DOE/GO/10025--T1

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION
ASSESSING THE POTENTIAL OF BIOENERGY

Final Report for the Period
October 1, 1997 - September 30, 1998

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PREPARED FOR THE UNITED STATES
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EXECUTIVE SUMMARY

As electricity restructuring proceeds, traditional concepts of how energy is produced, transported, and utilized are likely to change dramatically. Marketplace, policy, and regulatory changes will shape both the domestic and global energy industry, improving opportunities for clean, low-cost energy, competitively priced fuels, and environmentally responsible power systems. Many of these benefits may be obtained by commercial deployment of advanced biomass power conversion technologies.

The United BioEnergy Commercialization Association represents the U.S. biomass power industry. Its membership includes investor-owned and public utilities, independent power producers, state and regional bioenergy, equipment manufacturers, and biomass energy developers. To carry out its mission, UBECA has been carrying out the following activities:

- production of informational and educational materials on biomass energy and distribution of such materials at public forums;
- technical and market analyses of biomass energy fuels, conversion technologies, and market issues;
- monitoring of issues affecting the biomass energy community;
- facilitating cooperation among members to leverage the funds available for biomass commercialization activities.

DELIVERABLES

The monthly reports filed for this grant are included in the Appendix. The deliverables specified for this grant (DE-FG36-94GO10025, Grant Agreement A006), entitled *United BioEnergy Commercialization Association (UBECA) Assessing the Potential of Bioenergy*, have been sent to the Report Control Center under separate cover, and include the following items:

Deliverable No.1

- UBECA Biomass Fact Sheet
- UBECA Membership Information
- Copy of Poster Display for BioEnergy '98 Conference
- Draft Biomass Cofiring Brochure (being produced in conjunction with NREL)
- Hardcopies of pages from the UBECA Web Site
- UBECA Industry Statement

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Deliverable No. 2

- Proceedings of Workshops, including Presentations
- Information from the UBECA Annual Meeting (Agenda, Registration List, Presentations)

Deliverable No. 3

- Collected Market and Technical Studies (Domestic and International) – Reprints Removed

Deliverable No. 4

- Biomass Energy Project Investment Network – privacy information – Removed

Deliverable No. 5

- Biomass Energy Near-Term Opportunities

MEETINGS AND CONFERENCES

UBECA has been engaged in an active program of industrial outreach with a focus on information dissemination and technology transfer. In this regard, the members and staff of the Association have participated in a number of meetings designed to bring together experts from government and industry. These meetings have served as the main forum for the exchange of ideas concerning the future of biomass power and have been characterized by strategic planning sessions, technical presentations, and discussions of policy issues. UBECA has played a leading role in attracting speakers to some of these meetings and has made presentations at others. Among the meetings which UBECA has participated in are the following:

- Joint Annual Meeting with the National BioEnergy Industries Association
- Biomass Co-firing Workshops (DOE-sponsored)
- Biomass Interest Group meetings (EPRI-sponsored)
- BioEnergy '98
- Meetings of the BioEnergy Research Association (BERA)

CONCLUSIONS

Biomass power has developed into a diverse industry. Some 350 biomass power plants with a combined rated capacity of 7000 MW feed electricity into the nation's power grid, while an additional 650 enterprises generate electricity with biomass for their own use as cogenerators. Estimates of the ultimate potential for biomass energy vary and depend on agricultural forecasts, waste reduction by industry, and paper recycling. The Electric Power Research Institute puts the estimate as high as 8% of the nation's electricity by the year 2010. In addition, it is estimated that 10% of the country's transportation fuels will be supplied by biomass by 2010, and as much as 50% by 2030. While the proposed Comprehensive Electricity Competition Act and other energy bills are tied up in congressional committees, most industry watchers agree that when legislation is passed, it will include a provision mandating the sale of green power. When that happens, it will give biomass developers a boost.

UBECA envisions the overall biomass power market expanding in response to a number of domestic and international events:

- Electric utility restructuring - The need to diversify and differentiate products in anticipation of greater competition will cause utilities to consider biomass= uniqueness as an energy product. When customers are given the opportunity to choose their electric power provider, corporate goals and differentiated services will have a great impact at the retail and wholesale levels. Also, a portfolio standard or wires charge, if implemented, is anticipated to support continued development of renewable energy resources, including biomass power as an attractive option.

- Global climate change - Stricter international agreements for the mitigation of greenhouse gas emissions are expected to be developed in the wake of the Kyoto Climate Change Summit. If new agreements are implemented, bioenergy will be one of the most feasible near-term options to meet ever-tightening air quality standards and may produce tradeable emissions credits.

- Burgeoning electricity requirements of developing countries - Three factors will affect the biomass market in developing nations: (1) Price--for many countries biomass is a cheap alternative to fossil fuel power options; (2) Familiarity--biomass will be favored for its familiarity in use as a traditional fuel; and, (3) International pressure--if the use of fossil fuel power expands to accommodate expected population growth, the demand for global climate change compliance will intensify.

- Government endorsement - DOE, USDA, and the White House Office of Science and Technology Policy all recognize the synergistic benefits of bioenergy and predict that it will receive greater government attention in the coming years. As pressure to meet new air quality standards builds, it is likely that the development of biomass initiatives will accelerate.

- Community service appeal - In their role as providers of electric power, utilities have traditionally maintained a sense of obligation to their service region. Despite changes in the industry, this sense of obligation will not disappear. Even in a competitive era, utilities can have a great impact on rural economic development. Biomass power can benefit the local economy by providing incentives for farmers, improving air quality, creating jobs, and utilizing local resources.

The biomass industry is fragmented, focusing on an array of technologies that strive to produce a host of energy products. There is a need for greater integration in the industry due to the range of potential benefits for power generation, production of transportation fuels, and the development of new coproducts. UBECA will continue to work to realize the vision of an integrated biomass industry which is market driven and industry led.

APPENDIX
Monthly Reports

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN MARCH 1998

Activities Completed in March

- Completed first draft of recruitment brochure.
- Attended March 4th hearing of the House Commerce Subcommittee on Energy and Power concerning the Kyoto Conference. Obtained testimony of Stuart Eizenstat, Under Secretary of State, and distributed to the membership.
- Attended March 10th hearing of the Senate Appropriations Subcommittee on Energy and Water Development. Obtained testimony of Dan Reicher and Martha Krebs and distributed key points to the membership.
- Published and distributed weekly newsletter on global climate change and electricity restructuring.
- Submitted abstract for possible poster session to Bioenergy '98 (Madison, Wisconsin).
- Received notification that UBECA grant application ($100K) had been approved by the DOE Golden Field Office.
- Submitted draft Statement of Work to the DOE Fossil Energy Office/Federal Energy Technology Center (FETC). Statement of Work is currently in review, $100K has been set aside.
- Contacted organizations to enhance UBECA's communication network and improve its recruiting potential (see complete list attached).
- Contacted members about the DOE/Sandia National Laboratory Request for Quotations (RFQ) on Small Modular Biomass Power Projects including Burlington Electric Dept., Bioten GP, Westinghouse, Niagara Mohawk.
- Received Request for Pre-Proposals from the United Soybean Board (USB) for projects intended to increase the export of soy-based products to Asian markets. Contacted members (Golden State Import Export) and non-member companies (as appropriate) concerning the USB solicitation, as well as a solicitation by the U.S. Department of Agriculture (USDA) on emerging markets for U.S. agricultural products. Contacted non-member companies manufacturing soy diesel and soy-based hydraulic fluid about possible partnership with UBECA members.

- Contacted two companies involved in the development of Stirling engines to inform them about other relevant RFPs. In accordance with our mission to increase membership, we are using a recruitment strategy which entails notifying candidate companies about relevant solicitations and informing them about potential partnerships with UBECA members.

- Researched other sources of funding, including foundations and philanthropic organizations that might provide support for biomass power projects based on the benefits of such projects to local economic development.

- Invoiced the following members for 1998 dues: Westinghouse Electric

Planned Activities in April 1998

- Complete arrangements for spring Board of Directors meeting.

- Attend seminar on "Carbon Trading: Opportunities and Hurdles in the Post-Kyoto Environment" at the Forum for Environmental Law, Science, Engineering, and Finance in Washington, DC.

- Obtain copies of missing invoices from DOE; contact accounting firm to prepare UBECA taxes.

- Follow up DOE/FE/FETC Statement of Work.

- Complete drafts of new UBECA organizational and recruitment literature.

- Continue contacting potential members.

- Complete draft summary of fall '97 Board meeting.

- Follow up with United Power Associates for possible membership (discussions in progress).

Outstanding Issues:

- TTC closeout still not completed.

- Must finalize arrangements with accounting firm to file UBECA income tax return.

UBECA Contact List - March 1998

- International Lead and Zinc Research Organization (ILZRO) on matters of phytoremediation
- Sustainable Energy Coalition for weekly information exchange
- Business Council for Sustainable Energy
- Biomass Fuel Cell Council (Eric Simpkins)
- Bob Lawrence and Associates
- Coal Utilization Research Council (co-firing)
- Public Technologies, Inc. (PTI) to discuss joint activities geared towards urban and rural communities
- American Forest Products Association
- Institute of Paper Science and Technology
- Weyerhauser Corporation
- Peabody Coal
- United Soybean Board
- U.S. Geological Survey
- United Power Associates

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN APRIL 1998

Activities Completed in April:

- Completed one-page information document.
- Published and distributed weekly newsletter on global climate change and electricity restructuring.
- Provided information concerning states' activities in establishing a renewable standards portfolio
- Contacted organizations to enhance UBECA's communication network and improve its recruiting potential (see complete list attached).
- Attended seminar on "Carbon Trading: Opportunities and Hurdles in the Post-Kyoto Environment" at the Forum for Environmental Law, Science, Engineering, and Finance in Washington, DC.
- Obtained copies of missing invoices from DOE; contacted accounting firm to prepare UBECA taxes.
- Researched other sources of funding, including foundations and philanthropic organizations that might provide support for biomass power projects based on the benefits of such projects to local economic development.
- Attended Clean Coal Technologies Conference in Reno, Nevada.
- Invoiced the following members for 1998 dues: TVA.

Planned Activities in May 1998:

- Complete arrangements for spring Board of Directors meeting.
- Follow up DOE/FE/FETC Statement of Work.
- Complete drafts of new UBECA organizational and recruitment literature.
- Continue contacting potential members.

- Complete final draft summary of fall '97 Board meeting with comments received from Board members.

- Follow up with United Power Associates for possible membership (discussions in progress).

Outstanding Issues:

- TTC closeout still not completed.

- Must finalize arrangements with accounting firm to file UBECA income tax return.

UBECA Contact List - April 1998

- U.S. Department of Energy, Office of Federal Energy Management Programs (FEMP)

- Peabody Holding Company

- Institute of Gas Technology

- Coal Utilization Research Council

- Southern States Energy Board

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN MAY 1998

Activities Completed in May:

- Completed four-page membership information document.
- Attended hearing of the House Committee on International Relations concerning the Kyoto Climate Change Treaty.
- Met with Public Technologies, Inc. (Washington, DC) about possible cooperation and recruitment of municipalities (urban and rural jurisdictions).
- Attended Renewable Energy Expo at the Cannon House Office Building (sponsored by the House Renewable Energy Caucus) in Washington, DC. Distributed UBECA recruitment literature.
- Met with ERC and requested information on the Biomass Fuel Cell Council.
- Changed UBECA Website over to <www.energeticsservices.com/ubeca.htm>

Planned Activities in June 1998:

- Information requests to be sent for membership directory.
- Complete arrangements for Board of Directors meeting.
- Follow up DOE/FE/FETC Statement of Work.
- Complete drafts of new UBECA recruitment literature.
- Continue contacting potential members.
- Complete final draft summary of fall '97 Board meeting with comments received from Board members.
- Follow up with United Power Associates for possible membership (discussions in progress).
- Begin updating the information on the UBECA website.

Outstanding Issues:

- TTC closeout still not completed.
- Must finalize arrangements with accounting firm to file UBECA income tax return.

UBECA Contact List - May 1998

- Public Technologies, Inc.
- Institute of Gas Technology
- TransAlta
- Peabody Holding
- Energy Research Corporation

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN JUNE 1998

Activities Completed in June:

- Attended the DOE-sponsored Biomass Co-firing Workshop at the Edison Electric Institute.
- Hosted the UBECA Board of Directors meeting in Washington, DC.
- Entered UBECA's name on the electronic Bioenergy Mailing List hosted by the Center for Renewable Energy and Sustainable Technologies (CREST) as a means of increasing contacts within the biomass community.
- Registered UBECA.org as a domain name on the World Wide Web. Began updating UBECA web site.
- Attended reception in Washington sponsored by Fibrowatt Ltd., pollution control and energy technologies.
- Discussed membership opportunities with Trigen-Biopower and with PennState University.
- Held discussions with NREL on collaborative effort to publish Co-firing brochure as part of our program of industrial outreach.
- Began collecting information from members for a UBECA membership directory and BioEnergy '98 poster.
- Completed an assessment of the records received from UBECA's former management team; presented our findings to the Board.

