

DOE/OR/21389--T23

NORTHEAST REGIONAL BIOMASS PROGRAM
SECOND & THIRD QUARTERLIES & FINAL REPORT
JANUARY - SEPTEMBER 30, 1994

RECEIVED
APR 23 1997
OSTI

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED *ph*

MASTER

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

**Portions of this document may be illegible
in electronic image products. Images are
produced from the best available original
document.**

NORTHEAST REGIONAL BIOMASS PROGRAM
SECOND AND THIRD QUARTERLIES AND FINAL REPORT

JANUARY - SEPTEMBER 30, 1994

CONEG POLICY RESEARCH CENTER, INC.
400 NORTH CAPITOL STREET, NW
SUITE 382
WASHINGTON, D.C. 20001

RICK HANDLEY, PROJECT MANAGER

JULY 1995

TABLE OF CONTENTS

INTRODUCTION	1
PROGRAM GOALS AND OBJECTIVES	2-3
MANAGEMENT REPORT	4-6
(Conferences, Workshops & Meetings Attended; New Contracts; Grants; Planning Activities; Publications Released; and Problems Encountered)	
STATE PROGRAM SUMMARIES	7-9
(A summary of the biomass activities conducted as part of the grants to states provided by the NRBP)	
TECHNICAL PROJECT STATUS REPORT	1-72 & 1-67
(Completed Projects; Active Projects; Contractor Selection or Negotiations Pending; and Concepts Under Consideration)	
TECHNOLOGY TRANSFER	
(copies of publications, reports, articles, meeting minutes, etc.)	

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 January 1, 1994 through September 31, 1994, the eleventh year funding for the NRBP.

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.

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.

January

10&11 Conducted NRBP steering committee meeting in Annapolis, MD

February

1 Attended landfill gas seminar in Albany, NY co-sponsored by SWANA and SCS Engineers.
14 Conducted planning meeting for the Governors' Biomass Roundtable
16 Attended planning meeting and provided input to the design and implementation of EPA's Methane Outreach Program.
18 Attended meeting on landfill gas in Boston, MA sponsored by Mass DOER
23 Attended RBEP managers meeting Washington, DC
24 Hosted 3rd annual RBEP/EUS meeting Washington, DC

March

1 Meeting with Norm Hinman, NREL, in Washington, DC follow-up to discussions held at RBEP/EUS meeting on promoting ethanol-to-biomass in the Northeast.
 Attended NASEO reception.
4 Meeting with DOE biomass program manager Washington, DC.
17 Staffed RBEP booth at AG-Day "New Products and New Uses From Agricultural Materials" Washington, DC
22 Meet with Biofuels! America staff Washington, DC

April

11 Attended Renew 94 conference Stanford, CT
28 Co-hosted and attended BERA Luncheon (the NRBP provides a site for the BERA Washington Luncheons)
29 Attended fuel cell presentation hosted by International Fuel Cells Danbury, CT

May

- 2 Attended Governors Biomass Roundtable meeting Burlington, VT
- 9&10 NRBP Steering Committee meeting New London, NH
- 12 Attended a presentation on BEFIS by Meridian Corp. Washington, DC
- 25&26 Attended two day workshop on biomass data collection hosted by EIA, Washington, DC

June

- 1 Meeting with Cindy Jacobs EPA on coordinating NRBP and EPA efforts to support landfill gas-to-energy
- 5&6 Attended UBECA meeting Washington, DC
- 8 Staffed the RBEP booth at 2nd annual SWANA Waste To Energy Conference in Boston, MA
- 8 Briefed the CONEG energy working group on biomass program activities
- 14&15 Governors Biomass Roundtable Burlington, VT
- 21 Made a presentation to the New England Energy Task Force meeting Boston, MA
- 27&28 Attended the NRBP Pellet Conference Bedford, NH

July

- 22 Hosted a meeting with Northeast Hearth Products Association Boston, MA to discuss opportunities to better coordinate efforts
- 26 Attended the Delaware biomass working group meeting Dover, DE

August

- 15-17 Participated in three days of meetings in Denver, CO. Met with RBEP managers, participated in joint meeting of WRBEP and SERBEP steering committees, and made a presentation to Western Regional Ad Hoc committee on Governors Roundtable.

September

- 13 Issued Notice of Grant Availability to states
- 13 Governors Roundtable Meeting New York, NY
- 27 Conducted NRBP Co-Fire Forum Philadelphia, PA

**DOE FINAL REPORT - JANUARY 1, 1994 - SEPTEMBER 31, 1994
PUBLICATIONS**

- Energy Implications of Integrated Solid Waste Management Systems
- Small Gas Turbines for Distributive Generation and Biomass Power Applications
- Wood Chip Heating Systems - A Guide for Institutional and Commercial Biomass Installations - July 1994
- The Potential for Producing Ethanol from Biomass in the Northeast - September 1994
- Implementation Guide for Landfill Gas Recovery Projects in the Northeast - September 1994
- Regional Biomass Energy Program (RBEP) Informatin Packet
- The Economic Impact of Wood Energy in the Northeastern States. Volumes I, II, and III

STATE GRANTS

Connecticut

Connecticut continued to support the use and production of ethanol. A summary was developed of Connecticut and federal legislation discussing biogas potential of landfills and sewage treatment plants. The Department of Environmental Protection was asked to join in the effort to have workshops for landfill operators interested in recovering methane from their sites. Northern Utilities was contacted to discuss their role in getting a methane recovery facility at Hartford's North Meadows Landfill. The regional biomass energy programs' states grant projects were reviewed and updated. The federal and state biomass tax incentives and subsidies were also reviewed and revised.

Delaware

The Residential Fuelwood Survey is underway. A no cost extension for Delaware's year ten grant was requested to complete the survey. The Biomass Work Group met twice to discuss potential projects for the upcoming year. The group gave approval for biomass energy demonstration plots to continue. The group met with Christine Donovan to review her report. The State Waste Biomass Resource Survey was completed September 1, 1994 by C.T. Donovan Associates, Inc. Thirty copies were distributed in and out of the state. Delaware continued to promote landfill gas opportunities in the state. Work with SCS Engineers on the Jones Crossroads landfill in Sussex County is continuing. With a contribution from Delmarva Power a Hybrid Poplar (Biomass for Energy) Demonstration Plantation project is planned. TVA and SUNY were contacted to learn about their plantation projects. The state's biomass contact attended the Wood Recycling Course sponsored by SERBEP, the Pellet Conference and Wood/Coal Co-firing roundtable sponsored by the NRBP. Delaware also sent a representative to the National Biofuels Conference.

Maine

Maine's biomass program director responded to many requests for information. The contact contributed to the development of NRBP projects and attended steering committee meetings. The state continued their work on biomass energy related projects. The biomass program director continued to serve as a team member to bring expertise on biomass energy resources and issues to the state's energy plan. The program director is supporting a NICE 3 grant proposal effort by the Office of Industrial Assistance, College of Engineering, University of Maine for energy efficiency and waste reduction improvements in the leather tanning industry.

Maryland

The cogeneration project in Cumberland has been delayed primarily due to the emergence of new industry in the area. The wood survey will be re-issued in late fall or

winter. Good progress is being made for the electronic bulletin board. The state has been talking with local officials regarding the Oaks Sanitary Landfill. Work is continuing on the Back River waste treatment plant.

Massachusetts

Massachusetts' hosted a forum - "Landfill Gas Recovery Potential In the Northeast". Massachusetts' Alternative Transportation Fuel program is closer to developing and implementing regulations and standards. DOER is working with a developer on the construction of a biodiesel plant converting liquid wastes to a diesel additive. DOER is in a ethanol controversy on the mandated use of renewable fuels in the production of oxygenates for reformulated gasoline. DOER has worked with the Division of Forests and Parks on improving carbon sequestration through professional management and emission reduction credits.

New Hampshire

The program manager is serving on a project team, coordinated by the North County Resource Conservation and Development Area, Inc., who developed a grant proposal - "Energy Integration and Opportunities to Diversify Local Economics in New Hampshire". SB 790 is an attempt by the state legislature to recognize the economic value of biomass energy and the need for a balance between closing plants and having competitively priced electricity was passed by the legislature and signed by Governor Merrill. Logistical support was provided for the wood pellet conference, "Putting Pellets in Place: The Northeast Passage". The annual fuel use survey is being analyzed and will be available soon.

New Jersey

Utilities in the state are being encouraged to use waste wood to co-fire with coal and to assist facilities in converting to biomass fuels. New Jersey is active in the development of the co-firing forum. The state is also very active in trying to find a market for waste wood and tree trimmings.

New York

Three workshops are in the works; 1) to deal with the pulp & paper industry; 2) the potential research/commercial sector biofuels companies; and 3) a stakeholder workshop on wood energy. The state is expanding their public education program on wood stoves. The video - "The Right Way" was distributed to thirty-eight television stations. The brochure - "How to Burn Wood Right" is in reproduction. A postcard survey to accompany the brochure is researched, prepared and printed. The wood stove education package is being reprinted and distributed. New York continues to participate on the Governors Biomass Roundtable.

Pennsylvania

The landfill gas recovery project was introduced to the PA Energy Office. A literature search is continuing on PA's Cool Community Program. The PA Energy Office and Royal Resource Corp. have been working on Electro-Farming. The production of the video - Wood Energy Works in the Northeast has begun. Comments were provided to the NRBP on the Farm Bill 1995. Technical and outreach assistance was provided.

Rhode Island

Research is being compiled to determine which wood waste types are likely to meet end use market specifications. The findings will be published. Rhode Island is also preparing a residential fuelwood survey.

Vermont

Vermont continued to facilitate the development of demonstration projects for biomass gasifier technology. Instate project assistance was provided. The biannual survey to promote residential wood energy use in Vermont will be conducted in November and December of 1994. Vermont is working with the Superintendents' Association on wood chip procurement.

**NORTHEAST REGIONAL BIOMASS PROGRAM
TECHNICAL PROJECTS STATUS REPORT
JANUARY 1994 - JULY 1994**

COMPLETED PROJECTS:

Title: Evaluation of the Performance of Wood Chip Heating Systems in Institutional Buildings
NRBP Funding: \$36,469
Contract Period: 12 months, starting March 1, 1992
Completion Date: November 1993
Objective: To determine fuel and capital costs, combustion efficiencies, O&M costs, and overall system performance of wood residue to energy systems.

Title: Wood Fuel Pellet Forum
NRBP Funding: \$20,000
Contract Period: April 1993 - December 1993
Completion Date: December 1993
Objective: To bring together key people representing various aspects of wood fuel pellet manufacturing and use in a problem solving forum designed to identify problems and potential solutions to expanded production and use of pellets in the region.

Title: Wood Stove Stress Testing Workshop
NRBP Funding: \$7,000
Contract Period: August 1992 - February 1993
Completion Date: February 1993
Objective: To educate manufactures about the methodology and results of the wood stove stress testing project and to inspire changes in wood stove design; and to accept suggestions from manufactures which might improve the methodology.

ACTIVE PROJECTS:

Title: Wood-chip Heating Systems: A Guide for Institutional and Commercial Biomass Institutions
NRBP Funding: \$18,725
Contract Period: February - October 1993
extension until July 1994
Status: Guide is complete and available from CONEG
Objective: To provide a simple, usable working tool to enable public boards, administrators and other decision-makers, including private owners of

ACTIVE PROJECTS CONT:

commercial or industrial facilities in the Northeast to; 1)consider the replacement of existing or the installation of new, wood-chip energy systems; 2)investigate the economics of wood-chip heat, hot water, and drying and process steam applications, using life-cycle cost and cash-flow analysis; 3)compare different types of wood-chip systems and select a system appropriate to the needs of their facilities; and 4)implement wood-chip energy projects.

Title: Impediments to Development of Landfill Gas Recovery Projects in the Northeast
NRBP Funding: \$68,801
Contract Period: 12 months, starting February 1993
Status: Draft Final Report completed
Objective: To assist potential developers of landfill gas to energy sites in the Northeast and associated policy and regulatory personnel to understand the current state of the industry and to realize new development opportunities. The project will identify candidate landfill sites in the Northeast for LFG recovery; estimate the total energy potential available from LFG in the Northeast and will provide information that could be used to affect state and federal energy policy.

Title: Lessons Learned II: Woodstove Emissions
NRBP Funding: \$50,000
Contract Period: June 1993 - March 1994
Status: Completed; an estimated 550 stoves sold; 95 newspaper stories; 16 radio broadcast interviews, 2100 telephone inquiries to NY "800" numbers.
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.

Title: Comparative Analysis of Landfill Gas Technologies
NRBP Funding: \$40,000
Contract Period: October 1993 - August 1994
Status: Tasks 1-7 completed; Draft final report due August 1994
Objective: To compare and evaluate several gas-to-electricity technologies for their economic and environmental conversion technologies.

Title: Biomass Facilities Directory
NRBP Funding: \$30,000
Contract Period: September 1993 - June 1994
Status: final data collection format completed (Task 3); Tasks 1,2 & 4 partially completed. Final telephone interviews underway.

ACTIVE PROJECTS CONT:

Objective: To compile a comprehensive, updated database of industries, businesses, institutions and utility companies using biomass for fuel in the eleven northeastern states and to input this information into the modified Biomass Facilities Information System (BFIS).

Title: Resource Survey of Large-Scale Liquid Fuel Products From Biomass
NRBP Funding: \$40,000

Contract Period: July 1993 - May 1994

Status: Draft Final Report Completed

Objective: To encourage the development, in the Northeast, of a large-scale demonstration project or commercial facilities using biomass waste materials to produce ethanol project or commercial facilities using biomass waste materials to produce ethanol or other liquid fuels.

Title: A Methodology for Environmental Externalities: Accommodating Biomass Feedstocks

NRBP Funding: \$49,935

Contract Period: October 1993 - August 1994

Status: Draft interim report for Task 1 complete; quantitative and qualitative descriptions of key biomass attributes in fuel cycle underway.

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: Update on Economic Impacts Study

NRBP Funding: \$40,000

Contract Period: October 1993 - August 1994

Status: Tasks 1-3 complete; Task 4 underway

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

Title: Wood Pellets Fuels Conference

NRBP Funding: \$25,000

Contract Period: November 1993 - August 1994

Status: Conference was completed; 50 participants. Participants agreed that with the establishment of four new pellet plants and the sale of 6,000 pellet appliances in the region, the industry is well underway. Two key lingering problems are ash slagging of stoves and varying quality of pellet. Due to price non-competitiveness, market forces may force even higher-ash content pellet made from wood and paper wastes.

Objective: To inform, motivate and train participants to carry out Action Plan drafted in last June's Forum. To update status of industry in the region.

ACTIVE PROJECTS CONT:

Title: Governor's Round Table
NRBP Funding: \$30,000 has been allocated to cover the site costs, facilitator expenses, and travel costs for certain stakeholders.
Contract Period: November 1993 - April 1995
Status: Two meetings have occurred. Next meeting is scheduled for September 14.
Objective: The Biomass Roundtable is a convening of invited stakeholders, representing all aspects of production, consumption and regulation of biomass derived energy.

Title: Long Range Planning
NRBP Funding: part of Technical Support contract
Contract Period: August 1993 - July 1994
Status: Draft Report Completed: Chapters on Supply, Demand. Conversion Technologies, and Technology Transfer.
Objective: To guide project selection and project selection criteria over the next five years.

STATUS REPORTS: CONTRACTORS SELECTION OR NEGOTIATIONS PENDING

Title: Co-Firing Wood and Coal in Utility Boilers
Budget: \$40,000
Proposed Project: A roundtable to discuss the key issues will be held September 27 in Pennsylvania. Targeted to utilities and air regulators.

Title: Resource Assessment Follow-up
Budget: \$40,000
Proposed Project: A Liquid Fuels Development Forum scheduled for September 22. The objective is to bring together key players to discuss what is required to get a large-scale biomass-to-ethanol production plant under construction.

Title: Study of Emissions From Small Wood-Fired Boiler Systems
Budget: \$40,000
Proposed Project: 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 wood-chip fired combustion systems and to determine the associated health risks, if any.

STATUS REPORTS: CONCEPTS UNDER CONSIDERATION

Title: Wood Waste Roundtable and Report Publication
Budget: 1: \$35-45,000; 2. \$10-15,000 (estimated)
Contract Period: possible 1994 project
Objective: Last year there was a successful roundtable discussion in New York and a successful wood waste conference last fall. Two related projects proposed are; 1)Roundtable Workshops on the Technical, Regulatory and Public Policy Issues Affecting Waste Wood Processing and Combustion for Fuel in Selected Northeastern States; 2)Package and Disseminate Results of Wood Products in the Waste Stream Study.

Title: Co-Firing Wood and Coal in Utility Boilers
Budget: \$40,000 (estimated)
Contract Period: possible 1994 project
Objective: This project would begin with a retrospective survey of existing research and documentation of experience with co-firing in present facilities. The project would conclude with a test firing of wood at a coal-burning utility boiler.

**Northeast Regional Biomass Program
Applied Research & Technology Transfer**

**Project Status Reports and Work Statements
Proposed Project Description**

January 1994 - July 1994

Prepared by:

**Stephen J. Morgan
Technical Coordinator
Citizens Conservation Corporation
530 Atlantic Avenue, Boston, Massachusetts 02210**

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

STATUS REPORTS: ACTIVE PROJECTS

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July, 1994

Title: **Booklet for Key Decision Makers on Potential for
Wood Chip Heat in Commercial & Industrial Facilities**

Rationale: Even though wood chip combustion facilities have been in existence for several decades, the technology is unfamiliar to most engineers and facility managers outside the forest products industry.

Objectives: The objective of this booklet is to provide a simple, usable working tool to enable public boards, administrators and other decision-makers, including private owners of commercial or industrial facilities in the Northeast to:

- (1) Consider the replacement of existing energy systems (or the installation in new facilities) of wood-chip energy systems;
- (2) Investigate the economics of wood-chip heat, hot water, and drying and process steam applications, using life-cycle cost and cash-flow analyses;
- (3) Compare different types of wood-chip systems and select a system appropriate to the needs of their facilities;
- (4) Implement wood-chip energy projects.

The target applications (new and retrofit) fall in the 1-10 MMBTU range and are generally on a turn-key basis.

Approach: Contractors will employ an extensive review of secondary data on wood-chip installations and will conduct a phone survey of a representative range of installations and decision makers. Contractors will draw upon their own project team expertise and may interview CONEG membership. Site visits will be undertaken to a select group of installations that provide unique or instructive installations. A booklet will be produced based upon RFP guidelines on content which will draw upon the above data.

Tasks:

- (1) Research applicable wood-chip systems in the NE and E.Canada through review of secondary research and by conducting a phone survey of applications
- (2) Research wood-chip supply throughout the NE region
- (3) Conduct Existing Chip System Site Visits (unique or instructive applications only); report observations, including photos
- (4) Develop Guidelines and Tools for Economic Analysis of Prospective Wood-Chip Systems
- (5) Research Financing Options for Wood-Chip Installations
- (6) Examine Varying Modes of Project Management and Implementation
- (7) Develop Guidelines for Assessing the Efficiency, Stack Emissions and Safety of Manufacturers' Wood-Chip Combustion Systems
- (8) Describe Options for Public Participation and Education in a Wood-Chip Project
- (9) Categorize Operational Issues for a Successful Wood-chip System
- (10) Develop Outline of Booklet Content following RFP guidelines for project management prior approval
- (11) Produce 300 Copies of Booklet,estimated at 60 pages. Retain a non-technical professional editor and professional graphics personnel to assure professional quality production. Coordinate with Vermont Steering Committee and CONEG.
- (12) Prepare Timely Progress Reports for CONEG Policy Research Center, including quarterly written reports and oral presentations to the project Advisory Committee

Status: Guide is complete and available from CONEG

Contractor: Energy Efficiency Associates, Calais, Vt.
Tim Maker (802) 223-6918

NRBP Funding: \$18,725

Cont. Period: February - October 1993
Extension until July 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

**Title: Impediments to Development of Landfill Gas Recovery Projects
in the Northeast**

Rationale: The technology of converting landfill gas to energy (LFG) has been known for some time and LFG projects have been operating in the West; however, the development of such projects has been slow in the Northeast.

Objectives: To assist potential developers of landfill gas to energy sites in the Northeast and associated policy and regulatory personnel to understand the current state of the industry and to realize new development opportunities. In addition, the project will identify candidate landfill sites in the Northeast for LFG recovery; estimate the total energy potential available from LFG in the Northeast and will provide information that could be used to affect state and federal energy policy.

Approach:

PHASE I: A survey of the LFG industry will identify the parameters for a successful project and identify any impediments to success. Contractors will employ a data search, data from the surveys, other secondary data and their own expertise to develop a handbook providing project feasibility criteria, strategies to overcome both technical and non-technical barriers to development, and technical siting criteria.

PHASE II: A review of existing landfill databases and visits to up to four NE states will provide input to a new database of active landfills larger than 100 TPD, with emphasis on the 60 sites receiving 500+ TPD. The contractors will apply criteria developed in Phase I to rank landfills by state for attributes favoring development. A software package will be developed for estimating LFG yield and economic feasibility.

Tasks:

PHASE I

- (1) Conduct a literature review and prepare a summary report addressing the technical, economic, institutional and environmental aspects of developing LFG recovery projects. The discussions will emphasize changes the industry has undergone over the past five years.
- (2) Interview LFG developers, owners, utilities, financiers, and others to determine national and regional perspectives
- (3) Identify project feasibility criteria for the following: landfill characteristics; energy sales agreement; regulatory/environmental conditions; tax incentives and subsidies; landfill owner-LFG developer procurement.
- (4) Describe barriers to success, ranking relative difficulty, and provide options to overcome each potential barrier
- (5) Provide guidelines for technical siting decisions in Northeast
- (6) Identify non-technical factors critical to success
- (7) Prepare a draft handbook with products and data from steps 1-6 for review (4 copies)

PHASE II

- (1) Compile Landfill Database
- (2) Identify and Group Landfills for LFG Development Based on Technical Criteria
- (3) Rank Landfills for LFG Development, Applying Non-Technical Factors
- (4) Develop Criteria and Methodology or Qualifying Landfills for LFG Development (software model)
- (5) Produce final handbook (including Phase I draft material); provide LFG recovery economic model in hard copy and disks

Contractor: SCS Engineers, 11260 Roger Bacon Drive, Reston
VA, 22090. Attn: Mike McGuigan (703)471-6150.

NRBP Funding: \$68,801

Cont. Period: 12 months, starting February, 1993

Status: Draft Final Report Completed

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

Title: Lessons Learned II: 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.

Approach: Working closely with the Northeast Hearth Products Association, develop a retail promotion strategy designed to sell stove change-outs. The campaign will be designed to build upon an earlier NRBP project which developed promotional and educational materials and employed mass media channels. Retailers would pay for electronic media "time" or for costs of print media. This project would provide ad slicks, newspapers inserts, radio promos, and other promotional materials. The campaign will last from mid-January to the end of February and encompass New England and New York.

Tasks:

- (1) Develop a retail promotional campaign based on the theme of Old Stove Amnesty, include retailer and project management input to improve impacts
- (2) Develop a name, a logo, two print advertisements, camera-ready headlines and copy points, a sore banner design, and a product hang tag.
- (3) Establish media targets among print, radio and TV in seven state region.

- (4) Designate an expert and organize a radio tour to promote "Clean Heat Woodstove Exchange"; draft press release for media; release wire photo for AP and UPI to accompany newspaper articles; produce video news release for TV stations.
- (5) Document impact of campaign through retailer surveys, phone interviews, review of sales data, or other suitable methods

Status: Completed; an estimated 550 stoves sold; 95 newspaper stories; 16 radio broadcast interviews, 2100 telephone inquiries to NY "800" number.

Contractor: Kelliher/Samets/Volk , Burlington, VT, (802)862-8261

NRBP Funding: \$50,000

Contract Period: June 1993 - March 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

July 1994

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; Draft final report due August 1994

Contractor: SCS Engineers

NRBP Funding: \$40,000

Contract Period: October 1993 - August 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

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 underway.

Contractor: Combustion Testing & Engineering

NRBP Funding: \$30,000

Contract Period: September 1993 - June 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

Title: Resource Survey of Large-Scale Liquid Fuel Products From Biomass

Rationale: There exists a variety of laboratory-tested technologies for converting woody and other biomass feedstocks into ethanol and other biofuels which can readily be used to displace fossil-based fuels in the generation of electricity. One key to successful transfer of current conversion technologies to commercial-scale liquid fuel production is the availability of a low-cost feedstock resource. The Northeast region is less well suited than other parts of the country to the development of short rotation crops as a competitive fuel feedstock. In the Northeast, a more economical feedstock may be biomass waste materials, such as waste paper, which have a low or even a negative value due to increasing disposal costs. Up-to-date information on available resources and on potential support or impediments to project development is needed by policy makers and potential commercial developers.

Objectives: The ultimate purpose of this project is to encourage the development, in the Northeast, of a large-scale demonstration project or commercial facilities using biomass waste materials to produce ethanol or other liquid fuels. The immediate objective of this stage of the project is to generate a base of information on the availability of economically competitive and sustainable biomass waste feedstocks which meet criteria for utilization with existing conversion technologies, including (but not necessarily limited to enzymatic and acid-based hydrolysis conversion technologies. NRBP seeks responses to the following questions:

- (1) How much potential feedstock material exists?
- (2) What is the cost to extract/obtain these materials as feedstock for the large-scale commercial generation of liquid fuel?

Approach: The project is envisioned to proceed in three phases: (1) Preliminary Resource Survey; (2) Further Evaluation of Potential to Support a Large-scale Biomass-to-Ethanol Conversion Facility; (3) Identification and Detailed Analysis of Candidate Demonstration Sites. The focus of this project is **I: Resource Survey** only. The survey will rely on existing research and data.

Tasks:

- (1) Establish the requisite characteristics (e.g., acceptable types of material, moisture content, etc.) needed to qualify potential biomass waste feedstock materials for both enzymatic and acid-based hydrolysis conversion processes.

INTERIM REPORT TO NRBP STEERING COMMITTEE: present criteria to be used in defining potential feedstock materials, and plan for proceeding with the regional resource assessment.

- (2) Identify potential feedstock sources by state and county (or other jurisdictions, as appropriate), including both MSW and other significant sources which may not show up in the MSW stream.
- (3) Describe any anticipated change in availability or value/cost of feedstock over next ten years.

INTERIM REPORT TO NRBP STEERING COMMITTEE: present findings of tasks 2 and 3.

- (4) For areas within the region where potential resources and energy demand are concentrated, make a preliminary identification of the fuel most likely to be displaced, and any relevant environmental or regulatory barriers or incentives to development of a waste-to-ethanol site.
- (5) DRAFT FINAL REPORT TO THE NRBP STEERING COMMITTEE: The draft final report will be distributed to the Steering Committee in time for the Committee to review the document prior to a presentation and discussion of the findings by the contractor.
- (6) FINAL REPORT TO THE NRBP STEERING COMMITTEE. The final report should incorporate a discussion of the implications of the Resource Survey's findings for the development of ethanol to liquid fuel in the Northeast. The report will be made available to the Center both in hard copy and on diskette.

Status: Draft Final Report Completed

Contractor: C.T. Donovan Associates

NRBP Funding: \$40,000

Cont. Period: July 1993 - September 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

July 1994

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 for Task 1 complete; quantitative and qualitative descriptions of key biomass attributes in fuel cycle underway.

Contractor: Meridian Corporation

NRBP Funding: \$49,935

Contract Period: October 1993 - August 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

July 1994

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

Status: Tasks 1-3 complete; Task 4 underway

Contractor: Resource Systems, with assistance from Energetics

NRBP Funding: \$40,000

Contract Period: October 1993 - August 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

July 1994

Title: Wood Pellet Fuels Conference

Rationale: The chicken-and-egg problem which has bedeviled the emergence of the pellets industry has many roots. Concerted and informed activity by government and industry will accelerate the penetration of both stove sales and pellet sales in the region. The Pellets Forum held last June created an Action Plan for both the private and public sectors: the Conference should gain attention for the Plan and afford participants with information and training to effect its recommendations

Objectives: To inform, motivate and train participants to carry out Action Plan drafted in last June's Forum. To update status of industry in the region.

Approach: To co-sponsor a conference of 150-200 participants late in the spring or early summer of 1994.

Tasks:

- (1) Form steering committee.
- (2) Prepare Conference program.
- (3) Contact and confirm key participants.
- (4) Prepare program curricula materials for training sessions.
- (5) Solicit exhibitors for Conference
- (6) Arrange meeting site and facilities.
- (7) Prepare a record of Conference.

Status: Conference was completed; 50 participants. Participants agreed that with the establishment of four new pellet plants and sale of 6,000 pellet appliances in region, the industry is well underway. Two key lingering problems are ash slagging of stoves and varying quality of pellet. Due to price noncompetitiveness, market forces may force even higher-ash content pellet made from wood and paper wastes.

