DOE/OR/21389--T24

NORTHEAST REGIONAL BIOMASS PROGRAM

FIRST AND SECOND QUARTER REPORTS

OCTOBER - MARCH 31, 1995

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NORTHEAST REGIONAL BIOMASS PROGRAM

FIRST AND SECOND QUARTER REPORTS

OCTOBER - MARCH 31, 1995

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JULY 1995

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INTRODUCTION

The Northeast Regional Biomass Program (NRBP) is comprised of the following states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont. It is managed for the Department of Energy (DOE) by the CONEG Policy Research Center, Inc.

The Northeast states face several near-term barriers to the expanded use of biomass energy. Informational and technical barriers have impeded industrial conversions, delaying the development of a wood energy supply infrastructure. Concern over the environmental impacts on resources are not well understood. Public awareness and concern about safety issues surrounding wood energy use has also grown to the point of applying a brake to the trend of increases in residential applications of biomass energy. In addition, many residential, commercial, industrial, and commercial energy users are discouraged from using biomass energy because of the convenience factor. Regardless of the potential for cost savings, biomass energy sources, aside from being perceived as more esoteric, are also viewed as more work for the user.

The Northeast Regional Biomass Program (NRBP) is designed to help the eleven Northeastern states overcome these obstacles and achieve their biomass energy potentials. The objective of this program in the current and future years is to increase the role of biomass fuels in the region's energy mix by providing the impetus for states and the private sector to develop a viable Northeast biomass fuels market.

The NRBP constitutes an innovative blend of public-private cooperation that involves state and federal governments, regional and national organizations, and key industrial concerns in the Northeast. The program has been designed with three basic features:

- A state grant component that provides \$30,000 (with a 50 percent match requirement) to each of the eleven northeastern states to strengthen and integrate the work of state agencies involved in biomass energy.
- A series of technical reports and studies in areas that have been identified as being of critical importance to the development of wood energy in the Northeast.
- A long-range planning component to identify long-term regional efforts necessary to spur greater development and use of biomass energy in the Northeast.

This report covers the period October 1, 1994 through March 31, 1995.

PROGRAM GOAL & OBJECTIVES

The overall goal of the Northeast Regional Biomass Program (NRBP) is to increase the production and use of biomass fuels from indigenous feedstocks, including wastes, in a manner that will create jobs, reduce dependence on imported energy, and provide an overall environmental benefit for the Northeast region. In order to achieve its goal the NRBP uses three basic approaches: provides grants to states; conducts regional technical projects; and engages in an on-going planning and review process to ensure private sector input and to ensure a responsive program.

The program's technical focus is on; waste utilization, environmental benefits of biofuels, and potential of bioenergy to create jobs. The approach to achieve these objectives places emphasis on technology transfer and partnership building. The NRBP believes that there are many cost effective and proven biomass technologies that are not being adopted by the regions energy consumers due to their lack of product knowledge and the difficulty in overcoming institutional barriers. The creating partnerships will allow the NRBP to leverage its resources and reach a broader audience of energy consumers.

To achieve this overall goal, the NRBP has multiple objectives. These are to:

- 1) improve the effectiveness, coordination, and planning capabilities of the state agencies in the region which have biomass energy related responsibilities;
- 2) assess the technologies, resource availability, and end-use strategies for the conversion of dedicated feedstocks, wastes, and waste by-products to energy;
- 3) provide reliable information to industrial companies, residential, commercial, and public institutions about the potential and versatility of biomass energy resources;
- 4) transfer the results of government-sponsored research and development to the public and private sector;
- 5) support region-specific and interregional studies of the critical impediments to the further development of biomass energy resources, and to support region-specific and interregional demonstration projects of market-ready biomass energy technologies;
- 6) educate Governors and senior state policy makers about the potential benefits arising from managing and converting biomass energy resources, its capacity to create jobs, and to combat air pollution and global climate change;
- 7) coordinate the NRBP with other federal, state, and regional efforts to avoid duplication and maximize the effectiveness of NRBP dollars; and

- 8) coordinate the NRBP activities with the Boston, New York, and Philadelphia DOE Support Offices and the energy offices in each of the 11 NRBP states to transfer biomass technology.

MANAGEMENT REPORT

This section provides a brief description of the; communications and outreach, partnership building, technology transfer and education activities for the past quarter. These activities may include: attending conferences or workshops for the purpose of informing others about the NRBP; learning about new technologies or the activities of other organizations; distributing NRBP materials or educating energy producers and consumers; or attending meetings for the purpose of building partnerships to promote the objectives of the NRBP.

October

- 2 Conducted NRBP steering committee meeting Reno, NV
- 3-6 Master of Ceremonies Bioenergy 94 Reno, NV
- 11 Meeting with Connecticut Commissioner of Agriculture on potential for demo project for small scale farm anaerobic digester
- 12 Conducted NRBP forum "Siting an Ethanol Plant in the Northeast" Hartford, CT
- 18-20 Made presentation at DOE All States conference Biloxi, MS
- 25 Attended a workshop jointly sponsored by USDA and DOE seeking input on energy crops in Burlington, VT
Issued RFP "Air Emission Testing of Two Wood-chip Fired Furnaces"
- 26 Meeting with Cindy Jacobs EPA on coordination of activities to support energy recovery from landfill gas
- 28 Meeting with Richard Moore and Ron Santaro DOE, briefing on NRBP activities

November

- 1&2 Governors' Biomass Roundtable Washington, DC
- 3 Conducted NRBP steering committee conference call
- 30 Conducted Meeting with John Lewyta, Steve Fitzpatrick and Steve Morgan on the Biofine technology Boston, MA

December

- 5-7 Attended Bio Products Expo Kansas City MO
- 13&14 Attended Governors' Biomass Roundtable Albany, NY
- 15 BERA Luncheon
- 21 Attended Pennsylvania Energy Office meeting on Co-Firing Harrisburg, PA

January

- 1 Entered in contract with NEOS Corp. to complete biomass facilities directory
- 9 Attended a meeting with DOE biomass program manager and EPA consultant Larry Good on increasing biomass awareness for FEMP renewable committee Wash, DC
- 10 Conducted conference call for Governors' Roundtable
- 13 Conducted conference call to review proposals for NRBP project to measure emissions from small wood-chip furnaces, selected Environmental Risk Ltd. of Bloomfield CT.
- 24-26 Attended RBEP strategic planning meeting Platt City, MO
- 30-1 Conducted NRBP steering committee meeting Pittsburgh, PA

February

- 3 Meeting with Wenda Tucker and Karen Conklin. DOE NY Support Office, on NRBP Fiscal reporting
- 14 Conducted a conference call on NRBP externalities report
- 15 Attended Capitol Hill reception sponsored by Governors Ethanol Coalition
- 16 Attended Governors Ethanol Coalition meeting Wash DC
- 17 Meeting with Steve Morgan on NRBP technical projects

March

- 6 Meeting with M. Voorhies, M. Adra, J. Easterly on options to promote RBEP and expanded use of RBEP display Wash DC
- 17 Attended UBECA brown bag lunch Wash DC

PUBLICATIONS

- Report on a Forum: Establishing an Ethanol Production Facility in the Northeast - December 1994
- Report on a Forum: Co-Firing Wood With Coal in Utility Boilers in the Northeast - November 1994
- Bibliography: Co-Firing Wood and Coal - October 1994
- CONEG Governors' Biomass Roundtable, Interim Report - January 1995
- Northeast Regional Biomass Program: Retrospective 1983 - 1993

STATE GRANTS

Connecticut

Assistance was provided to Richard Wills, President and CEO of Waste Conversion Technologies, Inc. in Milford with his proposal to NREL under the STEP program. Contact was made with Richard Wills, at the Ethanol Forum held October 12, 1994 Connecticut. As a result of the January 12 workshop on landfill gas recovery the Connecticut Resource Recovery Authority issued a request for proposals to convert the LFG presently at the Hartford Landfill. Connecticut is promoting the concept of insurance company investment into other Connecticut based clean energy industries as a way to mitigate global climate change. In January a Connecticut Critical Industries Fund bill was introduced. It has support from both co-chairs of the Energy & Technology Committee.

Delaware

Effective January 1, 1995, Austin Short III is Senior Resources Planner with the Delaware Department of Agriculture. Julia Klapproth will now serve on the Biomass Steering Committee. Twelve-hundred Residential Fuelwood Survey postcards were sent out, followed up with two more mailings and then a phone call. There was a sixty percent response. A final report is due April 30, 1995. Money from Delaware's 1995 NRBP grant with a contribution from Delmarva Power will be used for a Hybrid Poplar (Biomass for Energy) Demonstration Project. Seven tree species and eight hybrid poplar clones for potential biomass energy production will be evaluated. Due to local opposition the KES proposal to build a wood-fired power plant has been dropped. Eastern Shore Forest Products in Maryland has expressed interest in producing pellets for home stoves. Delaware was contacted to see if they be interested in helping with a promotional campaign for pellet stoves. This spring the Delaware Forest Service hopes to begin a timber tracking system to tie in with their new timber harvest regulations. On January 24-26 Delaware was represented at the US Forest Service Ecosystem Management & Urban Forestry Workshop.

Maine

Preliminary contact has been made with possible co-sponsors of a wood energy seminar. On November 11, a briefing was made on pellet production opportunities to the Town of Greenville economic development subcommittee on forest products. Guidance and participation was provided to the following activities; the state energy plant, the energy and environmental study; and the green house gas project. "In the Aftermath of PURPA: The Future of the Biomass Energy Industry in Maine" will be presented at the Second Biomass Conference of Americas. A private sector energy developer is exploring the potential for a wood ethanol plant in Maine. Information on bio-diesel in marine applications was shared with the boating writer at the Maine Sunday Telegram.

Massachusetts

Massachusetts has continued with its promotion of waste wood, liquid wastes and solid wastes in the production of energy. DOER was the contact for the Clean Woodstove Exchange. Devonrue, Ltd. completed an assessment of the technical, regulatory and economic feasibility of renewable energy resources at a landfill in Nantucket. DOER has received various grants to fund the incremental costs of four CNG-fueled buses for MASSPORT and to develop electric power infrastructure. DOER submitted a proposal to NREL in partnership with Twin Rivers Technology, Inc. as part of NREL's STEP program. DOER with the U.S. EPA and Massachusetts DEP have signed a memorandum of understanding to develop an outreach program to recover and utilize landfill gas as an energy resource. DOER is planning to respond to DOE's solicitation on heavy duty vehicles.

New York

New York is expanding the public education program on wood stoves. The video "The Right Way" was distributed to thirty-eight television stations. The "How to Burn Wood Right" brochure is in reproduction. A postcard survey to go with the brochure is being researched, prepared and printed. The wood stove education package, "Your Fireplace and Woodstove Survival Kit" is being reprinted and distributed. Brochures and video tapes were distributed over the heating season along with the survey. Responses to the survey were light. NY supported the Forest Management Practices Workshop held on April 6 and 7. The Energy Authority and the NYS Department of Economic Development put on a workshop with representatives of the paper industry to discuss sludge disposal and how to produce energy from it. Five hundred thousand dollars has been allocated for a proposal to demonstrate technologies that either produce energy products or increase the energy efficiency of sludge management.

Pennsylvania

The Pennsylvania Energy Office and the Department of Environmental Resources have entered into a Memorandum of Understanding with EPA on the promotion of landfill gas recovery. There are plans for a Landfill Gas Recovery Workshop and the Primer that is being suggested by EPA into Phase III of their Greenhouse Gas/Global Warming Action Initiative. EPA is funding a grant with the California University of Pennsylvania that will sponsor the workshop and write the Primer. The Warren State Hospital converted boiler has been successful and is estimated to save the Commonwealth of Pennsylvania \$400,000 a year. A video on the Wood Energy Works in the Northeast is set for completion. The Pennsylvania Wood Energy Program helped sponsor a one day forum Co-firing Wood with Coal. About forty individuals attended. The PA Energy Office and Royal Resources in Germany have been working on Electro-Farming. Electro-Farming not only uses switchgrass, but also uses a mobile wet pelletizer to harvest and pelletize the grass at one time. CONEG's biomass contact has been working with Wefelmeyer and Davis on their effort to receive DOE funding to site their ethanol plant in Clearfield, PA. The biomass contact has also been working with

Penelec on a proposal to the PA Energy Office to fund a co-firing study at one of their utility plants. Various technical and outreach assistance was provided.

Vermont

Vermont is facilitating the development of a demonstration project for biomass gasifier technology. The survey to promote residential wood energy use in Vermont is completed but not yet published. The survey is a biannual survey of residential homes in the state. Vermont is working with the Superintendant's Association on wood chip procurement. DPS continues to give assistance on a project dealing with schools who have chosen or are planning to use wood chips for space heat. DPS assisted with the air emissions testing conducted by ERL. Results are expected by mid-summer. Chip supply bids expected for late summer. The Commercial and Light Industrial Wood-Chip Fired Systems video is in the planning stages and will soon be underway and completed. In order to support wood energy market opportunities such as district heating a grant will be applied to assist with a feasibility study.

**NORTHEAST REGIONAL BIOMASS PROGRAM
TECHNICAL PROJECTS STATUS REPORT
APRIL 1995**

COMPLETED PROJECTS:

Title: Economic Impacts Study
NRBP Funding: \$40,000
Contract Period: April 1993 - August 1994
Completion Date: extended to December 1995
Objective: Document and estimate the dollar savings, direct and indirect economic impacts, including job creation, associated with the wood energy industry.

ACTIVE PROJECTS:

Title: Comparative Analysis of Landfill Gas Technologies
NRBP Funding: \$40,000
Contract Period: April 1993 - June 1995
Status: Tasks 1-7 completed; In late 1994 NREL funded new task: analysis of fuel cell technology, Final analysis not yet completed.
Objective: To compare and evaluate several gas-to-electricity technologies for their economic and environmental costs and benefits.

Title: Lessons Learned III: Woodstove Emissions
NRBP Funding: None
Contract Period: April 1994 - June 1995
Status: Campaign complete; 200+ stoves sold; customer questionnaires not yet analyzed.
Objective: To increase awareness among consumers of improved safety and performance of wood stoves and to enhance consumer purchases of clean-burning wood stoves in the Northeast. To continue the momentum of last years Wood Stove Changeout campaign.

Title: Biomass Facilities Directory
NRBP Funding: \$8,700
Contract Period: January 1, 1995 - March 31, 1995
Status: final data collection format completed (Task 3); Tasks 1,2 & 4 partially completed. Final telephone interviews completed, but only 55 facilities profiled. Contractor and CONEG mutually agree to terminate contract. NEOS under contract to complete survey and final report by June 1995.
Objective: The primary objective of this project is to compile a comprehensive, updated database of industries, businesses, institutions and utility companies using biomass for fuel in the eleven northeastern states.

ACTIVE PROJECTS CONT.:

Title: Ethanol Facility Siting Solicitation
Contract Period: September 1993 - June 1995
Objective: To facilitate the siting of an ethanol plant utilizing biomass feedstocks.

Title: A Methodology for Environmental Externalities: Accommodating Biomass Feedstocks
NRBP Funding: \$49,935
Contract Period: April 1993 - August 1994; extended to June 1995
Status: Draft interim report completed; Final report due May 1995 10, 1994
Objective: To propose a credible methodology for incorporating the CO2 sequestration impacts of growing biomass in an externalities methodology; to identify existing PUC methodologies which are most amenable to such an application.