Planned Activities in July 1998:

- Begin work on the membership directory and on the co-firing brochure in conjunction with NREL. Activity is underway to propose a more comprehensive communication plan.
- Meet with the White House Office of Science and Technology Policy to discuss initiatives for following up PCAST recommendations and other interagency biomass opportunities.

- Follow up DOE/FE/FETC Statement of Work.
- Complete layout of new UBECA recruitment literature (to parallel the membership directory).
- Continue contacting potential members.
- Begin draft summary of June '98 Board meeting.
- Continue sending weekly electronic newsletter to members (*Climate Change and Utility Restructuring News*)
- Continue updating the information on the new UBECA website.

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN JULY 1998

Activities Completed in July:

- Met with Sam Baldwin of the White House Office of Science and Technology Policy (OSTP) to discuss following up PCAST recommendations and other interagency biomass opportunities.
- Completed paper for Bioenergy '98 poster session with contributions from UBECA members. Began work on poster layout.
- Began updating the new UBECA web site.
- Followed up DOE/FE/FETC contract funding and spoke with Phil Goldberg, FETC. The Statement of Work has been approved and a sole source justification has been submitted. Currently awaiting additional paperwork and DOE transfer of funds.
- Continued discussions with Jim Jones of NREL on collaborative effort to publish co-firing brochure as part of our program of industrial communication and outreach.
- Requested that TTC turn over all outstanding UBECA records to Energetics.

Planned Activities in August 1998:

- Continue working on the membership directory and on the co-firing brochure in conjunction with NREL.
- Make arrangements to attend Bioenergy '98 and to hold a UBECA "planning session" with the members.
- Complete layout of new UBECA recruitment literature (to parallel the membership directory).
- Begin draft summary of June '98 Board meeting.
- Continue sending weekly electronic newsletter to members (*Climate Change and Utility Restructuring News*)
- Continue updating the information on the new UBECA website.
- Begin preparation of the FY '99 Financial Assistance Package to DOE/Golden Field Office along with the next UBECA planning document.
- Contact NBIA about plans for joint annual meeting in Washington.

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN AUGUST 1998

Activities Completed in August:

- Met with Ray Costello to discuss EERE funding situation for FY' 99.
- Completed draft summary of the June Board of Directors meeting and sent it out for review and comment.
- Continued work on BioEnergy '98 poster layout.
- Continued updating the new UBECA web site (www.ubeca.org).
- Followed up DOE/FE/FETC contract funding. Currently awaiting additional paperwork and DOE transfer of funds.
- Began working with Jim Jones of NREL on co-firing brochure as part of our program of industrial communication and outreach.

Planned Activities in September 1998:

- Continue working on the membership directory and on the co-firing brochure in conjunction with NREL.
- Continue working on new UBECA recruitment literature.
- Complete the poster for BioEnergy '98.
- Continue sending weekly electronic newsletter to members (*Climate Change and Utility Restructuring News*)
- Continue updating the information on the new UBECA website.
- Prepare FY'99 UBECA Program Plan.
- Plan for next board Meeting.

UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION

REPORT ON ACTIVITIES PERFORMED IN SEPTEMBER 1998

Activities Completed in September:

- Completed BioEnergy '98 poster.
- Submitted biomass article for publication to *Renewable Energy World* magazine.
- Continued updating the new UBECA web site (www.ubeca.org).
- Followed up DOE/FE/FETC contract funding. DOE transfer of funds to UBECA has been completed for Phase I activities. A second transfer of funds is pending.
- Continued working with Jim Jones of NREL on co-firing brochure as part of our program of industrial communication and outreach.

Planned Activities in October 1998:

- Continue working on the membership directory and on the co-firing brochure in conjunction with NREL.
- Submit deliverables to DOE Golden Field Office.
- Continue working on new UBECA recruitment literature.
- Attend BioEnergy '98 in Madison October 4-8.
- Submit brief article on BioEnergy '98 to *Renewable Energy World* magazine.
- Continue sending weekly electronic newsletter to members (*Climate Change and Utility Restructuring News*)
- Continue updating the information on the new UBECA website.
- Prepare FY'99 UBECA Program Plan.
- Continue follow-up of recruiting activities and other strategic alliances.
- Plan for next Board meeting in early December.

UBECA Produced Brochures

- **Biomass Fact Sheet**
- **UBECA Membership Information**
- **Poster Display for BioEnergy '98**
- **Draft Cofiring Brochure (being produced in conjunction with NREL)**
- **UBECA Web Site**
- **UBECA Industry Statement**

Prepared by

UBECA
United BioEnergy Commercialization Association
Columbia, Maryland

Prepared under contract to the

U.S. Department of Energy
Biomass Power Program

September 1998

United BioEnergy Commercialization Association (UBECA)

Biomass to Electricity:
A Near-Term Solution for Reducing Greenhouse Gases

What Is Biomass?

Biomass is an energy resource derived from the organic waste of natural and human activities. Biomass is obtained from many sources, including timber industry by-products, raw forest material, agricultural crops, household waste, and demolition wood.

Why Should Biomass Fuels Be Considered for Generating Electricity?

Carbon dioxide or CO_2, the primary greenhouse gas, is released whenever fossil fuels are burned. Our reliance on these fuels means that atmospheric levels of CO_2 are increasing at an alarming rate as world living standards rise. Renewable energy technologies that include biomass can help to reduce the level of carbon dioxide and other greenhouse gases in the atmosphere. Biomass is a readily available fuel that can be fired in existing power plants which currently burn coal.

How Can The Use of Biomass Fuels Help Reduce Atmospheric CO_2?

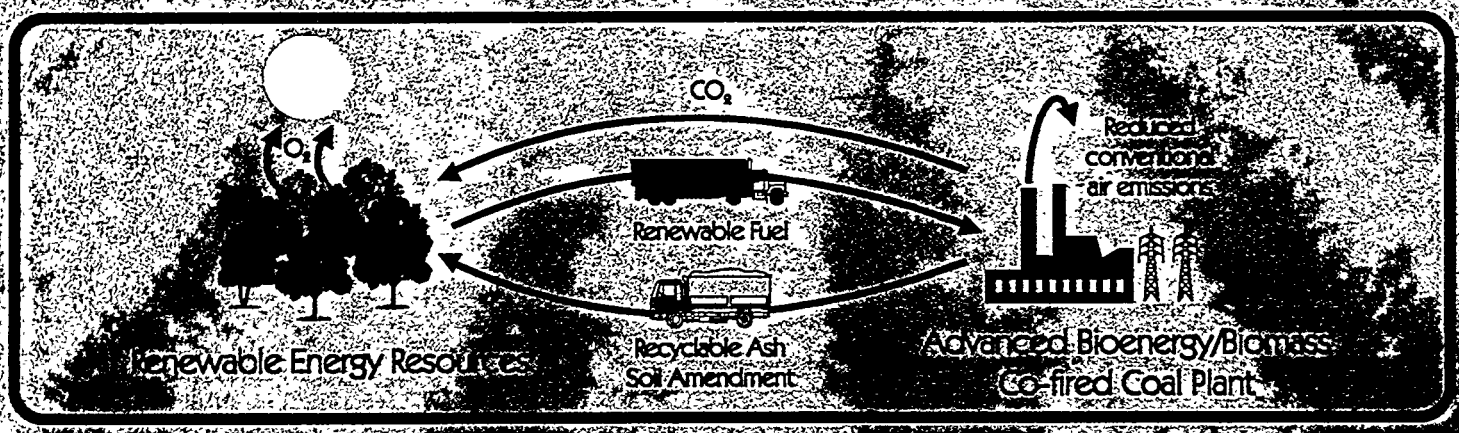
Biomass power is one of the most attractive options for addressing concerns over CO_2 because trees and other plants sequester atmospheric carbon dioxide. The growth of plants and their conversion to energy as biomass fuels thus recycles atmospheric carbon. The result is no net addition of CO_2 into the atmosphere.

What Other Environmental Benefits Can Be Realized From The Use of Biomass Fuels?

Biomass, if properly managed, is a renewable resource. Its low sulfur content means that emissions of sulfur dioxide gas are minimized. Ash resulting from the burning of biomass is low in heavy metals and can be recycled into soil amendment and other products. Power plants that currently burn only coal can be easily adapted today to co-fire blends of coal and biomass. It has been estimated that as much as a 15% blend of biomass can be co-fired without major equipment modifications and can result in a corresponding reduction of fossil-based carbon emissions.

Is Biomass Currently Being Used to Produce Electricity?

The use of biomass for power generation has increased over the last decade. In the U.S., total electricity generation grew by only 1.5% each year between 1990 and 1994. During the same period, the portion generated from biomass grew by 7% annually, reaching 59,000 GWh in 1994 — nearly 2% of all electricity generated (utility and non-utility) in the U.S. In Europe too, biomass energy currently accounts for about 2% of total energy consumption. Estimates of future opportunities for increasing biomass to electricity generation vary. In the U.S., the estimate is that by 2020, the biomass industry could produce as much as 4.5%, and in Europe 15%, of all electricity consumed.



United BioEnergy Commercialization Association

List of Member Companies and Associations (7-23-98)

Members

Electric Utilities and Associations

Burlington Electric Department (Burlington, Vermont)
Central and South West (Tulsa, Oklahoma)
Edison Electric Institute (Washington, D.C.)
General Public Utilities (GPU) Genco (Johnstown, Pennsylvania)
National Rural Electric Cooperative Association (Arlington, Virginia)
Niagara Mohawk Power Company (Syracuse, New York)
North American Power Group (Englewood, Colorado)
Northern States Power Company (Minneapolis, Minnesota)
Northern Indiana Public Service Company (Hammond, Indiana)
Southern Company (Birmingham, Alabama)
Tennessee Valley Authority (Chattanooga, Tennessee)

Associate Members

Electric Power Research Institute (Palo Alto, California)
Bioten GP (Knoxville, Tennessee)
Council of Great Lakes Governors (Chicago, Illinois)
Golden State Import Export (Pomona, California)

United BioEnergy Commercialization Association

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MEMBERSHIP INFORMATION

BACKGROUND

The United BioEnergy Commercialization Association (UBECA) was formed in 1994 to encourage the development of sustainable biomass resources and economically competitive biomass energy conversion technologies for the benefit of electric utilities, power producers, fuel suppliers, their customers, and society. Electric utilities and other power producers joined together to form the nonprofit association in collaboration with the Electric Power Research Institute (EPRI) and the U.S. Department of Energy (DOE). Building upon the experience of its members, UBECA is responding to the challenge of commercialization by defining appropriate commercialization paths for various biomass technologies. UBECA also provides contacts and facilitates joint development projects as, and where, appropriate.

UBECA activities reflect the needs of the marketplace. Of significant near-term interest to UBECA members is cofiring biomass with coal. This technology, which can reduce coal consumption by as much as 15%, has been demonstrated at several power plants to be technically feasible. Because the possibility of cofiring in coal-fired facilities exists today, this pathway can be a near-term contributor to greenhouse gas reduction. In addition to cofiring, UBECA's interests extend to advanced gasification technologies and to promoting the use of forest and agricultural residues, short rotation woody crops, such as poplar and willow, and dedicated herbaceous energy crops, such as switchgrass.

Located in the Washington, D.C. area, UBECA maintains close contact with the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy which administers the DOE Biomass Power Program. UBECA also maintains contact with the National Renewable Energy Laboratory in Golden, Colorado and the Oak Ridge National Laboratory in Oak Ridge, Tennessee. Along with other leading institutions, these National Laboratories are working to develop low-cost, high-quality biomass feedstocks and efficient technologies for converting those feedstocks to energy.

UBECA invites and encourages the support of qualified members to join with other industry leaders to promote the use of biomass as the renewable fuel of choice for companies who have coal-firing assets and experience, and for companies seeking fuel flexibility and other strategic competitive advantages.

PROGRAM

UBECA's mission is to serve as the primary voice of power producers with an interest in biomass power generation, and to encourage the development and commercialization of sustainable biomass fuel resources and economically competitive biomass energy conversion technologies. To achieve this, UBECA has developed the following four-point strategy:

- ***Encourage the private sector commitment:*** UBECA acts as a forum for the exchange of ideas on how biomass can be utilized to the maximum benefit of both the electric service provider and the customer. UBECA identifies opportunities for new bioenergy conversion technologies in both domestic and foreign markets, and assists its members to identify barriers that may restrict the entry of those technologies.

