Biomass Research and Development Technical Advisory Committee

Annual Recommendations to the Secretaries of Agriculture and Energy
Fiscal Years 2002 - 2006

Table of Contents

From the FY 2002 Annual Report to Congress on the Biomass R&D Initiative:

V. Report of the Biomass Research and Development Technical Advisory Committee

As required by section 309 of the Biomass Act, the Committee is submitting this report to assess whether or not funds appropriated for the Initiative are being used in a manner that is consistent with the Biomass Act.

A. Process Used to Select Projects

For the $5 million that were made available to the Initiative for FY 2002, the points of contact for the Initiative decided that a collaborative effort would be the best course of action for selecting projects. It was decided that a USDA Working Group would develop a process to select projects for funding from an existing DOE solicitation. The Working Group selected two projects, and the Board reviewed their selection and approved funding.

B. Projects Selected

The following is a review of the grants that received funding from the Initiative:

1. **Project Title:** Value Added Products from Hemicellulose Utilization in Dry Mill Ethanol Plants.

   Partners: The Iowa Corn Promotion Board, the Minnesota Corn Research and Promotion Council, the Ohio Corn Marketing Program, the Pacific Northwest National Laboratory, and the Idaho National Engineering and Environmental Laboratory.

   Objectives: Aimed at integrating enzymatic hydrolysis, fermentation, and aqueous phase catalysis to produce high value components from hemicellulose in the corn dry milling process.

2. **Project Title:** Continuous Isosorbide Production from Sorbital Using Solid Acid Catalysis.

   Partners: The Iowa Corn Promotion Board, the Pacific Northwest National Laboratory, and Archer Daniels Midland.

   Objectives: Research is focused on developing an economically viable process that converts sorbitol, from corn wet milling operations, to isosorbide. Researchers will be exploring how isosorbide could replace petroleum-derived polyethyleneterephthalate, both in terms of economic values and environmental benefits.

C. Committee's Evaluation of the Project Selection Process

While the Committee did not participate in the process used to select these projects, the Committee understands the circumstances under which USDA chose to use this process for FY 2002 funding. The Committee strongly recommends that the process used to select these two projects not be used for future funding. To better fulfill their duties to advise the Secretaries of Agriculture and Energy, the Committee will investigate opportunities to increase their involvement regarding procedures for reviewing and evaluating proposals under the Initiative. Further, due to constraints regarding the release of information on the FY 2002 project selection process, the Committee did not believe it was provided with adequate information to affirm the process by which the projects were selected.

D. Committee's Evaluation of the Projects Selected

In reviewing the grants that received funding from the Initiative in FY 2002, the Committee believes that the technical focus of the projects is consistent with the goals of the Initiative.

The project titled, "**Value Added Products from Hemicellulose Utilization in Dry Mill Ethanol Plants**," satisfies the qualifications under the Biomass Act by focusing on technology that will diversify the range of products that can be efficiently and cost-competitively produced from biomass. This project also satisfies the recommendations of the Committee by helping to further the biorefinery concept and by increasing the value of agricultural products.

The project titled, "**Continuous Isosorbide Production from Sorbital Using Solid Acid Catalysis**," satisfies the qualifications under the Biomass Act by focusing on the research priorities of developing biobased industrial products that can compete in performance and cost with fossil-based products; accurate measurement and analysis of greenhouse gas emissions in relation to the life cycle of biobased industrial products with respect to other alternatives; analyzing the economic viability of a biobased industrial product; and evaluating the cost of the required process technology and interactions between an emergent biomass refining industry and the petrochemical-refining infrastructure. This project also satisfies the recommendations of the Committee by helping to further the biorefinery concept and by increasing the value of agricultural products.

From the FY 2003 Annual Report to Congress on the Biomass R&D Initiative:

IV. Report of the Biomass Research and Development Technical Advisory Committee & Departmental Response to Committee Recommendations

The Biomass Act charges the Committee with advising the Secretary of Energy, the Secretary of Agriculture, and the points of contact concerning the "technical focus and direction of requests for proposals issued under the Initiative and procedures for reviewing and evaluating the proposals." In addition, it assigns the Committee the duty of evaluating awards made, making recommendations to the Board to ensure that "funds authorized for the Initiative are distributed and used in a manner that is consistent with the goals of the Initiative," and that the "points of contact are funding proposals under this title that are selected on the basis of merit, as determined by an independent panel of scientific and technical peers." The Initiative, as stated above, is described in section 307 of the Biomass Act.

As required by section 309 of the Biomass Act, the Committee is submitting this report to assess whether or not funds appropriated for the Initiative are being used in a manner that is consistent with the Biomass Act.

During Committee meetings held over the course of the year, USDA provided the Committee with updates on the status of the joint solicitation process. Following the announcement of the fiscal year 2003 joint solicitation awards, the Committee was provided with a written overview of the joint solicitation process and a summary of the awards made.

The following are summary comments made by the Committee on the joint solicitation process and the awards made. Comments are organized into four areas:

A. Recommendations on Changes to the FY 2004 Joint Solicitation,
B. Tracking the Progress of Research under the Joint Solicitation, and
C. Review of Awards Made under the Initiative
D. Committee Review of the USDA and DOE Biomass-related R&D Portfolio

Although this is the Committee's report, USDA and DOE responses have been added in italics at the end of each of the four areas listed above to correlate with each of the Committee's recommendations. No changes have been made to the actual content of the Committee's report by adopting this report structure.

A. Recommended Changes to the FY 2004 Joint Solicitation

1. Added emphasis should be placed upon the importance of enhancing "creative and imaginative approaches toward biomass production, handling, processing, and manufacturing…."

2. Bidders should be required to review the Committee's *Vision* and *Roadmap*, and specify how the proposed research addresses strategic recommendations outlined in the *Roadmap* and contributes to achieving *Vision* goals.

3. The Committee agreed with the "high priority" project areas described in the FY 2003 solicitation with the following recommended changes:

    a. Since a large number of animal waste projects were selected under the FY 2003 joint solicitation, animal waste should be de-emphasized in the language used in the FY 2004 joint solicitation.
    b. The priority listed in the FY 2003 solicitation on improving the "understanding and ability to overcome technical and institutional barriers associated with connections to the commercial power grid and energy distribution and transmission systems" should not be included in the FY 2004 solicitation.
    c. Applicants proposing demonstration projects should be required to provide information as to why the technology involved is technically superior to other options and why it is commercially viable.
    d. Priority should be given to applicants who plan to patent or publish their results.

4. For FY 2004, the Committee recommended revising the weighting of evaluation criteria used in scoring proposals. Specifically, the Committee recommended increasing the weight placed on "Technical Relevance and Merit" from 40 percent (in FY 2003) to 50 percent, and reducing the weight placed on "Technical Approach" and "Capability" from 30 percent each (in FY 2003) to 25 percent each. In addition, the minimum cost share should be increased from the 20 percent level used in FY 2003 to a range of 20 percent to 50 percent with a higher cost share required for projects that are further along in the research cycle.

5. As part of the DOE and USDA technical merit review, the Committee recommended that the Departments include non-Federal, non-laboratory experts in the review process. These may include retired experts from academia or private industry who can provide insights into the technical feasibility or relevant research history of proposed projects as well as other useful insights. The programmatic review should also ensure an appropriate balance of near-, medium-, and long-term research.

6. The Committee also recommended that, in general, projects should be funded on a graduated scale, with future funding dependent upon the accomplishment of key technical milestones. Alternatively, DOE and USDA could allow proposals to be submitted for follow-on phases of R&D. DOE and USDA should establish checkpoints on funded research to ensure that solutions to technical barriers are being identified and to continuously monitor technical progress of research. DOE and USDA should avoid committing large sums of funding to a project whose technical concept has not been proven to be viable at the small scale, and whose economic projections are not viable.

Departmental Responses to the Technical Advisory Committee's FY 2004 Joint Solicitation

A number of steps were implemented with regard to the RFP language and process for the FY 2004 Joint Solicitation to address Committee recommendations:

1. *Novelty, innovation, uniqueness, and originality were included as sub-criteria under Criterion 1: Technical Relevance and Merit in the FY 2004 Joint Solicitation.*

2. *In the FY 2004 Joint Solicitation, applicants were encouraged to review The Roadmap for Biomass Technologies in the United States and are directed to a website where the document can be assessed. In addition, an Appendix was included in the solicitation that linked each of the eight solicitation topic categories to the Roadmap.*

3. *In response to the Committee recommended changes on the "high priority" project areas from those described in the FY 2003 solicitation to those that should be described in the FY 2004 solicitation:*

    a. *Animal waste was not highlighted in the FY 2004 solicitation.*
    b. *"Understanding and ability to overcome technical and institutional barriers associated with connections to the commercial power grid and energy distribution and transmission systems," were not specifically included in the FY 2004 solicitation.*
    c. *Biomass Development and Production was identified as one of the 4 technical topic areas for USDA. Of the eight technical topic areas, only USDA Topic 8, "Incentives" mentions demonstration projects and, in particular, applications that address viable options for mobile or small-scale biopower projects for rural locations and communities. A minimum of 20% cost share was required with the expectation that a greater cost-share would most likely be needed by a successful applicant.*
    d. *Patents were requested as part of the application package and will be favorably considered.*

4. *The weighting of evaluation criteria was adjusted in the FY 2004 solicitation to reduce "Technical Approach" and "Capability" from 30% to 25 % in accordance with the Committee recommendations. A "Benefits" criterion was added this year at 20%, which meant that "Technical Relevance and Merit" was limited to 30%, less than the 50% that the Committee had requested. The Departments will again evaluate the weighting of these criteria next year based on the Committee's recommendation of this new weighting structure.*

5. *In developing a technical merit review committee for this year's solicitation, the Departments included non-Federal, non-laboratory experts in the review process.*

6. *DOE is planning to use a Stage Gate management system to monitor technical project progress and "stage" funding based on reasonable progress. USDA will utilize a similar system to ensure that technical progress is being made and funded accordingly for projects selected through this solicitation.*

B. Tracking the Progress of Research Performed under the Joint Solicitation

The Committee made several specific recommendations to the Departments to facilitate evaluation of research performed under the joint solicitation:

1. DOE and USDA should develop a method to quantitatively track progress towards the Committee's *Vision* goals. This should include the status of the use of biomass energy and biobased products in the United States. Such information will provide the Committee with insight on the effectiveness of Federal biomass-related programs and activities and provide the Committee guidance in developing future recommendations.