Title: Governors' Roundtable
NRBP Funding: \$30,000 has been allocated to cover the site costs, facilitator expenses, and travel costs for certain stakeholders.
Contract Period: November 1993 - June 1995
Status: Draft final report done in January 1995; May meeting will add sections for final report, due June 1995
Objective: The Biomass Round Table is a convening on invited stakeholders, representing all aspects of production, consumption and regulation of biomass derived energy.

Title: Study of Emissions From Small Wood-Fired Boiler Systems
NRBP Funding: \$40,000 is NRBP share; Cost sharing, \$6,000 has been provided each by the state of Vermont and the Canadian Combustion Research Laboratory. In-kind assistance from Public Service Department and Department of Air Quality represents another \$5,000 in support.
Contract Period: Final report is expected in August 1995
Objective: Test a few existing boilers for particulate emissions.

STATUS REPORTS: CONTRACTOR SELECTION OR NEGOTIATIONS PENDING

Title: Biomass for Public and Institutional Building: A Conference and Technology Exhibition
Budget: \$30,000
Proposed Project: Stage a conference and technology exhibition for facility managers and other decision-makers for public buildings.

**STATUS REPORTS: CONTRACTORS SELECTION OR NEGOTIATIONS PENDING
CONT:**

Title: Co-Firing Wood and Coal In Utility Boilers
Budget: \$40,000
Proposed Project: A roundtable to discuss the key issues was held on September 27 in Pennsylvania. It led to the formulation of the attached work statement and pending contract.

Title: Liquid Fuels Resource Assessment Follow-up
Proposed Project: The first step is the resource assessment, to be completed later this summer. The next steps are identifying what the developers think are obstacles in the region.

Title: Siting and Ethanol Plant in the Region
Budget: \$40,000
Proposed Project: The first phase of the project is to gather information concerning state-by state regulations and incentives affecting the siting of a plant.

Title: Addressing Pellet Stove Customer Needs For Information
Budget: \$40,000, of which NRBP share is \$5,000
Proposed Project: To understand the informational needs of current and prospective residential pellet stove owners. A telephone survey will be taken and phase II will be an appropriate response to the needs revealed in the survey.

Title: Organization and Sponsorship of Phase I Consumer Attitude Research.
**Proposed Project
& Budget:** To draft and pretest a quality questionnaire, collect mailing lists, sample appropriately, survey 125 stove owners in each of four regions, analyze the results, and write a report will cost \$16-20,000, depending in part how much assistance the industry can provide in generating customer lists for the contractor.
Phase II, the generation of brochures, videos and other informational and/or promotional materials would cost in the range of \$25,000 to \$150,000 depending upon the range and extent of the activities recommended.

Title: Biomass Consultant to Assist with Technology Transfer of Completed Projects.
Budget: \$30,000
Proposed Project: To secure the services of a communications and public relations specialist to assist with drafting feature articles, getting them placed in both trade and general publications, and generally assisting in communicating our message effectively to both general and technical audiences.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

April 1995

SUMMARY REPORTS: COMPLETED PROJECTS

Title: Update on Economic Impacts Study

Rationale: The widespread public perception that wood energy is at best a marginal contributor to the energy mix handicaps the industry's clout in regulatory and public policy arenas. A well-documented study updating an older estimate of the job creation and economic development impacts of the industry would help improve its prospects.

Objectives: Document and estimate the dollar savings, direct and indirect economic impacts, including job creation, associated with the wood energy industry.

Approach: Establish a structure and parameters of economic impact model. Provide a simplified version that states can run on a PC to determine the impact (on such outcomes as direct and indirect employment, income, and energy cost savings) of projects that increase the state's overall wood energy use. The model should at a minimum be able to estimate direct and indirect employment impacts, as well as impacts on income and fossil fuel displacement, and to distinguish between residential and commercial/industrial wood energy use impacts. The model should account for employment and income that might have been generated by energy sources (e.g., oil) displaced by wood energy. Data on employment and income and economic multipliers for oil and other energy sources will be calculated from available published and unpublished sources.

Tasks:

Phase 1: Economic Impact Model

Task 1.1 - Consult with CONEG and Northeast States on Final Product Needs.

Task 1.2 - Design Economic Impact Model.

Tasks 1.3 and 1.4 - Program and Test-Run Model on Mock Data.

Phase 2: Survey Employment and Economic Characteristics of Wood Energy Industry

Task 2.1 - Design a Survey of Employment and Salaries.

Task 2.2 - Conduct the Survey and Interpret the Results.

Phase 3: Compile Data and Estimate Present Economic Impacts.

Task 3.1 - Compile Wood Fuel Use and Plant Data on a State-by-State Basis.

Task 3.2 - Estimate Present Wood Energy Use.

Task 3.3 - Run Model to Estimate Present Economic Impacts.

Phase 4: Develop Scenarios

Task 4.1 - Develop Wood Energy Use Scenarios for the States.

Task 4.2 - Run Model to Estimate Economic Impact through 2010.

Tasks 4.3 and 4.4 - Develop Simplified Project Version of the Economic Impact Model for PC and Write a Supporting Manual and Workbook.

Task 4.5 - Test and Assist States in Use of the Project Model.

Phase 5: Reporting and Presentations

Task 5.1 - Compile Final Report.

Task 5.2 - Regional Presentations

Contractor: Resource Systems, with assistance from Energetics

NRBP Funding: \$40,000

Contract Period: April 1993 - August 1994, extended to December 1995

STATUS REPORTS: ACTIVE PROJECTS

Title: Comparative Analysis of Landfill Gas Technologies

Rationale: The LFG industry is still emerging in the United States. There are four-five technologies which are recently commercialized or not yet commercialized which are deserving of comparative analysis for their application to landfills.

Objectives: To compare and evaluate several gas-to-electricity technologies for their economic and environmental costs and benefits

Approach: Through interviews, literature reviews and analysis, compare costs and benefits of alternative conversion technologies

Tasks:

- (1) Select and describe a typical landfill gas composition.
- (2) Perform a comparative analysis among several technologies, looking at both economic and environmental (air emissions) costs and benefits, including economic incentives which may be available to LFG projects.
- (3) Given the system designs developed for Task 1, estimate capital investment, operating and maintenance costs.
- (4) Examine existing and pending regulations in the 11-state region as well at the federal level to ascertain whether reduction of emissions due to LFG energy projects qualify for any economic incentives, including off-site emissions reduction credits.
- (5) Determine the types of project partnerships that are necessary to maximize federal economic incentives, in terms of the PTC or the REPI, for each technology considered.
- (6) Obtain from Public Utilities Commissions current purchase prices regulated electric utilities are required to offer for electricity from LFG projects of 5,000 KW capacity or less.
- (7) Obtain from each state's Public Utilities Commission what Environmental Externalities monetary values for air emissions, if any, which are either in effect or being considered.
- (8) Using the information developed in the preceding tasks, perform a comparative analysis (within the 1000 to 3000 KW range) between all conversion technologies under consideration to compute and tabulate all pertinent parameters associated with each technology, including the following:

efficiency;

capital cost (in total \$ and in \$/KW installed);

power generation cost, cents/Kwh

air emissions in lbs/Kwh.

(9) Prepare a tabulation comparing each conversion technology's air emissions (in lbs./kWh) to those in the system margin of each utility, to the extent available data permit.

(10) Review the CAAA and state regulations to ascertain whether a case could be made for legislative and regulatory action establishing mechanisms to credit the emissions reductions achieved by LFG projects and to enable such credits to be sold to help generate economic incentives for such projects.

(11) Prepare a tabulation comparing information obtained in Task 5 and 6. Also, indicate the states with monetary values for Environmental Externalities that allow trading of off-site emission reduction credits, similar to the case in Massachusetts.

(12) Prepare a tabulation showing air emissions changes at the landfill site (before and following implementation of each LFG conversion technology considered) for several source pollutants.

Status: Tasks 1-7 Completed; In late 1994 NREL funded new task: analysis of fuel cell technology. Final analysis not yet completed

Contractor: SCS Engineers

NRBP Funding: \$40,000

Contract Period: April 1993-June 1995

TECHNICAL PROJECTS - STATUS REPORT

Title: Lessons Learned III: Woodstove Emissions

Rationale: There is too little consumer awareness about the advantages in efficiency and air emissions improvement in the certified wood stove. That the certified stove demonstrates 25% efficiency improvements and 200% emissions improvements over conventional airtight stoves sold before 1989 is a well-kept secret. Stove sales are today about 20% of what they were ten years ago. Both the pace of stove changeouts and consumer interest in purchasing wood stoves for the first time would improve if accurate, compelling information could be directed to consumers.

Objectives: To increase awareness among consumers of improved safety and performance of wood stoves and to enhance consumer purchases of clean-burning wood stoves in the Northeast. To continue the momentum of last years Wood Stove Changeout campaign

Approach: Support the efforts of the Northeast Hearth Products Association, which now assumes responsibility to develop and execute a retail promotion strategy designed to sell stove change-outs. The campaign will be designed to build upon last year's NRBPA/NHPA partnership which developed promotional and educational materials and employed mass media channels. Retailers paid for electronic media "time" or for costs of print media. Last year's project provided ad slicks, newspapers inserts, radio promos, and other promotional materials. The campaign this year will last for one month, beginning February 1. It will be targeted in New England and New York. Last year's campaign sold 550 stoves.

Tasks:

- (1) Assist NHPA in access to New York State's toll-free number to assist consumers with information about clean-burning woodstoves.
- (2) Make available to NHPA and its members without charge the logo, two print advertisements, camera-ready headlines and copy points, a sore banner design, and a product hang tag developed in last year's campaign.
- (3) Develop a customer questionnaire to profile demographic characteristics of participant in the campaign.
- (4) Facilitate NHPA utilization of Steering Committee members in seven states to assist media promotion of campaign in late January and February.
- (5) Assure that NHPA administers customer questionnaire and documents impact of campaign through retailer surveys, phone interviews, review of sales data, or other suitable methods

Status: Campaign completed; 200+ stoves sold; customer questionnaires not yet analyzed.

Contractor: Northeast Hearth Products Association

NRBP Funding: None

Contract Period: April 1994 - June 1995

Title: Biomass Facilities Directory

Rationale: A NRBP-sponsored 1987 directory of industries, businesses, utilities and institutional facilities in the eleven NE states listed about 400 facilities using wood to generate energy in 1986, with an emphasis on facilities using wood to generate more than 3 million BTUs (or 3,000 pounds of wood) per hour. It also provided more detailed information about the operation of biomass energy systems for about half of those facilities. The directory has proven to have widespread application to policy decision-makers and others in the region. Information in the 1987 directory is now six years old--its continued value is increasingly compromised.

Objectives: The primary objective of this project is to compile a comprehensive, updated database of industries, businesses, institutions and utility companies using biomass for fuel in the eleven northeastern states. The second objective is to input information into the modified Biomass Facilities Information System (BFIS), an automated menu-driven database designed to run on any IBM PC or compatible available for bidders interested in developing a project.

Approach: Contractor will conduct a review of existing Directory listings to provide accurate current information in addition to the development of a data base in needed form on new facilities not previously listed. The current Biomass Facility Census Form will be revised to accommodate the data requirements of the BFIS. A report will be prepared describing any cases in which facilities have ceased to use wood since 1987. Quality control checks will assure accuracy of data.

Tasks:

- (1) Obtain amendments to 1987 list of facilities from NRBP Steering Committee members (state contacts).
- (2) Obtain lists of wood-burning facilities for the northeast region from trade associations and air quality offices.
- (3) Revise Facility Survey Form ("Biomass Facility Census Form") to accommodate additional data to be collected for the modified BFIS.
- (4) Update contact and profile information for existing facilities still using wood and compile contact and profile information for facilities to be added to the Directory this year.
- (5) Generate the following documents for the NRBP Steering Committee to review:
 - a. Hard copy of Facility Reports for all facilities in the database.
 - b. Disposition of all facilities surveyed, including facilities which were found not to be burning wood or other biomass, and facilities for which

information could not be obtained despite efforts to contact and solicit information. (This disposition report will constitute the firm's record of attempted as well as successful contacts.)

- c. Quality control report summarizing measures taken to ensure the accuracy of the information gathered and the data entered into the BFIS.

Status: Final Data Collection Format completed (Task 3); Tasks 1,2 & 4 partially completed. Final telephone interviews completed, but only 55 facilities profiled. Contractor and CONEG mutually agree to terminate contract. NEOS under contract to complete survey and final report by June 1995.

Contractor: NEOS

NRBP Funding: \$8,700

Contract Period: January 1, 1995 - March 31, 1995

Ethanol Facility Siting Solicitation

The NRBP has identified the potential of ethanol from biomass feedstocks as a major opportunity, initiating the work with an investigation of resources which might serve as cost-effective feedstocks. The NRBP could facilitate the siting of an ethanol plant utilizing biomass feedstocks in a variety of ways. For example:

- by providing developers and government policy-makers with state-specific information regarding the regulatory steps required to permit an ethanol facility;
- by documenting the permitting history of plants elsewhere in the nation, focusing on the regulatory hurdles and existing economic incentives available from state and local governments;
- by assisting the creation of a transportation fuels market for ethanol or nearly pure ethanol by encouraging states to commit state vehicle purchases to compatibility with such a fuel;
- by identifying the factors in addition to feedstock costs and availability which facilitate an economic facility siting; and
- by making available a consultant to work with regulators and developers to further explore and/or clarify these issues.
- by hosting a forum which brings together developers, regulators, energy officials, feedstock producers, and other interested parties to discuss the issues and findings associated with the siting of a facility;

Contract Period: September 1993 - June 1995

Title: A Methodology for Environmental Externalities: Accommodating Biomass Feedstocks

Rationale: In the valuation processes undertaken by public utility commissions, woody biomass are penalized because their full fuel cycle environmental impacts are not taken under consideration in the calculation of environmental externalities. As a result biomass technologies are treated comparable to coal-burning in impacts.

Objectives: To propose a credible methodology for incorporating the CO₂ sequestration impacts of growing biomass in an externalities methodology; to identify existing PUC methodologies which are most amenable to such an application.

Approach: This project begins with an examination of proposed and existing regulations regarding economic and environmental externalities for PUC action, with an emphasis on how CO₂, NO_x and SO₂ are handled; the project then turns to proposing an appropriate life-cycle evaluation process, considering total fuel-cycle impacts. Job creation and economic impact value-adders are also to be considered; and a strategy for promoting modifications to existing externality methodologies to incorporate these changes will be formulated.

Tasks:

- (1) Carry out a literature review and interviews with consultants, PUC staff, and commissioners to understand and analyze current environmental externality methodologies, featuring total fuel-cycle analysis approaches and economic impacts of specific technologies.
- (2) Draft report outlining the status and key features of existing/emerging technologies, documenting the impacts considered, how values are assigned to those impacts and applied to resource planning.
- (3) Propose one or more approaches for appropriate life-cycle evaluation of biomass energy projects, considering total fuel-cycle impacts.
- (4) Evaluate the arguments for and against establishing an absolute externality value or percentage adder to account for the development of economic development impacts of utilizing various energy resources. Propose an approach and approximate measures of job creation and associated benefits of energy from wood, natural gas, coal, and oil, for subregions within the Northeast.
- (5) Project the likely impacts of the proposed methodology on electric power generation in the region, and on resulting total fuel-cycle emissions levels, electric rates, and job creation within the region as compared with the likely impact of two-three representative IRP methodologies now employed in the region. Address when and how quickly the proposed approach or approaches, if adopted, might affect the regional resource mix.