- ***Track government research, development and demonstration activities:*** UBECA stays up to date on the annual budget process of the U.S. Department of Energy's Biomass Power Program. UBECA members are kept apprised of trends in funding and of new government initiatives to increase the use of biomass in electric power applications. Such initiatives may include cooperative agreements which make it possible for members to leverage their participation in the program. Members are also informed of legislative and regulatory issues which might impact the market for biomass power technologies.

- ***Monitor restructuring of the electric power industry:*** Members are provided with information on utility restructuring initiatives at both the federal and state levels, renewable portfolio standard disclosure requirements, and changes in the fast-developing area of emissions allowance trading. UBECA keeps its members informed through its weekly electronic newsletter, *Climate Change and Utility Restructuring News*, and in so doing, on the competitive edge in an age of increasing market uncertainty.

- ***Nurture cooperation and partnership:*** UBECA brings together representatives of the power industry, agriculture, the federal government, and the financial community in a concerted effort to ensure America's sustainable energy future and continued prosperity.

As the electric power industry transforms itself to meet the needs of a deregulated marketplace, it will become ever more critical to identify and develop high-value bioenergy market niches while pursuing environmentally benign methods of electricity production. Successful research, development, and demonstration projects must be linked to commercialization strategies that provide incentives, and lower the risks and costs associated with new facilities. UBECA can help its members evaluate new and unique technologies for this competitive marketplace, and facilitate their advancement toward full commercialization.

MEMBERSHIP BENEFITS

As utility restructuring proceeds, traditional concepts of how energy is produced, transported, and utilized are likely to change dramatically. Marketplace, policy, and regulatory changes will shape both the domestic and global energy industry, improving opportunities for clean, low-cost energy, competitively priced fuels, and environmentally responsible power systems. Membership in UBECA provides a mechanism for your company to be kept informed of the issues and important developments taking place in the areas of global climate change and utility restructuring. While Congress debates ratification of the Kyoto Climate Change Treaty, the Administration has put forward a five step Climate Change Proposal to reduce greenhouse gas emissions. The proposal includes binding targets for reducing greenhouse gas emissions below 1990 levels and a $6 billion program of tax cuts and R&D spending to spur the development of key renewable technologies, such as biomass. Power generators are therefore facing the prospect of having to reduce carbon dioxide emissions while, at the same time, adapting to the uncertainties of a deregulated marketplace. UBECA acts in concert with allied trade associations to ensure that biomass is considered along with such renewable energy sources as wind, hydroelectric, and solar in the context of "green pricing" or a renewable energy portfolio standard, wherever such standards become law.

In addition, member companies receive the following benefits:

- Access to current industry developments through UBECA's weekly electronic newsletter *Climate Change and Utility Restructuring News*.
- Point of contact to address common problems related to biomass technologies and their commercialization.
- Information clearinghouse and source of data for the biomass power industry.
- Annual conference conducted jointly with the National Biomass Industries Association featuring speakers from government, industry, and the world financial community.

WHO CAN JOIN

UBECA welcomes the participation of all companies who have an interest in advancing the use of biomass as a renewable energy resource. Any power producer may become a Regular (voting) Member of UBECA, and any other interested organization may become an Associate (non-voting) Member. Our membership includes investor-owned and public utilities, independent power producers, state and regional bioenergy organizations, equipment manufacturers, industrial cogenerators, fuel suppliers, and biomass energy developers. The membership application on the back lists the various categories of membership and the dues for each category.

UBECA Membership Application

My organization is applying for **Regular Membership.** It is an (check one):

- ☐ Electric utility
- ☐ Owner or operator of independent, non-utility generation equipment
- ☐ Owner or operator of power generation equipment used for supply of own electric load
- ☐ Organization of electric utilities or other power producers
- ☐ Other (describe) _____

or, my organization is applying for **Associate Membership**:

- ☐ Describe: _____

A. For Regular Membership Application: Our dues for a *12-month introductory membership* will be:

- ☐ ~~$2,000~~ $1,000 (for revenues less than $30 million)
- ☐ ~~$4,000~~ $1,000 (for revenues between $30 and $300 million)
- ☐ ~~$6,000~~ $1,000 (for revenues between $300 million and $3 billion)
- ☐ ~~$8,000~~ $1,000 (for revenues greater than $3 billion)
- ☐ ~~$10,000~~ $1,250 (for multi-organization member*)

* This membership option is available to organizations such as joint action agencies and their municipal members, generation & transmission cooperatives and their power distributors, holding companies and their operating companies, and power producers and their parent organizations and subsidiaries. Any such family of companies, if they do not wish to join as individual members, may join UBECA as a group for a single, total fee of $10,000. Membership privileges (e.g., participation on committees, member fees at meetings, inclusion on Member Mailing List, receipt of UBECA publications) are available to all related organizations within the family. The only limitation to a family membership is that only one voting (member) representative may be appointed. This option applies to power producer families provided the included subsidiaries are 100% owned by the parent company.

B. For Associate Member Application: Our dues for a *12-month introductory Associate membership* will be:

- ☐ ~~$2,000~~ $500 (for all Associate Members)

C. For all applicants:

- ☐ Payment of the membership fee is enclosed.
- ☐ Payment of an invoice for the membership fee will be paid within 60 days.

Upon becoming a member, _____, *agrees to abide by the By-Laws of the* ***United BioEnergy Commercialization Association.*** *All dues shall be in effect for one calendar year from date received in this office.*

Company: _____

Designated representative: _____

Address: _____

Phone: _____ Fax: _____ E-mail: _____

Date: _____ Authorized signature _____

UBECA, 7164 Gateway Drive, Columbia, MD 21046, Phone: 301/621-3002, 621-3003, Fax: 301/621-3725

UBECA

United BioEnergy Comm

UBECA MISSION

- To serve as the primary voice of power producers with an interest in biomass power generation.
- To encourage the development and commercialization of sustainable biomass fuel resources and economically competitive biomass energy conversion technologies.

KEY ACTIVITIES

- **Production of information** and educational materials on biomass energy and distribution of such materials at public forums;
- **Technical and market analyses** of biomass energy fuels, conversion technologies, and market issues;
- **Monitoring and reporting** on Congressional, State, and Administration issues affecting the biomass energy community; and
- **Assistance to members** in commercializing biomass in a restructured energy marketplace.

MEMBERS

United BioEnergy Commercialization Association
List of Member Companies and Associations

Electric Utilities and Associations

Burlington Electric Department (Burlington, Vermont)
Central and South West (Tulsa, Oklahoma)
Edison Electric Institute (Washington, D.C.)
General Public Utilities (GPU) Genco (Johnstown, Pennsylvania)
National Rural Electric Cooperative Association (Arlington, Virginia)
Niagara Mohawk Power Company (Syracuse, New York)
North American Power Group (Englewood, Colorado)
Northern States Power Company (Minneapolis, Minnesota)
Northern Indiana Public Service Company (Hammond, Indiana)
Southern Company (Birmingham, Alabama)
Tennessee Valley Authority (Chattanooga, Tennessee)

Associate Members

Bioten GP (Knoxville, Tennessee)
Council of Great Lakes Governors (Chicago, Illinois)
Golden State Import Export (Pomona, California)

Market Driven

Biomass Ga

Burlington Electr

The Burlington Electric Dep... 50% owner of the Joseph ... Station, a 50 MWe wood-... McNeil Station is now the ... Energy biomass gasification ... successful, the project will p... generate electricity more ef... than current wood-burning ... advanced gas turbines and ... Generating Station, and e... FERCO, were selected by Re... Development Magazine ... gasifier as one of the top 10 ... products of 1998

Equipment Development and Deployment

BIOTEN GP

BIOTEN GP has developed both a biomass fuel processing system and a biomass-fired combustion turbine power... plant. The fuel processing system provides the uniform, dry biomass fuel stream required to support cofiring applications. The combustion turbine power plant, including the fuel processing system, generates 6 MWe and produces usable thermal energy and... marketable ash

Biomass Market

Council of Great Lakes Governors

The Council of Great Lakes Governors is a private, nonprofit organization devoted to working cooperatively on public policy issues common to its eight member states: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin. The Council of Great Lakes Governors operates the Great Lakes Regional Biomass Energy Program under contract with the U.S. Department of Energy. The objective of the program is to stimulate the production and use of biomass for energy, by developing and disseminating information about market ready biomass technologies and resources to both the public and private sectors.

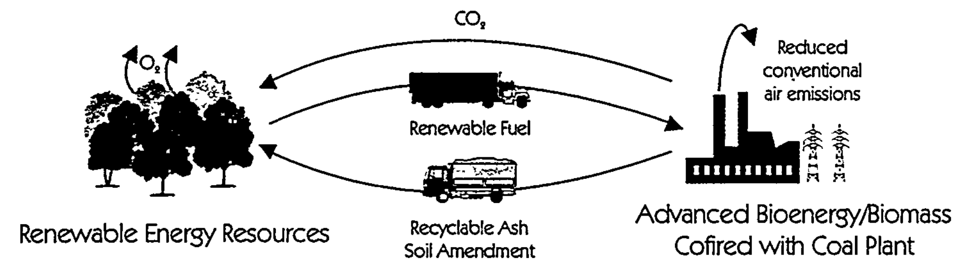
Central and South West Corporation

Central and South West (CSW) has received recognition for its pioneer renewable energy technology initiatives. CSW has operated a wind farm and solar park in southern Texas since 1994. CSW is also evaluating its coal burning plants and the economic-environmental trends in its service territories for potential biomass synergies. A cofiring feasibility study will be completed later this year.

rcialization Association

UBECA

Industry Led



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Department

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Energy Crop Utilization

Northern States Power Co.

Northern States Power (NSP) has entered into agreement with the Minnesota Valley Alfalfa Producers (MNVAP) to purchase enough "farm-grown, closed-loop" biomass generation resources to supply 75 MWe of power to the NSP system by December 31, 2000. This 75 MW increment represents Phase I of NSP's legislative commitment to have 125 MW of farm-grown, closed-loop biomass generation in place by the end of 2002. Once the power plant is operating, it will be the first dedicated crop-fuel plant of its size in the world. Northern States also has experience cofiring coal and forest residues at its Bay Front Station in Ashland, Wisconsin.

NSP's Bay Front Generating Station in Ashland, Wisconsin

Development

Edison Electric Institute

Edison Electric Institute (EEI) is the association of shareholder-owned electric companies. EEI members generate approximately 79% of all of the electricity generated by electric utilities in the United States, and distribute 75% of all of the electricity that is distributed to customers. EEI's Climate Challenge is a voluntary effort to reduce, avoid or sequester greenhouse gases. It is the world's largest and most successful voluntary initiative on global climate change. DOE estimates that in the year 2000 the voluntary actions and initiatives by EEI's member companies, including the use of biomass fuels, will reduce, avoid and sequester more than 170 million metric tonnes of carbon dioxide-equivalent greenhouse gases

National Rural Electric Cooperative Association

The National Rural Electric Cooperative Association (NRECA) represents the national interests of the nearly 1,000 electric cooperatives serving 30 million people in 46 states. Electric cooperatives serve more than 12 million farms, homes, schools, churches, irrigation systems, businesses and other establishments in 2,600 of the 3,128 counties. Electric cooperatives are predominantly located in rural areas where biomass crops are grown. They can utilize this renewable resource when cost effective or when environmentally preferred. NRECA has financed research projects in the use of biomass, and a number of members are involved in studying or working on biomass projects

Biomass Cofiring and Feedstock Development

GPU Genco

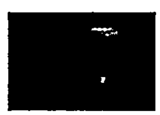
GPU Genco is currently in the design phase of a long term sawdust cofiring project at Seward Station on #12 Boiler. The company expects to be burning sawdust on a sustained basis before the end of this year. The $2,000,000 project is being sponsored by the Department of Energy (DOE), EPRI, the Upgraded Coal Interest Group (UCIG), GPU Genco & others. It will demonstrate the long term performance and cost factors related to sawdust cofiring on a 32 MWe pulverized coal wall-fired boiler. There will also be parametric cofiring of utility wood waste (poles, crossarms, spools & pallets) during the two-year test period.

Northern Indiana Public Service Co.

Northern Indiana Public Service Company (NIPSCO) and EPRI sponsored cofiring tests of urban wood waste with Powder River Basin (PRB) coal at the Michigan City Generation Station Boiler #12. It was the most extensive test involving urban wood waste with some 1000 tons of biofuel co-fired with a blend of PRB and Shoshone coal. The test results demonstrated that co-firing could be accomplished, and that there were no technical fatal flaws to deploying this technology.

Niagara Mohawk Power Company

Niagara Mohawk (NIMO) has been a leader in researching the use of short rotation woody crops as a feedstock and currently has a 135 acre willow plantation under cultivation. NIMO, along with New York State Electric and Gas, and the State University of New York College of Environmental Science and Forestry, is a member of the New York Salix Consortium. Willow has been test fired at the Greenidge station of New York State Electric and Gas (10%, 11 MWe). NIMO has test cofired 80 tons of wood waste at its Dunkirk, New York station (15%, 13.5 MWe).



