mr. Shane framed the subcommittee's recommendations by describing the division of goals in two timeframes. He noted that the window is very small for basic research on technologies that will be useful by 2020. For this reason the focus of the subcommittee is more on technology transfer and commercialization of existing technology, rather than basic research.

After Mr. Shane's initial review of the subcommittee's R&D recommendations the Committee discussed changes to the document:

- Committee Discussion - Robert Boeding questioned whether the definition of bioproducts is too inclusive. The Committee discussed potential changes to the definition including how narrowly the term should be defined and whether the definition from the legislation should be used. David Morris suggested that the Preamble contain a clause that the definition of Biomass was taken directly from the legislation, but the Committee created the definitions for bioproducts, biopower, and biofuels. The Committee settled on Robert Dorsch's suggestion of using the definition from the legislation but adding the exclusions indicated on page six of the AD Little "Aggressive Growth in the Use of Bioderived Energy and Products in the United States by 2010" report.
- Committee Discussion - The first sentence in the Fractionation & Separation section on page eleven was changed to read "Traditional, agriculture, forest crops, urban waste byproducts, and crop residues represent a major source of readily-available complex proteins, oils and fatty acids, and simple and complex sugars."
- Phillip Shane - The first sentence in the Enhancing the Supply of Biomass section should read, "The land set aside by the Conservation Reserve Program and other

stewardship programs, and currently overcrowded forest land could potentially be used to grow biomass for use in bioenergy, biopower, and biobased products.”

The last discussion in this section covered the scope of coverage and degree of specification that should be used. Ideas that were mentioned included:

- Edan Prabhu – Care should be taken in the use of references to liquids, solids and gases in each section.
- Douglas Durante - Biofuels might only include liquids today, but could include gases in the near future.
- Steve Gatto – The issue is not clear because of cases like that of lignin, which is a solid that is converted to liquid for fuel. He restated that the intent of the recommendations is to be broad and cross all boundaries.
- Loyd Forrest - The Committee is not aware of all the technology that is new to the market and, therefore, should not set limits.

FINAL DISCUSSION AND ADOPTION OF R&D RECOMMENDATIONS

Glenn English opened the discussion on the Crosscutting Recommendations. The Committee received clarification that a consulting group created the text in the crosscutting section by identifying common areas from all three subcommittee reports and placing them in this crosscutting section. The Committee discussed this and concluded that some additional areas should be added to the crosscutting section. Glenn English asked Larry Walker and Steve Gatto to develop a list of areas that should be added to the crosscutting section for the Committee’s review. -See Attachment A.

Mr. Walker suggested that this replace the crosscutting section that was currently in the recommendations paper. The new section contained seven areas:

1. Genetically Enhanced Crops
2. Product Storage
3. Biomass Fractionation
4. Enhance Enzymes and Chemical Catalysts
5. Genetically Enhanced Microbes
6. Product Recovery (Separation Technology and Residue Utilization)
7. System Design and Optimization – Biorefinery

Mr. Walker stated that these are the common research themes from the three subcommittee reports. The Committee discussion on the presentation included:

- Holly Youngbear-Tibbets - Modular systems should be explicitly included. The Committee decided to add a note about modular systems to the System Design and Optimization section.
- Frank Flora – This participant from the U.S. Department of Agriculture, stated that it would be helpful for the Advisory Committee to identify specific targets.

The Committee decided that setting specific targets would make the recommendations too visionary.

- Marv Duncan - This participant from the U.S. Department of Agriculture suggested that the terminology Genetically Enhanced Crops was not comprehensive. The Committee decided to use the phrase Industrially Useful Crops instead.

Further Committee discussions yielded additions to the Non R&D crosscutting section:

- Jack Huttner – Mr. Huttner suggested including environmental benefits as a criterion for recommending R&D projects.
- Loyd Forrest – Mr. Forrest suggested including the importance of improving biomass product competitiveness. The text would say that a key criterion for evaluating biomass R&D expenditures is economic competitiveness, and that a prime objective of biomass R&D expenditures is to make resulting biobased products economically competitive.

With those final additions the Committee voted to adopt the recommendations subject to the Co-chair's approval that the edits outlined in the meeting were made correctly. The Committee approved the recommendations with one dissenting vote by David Morris who will produce a minority report explaining his position.

Jack Huttner returned to the earlier Preamble discussion. He asked Holly Youngbear-Tibbetts to have a draft completed by the week of November 26. The draft would briefly capture all of the ideas that were discussed at the meeting.