(6) Identify opportunities to influence or modify the region's resource planning processes. Assess the relative value of promoting such modifications. Given the prospects for adoption of total fuel-cycle approaches, and the likely resulting impacts on the resource mix, outline a strategy for pursuing the recommended modifications.

(7) Draft a final report incorporating the findings, analyses, methodologies and recommendations in Tasks 1-6.

Status: Draft interim report completed; Final report due May 1995

Contractor: Meridian Corporation

NRBP Funding: \$49,935

Contract Period: April 1993 - August 1994, extended to June 1995

Title: Governors' Round Table

Rationale: Biomass is the Northeast's greatest renewable resource for energy production. Biomass, appropriately developed, offers numerous opportunities to diversify the Northeast energy base by reducing dependence on imported energy while meeting the regions's tough emissions requirements. The development of a locally-based biomass fuels industry would lead to the creation of jobs through all phases of the energy production cycle. Yet the potential and benefits of biomass have yet to be fully recognized by all stakeholders such as: policy leaders, investors, environmental groups; utilities; and government.

Objectives: The Biomass Round Table is a convening of invited stakeholders, representing all aspects of production, consumption and regulation of biomass derived energy. Meeting in facilitated sessions, the stakeholders will engage in open, frank, and substantive discussions. The outcome of these discussions will be to arrive at a consensus finding encompassed in an action plan. The action plan will specify: the tasks that must be completed to overcome any institutional, regulatory, or market barriers to increasing the utilization of biomass derived energy in the region; the organizations that must accomplish those tasks; the time frame in which the tasks must be completed and; an estimate of the resources that are needed to complete the tasks.

Approach: A series of professionally facilitated policy forums with an invited group of biomass stakeholders from the region to identify issues and jointly suggest solutions.

Tasks:

- 1) select a facilitator
- 2) select a stakeholder
- 3) conduct facilitated Round Table sessions
- 4) prepare a report on findings and present to CONEG Governors

Status: Draft final report done in January 1995; May meeting will add sections for final report, due June 1995

Contractor: RESOLVE, Abby Arnold, facilitator; EUA Citizens, subcontractor.

NRBP Funding: \$30,000 has been allocated to cover the site costs, facilitator expenses, and travel costs for certain stakeholders.

Contract Period: November 1993 through June 1995

Governors Biomass Roundtable

In May, 1995, representatives of 11 key stakeholders came together in Burlington, Vermont, to focus on the opportunities and issues pertaining to the increased use of biomass energy in the Northeast. Convened by Governor Dean, the 19 Roundtable participants demonstrated a wide range of perspectives and a common commitment to providing the Governors with findings on the potential for and implications of developing this regional resource. Governor Dean welcomed the participants, who represented utilities, private developers, researchers, environmental advocates, consumers, the forest and paper industry, and state regulatory and policy officials.

The first meeting focused on discussions of Roundtable objectives, issues and opportunities associated with biomass energy, as well as on organizational matters. At the second meeting, convened June 14-15 (also in Burlington), participants broke into subcommittees to spend the summer selecting and researching specific issues in the areas of: biomass development potential; economic impact; regulatory and policy issues; and the relationship between increased utilization of biomass and forest management practice.

The Roundtable reconvened in full session on September 13 in New York City to review subcommittee findings and proposed action steps, and to develop a reporting format for findings. The major area of contention is the circumstances under which forestry harvesting is acceptable to the environment. The Governors' Roundtable expects to present its findings to Governor Dean by January 1995.

Proposed Project: Study of Emissions From Small Wood-Fired Boiler Systems

Problem: Institutional building managers are skeptical about the emissions performance of medium-sized boilers, and they are joined in their concern by air regulators who could prevent their siting.

Overcoming the Barriers: Test a few existing boilers for particulate emissions.

The Project: The project has been proposed by the Vermont Department of Public Service (DPS, Energy Efficiency Division). Intended to complement the CT&E efficiency testing, the Wood Chip Heating Guide and a video on heating schools with wood chips, the testing project will be designed to determine the air emissions produced by small (0.5 to 3.0 MMBT-Uh) wood-chip fired combustion systems and to determine the associated health risks, if any. Concentrations and emissions rates will be determined for metals, poly-aromatic hydrocarbons, and dioxins/furans. The Department of Health will conduct an environmental health risk assessment. Every effort will be made to ensure that data collected should be representative of such systems throughout the eleven Northeast states.

The testing program has been coordinated by the Vermont DPS, with Vermont's Department of Environmental Conservation (Air Pollution Control Division - VAPCD) and Department of Health (Environmental Health Division) contributing in-house staff time to monitor and assist the testing consultant and provide quality control and project management/oversight. This cooperative approach will serve both to augment NRBP project funds and to establish the credibility of the findings with the region's air quality and public health regulators who will be one audience for the final report.

Budget: \$52,000; \$40,000 is NRBP share; \$6,000 has been provided each by the state of Vermont and the Canadian Combustion Research Laboratory. In-kind assistance from Public Service Department and Department of Air Quality represents another \$5,000 in support.

Status: Environmental Risk Limited has been selected as the contractor; testing was completed in February and March. Final report is expected in August.

**STATUS REPORTS: CONTRACTOR SELECTION OR
NEGOTIATION PENDING**

Proposed Project: Biomass for Public and Institutional Buildings: A Conference and Technology Exhibition

Problem: Although public and institutional buildings should be excellent candidates for conversions to biomass--both due to high energy bills and to their potential for serving as demonstrations--few buildings have converted to biomass technologies outside of Vermont. One of the most successful markets for conversions to wood heat has been public buildings. An estimated 50 schools, hospitals, prisons and other public buildings in the region have converted to wood heating--some cogenerate as well--in the last several years. Electrically heated buildings, especially schools, have been especially attractive and cost-effective candidates for wood boiler conversions. The vast majority of these conversions have occurred in northern New England. Yet schools and hospitals in Pennsylvania, and a prison in Maryland have recently converted.

To address this market opportunity, the Northeast Regional Biomass Program (NRBP) has tested the efficiency of boilers in these buildings, completed a guide for decision-makers considering wood boilers, and is now testing for air emissions levels. The time is ripe to stage a conference and technology exhibition for facility managers and other decision-makers for public buildings. The purpose is to facilitate boiler conversions to wood energy.

Status: The NRBP has drafted a RFP which is now out to bid. Contractor selection is expected in June.

Budget: \$30,000.

Proposed Project: Co-Firing Wood and Coal In Utility Boilers

Problem: Outside of northern New England and upstate New York, there is not widespread public support for utilizing wood in utility boilers. Nuclear, coal, oil, gas, and a few hydroelectric plants have long dominated the mix of electric generating technologies for the past thirty years. The wood industry is dominated by hundreds of small firms, most of which think of wood fuel as a waste product of their core business activity. There is an abundance of wood available on a renewable basis, but demand for unmerchantable wood, stumps, and processed wood wastes has not materialized in much of the region.

Yet the Clear Air Act of 1990 and the continuing efforts to limit acid rain emissions places escalating pressures on state regulatory authorities to cut back usage of fossil fuels, except for natural gas. The usage of coal is particularly vulnerable in the decades to come, affording wood an opportunity as a co-fired fuel. Because wood has very low sulphur and low Nox emissions, it offers environmental advantages over coal.

Overcoming the Barriers: In 1985 the NRBP conducted a study to determine the feasibility of co-firing wood with coal, focusing on industrial opportunities. Scott Paper Company in Westbrook, Maine has been co-firing with wood for more than a decade. A handful of smaller industrial boilers have also co-fired the two fuels during the past several years. The greater storage capacity, alterations in the handling system, and combustion grate modifications are all issues which have been addressed in these boilers. An unfamiliar procurement system, fuel quality variations, and fuel bridging problems are unique challenges faced by facility operators. A facility co-firing the two fuels will also experience a wider variance in combustion characteristics and a higher ash content. Fuel costs should be competitive or lower than coal on a delivered energy basis.

Proposed Project: A roundtable to discuss the key issues was held on September 27 in Pennsylvania. It led to the formulation of the attached work statement and pending contract.

Budget: \$40,000

Status: The roundtable attracted 45 participants from electric utilities, public service commissions, environmental regulatory offices, state energy offices, DOE, independent power producers, forestry departments, and research organizations. The roundtable concluded that co-firing has been successfully used in other sections of the country and demonstrated in a limited number of utilities in the northeast; that the technology exists for co-firing wood with resulting net benefits with regard to air emissions; there is abundant supply of wood available in many forms in the region, and wood processing technology is being developed rapidly to utilize these resources efficiently; and the climate for co-firing is very good in the region.

The roundtable participants enumerated resource, economic, regulatory and political barriers to co-firing. They also developed strategies to overcome these barriers.

The purpose of this project is to make co-firing a reality for one or more of the region's utilities. Towards this end, three project objectives are outlined:

- 1) to compile the available emissions and plant operation data from utility co-firing experiences to date and document the key factors associated with successful co-firing operations;
- 2) to identify those power plant facilities in the 11 Northeast states which may be candidates for co-firing coal with biomass, and to perform a preliminary analysis of those sites to determine where the strongest opportunities can be found for co-firing in the region; and
- 3) to assist candidate sites in further evaluating and pursuing their co-firing potential.

Proposed Project: Liquid Fuels Resource Assessment Follow-up

Problem: The region has a short window of opportunity to attract a commercial-scale ethanol from wastes plant by a major developer.

Overcoming the Barriers: The first step is the resource assessment, to be completed later this summer. The next steps are identifying what the developers think are obstacles in the region.

Proposed Project: Siting an Ethanol Plant in the Region

The project is designed to address three state government constituencies: (1) state air quality managers; (2) economic development officials; and (3) vehicle fleet managers. The first phase of the project is to gather information concerning state-by state regulations and incentives affecting the siting of a plant. Interviews with fleet managers would establish the requirements and obstacles to converting state vehicles to ethanol. Identifying the elements of successful alcohol fuel facility siting would then precede the publishing of a report and convening of one or more forums with stakeholders to discuss next steps for feasibility studies and other activities to facilitate the location of an ethanol plant in the region.

Budget: \$40,000

Status: RFP is out to bid

Addressing Pellet Stove Customer Needs For Information

Proposed Project: To understand the informational needs of current and prospective residential pellet stove owners, the Regional Biomass Programs will undertake a telephone consumer survey, stratifying samples by region of the country to distinguish area differences in perceptions. A Phase Two of the project will be an appropriate response to the needs revealed in the survey, a response which may feature a consumer brochure, informational video, and/or other media products targeted to appliance owners and prospective owners.

Problem: Pellet stove owners and prospective owners lack information which would either (1) stimulate their interest in buying pellet appliances; or (2) assist their understanding of how pellet stoves can operate most effectively. Discussions with appliance manufacturers, retailers, pellet fuel distributors and state energy officials reinforce the perception that both customers and prospective customers lack adequate information to make intelligent choices when considering the purchase of pellet stoves; or in maintaining and operating their current stoves most efficaciously.

The pellet stove industry is a maturing one, characterized by double digit yearly sales growth, new entries into the marketplace, and a largely uninformed public. Stimulated largely by air quality problems associated with wood stoves in the Northwest and an abundant supply of forest product industry wastes to provide a cheap feedstock for pellet manufacturing, the residential pellet industry has rapidly spread to the Midwest, Southeast and Northeast over the past three years. Advertised as a clean-burning and labor-saving alternative to the conventional woodstove, the pellet stove has demonstrated strong appeal to several customer segments.

But the industry has also experienced typical growing pains: ash slagging has been a consequence of firebox designs unforgiving of variations in fuel ash contents; automatic conveyance and feeding systems have jammed; pellet specifications have varied beyond tolerance limits of appliances; reasonably priced pellets have not been available in some areas of the country; and consumers have not been well trained in stove maintenance and operations issues (e.g. schedules for emptying ash trays).

Budget: \$40,000, of which NRBP share is \$5,000.

Status: Work Statement has been drafted. Co-sponsorships from other regional programs and from Pellet Fuels Institute are being finalized.

Modeled on the successful public information and promotion campaign carried out on behalf of the wood stove industry, a pellet promotional campaign might feature the development of an accurate and detailed consumer brochure, an informational video appropriate for cable television and retail outlets, and perhaps radio, TV, and newspaper news features touting the virtues of pellet appliances. But before such a campaign can be generated, it is necessary to gain a better understanding of what present pellet stove owners don't like or lack information about their appliances; and what information gaps or misperceptions plague potential owners.

Because there are regional differences in both owner experiences and prospective owner perceptions, it is important to stratify a telephone survey of owners by region: Northwest, Southeast, Midwest, and Northeast will each be sampled separately. Stove retailer sales records will be the sampling frame for the telephone survey. A nationwide total of 500 households should be surveyed, providing an accuracy of plus or minus 4% with a 95% confidence interval.

Organization and Sponsorship of Phase I Consumer Attitude Research.

The five regional programs, the Hearth Products Association, and the Pellet Fuels Institute are the anticipated co-sponsors of this effort. Cost-sharing among these groups is expected. An advisory committee to guide the RFP drafting, contractor selection, and contractor oversight is contemplated. One member from each sponsor will be asked to participate on the advisory committee: additional industry members may be added. The Pellet Fuels Institute has agreed to serve on the advisory committee. Barbara Schein of Dry Creek Products in Arcade, NY--a member of the PFI Board is a particularly enthusiastic committee member.

Budget: To draft and pretest a quality questionnaire, collect mailing lists, sample appropriately, survey 125 stove owners in each of four regions, analyze the results, and write a report will cost \$16-20,000, depending in part how much assistance the industry can provide in generating customer lists for the contractor.

Phase II, the generation of brochures, videos and other informational and/or promotional materials would cost in the range of \$25,000 to \$150,000 depending upon the range and extent of the activities recommended.

Schedule: Phase I can be completed in 4-6 months, beginning in May 1995.

Proposed Project: Biomass Consultant to assist with Technology Transfer of Completed Projects.

Problem: The NRBP has not reached every stakeholder through every effective means to communicate the essential findings of its technical reports and testing. We have drafted mailings, completed press releases, and reached our core group of 1,000-1,500, but we have not succeeded in reaching other interested audiences as well as we would like.

Project: To secure the services of a communications and public relations specialist to assist with drafting feature articles, getting them placed in both trade and general publications, and generally assisting in communicating our message effectively to both general and technical audiences.

Status: NRBP has drafted a RFP which is now out to bid. Contractor selection is expected in June.

Budget: \$30,000.