2. DOE and USDA should develop a matrix for aligning research projects selected under the joint solicitations with evaluation criteria such as relevant *Roadmap* category, near-/medium-/long-term research, and other criteria. This will help the Committee to track and evaluate projects selected under the joint solicitations over time.

3. DOE and USDA should provide the Committee with additional information on the historical progress of research in the areas of gasification, cellulosic ethanol, and co-firing. This will help the Committee better understand progress that has been made in past decades and better evaluate current and future research investments.

USDA and DOE Response to Committee Recommendations on Tracking the Progress of Research Performed under the Joint Solicitation

1. *During the Committee's meeting in March 2004, the Departments presented a matrix that quantifies progress towards achieving the Committee's Vision goals. The Departments will maintain the matrix for future Committee meetings.*

2. *DOE and USDA presented a matrix to the Committee during its March 2004 meeting that aligned projects selected under the solicitations for the past 3 years with evaluation criteria including relevant Roadmap categories, research time frames, and other criteria such as major technical milestones. The Departments will maintain this matrix for future meetings.*

3. *During the March 2004 Committee meeting, DOE presented information on historical progress for cellulose ethanol, gasification, and co-firing to help the Committee better understand and evaluate the need for current and future research investment.*

C. Review of Awards Made Under the Initiative

1. The projects selected in FY 2003 do not appear to increase consumer awareness or confidence in biobased products.

2. Federal agencies and laboratories do not have a strong track record in disseminating the results of research to the private sector or in fostering commercial readiness of biobased products. A larger number of companies in the bio-industries should be involved in the activities under the joint solicitation to increase the likelihood of market penetration of biomass energy and biobased products. There is an immediate need to identify biomass technologies or biobased products that are close to commercial readiness and to nurture them to success through demonstration. Examples include bioenzymes, thermal conversion agents, solvents, various biopolymers, and fuels and additives.

USDA and DOE Response to Committee's Comments on Awards Made Under the Initiative

1. *As described in Section IV.A, the Departments made a number of revisions to the FY 2004 joint solicitation. This included adding technical topics on "Biobased Products" and "Incentives." In addition, the Departments are continuing their efforts to increase public awareness and use of biobased products. DOE is performing analysis to identify top biobased products for future focus. USDA is moving forward with a program to increase Federal procurement of biobased products and institute a labeling program.*

2. *The availability of funding each fiscal year is a significant factor in determining the number of companies that participate in Federally-funded R&D. Moreover, the Departments must develop an R&D portfolio that effectively addresses their respective goals. This may require a larger number of research performers participating in smaller-scale research projects, or a smaller number of research performers participating in larger-scale research projects.*

D. Committee Review of USDA and DOE Biomass-related R&D Portfolio

In February of 2003, the agencies that comprise the Board presented to the Committee their respective portfolios of research and non-R&D activities as they relate to the Committee's *Roadmap*. Following that presentation, through a series of meetings and conference calls, Committee members reviewed the detailed research portfolios of DOE and USDA as they relate to the *Roadmap* in order to provide recommendations on the strategic direction of future research funding. This review included critiquing the research jointly funded through R&D solicitations in FY 2002 and FY 2003 by USDA and DOE.

While the Committee stands by the goals set forth in the *Vision* and continues to believe they are achievable within the timeframes we have established, it does not believe current U.S. government efforts put the industry on track to meet these goals. To the contrary, the Committee believes that the current DOE and USDA biomass activities will make only a very modest contribution towards this end.

The Committee does not believe that the U.S. government's current funding for biomass programs is sufficient to implement the *Roadmap*. Committee members reviewed information provided by USDA and DOE on their respective R&D portfolios as they relate to the Committee's *Roadmap*. This section contains specific recommendations from the Committee to the Secretaries of Energy and Agriculture on their biomass-related research and the Departments' non-R&D activities. Crosscutting recommendations and general observations on the Departments' research portfolios are also included. The Committee's recommendations are intended to assist DOE and USDA in achieving the findings set forth in the Biomass Act as well as the *Vision* and *Roadmap* goals.

Underlying the Committee's recommendations is the consensus that that an effective research and development program in the biomass area must work in a coordinated fashion with the goal of demonstrating technologies at a commercial scale and the implementation of public policies, including public education, incentives, government purchasing, and removal of regulatory roadblocks. A role for USDA, DOE, and other sectors of the Federal Government exists across these areas, including financial support prior to transfer to the private sector. This fundamental premise is the foundation on which the *Vision* and *Roadmap* were built.

The Committee does not believe that the Departments' current biomass programs, in the current policy context, are adequate to achieve the goals set forth in the *Vision*. While the specific recommendations in this report are designed to help the agencies modify current programs to bring them into conformity with the *Roadmap*, one overall recommendation is that the *Roadmap* cannot be effectively implemented and the *Vision* goals cannot be achieved without an order of magnitude increase in financial and policy support for biomass. Specific first steps in this direction should include:

1. A request for $60 million to support the construction of three cellulose-to-ethanol plants capable of processing a variety of cellulose raw materials and using different production technologies to be operational by 2008.
2. Active support for substantial procurement and incentive policies that will dramatically increase the production of biomass energy and biobased products.

The following are Committee findings and recommendations per review of the joint DOE and USDA 2003 biomass portfolio as it corresponds to the Committee's *Roadmap*.

1. Committee Recommendations on Biomass Feedstock Production

a. The Committee believes that additional funding for biomass feedstock research is essential. While there does not appear to be significant duplication of work between USDA and DOE based upon review of the materials provided, increased coordination should be pursued to avoid future duplication and to better coordinate planning within and among Federal agencies.

b. Most of the research emphasis is on harvesting/collecting/processing/ transporting/storing stover, straw, herbaceous crops [Conservation Reserve Program (CRP)], short rotation woody crops, and forest feedstocks. This is appropriate given the potential impact of these processes on overall economics of biomass products. Equal emphasis should be given to finding non-invasive perennial biomass crops as well as supporting research related to crop residue (e.g., straw and stover). Perennial herbaceous (grassy) energy crops offer lifecycle benefits and help reduce soil erosion.

c. Continued DOE and USDA collaborative research to examine soil carbon, fertility, and impacts of biomass removal on sustainability is very appropriate. A full feedstock life cycle analysis is needed to determine the sustainability of biomass collection. The parameters of the full feedstock life cycle analysis must be defined, considering elements such as ash recycling. Coordination needs to occur at the public policy level to identify the appropriate factors to include in such life cycle analyses.

d. USDA and DOE need to coordinate between and within programs in all feedstock research areas. It is also critical to coordinate feedstock research activities with conversion technology development to assure feedstock research is addressing the appropriate needs.

e. There does not appear to be significant duplication of feedstock work between USDA and DOE. Some of the reasons for low duplication are the differing feedstock foci that DOE (straw and stover) and USDA (herbaceous and woody) are using. USDA also focuses more on feedstock-related research through harvesting and collection, while DOE's feedstock-related research concerns the processing and conversion characteristics of the feedstocks.

f. There appear to be some research gaps, including biomass storage life and sensor development in support of conversion and pre-conversion technologies. Some of these issues should be identified in the *Roadmap* for Agricultural Biomass Feedstock Supply in the United States, currently under review; but this effort is focused on corn stover and wheat straw. Similar needs should be identified for herbaceous and woody biomass materials. There may be opportunities to improve storage strategies that enable biomass to be used throughout the year (harvest to harvest). Strategies should include using crop byproducts after harvest in combination with dedicated biomass crops that have growth characteristics that allow them to stand when dormant. Another strategy, which would require further research to be cost-competitive, is to gasify biomass at harvest and store the gas.

g. Committee members feel there may be DOE Office of Science and USDA research, including basic plant science, which was not included in the portfolio information provided. Although this research may not be specific to biomass technologies, it could have both direct and indirect application to biomass feedstock R&D. Specific harvesting technologies are particularly critical, especially one-pass harvesting for corn and corn stover, and storage technologies. Cost-effective and sustainable removal of biomass waste from forests is also critical. It is important that the impacts of this research be recognized and coordinated with overall biomass feedstock and conversion R&D activities.

USDA and DOE Response to Committee Recommendations on Biomass Feedstock Production

a. The Departments are pleased that the Committee did not find significant duplication of R&D related to feedstock production and will continue to work together to increase coordination and decrease duplication. For instance, the DOE's National Bioenergy Center (NBC) is considering adding the USDA's Agricultural Research Service (ARS) as a member in order to improve coordination between the USDA and DOE relating to biomass research (including feedstock production) to meet the Committee's precept of more coordination. The Departments will consider the Committee's comments on the level of funding for biomass feedstocks as they make future R&D investment decisions. In making R&D investments, the Departments are constrained by the level of unencumbered funding available each year and must design a balanced portfolio to address the range of technical barriers that exist.

b. The Committee's recommendation to support non-invasive perennial biomass crops as well as supporting research related to crop residues is addressed in the joint solicitation by the USDA's Technical Topic 5, "Feedstock Development and Production," that targets non-invasive perennial biomass crops (such as switchgrass and poplars) for research development and demonstrations.

c. The broad scope of USDA Topic 5, "Feedstock Development and Production," and USDA Topic 6, "Biobased Products – Economic and Environmental Performance," could cover proposals that address research gaps identified in the Committee's recommendations, such as the need for a feedstock life cycle analysis, biomass storage, and sensor development in support of conversion and pre-conversion technologies.

d. In response to the recommendation that USDA and DOE feedstock research be coordinated, the USDA and DOE have collaborated on a Roadmap for Agriculture Biomass Feedstock Supply in the United States (Feedstock Roadmap). In 2003, joint meetings between USDA and DOE were held where feedstock programs were described and discussed. In addition, formal meetings were held with major land grant universities and DOE managers to discuss programs and areas of mutual interest. A meeting was recently held between the USDA's Agricultural Research Service scientists specializing in feedstocks and the DOE's National Renewable Energy Laboratory conversion researchers to develop better working relationships for conversion and feedstock interface.

e. The Departments are pleased that the Committee did not find significant duplication of R&D related to feedstock production.

f. The broad scope of USDA Topic 5, "Feedstock Development and Production," and USDA Topic 6, "Biobased Products – Economic and Environmental Performance," could cover proposals that address research gaps identified in the Committee's recommendations, such as the need for a feedstock life cycle analysis, biomass storage, and sensor development in support of conversion and pre-conversion technologies.

g. Harvest and collections systems for small diameter wood from forest thinnings were identified as one of the areas of interest under USDA Technical Topic 5 in the Joint Solicitation. Specific harvesting technologies have been identified in the Feedstock Roadmap, including the one-pass harvesting system. These were discussed at DOE's Biomass Program Multi-Year Technical Review Meeting last November. Quite a few Committee members participated in the Review Meeting either as formal reviewers or attendees.