Contractor: New England Forestry Alliance

NRBP Funding: \$25,000

Contract Period: November 1993 - August 1994

Wood Pellet Conference held in June

The NRBP's ongoing efforts to foster development of a wood pellet industry in the Northeast have achieved critical momentum. The Northeast is now the fastest growing region for pellet stoves and pellet fuel sales in the nation. Today there are about 25,000 residential pellet stoves in the region's homes, more than double what there were two years ago. Four new pellet manufacturers have located in the region, with collective capacity for manufacturing more than 100,000 tons per year. Today the region utilizes an estimated 75,000 tons annually.

On June 27-28, 50 individuals participated in the NRBP-sponsored Wood Pellet Fuels Conference held in Bedford, New Hampshire. The objective of the Conference was to inform, motivate, and train participants to carry out the *Wood Fuel Pellet Action Plan* developed at the Wood Pellet Forum co-sponsored last year by the NRBP and the Northeastern Forest Alliance (NEFA). The *Action Plan's* recommendations included:

- establish certification programs and pellet fuel standards
- better education of stove dealers by manufacturers;
- enlist government and nonprofit organizations such as the Regional Biomass Programs to help educate consumers;
- improve stove designs;
- research market to better know who is or may be buying pellet stoves;
- government incentives, including tax and emission credits.

A record of the Conference proceedings is being produced, and will be available from the CONEG Policy Research Center.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

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: Two meetings have occurred. See accompanying update. Next meeting is scheduled for September 14.

Contractor: RESOLVE, Abby Arnold, facilitator.

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 April, 1995

Governors Biomass Roundtable

In May, 1994, 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 will reconvene 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 Governors' Roundtable expects to present its findings to Governor Dean by January 1995.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

July 1994

Title: Long Range Planning

Rationale: A blueprint to guide the selection of technical projects will maximize the efficacy and efficiency of projects. Such a long-range plan was completed in 1984 and again in 1989.

Objectives: To guide project selection and project selection criteria over the next five years.

Approach: A written report will be available in the spring. Conference papers, interviews, issue discussions at Steering Committee meetings, technical committee forums, and other sources will assist the development of the Long Range Report. After a draft is completed, discussion and comments from the Steering Committee will precede Final Report.

Tasks:

PHASE I. The first phase of the Long Range Planning exercise will be to map out the major resources, conversion technologies, and end uses/users, and identify in broad terms the opportunities for and barriers to forging and strengthening the connections between these categories. Tasks associated with this phase will be carried out primarily by CCC staff:

Task 1: Review literature and identify experts and representatives of key stakeholders who might make valuable contributions to the planning exercise.

Task 2: Attend conferences, notably the Biomass Conference of the Americas scheduled for August 30 - September 2 in Burlington, Vermont. (Also scheduled: Hearth Products Association Trade Show, March 11, 1994.)

Task 3: Prepare materials to inform and guide discussions (Phase II).

PHASE II. The second phase of the Planning exercise will consist of focused discussions among Steering Committee members and Advisory Panels convened to address specific opportunities and barriers.

Task 4: Steering Committee invites experts to address specific opportunities and issues associated with specific topic areas.

Task 5: Major stakeholders invited to participate in Advisory panels, convened by teleconference.

Task 6: Integrate recommendations of the Governors' Biomass Policy Round Table.

Status: Draft Report Completed: Chapters on Supply, Demand, Conversion Technologies, and Technology Transfer

Contractor: Citizens Conservation Corporation

NRBP Funding: Part of Technical Support contract

Contract Period: August 1993 - July 1994

STATUS REPORTS: CONTRACTOR SELECTION OR NEGOTIATION PENDING

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 will be held in September 27 in Pennsylvania. It will be targeted to utilities and air regulators and feature presentations by NYSEG, which currently has several co-fired boilers. This roundtable will identify future issues for follow-up projects.

BUDGET: \$40,000

PROPOSED PROJECT: 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: To help us generate a project, the NRBP will stage a **Liquid Fuels Development Forum**, scheduled for Thursday, September 22, at the Bradley Air Museum in Connecticut, will bring together representatives of DOE/NREL's Alternative Fuels Program and Transportation End Use Sector with potential commercial-scale developers of liquid fuel production facilities and representatives of relevant permitting agencies, energy offices, and the Biomass Program from each of the eleven Northeast states. The objective of convening key players in the development process is to facilitate a specific discussion of what is required to get a large-scale biomass-to-ethanol production plant under construction in the region by the end of 1995, and to identify what the NRBP (with DOE and NREL's technical support) can do to facilitate the siting, permitting and development process.

BUDGET: \$40,000

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 PROPOSED 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 MMBTUh) 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 will be 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: \$40,000

APPENDIX - DETAILED WORK STATEMENTS

**TITLE: BOOKLET FOR KEY DECISION-MAKERS ON POTENTIAL FOR
WOOD-CHIP HEAT IN COMMERCIAL AND INDUSTRIAL FACILITIES**

SCOPE OF SERVICES

The objective of this booklet is to provide a simple, usable working tool to enable public boards, administrators and other decision-makers, including private owners of commercial or industrial facilities in the Northeast to:

- (1) Consider the replacement of existing energy systems (or the installation in new facilities) of woodchip energy systems
- (2) Investigate the economics of wood-chip heat, hot water, and drying and process steam applications, using life-cycle cost and cash-flow analyses
- (3) Compare different types of wood-chip systems and select a system appropriate to their facility's needs
- (4) Implement wood-chip energy projects

I. PROPOSED SCOPE OF WORK

Section 1: General Discussion

The following Scope of Work is intended to produce a final product which reflects the Objectives and Strategy of the RFP, and which meets and expands upon the requirements of the RFP's Task Description. This outline is generally organized according to necessary tasks for researching and producing the final booklet. Under the task area of writing the booklet (Element J below), a preliminary outline of the booklet organization is given. Certain topics for inclusion in the booklet, not listed under the research section, are listed here.

This Proposal assumes that the target type of wood-chip application for the booklet falls in the 1-10 MMBTU size range, in the institutional, commercial and light industrial sectors (not including the wood products industry), and that the systems are generally installed on a turn-key basis (rather than as separate components designed into systems by specializing engineers). Applications include both retrofit systems and systems in new construction.

There are three reasons for these assumptions. First, below 1 MMBTU the cost and size of a fuel storage facility, and the general unavailability of manufactured systems, tend to make projects uneconomic and difficult to justify. Second, for systems above 10 MMBTU it is common to hire a design engineer specializing in solid fuel combustion, storage and handling to select and assemble system components from a number of vendors. For these large systems, the owner is relieved of much of the responsibility for design and selection decisions. The last assumption is that the wood products industry is a

specialized case of industrial use which is excluded from coverage because that industry already has the experience and knowledge in putting together wood combustion projects. In addition, the wood products industry operates in a different economic framework because it produces the fuel and so does not have to figure biomass fuel price into decision making.

Section 2: Approach and Tasks

Booklet Research and Development:

A. Research applicable wood-chip systems in the Northeast region.

The purpose of this element is to identify and collect information from existing wood-chip burning facilities throughout the region and eastern Canada which might serve as models for different system types, illustrative models of different applications of the technology, examples of systems in different chip supply markets, and case study models of the process used in selecting and implementing systems. The experience of the contractor and subcontractors will be supplemented by the following tasks.

- (1) Review the Northeast Directory of Biomass Facilities.
- (2) Conduct phone interviews of the 11 Northeast Region State Biomass Contacts, to identify noteworthy systems of different types.
- (3) Develop a survey tool for collecting information on existing systems.
- (4) Interview selected system sites (operators and/or administrators) by phone to gather information on different types of systems throughout the region and eastern Canada, using the survey developed in Task 3 above.
- (5) Compile survey results, using categories suggested in the following elements and tasks.

B. Research wood-chip supply throughout the Northeast region.

The intent of this element is to gain an understanding of chip markets in the region from the standpoint of prospective chip users, not to do an exhaustive survey of fuel supply. The focus will be on gathering information directly relevant to the content of the booklet.

- (1) Collate data collected in phone interviews above (from Biomass Contacts and existing system sites).
- (2) Research biomass cost, supply and delivery capability through phone interviews with biomass producers and users in different geographical areas.
- (3) Investigate stability of chip supply, as indicated by historical pricing information provided by fuel suppliers and users.

C. Conduct Existing Chip System Site Visits.

The visits will be to sites which will expand the knowledge base of the Project Team in ways which will directly benefit the usefulness of the booklet. The target area for systems will be the 11-state northeast region plus the eastern provinces of Canada.

- (1) Based on the results of the phone survey, identify any existing sites which represent different, unique or instructive equipment configurations, storage facility designs, applications of wood-chip combustion or innovative linkages with fuel suppliers.
- (2) Categorize and list sites which could be visited to advance the Project Team's knowledge of systems applicable to the objectives of the booklet.
- (3) From the research of Topics 1 and 2 above, develop a trip itinerary of sites which could be visited on a cost-effective basis and which will yield optimal site experience relevant to the booklet's aims.
- (4) Review trip itinerary with CONEG Advisory Committee which must approve any planned trips.
- (5) Perform site visits and collect field data, including photographs.

D. Develop Guidelines and Tools for Economic Analysis of Prospective Wood-Chip Systems.

The purpose of this element is to simplify and clarify the financial decision-making process for building owners of different types: schools, hospitals, non-profits, heating applications in commercial buildings, industrial process steam users, etc.

- (1) Identify the normal different financing methods and capital sources of prospective booklet users: public schools, non-profits, housing authorities, commercial building owners, industries, etc.
- (2) Characterize the economic decision-making parameters for each type of financing framework, including expectations for return-on-investment, investment time horizons, types of financing used, etc.
- (3) Conduct phone interviews of existing system owners or administrators to answer questions or exemplify areas in need of clarification.
- (4) Develop or characterize methodologies for performing financial feasibility analysis in key applications (including simple payback analysis, life-cycle-costing, cash-flow projections, etc.). In the final text, explain life-cycle cost, cash-flow, and other relevant tools for analyzing the economics of a wood-chip project, and produce worksheets or similarly practical guidelines for applying these analyses to actual commercial, industrial, and institutional projects.

- (5) Develop worksheets to simplify and summarize the analysis in the key types of applications.
- (6) Based on previous phone interviews, compile examples of the use of the worksheets, for inclusion in the booklet appendix. Illustrate the use of these worksheets or guidelines with at least one example from each sector and each basic type of application (e.g., process steam in an industrial application, space heat in a commercial facility, and hot water in an institutional setting).

E. Research Financing Options for Wood-Chip Installations.

This element will assemble information on the financing options for installing wood-chip systems in different types of applications.

- (1) Research and identify available grant programs (state, DOE, etc.).
- (2) Research state-aid school construction financing available for energy projects in typical northeastern states.
- (3) Explore loan availability for biomass projects: commercial loans, special energy loan programs, bond financing (including municipal bond banks), etc.
- (4) Investigate and identify sources for third-party financing, leasing, shared savings and installations by energy service companies.

F. Examine Different Modes of Project Management and Implementation.

The purpose of this element is to systematize the different ways in which a successful biomass project can be structured and implemented, with particular emphasis on human resources.

- (1) Using data gathered in phone interviews and site visits to existing installations (sections A and C, above), identify different modes of using human resources and professional resources in a biomass project.
- (2) Categorize modes in the following areas: use of professional design assistance (engineers, system suppliers, biomass system designers); role of the owner; role of volunteer committees (for public institutions); production of bid specifications; the role of competitive bidding; the interaction of different design professionals (architects, mechanical and structural engineers, design-build project managers); and contracting for wood-chip system installation (contractor role vs. general construction contract sub-contractor role).
- (3) Develop guidelines on the importance of including the owner's maintenance staff early in the planning process, in supporting the concept of wood-chip burning, and in designing and installing systems which do not impose an undue burden on maintenance time, interest and capability.

G. Develop Guidelines for Assessing the Efficiency, Stack Emissions and Safety of Manufacturers' Wood-Chip Combustion Systems.

This element will focus on assembling known information on how these areas of concern can be addressed by lay decision makers, project managers and engineers with little or no prior experience in wood-chip systems. One emphasis will be on judging manufactured products which have not been independently tested for efficiency, stack emission quality or safety. This work will systematize and expand upon CANMET's extensive work in research and testing of biomass combustion systems.

- (1) Review the status of efficiency testing, stack emission testing and safety testing for manufactured units in the 1-10 MMBTU size range, focusing on regional regulatory venues and on systems available in the Northeast region.
- (2) Develop a set of guidelines for each of the three areas, to assist decision makers in judging the design and performance of combustion systems available from a variety of manufacturers.

H. Study Ways of Including Public Participation and Education in a Wood-Chip Project.

The purpose of this element is to collect information on successful and unsuccessful projects, in the areas of public information on wood-chip systems and creating a positive atmosphere in which the public can address its concerns about particular implementation projects.

- (1) Using Project Team experience and data gathered in phone interviews and site visits to existing installations (Elements A and C, above), assemble a list of important public information and participation issues, including concerns about air quality and odor, visual appearance of systems, and truck traffic.
- (2) Develop guidelines for prospective system owners to present biomass systems in a positive light, with respect to such areas as the use of biomass as a locally produced renewable fuel, impacts on the local economy, and fuel price stability.

I. Categorize Operational Issues for the Successful Operation of a Wood-Chip System.

Since the successful operation of a wood-chip burning system is largely dependent on pieces that are put in place during the study and installation phases of the project, it is important for prospective system owners to be aware of these operational issues from the start. Through this work, the existing knowledge base of system operation and maintenance will be expanded.

- (1) Review the Project Team's extensive experience in actual system operation, as well as its knowledge derived from prior contacts and interviews with system operators throughout the northeast region, the upper midwest and eastern Canada.

- (2) Review and collate data from phone interviews of elements listed above and from site visits, relative to fuel procurement (including quality control and moisture monitoring), start-up trouble-shooting, warranty work, on-going maintenance (including maintenance contracts), ash disposal options, system monitoring and record keeping.

BOOKLET WRITING:

The work of the following elements will systematize the results of the research and development activities listed above into an outline and then into the finished text of the booklet.

J. Organize Booklet Material into Outline Form.

The following is a listing of anticipated main booklet topics. Sub-topics listed are intended to indicate the inclusion of areas which may not have been listed specifically in the research and development section above.

1. Applications of Wood-Chip Energy Systems

- o Assessing the needs for a wood-chip system
- o Differences in the needs of institutional, commercial and industrial users
- o Types of energy use: heat, hot water, warm air, drying, process steam
- o Retrofit vs. new construction
- o Requirements for manual or automatic operation
- o Site constraints

2. Elements of a Wood-Chip Energy System

- o Storage facility and loading system
- o Chip handling equipment
- o Chip combustion equipment and controls
- o Stack emission control systems
- o Ash disposal systems

3. Wood-Chip and Other Biomass Fuel Supply

- o Mill and whole-tree wood chips
- o Other biomass products
- o Characteristics of hardwood, softwood and different species
- o The role of fuel moisture
- o Sources of wood-chip supply
- o Fuel cost and availability, including price stability

4. The Relationship Between Fuel Source, Delivery Vehicle, Type of Fuel Storage and Fuel Handling Equipment

- o Fuel suppliers and haulers
- o Types of delivery vehicles
- o The relationship between delivery vehicle and storage loading system
- o Electrical energy use of bin loading equipment
- o The relationship between fuel characteristics and handling equipment

5. Wood-Chip Combustion Systems and Related Components

- o Combustion types: gasifiers, direct burn systems, two-compartment burners
- o Heat exchangers
- o Generic types of fuel handling equipment

6. Human Resource for Studying and Installing Wood-Chip Systems

- o Resources for energy and financial analysis
- o Chip system designers
- o Consulting and mechanical engineers
- o The role of the project manager
- o Governmental and public technical resources
- o The use of volunteer committees in institutional projects
- o The importance of the facility's maintenance staff

7. Economic Feasibility Analysis of Wood-Chip Systems

- o The different types of economic analysis
- o Matching the type of economic analysis to the owner's needs
- o Identifying sources of financing
- o Integrating characteristics of sources of capital into the analysis
- o Use of booklet financial analysis worksheets

8. Putting Together and Implementing a Wood-Chip Project

- o Public involvement in implementing a wood-chip system
- o Public education and dealing with misconceptions about biomass combustion systems
- o Decision-making based on financial analysis
- o Assembling the project team
- o Writing performance specifications
- o The importance of competitive bidding
- o Assessing bids: cost, efficiency, air quality and safety
- o Project management for the system installation

9. Operating and Maintaining a Wood-Chip System

- o Initial system start-up
- o System adjustments during the warranty period
- o On-going maintenance
- o Maintenance contracts
- o Ash disposal
- o Performance monitoring and record keeping

K. Write the Booklet Text.

- (1) Write text for the main body of the booklet, and employ a professional editor to complete draft.
- (2) Assemble and/or write appendix material.

L. Coordinate Peer Review.

- (1) Work closely with Vermont Steering Committee representatives on each task; meet telephonically with CONEG Project Review Committee to review outline, each draft chapter, and appendices for text. The Advisory Committee will review and critique all text. The Committee membership is comprised currently of Steering Committee representatives from Maine, New Hampshire, Delaware, and Vermont; the CONEG Policy Research Center's RBP Manager and the Technical Coordinator.
- (2) Collate responses from reviewers and revise text as necessary.

Format, Layout, Edit and Print the Booklet:

M. Assemble and Select Photographs.

This Proposal assumes there will be an appropriate number of black-and-white photographs in the booklet. These will illustrate the exterior appearance of wood-chip systems and will include close-ups of key system components. The Proposal assumes that up to 15 color slides may need to be converted to prints for use in the booklet. Illustrations, if any, will be added if necessary to clarify areas which cannot be presented adequately with photographs.

N. Edit Final Draft of Text .

An independent non-technical editor will read the final draft for clarity and to suggest appropriate changes to the text.

O. Design Booklet Presentation, Including Layout, Format and Cover.

The contractor will hire, as part of the Proposal price, a graphic designer to lay out and format the booklet, design the cover, and oversee the printing and production. The cover

will be a simple but attractive graphic design appropriate to the text. The final booklet design will be closely coordinated with the Technical Review Committee.

P. Print 300 Copies of the Booklet.

The Proposal includes the cost of printing, binding and producing 300 copies of the booklet. The Proposal assumes the booklets will be approximately 60 pages long, will be center-stapled, and will have durable cover stock. The Proposal includes delivery of the 300 booklet copies to the Vermont State Biomass Contact in Montpelier, Vermont.

Q. Report Project Progress to CONEG Policy Research Center.

This Proposal includes written progress reports, at least every three months, in addition to less formal and more frequent reports to the Project Advisory Committee. A presentation to the September meeting of the Steering Committee will take place.

This is a fixed price contract of \$18,725.

TITLE: IMPEDIMENTS TO DEVELOPMENT OF LANDFILL GAS RECOVERY PROJECTS IN THE NORTHEAST

SCOPE OF SERVICES

PHASE I - Characterize LFG-to Energy Industry in the Northeast

The project objectives for this phase are:

- Through a survey of the LFG recovery industry, identify the parameters for a successful project.
- Identify impediments to a successful project.
- Provide recommendations on how barriers can be surmounted.

The contractor must complete the following tasks to meet the project objectives:

- Task 1 - Literature Review
- Task 2 - Interview LFG Developers
- Task 3 - Project Feasibility Criteria
- Task 4 - Barriers and Means to Overcome
- Task 5 - Technical Siting Criteria
- Task 6 - Non-Technical Factors
- Task 7 - Draft Report/Handbook

TASK 1 - LITERATURE REVIEW

APPROACH

The contractor will review current literature and prepare a summary of the technical, economic, institutional and environmental aspects of developing LFG recovery projects. Much of the information is already in our possession, and we will not have to expend significant effort to research the field. In-house information sources which can be utilized include:

- The contractor project files and databases.
- SWANA (Solid Waste Association of North America) Annual Landfill Gas Symposium - 15 years of proceedings (SWANA was formerly GRCDA).
- USEPA - Background Information Document for the New Source Performance Standards (NSPS) for Landfill Emissions.
- International Landfill Gas Conference proceedings (1986, 1988 and 1990), sponsored by UK Department of Energy - Energy Technology Support Unit (ETSU).

- Handbook on Biogas Utilization, Gas Research Institute - The contractor co-author.
- Trace Constituents in Landfill Gas - Task Report on Inventory and Assessment of Cleaning Technologies, Gas Research Institute - The contractor co-author.
- Methane Recovery From Landfill Yearbook, 1990 and 1992, Governmental Advisory Associates, Inc. (GAA).
- Vendor literature from developers, equipment suppliers, other consultants, etc.

These sources and the contractor's knowledge will serve as the basis for a summary of the major aspects of LFG recovery. A brief overview of the following topics will be provided:

- LFG collection methods (vertical wells, horizontal trenches, and cover venting systems).
- LFG utilization technologies.
 - Medium Btu (direct combustion, on-site uses, space heating, boilers).
 - High Btu/purification (pipeline quality natural gas, LNG).
 - Electrical generation (engine/generators and gas turbines).
 - Other uses (vehicular fuels, fuel cells, liquid fuels - diesel).
- Economic Aspects.
 - Typical range of capital and operational costs.
 - Revenue ranges for electricity, pipeline quality gas, and direct use.
 - Summary of the Federal tax credits (Section 29) and the Renewable Energy Production Incentive (Section 1212 of the Energy Bill) available for LFG recovery projects.

- Institutional Issues.
 - Types of ownership: municipal, utility, or independent.
 - Public/private partnerships.
- Environmental Issues.
 - Subtitle D requirements (LFG control).
 - Proposed New Source Performance Standards (NSPS) under the Clean Air Act.
 - Condensate management.

The discussions will emphasize changes the industry has experienced over the past five years. With the extension of the Federal tax credits (Section 29) and the new renewable energy incentive payments for publicly-owned facilities, additional revenue sources are available to improve the project economics.

DELIVERABLES

A draft report will be prepared and submitted to the Center at the project kickoff meeting (to be scheduled a couple of weeks after contract award). This report will summarize the state of the industry and provide the reader with an understanding of many of the technical and non-technical elements affecting LFG recovery projects.

TASK 2 - INTERVIEW LFG DEVELOPERS

APPROACH

The contractor will contact developers/owners/investors/operators of LFG recovery projects to obtain information on both the technical and non-technical impediments to successful projects. The contractor will also gather information on reasons why potential LFG projects were not successful. Exhibit 1 is a listing of developers to contact.

The contractor will concentrate on the listed developers with multiple projects and a proven track record. The criteria for selection of firms to interview includes:

- Major LFG developers nationwide (Waste Management, BFI, O'Brien, Michigan Cogeneration, etc.).
- Active developers in the Northeast (Energy Tactics, Palmer Capital, Phillips Energy, etc.).

The contractor plans to contact small developers as well as larger developers (both are included in the above listing). Smaller developers are the firms likely to develop the

smaller landfill sites due to the lower capital investment requirements and their desire to gain experience.

Several landfill owners active in LFG recovery also will be interviewed. The following municipal agencies are active in the LFG field. Their insight will be valuable from landfill owner's perspective. Municipalities to be contacted may include:

- Los Angeles County Sanitation Districts.
- New York City, Department of Sanitation.
- Connecticut Resource Recovery Authority.
- Rhode Island Solid Waste Authority.
- Delaware Solid Waste Authority.
- Fairfax County, Virginia.

EXHIBIT 1. PROPOSED CONTACT LISTING OF LFG DEVELOPERS

LFG Developer	Location	Key Contact
Air Products, Inc.	Allentown, PA	Paul Persico
Bio Development Corp.	Bedford, NH	Joel Gordon
Browning-Ferris Industries	Houston, TX	Dave Conrad
Cambrian Energy Systems	Santa Monica, CA	Bob Hatch
Emcon Associates	San Jose, CA	John Pacey
Energy Tactics, Inc.	Yaphank, NY	Stan Drake
Hayden-Wegman, Inc.	Boston, MA	John Murphy
Hazox Alternate Energy	Chester, PA	Dan Snyder
JWP Energy & Environment	Purchase, NY	Bob Anderson
Laidlaw Gas Resource Systems	Newark, CA	Kenneth Wuest
Michigan Cogeneration Systems	Novi, MI	Scott Salisbury
O'Brien Energy Systems	Philadelphia, PA	Doug Nielsen
Ogden Martin Systems	Fairfield, NJ	Tom Rantas
Pacific Energy	Commerce, CA	Tony Henrich
Palmer Capital	Cambridge, MA	Jim Levitt
Phillips Energy	Waitsfield, VT	Fran Woods
Vermont Energy Recovery	Brattleboro, VT	Allan McLane
Waste Management Inc.	Oak Brook, IL	Chuck Anderson
Wehran EnviroTech	Middletown, NY	Fred Wehran

Several utilities and other end users of the energy produced from LFG projects will be contacted, including:

- Brooklyn Union Gas - New York, New York
- Burlington Electric Department - Burlington, Vermont
- Long Island Lighting Company, New York
- New England Power
- Virginia Power
- Public Service of New Jersey

In addition, The contractor will contact several financial institutions active in financing LFG recovery projects. Their concerns and requirements will be identified. Financial institutions to be contacted may include:

- State Street Bank and Trust Company - Boston, Massachusetts
- Michigan Bank - Detroit, Michigan
- First Union Bank - Atlanta, Georgia
- First Pennsylvania Bank - Philadelphia, Pennsylvania

An interview form will be prepared (see Exhibit 3 in the proposal for a preliminary outline) for use in obtaining consistent and complete (to the extent available) information about each LFG recovery project. Generally, the information to be obtained will include the following, to the extent that it is available:

- Project location, size, types, etc.
- Energy purchase price, terms/conditions, negotiating difficulties.
- Permitting and environmental difficulties.
- Tax incentives/subsidies.
- LFG developer/landfill owner relationship and terms.
- Permitting experience; i.e., difficulties and solutions; ease of gaining permits; time required.

The interview form will be provided to the Center for information purposes. The contractor' approach to conduct the interviews is as follows:

- Record on the interview forms what we already know about each site before contacting the developers and others.
- The interviews with the developers, landfill owners, end users, and financial institutions will be conducted by the contractor senior staff members. In most cases, this staff member will be known to the interviewee. We anticipate a one-hour time period with each developer.
- Send each developer a follow-up letter to allow the opportunity for confirmation of the data, additional comments, etc.

EXHIBIT 3. LFG INDUSTRY INTERVIEW OUTLINE

Company Information

- Company, contact name, address, phone and fax numbers
- Type of firm: LFG Developer, Landfill Owner, Energy User, Financial Institution
- The contractor contact person, date

Company Experience in LFG Recovery

- Number of projects and status (planned, active, shutdown, etc.)
- Recovery projects location, size (update of Exhibit 2-1 for Northeast projects)
- Years of experience in LFG recovery, year of first involvement

Project Characteristics (separate sheet for each project)

- Landfill characteristics - acreage, refuse volumes (or tons), age, configuration, open or closed, etc.
- LFG recovery system - wellfield, utilization equipment, etc.
- Project economics
 - Energy purchase and lease agreement provisions (energy payments, royalties, terms, duration, etc.)
 - Tax credits and/or other economic incentives
- Environmental/regulatory issues, air emissions, condensate management, permits

Impediments Encountered and Solutions

- Landfill
- LFG collection system
- Energy generation equipment
- Financial
- Institutional
- Regulatory

Deliverables

Task deliverables will include:

- Listing of LFG developers, owners, energy users, etc., to be contacted (an update of those listed herein)
- Interview form (an update of Exhibit 3)
- The survey results will be included in the Task 7 report

TASK 3 - PROJECT FEASIBILITY CRITERIA

APPROACH

Based on our knowledge of the industry, the limited literature review, and the developer interviews and industry contacts, The contractor will set forth typical criteria under each of the following major factors:

- Landfill characteristics.
- Energy sales agreement (ease of negotiation and revenue).
- Regulatory/environmental conditions.
- Tax incentives and subsidies.
- Landfill owner - LFG developer procurement requirements.

DELIVERABLES

The task outputs will be included in the Task 7 report.

TASK 4 - BARRIERS AND MEANS TO OVERCOME

APPROACH

Using information gathered during the interviews, The contractor will identify the barriers to LFG recovery. Potential barriers for discussion may include:

Technical

- Landfill characteristics.
 - Insufficient refuse volumes.
 - High quantities of inorganic wastes.
 - Shallow refuse depths.

- Poor final or intermediate cover systems.
- Perched liquids.
- Insufficient LFG quantities and/or poor quality.
 - Overly optimistic LFG production estimates.
 - Low heating value of recovered LFG.
- LFG collection systems.
 - Incompatible wellfield designs, continually changing landfill operations which require extension of recovery system.
 - Air intrusion due to poor final cover or over drawing.
 - High landfill liquid levels that reduce the active well slotlines and reduce the effectiveness of the wells to recover LFG.
 - Poorly operated and maintained collection systems.
 - Condensate drainage problems and insufficient header slopes.
- Power generation or utilization systems.
 - Poor maintenance.
 - Equipment incompatibilities with LFG constituents.
 - Improper compressor or blower sizing.