APPENDIX - DETAILED WORK STATEMENTS

Title: Air Emissions Testing of Two Woodchip-Fired Furnaces

Scope of Services

Project Objectives: The project will complement several other previous Coalition of Northeastern Governors (CONEG) projects regarding wood-chip fired combustion systems, in particular, the recent testing conducted by CT&E, the video produced by the Vermont Department of Public Service, and the in-progress guidebook being developed by Energy Efficiency Associates, Inc. This project will enable CONEG to objectively represent the air emissions associated with wood-chip fired combustion systems with a 0.5 MM/Btu/hr to 3.0 MMBtu/hr size range. The data collected should be representative of such systems throughout the CONEG and Northeast States for Coordinated Air Use Management region and may be applicable to other regions given similarities in wood-chip fired heating systems and wood-chip fuel.

Project Goals: To determine the air emissions produced by small wood-chip fired combustion systems and determine the associated health risks, if any. A final report will be produced and submitted to CONEG, CONEG state air quality regulators and NESCAUM and to other interested parties, to be identified by CONEG and the projected contractor.

Approach:

I. Test Program Introduction

This test program will sample and analyze emissions from two, relatively small wood-fired furnaces for a variety of pollutants. The test program is being coordinated by CONEG through its Vermont representative, the Vermont Department of Public Service (VDPS) with the assistance of the Vermont Air Pollution Control Division of the Vermont Agency of Natural Resources (VAPCD). The principals are:

Norm Hudson, Wood Energy Specialist and
Stuart Slote, Demand-Side Management Specialist
Energy Efficiency Division
Vermont Department of Public Service (Tel: 802-828-2393)

Chris Jones, Enforcement Section Chief
Vermont Air Pollution Control Division
Vermont Department of Environmental Conservation (tel: 802-241-3851)

David Manning, Enforcement Engineer
Vermont Air Pollution Control Division
Vermont Department of Environmental Conservation (tel: 802-2413855)

Doctor Bill Bress, Lead Toxicologist
Environmental Health Division
Vermont Department of Health (tel: 802-863-7220)

In 1992, the coalition of Northeastern Governors (CONEG) conducted thermal and combustion efficiency testing on similar furnaces. This proposed testing program is intended to compliment the data gathered in the previous study and allow CONEG to characterize and represent the relative air emissions of wood-chip fired furnaces within the size range tested (0.5 MMBtu/hr to 3.0 MMBtu/hr).

II. Furnace Descriptions and Operation

A. Furnace Specifications: The VDPS has preliminarily selected the following two furnaces to be tested during the current heating season.

Manufacturer-Chiptec 85-90T
Rating-63 HP (c 2.8 MMBtu/hr)
Location-Hazen Union High School, Hardwick VT.

Manufacturer-Messersmith
Rating-2.2 MMBtu/hr
Location-Green Acres Housing Project, Barre Town, VT.

The contractor may propose alternative systems and justify their recommendation.

B. Operating conditions: Samples will be taken while the furnace are operating at a high firing (wood consumption) rate. The same fuel (either whole tree chips or mill chips will be used in the furnaces during the test periods. The method of fuel feed will be the automatic normal mode of operation for the units.

III. Pollutants to be measured and test methods

A. Concentration and emission rates must be determined for the following pollutants.

Total particulate matter
Metals: arsenic, barium, beryllium, cadmium, total chromium, copper, lead, manganese, nickel, selenium, silver and zinc.

Poly-aromatic hydrocarbons: benzo (a) pyrene and other PAH compounds as will be specified with the assistance of the contractor. (the VAPCD expects

bidders to identify additional PAH compounds that are characteristic of this source category and quantifiable by the test method).

Dioxins/furans: 2,3,7,8 - TCDD equivalents, requiring the determination of tetra through octa dioxins/furans with factoring for the determination of equivalent concentrations per Appendix A to the Rutland, Vermont Resource Recovery Facility Air Pollution Control Permit issue by the Vermont Air Pollution Control Division on September 11, 1986.

B. The following test methods will be applied to each of the two furnaces

Total Particulates	USEPA Method 5
Multiple Metals	modified USEPA Method 5
Dioxins/Furans	USEPA Method 23
Polyaromatic Hydrocarbons	USEPA Method 23

The actual emission rate will be considered the arithmetic average of at least three test runs performed under similar operating conditions. All quality control/quality assurance procedures listed in the methods noted above will followed, including field and analytical blanks and audit samples.

1. Total Particulates: At least 30 cubic feet of sample will be collected over approximately a one to two hour period to comprise a test run. Sampling will be conducted isokinetically as required the method. The USEPA Method 5 train will also be used to determine the stack gas moisture content. The emission rates will be reported in the following units: grains per dry standard cubic foot corrected to 12% CO₂ and pound per hour.

2. Multiple Metals: Analyses will be performed for the following metals.

arsenic, barium, beryllium, cadmium
total chromium, copper manganese, nickel, lead
selenium, silver, and zinc

Either the total particulate sample will be analyzed for metals or a separate sample will be collected for metals analysis, at the discretion of the test consultant from the USEPA at the time of the testing. If the samples from the two furnaces are not submitted to the laboratory simultaneously, then one audit submitted with one sample will be considered sufficient for the test program.

3. Dioxins/Furans, PAHs, Semi-volatiles: Method 23 samples may be analyzed for dioxins/furans and PAHs or separate samples may be collected for each analysis. The contractor's pre-test report shall specify the selected approach which shall be subject to VAPCD approval. Results should be reported in terms of pounds per eight hours. The

appropriate dioxin/furan audit sample(s) will be obtained by the test consultant from the USEPA at the time of the testing. If the samples from the two furnaces are not submitted to the laboratory simultaneously then one audit submitted with one sample will be considered sufficient for this test program.

4. Detection Limits: If feasible, positive quantification of emissions will be required for the metals and dioxins/furans. The most significant species of poly-aromatic hydrocarbons will also be positively quantified, if feasible. If quantification is not feasible, an adequate quantity of flue gas will be sampled to assure that the detection limits for these contaminants will be at or below their respective "Action Levels", as listed in Appendix C of the Vermont Air Pollution Control Regulations. Calculations of detection limits and expected concentration in mg/DSCM at 12% CO₂ and pounds per hour must be provided for the various test species in the pre-test report.

5. Other: gas molecular weight will be determined from an integrated bag sample taken simultaneously with the test runs. A minimum of one fuel (wood chip) sample will be taken from each furnace at the time of the test. The fuel sample will be tested for moisture and ash content and for the metals listed above in section III. In order to determine the degree of correlation between fuel composition and emission rates.

IV. Test Reports and Scheduling

A. Prior to scheduling the sampling dated(s), a pre-test report will be filed by the test consultant with CONEG, the VDPS and the VAPCD. This report will identify all methods and procedures to be used for sampling and analysis and will include diagrams of the sampling locations. The VAPCD's "Source Emission Testing Guidelines", which includes a suggested report outline, will be used as a reference. The test consultant will visit each site, take all measurements needed for preparation, of the pre-test report, identify and schedule and pre-sampling site preparation, and ensure that the sampling location meets the minimum requirement of USEPA Method 1 or Method A. If necessary, a temporary staff will be fabricated that meets these sampling requirements.

B. At least one week prior to commencing actual sampling, the test consultant shall meet with the Vermont Air Pollution Control Division at one of the test sites to review the proposed test methods and source operating conditions. The contractor must provide a tentative schedule of sampling activities, including run times, at this pre-test meeting. Sampling shall not go forward unless the Vermont Air Pollution Control Division has approved the pre-test report for each site and has approved all proposed test methods and operating conditions.

C. Sampling of emissions from all two furnaces shall be completed by no later than March 18 of the test year. Bids must identify action sand materials the contractor will use in the testing to accommodate cold weather conditions. Sampling runs shall be started only when the

ambient temperature is between 20 degrees and 32 degrees F, except with the prior approval of the VAPCD and VDPS.

D. The Vermont Air Pollution Control Division and VDPS will set the dates for sampling at each site, in consultation with the test consultant. The Vermont Air Pollution Control Division or VDPS may require rescheduling of a sampling event, including the halting or invalidating of a sampling run, in the event of malfunctions of sampling equipment, unacceptable weather conditions, unrepresentative source operating conditions or for related reasons.

E. A complete final test report, including a description of the test procedures, calculation, and raw data collected during field work and from the laboratory analyses, as well as a record of source operating conditions, will be prepared by the testing consultant after completion of the sampling and analysis. This final report will be submitted to CONEG, VAPCD, and VDPS and the Northeast States for Coordinated Air Use Management (NESCAUM) within 90 days after conclusion of all required samples.

F. The Vermont Air Pollution Control Division, in consultation with the Vermont Department of Health, will prepare an explanation in lay terms of the staff testing results and their implications with regard to public health.

V. Technology Transfer Activities

A. Bidders shall outline a report distribution plan which includes the following elements:

- i. the constituencies to be addressed;
- ii. the specific trade associations serving those constituencies which should receive the report;
- iii. the appropriate forums or vehicles through which the top 5-6 trade associations should receive information about the report;
- iv. general media or trade publications which will be targeted;
- v. the format and approximate length of any summaries, press releases and/or articles which will be drafted to accompany the final report.

B. At a minimum, the report will be accompanied by an executive summary, which

VI. Other Specifications

A. Bidders shall be preferred who have easy accessibility to the Central Vermont region. Additionally, due to the possible postponement of testing due to the variability of weather

conditions, there should be a preference to bidders located in close proximity (no more than four hours driving distance) to the Central Vermont region.

B. The bid must identify the contractor's experience in performing these assessments. The bid must also identify the test team, including Project Engineer (team leader) and identify their experience with these tests. Identification of recent experience, with referenced, must be provided (in regard to the contractor and the test team).

C. Bids must identify which laboratories will be used for sample analysis and their related experience.

Potential Partners: The VDPS and VAPCD will contribute in-house staff time to monitor and assist the testing consultant and provide quality control /oversite management of the project. The Vermont Department of Health will conduct an environmental health risk assessment. In-kind staff contributions are estimated to be \$2000 for the VAPCD (80 hours of total staff time) and \$1500 (40 hours for Doctor Bress and staff) for the Department of Health.

Required NRBP Funding: \$50,000

Project Sponsors: Energy Efficiency Division of the Vermont Department of Public Service and the Vermont Air Pollution Control Division of the Vermont Department of Environmental Conservation.

For more technical information on this proposal, please contact Chris Jones, Vermont Air Pollution Control Division, 802-241-3851.

Title: Landfill Gas II: Technologies

C. Work Statement

1. Select and describe a typical landfill gas composition.
2. Perform a comparative analysis among several technologies, looking at both economic and environmental (air emissions) costs and benefits, including economic incentives which may be available to LFG projects.

The economic incentives shall include capacity and energy payments, tax incentives, and REPI payments. Develop system engineering designs for traditional and non-traditional low-cost, low-polluting conversion technologies, which are or could soon be commercially available for projects ranging in size from 1000 to 5000 KW. (At a minimum, system designs should be developed for projects at the 1000 and 3000 KW size, and for at least one intermediate size.) Specific conversion technologies to be considered would include but would not necessarily be limited to: *Otto Cycle* (spark ignition engine); *Organic Rankine Cycle* (vapor turbogenerator system)¹; *Brayton Cycle* (gas turbine configuration); *Stirling Cycle* (external combustion engine)². *Add to the list of conversion technologies to be considered the fuel cell.* In addition to being considered as a stand-alone system (using heat from a conventional LFG incinerator), the organic rankine cycle system (ORC) shall also be evaluated (as appropriate) as an add-on to other technologies as a waste heat recovery-to-electricity system. Include process flow diagrams for each size configuration.

3. Given the system designs developed for Task 1, estimate capital investment, operating and maintenance costs.
4. Examine existing and pending regulations in the 11-state region as well at the federal level to ascertain whether reduction of emissions due to LFG energy projects qualify for any economic incentives, including off-site emissions reduction credits.
5. Determine the types of project partnerships that are necessary to maximize federal economic incentives, in terms of the PTC or the REPI, for each technology considered.

¹ The ORC system, although in existence for over 30 years, is not widely available. Two companies known to make ORC systems are: (1) Perennial Energy, Inc. of West Plains MO, and (2) Ormat, Inc. of Reno/Sparks, Nevada.

² The Stirling technology is an old concept, but only recently has surfaced as a potential contender across a wide range of industries (refrigeration, automotive and power generation). A company known to be working on the development of Stirling systems is Mechanical Technology, Inc. of Latham, New York.

6. Obtain from Public Utilities Commissions current purchase prices regulated electric utilities are required to offer for electricity from LFG projects of 5,000 KW capacity or less.

7. Obtain from each state's Public Utilities Commission what Environmental Externalities monetary values for air emissions, if any, which are either in effect or being considered.

8. Using the information developed in the preceding tasks, perform a comparative analysis (within the 1000 to 3000 KW range) between all conversion technologies under consideration to compute and tabulate all pertinent parameters associated with each technology, including the following:

efficiency;

capital cost (in total \$ and in \$/KW installed);

power generation cost, cents/kWh air emissions in lbs/kWh.

9. Prepare a tabulation comparing each conversion technology's air emissions (in lbs./kWh) to those in the system margin of each utility, to the extent available data permit.

10. Review the CAAA and state regulations to ascertain whether a case could be made for legislative and regulatory action establishing mechanisms to credit the emissions reductions achieved by LFG projects and to enable such credits to be sold to help generate economic incentives for such projects. Consider in particular the credits which may be forthcoming with adoption of the pending New Source Performance Standards for nonmethane organic compounds (NMOC) and methane.

11. Prepare a tabulation comparing information obtained in Task 5 and 6. Also, indicate the states with monetary values for Environmental Externalities that allow trading of off-site emission reduction credits, similar to the case in Massachusetts.

12. Prepare a tabulation showing air emissions changes at the landfill site (before and following implementation of each LFG conversion technology considered) for the each of the following substances:

		Nox	Sox	NMOCs	VOCs
TSP	CO	CO ₂	CH ₄	N ₂ O	

Establish "most common" project scenarios to assist formulation of these tabulations. Also describe scenarios that represent exceptions to these tabulations, exceptions in which one technology is favored over another.

D. DELIVERABLES

Interim Report summarizing the findings from each task. **Produce a comprehensive report delineating the results of the foregoing tasks and findings.** The report will be geared towards potential public and private developers of LFG energy projects. The report should aim to demonstrate the availability of low cost conversion technologies, appropriate to landfill

sites of different sizes and other conditions, which when combined with existing economic incentives (FPT or REPI) and pressing LFG control regulations, will accelerate the development of LFG energy projects. The report shall also be directed to key constituencies, air, water, and solid waste regulators, environmental consultants, municipalities, landfill operators, and utilities.

Title: A Methodology For Environmental Externalities Accommodating Biomass Feedstocks

Task 1: Examine proposed and existing regulations and related literature addressing environmental and economic externalities. For each of the 11 Northeastern states assess the status of existing or proposed methodologies for incorporating externalities into resource bidding or planning processes.