2. Committee Recommendations on Processing and Conversion

1. Recommendations in this area relate to thermochemical conversion, bioconversion, and the integrated biorefinery. Committee members felt that reorganization of DOE biomass programs has helped the Department focus its biomass planning. While the Committee recognizes that the dispersed nature of USDA and the Department's need to address regional priorities makes it more difficult for USDA to use the *Roadmap* for planning, increased effort is needed to coordinate USDA bioconversion R&D.

2. The overall level of funding for bioconversion is inadequate.

3. Increased effort is needed on the part of both DOE and USDA to coordinate research as it relates to bioconversion.

4. The Committee has had a difficult time evaluating USDA's portfolio as it relates to the *Roadmap*. The Committee would like more transparent reporting of USDA R&D activities in alignment with the *Roadmap* categories.

5. The portfolio of research related to thermochemical conversion is not sufficiently diverse. As much emphasis should be placed on gasification from waste and surplus feedstocks as is currently being placed on gasification from grain-based biomass feedstocks.

6. 50-50 cost share funding to demonstrate black liquor and woody biomass gasification with associated power generation should be continued until both high pressure and atmospheric pressure black liquor technologies and one wood gasification technology are each operated successfully for at least two years at commercial scale. Absent such demonstrations, these technologies are not likely to be implemented because of financial risk, and the many economic and environmental benefits of the technologies will not be realized. The current Federal level of funding will not support these demonstrations.

7. There are major gaps in basic research applied to sustainable chemicals. This is especially true in the areas of organic chemistry and biochemistry of oils, lipids, proteins, and carbohydrates. Specifically, the National Science Foundation (NSF) and DOE's Office of Science should increase funding in this area. There is a great need for reactivating known, but unused, chemistry to replace existing petrochemical feedstocks with renewable ones. We will need to find equivalent or new functionalities from renewable resources.

USDA and DOE Response to Committee Recommendations on Processing and Conversion

a. The DOE's NBC is considering adding the USDA's ARS as a member in order to improve coordination between the USDA and DOE relating to biomass research (including bioconversion) to meet the Committee's precept of more coordination.

b. The Departments will consider the Committee's comments on the level of funding for bioconversion as they make future R&D investment decisions. The DOE's Biomass Program FY 2004 Energy and Water Development appropriations included approximately $41.0 million, or nearly half of the biomass budget, targeted to specific projects not identified in program plans. By redirecting funds away from the Program's planned R&D investments which contribute to a balanced portfolio addressing a range of technical barriers that exist, Congressional earmarking delays progress toward the Program's goals and diminishes core research capabilities at the National Laboratories.

c. The Departments will continue to use the BioInitiative and other methods to increase coordination.

d. In response to the Committee's comments concerning the level of USDA information provided, a USDA program manager made a presentation at the October 2003 Committee meeting on how to secure detailed project level data through the Internet website and offered to provide more specific information as requested by the Committee.

e. The Committee's comments concerning a lack of technology diversity for thermochemical conversion and the range of feedstocks being addressed. DOE responded by including a technical topic in the thermochemical processing category of the FY 2004 solicitation. Pyrolytic Bio-Oils and black liquor gasification also was targeted by DOE. Under the USDA solicitation incentives category, small biomass power projects were cited as having special interest.

f. Since Congress directed further work in FY 2004 for black liquor gasification, DOE is continuing its project with its partner on a demonstration of the low temperature black liquor gasification technology. In addition, for the FY 2004 Joint Biomass Solicitation with USDA a DOE topic is addressing the needs of Kraft black liquor gasification, thereby supporting the majority of United States' pulp and paper mills.

g. One of the DOE's Biomass Program core R&D areas focuses on Products, which is working with industry to determine the top valued added chemicals from biomass. This could contribute to future areas of basic research.

3. Committee Recommendations on Product Uses and Distribution

a. A number of biobased products and biofuels are currently ready for commercial use. For these products, the Departments should facilitate--through cost-sharing arrangements, independent testing, and validation of product performance--public education on the benefits of those products. Additional R&D is needed to decrease the cost and improve the performance of products currently ready for commercial use and to expand the slate of biobased products available to consumers. DOE and USDA should work with EPA to ease regulatory hurdles that currently exist for natural products to displace petrochemicals. Some of these barriers are very difficult to overcome, particularly for small start-up companies with new products.

b. Because many products are already ready for commercial use, USDA and DOE activities in this area should focus on educating consumers on the benefits of these products and facilitating the development of more widespread distribution systems to get biobased products to consumers. The Departments should foster these public education efforts. However, funding for these efforts should not be obtained from resources currently dedicated to research. Public education needs to be as direct as possible and use well-established commercial marketing concepts.

c. DOE and USDA should fund analysis to validate performance of biobased products and continue research to improve the competitiveness of those products. Increased Federal procurement will require biobased content certification/decertification and an assessment of the viability of existing technologies and products to fulfill the various purchasing requirements. Moreover, demonstration audit services are needed to compare existing products to available alternatives. USDA should also include comparison testing of biobased product performance and an evaluation of the plausible time for delivery.

d. A full life cycle cost and environmental analysis of biobased fuels and products in relation to petroleum-based alternatives should be performed so that a balanced cost and environmental comparison can be made and the public can be educated on the full cost of both biobased and petroleum-based fuels and products. Life cycle analyses should include terrestrial carbon sequestration. They also should compare grain-based renewable transportation fuels, ethanol from corn, and soy diesel to liquid transportation fuels from perennial cellulosic crops and/or carbohydrate-rich materials going to landfills.

USDA and DOE Response to Committee Recommendations on Product Uses and Distribution:

a. USDA is working to implement section 9002 of Title IX of the Farm Bill. Implementation of this program meets the Committee's recommendation to establish an aggressive purchasing program for biobased products. Further, this program has the force of law since USDA is implementing a statute. When fully implemented, the program will require Federal agencies to greatly increase their use of biobased industrial products. That increase is expected to contribute to the development of a broad range of new biobased products. Agencies will be required to purchase biobased industrial products whenever their cost is not substantially higher than fossil energy-based alternatives, when biobased industrial products are available and when biobased industrial products meet the performance requirements of the Federal user.

b. The Office of Procurement and Property Management (OPPM) in USDA's departmental administration mission area is developing a model procurement plan that will be exported to other Federal agencies in cooperation with the Office of Management and Budget. Education and outreach will be a significant component of the program. A labeling program is also provided for in the statute. A "U.S.D.A. Certified Biobased Product" label and logo will be available for future use. Requirements for use of the label will be based on product information provided to the buyer. USDA hopes to have a proposed rule out this calendar year.

c. The proposed rule details the process by which USDA will designate "items," which are generic groupings of similar biobased products, such as hydraulic and transmission fluids. To designate an item, USDA must obtain and make available information such as availability, relative price, performance, and environmental and public health benefits for the items and biobased materials designated for preferred procurement. Items will be designated through subsequent regulations. Once an item is designated, every manufacturer and vendor producing and marketing

products contained within that item are eligible for preferred procurement status when marketing their products to Federal agencies. Manufacturers must certify that the biobased content in their products is consistent with the statutory definition of biobased products. They must also certify that they have had third-party testing of the biobased content.

d. To help in responding to this comment, the FY 2004 joint solicitation included USDA's Technical Topic 6 "Biobased Products – Environmental and Economic Performance" and USDA's Technical Topic 8 "Incentives" which covered life cycle and economic analysis and environmental of biobased products -- including effects on greenhouse gases and carbon sequestration.

4. Committee Recommendations on Public Policy Measures

While Committee members were pleased with much of the work the agencies are undertaking in the areas of economic analysis, education and outreach, and Federal procurement, we found significant gaps in the area of policy support for biomass, which we believe will seriously jeopardize the prospects for successfully achieving the goals set forth in the *Vision*. In particular, we recommend a substantial increase in efforts to commercialize proven biomass technologies and remove regulatory barriers to their widespread adoption.

Aggressive Federal Purchasing of Biobased Products - The positive impact of Federal procurement in fostering new markets is significant, as demonstrated by Federal purchasing of recycled materials in the 1980s and 1990s. Federal procurement played a significant role in expanding the recycling industry in the United States. A similar opportunity exists for fostering the biobased economy. Since the Federal Government is the Nation's largest purchaser of products, the Committee believes that aggressive purchasing of biobased products by DOE and USDA, as well as other parts of the Federal Government, is an important step in achieving the goals of the Biomass Act. The production of fuels, power, chemicals, and materials from biomass will encourage healthier rural economies and reduce American dependence on imported oil. The Federal Government should also encourage state and local governments to purchase and use these products.

The Committee formally recommends that the Secretaries of Energy and Agriculture immediately establish an aggressive purchasing program for biobased products. The Secretaries should establish a departmental-wide goal in which biobased products, defined as products that contain over 90 percent plant or animal matter by weight, account for a minimum of 30 percent of all purchases in each product category for which biobased products are available, exhibit equal or superior performance characteristics and have a total product cost--including the cost of disposal and handling--no more than 10 percent higher than their conventional counterparts with a benchmark goal date of January 2006. To evaluate progress in reaching this goal, the Committee requested that the Secretaries of Energy and Agriculture report in January 2004 on the progress to date and the procurement strategy to achieve the goal.

The Secretaries should recommend to other parts of the Federal Government and to State and local government that they should have a similar program. A report to the Committee shall be made by June 2004 as to progress with expanding biomass purchasing beyond USDA and DOE.

The ARS facility in Beltsville, Maryland, has already made significant progress in displacing chemicals with biobased products. To help facilitate the use of biobased products, the biobased products industry has offered to assist the Federal Government in educating procurement officers and other key department personnel on the availability and performance characteristics of biobased products. The Federal Government and other interested parties should take advantage of this offer.