David Morris offered to have his minority report completed by the week of November 26. The Committee discussed what a minority report means to the main report including whether a Committee member can register support for both reports. Mr. Huttner said that they could not support both, and said that the preamble could include a discussion on the individual reservations of the Committee members. A few Committee members expressed concern that a minority report would weaken the primary Committee report. Glenn English commented that the Committee should not be concerned with the fact that it is not unanimous in its recommendations. Moreover, based on his experience, he believes the Committee is doing a thorough job and the members should feel good about their efforts.

NEXT STEPS AND PRIORITIES FOR 2002

Jack Huttner led the discussion on next steps and priorities for 2002. He suggested that each of the four meetings in 2002 be held over a two-day period, beginning the afternoon of the first day and ending early in the afternoon on the second day. He identified four products for the Committee to consider producing during the coming year.

1. Guidance Document
2. Gap Analysis / Portfolio Review

3. Strategy Recommendations on overall Progress Direction
4. Annual Report

He turned the discussion over to Douglas Kaempf. Mr. Kaempf suggested that while the current subcommittee structure has been effective, the Committee might be more effective if it reorganizes its subcommittees into four new sections to address the needs of DOE and USDA and the requirements of the legislation. He recommended:

- Plant Sciences
- Production and Collection
- Processing and Conversion
- Uses and Distribution

He added that, in 2002, the Committee should identify whether additional industry experts are needed to augment Committee members' knowledge base in subcommittees or in the Committee as a whole. He emphasized that experts can raise the knowledge of the Committee to a higher level.

Loyd Forrest asked whether R&D funds would be categorized in accordance with the four sections in this new arrangement. The Committee registered concern that funds are not currently transparent, and acknowledged that this is an issue that needs to be addressed. Glenn English questioned how the tasks of the Committee fell into these categories. Mr. Kaempf stated that the recommendations currently do fall into these categories, and these categories will also better incorporate USDA's specific issues, including rural development. He asked that the Committee look at their overarching goals, and decide what they need in order to achieve those goals.

Glenn English expressed his desire to meet with researchers involved in these projects in order to better determine their actual priorities. Douglas Kaempf stated that this is something that the DOE Office of Energy Efficiency and Renewable Energy is currently working on. He also emphasized that the Committee's recommendations are very important and the recommendations will directly translate into DOE programs.

Jack Huttner discussed planning for the next meeting. He asked that the subcommittees come to the meeting with a plan for the next year as well as an idea of resources that they will need. He said that the Committee should agree to a blueprint. After the Committee discussed the procedure for developing this blueprint Jack Huttner asked Committee members to submit any questions to the co-chairs, and the co-chairs would make sure they were answered.

FACA GUIDANCE DOCUMENT

The Committee discussion moved back to the list of suggested deliverables for 2002. These are:

1. Guidance Document
2. Gap Analysis / Portfolio Review
3. Strategy Recommendations on overall Progress Direction
4. Annual Report

Mr. Kaempf stated that the first thing the Committee needed was a guidance document that could be a reference for the Committee to identify a pathway to achieving the overarching goals of the Biomass R&D Act. This guidance document will help the Committee to determine where the gaps are in order to create stronger recommendations leading to a more complete Annual Report.

John Wooten brought up the Strategic Plan that was introduced to the Committee at its very first meeting and asked why it was not the guidance document for the Committee. Douglas Kaempf indicated that the Strategic Plan was still in the development process as were other guiding documents that might have been of use to the Committee. The Committee discussed creating its own strategic plan or updating the plan currently in draft form to help serve as a guidance document. The Committee concluded they should create a new guidance document that would help them to create more complete recommendations in the future. The new document would take all of the old documents and synthesize them to create a new plan consisting of the Committee's own vision. Glenn English added that this new guidance document could be used as a checklist for determining recommendations as long as it is not too detailed. Related comments included:

- David Morris – He asked if the Committee could see exact figures on FY 2001 spending in order to analyze allocations for future budgets. The Committee concluded that consideration of too much detailed information would lead to a loss of perspective.
- Phillip Shane – He suggested that USDA and DOE present the Committee with ideas on how they will meet the recommendations that the Committee approved at today's meeting so that the Committee can determine where the gaps lie. The Committee concluded that they need something to use as a basis of comparison in order to determine gaps before looking to agency implementation of the recommendations. A guidance document would be the tool the Committee needs to accomplish that task, and to establish the criteria for effectiveness that would allow them to produce better recommendations

The Co-Chairs will send an email to the Committee members to clarify what the contents of the guidance document will be.

SCHEDULED PUBLIC COMMENT

Jack Huttner asked for Public Comment. Christian Demeter of Antares, Inc., stated that he would submit his comments in writing - see Attachment B.

MEETING ADJOURNED AT 3:45 PM.