1.1 Carry out a literature review and interviews with consultants, PUC staff, commissioners and other experts to complete the following tasks:

review of existing and proposed use of externalities for resource bidding or planning processes by regulators and utilities across the U.S., and particularly in the 11 Northeastern states;

review of literature assessing general and specific methodologies for incorporating environmental externalities and economic impact considerations into utility rate structures and planning;

review of total fuel-cycle analyses and approaches for addressing fossil fuels and biomass power, including data on: combustion emissions from current and emerging/advanced conversion technologies (such as gasification/combined-cycle systems), particularly SO₂, CO₂ and NO_x;

emissions related to supplying fuel: for fossil fuels this would include data on emissions from mining or drilling and transport of fuels;

for wood fuel this would include CO₂ sequestering with tree growth, as well as emissions related to producing, harvesting/collection and transport of wood fuel;

collection of data and information on the economic impacts of supplying and converting biomass vs. fossil fuels, including: - direct and indirect jobs and income;

improved forest quality and value, through good forest management techniques in providing wood residues;

projections of electric generating capacity needs of the 11 states within the Northeastern Regional Biomass Program (NRBP) area;

collection of other data relevant to biomass, such as: avoided costs and emissions from the use of wood waste (considering avoided landfill tonnages, reduced methane emissions by avoided decomposition of biomass in forests and landfills);

biomass resource availability and costs (which will affect the ultimate impact and market penetration of biomass);

generating capacity in the 11 NRBP states suitable for cofiring biomass (i.e., simultaneous cofiring of coal and wood).

- 1.2 Document effects on the resource mix due to competitive bidding and IRP processes through the use of contractor data bases, interviews and the additional information collected under Task 1, identify utilities in the Northeast that have prepared resource plans or implemented competitive bidding processes which include externality factors;

particularly relevant examples from states outside the Northeast; and

documentation regarding the effects of these approaches on the resource mix.

Task 2: Draft report outlining the status and key features of existing/emerging methodologies, documenting the impacts considered, how values are assigned to those impacts and applied to resource planning. In particular, identify, the value (explicit or implicit) assigned to CO₂;

whether and under what circumstances wood is treated as a renewable;

whether resources are ranked on basis of total fuel-cycle or combustion impacts only; and

documented impacts of existing methodologies on the resource mix.

Include sections in the report which address the following topic areas:

The range of values assigned to other environmental externalities including, but not limited to, SO₂, NO_x, solid wastes, and waste water streams -- particular attention will be paid to value systems which include benefits or credits for emission reductions;

Environmental factors that are not being allocated a value, or included in the utility resource selection processes, which may be of interest with respect to biomass applications (e.g., reductions in emissions for co-firing biomass at coal plants, socioeconomic impacts such as jobs and use of indigenous resources, waste minimization, etc.);

Definitions of technologies/fuel-cycles as renewable energy resources, the reasoning behind the definitions and the pros and cons of specific definitions;

A description of the various methodologies utilized -- quantitative versus qualitative -- and how those methodologies were developed including a discussion of the considerations taken into account by regulators in developing the process;

How the values and methodologies are being applied by the utilities under the jurisdiction of the regulators and the means for incorporating these into the resource selection process including integrated resource planning and competitive bidding;

What real impacts environmental externalities or total energy cycle analyses are having on the future resource mix including why certain approaches either fairly or unfairly treat biomass as a resource option;

Whether environmental externalities or total energy cycle concepts are being applied on a systematic basis which addresses both future and existing energy resources (for example, are potential negative impacts from biomass, such as PM10 emissions or impacts on habitat being given more attention than impacts of coal mining on land and habitat); and

Differences in basic methodologies for addressing the externality cost factors for CO₂ -- some methods address the cost of control (such as tree planting), while others address damage costs (such flooding of coastal areas);

What actions or research has been undertaken to address the many economic "externalities," the pros and cons of including economic externalities, and the arguments and positions of various key stakeholders in the industry. The draft report will include appendices which incorporate all bibliographic references and citations for interviews.

Task 3: Taking account of findings discussed in Tasks 1 and 2, propose one or more approaches for appropriate life-cycle evaluation of biomass energy projects, considering total fuel-cycle impacts.

3.1 As part of this work, include an accounting framework to:

- (1) identify the emissions burden from a biomass fuel-cycle stage;
- (2) name and identify impacts and if possible, give quantitative ranges of named impacts, and
- (3) translate these impacts into estimates of damages or benefits;
- (4) address environmental characteristics of the biomass supply portion of the full fuel-cycle, including production/procurement, harvesting, processing, and delivery;

3.2 Develop an evaluation matrix for the environmental impacts for several key biomass conversion technologies including stoker boilers, fluidized-bed conversion, gasification gas turbine technology (STIG, ISTIG and combined-cycle systems), and the Whole-Tree Burner™ technology, to characterize the material/chemical agents generated by biomass power systems, plant waste streams and their impact on air, water, land, and habitat. In these evaluation frameworks, the contractor will also

account for the environmental benefits of biomass-fueled plants. The evaluation will explicitly consider:

Utility Control: Is the cause of the externality effect or economic impact within the control of an electric utility? IOU vs. other utilities?

Commission Jurisdiction: Is the cause of the externality effect or economic impact within the jurisdiction of the Commission?

Existing Regulations: Is there existing federal or state legislation which addresses(to any degree) the causes of the externality effect/state economic impact?

Geographic Scope: What is the geographic scope of the externality effect? Local, regional, or global?

Scientific debate: Is there scientific debate about the role or magnitude of the externality effect?

High Risk: What is the relative risk of the externality effect in relation to the number of affected sites or scale of the problem?

Task 4: Beyond fuel-cycle impacts, evaluate the arguments for and against establishing an absolute externality value or percentage added to account for the development of economic development impacts of utilizing various energy resources. Propose an approach and approximate measures of the job creation and associated benefits of energy from wood, natural gas, coal, and oil, for subregions within the Northeast. To complete this task, the contractor will examine the trade-offs between distributional issues (related to jobs and income creation, etc.) and efficiency (such as least-cost, economic dispatch approaches) in addressing aspects of resource decisions.

Task 5: Project the likely impacts of the proposed methodology on electric power generation in the region, and on resulting total fuel-cycle emissions levels, electric rates, and job creation within the region as compared with the likely impact of two-three representative IRP methodologies now employed in the region. Address when and how quickly the proposed approach or approaches, if adopted, might affect the regional resource mix. To accomplish this task, undertake at a minimum the following tasks:

a projection of potential capacity needs in the 11 states covered by NRB, as the target market for biomass capacity;

analysis of base case (no externalities) and current (with representative environmental factors in use in the Northeastern states) evaluation methods on biomass competitiveness and the potential for overcoming the competitive disadvantages of biomass versus conventional technologies by applying TFCA methods;

an estimate of the market penetration of biomass technologies over time as the result of plausible externality valuations, in the context of capacity needs and their current cost competitiveness (including cofiring at existing coal plants and new stand-alone biomass power plants);

impacts of potential biomass market penetration on job creation, electric rates, emissions and environmental impacts, and regional resource mix. Consider life extension and repowering possibilities as well as incremental additions to capacity. Also consider co-firing wood with coal at existing coal plants as an option undertaken to reduce current sources of pollutants at these sites. In the geographic analysis of the region which matches specific capacity needs to biomass resource and technology options, consider explicitly at a minimum the following: negative impacts of not acting to use biomass waste streams, like waste wood, when they contribute to landfill capacity shortages and landfill methane emissions;

local opportunities to reduce reliance on imported fuels;

the constraints wildlife, endangered species and land use impacts can have in limiting biomass development; and

biomass potential in areas where their contributions to air quality improvements could be more highly valued because of particular criteria air pollutant problems.

Task 6. Identify opportunities to influence or modify the region's resource planning processes. Assess the relative value of promoting such modifications. Given the prospects for adoption of total fuel-cycle approaches, and the likely resulting impacts on the resource mix, outline a strategy for pursuing the recommended modifications. Identify particular utilities and public utility commissions in the region where one or more strategies may be successful.

Task 7. Draft a final report incorporating the findings, analyses, methodologies and recommendations in Tasks 1-6. The report shall include a stand-alone executive summary of 8-12 pages. The full report shall also include in its appendices a full bibliography of important references and interviews.

Utility Wood-Coal Co-firing: Summary of Documented Results and Guide to Opportunities in the Northeast

Background: Utilities have successfully co-fired biomass with coal under a variety of circumstances at over 30 power plant facilities in the United States and elsewhere. Various factors have motivated these operations. The opportunity to utilize a low- or negative-cost fuel (where utilities or their customers face the cost of disposing of large quantities of waste biomass) has been the primary motivation. The need to reduce sulfur emissions has been another.

While the experience of utilities, in conjunction with research organizations such as the Electric Power Research Institute (EPRI) constitutes a significant body of evidence that co-firing can make technical, economic, and environmental sense for a utility, much of this data has not been published or compiled into a single, accessible resource. In the absence of such data or other documentation of successful co-firing operations, many utilities are reluctant to pursue this option. Regulators looking for sulfur reductions from coal-fired plants in their states have not looked to biomass as a possible solution, and are unlikely to consider it until utilities present them with evidence for the satisfaction of emissions requirements from co-firing.

In the Northeast, the combination of relatively high sulfur content coal and the availability in many locations of suitable waste biomass materials from the forest products industries, land-clearing activities, and urban construction and demolition make co-firing a potential option for a select number of coal-fired utility plants. Co-firing with biomass is only one of several options facing these plants; others include pollution control retrofits, fuel conversion or treatment, and early retirement of aging plants.

Purpose of Project: The purpose of this project is to make co-firing a reality for one or more of the region's utilities. Towards this end, three project objectives are outlined:

- 1) to compile the available emissions and plant operation data from utility co-firing experiences to date and document the key factors associated with successful co-firing operations;
- 2) to identify those power plant facilities in the 11 Northeast states which may be candidates for co-firing coal with biomass, and to perform a preliminary analysis of those sites to determine where the strongest opportunities can be found for co-firing in the region; and
- 3) to assist candidate sites in further evaluating and pursuing their co-firing potential.

Statement of Work: The tasks below are grouped into three major steps, corresponding to the three objectives outlined above:

- I. Compiling data from available literature on utility co-firing experience to date and documenting the key factors associated with successful operations.
- II. Identifying candidate plants in the Northeast and performing a preliminary analysis, or screening, to determine which sites present the strongest opportunities.
- III. Identifying key stakeholders with a potential interest in realizing those opportunities, and providing them with one-on-one technical assistance to facilitate action on a co-firing project.

The emphasis of project effort will be placed on Task III. The contractor selected to carry out this project will be expected to make use of existing data on utility co-firing (see attached bibliography, compiled by the NRBP in October 1994). Existing feasibility screening tools may be adapted for the purpose of carrying out Task II.

I. Compiling Existing Data and Documenting Success Factors

A. Compile Existing Data on Co-firing in Utility Boilers

The purpose of this task is to assemble and present documented evidence of co-firing's impacts on emissions and plant operations, for utility-scale boilers 10 million BTU/h or larger. This is not a primary research task. Sources of existing data may include published studies, reports, regulatory permit applications, and (to a limited extent) interviews with utility managers.

1. Co-firing emissions data should include the following pollutants:

- NO_x;
- SO₂;
- particulates;
- CO;
- heavy metals.

2. In addition to emissions testing data, compile from existing literature any information available on operational impacts, including:

- percent contribution to heat input of biomass fuel;
- derating;
- retrofit requirements and associated capital costs;
- operating costs and plant downtime;
- ash disposal.

3. Produce an interim report summarizing the available data on utility co-firing operations and emissions results.

A. The presentation of emissions data and operational results should be cross-referenced with profiles of the plants from which the results were obtained. Relevant plant profile characteristics may include: the size, age, and type of boiler; plant capacity; the sulfur characteristics of existing (coal) fuel; pre-existing emissions profile and pollution control equipment, if any; source, quantity and cost of biomass fuel supplies; fuel storage and preparation requirements.

B. Document Key Factors Associated with Successful Operations

The purpose of this task is to establish a basis for identifying utility boilers in the Northeast which may be good candidates for co-firing with biomass, and to provide a framework for making a preliminary feasibility assessment of these units' co-firing potential.

1. Based on existing literature and available data, identify the key technical, economic, and environmental/regulatory factors associated with successful utility co-firing operations. Likewise, identify the most common impediments to implementation, and document strategies for avoiding or overcoming these barriers, based on the experience of utilities to date.

2. Establish a set of basic technical, economic, and environmental/regulatory criteria for identifying coal-fired utility boilers which may make good candidates for co-firing with biomass.

3. Develop a framework for performing a preliminary assessment of candidate boilers' co-firing potential. Basic criteria are expected to include:

age of plant;
planned retirement date of plant (minimum of 15 years useful life remaining);
plant capacity;
type of boiler system (PC, cyclone, tangential/wall-fired, fluidized bed);
sulfur characteristics of existing fuel;
existing emissions profile for NO_x, SO₂, CO, particulates;
existing pollution control equipment;
fuel storage capacity at the plant;
cost of meeting CAAA requirements through additional controls or fuel treatments;
type, source and availability of biomass feedstocks within a 20-mile radius of the plant;
cost of biomass fuel.³

³ Large-scale supply costs may be difficult to pin down. One approach may be to determine whether an adequate supply is likely to be available without exceeding the maximum biomass fuel price for which co-firing is economically feasible, given the cost of alternatives and the capital and other costs associated with the co-firing option.

II. Identifying and Screening Candidate Plant Sites in the Northeast

A. Identify Candidate Utility Plants for Co-firing in the Northeast

The purpose of this task is to limit the focus of the preliminary feasibility assessment to those power plant units in the region for which co-firing with biomass is a real option.

1. Assemble a list of coal-fired power plant units in the 11 Northeastern states.⁴ Using the basic criteria established in task B2, above, identify those units which may be candidates for co-firing with biomass.
2. For each of the units identified in step 1, survey utility power supply managers to learn their priorities and concerns regarding options for meeting Clean Air Act Amendment requirements for these units. What questions do they need answered about the option of co-firing with biomass? If co-firing has been explicitly eliminated from consideration, note the reason; if another option is already being implemented, eliminate the unit from the list of candidate sites.
3. For each of the units identified in step 1 (and not eliminated in step 2), survey state air regulators regarding their schedules and concerns associated with meeting CAAA requirements. Identify any specific issues or questions they may have with respect to the biomass co-firing option.

B. Perform Preliminary Analysis to Identify Strongest Co-firing Opportunities

The purpose of this task is to perform the preliminary feasibility analysis and to document the results, as well as to suggest strategies for pursuing the region's most promising utility co-firing opportunities.

1. Gather additional information necessary to perform the preliminary analysis. Much of the necessary information will have already been gathered as part of task A, above. An additional source of information at this stage will be to identify and interview waste producers and haulers operating in the vicinity of the plants.
2. Perform the preliminary assessment of co-firing feasibility at the candidate sites. The assessment should result in:

a short list of utility boilers offering the strongest co-firing opportunities;

⁴ One resource may be the Environmental Protection Agency's 1991 National Allowance Database which provides operating data for approximately 3,700 units nationally, including state and county, operating utility, SO₂ emission rate, heat rate, and capacity factor.

an estimate of utility wood-coal co-firing potential for each state and for the region as a whole;
estimated emissions reductions achievable through co-firing at candidate sites;
estimated capital and operating costs associated with achieving these reductions through co-firing as opposed to other options;
evidence of adequate biomass fuel supply at economically feasible cost;
other benefits of co-firing (e.g., lowering customers waste-disposal costs);
outstanding questions, issues or concerns to be addressed through more in-depth, site-specific feasibility study or testing.

3. Prepare an interim document which presents the method and results of the preliminary assessment of candidate sites and the potential for utility wood-coal co-firing, both on a state by state basis and for the region as a whole. Summarize the key concerns or issues raised by utility plant managers and regulators, and suggest practical strategies for addressing these issues and concerns.