Electric Supply & Delivery

Southern Company

Southern Company has been investigating biomass as an alternative fuel for more than 8 years, initially as a means of resolving customer wood waste disposal issues and as a way to reduce landfill pressures. Biomass energy research studies at Southern Company have included:

- Field tests of wood/coal cofiring by comilling
- Combustor studies of paper mill sludge cofiring
- Direct injection wood cofiring test
- Impact of wood/coal cofired ash on the properties of concrete
- Investigation of switchgrass/coal cofiring (ongoing)

SOUTHERN COMPANY
Energy to Serve Your World

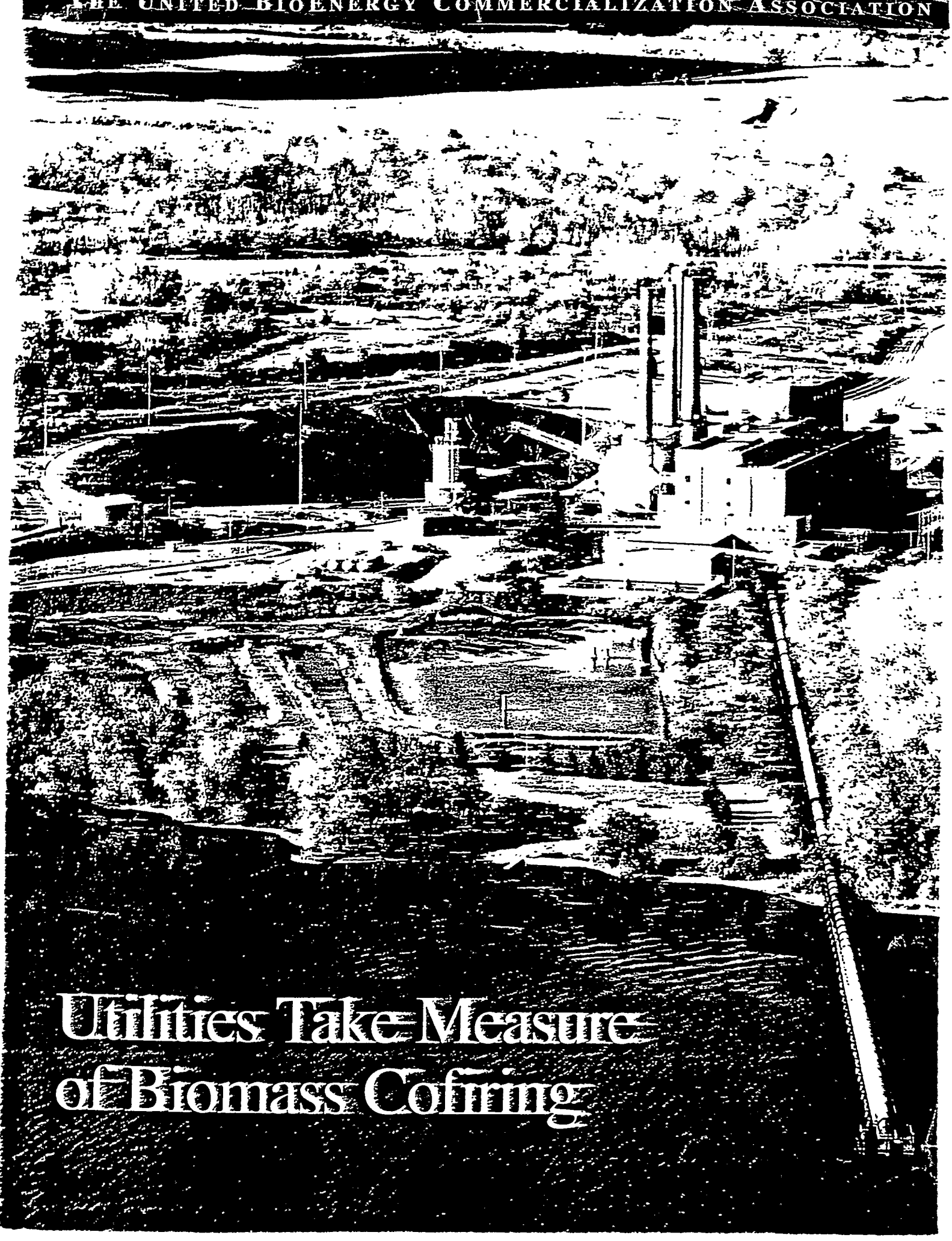
North American Power Group, Ltd.

North American Power Group, Ltd., ("NAPG") develops, owns and operates biomass fired power generation facilities as well as developing and managing other facilities which use non-commercial fuels as their principal form of energy for power production. NAPG's facilities have been in continuous base load operation for over 12 years, collectively disposing of over 1,040,000 tons of waste wood and wood related products annually. NAPG's facilities were the first in California to be certified as renewable energy providers. NAPG also has completed the "loop" by having its byproducts approved for agricultural use.

Tennessee Valley Authority

TVA has demonstrated a commitment to investigating renewable energy resources through various biomass co-firing tests and operations, and energy crop environmental benefit assessments. Current efforts are concentrated on gasification of biomass as a supplemental boiler fuel

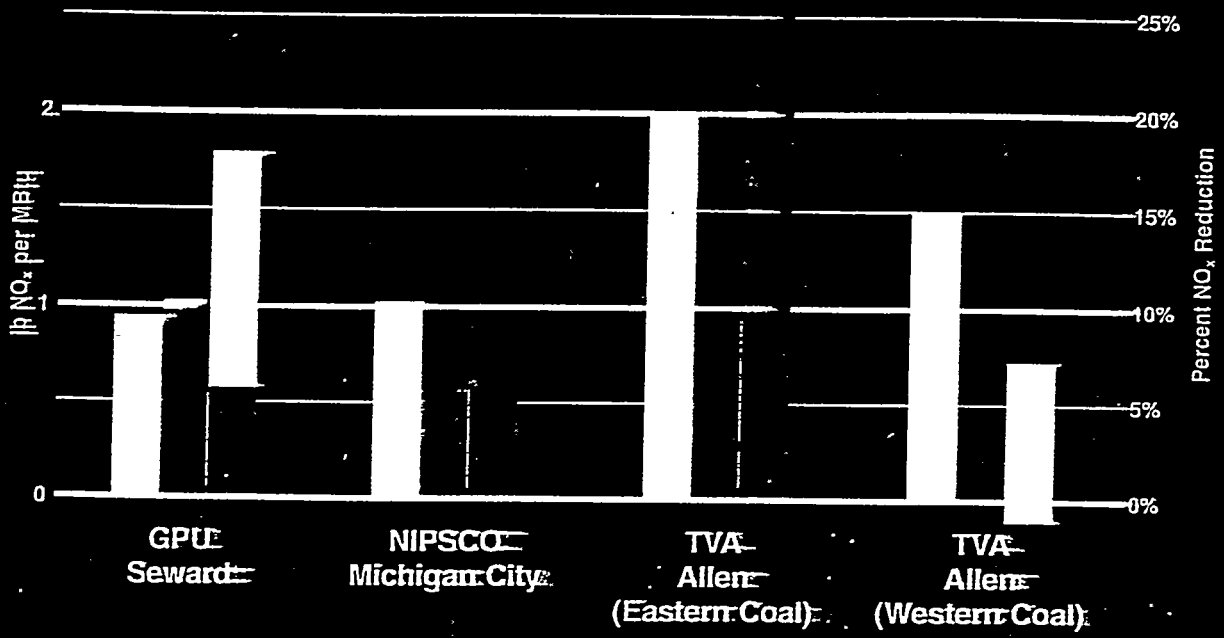
THE UNITED BIOENERGY COMMERCIALIZATION ASSOCIATION



Utilities Take Measure of Biomass Cofiring

Percent NO_x Reduction: Cofiring Wood With Coal Compared to 100% Coal

- lb NO_x per MBtu
- Percent Cofire (heat basis)
- Percent NO_x Reduction
- Range of Percent Cofire (heat basis)
- Range of Percent NO_x Reduction



Cofiring biomass with coal has environmental advantages, including reducing greenhouse gases such as carbon dioxide (CO_2) and acid rain precursors such as sulfur dioxide (SO_2) and nitrogen oxides (NO_x). Almost all biomass is low in sulfur content, so SO_2 reductions are typically proportional to the biomass input. Furthermore, some biomass fuels, such as wood, are also low in nitrogen content. Recent tests sponsored by the Electric Power Research Institute (EPRI) and the U.S. Department of Energy (DOE) conducted at 10 utility boilers cofiring up to 7% wood show NO_x emissions can be reduced as much as 15% compared with coal-only operation. The results—which depend on firing configuration and boiler type—did not explore optimizing NO_x reductions.

Industry Surveys Performance

SEVERAL YEARS OF OPERATING EXPERIENCE AND TESTING HAVE ALLOWED POWER COMPANIES TO DELINEATE THE TECHNICAL AND ECONOMIC ISSUES ASSOCIATED WITH COFIRING BIOMASS WITH COAL.

Economic Requirements

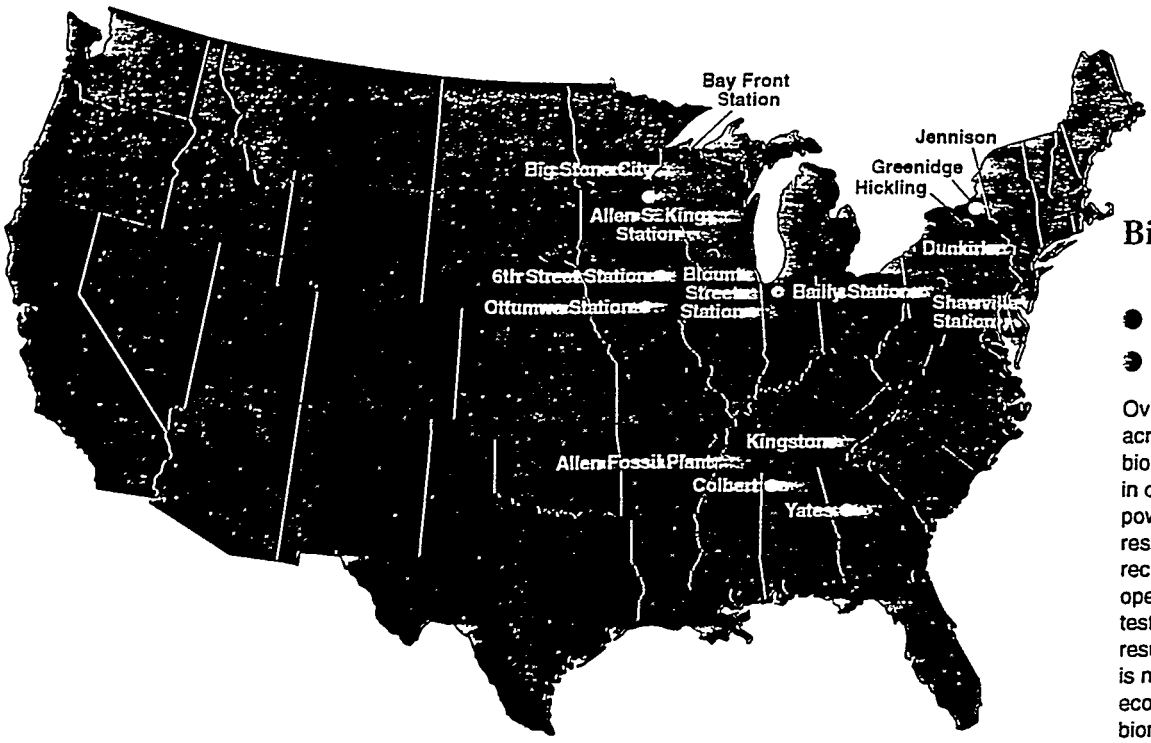
The economics of cofiring are highly site-specific and depend on the layout of the power plant and the availability of low-cost biomass fuels. A typical cofire installation includes modification to the fuel-handling system and storage for biomass. Costs can increase significantly if facilities for wood drying or size reduction are required, or if a separate feed to the boiler is required. For pulverized-coal boilers, retrofit costs range from $150 to $300 per kilowatt (kW) and higher. The lowest-cost opportunities are with cyclone boilers. for which costs may be as low as $50 per kW.

The more important cost factor, however, is fuel supply. Costs for biomass fuels depend on a number of factors such as climate and proximity to population centers and industries that handle and dispose of wood. Usually the cost of biomass fuels must be equal to or less than the cost of coal (per MBtu) for cofiring to be economically successful. Some utilities reduce fuel costs by cofiring with biomass; the Tennessee Valley Authoirity, for example, estimates it will save $1.5 million per year in fuel costs cofiring at its Colbert plant.