Economic

- Low energy purchase prices and future price stability.
- Unrealistic economic projections.
- Cyclical demands for medium Btu applications.
- Inadequate capitalization.
- Difficulties and time required to negotiate purchase agreement with the energy purchaser (utility company or direct user).

Institutional

- Political impediments (e.g. conflicting priorities between LFG recovery project and filling operations or end-use plans).

- Size (i.e., small) of LFG project decreases interest by utility company.
- Inability to accurately estimate future production and relatively short production life.
- Zoning ordinances regarding noise or facility types.
- Lack of interest of energy users to purchase LFG or electricity generated using LFG as fuel.

Many of the above impediments have means by which they can be overcome on a case by case basis. Input from the interviews and the contractor's project experience will be used to develop suggested remedies to the barriers identified.

DELIVERABLES

The task outputs (to be presented in the Task 7 report) will include listing of project barriers, the relative level of difficulty (i.e., their likelihood of being overcome), and potential remedies.

TASK 5 - TECHNICAL SITING CRITERIA

APPROACH

Technical siting criteria will be developed based on experience at successful Northeast projects. Criteria may include the following:

- Landfill characteristics.
 - Minimum size (acres).
 - Minimum average refuse depth (feet).
 - Minimum capacity in-place (cubic yards and/or tons).
 - Minimum capacity at closure (cubic yards and/or tons).
 - Maximum age of refuse - years since closure.
 - Landfill status - open or closed.
 - Refuse types (MSW, not construction and demolition debris, liquids, etc.).
 - Landfill final cover system.
- LFG Utilization Requirements.
 - Direct use (medium Btu).
 - Distance to user.
 - User requirements - hours/day, quantity, seasonality.
 - Minimum revenue (\$/MM Btu).
 - Electricity generation.

- Minimum revenue (\$/kWh).
- Onsite use or tie-in to utility grid
- High Btu (pipeline quality).
 - Distance to pipeline.
 - Cost of electricity to power purification process
 - Minimum revenue (\$/MM Btu)

DELIVERABLES

The technical criteria will be presented in the Task 7 report. These criteria will be subsequently used in Phase II to make a first cut at identifying sites with the greatest potential for LFG recovery.

TASK 6 - NON-TECHNICAL FACTORS

APPROACH

The contractor will develop a framework of non-technical factors that are necessary for a project to be successful. These factors will be based on the Task 2 interviews and project experience. Non-technical factors to be considered may include:

- Institutional factors.
 - Types of ownership which have been successfully applied.
 - Methods to assist successful public/private partnerships.
 - Appropriate levels of risk-sharing by the major parties (landfill owner and LFG developer).
- Financial factors.
 - Revenue ranges for electricity, pipeline quality gas, and direct use.
 - Methods to structure project to take advantage of the Federal Tax Credits (Section 29) and the Renewable Energy Production Incentive (Section 1212 of the Energy Bill).
 - Financing alternatives.
- Regulatory factors.
 - Identify permitting requirements for each of the states. For example, New York a LFG recovery project must have a solid waste management facility permit to comply with specific design and operational criteria.

- Identify air emissions and condensate management requirements for each state or region.

DELIVERABLES

The non-technical criteria will be presented in the Task 7 report.

TASK 7 - DRAFT REPORT/HANDBOOK

The contractor will prepare a draft report/handbook incorporating the results of Tasks 1 through 6. The report will be geared towards potential developers of LFG recovery projects in the Northeast.

DELIVERABLES

The draft report/handbook. Four copies of this draft document will be submitted to the Center for their review and comments. Comments from the Center will be incorporated in the Phase II final report/handbook.

PHASE II - Identify Landfills for LFG Development

The Phase II objectives as presented in the RFP are as follows:

- Identify candidate landfill sites in the Northeast for LFG recovery.
- Estimate the total energy potential available from LFG in the Northeast.
- Provide information that might be used to affect state and federal energy policy.
- Encourage development of LFG recovery projects.

The contractor has reviewed the RFP and identified the following tasks to meet the objectives:

- Task 1 - Compile Landfill Database
- Task 2 - Identify and Group Landfills for LFG Development Based on Technical Criteria
- Task 3 - Rank Landfills for LFG Development, Applying Non-Technical Factors
- Task 4 - Develop Criteria and Methodology for Qualifying Landfills for LFG Development
- Task 5 - Final Report/Handbook

Our approach and task deliverables follow.

TASK 1 - COMPILE LANDFILL DATABASE

APPROACH

The contractor will access existing landfill databases to identify candidate sites for LFG recovery. A listing of the databases that the contractor will access, along with the type of information included in each, is summarized below:

- 1986 Solid Waste Landfill Survey - by the EPA. Approximately 1,000 landfill sites were surveyed. Information collected includes:
 - Contact information.
 - Facility area - acres.
 - Design capacity - cubic yards.
 - Annual waste quantities - metric tons/year.
- Solid Waste Digest, Northeast Edition - Facility Index.
 - Contact information.
 - Tip fee.
 - Capacity (tons per day).
- NSWMA Tip Fee Survey Database.
 - Contact information.
 - Tip fee.
- SWANA database on 4,300 landfill sites - contact information only.
- State solid waste regulatory agencies - most states have contact information on permitted facilities. The contractor has contacted the 11 Northeast states and requested copies of their solid waste management plans (SWMP's) and landfill databases. We have in our possession landfill listings for Delaware, Maryland, New York, and Pennsylvania.
- New York State - Analysis of Methane Recovery Potential at New York State Sanitary Landfill Sites. This 1981 report identified 34 landfills in the state with over 1 million tons in-place with an average refuse depth of at least 40 feet. Of these 34 sites, 15 were identified as candidate recovery projects.

The contractor will contact each of the 11 state solid waste regulatory agencies to acquire updated landfill databases or listings (active and closed sites). The information in the databases or landfill listings is often incomplete. Specific landfill capacity data (volume or tonnage in-place or permitted) is often not included in the state's listings. The contractor plans to visit up to four state solid waste regulatory agencies to attempt to obtain capacity data. One day visits to New Jersey, Pennsylvania, Massachusetts, and New York are anticipated.

The contractor will compile the database from the above sources into a PC-based system (Dbase, Paradox, Q&A).

The type of information desired for each prospective landfill site (if available) includes:

- Landfill name, owner, address and contact names.
- Landfill size (acres), capacity (yards or tons in-place or total).
- Average refuse depths.
- Filling rate in cubic yards or tons/day.
- Year open/expected closure.
- Existing LFG control or recovery system (or planned).

Acquiring landfill capacity (in-place) and filling histories will be the most difficult aspects of this task. Available databases do not include this detailed information to-date. The SWANA database may include much of this data by the end of 1993, based on their current projections.

DELIVERABLES

The landfill database will be submitted on a suitable database format (Dbase, Paradox, or Q&A) in both printed and disc formats.

TASK 2 - IDENTIFY AND GROUP LANDFILLS FOR LFG DEVELOPMENT BASED ON TECHNICAL CRITERIA

APPROACH

The siting criteria previously developed in Phase I (Task 5) will be applied to the potential landfill sites. The database will be sorted and landfills which meet each criteria will be identified.

An example criteria is:

- Minimum refuse tonnage in-place - 1,000,000 tons.
- Minimum average refuse depth - 40 feet.
- Minimum acreage - 20 acres.

For New York State, The contractor will rely on a NYSERDA project (Analysis of Methane Recovery Potential at New York State Sanitary Landfill Sites) for background data on existing sites. Since only a few landfills have opened in New York in the past 10 years, we will only need to update capacity data from existing sites.

The contractor has reviewed the database of active landfills in the Northeast prepared by Solid Waste Digest. The number of landfills and daily capacity ranges in tons per day (TPD) are presented in Exhibit 4.

EXHIBIT 4. OPEN LANDFILLS IN THE NORTHEAST

State	Number of Active Landfills	Total Tonnage Landfilled (Tons/day)	Number of Landfills Over 100 TPD	Number of Landfills Over 500 TPD
Connecticut	40	4,179	10	1
Delaware	3	2,600	3	1
Massachusetts	74	15,917	18	7
Maryland	26	17,191	19	8
Maine	12	842	1	0
New Hampshire	35	3,280	5	2
New Jersey	15	12,689	12	6
New York	107	26,378	33	11
Pennsylvania	44	42,226	42	24
Rhode Island	5	2,252	1	1
Vermont	37	2,017	4	0
TOTAL	398	129,571	148	60

To reduce the number of landfills to a more manageable number, landfills smaller than 100 TPD will not be addressed. This criteria reduces the number of active landfills from 398 to 148. Within this group of 148 landfills, efforts will concentrate on the 60 listed sites receiving 500 TPD or more. These sites likely have the most potential.

DELIVERABLES

Outputs of this task are:

- Listing of candidate landfill sites which meet each of the specified criteria.
- Listing of sites which meet more than one criteria (i.e., over 1 million tons and over 40 feet average refuse depth).
- Listing of candidate sites which meet additional criteria. These sites potentially should be the best candidates for LFG recovery based on technical factors.

TASK 3 - RANK LANDFILLS FOR LFG DEVELOPMENT, APPLYING NON-TECHNICAL FACTORS

APPROACH

The contractor will apply the non-technical criteria developed during Phase I (Task 6) to the grouping developed in Task 2. Not all of the non-technical criteria developed under Phase I can be employed in this ranking task due to a lack of readily available information. Such criteria requiring more in-depth information than can be obtained for individual sites will be included in the model developed under Task 4 of Phase II.

This ranking should result in a listing by state of the sites having the attributes (technical and non-technical) for LFG recovery.

DELIVERABLES

The landfills with the attributes (technical and non-technical) for LFG recovery will be identified in the Task 5 report.

Task 4 - DEVELOP CRITERIA AND METHODOLOGY FOR QUALIFYING LANDFILLS FOR LFG DEVELOPMENT

APPROACH

Based on the information gathered in Tasks 1 through 3 and the Phase I report, The contractor will have identified technical and non-technical criteria to evaluate candidate landfill sites for LFG recovery. A software model will be developed that can be used by others to estimate LFG yield and to estimate economic feasibility for potential projects.

The model will be developed to run on Lotus 123. Input parameters can be entered via an input screen with standard report outputs available from a report memo screen. The LFG model can be loaded on a computer software program named "Baler." Baler can be run in DOS, and does not require the user to access other software programs, such as Lotus 123. The use of Baler will keep users from altering the formulas in the program.

The major input parameters for the LFG recovery model may include:

- Landfill data - site name, location.
- Refuse filling history - (default - straight line projection).
- Estimated LFG collection efficiency.
- LFG collection system costs (default - \$/MM cfd).
- LFG utilization method (medium Btu use or electricity generation and cost (\$/Kwh or \$/MM cfd)).

- O&M cost (\$/Kwh and/or \$/MM cfd).
- Revenues (\$/kw-hr or \$/MM Btu).
- Royalty Payments.
- Section 29 tax credits and Section 1212 Energy Payment Incentives (indicate whether to include in analysis).

Model outputs may include the following:

- Estimated LFG generation and collection rates.
- Annual revenues.
- Annual value of the royalty payments.
- Annual value of the Section 29 tax credits and Section 1212 Energy Payment Incentives (if applicable for the specific project).
- Present worth calculation.

The "heart" of the model is the estimated LFG generation and collection estimates. Based on landfill data and filling history, LFG production estimates over time can be made. The contractor has developed a PC-based LFG generation model based on our experience conducting extraction test programs and from active recovery projects. The contractor compiled pump test data from landfill sites around the country to estimate LFG generation rates. This data, along with an analysis of the GAA database and the contractor's experience, will be used to estimate LFG generation rates for the Northeast.

DELIVERABLES

- A computer LFG recovery economic model.
- Brief user's guide for imputing landfill and economic parameters.

TASK 5 - FINAL REPORT/HANDBOOK

APPROACH

The Phase I draft report/handbook will be expanded to include the results of the Phase II efforts and to incorporate the Center's comments on the Phase I draft. A draft of the final report/handbook will be submitted to the Center for review and comments. Comments will be incorporated, and the final document will be submitted for the Center's use and distribution.

DELIVERABLES

- Draft Final Report/Handbook - 1 copy.
- Final Report/Handbook - 1 bound and a photo ready original. The handbook also will be provided on a disc in WordPerfect 5.1. The LFG recovery economic model also will be provided on a disc.
- The contractor will prepare quarterly progress reports which will review progress to-date, identify upcoming activities, and identify problems encountered/solutions.

PROJECT SCHEDULE

Total project duration will be 12 months, effective February 1993.

This is a fixed cost contract for \$68,801.

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.

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.

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.

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. 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
- CO₂
- CH₄
- N₂O

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 SO_2 , CO_2 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 CO_2 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 NRB 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;

(3) 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 BurnerTM 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 adder 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 NRBP, 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.

PROJECT: WOOD FUEL PELLET CONFERENCE

SCOPE OF SERVICES

1.0 Scope of Work

CONEG and the Northeastern Forest Alliance (NEFA) are jointly funding a regional wood fuel pellet Conference for the purpose of assisting with the implementation of the recommendations forthcoming from the Wood Pellet Action Plan developed in the Wood Pellet Forum last June. In accordance with the Action Plan, the conference will be held to: educate wood stove retailers, chimney sweeps, air and solid waste regulators, energy and forestry office officials, fire marshals, wood waste haulers and processors, the forest products industry, and others about the opportunities and barriers associated with wood pellet appliances and fuel. The anticipated result of this conference will be growth in the demand for biomass fuel pellets.

The conference will be organized around general sessions with breakout sessions directed to specific audiences and topics. The general sessions will cover such topics as:

- the technical problems associated with the conveyance of fuel and combustion of pellet stoves;
- the importance of ash and moisture content in pellets to efficient and safe appliance operation;
- better understanding of the emerging residential markets for pellet stoves;
- discussion of existing capacity and planned additions to the pellet manufacturing industry in the Northeast;
- the merits and sources of waste wood feedstocks;
- the merits and technical issues associated with establishing standards for grading pellet fuels;
- a comparison of pellet fuels by price per ton and price per million BTUs of delivered energy to: electricity, coals, natural gas and oil in the region;

The breakout sessions will cover such topics as:

- potential trade association and government roles in the regulation and promotion of the industry;
- improving stove retailers' capacities to accurately communicate to consumers the technical advantages and disadvantages of pellet stoves, and appropriate

methods for operating and maintaining pellet appliances; and discuss the merits of dealer training certification

- one or more case studies of successful fuel pellet manufacturing and distribution operations.

It will be the responsibility of the contractor to develop the curriculum for the conference with input and approval of the Steering Committee and NRBP Project Director.

The conference will be hosted at a suitable site in central New England that will accommodate 150-200 attendees, and appropriate speakers and panelists from around the country.

A conference notebook, containing appropriate technical materials shall be produced for all conference attendees.

Exhibit space shall be available for industry participants.

NEFA will provide \$4,000 as a minimum cost-share toward the expenses of the Conference.

The Subcontractor shall be responsible for performing the following tasks:

Task 1. Form Steering Committee. The same constituent organizations involved in the initial forum may be reconstituted for the Conference Steering Committee. The Steering Committee shall advise the Subcontractor on all subsequent tasks and teleconference or meet in person at the outset of the subcontract.

Task 2. Prepare Conference Program. This program will be consistent in its objectives with the statements listed above. NEFA will be responsible for developing detailed curricula for each general and breakout session. All curricula will be reviewed by the Steering Committee and the NRBP Project Director.

Task 3. Contact and confirm key participants. NEFA will be responsible for identifying and inviting knowledgeable, and where possible, recognized experts, to conduct conference training. Initial and confirming contact by telephone during November and December, followed by confirmation letter. The target date for completion is March 1994. Confirmation of speakers will be coordinated with conference activities in order that they will be included in pre-conference mailings and registration materials.

Task 4. Prepare materials for Program. The case study reference above, attendance lists, relevant articles, and information shall be prepared in notebook format for all conference attendees.

Task 5. Secure Program co-sponsors and co-funding. In close collaboration with the Center, approach the Fibre Fuels Institute, the Northeast Hearth Products Association, and other stakeholder organizations about co-sponsoring and co-funding the Conference.

The amounts and stipulation for co-funding must meet prior approval of the Center before invitations are tendered. The solicitation shall take place no later than _____, 1994.

Task 6. Arrange Conference Site and facilities. The date and location for the Conference shall be determined by the Steering Committee. The Conference shall be held no later than _____1994. The Conference facility must accommodate up to 225 participants and include enough space for up to 25 exhibitors.

Task 7. Establish Registrant and Exhibitor Fee Schedules and Collect Fees. Prior approval of Center and funding co-sponsors will be required for fee schedules. Fees should be consistent with the goal of covering conference expenses.

Task 8. Organize and conduct the Conference. The conference shall take place over a 2-3 day period.

Task 9. Account for Conference Expenses and Revenues. The Subcontractor must carefully and fully account for all expenditures and revenues associated with the Conference. Revenues generated from co-sponsors, vendors, and registrations may be used to cover expenses as they occur. NRBP funds will be used to cover any shortfall in anticipated revenues to provide insurance that the pellet conference will be held, and be a quality project reflective of the NRBP and NEFA.

Task 10. Capture a record. Make arrangements to transcribe or take notes at the Conference proceedings to summarize significant points of discussion and recommendations. Also record all names, addresses, and affiliations of participants, exhibitors, and other attendees and distribute a list to all attendees.

Task 11. Prepare draft report on Conference findings and recommendations. The Subcontractor shall ensure that an initial draft report is prepared for review and comments by Steering Committee members. The target date for completing this task is _____ 1994

Task 12. Prepare Final Report. Incorporating comments of the Steering Committee, the Subcontractor shall draft a final report for review by the Center. The target date for completion is _____, 1994.

Task 13. Publication of Training Booklets. The NRBP funds that remain at the conclusion at the conclusion of the conference will be used to cover all reasonable and necessary expense to compile training booklets directed to the conference's target audiences. The Subcontractor, after consultation with the Steering Committee and Center Project Director, will submit a plan for compiling and publishing the content of sector-specific sessions such as training for fire code officials, state air regulators, chimney sweeps, etc and shall print sufficient copies for NRBP and other co-sponsors. The target date for completion is _____, 1994.

2.0 Period of Performance

The Subcontractor shall complete all work hereunder within nine (9) months of the effective date of this subcontract.

**NORTHEAST REGIONAL BIOMASS PROGRAM
TECHNICAL PROJECTS STATUS REPORT
OCTOBER 1994**

COMPLETED PROJECTS:

Title: Impediments to Development of Landfill Gas Recovery Projects in the Northeast
NRBP Funding: \$68,801
Contract Period: 12 months, starting February, 1993
Completion Date:
Objective: To assist potential developers of landfill gas to energy sites in the Northeast and associated policy and regulatory personnel to understand the current state of the industry and to realize new development opportunities.

Title: Resource Survey of Large-Scale Liquid Fuel Products From Biomass
NRBP Funding: \$40,000
Contract Period: October 1993 -September 1994
Completion Date: Late September, Forum in October
Objective: To encourage the development, in the Northeast, of a large-scale demonstration project or commercial facilities using biomass waste materials to produce ethanol or other liquid fuels.

ACTIVE PROJECTS:

Title: Comparative Analysis of Landfill Gas Technologies
NRBP Funding: \$40,000
Contract Period: October 1993 - January 1995
Status: Tasks 1-7 completed
Objective: To compare and evaluate several gas-to-electricity technologies for their economic and alternative conversion technologies.

Title: Lessons Learned III: Woodstove Emissions
NRBP Funding: None
Contract Period: October 1994 - March 1995
Status: Planning almost completed for 1995 Changeout Campaign
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.

ACTIVE PROJECTS CONT.:

Title: Biomass Facilities Directory
NRBP Funding: \$30,000
Contract Period: September 1993 - March 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, make partial payment and complete contract with NEOS, which should be underway with telephone resurvey late in fall.

Title: A Methodology for Environmental Externalities: Accommodating Biomass Feedstocks
NRBP Funding: \$49,935
Contract Period: October 1993 - August 1994; extended to January 1995
Status: Draft interim report for Tasks 1-5 complete; Final report due January 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: Update on Economic Impacts Study
NRBP Funding: \$40,000
Contract Period: October 1993 - August 1994; extended to December 1994
Status: Draft final report complete; final due in December 1994
Objective: Document and estimate the dollar savings, direct and indirect economic impacts, including job creation, associated with the wood energy industry.

Title: Wood Pellets Fuels Conference
NRBP Funding: \$25,000
Contract Period: November 1993 - August 1994
Status: Conference was completed; 50 participants. Participants agreed that with the establishment of four new pellet plants and the sale of 6,000 pellet appliances in the region, the industry is well underway. Two key lingering problems are ash slagging of stoves and varying quality of pellet. Due to price non-competitiveness, market forces may force even higher-ash content pellet made from wood and paper wastes.
Objective: To inform, motivate and train participants to carry out Action Plan drafted in last June's Forum. To update status of industry in the region.

ACTIVE PROJECTS CONT.:

Title: Governor's Round Table
NRBP Funding: \$30,000 has been allocated to cover the site costs, facilitator expenses, and travel costs for certain stakeholders.
Contract Period: November 1993 - March 1995
Status: Three meetings have occurred. See accompanying update. Next meeting is scheduled for November 1994.
Objective: The Biomass Roundtable is a convening of invited stakeholders, representing all aspects of production, consumption and regulation of biomass derived energy.

Title: Long Range Planning
NRBP Funding: part of Technical Support contract
Contract Period: August 1993 - October 1994
Status: Draft Report Completed: Chapters on Supply, Demand, Conversion Technologies, and Technology Transfer: comments from Steering Committee members have been collected.
Objective: To guide project selection and project selection criteria over the next five years.

Title: Air Emissions Testing of Two Wood-Chip Fired Furnances
NRBP Funding: \$40,000; Cost sharing, \$6,000 State of Vermont; \$10,000 in-kind professional labor support from Energy and Air Quality Offices
Contract Period: Final report due by the Summer of 1995
Objective: To sample and analyze emissions from two wood-fired furnances from a variety of pollutants.

STATUS REPORTS: CONTRACTORS SELECTION OR NEGOTIATIONS PENDING

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 targeted to utilities and air regulators and feature presentations by NYSEG, which currently has several co-fired boilers. This roundtable identified future issues for follow-up projects.

Title: Liquid Fuels Resource Assessment Follow-up
Budget: \$40,000
Proposed Project: A Liquid Fuels Development Forum scheduled for September 22. The objective is to bring together key players to discuss what is required to get a large-scale biomass-to-ethanol production plant under construction.

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

Title:

Study of Emissions From Small Wood-Fired Boiler Systems

Budget:

\$40,000

Proposed Project:

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 wood-chip fired combustion systems and to determine the associated health risks, if any.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

October 1994

SUMMARY REPORTS: COMPLETED PROJECTS

Title: Impediments to Development of Landfill Gas Recovery Projects in the Northeast

Rationale: The technology of converting landfill gas to energy (LFG) has been known for some time and LFG projects have been operating in the West; however, the development of such projects has been slow in the Northeast.

Objectives: To assist potential developers of landfill gas to energy sites in the Northeast and associated policy and regulatory personnel to understand the current state of the industry and to realize new development opportunities. In addition, the project will identify candidate landfill sites in the Northeast for LFG recovery; estimate the total energy potential available from LFG in the Northeast and will provide information that could be used to affect state and federal energy policy.

Approach:

PHASE I: A survey of the LFG industry will identify the parameters for a successful project and identify any impediments to success. Contractors will employ a data search, data from the surveys, other secondary data and their own expertise to develop a handbook providing project feasibility criteria, strategies to overcome both technical and non-technical barriers to development, and technical siting criteria.

PHASE II: A review of existing landfill databases and visits to up to four NE states will provide input to a new database of active landfills larger than 100 TPD, with emphasis on the 60 sites receiving 500+ TPD. The contractors will apply criteria developed in Phase I to rank landfills by state for attributes favoring development. A software package will be developed for estimating LFG yield and economic feasibility.

Tasks:

PHASE I

- (1) Conduct a literature review and prepare a summary report addressing the technical, economic, institutional and environmental aspects of developing LFG recovery projects. The discussions will emphasize changes the industry has undergone over the past five years.
- (2) Interview LFG developers, owners, utilities, financiers, and others to determine national and regional perspectives
- (3) Identify project feasibility criteria for the following: landfill characteristics; energy sales agreement; regulatory/environmental conditions; tax incentives and subsidies; landfill owner-LFG developer procurement.
- (4) Describe barriers to success, ranking relative difficulty, and provide options to overcome each potential barrier
- (5) Provide guidelines for technical siting decisions in Northeast
- (6) Identify non-technical factors critical to success
- (7) Prepare a draft handbook with products and data from steps 1-6 for review (4 copies)

PHASE II

- (1) Compile Landfill Database
- (2) Identify and Group Landfills for LFG Development Based on Technical Criteria
- (3) Rank Landfills for LFG Development, Applying Non-Technical Factors
- (4) Develop Criteria and Methodology for Qualifying Landfills for LFG Development (software model)
- (5) Produce final handbook (including Phase I draft material); provide LFG recovery economic model in hard copy and disks

Contractor: SCS Engineers, 11260 Roger Bacon Drive, Reston
VA, 22090. Attn: Mike McGuigan (703)471-6150.

NRBP Funding: \$68,801

Cont. Period: 12 months, starting February, 1993

Status: Final Report has been completed and dissemination to the states has taken place. 200 copies were printed. All the states have been polled about specific LFG projects underway and any MOUs with EPA LFG outreach program.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

October 1994

Title: Resource Survey of Large-Scale Liquid Fuel Products From Biomass

Rationale: There exists a variety of laboratory-tested technologies for converting woody and other biomass feedstocks into ethanol and other biofuels which can readily be used to displace fossil-based fuels in the generation of electricity. One key to successful transfer of current conversion technologies to commercial-scale liquid fuel production is the availability of a low-cost feedstock resource. The Northeast region is less well suited than other parts of the country to the development of short rotation crops as a competitive fuel feedstock. In the Northeast, a more economical feedstock may be biomass waste materials, such as waste paper, which have a low or even a negative value due to increasing disposal costs. Up-to-date information on available resources and on potential support or impediments to project development is needed by policy makers and potential commercial developers.

Objectives: The ultimate purpose of this project is to encourage the development, in the Northeast, of a large-scale demonstration project or commercial facilities using biomass waste materials to produce ethanol or other liquid fuels. The immediate objective of this stage of the project is to generate a base of information on the availability of economically competitive and sustainable biomass waste feedstocks which meet criteria for utilization with existing conversion technologies, including (but not necessarily limited to enzymatic and acid-based hydrolysis conversion technologies. NRBP seeks responses to the following questions:

- (1) How much potential feedstock material exists?
- (2) What is the cost to extract/obtain these materials as feedstock for the large-scale commercial generation of liquid fuel?

Approach: The project is envisioned to proceed in three phases: (1) Preliminary Resource Survey; (2) Further Evaluation of Potential to Support a Large-scale Biomass-to-Ethanol Conversion Facility; (3) Identification and Detailed Analysis of Candidate Demonstration Sites. The focus of this project is **I: Resource Survey** only. The survey will rely on existing research and data.

Tasks:

- (1) Establish the requisite characteristics (e.g., acceptable types of material, moisture content, etc.) needed to qualify potential biomass waste feedstock materials for both enzymatic and acid-based hydrolysis conversion processes.

INTERIM REPORT TO NRBP STEERING COMMITTEE: present criteria to be used in defining potential feedstock materials, and plan for proceeding with the regional resource assessment.

- (2) Identify potential feedstock sources by state and county (or other jurisdictions, as appropriate), including both MSW and other significant sources which may not show up in the MSW stream.
- (3) Describe any anticipated change in availability or value/cost of feedstock over next ten years.

INTERIM REPORT TO NRBP STEERING COMMITTEE: present findings of tasks 2 and 3.

- (4) For areas within the region where potential resources and energy demand are concentrated, make a preliminary identification of the fuel most likely to be displaced, and any relevant environmental or regulatory barriers or incentives to development of a waste-to-ethanol site.
- (5) DRAFT FINAL REPORT TO THE NRBP STEERING COMMITTEE: The draft final report will be distributed to the Steering Committee in time for the Committee to review the document prior to a presentation and discussion of the findings by the contractor.
- (6) FINAL REPORT TO THE NRBP STEERING COMMITTEE. The final report should incorporate a discussion of the implications of the Resource Survey's findings for the development of ethanol to liquid fuel in the Northeast. The report will be made available to the Center both in hard copy and on diskette.

Contractor: C.T. Donovan Associates

NRBP Funding: \$40,000

Cont. Period: October 1993 - September 1994

Status: Completed in late September; dissemination to participants in October Forum will be central feature of dissemination strategy.

STATUS REPORTS: ACTIVE PROJECTS

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

October 1994

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 August negotiations with NREL to fund and sponsor analysis of fuel cell technology to earlier list of combustion systems. Final negotiations for adding fuel cell analysis to scope of work not yet finalized.

Contractor: SCS Engineers

NRBP Funding: \$40,000

Contract Period: October 1993-January 1995

Technical Projects - Status Report

October 1994

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 NRBP/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: Planning almost completed for 1995 Changeout Campaign

Contractor: Northeast Hearth Products Association

NRBP Funding: None

Contract Period: October 1994 - March 1995

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

October 1994 .