III. Technology Transfer

A. Site-Specific Technical Assistance

The purpose of this task is to provide technical assistance to key decision-makers involved with those utility plants which appear to afford the strongest opportunities for co-firing. This may involve:

1. Meeting with top-level utility decision-makers and/or regulators to go over the feasibility analysis and answer questions.
2. Advising utility planners or plant managers on specific elements of a detailed feasibility assessment, e.g., assessment of fuel supply, emissions testing, options for retrofitting existing equipment, etc.

It is anticipated that this task will require a total of 40 consulting hours, from a senior member of the consultant's project team.

B. Other Technology Transfer Activities

In addition to site-specific consultations, other forums for presentation and discussion of findings with key stakeholders may include:

1. State-level workshops for key stakeholders identified in Task II (A&B): utility plant managers and supply planners, state air quality regulators, waste producers and waste haulers operating in the vicinity of candidate plants.

2. Proposers are encouraged to suggest other strategies for disseminating study findings and facilitating next steps towards the implementation of utility co-firing projects in the region.

C. Final Work Products

The final work products of this project will include:

1. Final Report on Utility Wood-Coal Co-firing: Summary of Documented Results and Guide to Opportunities in the Northeast. This report will incorporate the two interim documents described as part of tasks I(A3) and II(B3), above.

2. An article, suitable for publication in a utility trade journal (e.g., Public Utilities Fortnightly), presenting the project and its findings.

Biomass For Public and Institutional Buildings: A Conference and Technology Exhibition

Request for Proposals: Organizing the Event

Background and Purpose of the Conference: One of the most successful markets for conversions to wood heat has been public buildings. An estimated 50 schools, hospitals, prisons and other public buildings in the region have converted to wood heating--some cogenerate as well--in the last several years. Electrically heated buildings, especially schools, have been especially attractive and cost-effective candidates for wood boiler conversions. The vast majority of these conversions have occurred in northern New England. Yet schools and hospitals in Pennsylvania, and a prison in Maryland have recently converted.

To address this market opportunity, the Northeast Regional Biomass Program (NRBP) has tested the efficiency of boilers in these buildings, completed a guide for decision-makers considering wood boilers, and is now testing for air emissions levels. The time is ripe to stage a conference and technology exhibition for facility managers and other decision-makers for public buildings. The purpose is to facilitate boiler conversions to wood energy.

Goals for the Conference/Exhibition:

1. Attract 300 facility managers, public building financial officials, engineers, consultants, equipment suppliers, manufacturers, waste generators, waste haulers, wood chip harvesters, air quality officials and other wood energy professionals to a 1.5-2 day conference on wood conversions.
2. Attract at least 20 exhibitors.
3. Hold the event within 50 miles of Albany, NY. in the late winter or early spring of 1996.
4. Bring together speakers and presentations which address the following topics:
 - a. testimonials from facility managers who have converted to wood
 - b. presentations on the economic, environmental, and technical issues associated with wood boiler conversions
 - c. relevant research on the efficiency and emissions from mid-sized wood boilers
 - d. case studies of several successful conversions
 - e. technical discussions on direct combustion and gasification systems, handling systems, storage and procurement issues associated with woodburning

Work Statement:

1. Meet with an Advisory Committee comprised of NRBP Steering Committee members and other wood energy and facility management professionals to discuss the goals, strategy, and format of the conference and exhibition.
2. Arrange a location suitable for plenary and concurrent sessions for 300 participants and up to 25 exhibitors of combustion equipment, automated controls, conveyance systems, pollution controls, storage, and associated hardware. The location should be within 50 miles of Albany, NY unless decided otherwise by the Advisory Committee.
3. Research conference dates of public facilities managers for New England and New York and set a date in late winter or early spring which does not conflict with any other assemblies of relevant stakeholders (piggybacking another meeting would be acceptable).
4. Mobilize mailing lists and draft conference brochures and mailings for up to 10,000 people.
5. Write announcements to appropriate trade journals and newsletters beginning four months before the event.
6. With the advice of the Advisory Committee, draft a 1.5 day conference agenda, invite speakers to the event, and make arrangements for their travel when necessary.
7. Assemble and publish a notebook with appropriate materials from speakers and from existing NRBP documents for participants at the event (not refereed papers).
8. Attract at least 20 exhibitors and command a fee sufficient to break even or better for the rental of the exhibition space.
9. Recommend a conference participation goal, participant registration fee, and project paid revenues for the conference within 90 days of contract start.
10. Handle participant registrations and all conference preparations and site facilitation for the event. With the assistance of the Advisory Committee, recruit moderators for every session at the Conference.
11. Prepare attendee mailing lists for all participants by the end of the first day.
12. With the advice of the Advisory Committee, organize a tour of 1-2 wood-burning facilities within 90 miles of the conference site. The tour should take place in the afternoon of the second day of the conference.

Siting An Ethanol Facility In The Northeast: Work Statement

1. Compile the air, water, and solid waste regulations which would pertain to the siting of an ethanol plant for each of the eleven Northeastern states.
2. Compile and describe the economic incentives available to alternative energy fuel suppliers in each of the eleven Northeastern states.
3. Investigate and describe the case histories of the siting and permitting of at least two representative existing ethanol plants. Focus attention on the regulatory requirements, economic incentives and technical assistance provided at the state government level.
4. Review procurement regulations and maintenance protocols and interview state vehicle fleet managers to determine the feasibility and steps required to commit states to ethanol fuel purchases. Draft a fuel specifications protocol for one or more ethanol fuels. Document the amount of gasoline and alcohol fuel currently purchased by state government in each of the eleven states.
5. Through interviews with developers, NREL officials, consultants and others knowledgeable in the field, draft a list of specific characteristics likely to be associated with a successful feasibility study--except for feedstock availability and price. These variables might include the available of a cheap electricity or steam source, an existing building, inexpensive land, a byproduct to sell, etc.
6. Write a report summarizing the findings and recommendations in tasks 1-5.
7. Draft a white paper directed to three key constituencies:
 - (1) state air quality agencies;
 - (2) state economic development agencies; and
 - (3) state fleet management officials;which summarizes the key issues and next steps required from decision-makers in order to facilitate the siting of an ethanol plant.
8. Organize a forum for developers, waste haulers, state and federal regulatory officials, investors, researchers, energy and economic officials to discuss the results of the report summarizing the findings in Tasks 1-5. The conference must take place at an appropriate location in the region no later than 45 days following the publication of the report.
9. Remain available for up to 80 hours of consulting to regulatory officials, other state policymakers, developers and other organizations explicitly authorized by the NRBP Program Manager. This consulting shall take place for a period of up to one year from the commencement of this contract.

Addressing Pellet Stove Customer Needs For Information

Work Statement:

1. Work with Pellet Fuels Institute members to collect 1,200 names, addresses, telephone numbers from stove purchasers over the past two years in all five regions of the country.
2. Stratify sample to call from a list of at least 200 names from each of five regions.
3. Administer by telephone a questionnaire which addresses at a minimum the following:

a. Demographics

- Purchaser Age
- Sex
- Education
- Income Range
- Wood-burning Experience
- Family Size
- Urban, Suburban, Rural
- Occupation
- Primary Heating Fuel (if electricity, cost/kWh)

b. Reason for Buying Stove

- Convenience
- Environment
- Novelty
- Saves Money
- Other

c. Stove Purchase Issues

- Month and Year Purchased
- Size and Brand
- Price paid

d. Where Consumer Learned about Stove

- Advertisement in Newspaper or radio
- Friend or Neighbor
- News Article
- Viewed in store
- Business

-Other

e. Stove Experience to Date: Satisfaction Level

- Heat Output
- Fuel Handling
- Stove Operation
- Appearance
- Cost of Pellet
- Availability of Pellets
- Maintenance of Stove
- Any Operations Problems?

f. Consumer Recommendations

- Would they recommend stove to others? What cautions, if any, would they advise.
- What advice would they make to manufacturers to improve the stove, if any?
- What advice, if any, would they make to retailers?

Project: Request for Qualifications: Communications and Public Relations Consultant

The Northeast Regional Biomass Program is seeking a Communications and Public Relations Consultant to assist with the editing and placement of articles favorable to biomass technologies in trade journals and the general press; for suggesting and assisting in the staging of press releases and media events; and for assisting generally in our technology transfer work to distribute the essence of our technical reports to the audiences which can most benefit from them. These audiences include: woodstove owners and retailers; chimney sweeps; facilities managers in public and institutional buildings; mechanical engineers; foresters; wood waste processors and haulers; landfill operators; equipment manufacturers and distributors; state energy, air quality and solid waste officials; public service commission staffs; secondary forestry industries; independent power producers, electric utility power supply managers.

We are seeking a person or firm with a communications and public relations background, some familiarity with energy technologies and the communications infrastructure, including computer networks, media outlets, and trade journals. We are interested in sustaining a retainer relationship on a twelve-month basis.

The central mission of the consultant will be assistance to the NRBP in carrying out its technology transfer role. The mission and activities of the Regional Biomass Program are outlined below.

A key objective of the NRBP is to help member states coordinate efforts among the wide range of agencies involved in the various aspects of resource management, energy production, energy utilization, and environmental and public health protection. The state grant program is critical to this coordination effort. The Northeast region's three DOE Support Offices (Boston, New York and Philadelphia), now affiliated with the NRBP, have helped to facilitate coordination both within the region, through groups such as the New England Energy Council, and between the region and DOE. The CONEG Policy Research Center, which manages the NRBP grant, facilitates regular communication between the Biomass Program and other CONEG energy and environmental committees and ensures the visibility of biomass issues with the region's Governors and their policy staffs.

The strength of the NRBP combines an applied technology focus with the perspective of energy and forestry specialists working at the state level to facilitate biomass projects requiring both private and public sector support. With its multi-disciplinary perspective, the Program Steering Committee has identified gaps in existing energy, forestry, solid waste management, and air quality research agendas, and defined and explored issues pivotal to the development of the region's biomass resources.

NRBP Member States

Connecticut	New Jersey
Delaware	New York
Maine	Pennsylvania
Maryland	Rhode Island
Massachusetts	Vermont
New Hampshire	

Request for Qualifications: Please submit your firm's qualifications to serve as the Northeast Regional Biomass Program Communications and Public Relations Consultant. Among qualifications of interest to us are your

- 1) technical writing and editing talents;
- 2) trade and general press feature article placements record;
- 3) experience and familiarity with energy technologies;
- 4) creativity in generating media interest in technical issues;
- 5) access and experience with computer networks, trade journal and media outlets.

We seek your corporate capabilities statement, including related clients, a sample of your technical writing, trade and general press article placement listings, and other relevant accomplishments.

Remuneration: We are considering a retainer arrangement, pegged at between \$1,000 and \$2,000 monthly. Please indicate what you could accomplish each month for each of these two amounts. We may also consider hourly rates, so please provide your professional staff hourly rates. In doing so, please also indicate what you could accomplish for \$1,000 and \$2,000 monthly. Writing articles, editing them, placing them, obtaining updated journal contacts, mailing lists, etc. are the deliverables you may discuss in describing what you could accomplish.

A Case Study: Boiler Emissions Study

To help acquaint you with the kind of assistance you might provide, and to give the NRBP an opportunity to learn about your approach to an issue, we will lay out the outline of an actual project and indicate our "technology transfer" challenge. We ask that you respond with suggestions for getting the results of our study out to the most appropriate audiences. Please provide in one page or less your suggestions and/or strategy for fulfilling our communications obligation associated with this project. State any assumptions you feel useful to facilitate your approach.

The Problem: Skeptical Engineering Consultants

Reports from several Vermont schools which had recently converted from electricity or oil to wood boilers indicated that their consulting engineers, generally mechanical engineers, had been very skeptical about the efficiency performance of wood boilers in the medium-size range--500,000-5 million BTUs/hr. Facilities managers and chief financial officers at these public schools converted to wood despite the generally negative appraisal of wood energy heating systems based on the consultants' judgments that the steady state efficiency of wood boilers was 65% at best. Oil and gas systems, by comparison, are generally running at 80% efficiencies. The higher capital costs of a wood system over a fossil-fuel or electric resistance heating system are generally compensated for by lower fuel costs (among other socio-economic advantages), but a lower efficiency rating might tip the economic balance away from the wood systems, especially given the general unfamiliarity most schools have with wood-fired boilers. Other wood energy advocates argued that the efficiency was very close to what manufacturers claimed--about 75%.

The Response: A Boiler Emissions Study

The NRBP commissioned a combustion engineering laboratory to field-test five medium-sized boilers in New England and New York: schools, a monastery, a prison, and a housing development. The study was thorough, objective and consistent in determining that wood boilers in the field consistently achieved a 72-75% efficiency rate.

The Challenge: Getting the Word out to Appropriate Audiences

Schools, hospitals, government buildings, housing developments, strip malls, and other commercial buildings in exurban and rural areas of the Northeast, especially in New York and New England--and especially those now heating with electricity--are excellent candidates for wood combustion boiler conversions. Consulting engineers with whom they contract for feasibility studies also could benefit from the results of this study. There are also other constituencies which might benefit. Please indicate what you think we should do with the 150-page boiler emissions study.

**NORTHEAST REGIONAL BIOMASS STEERING COMMITTEE
JANUARY 30-31 and FEBRUARY 1, 1995
PITTSBURGH, PENNSYLVANIA**

AGENDA

TUESDAY, JANUARY 31, 1995:

8:30am - 11:30	State Reports
11:30 - 1:00	Lunch
1:00 - 2:45	Colin High - Resource Systems Group Economic Impacts
2:45 - 3:00	Break
3:00 - 4:30	Jim Easterly - DynCorp Meridian Environmental Externalities
4:30pm	Adjourn

WEDNESDAY, FEBRUARY 1, 1995:

9:00am - 10:00	Jim Eckman - Pittsburgh Energy Technology Center "Cooperative efforts to promote co-firing wood and coal"
10:00 - 11:00	John Trocciola - International Fuel Cells "Cooperative efforts to promote/demonstrate bio-gas and fuel cells"
11:00 - 12:00	Wrap-up, schedule next meeting, and comments on the meeting
12:00 - 1:00	Lunch
1:00	Depart for Fuel Cell Tour (Mike Palko will provide van service)
2:00	Fuel Cell Tour at Pittsburgh Airport (old terminal)
3:30pm	Adjourn after the Fuel Cell Tour

**NORTHEAST REGIONAL BIOMASS STEERING COMMITTEE
JANUARY 30-31 and FEBRUARY 1, 1995
PITTSBURGH, PENNSYLVANIA**

AGENDA

MONDAY, JANUARY 30, 1995:

10:00am - 11:30	Program Manager's Report: a. State Grantsb. 1995 AOPc. Report On Changes at DOEd. Governors' Roundtable Reporte. State reporting
11:30 - 1:00	Lunch
1:00 - 2:00	Technical Coordinator's Report a. Boiler Emissions Contractor Selection, Start-upb. Facilities Directory: New contractorc. Stove Exchange: Feb. 1 Kick-offd. Landfill Technologies: Fuel Cell to completee. Ten-Year Reportf. Articles For Publications: new ideas
2:00 - 4:30	Discuss New Technical Projects: a. Rebuild America: District Heating with Biomassb. Liquid Fuels Follow-onc. Landfill Gas Follow-ond. Co-firing Next Stepse. Technology Transferf. Pellet User Survey/New Brochureg. GIS mapping of resourcesh. Air Toxics Testingi. Technology Transfer
4:30pm	Adjourn

**BIOMASS STEERING COMMITTEE MEETING
HIGHLIGHTS**

**JANUARY 30-31 and FEBRUARY 1, 1995
PITTSBURGH, PENNSYLVANIA**

Monday, January 30, 1995:

See Attachment A for participants.