Biobased products are currently available in over 22 product categories, including those listed below:

- Absorbents, Adsorbents, and Activated Carbon
- Cleaning Chemicals, Surfactants, Soaps, Detergents
- Construction / Composite Materials (Panels, Laminates)
- Fibers, Bonded Fabrics, Textiles
- Foods, Beverages, Nutrients
- Fuels and Fuel Additives
- Gases And Vapor Technology
- Inks, Dyes, Pigments
- Landscaping Materials, Soil Amenders, Fertilizers & Agricultural Chemicals
- Oils, Waxes, Binders, Lubricants, Rust Inhibitors, and Functional Fluids
- Packaging
- Paints, Coatings, Adhesives
- Paper and Paper Products
- Personal Consumer Items / Cosmetics
- Pharmacology & Neutracuticals
- Plastics, Polymers and Films
- Solvents & Co-Solvents
- Specialty Chemicals
- Water & Wastewater Treatment
- Biopesticides

Both farmer-owned and rural production facilities should be favored in the procurement of biobased products, fuels, and power.

USDA and DOE should expand the BuyBio program to include the development of a labeling program to better promote biobased products by signifying to consumers that the products conform to established standards for quality and performance. Specifically, the Departments should work with EPA in this effort to utilize their experience with “green” labeling.

Efforts to commercialize proven biomass technologies are an essential element of the *Roadmap*, but at present they are woefully under funded. Small piecemeal efforts such as those included within the State Technologies Advancement Collaborative will do little if anything to make these promising technologies commercially viable. The Committee would like information on the purpose for funding of both the “Consortium for Plant Biotechnology Research Initiative” and the “State Technologies Advancement Collaborative (STAC)” and suggests these activities be re-evaluated.

The $23 million grant program established pursuant to §9006 of the 2002 Farm Bill is promising, but only a small portion of those funds are likely to support biomass projects, and the current budget for fiscal year 2004 proposes an 86 percent reduction in funding to $3 million. This is a giant step in the wrong direction. (Note: the Omnibus appropriations bill ultimately passed allocated $23 million in fiscal year 2004.)

Both Departments, but particularly DOE, should give much greater attention to public policy measures that can dramatically increase the commercial viability of biomass technologies at relatively low cost. The Committee's *Roadmap* outlines strategies and recommendations on Federal incentives, financial incentives to support existing facilities, and a public benefits fund. The *Roadmap* also includes measures to foster procurement of biomass energy and biobased products including Federal procurement, performance standards, renewable portfolio standards, and other measures. Incentives available from the Commodity Credit Corporation in FY 2004 should not be reduced from FY 2003 levels. Federal incentives should not subsidize businesses' waste disposal costs. In addition, Federal incentives for methane-to-electricity generation should be allotted per ton of manure disposed of rather than per kilowatt-hour generated. A discussion of these and other policy initiatives are discussed in further detail in the *Roadmap* available at < http://www.bioproducts-bioenergy.gov/pdfs/FinalBiomassRoadmap.pdf>.

The economic analysis that the agencies currently undertake is of high quality and an essential element of the *Roadmap*. However, the agencies could improve this work by ensuring that it includes both economic and environmental life cycle analyses (LCAs) for all promising biomass feedstocks and conversion technologies. The agencies should also use the results of these analyses more directly to guide primary research so that, as noted in the feedstock-related recommendations above, the agencies do not waste resources conducting R&D on feedstocks and technologies with unfavorable LCAs.

Committee members find DOE workshops to be effective. In general, the agencies should conduct education and outreach with materials that are developed at the Federal level, focusing on technologies that are identified at the Federal level, rather than approaching this work in an ad hoc way or directing it at local issues. State and local entities can facilitate such workshops. DOE should consider providing financial assistance to small businesses and other organizations that may require assistance to attend these workshops.

In conducting outreach and education efforts, the agencies could make better use of state and regional offices to promote specific biomass technologies. For example, the agencies can invest in demonstration projects that are likely to attract public interest and earn the media's interest.

Centers for Excellence at the university level should be established to help train university students in areas related to biomass R&D and commercialization thereof.

While Committee members support the development of K-12 educational programs to help make young people aware of the promise of bioenergy and biobased products, we have mixed feelings regarding the ability of the Federal Government to do this successfully with the limited dollars available for policy initiatives. There might be an opportunity for the agencies to work collaboratively with industry by pooling existing dollars that companies are already allocating for public education efforts. Project Learning Tree is an example of this kind of public-private effort.

USDA and DOE Response to Committee Recommendations on Public Policy Measure:

Many of the Committee's policy-related recommendations surrounding biobased products are addressed in Section IV.3. In addition, at the Committee's March 2004 meeting USDA provided an update on the implementation of the Federal Biobased Products Preferred Procurement Program, including product designation, labeling and other program activities. USDA will continue to provide periodic updates to the Committee.

The Departments are continuing to work with colleges and universities as well as conduct outreach and educational activities within their mission and resources. For example, DOE has awarded grants to foster educational programs on bioenergy and biobased products at the college level. Through the Small Business Innovative Research Program, DOE also funds biomass-related research to small businesses. In terms of education and outreach, USDA is hosting a conference on Agriculture as a Producer and Consumer of Energy. Both Departments provide educational materials on bioenergy and biobased products on their respective websites.

5. Committee's Crosscutting Recommendations

A number of recommendations provided by the Committee are crosscutting in nature, including the following:

For FY 2005 and out years, the Secretaries of Agriculture and Energy should request $49 million in funding for the joint solicitation as authorized in the Biomass Act, as well as the additional $14 million in R&D funding available from the Commodity Credit Corporation under §9008 of the Farm Bill. The Committee recognizes that current funding is not adequate to achieve *Vision* goals.

Economic analysis, including life cycle analysis, should be performed to help guide research investments and the selection and development of investments leading to demonstration and commercialization, as well as to educate the public.

A study should be performed and independently validated that develops baseline indicators of the bioeconomy. This baseline should include economic, energy, environmental, agricultural, and other indicators to help characterize the current status of the bioeconomy and measure progress on at least an annual basis.

Product performance standards should be established for biobased products and biofuels.

Performance measures should be established for tracking R&D progress.

The Federal Government should continue to be involved in co-funding demonstration projects at a commercial scale when the financial risk is too high for industry. Without such support, the monies previously invested to develop technologies will go for naught. Examples of such technologies are black liquor gasification and power production.

To the extent feasible, DOE and USDA should seek out information on private sector and Federal and State R&D to make informed investment recommendations (i.e., not duplicate work being performed elsewhere).

USDA and DOE responses provided in Sections IV.1 through IV.4 address crosscutting recommendations made by the Committee.

From the FY 2004 Annual Report to Congress on the Biomass R&D Initiative:

IV. Report of the Biomass Research and Development Technical Advisory Committee & Departmental Response

The Biomass Act charges the Committee with advising the Secretary of Energy, the Secretary of Agriculture, and the points of contact concerning the "technical focus and direction of requests for proposals issued under the Initiative and procedures for reviewing and evaluating the proposals." In addition, it assigns the Committee the duty of evaluating awards made, making recommendations to the Board to ensure that "funds authorized for the Initiative are distributed and used in a manner that is consistent with the goals of the Initiative," and that the "points of contact are funding proposals under this title that are selected on the basis of merit, as determined by an independent panel of scientific and technical peers." The Initiative is described in section 307 of the Biomass Act.

As required by section 309 of the Biomass Act, the Committee is submitting this report to assess whether or not funds appropriated for the Initiative are being used in a manner that is consistent with the Biomass Act.

During Committee meetings held over the course of the year, DOE provided the Committee with updates on the status of the joint solicitation process. Following the announcement of the FY 2004 joint solicitation awards, the Committee was provided with a written overview of the joint solicitation process and a summary of the awards made.

The following are summary comments made by the Committee on the joint solicitation process and the awards made. Comments are organized into four areas:

E. Recommendations on the FY 2004 Joint Solicitation Process
F. Recommendations to the Secretaries on Energy and Agriculture on the Departments R&D Portfolios in Relation to the Committee's Vision and Roadmap
G. Overall Recommendations to the Secretaries of Energy and Agriculture in 2004
H. Recommendations on the 2005 Joint Solicitation Technical Topic Areas

Although this is the Committee's report, Departmental responses have been added in italics after each recommendation made by the Committee in each of the four areas listed above. No changes have been made to the actual content of the Committee's report by adopting this report structure.

C. Recommended Changes to the FY 2004 Joint Solicitation Process

1. The request for proposal (RFP) process should be changed to allow more time for response, easier access to the RFP, and to be more focused in its proposal criteria description.

Departmental Response: To address the Committee's concern regarding the short turn-around time for the 2004 joint solicitation, the Departments extended the length of time for bidders to prepare pre-applications by three weeks. The following table shows the FY 2004 joint solicitation schedule versus the FY 2005 schedule:

	Issue Date	Pre-Application Due	Full Application Due
2004 Solicitation	12/23/03	1/30/04	3/26/04
2005 Solicitation	12/17/04	2/15/05	4/15/05

To address the Committee's concern regarding easier access to the RFP, the FY 2005 joint solicitation RFP was posted to fedgrants.gov. Additionally, announcements of the RFP were posted to the Biomass Initiative website, the DOE's Office of the Biomass Program website, and in a USDA news release.

2. Proposals should be required to identify the relevance to the *Vision* and *Roadmap*, to address cost, energy, and environmental impacts, and to address by-products generated from the project.

Departmental Response: The 2005 joint solicitation RFP includes an appendix that relates technical topic areas to Roadmap goals.

The 2005 joint solicitation review criterion requires proposals to address: improvements in energy efficiency and economics of the biomass technology, oil displacement, rural economic development, and environmental benefits. Specifically the RFP calls for:

- *Estimated benefits in comparison to existing technology or system (e.g., crude oil displacement or energy efficiency gains in product production).*
- *Comparison of the cost to produce the targeted product(s), fuel(s), and power, versus existing best commercial technology.*
- *Anticipated energy and/or economic benefits, including those related to enterprise and community self-sufficiency, rural economic development, job creation, and reduction in imports.*
- *Potential for the proposed work to provide sufficient benefits in terms of cost reduction, risk reduction, or performance improvement to justify the cost of the system being investigated.*
- *Potential for near-term implementation of the proposed system or technology.*
- *Incorporation of activities and technologies that are protective of the environment.*
- *Extent to which public safety, environmental concerns, and land sustainability issues in rural areas are addressed.*

3. More proposal reviewers should be selected from industry, academia, and pools of retired experts and should be paid for their services.

Departmental Response: The Departments will take this recommendation into consideration during the FY 2005 joint solicitation review process and as they select experts to perform the technical merit review. The Departments will continue to strive for a slate of reviewers that brings both strong technical expertise and balance across the range of biomass technologies that will be evaluated in the proposal process.