Technical Challenges

Several technical questions having to do with fuel feed, boiler chemistry, and ash deposition and disposal have been defined and are approaching resolution. Losses in boiler efficiency due to cofiring are small (0.3 to 0.6 points out of 85 to 88 percentage points) and are usually due to higher moisture content in the biomass fuels. A consensus is emerging that cofiring is feasible at the majority of coal-fired power plants.

However, many power companies sell fly ash for use in making Portland cement: currently the standard set by the American Society for Testing and Materials require only "coal ash" be used in the mixture. Until this standard is changed to specify performance instead of "coal ash," cofiring biomass may alter the ability of plant managers to sell ash for use in making cement. Several utilities are working with the U.S. Department of Energy (DOE) to resolve this issue.



Biomass Cofiring Plants

In Commercial Operation

● Demonstrations Conducted

◑ Tests Planned

Over the last decade, electric utilities across the country have implemented biomass cofiring in demonstrations and in commercial operations. Today, five power plants are cofiring coal with wood residue products and a sixth plant recently shut down after 10 years of operation. Five more plants are planning tests some time in the next year. As a result of this experience, information is now available on the technical and economic performance of cofiring biomass with coal.

Customers Support Clean Energy

In a deregulated market, power producers with coal generation may use biomass cofiring to improve their overall environmental performance for customers who are sensitive to environmental issues.

Biomass cofiring may represent an opportunity for both consumers and power companies. In recent polls, consumers have indicated their willingness to support green-pricing and renewable energy programs. Some consumers are paying a premium for renewable energy, typically 10% or less of their entire bill. For power generators, biomass may represent the most plentiful and economic supply of locally available renewable energy.

Cofiring may also represent an opportunity for power companies to provide with new services to important customers. This opportunity exists for providing industries such as construction or transportation a way to discard large quantities of wood, or providing industries such as forestry, wood products, pulp and paper, agriculture, and food processing a way to dispose of large quantities of residues. In these locations, the cost of biomass fuels can be relatively low. Thus cofiring can provide both a service to industrial customers and renewable energy for environmentally conscious customers at the same time.

The United BioEnergy Commercialization Association

The United BioEnergy Commercialization Association (UBECA) is a trade association for the U.S. biomass power industry. UBECA's mission is to serve as a voice of the industry and encourage the commercial development of sustainable biomass energy resources and economically competitive power conversion technologies. Members include investor-owned and public utilities, independent power producers, state and regional bioenergy organizations, equipment manufacturers, and biomass energy developers.

Electric Utilities and Associations

- Burlington Electric Department, *Burlington, Vermont*
- Central and South West, *Tulsa, Oklahoma*
- Edison Electric Institute, *Washington, DC*
- GPU, Inc., *Johnstown, Pennsylvania*
- National Rural Electric Cooperative Association, *Arlington, Virginia*
- Niagara Mohawk Power Company, *Syracuse, New York*
- North American Power Group, *Englewood, Colorado*
- Northern States Power Company, *Minneapolis, Minnesota*
- Northern Indiana Public Service Company, *Hammond, Indiana*
- Southern Company, *Birmingham, Alabama*
- Tennessee Valley Authority, *Chattanooga, Tennessee*

Associate Members

- Electric Power Research Institute, *Palo Alto, California*
- Biotem GP, *Knoxville, Tennessee*
- Council of Great Lakes Governors, *Chicago, Illinois*
- Golden State Import Export, *Pomona, California*

For More Information

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DOE/GO
September 1998

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- UBECA -

PROCEEDINGS OF:

- **Workshops**
  - **Presentations**

- **Annual Meeting**
  - **Agenda**
  - **Registration List**
  - **Presentations**

Prepared by

UBECA
United BioEnergy Commercialization Association
Columbia, Maryland

Prepared under contract to the

U.S. Department of Energy
Biomass Power Program

September 1998

- UBECA -

WORKSHOPS

- **Presentations**

BOARD OF DIRECTORS MEETINGS

- **Meeting Summaries**
- **Presentations**

Semi-Annual Meeting

USDOE Biomass Power Program

January 21 - 22, 1998
The Mayflower Hotel
1127 Connecticut Ave NW, Washington, D.C.
(202) 347-3000

Wednesday, January 21, 1998

9:00 - 10:15 am	DOE Overview and Comments Moderator - Lynne Gillette Allan Hoffman - Invited Comments Gary Burch - Invited Comments Ray Costello - Program Overview Lynne Gillette - Technology Characterizations
10:15 - 10:30	Break
10:30 - 12:15	Project Overviews Moderator - Lynne Gillette
10:30 - 10:50	Biomass Power for Rural Development - Jim Spath, GO
10:50 - 11:10	Vermont and Hawaii Status - Robert Martin, GO
11:10 - 11:30	Sandia Overview: Modular Systems RFP and Combustion Studies - Tom Mancini, SNL
11:30 - 11:50	Feedstocks - Lynn Wright, ORNL
11:50 - 12:10	NREL Overview - Helena Chum, NREL
12:15 - 1:30	Lunch

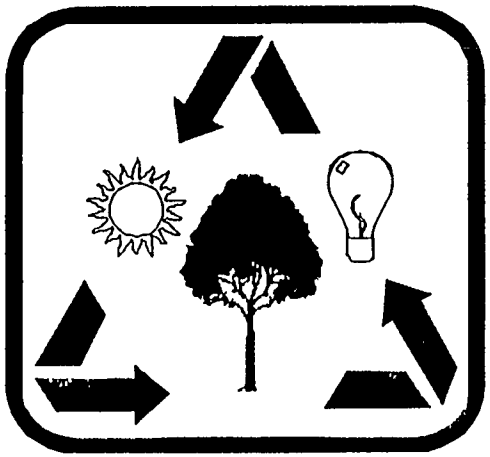
Afternoon Sessions - Stakeholder Organizations
Theme: Organizational overview and ways to work together
Moderator: Lynne Gillette

1:30 - 2:00	NBIA
2:00 - 2:30	UBECA
2:30 - 3:00	World Bank
3:00 - 3:15	Break
3:15 - 3:45	USDA - Roger Conway
3:45 - 4:15	DOE Regional Biomass Program
4:15 - 4:45	USAID - Ross Pumfrey
4:45 - 5:15	Business Council for Sustainable Energy - Michael Marvin
5:30 - 7:00	Reception

United BioEnergy Commercialization Association

Joe Badin

Executive Director



Presentation to the Semi-Annual Meeting of the U.S. DOE Biomass Power Program

January 21, 1998

Membership: Serving Diverse Needs

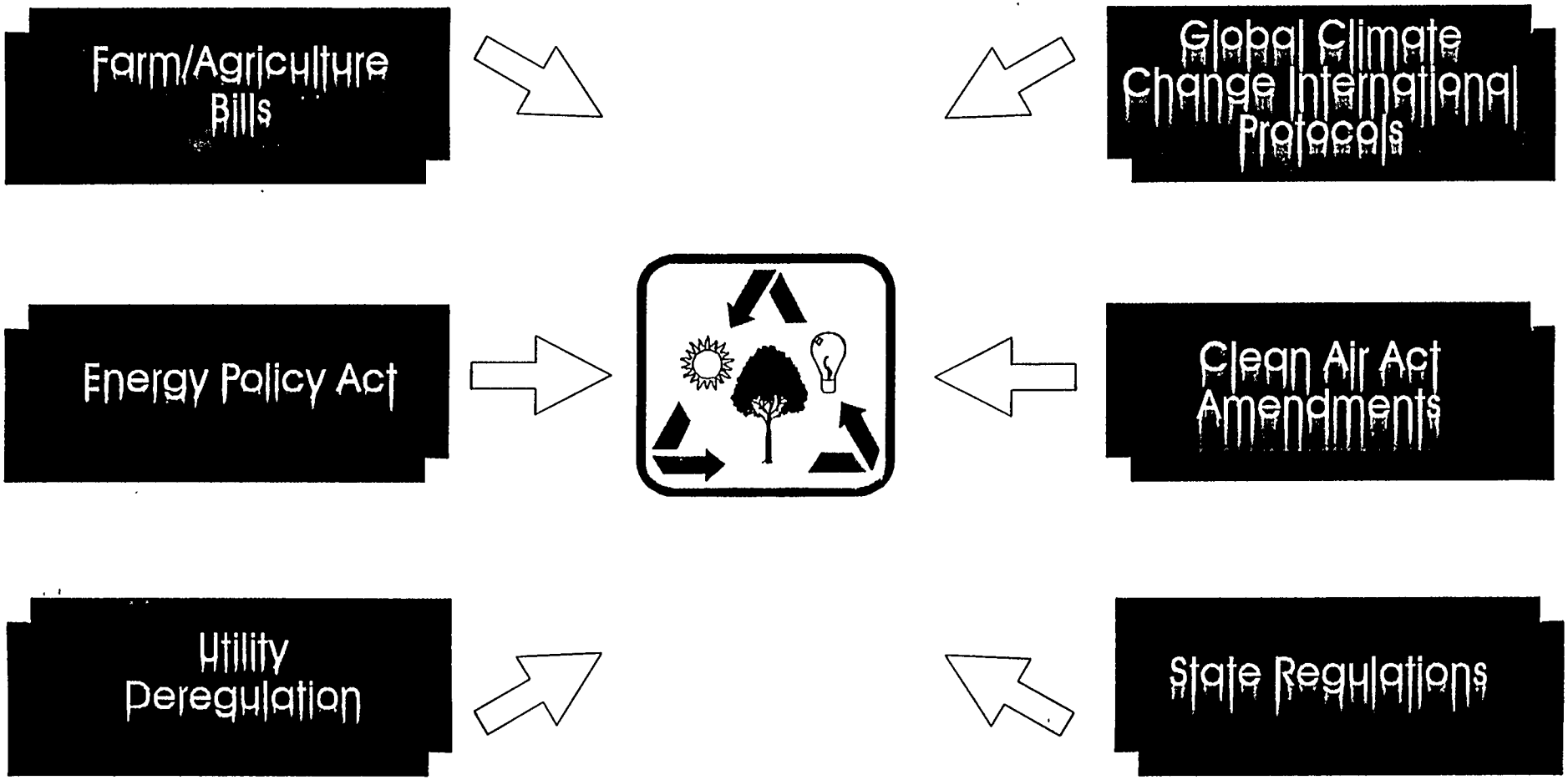
- Current Membership
  - 16 Full Members
  - 4 Associate Members
- Key Strategic Objective:

Self-sustaining association after 5 years (2003)

Target industrial cogenerators, agricultural organizations, independent power producers, and "green" power marketers.