Rick Handley began the meeting at 10:00 am with introductions. After introductions Rick presented the program manager's report. DOE funding of the Northeast Regional Biomass Program has been approved. Rick is presently working on getting all state grant proposals into contract form. Rick asked that state grants include the following: capture all cost share in budget proposal, quantifiable goals, be able to demonstrate impact (i.e., a letter for doing a good job), and incorporate technology transfer. Rick would like to make the contracts retroactive to avoid any carry forward, but it creates an accounting problem. State contract proposals need to be on disk. Jim Connors asked what the technical specs for the disks were. It was also asked if the disks could be returned. Irving Sacks asked for a letter stating what was said with regards to the progress of the grants.

It would be ideal to be able to get AOPs into DOE when they do there budget. In theory our 96 AOP would already be in there hands. However, the 95 AOP was just turned in. One million dollars was requested from DOE for the biomass program. If the one million had been granted the money could be used for two things: 1)pass it along to the states. (A problem with this though is that states might not be able to match the increase); or 2) set the funds aside for states to draw from as a match to be used for demonstration projects. In the AOP this is referred to as "hurdle money". The themes of the AOP were; 1)making a move to let people know that biomass is an option, and 2) technology transfer. Under technology transfer the focus was on education and training for regulators and the promotion of conversions (i.e., co-firing, vehicle conversion, bio-gas, and bio-refinery). The desire is to educate the regulators on the economic impacts, opportunities, and multiple benefits (i.e., waste reduction) of biomass. Jim Connors asked if the "hurdle money" would be limited only to demonstration projects or could it be used for cost sharing? Rick replied that the money is flexible and would like to see an increase in cost share. Jim Connors asked if it needed to be a demonstration project, for example could the funds be used for a publication, an area were funds are greatly needed. Mike Palko asked how the Southeast biomass program selected who got use of the "hurdle money". Connors replied that the Southeast biomass program is different and cannot be compared. Rick commented that the northeast does more policy analysis. This is the right road for the northeast eventhough our cost share is lower. Irving Sacks commented that there are significant differences amongst state interests. There are opportunities for solid wood combustion. Our interest is in liquid fuels and waste clean-up. Ed Lempicki commented that he believed that the idea to set aside funds was a good one. The heart of biomass is to apply technology. Jim Connors asked if there was a choice

between an increase in state grant funds and flexible money. If so, the choice made would be based on what the increase would be for the states.

Next Rick discussed what is happening at DOE. Rick is in the process of getting the grant application to the New York Support Office. DOE was told to reduce its budget by 17%, this lead to substantial cuts to the biofuels program and a reduction in biomass funds. However phone calls were made and the biomass funds were salvaged. The northeast will get \$810,000 as compared to last year's \$737,000. Irving Sacks stated that technology studies is the biggest bang for Massachusetts buck. He would lean towards an increase in funds for technology projects and that an increase in state money would not have the same impact. Connors stated that an increase in regional projects or a fund for each state to draw from was a good idea.

The Governors' Roundtable Interim Report will be given to the Governors at the CONEG meeting tomorrow. Committee members were told not to give there copy to anyone. There are a few typo's in the copy that committee members received, these typos were corrected for the Governors copy. If they would like a copy of the report received by the Governors they are to call CONEG. Rick did a brief run through of the report. Ginny Judson asked how effective the Roundtable was. She asked if they could bring their legislatures and/or policy people to Biomass Steering Committee meetings instead of having a Roundtable. She stated that Connecticut was not an active member on the Roundtable. Mike Palko asked who they should send the Roundtable report. Jim Connors commented that the report is not accurate of Maine and won't work at a state level. Ginny Judson stated that the report to did not reflect Connecticut either. Rick told the committee that they are responsible for making the report state specific. The report is to act as the door opener. Ginny said that she gave the report to David Lavine and Joel Gordes and they said that the Governor would not read it. Lavine told her to forget about the report. She asked to know who are the state representatives on the various CONEG committees. Jim Connors asked who in the Governor's office received the report and who came to the meeting. He said that he feels disconnected from the Roundtable and would like to provide input.

After lunch Steve Morgan presented an update on technical projects. Ginny asked why we were doing a project on Air Emissions Testing of Two Wood-Chip Fired Furnaces. It has never been done before and there is no data on small systems. Ginny suggested that the report should be understandable. Jim Connors said that people in Maine had reviewed the technical part of the report and had no problem with it. Ed Lempicki had a question regarding the metals listed on page five. Norm Hudson said that the metals listed were appropriate.

Steve told the group that there was a new contractor working on the Facilities Directory. Only fifty-five responses were received thus far and that CTE could not finish the job by May. NEOS Corp. is now handling the project.

The Woodstove Exchange is a project were customers bring in there old woodstoves and are given a rebate toward a new stove. Last years response from manufacturers was not good, however, this year has been better. The goal this year is 500 stoves. Woody Kenney

was elected to be the Biomass Steering Committee representative on the Northeast Hearth Products Board. The press release of the project was scheduled for February 1, 1995. Rick asked if they could get a copy of the press release before it went out. Steve Morgan said that the report will be done in April. Ginny asked if there were figures on the numbers of stoves turned in, in each state. Steve said that he would find out the number of stoves and how many were scraped.

Rick told the group that he got the final cost break down on the landfill gas. SCS is asking for \$20,000. We will advance the money to SCS from the FY1994 technical contract budget and be reimbursed by the NREL funds.

Susan Savitt said the 10 Year Report is at the printer and on the way to CONEG. A state profile could be used to inform the Governors. Susan said that she would return photos that were lent to her.

Next new ideas were discussed. It was stated that Biologue is an unreliable vehicle for getting information out on what is going on in the states. Rick said that he usually gets information from the quarterly reports on what is going on in the states but that he would like to get information not only from the reports. Biologue is not widely distributed and he would like to get information into magazines and journals. Ginny asked for the distribution list Biologue. Irving said that Bio-diesel reports would a good specialized journal to use. Biologue is a good source for a run down on other regions. Susan asked the committee to compile a list of publications they see and/or get on regular basis. Rick said that he is pursuing the possibility of getting the Steering Committee onto DOE's CCmail system.

Rick discussed projects decided on in New Hampshire; 1) air emissions testing, 2) liquid fuels, and 3) co-firing. Fifty thousand dollars has been allocated for liquid fuels and co-firing. The two forums were very successful. As a result it was discovered that there were strong barriers among utilities willingness to share information. Irving said that there is serious interest in co-firing. Rick suggested that the model for landfill gas be used for co-firing. Pick out potential sites for co-firing by looking at various characteristics, such as, size, the potential for co-firing at the plant, and technology transfer. Jim asked were the line was drawn between this being a regional or state project. Rick said that most utilities are driven by customers. Utilities have experience burning feedstocks and will continue to do so until it is no longer economic for them to do so. Irving asked if there was definite proof that co-firing with wood reduces NOx emissions. Rick said that technology is not generally distributed. Co-firing support with in utilities is not very strong. Have to look at availability, quantity, quality, and cost of your biomass fuels. Steve Morgan suggested doing the study in two parts. Jim Connors suggested using the Wood Chip Guide as a model; 1) compile evidence/literature, 2) survey utilities, air quality offices, 3) gather site specific information, and 4) compile a list of top candidates. Ed Lempicki said that he would like to see information on fuel supply.

The meeting adjourned at 5:00 pm and was scheduled to reconvene at 8:30 tomorrow morning.

Tuesday, January 31, 1995:

See Attachment B for the list of participants.

The meeting began with the continuation of the update on technical projects. Three things came out of the Ethanol forum in Hartford; 1) help in bringing down the capitol costs, 2) identified some captive markets in the northeast for ethanol, 3) will provide assistance to regulators to help in determining what is involved in determining a site. Rick has had a lot of discussions with John Lewyta with Champion International who has been working with Dr. Fitzpatrick. Dr. Fitzpatrick has been working with levulinic acid. Champion wants to find a market for the disposal of paper sludge and feel the Biofine (Fitzpatrick & levulinic acid) is the best way. In partnership with NREL a "step award" program has been set up. Arkenol is interested in producing ethanol directly from biomass feedstocks. They are looking at a brewery in Fulton, New York to produce the ethanol. The capitol costs are very high when building a plant from scratch. There are also long regulatory hoops one must go through when siting an ethanol plant. The availability and stability of markets is also a barrier. Irving Sacks commented on the need to get a hold of some reports that discuss this technology. Connors said there would be a lot of private sector and entrepreneurial interests. Rick told the group that their job is to get biomass into the market. Irving said that it can be done on a state-by-state basis. Rick stated that it is extremely expensive to go from state to state. Ginny suggested that we get on NREL to accelerate the "step award" program. She asked what NREL is doing to promote biofuels. Rick told the group it was time to work on a scope of work. Jim Connors suggested a regional conference. Duane Day said that a regional conference would help us to identify the developers.

The next project discussed was Rebuild America: District Heating with Biomass. District heating is where biomass has an opportunity. The Vermont Department of Public Service has taken the lead on this project and will have a number of partners. Morgan stated the principles of solicitation: 1) commercial and multi-family building, 2) focus on energy efficiency, 3) cooperative, and 4) cost share with at least 50% from DOE. Only one that would involve biomass district heating and would cover rural areas. There is a need to identify some other sites that can do the Lessons Learned. Vermont would be the lead and others cities will be sought. So far only interested in wood. Irving said that if they are only interested in wood it would limit the applications. Part of the lessons learned should be what do we know now that we didn't know then. The lessons are applicable to a small audience. Morgan asked about focusing on steam to hot water. He asked that if states had knowledge of the use of district heating, that they ask the plant manager to write a letter stating that they'd be interested in the results of this project. Rick said the cost to the states FY94 budget will be 2,500-3,000 dollars. Irving asked what was new in district heating. Ginny asked if there was a link between introducing biomass and the building people (architects).

After a three minute break state reports began with Connecticut. Ginny met with the agricultural director, Rick, and Phil Lusk to discuss bio-gas. There is one million in bond funds. Landfill Gas Recovery was the best thing that happened. Joel Gordes area is gas turbines.

In Maryland the MEA Bulletin Board has just begun. Two projects are dealing with landfill gas recovery. One of the projects had a problem, the other is in Montgomery County. In Montgomery Co. AER is going to build a plant and doesn't request any funding. The state requested \$70,000 from the General Assembly to help with co-firing systems in western Maryland schools.

In Maine the Ethanol Report was distributed to a handful of people. Jim would like advice of where Maine can go from here with ethanol. As shown in the SCS report there are very few opportunities in Maine for liquid fuels. There is a proposal to look at what is involved in going from whole tree chips to pellets. They have access to the chips. All of the necessary components are available just need to bring them together. Also need \$10,000 to pay for the rental, staff time, etc. Want to get the funds from industry folks. Fresh wood pelletizes easier and therefore a higher product rate is possible. The availability of pellets is going to become a problem. (trying to get ahead of the game). The results will probably be published in Forest Products Journal. Maine is moving into a new chapter in the Biomass Energy process. Maine is currently using public dollars to buy out power contracts. Jim Connors plans to present an abstract at the 2nd Annual Biomass Conference.

Delaware is currently conducting a Residential Wood Fuel Survey. A draft report is due in April and the final is due in March. The proposal for the wood power plant has been dropped.

Pennsylvania has been working on a video that will be finished in about two weeks. There was a co-firing consortium in Harrisburg. Clearfield County is interested in siting an Ethanol Plant. There is concern that wood waste is running out in the upper left hand corner of the state. Companies have been calling with there concern that there are too many companies up there using wood waste. The NEOS Wood Pellet report was reviewed. Mike Palko attended a landfill gas seminar, and a Anaerobic Conference in Texas. Pennsylvania has five anaerobic systems.

Massachusetts' programs focus on gaseous and liquid fuels. There will be a forum to discuss the draft of a primer on Landfill Gas Recovery. The draft report builds on the SCS work and is directed at developers. The fuel cell program is mainly talk at this time. The program involves some EPA and Electric Company money.

After lunch the committee heard from Colin High, Resource Systems Group, on the Economic Impact Analysis. Maine uses the most wood in the northeast. New York, New Hampshire, and Vermont have the highest industrial and commercial wood use. New York and Pennsylvania are the highest in residential wood use. Overall there has been a decline in residential wood use since the last report. Jim asked if the burning of fire wood was being counted as a displacement of oil. Norm stated that in Vermont 36% use residential wood burners primarily. Woody stated that in New Hampshire it is only 12%. Colin High concluded his presentation with an overview of the disk that accompanies the report on how to calculate the figures for each state.

After Colin High's presentation the group discussed doing a press release. Rick said that he would discuss it with Anne. Rick asked that if an individual state did a press release to let him know.

After a break the group heard from Jim Easterly from DynCorp Meridian on Environmental Externalities. The final report is due in February. Leading the way were the total fuel cycle studies however this brought up many questions. Biomass externality/TFC Benefits would like to find a better argument for sustainable development. The numbers on Table 3-B are questionable. Jim questioned how much attention to pay the detail of the negative impacts. Rick asked the Steering Committee what they would like to do with the report. Ginny suggested a conference to report on the report or possible getting on the NERUC agenda. Rick congratulated Jim Easterly and Colin High for working together.

After Jim Easterly's presentation state reports were continued.

In New Jersey an alarming amount of mercury is being found in New Jersey fresh water fish. Fishing in certain areas had to be closed. Garden State Parkway is currently being used to demonstrate the application of bio-diesel. A landfill gas- to energy project is underway. Newark is piping it into Hackensack.

In Vermont the school wood chip supply is doing well. The McNeil plant is on schedule and will be ready in 1997. Vermont is currently running an emissions testing program.

In New Hampshire two wood fire plants have shut down. Mitigation funds are being established. Trying to work on what is going to happen to the towns and citizens where the plants were located. Starting February 22 the PUC is requiring plants to file a report. New Hampshire is talking with a British firm that is interested in processing sludge. Have completed a report stating that the forest have benefited from the chipping industry. The chimney sweep business is up in New Hampshire. Credit has been given to New Hampshire's awareness program.

The meeting adjourned at 5:00 pm and was scheduled to reconvene at 8:30 am tomorrow to complete the discussion on new technical projects.

Wednesday, February 1, 1995:

See Attachment C for a list of participants.

Wednesday morning began with a discussion to develop an outreach plan. Rick suggested getting a professional to put together a scope of work for looking at markets and to help us find the best way to get the word out. Duane Day suggested using the support offices as marketing arms. Rick told the group that he had talked with Joy Cazeaux and Duane about doing a two day education program. He has tried to get SECP funds, but DOE said no. Ginny asked if CONEG had enough office help. Rick said that his position is to manage grants (use funds to get someone to help out). Need to identify specific target audiences. Jim Connors said that can be done at a state level, possibly by bringing state people together for a one day seminar. He is concerned with someone else deciding the who, what, when and where it should be done. Rick said that \$70,000 has been set aside from technical projects FY94 money. Rick likes the idea of using it when we need it and bringing in people to help out as they are needed.