4. Continue to approve proposals on the merit of the project, but strive to include a variety of project sizes.

Departmental Response: The Departments will take this recommendation into consideration as it selects proposals. The Departments, however, will place emphasis primarily on proposals that demonstrate strong technical merit and respond to each Department's strategic objectives.

5. Projects in progress should be reviewed regularly and required to provide clear decision points before they are continued or provided with additional funding.

Departmental Response: The 2005 joint solicitation review criteria require proposals to address performance measures and milestones for evaluating progress with regard to key subtasks and/or deliverables. Additionally, USDA and DOE will conduct regular reviews of all R&D projects. For example, in March of 2005, USDA and DOE will hold a joint Stage-Gate review of feedstock related R&D projects that will include a review of past joint solicitation projects. Moreover, each recipient is required to submit quarterly reports on technical progress so that DOE and USDA project managers can track the progress of each project awarded on a regular basis.

6. USDA and DOE should announce publicly the joint solicitation awardees in a timely fashion and explain why each was chosen.

Departmental Response: Each year, the Departments publicly announce the results of the joint solicitation as soon as awards are finalized. These announcements provide a brief public description of each award and its relation to the Committee's Roadmap. The Departments will attempt to provide a fuller description of the contribution that each award has towards program objectives. The detailed results of the technical merit evaluations, however, are not for public release in order to protect the intellectual property rights of awardees.

B. Recommendations to the Secretaries on Energy and Agriculture on the Agencies' R&D Portfolios in Relation to the Committee's *Vision* and *Roadmap*

1. USDA and DOE should track progress towards, and funding spent, on *Roadmap* goals. USDA in particular, given its program focus, should track these variables across all agencies.

Departmental Response: The Departments provided information on the Federal investment and technical progress towards Roadmap categories through the Biomass R&D Portfolio Analysis and Narrative provided in 2003 and 2004. These reports collected funding data by project or department focus with respect to Roadmap category. The Departments began working with members of the Committee, as well as Department staff, in the first quarter of FY 2005 to begin developing a standard format for collecting and reporting this information on a regular basis. The intent is to illustrate direct linkages and progress towards Roadmap objectives.

2. USDA and DOE should seek more funding for achievement of *Roadmap* and *Vision* goals and for biobased resources.

Departmental Response: In its annual budget request, each Department evaluates the Committee's Roadmap and submits funding requests that align with both the Roadmap and the Department's programmatic objectives. In the case of DOE, funds allocated toward achieving Roadmap objectives are severely impacted due to Congressionally directed appropriations.

3. USDA and DOE should conduct a major benchmarking study that describes the current state of the following areas: biomass technologies, biomass in the marketplace, and the environmental impacts associated with biomass projects.

Departmental Response: The Departments will consider conducting a benchmarking study. Such a study, however, would be a major effort that would divert funding away from other R&D efforts. DOE has conducted such studies in limited areas. For example, in 2004, DOE and the Pacific Northwest National Laboratory conducted the Top Ten Products Study that identified twelve chemicals that can be made from sugars that are most likely to successfully enter the marketplace. Additionally, in coordination with the National Renewable Energy Laboratory, DOE is conducting an integrated biorefinery analysis.

C. Overall Recommendations to the Secretaries of Energy and Agriculture in 2004

8. Laws, regulations, and policies dealing with biomass should define biomass as all biomass and biomass derivatives.

Departmental Response: For purposes of the Biomass Initiative, the Departments use the Biomass R&D Act of 2000 for direction on the definition of biomass. In addition the USDA's Guidelines for Designating Biobased Products for Federal Procurement (effective February 10, 2005) defined biobased products as "A product determined by USDA to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic

agricultural materials (including plant, animal, and marine materials) or forestry materials." The Departments do not develop legislation, but will consider this recommendation and will include it in their annual report to Congress.

2. The Committee recommends the following approach for setting funding priorities regarding biomass to hydrogen:

- Accelerate the development and market penetration of ethanol-powered hybrid electric vehicles and ethanol powered plug-in hybrid vehicles to capture immediate environmental and energy security benefits.
- Significantly increase funding for cellulosic R&D programs.
- Continue to evaluate other alternative fuels strategies, including hydrogen, with particular emphasis on biomass to hydrogen in recognition of its unique carbon sequestration capabilities.

Departmental Response:

- *The Department conducts extensive research and development activities, cost-shared with industry, in support of advanced transportation technologies, including hybrid electric vehicles, under the DOE FreedcomCar and Vehicle Technologies Programs. Furthermore, the President's National Energy Policy includes proposals to provide incentives for hybrid electric vehicles and to encourage the expanded use of ethanol as a motor fuel. As part of our continuing efforts to promote the use of renewable fuels, DOE's Office of the Biomass Program recently held a meeting with industry representatives to identify the non-technical barriers to greater use of biomass technologies and potential solutions to those barriers.*
- *Cellulosic R&D is an important component of both USDA and DOE RD&D programs. DOE has made important strides in this area that were presented to the Committee in March 2004. Part of the struggle in funding more cellulosic R&D involves competing R&D demands and Congressionally directed funding.*
- *Under the President's Hydrogen Fuel Initiative, the Department has established an aggressive multi-year plan for hydrogen research, development, and demonstration. The DOE Hydrogen, Fuel Cells, and Infrastructure Technology Program works to overcome the technical barriers surrounding hydrogen and fuel cells for transportation, distributed stationary power, and portable power applications. The program is investigating the full range of potential sources for hydrogen production, including biomass.*

The Departments will continue to take this recommendation into consideration.

3. Biomass efforts should be tied to the Healthy Forests Initiative when appropriate.

Departmental Response: DOE has developed a Forest Biorefinery Plan that will assist in achieving the Healthy Forests Initiative goal of reducing forest fires through debris removal and forest thinning that would be used as feedstocks for the biorefinery. USDA

was consulted during development of the plan to assist with the determination of the amount of forest derived feedstock available and in identifying the R&D needs of a forest based biorefinery.

4. The Departments should provide the Committee with an annual, quantitative progress report on the Federal Biobased Products Procurement Program. The report should be specific in providing a detailed outline of program development required and progress made, as well as an assessment of the amount of biobased products being purchased by the Federal Government by agency and by product category. This is the *second year* such a report has been requested. The biobased products industry is willing to assist the Federal Government in educating its procurement officers on biobased products.

Departmental Response: At the March 11, 2004, Committee meeting, USDA provided the Committee with an update on the status of its Federal Procurement of Biobased Products plan. A brief status update was given at the March 17, 2005, Committee meeting, and a full update will be given at the summer 2005 Committee meeting once the rule is finalized.

5. The Departments need to provide the Committee with the appropriate information to fulfill its obligations under the Biomass R&D Act.

Departmental Response: The Committee's responsibilities under the Act are:

- *To advise the Secretaries and points of contact on the technical focus and direction of RFPs issued under the Initiative*
- *To advise the Secretaries and points of contact on procedures for reviewing and evaluating the proposals*
- *To facilitate consultations and partnerships among Federal and State agencies, agricultural producers, industry, consumers, the research community, and other interested groups to carry out program activities related to the Initiative*
- *To evaluate and perform strategic planning on program activities relating to the Initiative*

Each year, the Departments have developed a Work Plan to address these responsibilities. Information is provided within the resources of Department staff. Examples of information provided in FY 2004 include:

- *USDA provided a status report on the Federal Procurement of Biobased Products ruling. As of March 2004, the ruling was not yet finalized, but a voluntary program was in place. This information assists the Committee with its task of facilitating Federal and State partnerships with agricultural producers and industry.*
- *DOE staff provided the Committee with information on past DOE R&D on biomass technologies, including cellulosic ethanol, gasification, and cofiring. These presentations assist the Committee with its task of evaluating and performing*

strategic planning on program activities by providing them with background on R&D that has already been conducted.

- *USDA and DOE staff provided the Committee with a matrix of current and past joint solicitation R&D projects by Roadmap category, allowing the Committee to better advise the Secretaries and points of contact on the solicitation process and awards.*
- *USDA and DOE staff generated a report to track the current progress towards achievement of Vision goals. This document allows the Committee to identify areas that require more attention in meeting Vision goals, thus enabling them to provide more useful recommendations on the technical focus and direction of joint solicitation RFPs.*
- *The Committee was presented with information on hydrogen from biomass by a variety of experts, including those from industry, government, and the non-profit sector, with a range of opinions on the topic. This information assisted the Committee in the development of its position on biomass to hydrogen, which it used to make suggestions on the direction of program funding in this area.*
- *The Committee reviewed the results of the 2004 joint solicitation in order to make recommendations on the technical focus and direction of RFPs and on the procedures for reviewing and evaluating proposals.*
- *USDA presented to the Committee a report on the Energy Balance for Corn Ethanol. This assisted the Committee with making recommendations on program planning as it relates to corn ethanol.*
- *USDA and DOE provided the Committee with presentations on overall program direction and R&D portfolio analysis, assisting the Committee in suggesting technical topic areas that need more attention in joint solicitation RFPs, and in making strategic program planning recommendations.*

6. The approval of the Secretaries' annual report to Congress should be expedited and congressional actions resulting from the report should be communicated to the Committee.

Departmental Response: The Departments recognize that the final approval of the annual report was unusually long for 2003 and will make every effort to expedite the process in 2004.

D. Committee Recommendations on the 2005 Joint Solicitation Technical Topic Areas

e. R&D for bioproducts such as adhesives, lubricants, coatings, etc.

f. Broaden liquid biofuel research

g. Production of bioproducts and biofuels from hemicellulose streams, such as those extracted from raw materials at pulp and paper mills, without loss of quality in the final product

h. Cellulosic R&D, including large volume waste materials

i. Biopower generation through small-scale utility generating facilities

Departmental Response: The Departments took the Committee's recommendations into consideration when developing technical topic areas for the FY 2005 joint solicitation. One of the technical topic areas in the FY 2005 joint solicitation was Biobased Products Development, which includes the specific products mentioned in the Committee's recommendation. The Departments did not want to limit the types of biobased products to those listed in the Committee's recommendation in order to support a wide-range of proposals and R&D topics. The Departments also did not want to limit the joint solicitation technical topic areas too narrowly so as to exclude certain research proposals that may have been received otherwise. While some of the technical topic areas suggested by the Committee were not specifically included in the FY 2005 joint solicitation RFP, many of them fall into the broader areas that were included.

