

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

The Biomass R&D Act of 2000 charges the Biomass R&D Technical Advisory 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 Biomass R&D 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 R&D Act of 2000.

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 Biomass R&D Technical Advisory 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, Departmental 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 Request for Proposals (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. *The Department of Energy 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.

***Departmental Response to TAC 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.

***Departmental 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 to work 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 the USDA and DOE Biomass-related R&D Portfolio**

In February of 2003, the Agencies that comprise the Biomass R&D 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 the DOE and the 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 R&D Act of 2000 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.

### ***Departmental Response to TAC 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**

- a. 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.
- b. The overall level of funding for bioconversion is inadequate.
- c. Increased effort is needed on the part of both DOE and USDA to coordinate research as it relates to bioconversion.
- d. 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.
- e. 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.
- f. 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.
- g. 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.

### ***Departmental Response to TAC Recommendations on Processing and Conversion***

- a. *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 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.

***Departmental Response to TAC Recommendations on Product Uses and Distribution:***

- a. *The Department of Agriculture (USDA) is working to implement section 9002 of Title IX of the Farm Security and Rural Investment Act of 2002 (FISRA). Implementation of this program meets the Biomass Technical Research and Development Advisory 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 Biomass Technical R&D Advisory 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 R & D Act of 2000. 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 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 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 Agricultural Research Service 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 & Neutraceuticals
- 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.

***Departmental Response to TAC 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 should request \$49 million in funding for the joint solicitation as authorized in the Biomass R&D Act of 2000 as well as the additional \$14 million in R&D funding available from the Commodity Credit Corporation under §9008 of the 2002 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 other Federal and state R&D to make informed investment recommendations (i.e. not duplicate work being performed elsewhere).

***Departmental responses provided in Sections IV.1 through IV.4 address crosscutting recommendations made by the Committee.***