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, make partial payment and complete contract with NEOS, which should be underway with telephone resurvey late in fall.

Contractor: Combustion Testing & Engineering

NRBP Funding: \$30,000

Contract Period: September 1993 - March 1995

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

October 1994

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 for Tasks 1-5 complete; Final report due January 10, 1994

Contractor: Meridian Corporation

NRBP Funding: \$49,935

Contract Period: October 1993 - August 1994, extended to January 1995

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

October 1994

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

Status: Draft Final Report complete; final due in December 1994

Contractor: Resource Systems, with assistance from Energetics

NRBP Funding: \$40,000

Contract Period: October 1993 - August 1994, extended to December 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer

Technical Projects - Status Report

October 1994

Title: Wood Pellet Fuels Conference

Rationale: The chicken-and-egg problem which has bedeviled the emergence of the pellets industry has many roots. Concerted and informed activity by government and industry will accelerate the penetration of both stove sales and pellet sales in the region. The Pellets Forum held last June created an Action Plan for both the private and public sectors: the Conference should gain attention for the Plan and afford participants with information and training to effect its recommendations

Objectives: To inform, motivate and train participants to carry out Action Plan drafted in last June's Forum. To update status of industry in the region.

Approach: To co-sponsor a conference of 150-200 participants late in the spring or early summer of 1994.

Tasks:

- (1) Form steering committee.
- (2) Prepare Conference program.
- (3) Contact and confirm key participants.
- (4) Prepare program curricula materials for training sessions.
- (5) Solicit exhibitors for Conference
- (6) Arrange meeting site and facilities.
- (7) Prepare a record of Conference.

Status: Conference was completed; 50 participants. Participants agreed that with the establishment of four new pellet plants and sale of 6,000 pellet appliances in region, the industry is well underway. Two key lingering problems are ash slagging of stoves and varying quality of pellet. Due to price noncompetitiveness, market forces may force even higher-ash content pellet made from wood and paper wastes.

Contractor: New England Forestry Alliance

NRBP Funding: \$25,000

Contract Period: November 1993 - August 1994

Wood Pellet Conference held in June

The NRBP's ongoing efforts to foster development of a wood pellet industry in the Northeast have achieved critical momentum. The Northeast is now the fastest growing region for pellet stoves and pellet fuel sales in the nation. Today there are about 25,000 residential pellet stoves in the region's homes, more than double what there were two years ago. Four new pellet manufacturers have located in the region, with collective capacity for manufacturing more than 100,000 tons per year. Today the region utilizes an estimated 75,000 tons annually.

On June 27-28, 50 individuals participated in the NRBP-sponsored Wood Pellet Fuels Conference held in Bedford, New Hampshire. The objective of the Conference was to inform, motivate, and train participants to carry out the *Wood Fuel Pellet Action Plan* developed at the Wood Pellet Forum co-sponsored last year by the NRBP and the Northeastern Forest Alliance (NEFA). The *Action Plan's* recommendations included:

- establish certification programs and pellet fuel standards
- better education of stove dealers by manufacturers;
- enlist government and nonprofit organizations such as the Regional Biomass Programs to help educate consumers;
- improve stove designs;
- research market to better know who is or may be buying pellet stoves;
- government incentives, including tax and emission credits.

A record of the Conference proceedings is being produced, and will be available from the CONEG Policy Research Center.

STATUS: Final Report due in November 1994

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

October 1994

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: Three meetings have occurred. See accompanying update. Next meeting is scheduled for November 1994.

Contractor: RESOLVE, Abby Arnold, facilitator.

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 March 1995

Governors Biomass Roundtable

In May, 1994, 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.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

October 1994

Title: Long Range Planning

Rationale: A blueprint to guide the selection of technical projects will maximize the efficacy and efficiency of projects. Such a long-range plan was completed in 1984 and again in 1989.

Objectives: To guide project selection and project selection criteria over the next five years.

Approach: A written report will be available in the spring. Conference papers, interviews, issue discussions at Steering Committee meetings, technical committee forums, and other sources will assist the development of the Long Range Report. After a draft is completed, discussion and comments from the Steering Committee will precede Final Report.

Tasks:

PHASE I. The first phase of the Long Range Planning exercise will be to map out the major resources, conversion technologies, and end uses/users, and identify in broad terms the opportunities for and barriers to forging and strengthening the connections between these categories. Tasks associated with this phase will be carried out primarily by CCC staff:

Task 1: Review literature and identify experts and representatives of key stakeholders who might make valuable contributions to the planning exercise.

Task 2: Attend conferences, notably the Biomass Conference of the Americas scheduled for August 30 - September 2 in Burlington, Vermont. (Also scheduled: Hearth Products Association Trade Show, March 11, 1994.)

Task 3: Prepare materials to inform and guide discussions (Phase II).

PHASE II. The second phase of the Planning exercise will consist of focused discussions among Steering Committee members and Advisory Panels convened to address specific opportunities and barriers.

Task 4: Steering Committee invites experts to address specific opportunities and issues associated with specific topic areas.

Task 5: Major stakeholders invited to participate in Advisory panels, convened by teleconference.

Task 6: Integrate recommendations of the Governors' Biomass Policy Round Table.

Status: Draft Report Completed: Chapters on Supply, Demand, Conversion Technologies, and Technology Transfer: comments from Steering Committee members have been collected

Contractor: Citizens Conservation Corporation

NRBP Funding: Part of Technical Support contract

Contract Period: August 1993 - October 1994

Project Summary: Air Emissions Testing

TITLE: Air Emissions Testing of Two Wood-Chip Fired Furnaces

RATIONALE

The conversion of medium-sized commercial and institutional buildings to wood-fired systems has been slowed by informational barriers to facilities managers and financial officers. While NRBP has addressed a gap in knowledge about efficiencies and economics of wood conversions at this size, air permitting remains a significant issue in most of the eleven northeastern states. There exists a perception among many regulators that wood-fired systems below 10 million Btus/hr generate particulate, NOx, and PAH emissions significantly higher per unit of energy produced than larger combustion systems. Because there is very little data on emissions from system in this size category, there exists the considerable risk that permits will be delayed or denied based upon this perception. This study seeks to provide in situ emissions which provide a data base upon which permitting can proceed forthrightly. Secondly, this study seeks to alleviate concerns of building managers that emissions from facilities in this size range meet all applicable air standards.

DESCRIPTION

This stack emissions test program will sample and analyze emissions from two wood-fired furnaces from a variety of pollutants. The wood furnaces are sized between .5 MMBtu/hr to 3 MMBtu/hr. The pollutants measured are particulates, multiple metals, Dioxin, PAHs, formaldehyde, hex chromium, benzene, NOx, and carbon monoxide. The testing will occur at a high school and a housing project in Vermont over a one-week period. The samples will be taken while the furnaces are operating at a high firing rate. The same fuel will be used in the furnace throughout the testing period. The method of fuel feed will be the automatic normal mode of operation for the units.

The contractor will prepare a test protocol which details all sampling and analytical procedures required to complete the testing in accordance with the EPA regulations and methodologies as outlined in Title 40, Code of Federal Regulation, Parts 60 and 266 (40 CFR) and the California Air Resources Board. The Contractor will perform ultimate/proximate and fuel metals analysis on composited fuel samples for each of the two test locations. The contractor will also conduct pre-test volumetric flow monitoring and finalize specific sampling port locations, electrical requirements, temporary sampling enclosure specifications, and laboratory facilities prior to the submittal of the test protocol.

The contractor will complete the testing by April 1995 and submit a final report by the Summer of 1995. The contractor is obliged

to perform a variety of technology transfer activities, including two draft articles for publication in trade journals and/or for conference presentations. The work of the contractor will be guided by a technical advisory committee.

RESULTS

Testing is proceeding currently.

ADMINISTRATIVE INFORMATION

Performing Organization: Environmental Risk Limited

Key personnel: Rich Atkins, President;
Norm Hudson, Vermont Department of Public Service;
Chris Jones, Vermont Air Pollution Control
Divison, Agency of Natural Resources

RBEP funding: \$40,000;

Cost sharing: \$6,000, State of Vermont; \$10,00 in-kind
professional labor support from Energy and Air Quality Offices

STATUS REPORTS: CONTRACTOR SELECTION OR NEGOTIATION PENDING

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 targeted to utilities and air regulators and feature presentations by NYSEG, which currently has several co-fired boilers. This roundtable identified future issues for follow-up projects.

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. At the end of the day, several commitments were made by various participants:

1) GPU Service Corporation will convene a meeting of forestry personnel and PUC regulators in Pennsylvania and New Jersey with the purpose of initiating a dialogue among these parties;

2) The Pittsburgh Energy Technology Center, NREL, and other federal laboratories are willing to undertake CRADAs in co-firing;

3) Pennsylvania State University has combustion facilities which may be available for demonstrations;

4) NRBP will work to build a regional consortium to continue the efforts of encouraging opportunities to integrate and coordinate outreach and information transfers.

Another meeting is scheduled for mid-December in Harrisburg of several major stakeholders.

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: To help us generate a project, the NRBP will stage a **Liquid Fuels Development Forum**, scheduled for Thursday, September 22, at the Bradley Air Museum in Connecticut, will bring together representatives of DOE/NREL's Alternative Fuels Program and Transportation End Use Sector with potential commercial-scale developers of liquid fuel production facilities and representatives of relevant permitting agencies, energy offices, and the Biomass Program from each of the eleven Northeast states. The objective of convening key players in the development process is to facilitate a specific discussion of what is required to get a large-scale biomass-to-ethanol production plant under construction in the region by the end of 1995, and to identify what the NRBP (with DOE and NREL's technical support) can do to facilitate the siting, permitting and development process.

BUDGET: \$40,000

STATUS: A mid-October roundtable has been scheduled for Hartford, Ct. to involve the major stakeholders in a discussion of what barriers remain to the siting of an ethanol plant in the region by 1996.

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 PROPOSED 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 MMBTUh) 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 will be 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: \$40,000

STATUS: The RFP has been finalized and is scheduled to go out to bid in mid-October for a November 30 deadline. Contractor selection is expected in December.

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: 802-241-3855)

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 analysts, 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. A 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 missions 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 leases 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: IMPEDIMENTS TO DEVELOPMENT OF LANDFILL GAS RECOVERY PROJECTS IN THE NORTHEAST

SCOPE OF SERVICES

PHASE I - Characterize LFG-to Energy Industry in the Northeast

The project objectives for this phase are:

- Through a survey of the LFG recovery industry, identify the parameters for a successful project.
- Identify impediments to a successful project.
- Provide recommendations on how barriers can be surmounted.

The contractor must complete the following tasks to meet the project objectives:

- Task 1 - Literature Review
- Task 2 - Interview LFG Developers
- Task 3 - Project Feasibility Criteria
- Task 4 - Barriers and Means to Overcome
- Task 5 - Technical Siting Criteria
- Task 6 - Non-Technical Factors
- Task 7 - Draft Report/Handbook

TASK 1 - LITERATURE REVIEW

APPROACH

The contractor will review current literature and prepare a summary of the technical, economic, institutional and environmental aspects of developing LFG recovery projects. Much of the information is already in our possession, and we will not have to expend significant effort to research the field. In-house information sources which can be utilized include:

- The contractor project files and databases.
- SWANA (Solid Waste Association of North America) Annual Landfill Gas Symposium - 15 years of proceedings (SWANA was formerly GRCDA).
- USEPA - Background Information Document for the New Source Performance Standards (NSPS) for Landfill Emissions.

- International Landfill Gas Conference proceedings (1986, 1988 and 1990), sponsored by UK Department of Energy - Energy Technology Support Unit (ETSU).
- Handbook on Biogas Utilization, Gas Research Institute - The contractor co-author.
- Trace Constituents in Landfill Gas - Task Report on Inventory and Assessment of Cleaning Technologies, Gas Research Institute - The contractor co-author.
- Methane Recovery From Landfill Yearbook, 1990 and 1992, Governmental Advisory Associates, Inc. (GAA).
- Vendor literature from developers, equipment suppliers, other consultants. etc.

These sources and the contractor's knowledge will serve as the basis for a summary of the major aspects of LFG recovery. A brief overview of the following topics will be provided:

- LFG collection methods (vertical wells, horizontal trenches, and cover venting systems).
- LFG utilization technologies.
 - Medium Btu (direct combustion, on-site uses, space heating, boilers).
 - High Btu/purification (pipeline quality natural gas, LNG).
 - Electrical generation (engine/generators and gas turbines).
 - Other uses (vehicular fuels, fuel cells, liquid fuels - diesel).
- Economic Aspects.
 - Typical range of capital and operational costs.
 - Revenue ranges for electricity, pipeline quality gas, and direct use.
 - Summary of the Federal tax credits (Section 29) and the Renewable Energy Production Incentive (Section 1212 of the Energy Bill) available for LFG recovery projects.

- Institutional Issues.
 - Types of ownership: municipal, utility, or independent.
 - Public/private partnerships.
- Environmental Issues.
 - Subtitle D requirements (LFG control).
 - Proposed New Source Performance Standards (NSPS) under the Clean Air Act.
 - Condensate management.

The discussions will emphasize changes the industry has experienced over the past five years. With the extension of the Federal tax credits (Section 29) and the new renewable energy incentive payments for publicly-owned facilities, additional revenue sources are available to improve the project economics.

DELIVERABLES

A draft report will be prepared and submitted to the Center at the project kickoff meeting (to be scheduled a couple of weeks after contract award). This report will summarize the state of the industry and provide the reader with an understanding of many of the technical and non-technical elements affecting LFG recovery projects.

TASK 2 - INTERVIEW LFG DEVELOPERS

APPROACH

The contractor will contact developers/owners/investors/operators of LFG recovery projects to obtain information on both the technical and non-technical impediments to successful projects. The contractor will also gather information on reasons why potential LFG projects were not successful. Exhibit 1 is a listing of developers to contact.

The contractor will concentrate on the listed developers with multiple projects and a proven track record. The criteria for selection of firms to interview includes:

- Major LFG developers nationwide (Waste Management, BFI, O'Brien, Michigan Cogeneration, etc.).
- Active developers in the Northeast (Energy Tactics, Palmer Capital, Phillips Energy, etc.).

The contractor plans to contact small developers as well as larger developers (both are included in the above listing). Smaller developers are the firms likely to develop the smaller landfill sites due to the lower capital investment requirements and their desire to gain experience.

Several landfill owners active in LFG recovery also will be interviewed. The following municipal agencies are active in the LFG field. Their insight will be valuable from landfill owner's perspective. Municipalities to be contacted may include:

- Los Angeles County Sanitation Districts.
- New York City, Department of Sanitation.
- Connecticut Resource Recovery Authority.
- Rhode Island Solid Waste Authority.
- Delaware Solid Waste Authority.
- Fairfax County, Virginia.

EXHIBIT 1. PROPOSED CONTACT LISTING OF LFG DEVELOPERS

LFG Developer	Location	Key Contact
Air Products, Inc.	Allentown, PA	Paul Persico
Bio Development Corp.	Bedford, NH	Joel Gordon
Browning-Ferris Industries	Houston, TX	Dave Conrad
Cambrian Energy Systems	Santa Monica, CA	Bob Hatch
Emcon Associates	San Jose, CA	John Pacey
Energy Tactics, Inc.	Yaphank, NY	Stan Drake
Hayden-Wegman, Inc.	Boston, MA	John Murphy
Hazox Alternate Energy	Chester, PA	Dan Snyder
JWP Energy & Environment	Purchase, NY	Bob Anderson
Laidlaw Gas Resource Systems	Newark, CA	Kenneth Wuest
Michigan Cogeneration Systems	Novi, MI	Scott Salisbury
O'Brien Energy Systems	Philadelphia, PA	Doug Nielsen
Ogden Martin Systems	Fairfield, NJ	Tom Rantas
Pacific Energy	Commerce, CA	Tony Henrich
Palmer Capital	Cambridge, MA	Jim Levitt
Phillips Energy	Waitsfield, VT	Fran Woods
Vermont Energy Recovery	Brattleboro, VT	Allan McLane
Waste Management Inc.	Oak Brook, IL	Chuck Anderson
Wehran EnviroTech	Middletown, NY	Fred Wehran

Several utilities and other end users of the energy produced from LFG projects will be contacted, including:

- Brooklyn Union Gas - New York, New York
- Burlington Electric Department - Burlington, Vermont
- Long Island Lighting Company, New York
- New England Power
- Virginia Power
- Public Service of New Jersey

In addition, The contractor will contact several financial institutions active in financing LFG recovery projects. Their concerns and requirements will be identified. Financial institutions to be contacted may include:

- State Street Bank and Trust Company - Boston, Massachusetts
- Michigan Bank - Detroit, Michigan
- First Union Bank - Atlanta, Georgia
- First Pennsylvania Bank - Philadelphia, Pennsylvania

An interview form will be prepared (see Exhibit 3 in the proposal for a preliminary outline) for use in obtaining consistent and complete (to the extent available) information about each LFG recovery project. Generally, the information to be obtained will include the following, to the extent that it is available:

- Project location, size, types. etc.
- Energy purchase price, terms/conditions, negotiating difficulties.
- Permitting and environmental difficulties.
- Tax incentives/subsidies.
- LFG developer/landfill owner relationship and terms.
- Permitting experience; i.e., difficulties and solutions; ease of gaining permits; time required.

The interview form will be provided to the Center for information purposes. The contractor' approach to conduct the interviews is as follows:

- Record on the interview forms what we already know about each site before contacting the developers and others.
- The interviews with the developers, landfill owners, end users, and financial institutions will be conducted by the contractor senior staff members. In most cases, this staff member will be known to the interviewee. We anticipate a one-hour time period with each developer.
- Send each developer a follow-up letter to allow the opportunity for confirmation of the data, additional comments, etc.

OUTLINE

EXHIBIT 3. LFG INDUSTRY INTERVIEW

Company Information

- Company, contact name, address, phone and fax numbers
- Type of firm: LFG Developer, Landfill Owner, Energy User, Financial Institution
- The contractor contact person, date

Company Experience in LFG Recovery

- Number of projects and status (planned, active, shutdown, etc.)
- Recovery projects location, size (update of Exhibit 2-1 for Northeast projects)
- Years of experience in LFG recovery, year of first involvement

Project Characteristics (separate sheet for each project)

- Landfill characteristics - acreage, refuse volumes (or tons), age, configuration, open or closed, etc.
- LFG recovery system - wellfield, utilization equipment, etc.
- Project economics
 - Energy purchase and lease agreement provisions (energy payments, royalties, terms, duration, etc.)
 - Tax credits and/or other economic incentives
- Environmental/regulatory issues, air emissions, condensate management, permits

Impediments Encountered and Solutions

- Landfill
- LFG collection system
- Energy generation equipment
- Financial

- Institutional
- Regulatory

Deliverables

Task deliverables will include:

- Listing of LFG developers, owners, energy users, etc., to be contacted (an update of those listed herein)
- Interview form (an update of Exhibit 3)
- The survey results will be included in the Task 7 report

TASK 3 - PROJECT FEASIBILITY CRITERIA

APPROACH

Based on our knowledge of the industry, the limited literature review, and the developer interviews and industry contacts, The contractor will set forth typical criteria under each of the following major factors:

- Landfill characteristics.
- Energy sales agreement (ease of negotiation and revenue).
- Regulatory/environmental conditions.
- Tax incentives and subsidies.
- Landfill owner - LFG developer procurement requirements.

DELIVERABLES

The task outputs will be included in the Task 7 report.

TASK 4 - BARRIERS AND MEANS TO OVERCOME

APPROACH

Using information gathered during the interviews, The contractor will identify the barriers to LFG recovery. Potential barriers for discussion may include:

Technical

- Landfill characteristics.
 - Insufficient refuse volumes.
 - High quantities of inorganic wastes.
 - Shallow refuse depths.
 - Poor final or intermediate cover systems.
 - Perched liquids.
- Insufficient LFG quantities and/or poor quality.
 - Overly optimistic LFG production estimates.
 - Low heating value of recovered LFG.
- LFG collection systems.
 - Incompatible wellfield designs, continually changing landfill operations which require extension of recovery system.
 - Air intrusion due to poor final cover or over drawing.
 - High landfill liquid levels that reduce the active well slotlines and reduce the effectiveness of the wells to recover LFG.
 - Poorly operated and maintained collection systems.
 - Condensate drainage problems and insufficient header slopes.
- Power generation or utilization systems.
 - Poor maintenance.
 - Equipment incompatibilities with LFG constituents.
 - Improper compressor or blower sizing.

Economic

- Low energy purchase prices and future price stability.
- Unrealistic economic projections.
- Cyclical demands for medium Btu applications.
- Inadequate capitalization.

- Difficulties and time required to negotiate purchase agreement with the energy purchaser (utility company or direct user).

Institutional

- Political impediments (e.g. conflicting priorities between LFG recovery project and filling operations or end-use plans).
- Size (i.e., small) of LFG project decreases interest by utility company.
- Inability to accurately estimate future production and relatively short production life.
- Zoning ordinances regarding noise or facility types.
- Lack of interest of energy users to purchase LFG or electricity generated using LFG as fuel.

Many of the above impediments have means by which they can be overcome on a case by case basis. Input from the interviews and the contractor's project experience will be used to develop suggested remedies to the barriers identified.

DELIVERABLES

The task outputs (to be presented in the Task 7 report) will include listing of project barriers, the relative level of difficulty (i.e., their likelihood of being overcome), and potential remedies.

TASK 5 - TECHNICAL SITING CRITERIA

APPROACH

Technical siting criteria will be developed based on experience at successful Northeast projects. Criteria may include the following:

- Landfill characteristics.
 - Minimum size (acres).
 - Minimum average refuse depth (feet).
 - Minimum capacity in-place (cubic yards and/or tons).
 - Minimum capacity at closure (cubic yards and/or tons).
 - Maximum age of refuse - years since closure.
 - Landfill status - open or closed.
 - Refuse types (MSW, not construction and demolition debris, liquids, etc.).
 - Landfill final cover system.

- LFG Utilization Requirements.
 - Direct use (medium Btu).
 - Distance to user.
 - User requirements - hours/day, quantity, seasonality.
 - Minimum revenue (\$/MM Btu).
 - Electricity generation.
 - Minimum revenue (\$/kWh).
 - Onsite use or tie-in to utility grid
 - High Btu (pipeline quality).
 - Distance to pipeline.
 - Cost of electricity to power purification process
 - Minimum revenue (\$/MM Btu)

DELIVERABLES

The technical criteria will be presented in the Task 7 report. These criteria will be subsequently used in Phase II to make a first cut at identifying sites with the greatest potential for LFG recovery.

TASK 6 - NON-TECHNICAL FACTORS

APPROACH

The contractor will develop a framework of non-technical factors that are necessary for a project to be successful. These factors will be based on the Task 2 interviews and project experience. Non-technical factors to be considered may include:

- Institutional factors.
 - Types of ownership which have been successfully applied.
 - Methods to assist successful public/private partnerships.
 - Appropriate levels of risk-sharing by the major parties (landfill owner and LFG developer).
- Financial factors.
 - Revenue ranges for electricity, pipeline quality gas, and direct use.

- Methods to structure project to take advantage of the Federal Tax Credits (Section 29) and the Renewable Energy Production Incentive (Section 1212 of the Energy Bill).
- Financing alternatives.
- Regulatory factors.
 - Identify permitting requirements for each of the states. For example, New York a LFG recovery project must have a solid waste management facility permit to comply with specific design and operational criteria.
 - Identify air emissions and condensate management requirements for each state or region.

DELIVERABLES

The non-technical criteria will be presented in the Task 7 report.

TASK 7 - DRAFT REPORT/HANDBOOK

The contractor will prepare a draft report/handbook incorporating the results of Tasks 1 through 6. The report will be geared towards potential developers of LFG recovery projects in the Northeast.

DELIVERABLES

The draft report/handbook. Four copies of this draft document will be submitted to the Center for their review and comments. Comments from the Center will be incorporated in the Phase II final report/handbook.

PHASE II - Identify Landfills for LFG Development

The Phase II objectives as presented in the RFP are as follows:

- Identify candidate landfill sites in the Northeast for LFG recovery.
- Estimate the total energy potential available from LFG in the Northeast.
- Provide information that might be used to affect state and federal energy policy.
- Encourage development of LFG recovery projects.

The contractor has reviewed the RFP and identified the following tasks to meet the objectives:

- Task 1 - Compile Landfill Database
- Task 2 - Identify and Group Landfills for LFG Development Based on Technical Criteria
- Task 3 - Rank Landfills for LFG Development, Applying Non-Technical Factors
- Task 4 - Develop Criteria and Methodology for Qualifying Landfills for LFG Development
- Task 5 - Final Report/Handbook

Our approach and task deliverables follow.

TASK 1 - COMPILE LANDFILL DATABASE

APPROACH

The contractor will access existing landfill databases to identify candidate sites for LFG recovery. A listing of the databases that the contractor will access, along with the type of information included in each, is summarized below:

- 1986 Solid Waste Landfill Survey - by the EPA. Approximately 1,000 landfill sites were surveyed. Information collected includes:
 - Contact information.
 - Facility area - acres.
 - Design capacity - cubic yards.
 - Annual waste quantities - metric tons/year.
- Solid Waste Digest, Northeast Edition - Facility Index.
 - Contact information.
 - Tip fee.
 - Capacity (tons per day).
- NSWMA Tip Fee Survey Database.
 - Contact information.
 - Tip fee.
- SWANA database on 4,300 landfill sites - contact information only.
- State solid waste regulatory agencies - most states have contact information on permitted facilities. The contractor has contacted the 11 Northeast states and requested copies of their solid waste management

plans (SWMP's) and landfill databases. We have in our possession landfill listings for Delaware, Maryland, New York, and Pennsylvania.

- New York State - Analysis of Methane Recovery Potential at New York State Sanitary Landfill Sites. This 1981 report identified 34 landfills in the state with over 1 million tons in-place with an average refuse depth of at least 40 feet. Of these 34 sites, 15 were identified as candidate recovery projects.

The contractor will contact each of the 11 state solid waste regulatory agencies to acquire updated landfill databases or listings (active and closed sites). The information in the databases or landfill listings is often incomplete. Specific landfill capacity data (volume or tonnage in-place or permitted) is often not included in the state's listings. The contractor plans to visit up to four state solid waste regulatory agencies to attempt to obtain capacity data. One day visits to New Jersey, Pennsylvania, Massachusetts, and New York are anticipated.

The contractor will compile the database from the above sources into a PC-based system (Dbase, Paradox, Q&A).

The type of information desired for each prospective landfill site (if available) includes:

- Landfill name, owner, address and contact names.
- Landfill size (acres), capacity (yards or tons in-place or total).
- Average refuse depths.
- Filling rate in cubic yards or tons/day.
- Year open/expected closure.
- Existing LFG control or recovery system (or planned).

Acquiring landfill capacity (in-place) and filling histories will be the most difficult aspects of this task. Available databases do not include this detailed information to-date. The SWANA database may include much of this data by the end of 1993, based on their current projections.

DELIVERABLES

The landfill database will be submitted on a suitable database format (Dbase, Paradox, or Q&A) in both printed and disc formats.

TASK 2 - IDENTIFY AND GROUP LANDFILLS FOR LFG DEVELOPMENT BASED ON TECHNICAL CRITERIA

APPROACH

The siting criteria previously developed in Phase I (Task 5) will be applied to the potential landfill sites. The database will be sorted and landfills which meet each criteria will be identified.

An example criteria is:

- Minimum refuse tonnage in-place - 1,000,000 tons.
- Minimum average refuse depth - 40 feet.
- Minimum acreage - 20 acres.

For New York State, The contractor will rely on a NYSERDA project (Analysis of Methane Recovery Potential at New York State Sanitary Landfill Sites) for background data on existing sites. Since only a few landfills have opened in New York in the past 10 years, we will only need to update capacity data from existing sites.

The contractor has reviewed the database of active landfills in the Northeast prepared by Solid Waste Digest. The number of landfills and daily capacity ranges in tons per day (TPD) are presented in Exhibit 4.

EXHIBIT 4. OPEN LANDFILLS IN THE NORTHEAST

State	Number of Active Landfills	Total Tonnage Landfilled (Tons/day)	Number of Landfills Over 100 TPD	Number of Landfills Over 500 TPD
Connecticut	40	4,179	10	1
Delaware	3	2,600	3	1
Massachusetts	74	15,917	18	7
Maryland	26	17,191	19	8
Maine	12	842	1	0
New Hampshire	35	3,280	5	2
New Jersey	15	12,689	12	6
New York	107	26,378	33	11
Pennsylvania	44	42,226	42	24
Rhode Island	5	2,252	1	1
Vermont	37	2,017	4	0
TOTAL	398	129,571	148	60

To reduce the number of landfills to a more manageable number, landfills smaller than 100 TPD will not be addressed. This criteria reduces the number of active landfills from 398 to 148. Within this group of 148 landfills, efforts will concentrate on the 60 listed sites receiving 500 TPD or more. These sites likely have the most potential.