FY 2005 Recommendations on the FY 2006 Joint Solicitation:

Technical Topic Areas:

1. Feedstock development and production with emphasis on additional preprocessing activities
2. Pretreatment methodologies to enable enzymatic digestion
3. Separation technologies for purifying fractionations coming out of a biorefinery in order to develop value-added products from ethanol co-products
4. Increased woody feedstock understanding (availability, cost, implications of advances in biotechnology and nano-technology, harvesting, transportation, initial processing, sustainability)
5. Feedstocks derived from animal production and processing (i.e. inedible fats and greases, recycled restaurant grease, cooking oils)

Solicitation Scope, Criteria, and Schedule:

1. Require more demonstration projects that take existing technologies to the next step towards commercialization.
2. Projects should use existing pilot plant facilities rather than using government funds to build their own.
3. Give priority to Roadmap category completed projects for development into demonstration projects and commercialization initiatives.
4. Focus should be on early stage research as well as development and demonstration projects. Focusing only on demonstration projects could cause the research community to turn its attention to other federal research programs and deprive the biomass program of essential scientific contributions.
5. A merit review criteria should be added to address the path and time to commercialization.
6. Agree with the proposed accelerated solicitation schedule.
7. There should be at least two months between announcement of the solicitation and the proposal due date.

2005 Report of the Biomass Research and Development Technical Advisory Committee & Departmental Response

Section 306 of the Biomass Act charges the Committee with advising the points of contact with respect to the Initiative. Further, it charges the Committee with evaluating whether, and making recommendations to the Board to ensure that, "the funds authorized for the Initiative are distributed and used in a manner that is consistent with the goals of the Initiative;" and "the points of contact are funding proposals under this title that are selected on the basis of merit, as determined by an independent panel of scientific and technical peers."

During Committee meetings held over the course of the year, the Departments provided the Committee with updates on the status of the Initiative's joint solicitation process. Following the announcement of the FY 2005 joint solicitation awards, the Committee was provided with a written overview of the joint solicitation process, as well as a summary of the awards made and distribution of funds. Those results are provided in Section III-C of this annual report.

The following are summarized comments and recommendations made by the Committee for 2005, related to the joint solicitation process and the awards made. The Committee recommendations to the Secretaries of Agriculture and Energy for 2005 are categorized into the following areas:

I. **High-Priority Recommendations to the Secretaries of Agriculture and Energy**
J. **Recommended Changes to the Fiscal Year 2005 Joint Solicitation Process**
K. **Recommendations to the Secretaries of Agriculture and Energy on the Departments' R&D portfolios in Relation to the Committee's *Vision* and *Roadmap***
L. **Overall Recommendations to the Secretaries of Agriculture and Energy in 2005**

The responses of the Departments have been added in *italics* after each recommendation. No changes have been made to the actual content of the Committee's recommendations by adopting this report structure.

In addition to the Committee's recommendations, a minority report was disseminated to all Committee members. This report was neither discussed nor voted on by the Committee; however, it is included in Appendix 3 of this annual report.

A. High-Priority Recommendations to the Secretaries of Agriculture and Energy

1. Increase funding to encourage the achievement of *Vision* and *Roadmap* goals as outlined in future revised versions of the documents. The agencies are asked to detail consequences of under-funded research.

   The reduction in funding for the joint solicitations were caused by a mandatory funding decrease in section 9008 of Title IX of the Food Security and Rural Investment Act and a reduction in discretionary DOE Biomass Program funds due to congressionally directed projects. Funding for the Biomass Research and Development Initiative under the Departments' joint solicitation has decreased annually since its establishment by the Biomass Act. It is noted that funding for this initiative comes from two Appropriations Committees and that the Biomass Act is an authorization of funding for USDA only. Any DOE funding comes from discretionary funds out of Energy and Water Development Appropriations. The Committee requests that Congress note that these congressionally-directed funds are inhibiting the potential of the Initiative's joint solicitation, which aims to achieve the bioenergy goals set in the Committee's *Vision* and *Roadmap* documents.

   Response: ***DOE is making efforts to better communicate to Congress the technical strategy of the Biomass Program, and the benefits that strategy could have on energy security, if funding for congressionally-directed activities were used in alignment with Biomass Program R&D strategies.***

2. **Expedite the approval process for future Committee membership packages. The Committee has lost the benefit of having the 2004 members' participation.**

   The delays in the DOE membership approval process withheld membership from a significant portion of the Committee during 2005. The members recommend expedited approval in the future, as uncertainty in this area has a serious and irreparable negative impact on the Committee's focus and efficacy.

   Response: ***The Departments regret the delays in the 2004 nomination process. The DFO has made a concerted effort to expedite the Committee membership package for 2005. Specifically, the DFO has already submitted nominations for new membership. This timeframe is ahead of the 2004 schedule, promising to achieve a faster, more streamlined nomination process.***

3. Channel R&D to address issues or new opportunities for increasing the market utility of biofuels.

   In order to ensure a smooth transition from petroleum-based fuels to biofuels, more research needs to be funded that is focused on practical applications in the marketplace, such as the use of existing infrastructure for the distribution and storage of biofuels, the use of biodiesel in cold climates, and ethanol permeation.

Response: ***The DOE Biomass Program in FY 2007 is requesting additional funding to better address the new opportunities for the utility of biofuels. The effort hopes to achieve increased funding for biomass to fuels conversion technologies and deployment of these technologies in the private sector. Through the Clean Cities Program, DOE intends to award $1.5 million for E-85 refueling infrastructure in FY 2006 to encourage the adoption of biofuels into the marketplace. USDA has ongoing biofuels conversion and marketing research and support programs.***

4. Have a subcommittee interact with the congressional appropriations committee with the goal of having funding realigned with the *Vision* and *Roadmap* goals.

The revised *Vision* and *Roadmap* documents will be used as a valuable tool to evaluate R&D effectiveness in the future. The Committee is organizing subcommittees in the areas of policy and analysis, and will focus its message outwards to policymakers, fully highlighting any discrepancies with peer-approved guidelines in the *Vision* and *Roadmap* documents.

Response: ***The Departments encourage the Committee to pursue further development of its policy and analysis subcommittees.***

B. Recommended Changes to the Fiscal Year 2005 Joint Solicitation Process

7. Reduce minimum award amount to $150,000 for individual projects, allowing a greater number of awards in a wider range of topics. Where appropriate, projects should be incrementally funded thereafter.

Project performance should be evaluated at regular intervals over the course of each project, and the results should be used to help determine decisions on continued funding. The Committee would like the Secretaries to examine current funding practices, and where possible, move toward a higher number of awards, with funds distributed over the course of the project.

Response: ***The Departments do evaluate the progress of technical research throughout the year in the form of quarterly reports, stage gate reviews, peer reviews, and other mechanisms. The Departments will review the Committee's recommendation to reduce the minimum award amount.***

8. Announce the joint solicitation results earlier.

Delay in announcing the official joint solicitation awards can make information leaks possible and frustrate awardees with funding uncertainties. The Departments are urged to

facilitate efficiency in the award approval process. Board affirmation meetings held prior to the official announcement should be scheduled farther in advance to avoid these delays.

*Response**: Each year the Departments have made progress in accelerating the release of the joint solicitation and technical review of results. The Departments will make every effort to expedite public release of awards once decisions have been finalized; however, the Departments will continue to ensure that no awardees are announced until official selections have been completed.***

9. Increase compensation for reviewers from industry and academia that are involved in the joint solicitation technical merit review.

The Committee is concerned that reviewers primarily consist of Federal employees (USDA and DOE).

*Response**: The FY 2005 joint solicitation preproposal review was held in February 2006. It involved reviewers from industry, academia, and government. In the scientific community, voluntary peer review by technical experts who are not compensated is a common practice. The Department does not plan to compensate reviewers beyond their travel reimbursement.***

C. Recommendations to the Secretaries of Agriculture and Energy on the Departments' R&D Portfolios in Relation to the Committee's *Vision* and *Roadmap*

1. Require bidders to demonstrate commercial viability of the proposed technology as part of their funding request.

While the current joint solicitation process requires complete life cycle documentation in submitted proposals, the Committee encourages the establishment of evaluation metrics for each funded project along each step of its duration. The Committee's joint solicitation project matrix, resulting from a previous recommendation, aligns current R&D investments with *Roadmap* objectives. Assessing the likelihood of proposal success will be easier with an early explanation of each project's practical timeline to commercialization.

*Response: **The Departments will review this recommendation when planning for future solicitations. All DOE Biomass Program projects, including those funded through the joint solicitation, are reviewed annually via the stage gate process. The stage gate process reviews projects at five different steps in the project life cycle, from preliminary investigation to commercial launch. USDA has awarded a contract to the University of Nebraska for the FY 2002, 2003 and 2004 awards to perform peer reviews of the funded***

projects. The results of these peer reviews will be used to determine any necessary changes that might be needed for future solicitations.

2. Fund further research on the co-products of biofuel production.

   In order to improve the economics of biofuels manufacturing and enhance value, co-product research is necessary. In grain-based biofuel production, these co-products include high-protein distiller's dry grains (DDG) and petroleum-replacing biochemicals.

   Response: *The main focus of DOE research for 2005 has been the biorefinery concept in which a facility produces both biofuels and high-value co-products. In addition, bioproducts are one of the major platforms of the DOE biomass research portfolio, and co-product research and commercialization is important to the USDA.*

3. Fund further research on incentive programs and other methods to stimulate biobased products growth.

   The Committee believes that a huge market opportunity exists for biobased products, separate from biofuels, but that funding and incentives to support this potential market are lacking. The Committee finds that the definition of biobased products included in the Federal Government's procurement program is too narrow and advocates further incentives to spur the market for biobased products, including the co-products of biofuels production.

   Response: ***The Federal Biobased Product Preference Procurement Program has an important impact on the demand for biobased products in the United States. The Departments will review the new policy recommendations from the Committee.***

4. Recognize and communicate to other Federal agencies the importance of basic sciences for the success of biomass research.

   Upon review of the Departments' R&D portfolios, the Committee recognizes the need for basic science R&D. This basic science is needed in order to tackle some major technical barriers related to biomass fuels, power, and products. These needs should be communicated not only to the Departments, but to other Federal agencies, such as the Department of the Interior, the Environmental Protection Agency, the Office of Science and Technology Policy, the National Science Foundation, the Office of the Environmental Executive, and the Department of Transportation. The Committee recommends that these Federal agencies coordinate basic science activities aimed at addressing our need for biomass fuels, power, and products.