ADDENDUM A

**Biomass Research and Development Technical Advisory Committee Meeting
November 20, 2001**

ATTENDEES

Committee Members Present

Robert Boeding	Terri Jaffoni
Dale Bryk	David Morris
Robert Dorsch	Edan Prabhu
Douglas Durante	Philip Shane
Glenn English	Larry Walker
Loyd Forrest	John Wooten
Carolyn Fritz	Holly Youngbear-Tibbetts
Steve Gatto	David Friedman (representing William Nicholson)
Ronald Heck	
Jack Huttner	

Committee Members Not Present

Larry Bean	Michael Ladisch
William Guyker	Roger Rivera
Walter Hill	Jefferson Seabright
Roland Hwang	

Federal Employees Present

Carmela Bailey	USDA	Don Erbach	USDA ARS
Ron Buckhalt	USDA	John Ferrell	DOE
Marilyn Buford	USDA	Frank Flora	USDA ARS
Stan Bull	NREL	Mike Kossey	USDA
Helena Chum	NREL	Mark Paster	DOE
Roger Conway	USDA	Alex Pastern	USDA
Marv Duncan	USDA	Don Richardson	DOE
Karen Edwards	USDA	Bryce Stokes	USDA

Total Public Attendees - 11

Total Attendees – 45

Designated Federal Officer – Douglas E. Kaempf

ADDENDUM B

Biomass Research and Development Technical Advisory Committee Meeting November 20, 2001

AGENDA

- 8:30 am Introduction by Douglas Kaempf
- 8:35 am Preamble Discussion led by Glenn English and Jack Huttner
- 8:50 am Presentation of Subcommittee R&D Recommendations led by Glenn English
- 8:50 am Fuels Subcommittee: Douglas Durante
- 9:10 am Power Subcommittee: John Wooten
- 9:30 am Products Subcommittee: Phillip Shane
- 9:50 am Break
- 10:05 am Final Discussion and Adoption of R&D Recommendations
Discussion led by Glenn English
- 12:05 pm Lunch – USDA - Secretaries Dining Room
- 1:35 pm Next Steps and Priorities for 2002,
Discussion led by Jack Huttner
- 2:20 pm FACA Guidance Document
Discussion led by Jack Huttner
- 2:50 pm Scheduled Public Comment
- 3:05 pm Adjourn

Attachment A

Crosscutting Recommendations Outline

**Biomass Research and Development Technical Advisory Committee Meeting
November 20, 2001**

Crosscutting Research and Development Recommendations

1. Industrial useful plants
 - alter chemical constitutes
 - new chemical compositions
 - improved agronomics
2. Product storage
 - handling
 - feedstock collection, storage and transport (from farm gate to factory)
3. Biomass fractionation
 - pretreatment of lingo-cellulosic
 - extraction of oils
 - thermal processes
4. Enhance enzymes and chemical catalysts
 - polysaccharide degrading enzymes (PSDE)
 - chemical catalysts (i.e. fuel cells)
 - enzyme for efficient extraction of oils
5. Genetically enhanced microbes
 - genetic prospecting
 - metabolic engineering for multi-facet activities
 - natural products
6. Product recovery
 - separation technology
 - residue utilization
7. System design and optimization – bio-refinery
 - exploiting as much of the genetic resources entering the utilization system

Attachment B
Public Comment

Biomass Research and Development Technical Advisory Committee Meeting

Forrestal Building 6E-069

November 20, 2001

Public Comments from:

Christian Demeter, CEO

Antares Group Inc.

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Landover, MD 20785

(301) 731-1900

Chairmen and Members of the Committee, thank you for the opportunity to submit these comments pertaining to the discussion held Thursday. Due to the lateness of the hour and absence of the majority of members of the Committee at day's end, I appreciate the Chairmen's agreeing to accept these comments in writing and add them to the meeting minutes.

For those not familiar with my company, Antares Group Inc. is currently involved in assisting development of two biomass/coal - cofiring projects, a biomass gasification reburn retrofit, a combined heat and power project, and a biorefinery demonstration scale-up project. We have also advised the DOE, national labs, and various environmental groups on bioenergy issues and staff have testified before the Senate Energy Committee and various State public utility commissions and legislatures.

My comments pertain to four general areas:

1. Your morning discussion of legislative mandate to advise the Secretaries of Agriculture and Energy on R&D expenditures.
2. What I perceive as a lack of solid analytic support to assist in making R&D investment decisions.
3. Various miscellaneous gaps in the current R&D program not discussed by the Committee in its recommendations.
4. Procedure and Organization

1. R&D Advisory Role

In the wording of Title III of PL 106-224, I see nothing inconsistent with your legislative mandate to recommend R&D and provide advice on grants, contracts, and financial assistance, and the needs of the Secretary's of Agriculture and Energy to help them meet the bioenergy tripling goal by also recommending "other policy considerations". Federal expenditures on R&D is one aspect of R&D policy. Although your mandate initially appears narrowly defined to research grants and awards, there is latitude to note other financial assistance to mean the need for commercialization policies such as intellectual property, technology transfer mechanisms, loan programs and taxation and other financial mechanisms, and mandated procurement. The industry would appreciate that

you include those types of recommendations to help get technology out of the labs and off the shelf.