DELIVERABLES

Outputs of this task are:

- Listing of candidate landfill sites which meet each of the specified criteria.
- Listing of sites which meet more than one criteria (i.e., over 1 million tons and over 40 feet average refuse depth).

- Listing of candidate sites which meet additional criteria. These sites potentially should be the best candidates for LFG recovery based on technical factors.

TASK 3 - RANK LANDFILLS FOR LFG DEVELOPMENT, APPLYING NON-TECHNICAL FACTORS

APPROACH

The contractor will apply the non-technical criteria developed during Phase I (Task 6) to the grouping developed in Task 2. Not all of the non-technical criteria developed under Phase I can be employed in this ranking task due to a lack of readily available information. Such criteria requiring more in-depth information than can be obtained for individual sites will be included in the model developed under Task 4 of Phase II.

This ranking should result in a listing by state of the sites having the attributes (technical and non-technical) for LFG recovery.

DELIVERABLES

The landfills with the attributes (technical and non-technical) for LFG recovery will be identified in the Task 5 report.

Task 4 - DEVELOP CRITERIA AND METHODOLOGY FOR QUALIFYING LANDFILLS FOR LFG DEVELOPMENT

APPROACH

Based on the information gathered in Tasks 1 through 3 and the Phase I report, The contractor will have identified technical and non-technical criteria to evaluate candidate landfill sites for LFG recovery. A software model will be developed that can be used by others to estimate LFG yield and to estimate economic feasibility for potential projects.

The model will be developed to run on Lotus 123. Input parameters can be entered via an input screen with standard report outputs available from a report memo screen. The LFG model can be loaded on a computer software program named "Baler." Baler can be run in DOS, and does not require the user to access other software programs, such as Lotus 123. The use of Baler will keep users from altering the formulas in the program.

The major input parameters for the LFG recovery model may include:

- Landfill data - site name, location.
- Refuse filling history - (default - straight line projection).

- Estimated LFG collection efficiency.
- LFG collection system costs (default - \$/MM cfd).
- LFG utilization method (medium Btu use or electricity generation and cost (\$/Kwh or \$/MM cfd)).
- O&M cost (\$/Kwh and/or \$/MM cfd).
- Revenues (\$/kw-hr or \$/MM Btu).
- Royalty Payments.
- Section 29 tax credits and Section 1212 Energy Payment Incentives (indicate whether to include in analysis).

Model outputs may include the following:

- Estimated LFG generation and collection rates.
- Annual revenues.
- Annual value of the royalty payments.
- Annual value of the Section 29 tax credits and Section 1212 Energy Payment Incentives (if applicable for the specific project).
- Present worth calculation.

The "heart" of the model is the estimated LFG generation and collection estimates. Based on landfill data and filling history, LFG production estimates over time can be made. The contractor has developed a PC-based LFG generation model based on our experience conducting extraction test programs and from active recovery projects. The contractor compiled pump test data from landfill sites around the country to estimate LFG generation rates. This data, along with an analysis of the GAA database and the contractor' experience, will be used to estimate LFG generation rates for the Northeast.

DELIVERABLES

- A computer LFG recovery economic model.
- Brief user's guide for imputing landfill and economic parameters.

TASK 5 - FINAL REPORT/HANDBOOK

APPROACH

The Phase I draft report/handbook will be expanded to include the results of the Phase II efforts and to incorporate the Center's comments on the Phase I draft. A draft of the final report/handbook will be submitted to the Center for review and comments. Comments will be incorporated, and the final document will be submitted for the Center's use and distribution.

DELIVERABLES

- Draft Final Report/Handbook - 1 copy.
- Final Report/Handbook - 1 bound and a photo ready original. The handbook also will be provided on a disc in WordPerfect 5.1. The LFG recovery economic model also will be provided on a disc.
- The contractor will prepare quarterly progress reports which will review progress to-date, identify upcoming activities, and identify problems encountered/solutions.

PROJECT SCHEDULE

Total project duration will be 12 months, effective February 1993.

This is a fixed cost contract for \$68,801.

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.

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.

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. 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
- CO₂
- CH₄
- N₂O

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;
 - (3) 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 adder 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 NRBP, 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.

NORTHEAST REGIONAL BIOMASS PROGRAM

REQUEST FOR PROPOSALS

AIR EMISSIONS TESTING OF TWO WOODCHIP-FIRED FURNACES

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 analysts, 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 missions 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. 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.

APPENDIX A: THE NORTHEAST REGIONAL BIOMASS PROGRAM

A. Background

The northeast states (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont) 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 of expanded biomass energy use is also on the rise, but many of the facts about air emissions and the impact 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 on the trend of increasing residential applications of biomass energy. In addition, many residential, commercial, and industrial 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 potential. 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.

B. Program Goals and Strategies

1. Program Goals:

- * Improve the effectiveness, coordination and planning capabilities of the state agencies in the region which have biomass and wood energy-related responsibilities.
- * Provide information to private companies, residential and commercial consumers, and public institutions about the potential and versatility of biomass energy use.
- * Better understand and mitigate the environmental impacts of increased biomass energy use without stifling the region's ability to take advantage of its most abundant indigenous energy source.
- * Leverage existing federal biomass research development and demonstration investments with private investment to replace basis public sector R&D with private sector market development.
- * Support region-specific and interregional studies of the critical impediments to the further development of biomass energy resources.
- * Coordinate the regional program with other federal, state and regional efforts to avoid duplication and maximize the effectiveness of NRBP dollars.

2. Program Strategies

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.

C. Eligible Applicants - Technical Studies

Any for-profit or non-profit organization in the United States shall be eligible for any one or more of these contract awards. Regional, federal and state public agencies are also eligible organizations for awards under this project. Further qualifications for contractors appear in the "Evaluation of Factors for Award" section which accompanies each RFP.

D. Proposal Instructions and Conditions

Proposers are to follow these instructions and those instructions incorporated in the Statement of Work when preparing their proposals.

1. Limitation

This Request for Proposal does not commit the CONEG Policy Research Center, Inc. (the Center) to award a contract, to pay any costs incurred in the preparation of a proposal to this request or to procure or contract for services or supplies. The Center reserves the right to accept or reject any or all proposals received as a result of this request, to negotiate with all qualified sources, or to cancel in part or in its entirety, this Request for Proposals, if it is in the best interests of the Center to do so. The Manager of Contracts may require the offerors selected to participate in negotiations, and to submit such price, technical, or other revisions of their proposals as may result from negotiations.

2. In-Region vs. Out-Of-Region

The Northeast region includes the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont. The location of firms responding to this RFP will not directly influence the selection process. However, travel cost estimates are required as part of the proposed budget submittal.

3. Format

Unnecessarily elaborate brochures or other presentations beyond those sufficient to present a complete and effective proposal are not desired and may be construed as an indication of the offeror's lack of cost consciousness. Elaborate art work, expensive paper bindings, and expensive visual or other presentation aids are neither necessary nor desired. Conciseness is desirable.

4. Proposal Submission

Proposals shall be submitted in two separate parts. Part I shall consist of the technical and management submittal of the proposed work. Part II shall consist of complete cost and pricing data. Each part of the proposal shall be completed in itself in order that the evaluation of both parts can be accomplished concurrently, and the evaluation of the technical and management submittal can be made strictly on the basis of its merit.

Proposers shall submit eight (8) copies of Part I and two (2) copies of Part II.

Part I: Proposal Content and Outline

Section 1:

General Discussion -- The contractor is directed to each specific RFP for guidance on general discussion issues.

Section 2:

- (a) Approach and Tasks -- Indicate the approach to be used and describe the tasks required to accomplish the objectives of the project, indicating the principal milestones, tasks or sequence of events. Include a detailed statement of work describing what will be done. The offeror may base the statement of work on these tasks, and elaborate on them, or may modify or alter them if it feels its ideas to be more appropriate for the realization of the stated goals. The Center wants to allow maximum flexibility for the ideas, initiatives and creativity of the proposer. The offeror must fully explain and justify the approach if significant departures from the model statement of work are recommended.
- (b) Organization and Effort -- Include an organizational chart for the project showing the names of the project staff. Describe the effort contributed by each of the key personnel to each task and include an estimate of total effort hours for each task. If the contractor feels that some other organization could more effectively perform some of the tasks, it is encouraged to subcontract for these tasks. If such consultants, advisors, or subcontractors are to be used, explain the specific need for said expertise, describe the arrangements, and include resumes for key personnel. Provide a staffing plan detailing how project personnel shall be phased into the effort.

Note: Any subcontract above \$10,000 must have prior approval from the Center.

- (c) Prior and Current Experience -- The performance of these projects requires a mixture of skills. The appropriate skill and related experiences of your organization should be specified. Include a list of projects currently in progress and completed within the last three years which are relevant to the type of project effort proposed. Include names, addresses, and telephone numbers of contact points with these clients. The Center reserves the right to request information from any source so named.

Part II: Cost and Contract

At a minimum, the cost proposal shall contain the information specified below:

- (a) GSA Optional Form 60 -- this is a mandatory requirement and is to be completed by the offerer and any subcontractor. The GSA Optional Form 60 shall be completed for the total project in accordance with the general instructions and footnotes of that form.

Items that should be included, if applicable, are the labor mix, labor hours, labor rates, overhead bases and rates, escalation rates, list of materials/equipment, and quantities, consultants and their daily rate, travel and per diem rates, etc., for each participant.

Also, state the period of performance on the Optional Form 60.

If the offeror or any proposed subcontractor includes the use of an indirect expense rate (overhead and/or G&A) that has not been approved by a cognizant federal audit agency, then the proposer shall attach to the Optional Form 60 an indirect cost proposal. As applicable, the indirect cost proposal shall include major expense groupings for the base and pool line item and dollar amount. This information shall be furnished for the most recently completed fiscal year, and budget estimates for each subsequent fiscal year that covers the period of performance. Also, state at the bottom of the proposal the inclusive dates of the fiscal year.

- (b) Financial Statement -- The offeror shall provide a current financial statement that includes a balance sheet, profit and loss statement and source and use of funds statements.

- (c) Joint Ventures/Teaming Arrangements -- If a joint venture or teaming arrangement is proposed, the offeror shall clearly identify which cost elements pertain to each participant on the GAS Optional Form 50 and/or supporting schedules.

(d) Signature

The proposal shall be signed by an official authorized to bind the offeror, and shall contain a statement to the effect that the proposal is a firm offer for a 90-day (or more) period. The proposal shall also provide the following information:

Name, title, address, and telephone number of individual(s) with authority to negotiate and contractually bind the company and who may be contacted during a period of proposal evaluation.

- (e) Responsible Prospective Contractors -- Contracts will be awarded only to responsible contractors. In order to qualify as responsible, a prospective contractor must, in the opinion of the Manager of Contracts, meet the following standards as they relate to this Request for Proposal:

- * Have adequate financial resources for performance, or have the ability to obtain such resources as required during performance.
- * Have the necessary experience, organization, technical qualifications, skills, and facilities or have the ability to obtain them (including subcontractor arrangements).
- * Be able to comply with the proposed or required time of delivery or performance schedule.
- * Have a satisfactory record of performance.
- * Be otherwise qualified and eligible to receive an award under applicable laws and regulations.

5. Effort Level

The total effort level for this solicitation is estimated at not more than twelve (12) months.

6. Contract Award

The Center may award a contract, based on initial offers received without discussion or after limited discussions or negotiations of such offers.

Accordingly, each offer should be submitted on the most favorable terms possible from a cost and technical standpoint. However, The Center reserves the right to request additional data, or oral discussions or presentation, in support of written proposals.

The Center intends to evaluate proposals within four weeks of the closing date of the RFP. Award will be made to that/those responsible offer(s), whose offer(s) conforming to this Request for Proposal is considered most advantageous to the Center, considering the evaluation criteria contained in the following section of this solicitation.

7. Evaluation of Factors for Award

1. Experience in wood boiler emissions testing
2. Technical report writing experience, clarity
3. Clarity of proposal
4. Reasonableness of budget

E. Reporting Requirements

The contractor shall provide to the Center and CCC interim reports (at least every three months) and one Final Report. In addition to detailing the activities and program during each quarter, any difficulties encountered should also be cited. The purpose of the interim reports is both to keep the project managers informed and to aid the contractor in measuring progress toward the goals and deliverables of each project.

The Final Report shall contain all deliverables and be presented in a concise and readable manner suitable to a variety of audiences. Final documents must be submitted to the Center both in hard copy (printed) and on computer diskette. A final accounting of program expenditures will also be required.

Contractors should anticipate on-site visits from project management personnel, especially when field studies are being conducted or conferences sponsored. The contractor should be prepared to attend regional meetings and discuss the progress of the project, upon request of project management.

APPENDIX B: CONTRACT PRICING PROPOSAL FORM

Please review this RFP. To enable us to update our Source Lists, please complete the information below and mail to the address shown below, by the earliest practical date.

_____ We intend to submit a proposal.

_____ While we wish to remain on your Source List, we do not intend to submit a proposal for the following reason(s):

_____ We wish to have our name deleted from your Source List.

Name of Firm or Organization: _____

Mailing Address (incl. zip code): _____

Authorized Signature

Type or Print Name and Title

Date

RFP Project Title(s)

Please mail to:

**Steve Morgan
Citizens Conservation Corporation
530 Atlantic Avenue
Boston, MA 02210**

NOTICE OF GRANT AVAILABILITY

TITLE: Northeast Regional Biomass Program (NRBP) State Grants Program

ELIGIBLE GRANTEES: State agencies of the following eleven states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont.

PROGRAM DESCRIPTION: This is the twelfth year of an ongoing program designed to increase biomass energy development and use in the Northeast. The state grant component of the NRBP program is aimed at improving state agency coordination and strengthening state capabilities with regard to biomass energy development. Specific activities which may be undertaken include: information dissemination; state agency planning and coordination; technical assistance; and research, development, and demonstration projects designed to expand biomass energy use in the state.

DEADLINE FOR PROPOSAL: November 18, 1994

STATE GRANT AMOUNT: Up to \$30,000, subject to state in-kind match equal to 50 percent of the grant amount.

PERIOD OF PERFORMANCE: 12 Months

SUBMIT PROPOSAL TO: CONEG Policy Research Center, Inc.
400 North Capitol Street, NW, Suite 382
Washington, D.C. 20001

NUMBER OF COPIES: 1 Original and 2 Copies

FOR FURTHER INFORMATION CONTACT: Rick Handley
CONEG Policy Research Center
(202) 624-8454

INTRODUCTION

The Coalition of Northeastern Governors Policy Research Center, contingent on authorization of funds from the U.S. Department of Energy, New York Support Office, will be continuing for a twelfth year a program that includes sponsorship of activities designed to support expanded biomass energy programs primarily in four general areas: regulatory and policy impacts on biomass development; conversion assistance; resource availability and use assessments; and technical information development and dissemination.

In each state, the Northeast Regional Biomass Program has provided support for building a constructive, on-going relationship among state agencies. Unlike other energy sources, biomass development often requires the involvement of several agencies and jurisdictions. Therefore, the centerpiece of the state grants program will continue to be interagency cooperation within the appropriate state offices (i.e. energy, agricultural/forestry, economic development, and environmental).

Each of the eleven states participating in the NRBP have previously put together imaginative proposals that address state-specific concerns. The projects mainly focused on the direct combustion of wood residues due to the universal availability and quantity of this biomass feedstock, and the commercial viability of existing technology. The NRBP will continue to promote the direct combustion of wood, however, where it is appropriate, states are encouraged to examine additional opportunities to address barriers to the greater use of other biomass energy sources including waste-to-energy, liquid fuels from biomass, co-firing biomass with conventional energy sources, and development of energy crops.

PROGRAM DESCRIPTION

The state grants program constitutes approximately one half of the Northeast Regional Biomass Program. The other component are applied research and technology transfer activities.

The technical portion of the NRBP will continue to be designed to complement the efforts of the state activities. Every opportunity will be provided for state agency staff to take advantage of the applied research and technology transfer activities and the information gained therefrom.

STATE GRANT PROGRAM OBJECTIVES

The goal of the state grant program is to expand/improve the capability within states to promote and develop biomass energy resources. Specific objectives for this program include:

- Improve the effectiveness, coordination and planning capability among local, state, and federal agencies that promote or have oversight over biomass development.
- Provide reliable, objective information to consumers and public agencies regarding the economic and environmental impacts, safety requirements, efficiency, and versatility of biomass energy use.
- Identify the environmental impacts (positive and/or negative) associated with all phases (production, collection, conversion) of biomass development.

STATEMENT OF WORK

Funding of each state program will be provided at a level of up to \$30,000 for a period of 12 months. Additional funding will be sought beyond the FY 94 appropriations.

Beyond the requirement that the proposed program must represent a cooperative effort between state agencies, projects should respond to a demonstrated state need. Legitimate uses of project funds include hiring or retaining a staff person to serve as liaison between agencies or funding specific research, development or demonstration projects. Information transfer, including the use of public media, should be a key component of any program. Likewise, involvement of other states, federal agencies, universities, private industry groups, and trade associations, to increase the resources and expand the reach of the program will strengthen the application.

PROCESS FOR EVALUATING PROPOSALS

State grant proposals will be reviewed by CONEG staff and the technical coordinator for the Northeast Regional Biomass Program (NRBP). Proposals will be evaluated according to their degree of impact on the overall goals of the Northeast Regional Biomass Program. Specific criteria include the following:

Institutional Coordination

- Cooperation between state energy, forestry and other appropriate agencies in the design and implementation of the program.
- Potential to involve other states, federal agencies, private organizations, institutions and associations as participants in the program.

- Likelihood of improving private sector, state agency, interstate and local government involvement in biomass energy issues.
- Beneficial impact on government rules and regulations.

State Impact

- Number of individuals, industries, and institutions reached.
- Amount of imported fossil fuels displaced with biomass resources.
- Amount of economic impact e.g. jobs created or retained as a result of the biomass grant.

APPLICATION INSTRUCTIONS

Applications should be coordinated between appropriate state offices, and submitted by the Governor. Agencies should work together to assess state needs and determine a cooperative program designed to meet those needs. The final proposal should not exceed ten pages and should contain the following components:

- I. A cover letter of transmittal, signed by the Governor
- II. A one-page summary of the proposed project
- III. A narrative proposal with the following components:
 - A. Problem Statement
 1. statement of general and specific biomass related issues and needs; and
 2. a summary of prior year projects under the NRBP and other biomass energy-related work.
 - B. Statement of Work

Note: Information requested in items 1 and 2 should be arranged in the form of tasks as contained in the previous years contract.

1. Objectives--A description of the goals and measurable impacts of the grant program.
2. Strategies--An outline of the methods and approaches to be used to achieve the stated objectives.

3. Project Description--A description of the program structure and the day-to-day operations and activities.
 4. Implementation Plan--An outline of the project timetable, the development of interagency cooperation and the relationship to current agency programs.
 5. Relation to Previous State Programs--The grant funds may be used to fund existing biomass development programs and activities only if the state clearly demonstrates that continued funding is necessary to meet a critical state need.
 6. Relation to Prior Year NRBP Projects--A description of how this year relates to the prior year project.
 7. Schedule--The proposed timeline for completion of project activities, including key milestones in the project's development.
 8. Participants--Identify participating state agencies and staff names if available.
 9. Project Management--Describe the program management structure including the names and titles of key personnel.
 10. Deliverables--Indicate program products e.g., seminars, training materials, publications, research reports etc. Products must include three quarterly progress reports and a final project report.
- C. Budget proposal narrative discussion of budget proposal including a detailed description of state in-kind match.

IV. Cost proposal using OMB Optional Form 60 (see Attachment A). The project budget must include auditable in-kind contribution equalling 50 percent of the grant award (i.e. one-third of the total project budget). The matching funds may not be borne by another Federal grant, contract or other Federal government funds. However, general revenue sharing funds under 31 U.S.C. 1212 are not considered a Federal grant. Source of in-kind contributions must be identified in the cost proposal.

FREEDOM OF INFORMATION NOTIFICATION (FOIA)

Please be advised that applications submitted in response to this solicitation are subject to disclosure under the Freedom of Information act (FOIA). To assist the Department of Energy in determining whether or not to release information contained in an application in the event an FOIA request is received, applicants may, through clear earmarking or otherwise, indicate those portions of their applications which they believe should not be disclosed. While an applicant's advice will be considered by the Department of Energy in its determination whether to release requested information or not, it must be emphasized that the Department is required by the FOIA to make an independent evaluation as to the release of all information requested, and that accordingly, information may be released notwithstanding the applicant's views.

Attachments: A--OMB Optional Form 60

Attracting an Ethanol Plant to the Northeast: A Liquid Fuels Roundtable

Bradley Field, Hartford Ct.
Thursday, September 22, 1994
10 AM- 4:30 PM

Preliminary Agenda

- 9:30 -9:45 *Welcome:* Alan Johanson, Office of Policy and Management
Anne Stubbs, CONEG Policy Research Center
- 9:45-10:30 *Resource Assessment:* Christine Donovan, C. T. Donovan Associates
- 10:30-10:45 Break
- 10:45 - 11:15 *Harnessing the Waste Stream:* Wood Waste/Mixed Waste Paper Hauler
to be named (suggestion from Donovan)
- 11:15 -Noon *Addressing the Air Regulations:* Michael Bradley, NESCAUM
- Noon - 1 PM Lunch
"Siting an Ethanol Plant:Damn the Torpedos, the Albanian Experience"
Rick Handley, CONEG Policy Research Center, Luncheon Speaker
- 1-1:45 *Economic Development and Financing Assistance from the States:*
Speaker CONEG will supply
- 1:45-2:30 *Ethanol Technologies Update:* NREL will supply
- 2:30-2:45 Break
- 2:45-3:15 *Markets for Ethanol:* NREL or DOE to supply
- 3:15-4:30 *Where do we go from here:* Facilitated Discussion
(or panel with all day's speakers)

September 1, 1994

2~ 1~
3?~
4?~
5?~
6?~
7~, 8~ 9~

Dear Mr. 1~:

We invite your attendance and participation at our Wednesday October 12, 1994 forum, "Siting an Ethanol Plant in the Northeast", to be held at New England Air Museum, Bradley Field, Hartford, Connecticut from 9:30 AM to 5 PM. The goal of the forum is the identification of barriers and prospective strategies for the siting of one or more biomass-to-ethanol plants in the region during the next eighteen months. The forum's cosponsors, the National Renewable Energy Laboratory and the Northeast Regional Biomass Program, are committed to bringing together all of the prospective parties which can make the construction of an ethanol plant happen in the Northeast.

The target audience for the forum is developers. However representatives of important stakeholder groups such as: waste haulers, landfill operators, pulp and paper companies, air and solid waste regulators, state economic development and energy officials, researchers, public fleet managers, auto company representatives, oil companies, and investors will be present and provide input to the process. We anticipate between 75 and 85 attendees.

Several factors have prompted the cosponsors to convene the forum at this time: increasing costs associated with the disposal of biomass wastes; environmental and energy regulations encouraging reformulated gasoline, fuel extenders, oxygenated fuels and other alternative transportation fuels; the potential economic benefits for the Northeast arising from the development of indigenous-renewable fuels; and the desirability of providing additional fuel choices for alternatively fueled vehicles.

The Northeast Regional Biomass Program's release of a new report, "A Resource Assessment for Ethanol in the Northeast," provides an initial focus for the forum.

As the attached agenda reflects, the forum considers the following issues:

- * the candidate feedstocks, their short and long term availability and costs--among these include urban woody wastes, waste paper, paper sludge, food wastes, cheese whey, and forest product residues;

* the Clean Air Act Amendments, Energy Policy Act of 1992, and other environmental regulations which provide economic incentives for alternative fuels, including biomass-to-ethanol;

* the salient environmental and energy regulations and their relationship with market development and with the siting of an ethanol plant in the Northeastern states;

* the potential for an economic win win scenario for developers of biomass-to-ethanol facilities and the Northeast states;

* an update on conversion technologies; and

* potential markets for ethanol in the region.

The concluding panel will consider any other issues participants raise which may affect the successful siting of an ethanol plant. The forum will also be charged with generating an agenda for the Northeast Regional Biomass Program and NREL to consider for allocating their resources in the months ahead.

There will be no fees for participants at the Forum and lunch will be provided. Please return the attached reservation by mail or FAX. We look forward to seeing you on October 12th.

Sincerely yours,

Rick Handley
Program Manager, NRBP

Attachment

Michael Annarummo
Director
Department of Environmental
Mgmt.
8 Hayes Street
Providence, RI 02908-5003

Denise Lord
Deputy Director
Maine Waste Management
State House Station 134
Augusta, ME 04333

Carmine DiBattista
Director, Department of
Environmental Protection
State of Connecticut, Waste
Mgmt.
Bureau, Planning & Standards
Div.
165 Capitol Avenue
Hartford, CT 06106

Mark Kapner
Manager, Conservation &
Alternative
Energy Research & Development
New York Power Authority
1633 Broadway
New York, NY 10019

Trish Richmond
A.E. Staley Manufacturing Co.
P.O. Box 151
Decatur, IL 62525

Patrick Mohan
A.E. Staley Manufacturing Co.
P.O. Box 151
Decatur, IL 62525

Ting Carlson
Cargill
P.O. Box 9300
Minneapolis, MN 55440

Stephen McCurry
Cargill
P.O. Box 3300
Minneapolis, MN 55440

Loren Luppas
Cargill
1 Cargill Drive
Eddyville, IA 52553

Rodger Chieffalo
CES
1 Perimeter Park S - #325N
Birmingham, AL 35243

Richard Piela
Champion Paper
One Champion Plaza
Stamford, CT 06921

Thor Jackola
Great Plains Ingredients Co.
P.O. Box 1466
Great Falls, MT 59403

Rob McKeown
Heartland Grain Fuels LP
3601 Brown County 12W
Aberdeen, SD 57401

Ralph Sapko
John Brown
300 S. Riverside Plaza
#1100
Chicago, IL 60606

Ken Johnson
John Brown
300 S. Riverside Plaza #1100
Chicago, IL 60606

Richard Jurgenson
Minnesota Corn Processors
400 W. Main St. #201
Marshall, MN 56258

David McCombs
Monsanto
P.O. Box 14547
St. Louis, MO 63178

Larry Russo
New Energy/Indiana
3201 W. Calvert
South Bend, IN 46680

Tom Barry
Division of Air Resources
RI Dept. of Env. Protection
191 Promenade Street
Providence, RI 02908

Jane Lincoln
Deputy Commissioner
Maine Dept. of Transportation
State House Station #16
Augusta, ME 04333

Dr. Berry Goodell
College of Natural Resources,
Forestry, and Agriculture
University of Maine
Orono, ME 04469

Dr. Norman Smith
Dean
College of Engineering
University of Maine
Orono, ME 04469

Peter Lammert
Utilization Forester
Maine Forest Service
State House
Station 22
Augusta, ME 04333

Dr. Bill Seekins
Economist
Maine Dept. of Agriculture and
Rural Resources
State House Station 28
Augusta, ME 04333

Mark Carver
Vice President
Business Development
Arkenol, Inc.
23046 Avenida de la Carlota
Suite 400
Laguna Hills, CA 92653

Robert Walker
Alternative Feedstock
Development
AMOCO Corp.
MS E-2G
P.O. Box 3011
Naperville, IL 60566-7011

Frederick E. Becker, Director
Energy Technology
Tecogen, Inc.
45 First Avenue
P.O. Box 3995
Waltham, MA 02254-3995

Dr. Steven Fitzpatrick
Biofine, Inc.
70 Walnut Street
Wellsley, MA 02181

Dr. David Brink
Forest Products Laboratory
Univ. of California at Berkeley
1301 S. 46th St.
Richmond, CA 94804

Julia Delain
President
Biofuels America!
RD 1 Box 19
Westerlo, NY 12193-9801

Jeff Beller
Director
Biofuels America!
RD 1 Box 19
Westerlo, NY 12193

Ronald Buchter
Chairman
Power Alcohol, Inc.
P.O. Box 233
New York, NY 10101-0233

P.J. (Paul) Dinner, P.E.
Program Manager, Alternate
Energy
Supply
Ontario Hydro
800 Kipling Avenue, KR163
Toronto
Ontario CANADA, M8Z 5S4

Ronald Harvey
Principal Economist
Chief Technical Services
Section
Bureau of Energy & Radiation
NYS Dept. of Environmental
Conserv.
50 Wolf Road
Albany, NY 12233-0001

T. Jack Huggins
President & CEO
Pekins Energy Company
P.O. Box 10
1300 S. 2nd Street
Pekin, IL 61554

Dr. Duane Burau
Kraft General Foods, Inc.
Kraft Court
Glenview, IL 60025

Ed Corlew
Manager, Environmental Health &
Safety

Scott Paper
1 Eddy Street
Ft. Edward
NY, 12 12823

Dixon Brandt
Senior Principal Environmental
Engineer
Stone and Webster
246 Summer Street
Boston, MA 02107

Anne Dillenbeck
New York City Dept. of
Sanitation
125 Worth St., Room 722
New York, NY 10013

Jeffrey Gatto
Bionol Corporation
101 Derby Street
Suite 202
Hingham, MA 02403

Erik G. Funegard
Business Evaluation Consultant
Amoco Corporation
Mail Station E-2G
P.O. Box 3011
Naperville, IL 60566-7011

Dr. John Hanlin
Manager, Microbiology
Campbell Soup Company
Camden, NJ 08101-768

James Heptinstall
Project Manager
N.Amer. Manufacturing Strategy
Team
Rhône-Poulenc Inc.
CN 7500
Cranbury, NJ 08512

Dr. Richard Holsten
Director of Research
Cornell University
130 Biotechnology Building
Ithaca, NY 14853-2703

Dr. James Gaddy
Biomass Research Center
Highway 112
P.O. Box 3682
Fayetteville, AR 72702

Tim Fowler
Senior Scientist
Genencor International, Inc.
1700 Lexington Avenue
Rochester, NY 14652-3605

Tom Getz
Waste Treatment/Composting
Anheuser-Busch, Inc.
P.O. Box 200
Baldwinsville, NY 13039

Dr. William Jewell
Department of Agricultural and
Biological Engineering
Cornell University
Riley-Robb Hall
Ithaca, NY 14853

Dr. Roger H. Kottke
QO Chemicals
P.O. Box 8035
Memphis, TN 38108

Dr. Lee Lynd
Assistant Professor of
Engineering/
Adjunct Professor of Biology
Dartmouth College
Thayer School of Engineering
8000 Cummings Hall
Hanover, NH 03755-8000

Mark Loch
Technical Director
Ecochem
3501 Silverside Road
Naamans Building, Suite 100
Wilmington, DE 19810

Angus Macdonald
Macdonald and Associates
One Davol Square
Suite 103
Providence, RI 02903

Chip Marslan
Biofine, Inc.
70 Walnut Street
Wellesley, MA 02181

Dr. Donna Johnson
Program Director
Interchem Environmental, Inc.
9135 Barton
Overland Park, KS 66214

Jim Kearney
Bristol-Myers Squibb Company
P.O. Box 4755
Syracuse, NY 13221-4755

John Lewyta
Champion International, Corp.
Technology Center
West Nyack Road
West Nyack, NY 10994

Dr. David A. Lowe
Associate Director
Biotech Development Labs
Bristol-Myers Squibb Company
Bio/Chem Division
P.O. Box 4755
Syracuse, NY 13211-4755

Joanne March
NYS Dept. of Environmental
Conserv.
615 Erie Blvd.
Syracuse, NY 13204-2400

Parker D. Mathusa
Program Director
NYS Energy Research and
Development
Authority
3 Rockefeller Plaza
Albany, NY 12223-9998

Radmila Miletich
Assembly Energy Committee
Program and Counsel
The Capitol
Room 526
Albany, NY 12248

Dr. Karl J. Sanford
VP, Research and Development
Genencor International, Inc.
1700 Lexington Avenue
Rochester, NY 14652-3605

Gary Striar
Office of Policy and Program
Analysis
Dept. of Environmental
Conservation
50 Wolf Road
Albany, NY 12205

Dr. Edwin H. White
Dean of Research
SUNY College of Environmental
Science and Forestry
Syracuse, NY 13210-2778

Dr. David Winters
Friendship Dairies, Inc.
Country Road 20
Friendship, NY 14739

Dr. David Nini
Kraft General Foods
555 South Broadway
Tarrytown, NY 10591

Dr. Larry P. Walker
Associate Professor
Dept. of Agricultural and
Biological Engineering
Cornell University
Riley-Robb Hall
Ithaca, NY 14853

Richard D. Williams
Manager, Environmental Quality
Agway, Inc.
P.O. Box 4933
Syracuse, NY 13221-4933

F. James Wound
Director, Environmental Safety
&
Industrial Health
Bristol-Myers Squibb Company
P.O. Box 4755
Syracuse, NY 13221-4755

Siting an Ethanol Plant in the Northeast
FAX EARLY RESPONSE SHEET
Please respond by September 15

TO: Rick Handley, CONEG Policy Research Center, Inc.
FAX # (202) 624-8463

FROM:

(Name) _____ Title, Organization) _____
FAX: (_____ PHONE: (_____) _____

Check one: ☐ YES, I AM INTERESTED IN ATTENDING THE FORUM.
☐ I cannot attend, but would like to be kept on the mailing list.
☐ NO, I am not interested in the topic of biomass-to-ethanol.