UBECA Inputs

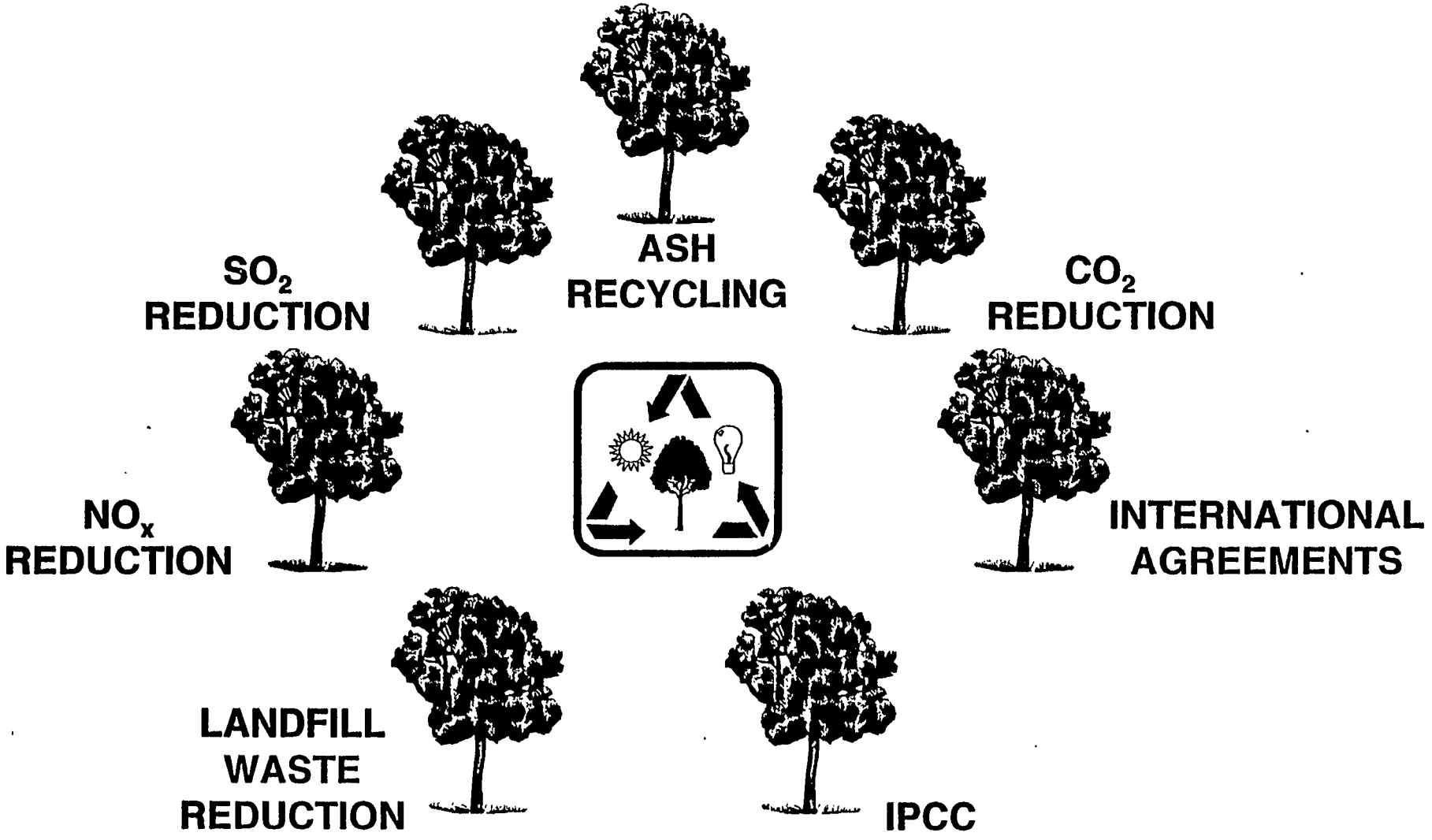
Legislative/Regulatory Drivers



Biomass Commercialization

- Major drivers
- Major markets
- Major challenges

The Environment



Major Industries

- Forest products
- Pulp and paper
- Other large cogenerators

Benefits of Cofiring

- Achieve reductions in atmospheric CO_2
  - Low-cost, low-risk, near-term solution
- Biomass is easily stored and dispatched (compared to other renewables)
- Makes best use of existing assets
- Greatly expands the potential market for biomass
- Reduces waste disposal at landfills

Major Challenges

- Fuel availability
- Transportation costs
- Low cost of conventional fuels
- Public awareness of biomass as “green”

Member Needs

- Keeping well-informed
  - Swiftly changing industry - analyze uncertainties
  - Regulatory changes and incentives
  - Technology cost & performance, R&D issues
  - Coordinated activities
- Obtaining competitive edge
  - Identify near-term, creative niche markets
  - Reduce deployment risk
  - Identify cost-effective integrated systems
  - Identify business partners and appropriate financial arrangements

UBECA's Emerging Agenda

- Provide a forum to promote bioenergy
- Expand outreach to encompass agricultural, forestry, and environmental stakeholders
- Develop a near-term game plan for increasing market awareness
- Identify critical RD&D needs and targets
- Accelerate commercialization: establish a biomass project finance network

Key Messages

- Resources are large, low-cost, and widely available
- Environmental benefits are significant and can be gained today
- Biomass energy can help to revitalize rural economies
- Biomass power can improve a utility's image with its customers
- Cofiring makes sense today … and other technologies are on the horizon

UBECA Members

16 Regular Members

Burlington Electric
Edison Electric Institute
Electric Power Research Institute
General Public Utilities:
- Pennsylvania Electric Company
- GPU Service Corporation
- GPU Genco
- GPU Energy

National Rural Electric Coop. Assoc.
Niagara Mohawk Power Corp.
North American Power Group, Ltd.
Northern Indiana Public Services Co.
Northern States Power Company
Central and South West Services
Southern Company:
- Georgia Power Company
- Southern Company Services

Tennessee Valley Authority

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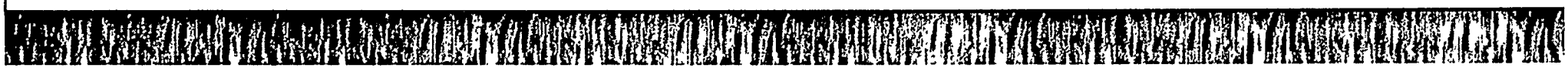
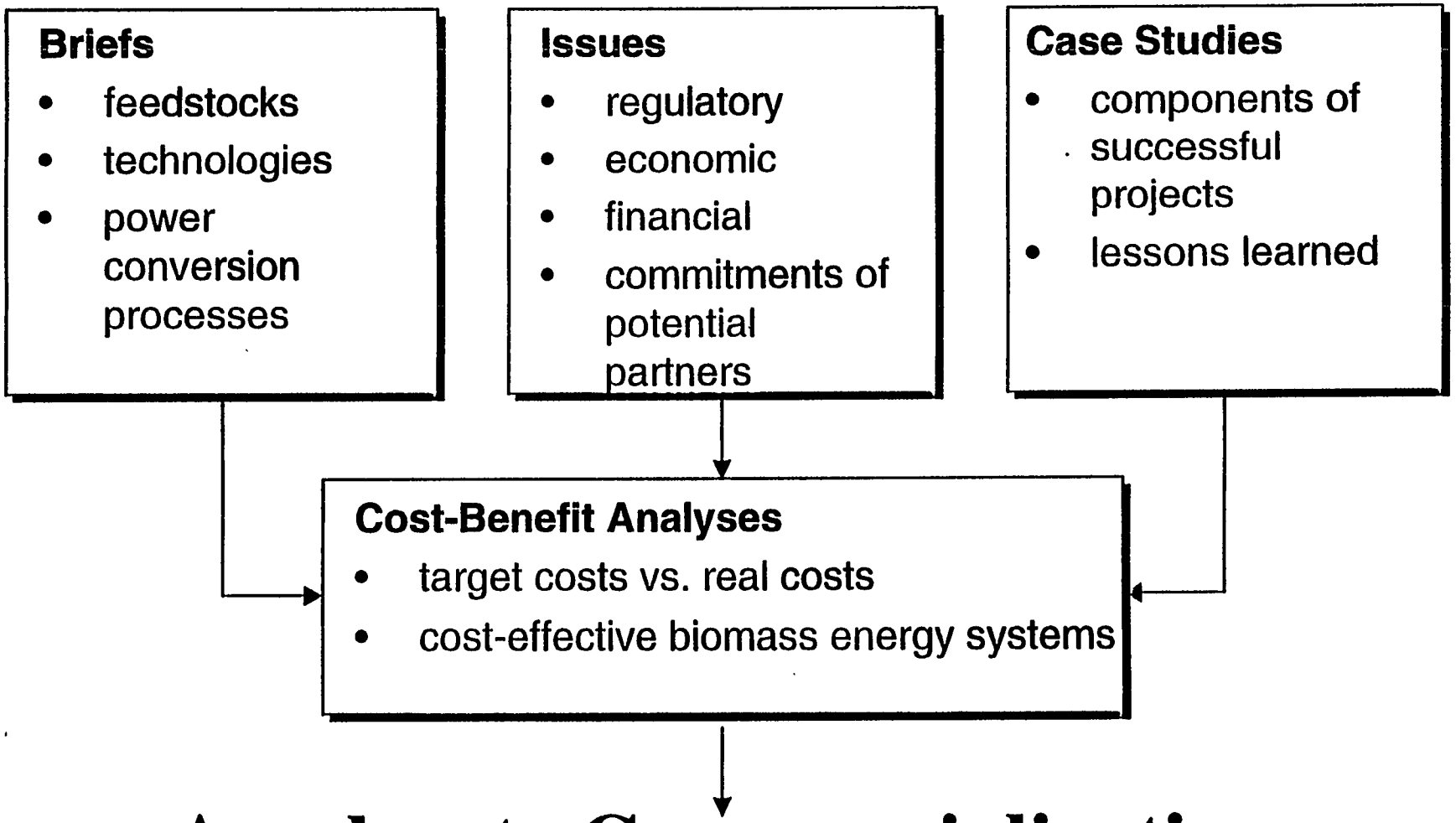


UBECA Activities Lead to Market Results



Accelerate Commercialization

UBECA 

- Membership Update
- Activity Summary
- EPRI Biomass Interest Group

JOSEPH S. BADIN

June 24, 1998

MEMBERSHIP UPDATE

MEMBERSHIP STATUS

- Currently UBECA has 15 member organizations with total 1998-1999 dues of $72,000.

- On-going recruitment activities:

  Interested Organizations:

  - Delmarva Power (Connectiv) - *Mike Zoccola*
  - Foster Wheeler - *Neil Raskin*
  - Penn State, Energy and Fuels Research Center - *Joel Morrison*
  - State University of New York - *Tim Volk*

- Issues

  - Honorary membership for National Laboratories
  - Joint membership option with NBIA

CURRENT MEMBERS

- Bioten GP
- Burlington Electric Dept.
- Central and South West
- Council of Great Lakes Governors
- Edison Electric Institute
- Electric Power Research Institute
- General Public Utilities (GPU) GENCO
- Golden State Import Export
- National Rural Electric Cooperative Assoc.
- Niagara Mohawk
- North American Power Group
- Northern Indiana Public Service Company
- Northern States Power
- Southern Company
- Tennessee Valley Authority

EXTENDING OUR PROFESSIONAL NETWORK

- DOE FEMP Renewable Energy Working Group
- Sustainable Energy Coalition
- Business Council for Sustainable Energy
- Biomass Fuel Cell Council
- Public Technologies, Inc.
- Coal Utilization Research Council
- Renewable Energy Policy Project
- Australian Biomass Energy Task Force
- The World Bank (Brazil)

CONTINUING CONTACTS

- Institute of Paper Science and Technology (Gary Baum)
- Weyerhauser Corporation (Del Raymond)
- Peabody Coal (John Wooten)
- United Power Associates (Steve Shurts)
- Institute of Gas Technology (Francis Lau)
  - Endesco (IGT subsidiary)
- Minnesota Power (Mike Cashin)
- Trans Alta Utilities (Malcolm McDonald)
- National Association of State Departments of Agriculture (Jeff Anliker)

OTHER PROSPECTS

- American Forest Products Association
- Independent Power Producers
  - Trigen Energy
  - Calpine
  - Others
- The White House (OSTP)
- Collaborations for Foundation Gants
  (Education and local economic development)
- Proposed strategic planning and technology roadmapping role crosscutting several sectors

ACTIVITY SUMMARY

ACTIVITY STATUS

- Published and distributed weekly newsletter on global climate change and electricity restructuring
- Produced new UBECA membership literature (new 1-pager and new 4-pager). Focused on recruitment efforts.
- Collecting information for a member directory
- Disseminated literature at the House Renewable Energy Caucus Expo
- Attended the EPRI Biomass Interest Group meetings
- Attended post-Kyoto hearings, appropriations hearings, a seminar on Carbon Trading, and a BERA meeting.
- Attended biomass energy reception at the British Embassy
- Distributed information on RFPs (small modular biomass power projects and other opportunities with USDA, the United Soybean Board)

ACTIVITY STATUS (CONTINUED)

- Attended DOE Cofiring Workshop
- DOE Golden grant ($100K) is active
- DOE/FE/FETC grant is pending
  - Proposed changes in scope to include planning/roadmapping and monitoring of international activities
- Reviewed DOE/FETC SBIR Phase I Biomass Gasification Proposal
- Expand communications, outreach, and website development activities
- Poster accepted for BioEnergy '98
- Developing column for biologue and article for trade publication
- Sorting through information and preparing options for reasonable TTC closeout

OVERVIEW OF EPRI BIOMASS INTEREST GROUP MEETING

MAY 28-29, 1998

EPRI BIOMASS INTEREST GROUP (EVAN HUGHES)

- About 35 attendees
- See enclosed agenda and background summary
- Common key drivers
  - Economics and operational justification
  - Renewable Portfolio Standards
  - Green Power
  - Customer Retention/Relations
  - Other competitive advantages/benefits

EPRI BIOMASS INTEREST GROUP (EVAN HUGHES) (CONTINUED)

- Discussion resulted in the following list of needs (not in priority order) for demonstration projects:
  - Reduce to least capital cost
  - Determine best way to feed into a boiler
  - Environmental benefits
  - Leverage dollars
  - Gain more interest
  - Select projects with agreed criteria
  - Regulatory supports
    - incentives
    - eliminate barriers
    - information exchange
  - "Roadmap" (proposed UBECA role)
    - consensus vision
    - definitions
    - quantify RPS mandate and ability to meet

EPRI BIOMASS INTEREST GROUP (EVAN HUGHES) (CONTINUED)

- Discussion resulted in the following list of needs (not in priority order) for demonstration projects: (continued)
  - Credibility
  - Real sites to visit
  - Meet a mix of needs (research, demo, others)
  - No policy positions
  - Intellectual property/credits/rights
  - Capture Europe (experience and market)
  - Ash quality (marketability)
  - Outreach/synergy/collaborations - avoid overlaps
  - Bring in wood, chemicals, industries
  - Answers: pollutants, char burn out; size, infrastructure; corrosion; costs
  - Disseminate results; get feedback

EPRI BIOMASS INTEREST GROUP (EVAN HUGHES) (CONTINUED)

- Discussion resulted in the following list of needs (not in priority order) for demonstration projects: (continued)
  - Public information/web page
  - Work load sharing
  - Monitoring legislation and regulations
  - Meetings/site visits/technical exchange
  - Issue appropriate reports

WRAP-UP

- Open Discussion
- Questions
- Recommendations

- UBECA -

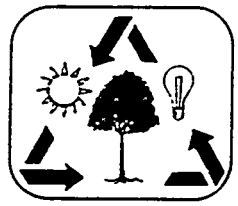
ANNUAL MEETING

- **Agenda**
- **Registration List**
- **Presentations**

BIOMASS ENERGY:

DYNAMIC SOLUTIONS TO GLOBAL PROBLEMS

hosted by the
National BioEnergy Industries Association
and the
United BioEnergy Commercialization Association
in
Washington, DC
at
The Jefferson



December 8-9, 1997

The *National BioEnergy Industries Association* (NBIA) and the *United BioEnergy Commercialization Association* (UBECA) will host a one-day workshop to examine the role of bioenergy in addressing the global climate change issue.