   Response: ***The DOE Biomass Program, the DOE Office of Science, and USDA will define the requirements for collaboration on biomass research.***

5. Continue funding for the thermochemical R&D platform.

Support for this area has fluctuated since the Committee's inception, and members strongly advocate its continued work, incorporating full use of all available biomass resources in future energy production.

Response: ***Funding for the thermochemical platform for FY 2005 was more than $18 million. The DOE Biomass Program requested $15 million for the thermochemical platform in FY 2006. However, in FY 2006 $10.5 million is available for this platform and includes approximately $6 million for congressionally-directed projects. Funding for thermochemical research has decreased from the request, due to the need to accommodate funding for congressionally-directed activities not related to the thermochemical platform.***

D. Overall Recommendations to the Secretaries of Agriculture and Energy in 2005

9. Facilitate a renewed emphasis on public education and awareness, and help to educate policy makers, their staff, and the public, including increased focus on education within universities.

The Committee feels that there is a need for a paradigm shift at the high school and university levels on how organic chemistry and related engineering disciplines are taught to rely on petroleum-based feedstocks for various chemicals. The Committee commends prior hybrid science programs at select universities, which have pulled separate departments and disciplines together to encourage research and student opportunities in the bioenergy field. The Committee advises an increase in public education in the Northeast and California, where public awareness of the increased use of biofuels is low. A better informed public will help shape future policy. Policy can also focus on creating more support for biomass-related disciplines throughout the educational system. This could be done via more university grants to support graduate students in these research disciplines or a change in curriculum to include biomass as a feedstock in chemical manufacturing, which will increase focus on the technical challenges and potential research areas for Ph.D. or graduate research. These changes could assist in communicating a thorough commitment to biomass technology that will influence future policy.

Departmental Response: ***The Departments have plans to better communicate to the public the costs and benefits of biomass technologies, via websites, conference exhibits, and other activities. The Departments also conduct competitively solicited research at universities, which in turn exposes graduate students to the field. Additionally, DOE's EERE office supports a crosscutting Technology Advancement and Outreach activity that disseminates information about energy efficiency and renewable energy technologies and products, including biomass.***

10. Increase the number of university faculty directly involved in federally funded biomass research.

Federal grants from the National Science Foundation, the National Institutes of Health, and other agencies do not target biomass work specifically. Moreover, Federal agencies that fund biomass research do not adequately communicate with one another. Opportunities for biomass research have a very low award rate. Consequently, current students lack learning opportunities in the biomass field. These factors combine to hinder fulfillment of the actual personnel needs of the biomass industry. The Committee recommends providing funding for top-down education of academia about the technological opportunities available in biomass, endorses the enhanced biomass professional community this will create, and advocates cooperation with industry to publicize education in biomass technology.

Response: ***The Departments cannot directly influence university decisions to increase staff. The Departments will continue to develop research strategies to advance biomass technologies as they support national goals.***

11. **Simplify the statutory language in section 9002 of the Farm Security and Rural Investment Act of 2002 (Farm Bill). Specifically, the Committee requests a broader, more inclusive (all bio-organic matter) definition of biobased products, concurrent with that of the *Vision* statement, be allowed.**

    The Committee elucidated this position in a memorandum during 2005. Drafted by Committee member David Morris of the Institute for Local Self-Reliance, the memorandum was affirmed and sent to Secretary Bodman on behalf of the Committee.

    USDA rulemaking defines products according to the level of biobased content, with a mature markets definition that excludes natural fibers, among other materials, from their Federal Biobased Product Preference Procurement Program. The Committee does not intend to alter the definition of bioproducts given in its *Vision* statement to exclude natural materials and fibers. Instead, the *Vision* definition focuses on tracking of petroleum-replacing biobased products for goal-setting, and will include natural material data in reporting when available. This definition is recommended for standard use when it is final.

    Response: ***USDA has considered the Committee recommendations regarding broadening the definition of biobased products to allow a wider definition of products for biobased designation under the Federal Biobased Products Preferred Procurement Program. USDA has also reviewed section 9002 of the Farm Security and Rural Investment Act (FSRIA) of 2002, and the conference report language on the Act in which Congress emphasized its intent that the focus of the Preferred Procurement Program be on new products and new markets.***

    In light of the clear intent of the Congress regarding section 9002 of FSRIA, USDA has decided to maintain the focus of the Preferred Procurement Program on new products and new markets. To broaden the definition of bioproducts in the way requested by the Committee would effectively invalidate the Preferred Procurement Program as a tool to

support development of new products and new markets, since Federal agencies would then be able to choose to procure mature biobased products in mature markets, instead of the new products and new markets that Congress clearly intended to emphasize.

USDA does, however, appreciate the Committee's desire to give recognition to mature biobased products in mature markets. Therefore, it will propose in forthcoming regulation implementing the voluntary labeling program provided for in section 9002 to make available the use of the "U.S.D.A. Certified Biobased Product" label and logo to all biobased products meeting labeling program qualifications, without regard to whether the product is a mature or new product or if the generic grouping of products under which it would fall has been designated for preferred procurement. This action will substantially broaden the application of the voluntary labeling program to mature products in mature markets, as well as to new products in new markets.

Appendix 3: Biomass Research and Development Technical Advisory Committee Minority Report

The minority report was disseminated to all Committee members, but was neither discussed nor voted on by the Biomass Research and Development Technical Advisory Committee.

Biomass Research and Development Technical Advisory Committee

Minority Report

Submitted by

Committee Member David Morris

March 7, 2006

This Minority Report takes issue with several recommendations submitted by the Biomass Research and Development Technical Advisory Committee (hereafter called Committee) to the Secretaries of Energy and Agriculture and, through them, to the U.S. Congress.

The Minority's recommendations are presented at the end of each section.

1. Should Increased Biomass R&D Funding Be Channeled Through DOE?

The Majority recommends as a "High-priority":

> ***"Increase funding to encourage achievement of Vision and Roadmap goals.... The agencies are asked to detail consequences of under-funded research."***

Among its obligations, the Committee is charged by Congress to evaluate the federal biomass R&D program. Recommending increased funding is appropriate if the Committee had performed such an evaluation. It has not. This is due in part to a lack of initiative on the part of the Committee itself, and in part to the Energy and Agriculture Departments' policies that deny the Committee access to any information not already available to the general public.

Without access to internal evaluations or progress reports, a Committee evaluation would have to rely on available external evaluations and its members' personal knowledge. Sufficient negative assessments of DOE's biomass work exist that, without undertaking its own evaluation, the Committee is not justified in recommending increased funding to DOE as the best way to achieve expanded use of biofuels and bioproducts.

•In 2001, DOE's own Inspector General criticized the Department's handling of its only two cellulosic ethanol commercialization projects.[1]

•In 2003, the same Office criticized the Department's management of its most important biomass gasification commercialization project.[2]

•The Office of Management and Budget's 2005 Biomass and Biorefinery Systems Assessment contains a number of critical assessments in a question and answer format.[3]

> Q. *"(I)s the program design effectively targeted so that resources will address the program's purpose directly and will reach intended beneficiaries?"*
> *A. "NO."*
>
> *Q. "(D)oes the program assess and compare the potential benefits of efforts within the program and…to other efforts in other programs that have similar goals?"*
> *A. "NO."*
>
> *Q. "Are funds (federal and partners') obligated in a timely manner and spent for the intended purpose?"*
> *A. "NO."*
>
> *Q. "Has the program demonstrated adequate progress in achieving its long-term performance goals?"*
> *A. "SMALL EXTENT."*
>
> *Q. "Does the program(including program partners) achieve its annual performance goals?"*
> *A. "SMALL EXTENT."*

The first generation of significantly sized cellulosic biofuel(diesel or ethanol) plants planned or under construction is occurring almost entirely outside the United States(e.g. Canada, Spain, Brazil, Sweden), with little or no U.S. R&D funding. Near term facilities proposed in the United States (e.g. Changing World Technologies, BCI, Pearson Technologies) have been funded largely by earmarks, a practice condemned by the Majority report, not as a result of DOE solicitations.

Four years after USDA's and DOE's first joint solicitation, to our knowledge, only one technological improvement funded through that effort has been commercialized. That contract was negotiated with a small business. However, the vast majority of DOE contract funding is awarded to large corporations. No DOE study has examined the effectiveness of its practice of preferring large corporations as its primary R&D and commercialization vehicle, at least none has been made public.

---

[1] Financial Assistance for Biomass-to-Ethanol Projects. Department of Energy. Office of Inspector General. Office of Audit Services DOE/IG-0513. July 2001.

[2] McNeil Biomass Project. Department of Energy. Office of Inspector General. Office of Audit Services. DOE/IG-0630. December 2003.

[3] www.whitehouse.gov/expectmore/detail.10003400.2005

One could argue that increased funding almost always increases impact. That may be true, but it raises another issue the Majority report does not address. Should increased funding be channeled through the DOE? Or could biofuels and bioproducts be commercialized more effectively by other federal agencies, a new project-oriented agency, a consortium of non-profits, or a consortium of private companies?

Minority Report Recommendation #1: Congress should direct an independent entity to evaluate the effectiveness of DOE and USDA programs in commercializing biofuels and bioproducts. Part of that evaluation should examine what the state of the technology and markets would have been if there had been no DOE biomass program. Another part of the evaluation should examine the effectiveness of federal agencies biomass R&D efforts compared with other public and quasi-public (e.g. soybean checkoff R&D) efforts.

2. Is DOE's research pertinent to and useful to policy makers?

DOE, as the nation's sole energy agency, has the obligation not only to direct R&D but also to educate the general public about energy issues and to provide relevant and timely information to those trying to design effective national, state and local energy policies.

Recent DOE actions raise questions about how DOE views its educational role, especially with respect to policy making.

In early 2004, the Energy Department suddenly doubled its previous estimate of the cost of making ethanol from cellulose (to $2.75 from $1.40 a gallon). No documentation was offered to explain the dramatic change.

In May 2004, David Garman, then Acting Undersecretary of Energy, testified before the Senate Agriculture Committee. During his testimony he was asked to explain the Department's revision. After a several month delay, DOE offered its explanation. That explanation is posted in a question and answer format on the Policy Questions section of DOE's Energy Efficiency and Renewable Energy web site.