The following people from my organization are interested in participating in the forum, if space is available:

Name(s):

Title/Position: Phone:

_____	_____	_____
_____	_____	_____

Please indicate 1 (most) to 5 (least) which of the following topics are most important to you. In the space below each topic, briefly mention the issue or issues of greatest pertinence to you.

- () Feedstocks - availability and cost
- () Economic Impacts - the "win win" potential for development
- () Technology Update/Economics of Biomass-to-Ethanol
- () Markets - the potential for ethanol in the Northeast
- () Other

Other items you would like to see on the agenda? Please fax an additional sheet if necessary.
A response by September 15 will give us time to ensure that the forum panelists and agenda reflect your needs and concerns.

Attracting an Ethanol Plant to the Northeast:
A Liquid Fuels Forum

Brady Field, Hartford Ct.
Wednesday, October 12, 1994

DRAFT AGENDA

- 8:30-9:30 Registration and Continental Breakfast
- 9:30 -9:45 Welcome:
Rick Handley, Northeast Regional Biomass Program
David Lavine, Connecticut Office of Policy and Management
John Ferrell, U.S. Department of Energy
- 9:45-10:00 The Day's Agenda:
Barry Lawson, Forum Moderator
- 10:00-10:45 Resource Assessment - Available Feedstock:
Christine Donovan, C. T. Donovan Associates
- 10:45-11:00 Break
- 11:00-12:00 Harnessing the Waste Stream - Short and Long-term Availability and Cost:
Urban wood wastes: Richard Wills, Stapleton Recycling (invited)
Wood residues: State Utilization Forester, TBD
Impact of Recycling laws: State Recycling Coordinator, TBD
Paper sludge: AFPA Spokesman, (invited)
Impact on landfills: Landfill Operator, TBD
- 12:00-1:00 Lunch (provided)
- 1:00-1:30 Technology Update/Economics of Biomass-to-Ethanol:
Norm Hinman, National Renewable Energy Lab
- 1:30-2:00 Economic Impacts - The "Win Win" Potential for Development:
Joel Gordes, Connecticut Office of Policy and Management (invited)
- 2:00-2:45 Markets - The Potential for Ethanol in the Northeast:
A panel discussion of the potential markets for ethanol in the Northeast.
- 2:45- 3:00 Break
- 3:45-5:00 Where do we go from here: Facilitated Discussion
Development of an action plan for the Northeast

Governors' Biomass Round Table

New York, New York
Draft Meeting Summary
September 13, 1994

Meeting Overview

The third meeting of the Governors' Biomass Round Table began at 10:00 AM on September 13, 1994. (See Attachment A for a list of participants). The facilitator, Abby Arnold, stated that the purpose of the meeting was to evaluate progress on subcommittee efforts on the findings report. After reviewing the proposed agenda (Attachment B), the participants decided to adjust the schedule to allow for feedback on the outlines of report sections before meeting in subcommittees. Upon hearing initial comments on findings report sections, the subcommittees met over lunch to further develop their ideas for each section. The groups then returned to plenary to discuss their plans and solicit the help of other Round Table members on specific tasks.

Comments on Proposed Findings Report Sections

Background. Richard Sedano and Garry Brown briefly summarized the objectives of the background section. This section will distill the driving forces that led to the formation of the Round Table. It will then focus on the biomass resource by defining the resource and describing some of its current and potential uses and benefits. The background section will provide the reader with the highlights of the report in the same fashion as an expanded Executive Summary. They suggested that it will also include a series of side-bar narratives to illustrate actual biomass energy scenarios.

During discussion, one participant suggested that in addition to the role biomass resources can play in carbon sequestration, the report ought to mention other possible carbon pathways if the resource is not burned as fuel (such as standing wood, residues in landfills, etc.). The participant noted that no methodology has been agreed upon for quantifying carbon mass balances but that even a crude analysis could prove illustrative. The participant offered to see whether carbon mass balance analyses she was familiar with could be released to the Round Table. The facilitator suggested that this issue be specifically discussed at the next meeting.

Another participant asked that the background section more equally balance discussion of the environmental benefits with the environmental concerns raised by biomass. The participant felt that some of the environmental concerns raised in the draft challenges section should first be mentioned in the background section and that the environmental concerns not be treated lightly.

In reference to the benefits provided by biomass, another participant pointed out that almost all the benefits identified had to do with the rural sector. In order to be compelling to the governors, the participant suggested that the report identify those benefits accruing to urban sectors as well.

Participants then discussed the influence biomass energy would have on job creation and retention in the Northeast. A few participants speculated that because biomass plants tend to be smaller, more numerous, and well-distributed, new construction jobs would be created. Some data suggests that biomass creates more jobs/kilowatt hour of energy than other energy sources. But other participants cautioned that the Round Table should not overpromote this suggestion without specific substantiation. Participants agreed that the reference to job creation may be most appropriate when discussing likely local impacts of biomass energy.

Finally, recognizing that the Northeastern region is the most urban region in the U.S., participants discussed how the report should address urban wood and waste streams. One participant suggested that the Round Table could usefully characterize the urban biomass resource, outline the variety of management and disposal options (including waste-to-energy) of urban waste, and set out the types of issues that need to be addressed and resolved. Another participant suggested that rather than focus on waste vs. non-waste materials, the emphasis should be on virgin vs. non-virgin materials. A second participant suggested that the concept of residues rather than wastes also be flushed out. Participants agreed that these topics merit further discussion by the Round Table. To facilitate the process, Ralph Overend of NREL volunteered to craft language addressing urban biomass resources for consideration by the Round Table. It was recognized that once the text is drafted it could then be decided where in the report it would be most appropriate.

After the subcommittee meeting, the following needs were identified along with participants who could help address the need:

- | | |
|--|-----------------------------------|
| • Benefits of biomass to urban areas | Jeff Peterson |
| • Anecdotes for background side-bars | Charles Cary
Christine Donovan |
| • Contribution of biomass to environment | Jim Cook |

Challenges. Members of the subcommittee who drafted the challenges section remarked that after seeing the other sections of the report, they would be in a better position to address the needs and interests of CONEG and the state agencies in this section. In order to provide the subcommittee with guidance for this section, participants discussed the purpose of the document and its likely audience.

Biomass energy tends to provide small benefits to a large number of people and interest groups. As a consequence, in general no single constituency strongly advocates for its development. In addition, biomass energy requires local governments with the ability to coordinate the activities of diverse agencies to take an interest in promoting it. Participants agreed that this section could usefully note these major barriers to biomass energy development and make a few recommendations for overcoming them.

After meeting, the subcommittee members said in their next draft they will further describe the challenges/barriers to biomass energy development as distinguished by energy type (thermal, power generation, and liquid fuels). They will then try to indicate the opportunity with the greatest potential in the short term. The focus will be placed on those barriers that can be addressed at the gubernatorial or state level and the specific strategies to address those barriers. Examples of barriers suggested included public/regulatory perceptions, economics of biomass projects, lack of agreement about which residues are environmentally acceptable as feedstocks, and lack of agreement and policies on how to insure sustainable forest harvesting practices.

The subcommittee asked that Round Table participants provide them with examples of other barriers to biomass energy other than the ones listed in their first draft. They also asked that participants give them specific strategies that they think should be mentioned in this section of the report.

Economics. Mike Tennis characterized the economics section as a summary of the cost of biomass in comparison to other resources. This requires an explanation for why biomass tends to cost more on a kilowatt hour basis than other fuels, why it is hard for biomass to compete in the current energy market, and what issues lie within the purview of governors that could make the costs competitive.

Pointing out that the cost of biomass depends on a variety of circumstances that may well change in the near future, one participant suggested that the comparison may actually favor biomass under scenarios that consider other factors, such as the Ozone Transport Commission. Several participants felt that although a number of values provided by biomass are not reflected in the market (externalities), it would be more effective to focus on the costs. In general, participants felt that quantitative comparisons of biofuels to other resources would be illuminating.

After meeting, the economics subcommittee said they would focus on biomass in thermal use and electricity production (with some analysis on gaseous and liquid fuels as well) in an effort to define the competitive positions of biomass. The subcommittee predicted that thermal use would be the most cost-effective use in today's market. Recognizing that the analyses could be highly technical, the subcommittee said they would balance the complexity of the information to be presented with keeping the material accessible to lay persons. One subcommittee member raised the concern that it might be difficult from both a technical and political standpoint to estimate the costs of waste wood. Therefore, the section would likely focus on "clean" biomass.

Participants also discussed whether the economic analysis should be framed in the current situation or a future expected marketplace. This question presented a dilemma: on the one hand, the energy market is currently in a high state of flux given likely changes in the electric industry so analysis confined to the current situation may not be valid for long; on the other hand, energy prices are notoriously difficult to predict, so future projections tend to involve a high degree of uncertainty. Some participants felt that the best approach would be to conceptually define a set of future scenarios and recommend policies that would make sense across all of them. Noting that governors want to both deal with current problems but also enjoy opportunities for innovative solutions (if not too risky), participants agreed that the economics section should provide a snapshot of the current situation, describe what the future might look like, and provide some recommendations as to what governors could do.

The following needs were identified by the subcommittee along with participants who could help address the need:

- | | |
|---|--|
| • Cost of SO ₂ and NO _x credits | Ed Neuhauser |
| • Analysis of employment impacts of biomass | Garry Brown
Jeff Peterson
Rick Handley |
| • Costs of biomass fuels | Rick Handley
Charles Cary
Steven Anderson |
| • NE Pool information on avoided costs | Rich Sedano |
| • Conceptual future energy market scenarios | Steven Anderson
Jan Beyea
Mike Tennis
Barbara Brenner
Ed Neuhauser |
| • Current cost and supply estimates for non-woody urban waste streams | Rick Handley
Christine Donovan |

Other Subcommittees. Two other subcommittees reported on their efforts:

Potential. Ralph Overend showed the Round Table preliminary GIS analyses of data on the status and potential of the biomass resource in the Northeast region. He said that NREL will provide CONEG with data, tables, maps and text for this section by the November meeting.

Forest Management. Jan Beyea reported that the forest subcommittee would work to draft an outline for the findings report by the next meeting. This subcommittee plans to try and define the current status, identify the barriers that may be posed to harvesting biomass from forests and some of the major issues related to reaching consensus on the use of forest resources.

Schedule

Round Table members agreed that the next meeting, to review and refine report section drafts, would be held at CONEG, 400 N. Capitol Street, Washington D.C. on November 1-2, 1994. Subcommittees will deliver drafts of their sections to CONEG by October 24. CONEG will send complete packets to the Round Table members by overnight mail on October 27. Participants also agreed that the December 13-14 meeting would be held in Albany, New York rather than Philadelphia.

The meeting was adjourned at 3:00 PM.

ATTACHMENT A

List of Participants

Abby Arnold	RESOLVE, Washington D.C.
Steve Anderson	International Paper Company, New York
Jan Beyea	National Audubon Society, New York
Barbara Brenner	Couch, White, Brenner, Howard & Feigenbaum, New York
Garry Brown	New York State Energy Office
Charles Cary	G & S Mill, Massachusetts
Jim Cook	National Audubon Society, New York
Dawn Dana	New York State Energy Office
Christine Donovan	C.T. Donovan Associates, Inc., Vermont
Rick Handley	CONEG, Washington D.C.
Norm Hudson	Department of Public Service, Vermont
Ed Neuhauser	Niagra Mohawk Power Corporation, New York
Ralph Overend	National Renewable Energy Lab, Colorado
Rich Sedano	Department of Public Service, Vermont
Mike Tennis	Union of Concerned Scientists, Massachusetts
Tim Wohlgenant	RESOLVE, Washington D.C.

ACCENT

24 Weston Street
Carver, MA 02330

SALES & MARKETING

Tel. (508) 866-4343
FAX (508) 866-7925

September 4, 1994

Mr. Rick Handley
CONEG
400 North Capitol Street
Suite 382
Washington, D.C. 20001

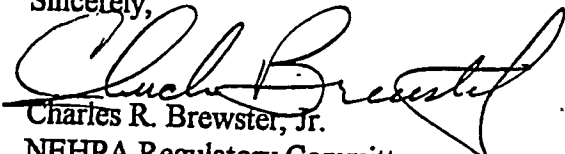
Dear Rick,

I wanted to let you know that I received the two video tapes you sent and I have forwarded them to the folks at the Pellet Fuels Institute. Perhaps CONEG and PFI can work together to produce a similar PSA oriented to pellet appliances. At the very least, perhaps PFI can help generate an appropriate handout pamphlet for regional energy offices distribution to consumers, such as Woody Keeney outlined.

I truly hope that there will be a continuing relationship between CONEG and NEHPA in the area of stove change-out programs. Last years effort, while less organized than it might have been, was a resounding success. If one conservatively estimates that the average appliance replaced emitted some fifty grams of smoke vs. an average 5 grams of smoke for the replacement unit, emissions would have been reduced by 90%. If the old appliance burned five cords of wood and the new, more efficient, unit burned three cords of wood to do the same job, the reduction in fuel consumption alone would reduce emissions by 40%. Extrapolate those reductions over the 500+ units changed out and there was a significant impact on the regional environment. I hope that the limited program NEHPA will be able to generate this season with limited resources is even half as successful. I really think a five year annual campaign organized by CONEG and NEHPA would have the most impact on the region for the least funding, if we can define a program.

Again, thanks for the tapes. If I can serve as a conduit between your office and NEHPA or PFI, please feel free to call on me.

Sincerely,


Charles R. Brewster, Jr.
NEHPA Regulatory Committee





STATE OF MAINE
EXECUTIVE DEPARTMENT
STATE PLANNING OFFICE

JOHN R. MCKERNAN, JR.
GOVERNOR

STEPHEN J. ADAMS
DIRECTOR

MEMORANDUM

May 2, 1994

To: Pellet Conference Steering Committee Members

From: Jim Connors, Coordinator JFC

Re: Progress Report

A lot of progress has been made in planning and organizing the regional wood fuel pellet conference. Since I have been working with each of you separately it is time to bring you all up to date on conference details.

Conference Brochure

With Woody's able help a conference brochure has been prepared and printed by the State of Maine's print shop. A copy of the finished product is enclosed.

Mailing of the brochure will commence this week. Each of you has been helpful in securing lists, identifying target audiences, and/or offering to mail the brochure. Enclosed is a listing of mailing lists, publications, newsletters, organizations, etc. that we will be using or notifying. If you have any additions please let me know.

Conference Program

The brochure contains a general program outline. A more detailed program, with speakers and topic descriptions is enclosed. I expect a lot of requests for more program details, which this document should provide. But, there are still some program details pending, and I will need your help to fill-in and firm-up the final program.

I need immediate help with the workshop for the generalist. The enclosed workshop description needs to be reviewed and arrangements made for presenters and resources. I need your

suggestions on program content, and the people/resources to use in presenting the workshop.

Other program arrangements are underway, with most of the primary contacts made with presenters, or an indication of a need for various resources. If you have any questions or comments please call.

We have the makings of a very interesting program, that should be useful to the diverse audiences we are trying to serve. Your contributions to these efforts are invaluable.

Thanks for the help.

Encls.

Putting Pellets in Place:
The Northeast Passage

June 27 and 28, 1994

Sheraton Tara Wayfarer Inn
Bedford, New Hampshire

Conference Program

Day One

10:00am Welcome

Gov. Merrill, N.H.
Gov. Dean, VT. ??

10:20am National Perspectives

Philip Badger, Program Director. Southeast Regional Biomass Program. The Pellet Industry - where it has come from, where it is, where it is going as an energy resource, industry, and business.

Jerry Whitfield, Pyro Industries, and PFI. Industry status, issues, and actions.

11:00am What's Going on in the Northeast?

User Experiences Presentation

Rex Morgan, Ex. Dir. NEHPA. Results of a preliminary user survey.

11:45am LUNCH

1:00pm. Marketing Perspective Presentation

Elton Bates, Lignetics Inc. Pellet Markets in the Northeast.

1:30pm. Hearth Products Retail Panel

Six +- retailers provide status reports on pellet activities in their business/area. Good /bad. Problems/issues/concerns. Expectations.

2:30pm. BREAK

3:00pm. Stove Manufacturers Panel

Representatives (six +/-) of pellet appliance makers in the region, or providing a significant supply, with a balance of technology types. Recent experience and future expectations.

4:00pm. Pellet Manufacturers Panel

Representatives of pellet makers in the region, or supplying the region. Recent experiences and future expectations.

6:30pm RECEPTION

7:15pm BANQUET

Day Two

8:00am. Workshops

Satisfaction Guaranteed: Serving the Customer.

A workshop designed for hearth products retailers, chimney sweeps, and others providing services to pellet using customers. Presentation of Hearth Products Education Foundation's new pellet certification program. Ben

Safety First

A workshop designed for fire marshalls, building inspectors, code enforcement officers, insurance adjusters, and others responsible/interested in the safe installation and operation of pellet stoves.

Good Health and the Environment

A workshop designed for people concerned about and responsible for indoor air quality, air emissions, and health and environmental impacts of burning wood for residential heating.

What's Cooking: A Recipe for Pellet Making

This workshop will provide technical, business, and marketing information about pellet production and sales. It is designed for potential and active pellet makers, and those interested in the technicalities of pellet production.

The Generalist: Pellets, Production, and Policy.

A workshop designed for energy officials, planners, and those interested in learning more about pellet production and use in general.

11:45am LUNCH

1:00pm. Panel: Regional Problems and Opportunities

Representatives of organizations involved in the production, use, and promotion of wood fuel pellets discussing pellet issues and related activities from the perspective of their organization.

Rick Handley, director, Northeast Regional Biomass Program
Chuck Brewster, past president, Northeast Hearth Products Association.

Bob Massengill, president, Pellet Fuels Institute.
???, National Hearth Products Association

2:00pm. What's next? A moderated audience discussion.

3:00pm ADJOURN

Pellet Conference Workshop
Safe Installation and Operation
of Pellet Burning Appliances

Workshop Objective

Provide essential and relevant information about the installation and operation of residential wood fuel pellet burning space heaters to fire marshalls and fire inspectors, building officials, code officers, insurance inspectors, and others responsible for public and consumer safety.

Program Elements

1. An introduction to wood fuel pellets and pellet stoves. A video presentation???
2. Operational requirements and characteristics of pellet appliances, (including pellet fuels and appliance compatibility problems).
3. What are the pertinent Codes, for installation, for certification? Who is responsible and how is the testing done?

Roles and responsibilities for certifications, installation, etc.

Testing and certification procedures and standards.

NEPA 211

ASTM E1509

4. Implementation, administration, and experience with codes and standards.

Presenters and Resources

Gary Satterfield - #2

Rick Curkeet, Warnock Hersey

Richard Ortesi-Best,

Tom Riley, MA office of building - #4

Environment and Health Workshop

Objective

To provide pertinent information to public health, environmental, air quality interests groups, and other interested people about the environmental and health impacts of pellet use.

Program

Introduction to pellets and pellet uses.

What pellets are and how they are made,

Pellet appliances,

Installation and safety standards

Comparative emission from pellet burning appliances. John C.

Impacts on indoor air quality. John C.

Results of new PM research. John C.

The potential for pellet burning in the region - near term and long term. Wood energy economist/energy planner?

The magnitude of pellet burning as an environmental problem in the future re. implementation of the Clean Air Act of 1991. American Lung guy, or EPA person?

Presenters and Resources

John Crouch

PFI programs - video presentations and resource person(s)

Harvard researchers? Joel Swartz or Doug Dockery, Harvard School of Public Health.

Ron White, American Lung association??

EPA chemist/research person dealing with wood smoke/PM issues, and other potential emissions in wood smoke. Dr. Mary Beth Smuts, EPA Boston??

Need a wood energy economist to assess the future. Ken Skog, USFS?

Pellet Conference Workshop

The Generalist: Pellets, Production, and Policy

Workshop Objective

Provide useful information about pellets, their production and use, and policy issues in the northeast to a diverse audience of energy officials, and the general public.

Workshop Program

Pellet production and use - covers manufacture and use of compressed wood pellets. Video introduction and overview.

Pellet manufacturing - critical aspects, problems, opportunities, and other considerations. Raw material supply.

Retailing pellets and pellet burning appliances - Making The Pellet Choice. Cost, availability, sales experience, future prospects. Customer needs and interests. Service training. Related services - sweeps, heating contractors, Market development and evolution.

Stove design and operation - designs, stove - pellet issues, user experience, future developments.

Safety, health, and environment - testing and certification, and installation standards. Stove performance and health/envirom. effects.

Pellets as a energy choice in the future - cost, availability, impacts. Short term - long term viability of wood fuel pellets. Energy agency or extension energy expert.

Presentors/resources

PFI videos and presentors

Pellet maker? - Barb Shine?? Averill Cook??

Retailer - Chuck Brewster? Dale Dupious?

Stove person - Vt castings ???

Safety - Environment - ???

Energy experts - Stu State? John O'good?

Brochure Mailing Lists

NEHPA - 400 copies forwarded to Rex Morgan for mailing

Pellet Forum Participants and others requesting notification of the pellet conference.

CODEWORD newsletter of the Mass. building codes officials

Northeast Building Officials Association

National Fire Protection Association, Technical Committee for Chimney, Fireplaces, and Venting Systems for Heat producing Appliances.

Product Testing Labs.

The National Underwriter Co., National Underwriter Property and Casualty/Risk and Benefits Management Edition.

American Lung Association, State and area affiliates in the northeastern states.

EPA Regional Indoor Air Coordinators, and New England Indoor Air Quality Workgroup.

Alternative Energy Retailer.

PFI Newsletter.

Pellet Topics, Association of pellet Fuel Industries

Hearth and Home Magazine

WEI-West/HPA News

Northern Logger and Timber Processor, Northeast Loggers Association, Inc.

Northeast Regional Biomass Program, Steering Committee members.

National Chimney Sweep Guild

NY State Chimney Sweep Guild News

Conservation UPDATE, State Energy Conservation Program/Energy Extension Service.

National Association of State Energy Officials

Northeastern Forest Alliance, NEFA ALERT

..
..

NESCAUM

National Association of Mutual Insurance Companies.

National Association of Fire Marshalls, Northeastern states.

Primary wood processors, wood energy people in CT.

**Governors' Biomass Round Table
Burlington, Vermont
Meeting Summary
June 14 -15, 1994**

Introduction/Overview

The Governors' Biomass Round Table is sponsored by The Northeast Regional Biomass Program, a United States Department of Energy program administered in the Northeast by the Coalition of Northeastern Governors (CONEG) Policy Research Center, Inc. The Round Table is established to examine and report to the CONEG Governors on issues, opportunities and barriers to biomass development, and presenting its findings to the CONEG Governors for possible future action.

The second meeting of the Round Table began at 11:00 am on June 14, 1994 with all participants meeting in sub-groups. The sub-groups met until 1:00 pm when participants convened in a plenary session. The first item on the agenda was a welcome by Abby Arnold and introductions of observers. AA discussed the purpose of the meeting - agreement on those issues the RT would focus on for its findings report, and a process on how to do it.

AA proposed that the RT needs to adopt criteria to identify the issues on which to focus and agree on how work would get done eg: subcommittees or the group as a whole. A question was raised, is the output or findings of the RT intended only for Governors? After a short discussion there was agreement that the primary objective was to present findings to the CONEG Governors.

AA advised the RT members that no comments have been received yet. Must be in by COB 6/15 to Rick Handley. AA stated that the meeting summary is a record of our meetings. It acts as an historical record and informs interested parties. We want to be sure that the participants ideas are captured and reported accurately. A draft meeting summary will be distributed after each meeting and distributed to the participants for review and comment. After changes are made, based on comments, the final meeting summary will be distributed to all RT members and interested parties.

Presentations

The RT had requested that it be provided information of the potential for biomass utilization in the Northeast. The presentation consisted of three parts the availability of feedstocks, the availability of conversion technologies, and the "real world" issues that can constrain or support biomass utilization.

Rick Handley distributed a report that was compiled by the NRBP's technical consultant. A copy of the full report is attached. Three tables from the report were presented and discussed as a summary. The report states that biomass accounts for 5% of the Northeast's total energy, and 95% of all renewable. Rick also reported that biomass could be expanded to four times its current usage by the year 2000 if 50% of the annual growth from the Northeast's forests were utilized. Several questions were raised on the report especially the validity timeliness of the data.

What are the assumptions about the price of competing fuels such as natural gas and oil?

Is electric production from paper industry/IPPs included?

How old is the data, does it include the total amount of fiber harvested?

There was general agreement that because of the way the data was presented and because it not current data it was not useful. The RT agreed that a more current assessment of potential will be necessary. That it will be important to show the Governors how much potential there is out there. Also the data needs to be formatted in a way that speaks to the Governors eg: potential to create jobs. A subgroup was formed to compile an updated assessment of the biomass potential for the Northeast.