On October 22, 1997 President Clinton announced the U.S. Administration's official negotiating position, to address global climate change, at the UN Global Climate Change Convention in Kyoto, Japan. In addition, President Clinton outlined several domestic policy measures to reduce greenhouse gases that, if adopted, should benefit the U.S. bioenergy industry.

The biomass industry has a unique window of opportunity, with this post-Kyoto workshop, to meet, strategize and to exchange ideas on how to create new market opportunities for bioenergy development, and to work with the public sector in order to facilitate greater bioenergy utilization.

PRELIMINARY AGENDA

December 8, 1997

Monday

- NBIA Board of Directors Meeting
- UBECA Members Meeting
- Biomass Stakeholders Strategy Meeting

December 9, 1997

Tuesday

Continental Breakfast

WELCOME & OPENING REMARKS
Joseph Badin, UBECA
Scott Sklar, NBIA
Dan Reicher, Dept. of Energy

SESSION I:
Biomass Energy's Role in Carbon Sequestration and Reduction

Evan Hughes, EPRI
Jim Cooper, Chariton Valley Project
Ted Dahill, BIOTEN GP

SESSION II:
Financing Biomass Projects - Domestic & International

Kevin McNamara, Taylor DeJongh
Masaki Takashi or Luis Vaca-Soto, World Bank
Craig O'Conner, U.S. Export-Import Bank (invited)

SESSION III:
Policy - Government's Role

Ray Costello, Dept. of Energy
J.P. Dowd, Senator Leahy's Office
Janet Cushman, ORNL

LUNCH

December 9, 1997

Tuesday

SESSION IV:
Creating Market Opportunities for Biomass Energy

Ken Campbell, MnVAP
Ron Buckhalt, AARC

DISCUSSION:
Issues & Options for Biomass Energy

David C. Allen, Wheelabrator Environmental Systems, Inc.
Ralph Overend, NREL
Larry Mansueti, Dept. of Energy

Who Should Attend?

- Equipment Manufacturers
- Companies/Organizations interested in entering the biomass energy market
- Power Producers/Rural cooperatives
- Congressional & Legislative staff
- Government officials and Government Agency staff
- Public Interest and Policy Groups (Energy, Agriculture & Forestry)
- Environmentalist

NBIA/UBECA Workshop

December 8-9, 1997

Meeting Registration

REGISTRATION FEES: Members $50 Non-Members $65

__ NBIA Member __ UBECA Member __ Non-Member

Time is short, Space is limited, so return the registration TODAY!

Name: _____

Title: _____

Company: _____

Address: _____

City, State: _____

Zip, Country: _____

Telephone: _____ Fax: _____

E-mail: _____

Cancellations received by December 1, 1997 will receive a 50% refund. There will be no refunds for cancellations received after December 1, 1997

PAYMENT

___ Check ___ VISA ___ Mastercard

Card No: _____

Expiration Date: _____

Signature: _____

Please send payment with registration form to NBIA/UBECA Workshop, NBIA, 122 C Street, NW, Washington, DC 20001

NBIA and UBECA have arranged for a discount with US Airways for travel to the workshop. The discount consists of 5% off First or Business Class or 10% off unrestricted coach. The discount fares require at least 7-day advance reservation and ticketing. To receive the special airfares call 800/334-8644 and refer to *gold file no: 72170448*

The Jefferson

Sixteenth & M Street, Washington, DC 20036

Phone: 202/347-2200 or 800/368-5966 **Fax:** 202/331-7982

A special NBIA/UBECA Workshop room rate of $180/ single plus 13% DC tax and $1.50 hotel tax has been reserved. You must guarantee your room reservation by November 24, 1997 with a credit card to ensure the group rate.

For additional information contact:

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UBECA Strategic Planning Meeting

Jefferson Hotel
Washington, D.C.
December 8, 1997

Agenda

I. 1998 Activities

1. Government Relations
   - Legislative Alerts

2. Outreach and Education
   - RECRUITMENT
   - COMMUNICATIONS
     - Recruitment Literature
     - Updated UBECA Directory
     - Web Site
     - Trade Journal Articles
     - Press Releases
     - Industry Statements
     - Brown Bag Seminars
     - Workshops/Conferences
     - Publications
       -- Proceedings
       -- Reports

3. Technical/Market Analyses

   - Provide clearinghouse function only

4. Commercialization Strategies

   - Financing/Development Workshop
   - Project Investment Network
   - Project Opportunities Study

5. Management and Administration

II. Other Ideas, Strategies, Priorities, or Areas of Interest

III. Subcommittees Based on Member Interest

IV. Open Discussion

Final Registration List

Biomass Energy: Dynamic Solutions to Global Problems
The Jefferson Hotel
Washington, DC
December 8-9, 1997

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BIOMASS ENERGY'S ROLE IN CARBON SEQUESTRATION AND REDUCTION

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Presentation to
National BioEnergy Industries Association (NBIA)
and
United BioEnergy Commercialization Association (UBECA)
in
Washington DC
9 December 1997

Fossil Carbon Mitigation

- If sustainable and closed-loop, biomass has role
- With super high yield crops, biomass could have 25% role
- Reduction = displace a fossil source (present or future)
- Fossil energy use can be <7% of biomass fuel value, so net greenhouse gas reduction is at least 93%
- Sequestration = grow but don't burn nor allow decay

"Mitigation Curve" for Biomass Cofiring

Input

- Supply versus cost for low-cost biomass (wood wastes?)
- Categories of cofiring: % wood, boiler type, feed mode

Intermediate Step

- Capital and operating costs of cofiring (increment over base)
- Performance considerations, especially moisture losses

Output: CO_2 reduction vs. cost to get increments of reduction

What are the hurdles to Biomass Commercialization?

- Logistics of Collection and Transportation of Fuel.
- Price
- Application of tax credit only to "closed-loops" biomass
- Regulatory Issues
- Economic and Financial Issues
- Technology Performance needs to be demonstrated
- Geographic factors
- Public Perceptions of Biomass as a "Consumer of Forests"
- Acceptance of Co-fired Ash

How can the Hurdles be overcome?

- Marketing and public relations: Identify what makes biomass an attractive alternative and publicize it.
- Broaden the definition of what constitutes "closed loop" biomass
- Give tax credits to farmers who practice conservation and produce energy crops
- Initiate a government/private sector dialogue. Encourage both government and private sector financing for commercial projects.
- The term "tax credit" needs to be more specifically defined.
- Involve municipalities in biomass energy projects. Identify what will make biomass attractive to municipalities.
- Reinforce the image of biomass as green power and mainstream technology (need more units in operation).
- Get EPA and other government agencies to distinguish "renewable carbon" from "fossil carbon".
- Demonstrate the viability of co-firing and solve the supply issue.
- Involve the forest products industry
- Develop advanced modular biomass units (50 KW – 5 MW) that can be packed and shipped overseas.
- Government involvement in the form of tax incentives is important, but we also must demonstrate a viable technology that can sell.

- Understand the fundamental socioeconomic issues that make biomass energy attractive. Tax credits are only transitory.
- Demonstrate that biomass can be used for district heating, as well as for power generation
- Leverage private investment with public funds set up as a "Renewable Energy Fund" to help limit the risk.
- Have a good understanding of the regulatory climate.

Looking to the Future:
The Department of Energy's Role in Developing Biomass Resources

Why?
What?

Janet H. Cushman and Lynn L. Wright
Oak Ridge National Laboratory
Oak Ridge, Tennessee
December 9, 1997

Biomass resources will determine the size of the bioenergy industry

- They are diverse
- They have competing uses
- They can be increased through R&D

Resource questions become more important

- With scale
- With time

Questions about both future and current resources revolve around

- Cost
- Quantity
- Environmental effects

Cost? Quantity? Environment?

Long-run questions focus on:

- Competition with food and fiber
- Sustainability

The Department of Energy's long-run research emphasizes energy crops

Although wood and wood wastes, municipal solid wastes, and crop residues are all important potential resources ..., energy crops are the most tempting prize.

Union of Concerned Scientists
Powering the Midwest (1993)

Species Screening 1979-1989

Selection of model species reflected cost, quantity, and environmental considerations

- Perennial
- Productive
- Efficient

Crop Development 1986-Present

Virtual crop development centers are increasing productivity and reducing production costs for poplar and switchgrass

- Genetics
- Physiology
- Management

Current and long-run resource availability are different issues

- U.S. farmers are looking for new markets, including energy
- Integrating energy crops with food production barely explored
- Reclamation, remediation, and recycling wastes could increase resource base

Cost? Quantity? Environment?

Near-term questions focus on:

- Comparisons with other energy options
- Rate of adoption
- Effectiveness as solutions for environmental problems

The Department of Energy's near-term feedstock research includes:

- New tools for integrated analysis
- Links to USDA analysis systems
- Carbon cycling studies
- Scale-up and feasibility projects
- Support to demonstration projects

BIOCOST: A tool to estimate energy crop costs on a PC

- Approximates average production costs
- Users can change inputs
- Distributed on diskette

ORECCL: Oak Ridge Energy Crops County Level database

- 43 crop-related variables per county
- Includes BIOCOST production cost estimates
- Available on world-wide web

11-State GIS-based Study

- Includes transportation networks
- Enables exploration of relationships between facility size and feedstock costs

USDA's POLYSIS modeling system

- DOE/USDA project
- Adds energy crops to agricultural sector model
- Enables assessments of relationships with food crops

Scale-up and demonstration projects are "multiple use" sites for research

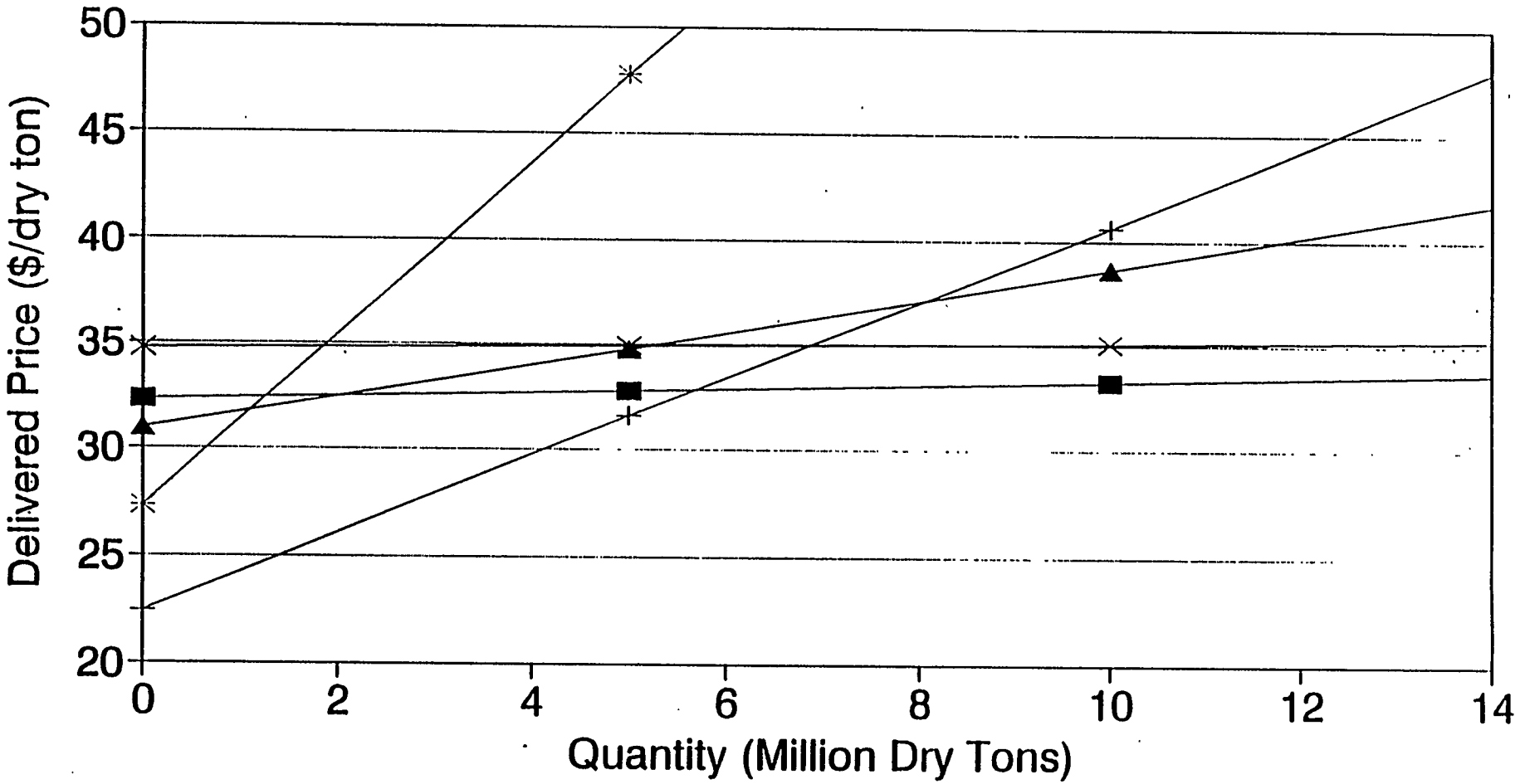
- Production economics
- Operational scale productivity
- Landowners/producer relationships
- Environmental research