> Q. "You mention that the current cost for ethanol from biomass is twice the cost of ethanol made from corn grain. This cost is much higher than previous estimates published by DOE, and it implies that it is not ready for commercialization."[4]

DOE answers its own question by noting that the previous estimate was based on the lowest cost feedstock(wood waste at $25 per ton) and the lowest cost technology(acid hydrolysis). The new

[4] Policy Questions. Energy Efficiency and Renewable Energy. Department of Energy. http://www1.eere.energy.gov/biomass/policy_questions.html

estimate was based on a much higher feedstock cost (corn stover at $53 per ton), and a much more expensive production technology (enzymatic).

This does explain the discrepancy. But it should have led the Majority report to note the disconnect between DOE research and policymaking.

Congress and the President want to achieve the most rapid commercialisation of ethanol (and other biofuels) from cellulose. However, they also want to develop a policy that achieves that goal at the lowest possible public cost. If Congress is going to offer incentives, for example, it needs a knowledgeable estimate regarding the level of incentive required, and that in turn requires it to be made aware of the actual cost of ethanol from the first cellulose to ethanol facilities. Estimates of the potential cost of second and third generation plants are not pertinent to the elaboration of policies designed to have a short-term impact.

In this regard, it is remarkable that DOE is unwilling to make public its estimates of the cost of cellulosic ethanol from the first commercial plants. Indeed, on its web site, DOE maintains, "It is not appropriate for the National Bioenergy Center or DOE to speculate on the cost of acid processes that are the subject of current commercial and financial negotiations. Suffice it to say that, given the much greater state of development for these acid technologies, we would expect their costs to be lower."

At this time, DOE is willing to offer policy makers and the nation estimates of the long-term costs of cellulosic ethanol but not the short costs of cellulosic ethanol.

Minority Recommendation #2**. The Department of Energy should immediately make public its estimates of the costs of making cellulosic ethanol from the lowest cost feedstock and the lowest cost production technology. The report should include a complete and well-documented breakdown of the cost components. The report should be available to Congress in time for use in developing policy initiatives in 2006.**

3. Are USDA and DOE adequately fulfilling their obligations as lead agencies in expanding the use of bioproducts?

In its November 2003 report the full Committee sent this recommendation to the Secretaries of Energy and Agriculture.

> "The Biomass Technical R&D Advisory Committee formally recommends that the Secretaries of Energy and Agriculture immediately establish an aggressive purchasing program for biobased products. The Secretaries should establish a departmental-wide goal in which biobased products, defined as products that contain over 90 percent plant or animal matter by weight, account for a minimum of 30 percent of all purchases in each product category for which biobased products are available, exhibit equal or superior performance characteristics and have a total product cost--including the cost of disposal and handling--no more

than 10 percent higher than their conventional counterparts. This goal should be achieved by January of 2006.

By January of 2004, the Secretaries of Energy and Agriculture shall report back to the Committee on progress achieved to date and the procurement strategy that has been put in place to achieve the two-year goal.

Separately, the Secretaries should recommend to other parts of the federal government and to state and local government that they should have a similar program. A report to the Advisory Committee shall be made by June 2004 as to progress with expanding biomass purchasing beyond USDA and DOE."

The Committee felt that, as the lead agencies in implementing the Congressionally-directed biomass initiative, the Energy and Agricultural Departments should become models of bioproduct and biofuels procurement. The Committee recommended the Departments not await the completion of the formal rulemaking for bioproducts procurement since that would take several years. The Departments should immediately and aggressively increase their purchase of bioproducts and develop a mechanism for monitoring compliance with that directive.

In the 2.5 years since the submission of the recommendation by the full Committee, neither DOE nor USDA has submitted to the Committee a report that demonstrates its embrace of that recommendation. There has been no report on the departments' level of procurement, any new directives regarding bioproducts procurement, nor any advances that have occurred in bioproducts procurement in other agencies.

Minority Recommendation #3. Congress should direct USDA and DOE to comply with the recommendation submitted to the departments regarding bioproducts procurement by the Committee in November 2003.

4. Must the Farm Bill provisions be changed to allow USDA to treat natural fibers the same as biobased fibers in its bioproducts procurement regulations?

In 2005, the USDA issued draft regulations to implement the Congressional directive to expand bioproducts procurement by federal agencies. The draft regulations formally distinguished between natural fibers and biobased fibers. In other words, for the first time there would be a formal federal preference for a synthetic fiber derived from plants over a natural fiber derived from plants. This Committee found this contrary to the spirit of the legislation and, if finalized, was concerned it could generate a backlash from parts of the agricultural community (e.g. cotton, wool, and other natural fibers) to the bioproducts procurement effort.

In November the Committee sent a letter to that effect to the Secretaries of Energy and Agriculture. To date there has been no response.

The Majority report repeats the views contained in its November 2005 letter, that there should be no preference of synthetic fibers made from plants over natural fibers. But its recommendation

implies that the ball is in the Congressional court, that only by changing the legislative language can the outcome of the rulemaking be changed.

> "The Committee recommends Congress simplify the statutory language in section 9001 of the 2002 Farm Bill. Specifically, the Committee requests a broader, more inclusive (all bio-organic matter) definition of biobased products, concurrent with that of its Vision statement."

The Majority report suggests that Congress has directed the USDA to distinguish between natural and biobased fibers. To the Minority's reading, the existing law does not contain such a directive, either explicit or implicit.

> "***SEC. 9001. Defines a biobased product as a product "****determined by the Secretary to be a commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials."*

Minority Recommendation #4. The USDA's decision in its draft regulations to distinguish between natural fibers and biobased fibers is not directed by Congress. Its final rulemaking should make no such distinction.

FY 2006 Annual Recommendations from the Biomass R&D Technical Advisory Committee to the Secretaries of Agriculture and Energy

Section 309(b)(1)(D) of the Biomass R&D Act of 2000 (Biomass Act) requires that biomass R&D funds be distributed in a manner that takes into account annual recommendations made by the Committee.

Full lists of specific annual recommendations, with responses from USDA and DOE regarding their action plans, can be found in Section IV of each annual report to Congress on the Biomass Initaitive since 2002. These are posted publicly on the Committee website: http://www.biomass.govtools.us/publications.asp .

Sections 306(c)(2) and 309(b)(1)(D) of the Biomass Act require the Committee to provide annual recommendations on biomass R&D efforts to the Secretaries of Agriculture and Energy. These recommendations assess the general status of cooperation and R&D efforts at both agencies with respect to biobased fuels and products, in compliance with Biomass Act section 309(b)(2).

Recommendations are submitted in the following categories, according to section 306(c)(2) of the Biomass Act:

A. Recommendations regarding the distribution and use of Initiative funds
B. Recommendations on the solicitation and proposal review process
C. Overall recommendations to the Secretaries

The following are the recommendations approved August 10, 2006, during the last public quarterly Committee meeting of the fiscal year.

A. Recommendations Regarding the Distribution and Use of Biomass Initiative Funds

1. In order to fully support the vision of the integrated biorefinery, the thermochemical platform should receive continued funding, and those thermochemical technologies should become an integral part of the Biofuels Initiative.

2. The Biomass Program and the Fossil Energy Program at DOE should report to the Committee on how their efforts in the areas of thermochemical conversion and in carbon capture and storage are interacting with each other, what synergies and benefits they see in expanding the coordination and collaboration from current levels, and what future coordination and collaboration are being planned.

3. R&D should be pursued to develop liquid transportation fuels from biomass, in addition to ethanol and biodiesel.

4. Fund R&D to develop technologies capable of processing multiple and mixed feedstocks into biofuels and bioproducts (to the extent possible).

5. Research should endeavor to provide technologies of scale that can be practiced on a local basis in dispersed geographies utilizing readily available feedstocks. Such technologies will help to reduce the concentration of plant emissions in an area, reduce the transportation requirements for inbound feedstocks and outbound finished products and provide the economic benefits of resulting jobs to more locations.

6. To reach the billion-ton feedstock goal, support R&D capable of handling and converting a wide variety of feedstocks. This should include research directed at overcoming logistical hurdles and addressing issues of harvesting, handling, densifying, transporting, preparing, and storing feedstocks headed for the biorefinery.

B. Recommendations on the Solicitation and Proposal Review Process

1. The 2007 USDA – DOE joint solicitation should be issued in a timely manner, by October 1, 2006.

2. Budgeted funding for the Initiative should be subject to fewer Congressionally-directed projects, and provide a greater proportion of discretionary amounts to pursue projects that are measured by documented milestones and which reflect the Committee's *Vision* and *Roadmap*. For example, a separate targeted program and/or solicitation should be developed in consultation with appropriate Congressional staff, focusing on drawing in state research and demonstration funding in a true partnership fashion. Around the nation, governors and legislators are making decisions about increasing funding for biofuels and bioproducts research, demonstration, and infrastructure efforts. States are providing not only funding but tax incentives, education, and outreach to the public. Leveraging these public interest funds and efforts in a manner that recognizes the important role of the states would greatly expand available resources for sector biofuels and bioproducts development efforts. Moreover, properly structured and communicated, it would greatly aid efforts in reducing the overall proportion of congressionally directed funding.

3. Support ongoing review and analysis of awards made to determine the impact of funded programs.

C. Overall Recommendations to the Secretaries

1. Opportunities for workforce development in biomass-related disciplines should be pursued.

2. Outreach to the general public should be expanded to better communicate the benefits of biomass technologies.

3. Fuel tax abatement has been extremely successful in promoting biofuels. Similar incentives should be developed to promote biobased products. An evaluation should be conducted to identify policy initiatives that will support the growth of biobased products.

4. That Congress provides full funding for the integrated biorefinery solicitation under section 932 of the Energy Policy Act of 2005 - FOA # DE-PS36-06GO96016.

5. The Committee encourages the agencies of the Interagency Biomass R&D Board to provide solicitations that support biomass R&D so that a greater number of university faculty members are directly involved in biomass R&D projects. This will advance the influence of the biomass community, facilitate the increase of the biomass workforce, and will encourage cooperation with industry and federal scientists.

6. Increased support should be given for international peer exchange among policy makers and researchers on biofuels and biobased products issues. Supporting a global market for biofuels and biobased products would greatly advance U.S. efforts by facilitating the exchange of complementary cross-border policies, development of joint research projects, and increased understanding of the potential of biofuels and biobased products.

7. Study and test the existing infrastructure to identify methods in which it can be modified or improved to transport and distribute biobased fuels, products and energy.