Charlie Cary made a presentation on the market potential for biomass to provide process heat. There is a challenge to promoting wood energy systems, many still feel they are dirty and inefficient. Systems can be competitive especially with free "clean waste wood" fuel. Free waste wood is available in the Northeast even as far north as New Hampshire. Biomass systems can have very attractive paybacks even as low as 2 years but this message is not getting out. Two comments were made following the presentation: Care must be given to characterizing small projects as clean, thought must be given to monitoring systems that use waste wood so that the systems remain clean; and many niche opportunities exist for small projects to dispose of waste but barriers need to overcome because of public perception of the use of wastes.

Christine Donovan made a presentation on "real world" issues facing biomass development. The fact is the Northeast has a large biomass resource, but it is unclear how it can be economically used and the use of biomass for energy is declining. States are sending mixed messages, they promote biomass in their planning but not in practice.

Christine posed the following questions to the RT.

Should we support biomass?

Why?

What is the most significant barrier?

What can RT do?

The following are summary responses from the RT members.

There was general consensus that biomass should be supported but not at a cost to the environment and not through subsidies paid by a utility.

Barriers identified by the participants included:

- Lack of knowledge by potential users, policy makers;
- low cost of competing fuels;
- possible forest habitat, environmental damage;
- development of new technologies;
- economics that include cost of fuel, overcapacity of electricity, and cost of new technologies;
- the lack of political will to make the hard decisions and investments required.

Responses to the question - Why should biomass development be supported? - include:

- because renewable are important and necessary for long-term quality of life;
- because they can help mitigate global warming;
- because it can create jobs;
- because it helps to promote clean air; and
- it provides a beneficial use for some forms of solid waste.

The RT participants had these suggestions as to actions the RT could take:

- educate the public;
- make a case for biomass based on its energy, economic, and environmental benefits;
- educate from a regional perspective;
- identify the market-ready opportunities and push them;
- overcome objections through an aggressive information and promotion campaign promoting the idea of "green jobs";
- demo projects:
- promote "green pricing"; and
- give the Governors the ammunition to fight for biomass.

Subcommittee reports

Public/Private Policy

The policy subcommittee determined that because the issues surrounding biomass in the Northeast are so numerous and complex, that the subcommittee felt it needed to develop a process/framework in which it could identify the major issues/opportunities over which Governors/policy makers had influence. They first grappled with a definition of biomass as a way of limiting its focus and then formulated a matrix. The matrix attempts to determine if

there are clusters of issues could be identified and then focus attention on those issues over which Governors have influence. The policy subcommittee felt the matrix may be a benefit for other committees too in attempting to focus their efforts. The presentation of the matrix was in the form of a recommendation and not intended to restrict the other subgroups.

The key issues identified by the policy subcommittee for regional policy include:

environmental permitting especially ash disposal and waste use;
electric generation issues including the changing utility industry;
competing uses for feedstocks;
information on carbon dioxide sequestration; and
local economic development opportunities.

comments: back to a definition of biomass; is this a list of priorities if it is its good

Cost/price/value

The Cost/Price/Value subcommittee sought to identify those areas, and under what circumstances, biomass will be competitive. Biomass fuels can't compete with other fossil fuels at their current prices. However biomass has benefits that accrue but are not captured by the price. The external or "soft" costs of biomass aren't captured. There is a need to look for cost competitive niche markets for electric generation. The RT should provide guidance to the Governors on opportunities to capture these "soft" costs. The payment of environmental costs should be transferred to the beneficiaries and not borne by the biomass producers. The RT should inform Governors as to the nature of "soft" costs. The "soft" cost of biomass value to habitat. The value of fuel diversity.

A question was raised how can the external value of biomass extend across state borders?

Resources and technology

The subcommittee recommends a list of technologies and resources that need to be explained to Governors.

- the benefit from utilizing good forest management practices and the need for energy markets to support forest management practices;
- the role of residues and waste wood until DFSS are available;
- the long-term potential for DFSS;
- the role of biomass in distributed electric generation;
- the potential for alternative uses for biomass feedstocks eg: chemicals;
- the promise of improved efficiency from new technology such as gasification and gas turbines;
- providing a definition of clean waste wood, its cost of disposal, and its quantities.

Comments by RT members include: there seems to be a focus on waste wood; the waste wood and forest harvesting issues are complex, the RT should provide guidance to the Governors: need to convey how large a resource we have in the Northeast; and convey the message that small biomass energy facilities can be permitted more easily than large fossil plants.

Regulatory

The regulatory subcommittee presented a list of issues/opportunities that were grouped in the following categories: gasification; combustion; recycling; fermentation; landfilling; composting; feedstock development; and retail wheeling. Associated with each issue/opportunity were corresponding possible actions by the RT. A copy of the table is attached.

The discussion comments included: issues raised on priorities listed on table; competition for fiber and recycling; consider focusing on only fiber that has no reuse value

comments: there was disagreement with column on priorities, the subcommittee agreed to drop the column.

Evening Session, Discussion of Day Two

The RT convened following a dinner break and held a discussion on how to structure the Wednesday session.

AA suggested that the RT needs to decide what type of product it will deliver to the Governors. AA suggested that the RT incorporate the issues identified during the day into a presentation/policy format. AA sees some common areas around which to organize: cost; education; and environment around which to focus ideas.

Comments by RT members: The findings should have a near and long term perspective (there was agreement with this approach); The RT also proposed that findings support early/near-term success/accomplishments and build from that point.

The RT then discussed how they should organize their findings report. One suggestion was to focus on technology that is being utilized today; another was to focus on the barriers to biomass development; recommend to governors biomass feedstocks that should be developed, given the competition for uses, which are the best feedstocks for energy only? Findings report should present a classification system (to select those feedstocks). RT could present a consensus vision of biomass in the Northeast, what are the opportunities? What are the guidelines to follow for development? RT should present the pros and cons of biomass development/utilization to the Governors which will provide them with direction. RT has consensus on the following items for inclusion in the findings report:

- there should be criteria in the findings which biomass development must meet;

- there should be mechanisms for cost sharing (soft costs);
- it should ID and promote cost effective conversion technologies;
- it should be written so that the layperson understands the report; and
- that findings contain a definition of consensus fuels

Wednesday's Agenda

- Revisit the concerns of the subgroups
- Ralph to prepare an outline: subset of biomass resources/feedstocks to be addressed
- RT needs to do an outline so we can see what the findings document will look like.
- Mike/Jeff will outline presentation format. Should include: vision/potential, opportunities, benefits, environmental issues, actions, pitfalls. The main categories are: environmental permitting, electric generation, technologies, economic development, carbon sequestration, information transfer,
- Discussion of RT guidelines
- RT Process discussion

Day Two
Wednesday June 15
Plenary Session

Plan Agenda

AA started off day two by asking the RT to develop an agenda for the day.

presentations on:

- biomass classification system; and
- format for findings report
- discussion of draft groundrules
- Report by Bo on adding a member to the RT representing investors

Presentation on Biomass Classification

As requested Ralph Overend presented a proposed biomass feedstock classification system (attached). The classification system would be used to help the RT to narrow its focus by selecting only certain feedstocks.

Comments by RT members during discussion included:

- opposition to long term contracts that could tie up fiber and other recyclable materials, even for those materials that can't be economically recycled today;
- concern expressed about nutrient removal from the forest;
- the use of clean vs contaminated wood; and
- concern over the potential loss of habitat and nutrients due to forest harvesting.

There was a question raised about the current markets for compost. The near-term use of wood residues will not affect the availability of wood for compost.

There is a need to reflect on social policy when we select feedstocks.

Comment that the use of wood residues for energy makes other recycling possible

AA suggests the following criteria be applied to the classification system to help select the feedstocks: flexibility; alternate markets; higher value use.

The question was asked What is meant by "clean"? Jeff and Chris will come up with a definition for clean.

Comment: when discussing clean vs dirty, don't look at the fuel but at the emissions from the fuel. Regulations should be concerned with the emissions and not the "cleanliness" of the fuel

input. There was disagreement on this point in that sometimes systems to control emissions do not work as designed and the only way to control emissions was to ensure that only "clean" fuel was used. Another comment is that "unclean" wood is being disposed off somewhere, and it is best to do it in a controlled setting and recover useful energy.

How does the RT decide what feedstocks to focus on? It was suggested that selection be based on the following criteria. Include those feedstocks where there is consensus, and where there is consensus if certain conditions are met. Exclude those where there is not consensus.

A question was raised if the RT limiting its discussion to biomass for energy? After some discussion it was agreed that the charge to the RT is to focus on biomass for energy.

Presentation On Format For Findings Report

Mike Tennis and Jeff Peterson took the list of issues and put them into sections. The sections are: Executive Summary; Background: Economics of Biomass; Potential; Barriers/Challenges; Action Items; Appendix; and Bibliography. The topics that are to be covered in each section are outlined in the "flipchart" summary sheets. A copy is attached.

Comments on the format: We need to have a "punchy" executive summary that describes environmental, energy, societal, and economic benefits. It should include important barriers too.

Discussion by RT members on what should be included in the findings report. AA - we have not agreed on what goes into the final report. Comments on what should be included: We need to include a description of what the RT is, how it makes decisions, who it represents, and that it is a consensus document.

Discussion on forest management policy. At least one member of the RT was uncomfortable with setting policy on forest management practices. We are not setting policy but making suggestions (there was discussion on whether it should be suggestions for states or the region). It's important for RT to deal with issue of providing guidance so that environmentalists can review and test for consensus. AA - we need to first look at current practice in each state, we should hear what industry has to say on the issue. What will a discussion of forest management practices provide RT? Should we limit it to impact on biomass? We need to present findings to Governors on the key factors re: forest management that the environmentalists will accept. Maybe come up with the five most important issues. RT formed a subgroup to meet and report back to the RT. Subcommittee is Bob, Jan, Bo, and Eric.

During lunch RT members selected the subcommittees they wanted to work on (section of the findings report). CONEG will prepare a background of policy issues (based on model developed by Ralph, Rich, and Jeff)

Discussion of Groundrules

Discussion of RT groundrules. Groundrules accepted as written.

Adding Investors to RT

Report by Bo on including a financial person on the RT. The financial community does not have much interest in biomass projects or serving on the RT.

Next meeting

Comment do we need a two day meeting, or do we do our review of the subcommittee reports in a different way? Next meeting is one day review of subcommittee reports is as follows:

Activities June 14 - September 13

Subcommittees meet to draft their respective sections;
Send drafts to CONEG for distribution - August 12;
CONEG prints and distributes to all RT members - August 15;
Comments to CONEG - August 29;
Comments returned to subcommittee - August 31;
Subcommittee - September 13.

Adjourn to subcommittees.

MEMORANDUM

To NRPB Steering Committee

From Rick Handley/Tom Critzer

Subject Steering Committee Meeting

Date April 27, 1994

We look forward to seeing you all again Monday, May 9th in New London. As you will see by our agenda, we will have a busy two days. Enclosed you will find a copy of our agenda for the meeting, copies of project proposals, and a summary of the proposals. We have more good project suggestions than we have resources to do them, so please give these proposals a good reading because we will have to make some tough choices.

I am requesting that each of you provide the members of the steering committee a printed copy of your state report. I think this will be a good permanent record of what is happening in the states and will help with compiling meeting notes.

Please note that Woody Keeney (being the excellent host that he is) has arranged for a dinner at the New London Inn on Monday evening. This will give everyone an opportunity to have a leisurely dinner and attend Woody's presentation, or take in the sites Monday night.

Enclosures



AGENDA

BIOMASS STEERING COMMITTEE MEETING

MAY 9-10, 1994

NEW LONDON, NEW HAMPSHIRE

May 9 New London Inn, Main Street, New London, New Hampshire

6:00 AM Optional morning walk - see Woody Keeney for details

9:00 AM Program Manager's Report

10:00 AM Technical Coordinator's Report
 - Status of Applied Research and Technology Transfer Projects

11:30 AM Report on New Hampshire Wood Energy Industry (TBA)

12:00 PM Lunch

1:30 PM Discussion of New Applied Research and Technology Transfer Projects

4:30 PM Adjourn

5:30 PM Dinner - New London Inn

7:30 PM Woody Keeney will be making a presentation on "The Statesman John Hay" at the First Baptist Church. All are invited.

May 10 Tracy Memorial Library (across the street from the New London Inn)

6:00 AM Optional morning walk - see Woody Keeney for details

9:00 AM Report from Technical Contractors
 - Christine Donovan, report on Liquids Fuels from Biomass Project
 - Tim Maker, report on Woodchip Guide Project
 - Colin High, report on Economic Impacts of Wood Energy Project

11:15 AM Report by Wally Benjamin - New York State Electric & Gas
 - NYSE&G Approach to Biomass Energy

11:30 AM Lunch

12:30 PM State Program Reports

3:00 PM Adjourn

TO: NRBP STEERING COMMITTEE
FROM: STEVE MORGAN
RE: TECHNICAL PROJECT PROPOSALS
DATE: APRIL 28, 1994

Thanks for all of your project ideas! Thirteen proposals, including the old air toxics emissions from woodstoves project, have been forwarded. The dollar amount for all of them ranges from \$418-\$483,000. The budget is, unfortunately, about \$155,000. We shall have to do some paring at our New London meeting. Happy reading!

<u>Projects:</u>	<u>\$ Amount (in thousands)</u>
✓ 1. Large-Scale Liquid Fuel Products from Biomass: Location Specific Analyses:	40-60
2. Technology Transfer: Promoting Wood Chip Heating:	8
✓ 3. Promoting Wood as Co-firing Utility Fuel with Coal:	10-50
✓ 4. Managed Forest Practices and CO2 Sequestration:	40
✓ 5. Mid-sized Boiler Environmental Regulations:	10-15 60
✓ 6. Wood Stove Video Discussion:	30
7. Improving Technology Transfer Strategies:	60
✓ 8. Onsite Applications of Landfill Gas:	40
9. Overcoming Barriers to Biogas in Wastewater Treatment Plants:	15-20
✓ 10. Liquid Fuels: Business Plan Development:	50
✓ 11. Emissions Testing: Two Wood-Chip Furnaces:	50
✓ 12. Air Toxics Emissions from Woodstoves:	35
✓ 13. Landfill Gas Outreach Program:	10

TOTAL: \$418-483,000

C.T. DONOVAN ASSOCIATES INC.

P.O. Box 5665
22 Church Street
Burlington, Vermont 05402
(802) 658-9385 (802) 658-9516 FAX

April 21, 1994

Rick Handley, Program Manager
Northeast Regional Biomass Program
CONEG Policy Research Center, Inc.
400 North Capitol Street, NW
Suite 382
Washington, D.C. 20001

Dear Rick,

I am writing in to suggest a potential project for the Northeast Regional Biomass Program that would build on information gained from the Resource Survey for Large-Scale Liquid Fuel Products from Biomass currently being conducted by C.T. Donovan Associates, Inc. and Dr. Lee Rybeck Lynd. As we discussed recently, the resource survey will be completed and available for review July 1. Results thus far indicate at least one potential follow-on project, described below.

Preliminary Results of Liquid Biofuels in the Northeast - Phase 1

A sample of preliminary results of the resource survey presently being completed is presented below.

The Availability of Waste Biomass: Substantial amounts of waste biomass are generated in the Northeast for which there are limited cost-effective disposal options. In many locations, there are only limited markets for waste biomass that is recovered for reuse or recycling. Most wood waste processors are disappointed with the lack of market development during the past five years. Some are literally desperate for new end uses and markets.

Results thus far indicate sufficient biomass feedstocks in New York State for one (or more) conversion facilities. This is especially true in metropolitan New York. Other potential locations in the region may be identified through the remaining research and analysis. However, it is premature to suggest other locations at this time.

The Role of Energy Crops: There is growing interest within DOE, NREL, EPRI, and other national agencies or organizations in developing major supplies of biomass from short rotation woody crops and

herbaceous crops. However, they are unlikely to be major, widespread sources of biomass in most of the Northeast during the next 10 to 15 years.

Forest Harvesting Issues: There is growing concern among environmentalists about increasing competition for forest resources, and potential (or alleged existing) over-harvesting or environmentally-unacceptable harvesting in the Northeast. (For example, this concern has been expressed in many ways during the public review of recent work by the Northern Forest Lands Council. It was also an issue of debate during development of the consensus document produced by the National Biofuels Roundtable. It was identified in the document as an "unresolved issue" for which consensus was not reached.) This growing concern could limit future energy harvests through changes in forest policies, land use policies, land ownership patterns, and/or forest harvesting regulations.

Economies of Scale: The economics of liquid biofuels conversion and ethanol production facilities indicate that a key issue is scale. To have viable process economics and production costs, conversion facilities need to be quite large. Therefore, substantial sources and amounts of biomass feedstock materials are required.

Policy and Regulatory Issues: There is no single federal policy or regulatory issue that is likely to either ensure or stop development of a liquid biofuels facility in the Northeast. A variety of incentives exist at the federal level, yet most permitting and regulatory issues are addressed at the state level. In general, the siting and permitting process should be expected to require a lot of time and expertise (both technical and political). This is because of likely concern among stakeholders about whether biomass-to-energy facilities are "green" and renewable, and because of the lack of experience siting and permitting liquid biofuels facilities in the U.S. (other than corn-to-ethanol plants).

Liquid Biofuels in the Northeast - Phase 2 Suggestions

A logical next step towards facilitating the appropriate development and use of liquid biofuels in the Northeast is to complete a detailed, location-specific feedstock supply analysis. Based on results of Phase 1 to date, CTD suggests that this be done for New York State, especially for metropolitan New York. CTD also suggests that the supply analysis focus extensively on waste paper and urban wood waste. These materials are generated in very large quantities. Yet, they also are materials for which there are known end uses and markets. Therefore, the market dynamics could be quite complex.

The feedstock supply analysis should be detailed and should be

done at the level of detail that would withstand review by a bank or other financial institution that would potentially finance construction of a biofuels facility. The analysis should include a survey of major waste paper and wood waste generators (and end users) in the area. The survey should be followed by interviews of major potential sources of waste material in order to document actual (not estimated) amounts of materials are available at what prices (or tipping fees).

Results of the feedstock analysis could complement other work involving development of a business plan that might be funded by NRBP through a parallel or "sister" project. To ensure that the project is useful to all NRBP states, the feedstock analysis could serve as a model for other NRBP states.

As part of this project, or as a separate project, a thorough assessment should be done of federal and state policies and regulations that apply to a liquid biofuels facility. Guidelines for successfully siting and permitting a facility should be developed. William Cohen at Bangor Hydroelectric Company in Bangor, Maine has developed a very effective siting and permitting methodology for hydroelectric dams that could inspire similar work for biofuels facilities. His approach is based on a political organizing and campaign methodology and has been very successful.

The estimated cost for this project is \$40-\$60,000, depending on the scope of the feedstock analysis and whether the project includes the activities involving policies and regulations and siting and permitting guidelines.

I look forward to seeing you at the Roundtable on May 2, and to attending some of the NRBP meeting on May 9 and/or 10.

Very truly yours,



Christine T. Donovan
President

cc: Steve Morgan, NRBP Technical Coordinator
c/o Citizens Conservation Corporation

PROPOSAL

TO: Northeast Regional Biomass Program

BY: Energy Efficiency Associates

FOR: Implementation of Biomass Guide and School Biomass Video

DATE: April 15, 1994

The purpose of this proposal is to offer an outline for how recent NRBP work products in the wood-chip combustion area can be most effectively used to promote the appropriate use of biomass heating in institutional, commercial and industrial facilities in the region. These work products include the "Wood-Chip Heating Systems Guide", the "Heating Schools with Wood Chips" video and the findings of the CT&E study, "Small and Medium-Sized Wood Energy Boiler Efficiencies".

BACKGROUND

In these three work products, the Northeast Regional Biomass Program has assembled a set of tools which could be used to promote the use of biomass in heating buildings in the region. The result of such a promotion, in our view, should go beyond simple dissemination of information. Effectiveness is ultimately measured by the number of new successful applications of biomass combustion in new construction and retrofitted facilities.

In recent years, Vermont has been the Northeastern state which has produced the greatest number of wood-chip heating plants in the greatest variety of settings. The Vermont experience includes some lessons learned, from which other states can benefit.

Perhaps the most important lesson learned in Vermont is that the aggressive, appropriate promotion of wood-chip combustion comes out of the interest and enthusiasm of individuals, more than it does from setting in place governmental or bureaucratic structures. It is impossible to predict how individuals in any other state might become interested in the technology, whether the most interested and enthusiastic proponents will come from the public or private sector, or how an in-state biomass heating industry might come into being and grow.

To use an agricultural analogy, it is our belief that the first step in promoting the expansion of institutional and commercial biomass heating is to locate the most fertile soil for planting the first seeds. Then those seeds have to be watched carefully to see if they germinate. When they do germinate, they need to be carefully nurtured.

This proposal from Energy Efficiency Associates (EEA) is intended to lay out and define the first steps in that process.

PROPOSED TASKS

I. All States

1. CONEG distributes 15 copies of the first printing of the "Wood-Chip Heating Guide" to each NRBP State Biomass Contact. NRBP Contacts become the main conduit for distribution of the guide in each state.
2. Prepare a memo to the NRBP State Biomass Contacts, describing the factors which are the best indicators of fertile ground for promoting institutional and commercial biomass heating.
3. Interview by phone all 11 State Biomass Contacts, to discuss such features as the existence of an existing biomass fuel supply network, individuals known to be interested in the technology, the level of interest of the state energy office and the ICP program, and any facilities known to be actively interested in installing a biomass heating plant.

4. Prepare a packet of materials for the State Biomass Contacts to use in promoting institutional and commercial biomass heating, such as:

- o A sample letter for a wide mailing to potentially interested parties, announcing the availability of the guide and the video
- o Suggestions on protocols for distributing the guide and the video, and on follow-up with facilities, programs and individuals who receive copies
- o An outline of a process for identifying facilities and individuals who offer the best potential for implementation of biomass heating plant installations
- o An outline of an on-site presentation to decision-makers at a facility such as a school or hospital
- o Guidelines for working with the ICP program staff to use ICP and Technical Assistance studies as vehicles for promoting the consideration of biomass systems
- o Guidelines for identifying when there is enough interest to warrant setting up a seminar on biomass heating systems and their applications

Distribute packets to all 11 states.

5. Provide follow-up phone support for State Contacts in the use of the materials provided.

II. Target States

1. Working with NRBP staff, develop a list of two or more states which seem to offer the best environment for actively promoting biomass heating.
2. Work with the NRBP State Contacts in the selected states to develop action plans, each unique to the particular state. Action plans might target working through the state ICP program (perhaps offering training seminars to engineers active in doing TA studies for ICP), or the state energy office. Or an action plan might focus on one or more facilities which are actively interested in installing biomass systems, to give them the support they need.

3. Implement state action plans in the selected target states. A state action plan would be carried out and supported by the state NRBP Contact with assistance from EEA. Use of the "Wood-Chip Heating Guide" and the "School Wood-Chip Video" would be part of the support package for individuals, engineers, building owners and public decision-makers.

III. Seminars

1. Design a one-day seminar to be used with appropriate interested groups, as identified jointly by State Biomass Contacts and EEA. Possible groups include: state energy office staff, ICP staff and engineers who do TA studies, other engineers and architects active in the institutional market, utilization foresters, school superintendents or business managers, etc. Seminar design by EEA will include the seminar syllabus, a slide presentation, overheads and other visual aids, and handouts.

The basic seminar syllabus will be flexible and adaptable to different audiences. It will focus on using the school video and slides to make an unfamiliar technology real and to show numerous applications in building types familiar to the audience. The technical focus of any seminar session will depend on the audience.

The length of particular seminar sessions may vary from 3 hours (half-day) to 5 hours (short full-day) of actual instructional time, depending on the needs and interests of particular audiences, and on the need to accommodate driving time.

The most likely sites for seminars will be in target states, although it is possible that one or more could be offered in other states if the appropriate level of interest was in evidence.

2. Lead seminars, as decided by NRBP staff and State Contacts. EEA will supply all written materials and handouts (with the exception of copies of the Guide and the video). Seminar logistics will be the responsibility of NRBP.

PROPOSAL PRICES

Because the details of the process outlined above cannot be predicted accurately in advance, it is impossible to offer a single fixed price for the work proposed by EEA. Instead, the following schedule gives the costs of the various pieces which might be included. The actual costs will be determined by the particular states which are selected as target states and on the specifics of the action plans that are developed for those states.

I. All States

The cost for the five tasks listed is \$1,800.

II. Target States

The cost for the three tasks listed is \$700 for each state selected. It is assumed that no travel or site visits by EEA is included in the listed tasks.

III. Seminars

The cost for designing and developing the professional-quality seminar is \$4,000.

The cost for putting on a seminar depends on distance from Vermont and travel arrangements. The basic EEA charge for a one-day seminar is \$800, including travel time and the provision of written materials for the participants. CONEG will be responsible for publicity, providing the meeting room, lunch and coffee, arranging for slide projector and other equipment and supplying copies of the guide and the video.

In addition to the basic seminar charge EEA would be reimbursed for mileage (for sites within 4.5 hours driving time from central Vermont), air fare (for more distant sites), for meals, and for lodging expenses when overnight stays are required (sites more than 2.5 hours driving time

from central Vermont). For budget purposes, these reimbursable expenses are estimated as follows, for a one-day seminar.

Sites less than 2.5 hour driving time: (no overnight)	\$100
Sites up to 4.5 hours driving time: (one overnight)	\$220
Sites more distant: (one overnight plus air fare)	\$880

PROJECT SCHEDULE

The proposed time schedule for implementation is for completion of all work within 6 months of contract signature, with the exception of an additional 3 month period for putting on seminars.

FOLLOW-UP

It is proposed that at the end of the six month period, when all work with the possible exception of seminars is complete, there will be a joint assessment by NRBP and EEA of the effectiveness of work to date. Plans will be formulated at this time for any further work which seems appropriate.

**NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research and Technology Transfer
PROJECT PROPOSAL**

Project Title: Promoting Co-firing Opportunities in Utility Boilers

Project Goal: To promote co-firing wood with coal in utility boilers by providing decision-makers with information about resource availability and existing technical research and expertise.

Background:

A number of utilities in the southern part of the region have manifested active interest in the possibility of co-firing woody biomass in coal-fired boilers. New York State Electric and Gas has begun burning wood in an effort to help the forest products sector, which contributes significantly to the utility's industrial customer base. In Pennsylvania, one utility is investigating the possibility of obtaining wood ash to burn with anthracite coal, as a way of boosting the BTU content of its fuel mixture. Other utilities currently using limestone to reduce sulfur emissions from coal may be able to achieve the same objective less expensively by adding wood to the fuel mix. Utilities in New Jersey and Delaware have expressed interest in co-firing, but appear to be concerned primarily about the availability of wood fuel.

The technical aspects of co-firing wood and coal are fairly well understood, and there exists already a body of research on the topic of co-firing in utility-scale boilers (TVA, EPRI, Northern States Power, New York State Electric and Gas). The critical gap for many utilities – particularly in the southern tier states – appears to be a need for reliable information about the biomass fuel supply (e.g., fuel sources, characteristics, cost).

Project Objectives:

- Identify specific utility co-firing opportunities;
- Document existing technical research and resource availability pertinent to these opportunities;
- Model impact of co-firing on plant emissions of SO₂ and CO₂ for candidate boilers;
- Convene a panel of experts to answer utility decision-makers' questions about the practical implementation of a co-firing strategy; and

- Define NRBP role, if any, in further facilitating utility and large industrial co-firing projects.

Approach:

Step 1. Identify coal-burning utility boilers which may be candidates for co-firing with wood. Characterize according to:

- size of boiler;
- type(s) and volume of fuel used;
- type of boiler and fuel handling systems;
- pollution-control technology in place; and
- status with respect to the utility's Integrated Resource Plan (IRP).

In the course of identifying and collecting information about candidate boilers, characterize the utility's potential interest in co-firing wood: how much interest is there, what's driving that interest, and what information does the utility need to pursue this? Identify key decision-makers at the candidate utilities.

Step 2. Identify type(s) of biomass fuel appropriate for co-firing in candidate systems, along with any other criteria, e.g.:

- handling or combustion characteristics of the material;
- volume required; and
- cost.

Step 3. Document availability of wood resource meeting identified requirements:

- quantity available;
- identified suppliers;
- reliability of supply (e.g., availability of long-term contracts);
- cost.

Step 4. Using EPRI model, model impact of cofiring on SO₂ and CO₂ emissions for candidate boilers.

Step 5. Assemble panel of (half a dozen?) people with expertise and experience in:

4/14/94

- co-firing technology (e.g., engineers with experience co-firing in a utility boiler);
- wood supply/availability (e.g., utilization foresters, chip suppliers);
- pollution control requirements, regulations regarding emissions, ash disposal;
- relevant utility regulations.

Step 6. Produce a report that documents the above and also summarizes available research, literature on co-firing in utility-scale boilers.

Step 7. Convene one-day conference assembling utility decision-makers and panel of experts.

Dissemination Strategy:

Distribute report to key decision-makers identified in Step 1.