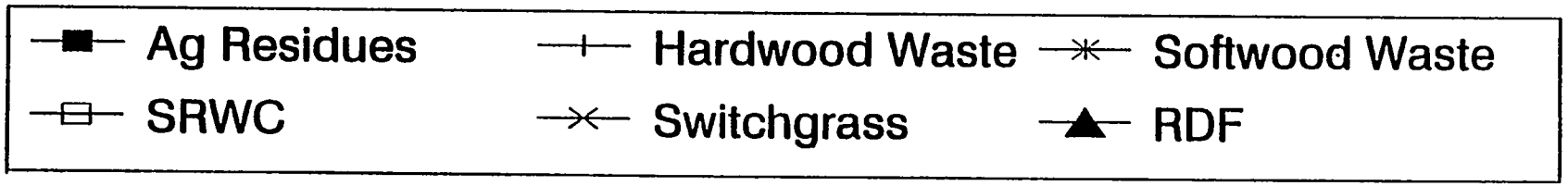
Cost? Quantity? Environment?

DOE supports investments in bioenergy with research to understand and enhance biomass resources

Feedstock Supply Curves--2000

Moderate Scenario





Department of Energy
Biomass Power

Dan Reicher
Assistant Secretary for
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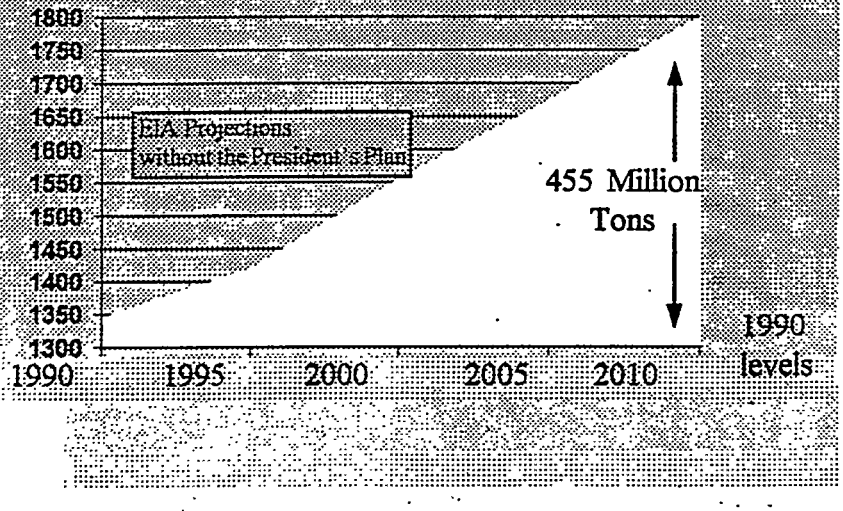
U.S. Department of Energy

Projected Carbon Emissions (mmt)



President's Three Stage Approach

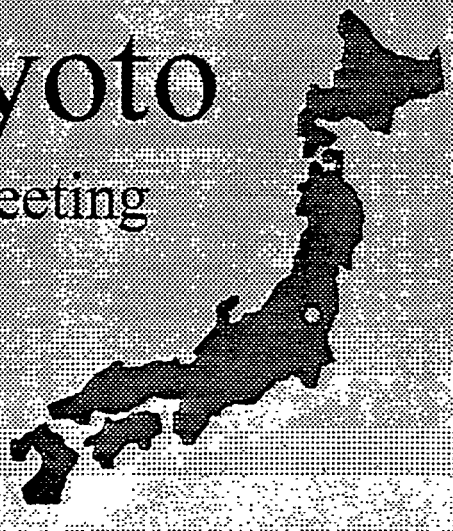
- 1997 Prime the Pump
- 2004 Review and Evaluate
- 2008-2012 Meet Binding Targets

President's Action Plan

- $5 Billion in Tax Cuts and Federal R&D
- Credit for Early Action
- Industry-by-Industry Consultations
- Encouraging the Use of Energy-Efficient Products
- Federal Procurement and Energy Use
- Electricity Restructuring
- Setting a Concentration Goal
- Bilateral Dialogues
- Economics and Science Reviews

Kyoto

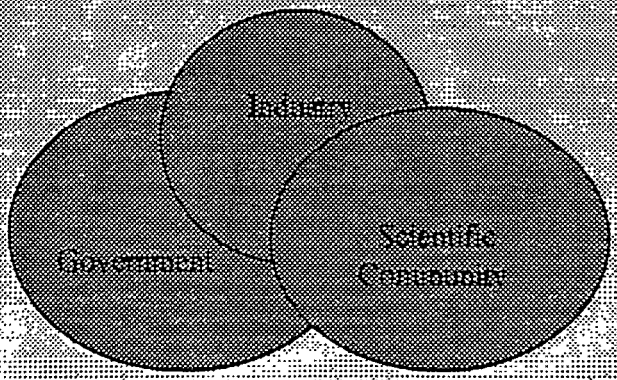
Meeting



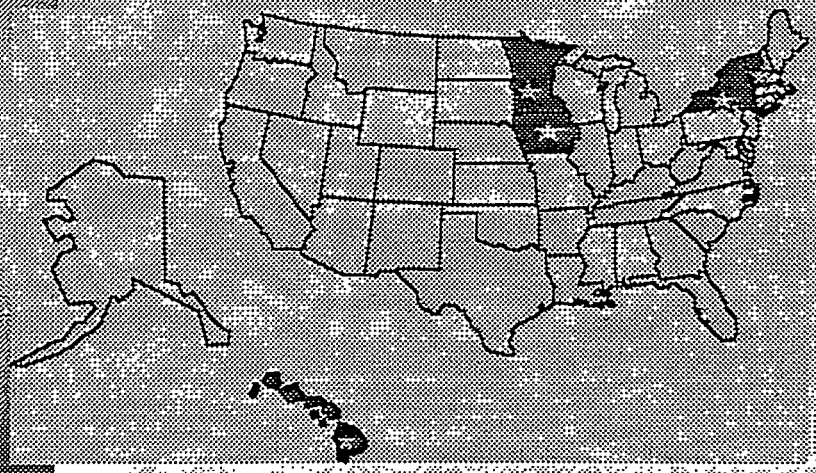
Other Drivers

- Electric Restructuring
- Clean Air
- Energy Security

Synergistic Partnerships



Biomass Power Across America



Biofuels/Biopower Budget
Administration's Request
($000)

Program Activity	FY 1996	FY 1997	FY 1998
Biofuels	42,099	40,540	40,040
Biomass Power	38,281	40,350	36,500
Total	80,380	80,890	76,540

Biofuels/Biopower Budget
Congressional Appropriation
($000)

Program Activity	FY 1996	FY 1997	FY 1998
Biofuels	27,180	27,328	31,150
Biomass Power	28,120	27,375	28,600
Total	55,300	54,730	59,750

Major Challenges

- Institutional
  - Utility Restructuring
  - Legislation
- Technical
  - Sustainability
  - System Integration

Future Opportunities - New Initiatives

- Co-firing
- Modular Systems

United BioEnergy Commercialization Association

UBECA

Program Plan and Budget
FY 1998

Presented to:

UBECA Board of Directors

July 29, 1997

ENERGETICS

Corporate Overview - Energetics, Incorporated

- Established in 1979
- Employs over 100 energy and environmental professionals
- Business Areas
  - Energy Technology and Market Assessment
    - Energy Conservation: Process Characterization in Energy Intensive Industries, Transportation and Buildings Sectors
    - Electric Power Conservation and Utility Programs
    - Fossil Energy Programs
  - Technical and Management Services
    - Strategic and Program Planning
    - Technology Development and Technology Transfer
    - Training and Outreach
  - Environmental Services

Recent Biomass Energy Publications by Energetics

1. *Summary of State-by-State Data Collection: Wood Energy Use in the Northeast - Economic Impact Analysis.* Prepared for the CONEG Policy Research Center, Inc. under subcontract to Resource Systems Group, September 1994.

2. *Survey of the Wood Energy Industry in the Northeast.* Prepared for the CONEG Policy Research Center, Inc. under subcontract to Resource Systems Group, September 1994.

3. *Economic Impact Analysis of Ethanol Production.* Prepared for the Western and Great Lakes Regional Biomass Energy Programs, July 1994 (Draft).

4. *Economic Impact Analysis of Wood Energy Use.* Prepared for the Western Regional Biomass Energy Program, July 1994 (Draft).

5. "The Environmental Externality Costs of Petroleum". Prepared for the Western and Great Lakes Regional Biomass Energy Programs and presented to a meeting of the Governors' Ethanol Coalition, June 1994.

6. "The National Security Costs of Petroleum". Prepared for the Western and Great Lakes Regional Biomass Energy Programs and presented to a meeting of the Governors' Ethanol Coalition, June 1994.

7. "The Economic Impact of Ethanol Production Facilities -- Four Case Studies." Prepared for the Western and Great Lakes Regional Biomass Energy Programs and presented to a meeting of the Governors' Ethanol Coalition, June 1994.

8. "Fuel Ethanol -- A Review of Recent Economic Impact Analyses". Prepared for the Western and Great Lakes Regional Biomass Energy Programs and presented to a meeting of the Governors' Ethanol Coalition, June 1994.

9. "Petroleum and Ethanol -- A Trade Deficit Analysis". Prepared for the Western and Great Lakes Regional Biomass Energy Programs and presented to a meeting of the Governors' Ethanol Coalition, June 1994.

10. "Biofuels and Job Creation" *Biologue*, February 1993.

11. "Biofuels Economic Impact Assessment". Presentation to a joint meeting of the Ad Hoc Committee/Agricultural Resource Group of the Western Regional Biomass Energy Program, October 5, 1992.

12. "Environmental Externalities: Status of State-Level Activities." Paper delivered to a meeting of the Agricultural Resource Group of the Western Regional Biomass Energy Program, September 12, 1990.

Recent Biomass Energy Analyses Performed by Energetics

For DOE Office of Utility Technologies:

- Review of Technology Characterizations
  - Biomass Co-Firing
  - Direct-Fired Biomass
  - Biomass Gasification

- Case Study - Analysis of the Switchgrass Electric Generation Concept proposed by Senator Tom Harkin (D-IA)

For DOE Office of Industrial Technologies:

- Technology R&D Roadmap- Forest Products Industry

Initial Contacts Have Been Made

- U.S. DOE Biomass Power Program
  - Ray Costello, Lynne Gillette, Gary Burch
- DOE-FE Office of Coal and Power Systems: Vic Der
- DOE-FE Office of Advanced Research: Howard Feibus
- DOE-FETC
  - Perry Bergman, Phil Goldberg, Mark Freeman
- NBIA: Scott Sklar, Karen Seho
- EPRI: Evan Hughes
- University of Pittsburgh: Jim Cobb
- NREL: Kevin Craig
- GPU Genco: Joe Battista
- Union of Concerned Scientists: Paul Jefferiss
- MIT: Howard Herzog