The next project discussed was the Pellet User Survey and New Brochure. Morgan suggested doing for pellets what we did for wood stoves. There is nothing specifically regional about the project. The scope of work developed includes the survey, estimated to cost around \$12,000-\$15,000, and the brochure. Rick said that the other regional program managers have endorsed the project. The Southeast has already put in \$3,000. The Western Biomass Program agreed to be the lead and have agreed to put in \$25,000. They are looking at a significant cost share from industry. The total project will cost as much as \$80,000. Duane asked if various committees will get a chance to comment on the survey. Rick said that an advisory committee needs to be set up first. Jim said that the brochure could turn out to be a handbook used to inform the customer on everything they need to know and what they should be looking for. Retailers need to get up to speed on the technology of pellet stoves so they can report to their customers. Rick said that at this point the Northeast Regional Biomass Program will commit \$3,000 for Phase I.

The group heard from Jim Eckman of the Pittsburgh Energy Technology Center. They have a federal laboratory. It is necessary to look at the whole cycle of coal combustion. The primary unit being used is combustion and environmental. The unit has two different burners that enables you to control swirl. It also has a low NOx moveable swirl block burner. Jim Connors asked if it was conceivable that new NOx standards could be controlled through combustion. Jim Eckman said that it was possible. The unit is designed to extract a lot of samples. A slag panel (water-cooled) can be inserted to get an idea of how tenacious the deposits are. It is run by a PC Data Acquisition System. It is 500lb/hr combustion and flue gas clean-up facility. This unit has four independent burners on the front wall. This gives you a little more flexibility. Most of the pellets are brought in as pellets. Pulverizing and handling systems are in place. Sensors allow problems to be diagnosed. They have experience in characterizing gaseous emissions and solid waste streams. It is a public sector organization accessible to all. They are involved in cooperative agreements, research and development. They make agreements to facilitate interaction with industry, academia, and

government. They plan to begin studies assessing the delivery, storage, in-plant handling and combustion of wood and coal. We were invited to contact them at 412-892-5716 to discuss the identification of fuel providers. Rick asked if they (the states) had identified a particular source of biomass that could be used for co-firing that they should contact Jim and make arrangements with the manufacturers. Mike said that he has been in contact with four sources and asked how to get it to Jim. Jim said that could be discussed with the provider. Jim Connors said he has someone he can contact. Rick said he would like to see a characterization of where the feedstock came from. He asked Steve Morgan to draw up a questionnaire the Committee could use when talking with the provider. He asked Jim and Steve to work together on this. Rick said that if were not looking at .75 - \$1.00 Btu you won't be able to sell it to a utility. Our fuel has to burn at 2 1/2 cents. John Trocciola said that utilities are afraid of committing to new technology.

After a break the group heard from John Trocciola from International Fuel Cells. John said there is the potential for a demonstration project in the northeast. There is a fuel cell in South Windsor, Connecticut. A fuel cell is like a battery except a cell stores reactants outside. The fuel cell: Fuel + Air = Power + Water + Heat + CO₂ - NO, NO_x, SO_x, CO, HC, or Noise. EPA has funded two demos. A natural gas fuel cell power plant, 200 kilowatt. A landfill in Los Angeles California that was started in FY91, has a verified clean-up system, a fuel cell installed, and started up in October 94. A waste water treatment plant was started in FY93. The study was completed in FY94. The clean-up system is scheduled for evaluation in FY95. There are many benefits of fuel cells to waste water treatment plants: increased reliability of power for a critical load (fuel cell runs continuously and eliminates diesel/gas turbine concerns); there is a higher quality power for computers/controllers; nil emissions; high efficiency; and siteability (can be located close to load). An analysis of ADG indicates the presence of H₂S. The fuel cell can accommodate ≤ 3 ppm. Additional analysis is underway. CO₂ is acceptable. The gas clean-up pallet design is complete. It has the same design criteria as the fuel cell power plant. Rick told John that the Committee would like to help in getting a site in the northeast.

After John's presentation the first Biomass Steering Committee meeting of 1995 was wrapped up. Steve asked the group to fax him responses and comments on the RFPs. He fax number is 919-408-0520 and phone is 415-989-0567. EPA has a lab for any air toxics testing we would like to do. A quick assessment of where anaerobic decisteres are at waste water treatment plants. June 12-13, 1995 will be the next Biomass Steering Committee meeting in Wilmington, Delaware. The meeting will start June 12 at around 12:00 pm. Sunday, August 20, 1995 there will be a Biomass Steering Committee meeting in Portland, Oregon in conjunction with the 2nd Annual Biomass Conference of the Americas.

The meeting was adjourned and the group went out to Pittsburgh's old terminal to visit a fuel cell.

**BIOMASS STEERING COMMITTEE MEETING
PITTSBURGH, PENNSYLVANIA**

JANUARY 30-31 and FEBRUARY 1, 1995

GUEST REGISTER

PLEASE PRINT LEGIBLY

Page 1 of

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Steve Morgan	EUA / CCS	919/408/6433	919/408/0520
Susan Smith	EUA / CCS	617 864-6952	617-338-8412
Lewis Brown	-	303-329-6088	303-329-6131

**BIOMASS STEERING COMMITTEE MEETING
PITTSBURGH, PENNSYLVANIA**

JANUARY 30(31) and FEBRUARY 1, 1995

GUEST REGISTER

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**BIOMASS STEERING COMMITTEE MEETING
PITTSBURGH, PENNSYLVANIA
JANUARY 30-31 and FEBRUARY 1, 1995
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NAME	AFFILIATION	PHONE NUMBER	FAX NUMBER
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Susan Savitt	EPA/CCS	617 864-6952	617-338-8412

DRAFT

Northeast Regional Biomass Steering Committee
October 2, 1994
Reno, Nevada

DRAFT AGENDA

- 9:00 a.m. Program Manager's Report
- Oak Ridge closeout - update
- State Grants
- Notice of state grant availability
- Are they too small?
- Reporting requirements. are they worth all the effort?
- AOP for 94-95
- 10:30 a.m. Update on technical projects
- 10 year report
- Report on NRBP forums
- 11:30 a.m. Working lunch - NRBP's 5 year plan - open discussion
- 2:00 p.m. Joint meeting with another regional committee - TBD
- Areas of common concern
- Opportunities for cooperative projects
- 4:30 p.m. Adjourn

TO: BIOMASS STEERING COMMITTEE

FROM: RICK HANDLEY/CHRISTINA EWING

RE: BIOMASS STEERING COMMITTEE MEETING
JANUARY 30 - FEBRUARY 1, 1994

DATE: JANUARY 9, 1995

The meeting location for the next Biomass Steering Committee meeting, January 30-31 and February 1 will be at:

Pittsburgh Hilton and Towers Hotel
Gateway Center
Pittsburgh, PA 15222
for reservations: 412-391-4600

The meetings will be held in the Duquesne Room. A block of rooms have been reserved at the Hilton and Tower under **CONEG quarterly meeting** for the nights of Sunday, January 29, 30, and 31. If you would like to arrive as early as Saturday, January 28 rooms are available but are not being reserved, so you need to make reservations as soon as possible. Reservations need to be made by **January 15**. A special rate of \$70 per night has been arranged. Attendees will be on their own for lunch all three days of the meeting.

Airport Limo service is available on the Ground Floor (Landside Terminal - Baggage Claim Area) of the Airport to the Hilton and Tower for \$20 roundtrip and \$12 one way. The Hilton and Towers Hotel is the first stop and is about a twenty minute ride. For those who will be attending the Fuel Cell Tour, transportation will be provided after the tour back to the airport. A copy of the Limo Service schedule is enclosed. Please note that schedules are subject to change. For information call 412-471-8900 or 412-471-2250.

A draft agenda is attached. If you have any questions you can call Christina Ewing at 202-624-8464. Happy New Year.

Attachments

NEWS RELEASE

Coalition of Northeastern Governors

FOR IMMEDIATE RELEASE

CONTACT: Rick Handley
(202)624-8450

CONEG GOVERNORS' BIOMASS ROUNDTABLE INTERIM REPORT

WASHINGTON, DC (March 17, 1995) -- "The Northeast has one major, largely untapped energy resource option which can contribute to keeping energy dollars at home, and improve environmental quality. That resource is biomass: trees, plants and wood-based by-products," said Governor Howard Dean of Vermont. Governor Dean's remarks were made in announcing the consensus findings of the CONEG Governors' Biomass Roundtable. The Roundtable is comprised of individuals from government, industry and environment groups with expertise in biomass resources and its technical applications.

The CONEG Governors' Biomass Roundtable Interim Report was presented at the CONEG Meeting on January 31 in Washington. The Coalition of Northeastern Governors (CONEG) has a longstanding interest in development of sustainable energy resources which can contribute to the region's energy security, environmental quality and economic well-being. Acting on this interest, Governor Dean convened the CONEG Governors' Biomass Roundtable in May of 1994. The Roundtable was given three major objectives: identify the substantive issues surrounding the development of biomass energy in the Northeast; explore feasible options to address these issues; and finally, to arrive at findings for the CONEG Governors' consideration.

According to the Interim Report released by the CONEG Policy Research Center. "Further development of biomass energy offers significant opportunities to retain millions of dollars in Northeast energy expenditures. A new generation of economical biomass-fueled energy systems offer the potential for reduced air emissions and other environmental benefits."

"Biomass can help the Northeast states reduce our dependence on imported energy and create jobs," said Governor Dean. "To do this, we must understand how industry and government can work together to make these opportunities a reality," he continued.

The Roundtable includes stakeholders whose actions directly or indirectly affect the use of biomass resources and technical applications. They include individuals from federal and state agencies dealing with energy and forestry, non-governmental interest groups, producers and users of biomass resources, manufacturers of conversion technologies, investors, and technology researchers. The Roundtable met five times in the past eight months in facilitated meetings to explore, debate, and reach consensus on the issues.

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This interim report presents the Roundtable's consensus findings on the potential for biomass energy in the Northeast, associated opportunities and concerns, and suggestions on what Governors can do to encourage biomass development. The Roundtable concluded that "Governors can provide the leadership to resolve a number of issues that are barriers to biomass energy use. Their leadership can increase public awareness of the opportunities for developing biomass, and can work to streamline regulatory processes that today are barriers to biomass projects". The Roundtable made the following recommendations:

- **Address the issue of inconsistent and misapplied environmental regulations** by ensuring senior level, interagency cooperation for sharing current, technical information; addressing inconsistencies among environmental regulations and permitting process that apply to biomass energy facilities; and streamlining the permitting process through coordination of agencies' policies;
- **Promote the near-term deployment of biomass energy systems in public buildings** through capital investment and fuel purchase policies of the states;
- **Encourage specific regulatory incentives to increased use of biomass energy in utility markets** through such measures as "green pricing" strategies;
- **Ensure environmentally-sound, low-cost biomass energy supplies** through a review, and revision where appropriate, of state solid waste management policies and forest management policies; and
- **Encourage economic development and financing assistance** for purchase of market-ready commercial/industrial biomass technologies, to identify new markets for biomass technologies, and for participation in development and deployment of advanced systems.

The Roundtable identified a number of issues, particularly related to forest management and biomass, which can benefit from further examination by its members and other experts in the field. In accepting the report the CONEG Governors asked the Roundtable to continue its deliberations on forest management and to look at mis-applied regulations affecting biomass. The Governors asked for a final report in August.

The CONEG Governors are: Governors John Rowland of Connecticut; Angus King of Maine; William F. Weld of the Commonwealth of Massachusetts; Stephen Merrill of New Hampshire (CONEG Chairman); Christine Todd Whitman of New Jersey; George Pataki of New York; Thomas Ridge of the Commonwealth of Pennsylvania; Lincoln Almond of Rhode Island ; and Howard Dean, M.D. of Vermont (CONEG Vice-chairman).

Reports are available through the CONEG Policy Research Center, Inc., 400 North Capitol Street, N.W., Suite 382, Washington, D.C. 20001 or call (202) 624-8450 for a pre-paid fee of \$10.00 per copy.

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Biomass - > Energy Plant Tour

In conjunction with Earth Day

The Association of Energy Engineers and The Northeast Regional Biomass Program

invite you to tour another Baltimore waste-to-energy operation, a

Renewable Methane Production Facility

When: 5:00 PM, Thursday, April 20, 1995

Where: Back River Wastewater
Treatment Plant,
8201 Eastern Blvd.
Baltimore, MD

Directions: Take I-695 to Exit 38E, go
east about 1 mi. on Eastern Ave., turn
right at 1st lite into plant, Admin.
Bldg. is 1st on rt., go to auditorium.

RSVP: \$24 advance payment by mail (See other side.)
\$26 at the door

Half price for FT students (All prices include meal.)
Call Jeff Deem at 703-550-9055 for optional bus ride.

Biomass fuel can

1. Consume waste streams
2. Stop methane (a greenhouse gas) emissions
3. Stop CO₂ (a greenhouse gas) accumulation
4. Control odors
5. Halt depletion of fossil fuel reserves
6. Function independently of weather
7. Reduce US oil imports.

The Back River Waste Water Treatment Plant does all of this and more. While processing sewage from 1.3 million area residents, it extracts 1.5 million ft³/day of gas (70% CH₄ & 30% CO₂). About half of this is used in-house to sustain plant operation and offset utility consumption.

Who should attend? To those who manage, build or service the following types of operations, wastewater-to-fuel is a potential profit center.

1. Municipal governments	4. Military bases	7. Cogenerators
2. County governments	5. Large Federal campuses	8. Any organization in a position
3. Heavy industry	6. College campuses	to treat its own waste stream

This Event Open to the Public

More Facts

- The new, highly efficient, egg-shaped anaerobic digesters are what allow the Back River Treatment Plant to generate more methane than it consumes.
- Treated effluent goes to Bethlehem Steel for industrial processes, treated sludge to Wheelabrator to produce fertilizer pellets.
- Excess methane, formerly purchased by BGE, is now flared; Wheelabrator is a potential customer.
- This plant, owned and operated by the Baltimore Dept. of Public Works, is one of the largest of its kind.
- The National Capital Chapter of the Association of Energy Engineers participates in the US Federal Interagency Renewable Energy Working Group to promote the use of renewable energy in Federal facilities.
- The US Department of Energy's Regional Biomass Program encourages the beneficial use and market development of methane produced from anaerobic digestion of sludge.

AEE-NCC
% BECSYS
4905 Del Ray Ave., #307
Bethesda, MD 20814

----- Registration Form -----

Please register the following person(s) for the April 20 biomass tour. Enclosed find check(s) covering \$24 registration fee for each attendee.

Name

Organization

Address

City, State, Zip

Phone/FAX

Name

Organization

Address

City, State, Zip

Phone/FAX

Clip and return this form with check(s) payable to AEE-NCC. Must be received at AEE-NCC, % BECSYS, 4905 Del Ray Ave., Ste. 307, Bethesda, MD 20814 by April 1/ 1995 for lower registration fee. Call Jeff Deem, 703 550-9055 about optional ride from Washington and other info.