Additionally there was some discussion about biomass definitions. I believe you correctly identified the definition of biomass in the law but I want to point out that the law does also clearly define biobased industrial products to mean, fuels, chemicals, building materials, or electric power or heat produced from biomass. I believe the intent is to refer to biobased industrial products as "short hand" to include all of the above subgroups.

2. Analysis Recommendations and Decision Making Models

The law does also refer to the committee having the power to recommend analysis yet the current recommendations are weak in this area. Analytic Models help organize information, structure relationships and flows, and produce traceable results. Those results guide decision making whether it be in private project development or determining federal R&D investments. They can also help to measure actual results against stated goals where goals ideally are set with the assistance of good analysis. It appears the group was at times frustrated by the lack of analytic resources and the quality of the existing resources yet there was not explicit recommendation to improve analytics in the Draft Recommendations to the Secretaries. I would suggest a specific recommendation to improve analytic capability. Specifically two areas come to mind: 1) Biorefinery modelling to help the industry and 2) Consumer market analysis for both R&D planning and industry.

1. Given the emphasis on the Biorefinery Concept it is unfortunate that a biorefinery optimization model has not been developed for general industry use. The model ideally would accept multiple input costs, determine process economics, develop multiple output prices and generate internal rate of return information useful for the investment community. The biorefinery concept being so broad would mean either a generic process would be specified or some set of modules could be developed. As a first step rather than a dynamic programming model, perhaps a set of linked spreadsheets would be useful to allow "what if" comparisons.

2. We should ask consumers what characteristics of bioenergy and bioproducts they find useful and direct R&D investment in those directions to increase the chance that consumer will actually purchase. I would propose a conjoint type internet-based survey technique to develop a statistically sound basis to make decisions. If results, for example, indicate that consumers want to pay more for a diesel fuel that is made from a farm grown input, or that noise reduction and low maintenance is important characteristics of prime mover energy technologies, then that is valuable information upon which to make R&D decisions.

3. Gaps in the Recommendations

Neglected areas or gaps is the discussion about R&D funding included liquids to power, bioderived home heating oil, and repowering at existing sites.

We are working with a major power equipment manufacturer which is interested in biofuels for power using reciprocating engines and ethyl levulinate (ethanol and levulinic acid) in combustion turbines. There is a potential market here where biomass-based fuels can substitute for a portion of imported petroleum-based product. I believe this is a national priority item, yet there appears to be no program element funding liquids to power. Pyrolysis liquids, EL, and other potential biofuels should be examined.

The Northeast U.S. in particular has suffered severe winter weather and home heating oil price spikes in recent years. A strategic home heating oil reserve was set up in response. Again this is a petroleum-based reserve where it may be possible to substitute a biodistillate reserve instead. I am unaware of an identified R&D program for biobased home heating oil which would, for example, examine blend stability issues, burner fouling, etc. I am aware however of interest in some rural petroleum distribution cooperatives in providing green fuels to customers similar to the green power concept in the power industry.

Cofiring has been identified as one of the major pathways to meeting the tripling goal. But cofiring is only replacement power. For capacity additions that can also improve efficiency, repowering at existing sites is a logical next step, but it is not mentioned by the advisory board. Repowering could be accomplished simply via, for example, combustion turbine feedwater reheat to more dramatic gasification/fuel cell combinations. DOE and NREL have sponsored some seed work in the repowering area in the mid 1990s, but little follow on effort has occurred. I believe the biomass R&D board should consider it.

4. Process Comments

Finally, two comments on process. 1) I favor the establishment of subcommittees by function (plant science, production and collection etc.) rather than consumer sector as it helps to achieve greater integration of power, fuels, chemicals and products. A key is to have representatives on each of the functional subcommittees bringing the flavor of each consumer sector to the discussion. 2) Clearly I believe public comment is important to the process you are undertaking, and I'd prefer to see the public comment section integrated into your discussions rather than be a meeting afterthought. I would suggest a 10 minute opportunity for public input at the end of each major section of your meetings and availability of draft recommendations prior to the meeting so the public can prepare for their input.

This concludes my comments on your meeting, and again I thank you for the chance to submit them in writing to be made part of your minutes.