Purpose of one-day conference (Step 7) is to disseminate the information we have collected, make experts available to answer questions, and also to identify any other needs (e.g., for more specific documentation on the availability of a particular resource) utility decision-makers need to proceed.

Required NRBP Funding:

Projected total cost: \$50,000

With co-sponsors, may be able to limit NRBP's contribution to \$10-15,000

Potential Partners:

- Utility End Use Sector (DOE)
- Utility Biomass Energy Commercialization Assn.
- Other regional programs (TVA/Southeast, Great Lakes, West)

NORTHEAST REGIONAL BIOMASS PROGRAM REGIONAL PROJECT PROPOSAL

Project Title: Wood Energy Recovery Using Managed Forest Practices to maximize Carbon Sequestration.

Project Objective: Carbon dioxide is a currently unregulated greenhouse gas. Neither state nor federal regulations mandate its reduction from existing power plants. Furthermore, there is no way to "clean" carbon dioxide emissions, and thus the only means of its management is through offsetting measures.

Forests are magnificent storers of carbon dioxide which, when absorbed through photosynthesis, sequester 25% of the CO₂ as carbon in wood. Increasing the amount of wood accumulated by individual trees would hasten the rate at which carbon dioxide is taken out of the atmosphere.

This project would determine the best forest management practices to increase the amount of carbon dioxide which could be sequestered in existing, unmanaged forests, and explore the use of wood wastes from such management in biomass energy programs.

Such factors could be incorporated into a regionwide carbon certificate program in which utilities could offset their existing carbon dioxide emissions by purchasing certificates for forest management. The cost of these certificates would be determined by the amount of CO₂, the rate at which existing forests could sequester the CO₂, and the cost of forest management. Once a certificate was purchased, a professional forester would manage private land owner's property for CO₂ absorption. Management of the property would produce wood residues which could then be channeled to biomass energy facilities.

The program would provide (1). economic development in the green industry, (2). an incentive to land owners to retain their land as forests, (3). a means to offset carbon dioxide emissions, and (4). a means to increase utilization of biomass energy.

Approach: (1) Determine the rate in which carbon dioxide can be absorbed in an existing, temperate forest. (2) Employ professional foresters to manage scattered plots of forest land. Evaluate alternative management techniques. (3) Establish a set of acceptable forest practices, with an average carbon storage figure to be incorporated into the certificate program. (4) In addition, determine an average amount of wood waste, and assess the resulting biomass energy capacity.

Required NRBP Funding: \$40,000

Project Sponsor: The Massachusetts Division of Energy Resources and the Massachusetts Executive Office Of Environmental Affairs.



G&S Mill, Inc.

SYSTEMS FOR RECYCLING WOOD & BIOMASS WASTE

Memorandum
Via Fax
1-609-984-0378

MEMO TO: Ed Lempicki
FROM: Charlie Cary
DATE: March 21, 1994
RE: Proposed Research Project

The Problem:

The current complexity and range of the regulations governing moderately sized industrial sized wood energy systems presents a barrier to developing this market. Industries considering investing in industrial wood energy lose confidence in public sector support for projects when understanding the relevant regulations becomes a complex research project. No industry will invest hundreds of thousands of dollars in a project they perceive could be shut down through new or yet undiscovered regulations.

Companies selling industrial wood energy have difficulty fully understanding the various regulations pertaining to industrial wood energy in CONEG's eleven state region. Each state has its own regulations and there is little uniformity among states.

Proposed Solution:

We propose that CONEG perform a study of air quality regulations governing industrial wood energy in the eleven state region. The final report would be a comprehensive and usable compilation of the regulations governing wood fired boiler producing 5,000 to 30,000 lbs. of steam per hour. This study would include:

1. Air quality standards for all controlled potential emissions within each state.
2. A list of non-containment areas showing the physical size of these areas and changes in regulations within these areas.
3. An outline of the regulatory process including threshold levels for public review.

G&S MILL, INC.
172 Otis Street, Northborough, Massachusetts 01532-2412 • 508-393-9266 • FAX: 508-393-8504

4. A BACT determination for each state. While technology changes the BACT over time, a snapshot of BACT policies among states would be extremely helpful.
5. An overview of special boiler requirements among states including, but not limited to, boiler room operating requirements.

Conclusion:

The final report would have three audiences. First, it would take the mystery out of the regulatory process for industries considering an investment in industrial wood energy. By taking the time to define the regulatory process, the public sector could build private sector's confidence that their investment would not be short term. Second, vendors selling industrial wood energy would use the report to confidently focus their sales efforts. Third, the report would enable public sector regulators to compare and contrast their regulations with other states in the region. It is hoped that this spotlight on these regulations would lead to increased uniformity among state's regulations governing industrial wood energy.

Ed - let me know what you think. . .

PROVIDING EXPERT ADVICE TO WOOD STOVE STAKEHOLDERS: A VIDEOTAPED DIALOGUE

The Problem. With the promulgation of wood stove New Source Performance Standards (NSPS) by the U.S. Environmental Protection Agency (EPA) in late 1987, the industry and its products have changed dramatically. The qualifying catalyst and high technology noncatalyst stoves require chimney installations, operator behavior and maintenance quite different than do conventional airtight stoves. Today's energy office brochures and industry manuals do not adequately convey the appropriate information to the prospective stove buyer and new stove owner. Even many retailers, increasingly diversifying his inventory with gas appliances and other household equipment, are not well educated about the installation and operational differences of the new wood stoves. Improper chimney installations can pose fire safety problems, creosote accumulation, and indoor air pollution. Improper stove operation and maintenance procedures can cause lower efficiency and several times the emissions achieved in laboratory tests.

A second problem which needs to be addressed is the poor public understanding of how much cleaner and more efficient the new generation of stoves can burn. The average stove owner is not aware of the two-threefold improvement in emissions performance from the EPA certified stove. Despite the increasing concerns from the public about air emissions from woodsmoke, very few stove owners realize the significant improvement to emissions this generation of stoves can provide. The recent Wood Stove changeout campaign sponsored by the NRBP stimulated comments from retailers about many customers who came into their stores explaining that they had not realized how much improvements the certified stoves promised.

Overcoming the barriers

This project seeks to address both issues articulated above: the less than adequate understanding among certified stove owners and those who advise them about the differing installation and operation requirements of the new technology appliances; and the poor understanding among most uncertified stove owners that the new stoves are significantly cleaner and more efficient than conventional airtights. The project will feature an edited, videotaped thirty-minute dialogue among 5-7 experts in wood heating. The experts will be drawn from among stakeholder groups: manufacturers, stove testing researchers, trade association officials, installers, energy and environmental offices. The audiences for the videotape will be energy and air quality offices, chimney sweeps, fire safety and code inspectors, stove retailers, and stove owners.

Project Goal

Produce a high quality videotape which captures the salient issues from experts on the advantages of certified stoves over airtights; and the key installation, operational and maintenance issues which homeowners should address with newly purchased appliances.

Work Statement

1. At the suggestion of the Wood Stove Air Toxics Advisory Committee, select the on-camera experts for a thirty-minute dialogue on certified wood stove technology, installation, and

operational issues.

2. With the guidance of the Advisory Committee, submit a detailed agenda for discussion by the recommended 5-7 experts.

3. Develop visual props for the dialogue: among these should be

- 1) catalyst and noncatalyst cut-out illustrations;
- 2) proper and improper chimney installations;
- 3) documented comparisons of efficiency and emissions from certified and airtight stoves;
- 4) videotaped cut-aways of proper and improper operational techniques;
- 5) pellet stove technologies;

4. Videotape and edit the discussion into a thirty-minute tape.

5. Develop a videotape distribution strategy and implement it, after Advisory Committee approval.

Budget: \$30,000.

¹If timely and feasible, add to the agenda a discussion of air toxics impacts, including a comparison of wood to other residential heating fuels.

REACHING THE AUDIENCE: DESIGNING AND IMPLEMENTING STRATEGIES TO FACILITATE TECHNOLOGY TRANSFER

The Problem. Since its inception a decade ago, the Northeast Regional Biomass Program has completed more than thirty technical projects designed to illuminate an opportunity, test environmental impacts, research a technological or regulatory issue, and document results from biomass technologies. With limited funding, averaging less than \$200,000 annually, the NRBP can fund 3-6 projects and spend \$20,000-\$80,000 per project. Too often a very useful technical report, however, does not penetrate deeply its intended audience: regulators, equipment manufacturers, foresters, state energy officials, the forest products industry, environmentalists, equipment retailers, industrial end-users, institutions, and the general public.

NRBP has experienced two, related problems in getting its technical reports and central findings out to the publics it hopes to reach:

- (1) an inadequate technical technology transfer strategy;
- (2) inadequate resources devoted to carrying out a strategy.

To be sure the NRBP has had successful technology transfer for some of its projects: wood stove research aimed at regulators and stove manufacturers has a profound effect on standards, testing methodologies and equipment design. There was a limited audience and the research reached the audience in a timely and digestible manner. A recent wood-stove change out campaign in conjunction with stove dealers was successful in reaching a large portion of the wood stove user public because we engaged professionals to conceptualize the strategy, we enlisted the retailers trade association as partners, and the professionals executed most of the media strategy.

But too frequently very useful research studies and other projects reached only a small portion of its intended public. Generally one or both of the problems listed above handicaps the technology transfer function.

Overcoming the barriers

This project aims to address the two problems above. We seek to engage one contractor or contractor partnership to examine past technology transfer strategies, work with the management and steering committee to develop one or more generic strategic approaches to various kinds of projects, and to design and implement technology transfer strategies for two priority projects identified by the Steering Committee during the course of the project.

Project Goal

To enhance the NRBP capacity to design effective technology transfer strategies and to design and implement such strategies for two current or recently completed projects. Examples of candidate projects worthy of attention for implementation include the boiler efficiency study and woodchip handbook; the liquid fuels resource feasibility study; the technical and institutional barriers to landfill gas to energy projects; the environmental externalities methodologies appropriate to biomass power plants; and the economic impacts study.

Work Statement

1. Meet with an Advisory Committee at least twice, appointed by the CONEG Policy Research Center, comprised of Steering Committee members and a DOE and EPA official to guide the project's implementation. Communicate by telephone, fax, and writing as necessary to receive and provide feedback.
 2. Examine the technical transfer strategies executed by NRBP over the last decade by interviewing program managers, the technical coordinator, and selected project contractors.
 3. Interview DOE, EPA, and the other RBEP managers to seek evidence of comprehensive, innovative and effective technology strategies. Draft a report based on especially successful and illustrative technology transfer activities for a renewable technology, especially a biomass technology or problem.
 4. With the assistance of the Advisory Committee, identify four salient project areas, appropriate audiences for each, appropriate trade publications, conferences, and media for communication, effective vehicles of communication and persuasion, and suggest strategic approaches which may be useful to pursue. Draft a report which provides details for each issue raised above.
 5. With the assistance of the Advisory Committee, select up to two projects underway or recently completed and design a technology transfer strategy. include in the strategy:
 - (1) a goals statement, featuring quantitative and qualitative impacts
 - (2) identification of audiences to reach;
 - (3) identification of vehicles to be utilized (direct mail, television, personal communications, press releases, radio talk show appearances, conference presentations, trade press articles, videotapes, etc)
 - (4) articulate a message or messages to convey;
 - (5) draft specific strategy for carrying message through identified media to appropriate audiences;
 - (6) a method or methods of evaluating success;
 - (7) identify expectations of other organizations and commitments anticipated;
 - (8) a budget.
 6. Implement the strategy.
 7. Evaluate its impacts in written reports for each implementation strategy.
- Projected Budget: \$25,000 for Tasks 1-4; \$30,000 for tasks 5 and 6; \$5,000 for Task 7.

Total: \$60,000

NORTHEAST REGIONAL BIOMASS PROGRAM
REGIONAL PROJECT PROPOSAL

Project Title: Nearby and On-site Applications of Landfill Gas

Project Objectives: On February 18, 1994 the Massachusetts Division of Energy Resources sponsored a forum, the focus of which was a presentation by SCS Engineers, Inc., of their CONEG-funded study on Landfill Gas Barriers and Conversion Technologies. This proposal lays the groundwork for a follow-on expansion of the current work, based largely on suggestions advanced by participants in the forum.

Approach: The SCS study showed that low price-per-kw obtained from the sale of electricity because of the capacity glut of power in the northeast limits the potential for profitable recovery for landfill gas. On-site and nearby applications can produce higher revenues because the target break-even price is the retail price of electricity and not the low price the utilities are willing to pay. The following approach offers a logical extension to the work performed to-date: (1) Identify landfill sites and industrial/commercial businesses located nearby who require both process heat and electricity, e.g., a recycling facility. (2) Evaluate the potential for landfill gas as an alternative transportation fuel for on-site application to fuel a centrally-stored trash hauler fleet. For both applications, evaluate the peculiar problems posed by landfill gas, e.g., low BTU content and constituent variability.

Potential Partners: CONEG and EPA

Required NRBP Funding: \$40,000

NORTHEAST REGIONAL BIOMASS PROGRAM REGIONAL PROJECT PROPOSAL

Project Title:

Impediments To The Development Of Bio-gas From Waste Water Treatment Plants.

Project Objectives:

The project objectives are to identify the impediments to the successful development of bio-gas from waste water treatment facilities.

Approach:

This project would follow the successful format followed in the NRBP Landfill Gas project. The project would be conducted in two phases:

Phase I

- Survey waste water plants that recover bio-gas, identify the parameters for a successful project.
- Identify impediments to a successful project.
- Provide recommendations on how the impediments can be overcome.

Phase II

- Identify candidate sites in the Northeast.
- Estimate total potential available from waste water bio-gas.
- Provide technical, economic, and environmental information that could be used to affect local, state, and federal policy.

Potential Partners:

Potential partners/co-funders for this proposed project include:

- EPA;
- Utilities;
- Other RBEPs;
- Vendors/manufactures of gas turbines or fuel cells; and
- States.

Required NRBP Funding:

A project of this type has many beneficiaries. NRBP funding should be limited to 25% of total project cost or \$15,000 to \$20,000.

Project Sponsor:

This proposal is being submitted by the NRBP Program Manager.

NORTHEAST REGIONAL BIOMASS PROGRAM REGIONAL PROJECT PROPOSAL

Project Title:

Development of site specific plans to construct an ethanol from cellulose facility in the Northeast.

Project Objectives:

As the Clean Air Act Amendment requirements are implemented, and states as well as private sector fleets choose clean alternative fuels, a supply of economically priced ethanol must be available in order for it to be included as an alternative fuel choice. Currently, in the United States, ethanol is produced economically and in large quantities from corn. The potential to produce large quantities of ethanol from crops such as corn is not practical in the Northeast. However, the potential to produce this clean alternative fuel from wood residues and waste paper is technically possible but as yet no plant has been built. This project proposes to identify serious developers of biomass-to-ethanol facilities by providing a financial incentive to potential developers to select a technology, a site, identify a feedstock supply, a market for its ethanol, and examine the economics of a site-specific proposal. A proposal of this detail conceivably would be sufficient to secure project funding. Detailed plans would also have the added benefit of identifying other potential barriers, such as restrictive state policies or legal barriers such as rights to technologies.

Approach:

The NRBP, in conjunction with its partners, would issue a solicitation to potential developers of a facility to produce ethanol from cellulose. The solicitation would be for co-funding a site-specific business plan to construct a facility to produce ethanol from cellulose. As part of the solicitation the NRBP would conduct a forum for potential developers to explain the solicitation and to offer an opportunity for the various interested parties to meet and develop partnerships.

Potential Partners:

Potential partners for this project include:

- DOE Transportation End-Use Sector
- NREL
- State economic development groups

- USDA
- State Energy Offices

Required NRBP Funding:

Site-specific business plans might cost up to \$150,000. We would like to fund 4-5 groups of potential developers. Total cost for such an undertaking is estimated at \$500,000. The major funder would be DOE end-use sector/NREL. NRBP funds would be estimated at about \$50,000.

Project Sponsor:

This project is being submitted by the NRBP Program Manager.

NORTHEAST REGIONAL BIOMASS PROGRAM REGIONAL PROJECT PROPOSAL

Project Title:

Air Emissions Testing of Two Wood-Chip Fired Furnaces
submitted: April 14, 1994

Project Objectives:

The project will compliment 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 COENG and the project 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: 802-241-3855)

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 develop policies and recommendations that include consideration of the air pollution potential of these types of furnaces. The test results may also enable 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 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.

B. Operating Conditions: Samples will be taken while the furnaces 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. Concentrations 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 determination of equivalent

concentrations per Appendix A to the Rutland, Vermont Resource Recovery Facility Air Pollution Control Permit issued 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 be 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 by 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 feet corrected to 12% CO₂ and pounds 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. The emission rates will be reported as pounds per eight hours. The appropriate analytical audit sample(s) for metals 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.

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 concentrations 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: Stack 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.A 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 date(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 any pre-sampling site preparation, and ensure that the sampling location meets the minimum requirements of USEPA Method 1 or Method 1A. If necessary, a temporary stack 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 actions and 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 the 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, calculations, 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 stack testing results and their implications with regard to public health.

V. 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 three 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 references, 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 total staff time) and \$1500 (40 hours for Doctor Bressor and staff) for the Vermont Department of Health.

Required NRBP Funding:

An estimated \$30,000 to \$50,000 is requested from CONEG to conduct the air emissions testing and to produce the accompanying report.

Project Sponsors:

As previously listed, the 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.

NORTHEAST REGIONAL BIOMASS PROGRAM
Applied Research & Technology Transfer

Technical Projects - Status Report

December 1993

Title: Characterization of Woodstove Air Toxic Emissions

Rationale: Emission factors (mass pollutants per mass fuel) are high for woodstoves as compared to industrial sources due to their relatively simple design and associated incomplete combustion of wood fuel. Their toxic content is particularly problematic because RWC pollutants are predominately either in respirable-sized particles or in the vapor phase. Such pollutants represent the highest human exposure risk due to their direct and penetrating entry into the respiratory system.

Little woodstove air toxic data exists. Most woodstove air quality research has dealt mostly with the criteria pollutants, carbon monoxide or PM10 (particulate material with an aerodynamic diameter less than 10 microns). The most notable air toxic research to date is either over a decade old or was performed with limited resources as part of the criteria pollutant work.

Objectives: To promote the appropriate use of wood energy by expanding the current RWC knowledge base on air toxins.

Approach: Contractor will employ reviews of secondary literature on air toxic data, prior testing data, and the results of laboratory testing (and optional field testing) of a selection of representative stoves. Contractors will confer closely with the Advisory Committee.

Tasks:

- (1) Evaluation of testing parameters through study of 11 stoves in four categories: certified catalytic (3), certified noncatalytic (3) conventional airtight (3), and pellet (2). Contractors will prepare a pre-test report indicating rationale for selection of testing parameters and complete testing plan.
- (2) Quantification of recognized air toxic compounds with emphasis on those most closely associated with human health impacts
- (2a) Field validation of air toxics (optional, should lab testing prove invalid)

Status: EPA has dropped its woodstove air testing program but the Canadian Combustion Laboratory (CANMET) has proposed to carry on the project with some modifications. Another solicitation of funding co-sponsors is underway.

Contractor: CANMET

NRBP Funding: \$

Contract Period: 1994

Principal Findings and Accomplishments to Date:

In the fall of 1993 two events dramatically changed the momentum of the planned project:

- 1) EPA's Office of Research and Demonstration (ORD) changed its research emphasis, dropping wood stove emissions research entirely from its portfolio and budgeting no dollars to FY 1994 wood energy research;
- 2) The Canadian Combustion Research Laboratory (CCRL) assumed responsibility for drafting a new workplan and volunteered to conduct the research with its own personnel.

As a result of these two efforts, other co-funders reassessed their interest and commitment to the effort. The new research design won acclaim from the entire advisory committee. Enthusiasm for the merit and methodology of the project grew stronger. The research focus on establishing a baseline of pre-certified stoves and comparing certified catalyst and non-catalyst brands against the baseline received unanimous support.

The other positive development associated with the CCRL research plan was the diminished funding commitment required of sponsors. Since CCRL was committing its own laboratory and own staff to the effort, the out-of-pocket costs are expected to be less than \$70,000 rather than the \$325,000 in the earlier EPA-driven design. Three of the remaining sponsors--HPA, NRBP, and NYSERDA felt the shared burden of \$70,000 would not be onerous to shoulder.

But two problems developed. The first was the absence of a United States air regulatory agency as a committed constituency for the project. If the research effort revealed troubling findings about the level of emissions from a known toxic compound, especially a known carcinogen, who would take up the cry to investigate further and/or recommend an abatement strategy? Both NYSERDA and NRBP decided this absence would preclude their funding commitment until or unless a committed air regulatory agency evidenced written support for the project.

To that end, the NRBP staff sent out written inquiries to three additional EPA offices and the Northeast States Coordinated Air Use Management Agency to solicit their interest. As of this date, responses have not been received.

The second problem is associated with the transfer of the Pacific Northwest RBP to the Region X Support Office in Seattle. While the BPA Program Manager committed \$30,000 toward the 1992 research effort, there is no present decision-maker to commit funding for 1994. We expect this problem to resolve itself in early 1994.

NORTHEAST REGIONAL BIOMASS PROGRAM REGIONAL PROJECT PROPOSAL

Project Title:

Landfill Gas Outreach Program

Project Objectives:

The project objectives are to develop and implement a technology transfer program to disseminate information and lessons learned from the NRBP Landfill Gas Projects I & II.

Approach:

This project would coordinate with EPA's efforts to encourage energy recovery from landfills that are required to mitigate methane emissions.

- Work with EPA to identify a target audience.
- Develop an information program designed to encourage landfill owners to invest in energy recovery rather than less lower first cost measures such as flaring. The package would include information on life-cycle cost, environmental, and policy implications.
- Conduct information sessions for the target audience.
- Evaluate, and revise as necessary, the programs impacts.
- Prepare a final report and recommendations for a national outreach effort.

Potential Partners:

Potential partners/co-funders for this proposed project include:

- EPA;
- Utilities;
- Other RBEPs;
- Vendors/manufactures of gas turbines or fuel cells; and
- States.

Required NRBPFunding:

This project meets many of EPA's objectives under Climate Change Action Item # 33. It also meets a Northeast need to disseminate information from the NRBPF landfill gas projects. It offers an excellent opportunity to leverage NRBPF and EPA resources.

NRBPF tasks would include development of an information program and coordinating NRBPF's extensive network within the states to ensure that the appropriate audience is reached. Expenses for projects of this nature could be offset by revenue from registration fees. NRBPF funding would cover the unrecoverable costs associated with conducting the preliminary sessions in the Northeast. Total project cost is estimated at between \$35,000 and \$50,000. Total NRBPF cost \$10,000.

Project Sponsor:

This proposal is being submitted by the NRBPF Program Manager.

**Governors' Biomass Round Table
Burlington, Vermont
Meeting Summary
May 2, 1994**

Introduction/Overview

The Governors' Biomass Round Table is sponsored by The Northeast Regional Biomass Program, a United States Department of Energy program administered in the Northeast by the Coalition of Northeastern Governors (CONEG) Policy Research Center, Inc. The Round Table is established to examine and report to the CONEG Governors on issues, opportunities and barriers to biomass development, and presenting its findings to the CONEG Governors for possible future action.

The first meeting of the Governor's Biomass Round Table convened at 10:00 a.m. on May 2nd in Burlington, Vermont. Anne Stubbs, Executive Director of CONEG opened the meeting by introducing Governor Howard Dean of Vermont.

Governor Dean thanked the participants for coming and being part of the Round Table. The Governor spoke about the exciting potential for biomass in the Northeast, and pointed out that the region is last in the production of oil, and imports 20-30% of its electric power from Canada. He stated that the potential for biomass in the Northeast lies in its ample supplies of wood residues. In order for wood residues to become a more significant part of the marketplace, new technologies will be needed. Governor Dean believes that the other CONEG Governors share his interest in the development of biomass energy and that the Governors look forward to the findings of the Round Table.

Introductions

Abby Arnold, facilitator, asked each participant of the Round Table to introduce him or herself and briefly describe what issues each of them brought to the table (see Attachment A for a list of Round Table participants).

The following summarizes a few of the issues raised by participants during introductions:

Supply:

- The Northeast has limited indigenous supplies of natural gas and oil with prices relatively higher than the rest of the country. Renewable resources, such as biomass, are attractive because they create jobs, and help to keep dollars spent on energy in the region.

- Biomass should be considered a fuel used in the future, in the long term, not just in the 1990's.
- With this long term perspective, can biomass be competitive with other fuels i.e., natural gas and oil?

Technology:

- There is a need to support new technology development that will make biomass competitive.

Environment/Habitat:

- Biomass offers great potential, however there is potential harm if forest habitat is destroyed in the process.
- Biomass power is an opportunity to solve waste disposal problems, including animal waste. Biomass power development may also encourage new forest planting.

Social economic cost:

- Rate payers should not have to bear the cost to support/subsidize new technologies.

Process of negotiation among stakeholders:

- The Governors' Biomass Round Table may offer insight and a new process for other renewable development.

Purpose/Objective of Round Table

The discussion then turned to clarification of the purpose of the Governors' Round Table. Anne Stubbs reviewed CONEG's purpose of forming the Round Table as a point of departure.

- Biomass cross cuts energy, economy, and environment. It offers many benefits but also raises issues that need to be resolved. The purpose of the Round Table should be to identify opportunities and barriers associated with biomass and present those findings to Governors for action.

The rest of the Round Table participants then listed their ideas for what the task/objective(s) could be for the next 6 months:

- Economics: The Round Table needs to address the economics of development of biomass resources for generation of electricity. For example, if biomass is more expensive, but offers extended benefits other than energy/fuel, then who is going to pay for the incremental cost? Rate payers or society as a whole? Additionally, utilities need to be able to provide the best priced electricity so industry in the Northeast can remain competitive.
- Education: The Round Table should develop/implement education components for Governors and the public. Increased public awareness/acceptance may help increase support for biomass.
- Regulatory barriers: Regulatory barriers increase the cost of developing biomass facilities. The regulatory barriers common across states need to be identified and options for removing the barriers need to be developed.
- States send mixed signals to industry regarding biomass development: different state agencies may be on opposite sides regarding development of biomass plants. Round Table needs to make Governors aware that this is occurring and direct their agencies to work together to support biomass energy.
- Definition of biomass for the Round Table deliberations: Governors and policy makers need a definition of what is included as biomass.

The Round Table members did not agree on what the objectives of the Round Table would be. However, members agreed that one task of the Round Table in the next few months would be to try and refine and elaborate the above possible objectives and try to reach agreement on an objective and tasks at the end of the second meeting.

The participants agreed that specific tasks for the remainder of this meeting would be to try and define "biomass" for purposes of discussion and identify a list of issues that the members would like the Round Table to address in the next six months.

Briefing of National Biofuels Round Table.

Ralph Overend, from the National Renewable Energy Lab reported on the findings of the National Biofuels Round Table. Overend stated that after 20 months of deliberations, a consensus was reached on principles and guidelines to develop biomass. The report projects a 10 fold increase in biomass utilization by 2030 through the use of Dedicated Feedstock Systems (DFSS). The report identified many impacts related to this level of biomass utilization and recommends site specific, regional guidelines for development of biomass. The report also identifies barriers to development of biomass and offers ideas that policy makers could consider in trying to overcome the barriers.

While the National Biofuels Round Table was able to reach consensus on 64 guidelines and numerous ideas regarding policy, three areas were left for future discussion: (1) When is harvesting forests for energy appropriate? (2) When is it appropriate to expand planting of non-native species for energy production? (3) Should the feedstock eligibility requirements of the Biomass Production Tax Credit be made more flexible?

Overend stated that many of the impacts identified in the Report need to be addressed at the regional level. Overend and two other members of the National Biofuels Round Table, Jan Beyea from National Audubon and Christine Donovan, C.T. Donovan Associates are also members of the Governors' Round Table. All three members agreed that the report is a good guidance document, however region specific solutions need to be found. They all expressed their interest in this opportunity to address regional issues in the Northeast.

Definition of Biomass

The members discussed the Round Table's definition of biomass. Most of the discussion centered on what resources to include for purposes of the Governors' Round Table.

There were two perspectives, those who favored a broad definition including materials from the waste stream, such as wood waste and animal waste, with forest residues. These members seemed to favor including the waste stream products because they felt the added opportunities improve the likelihood that biomass would be accepted as a realistic alternative. Further, proponents of a broad definition suggested that the definition should reflect the opportunities biomass energy offers to the economy and the environment.

Others suggested a narrow definition was more appropriate because the issues around development of biomass are complex and the Round Table needed a specific focus. Those favoring a narrow definition questioned the practicality of a broad definition. Addressing all potential biomass resources could compound the very complex issues which may prevent the Round Table from developing a set of useful guidelines and thereby limit the Round Table's actual usefulness.

The members agreed to initially consider a broad definition of biomass resources including: wood residues from forest management, lumber and furniture manufacturing, urban forestry, and land clearing; waste wood from construction & demolition activities, wood pallets, railroad ties, and treated lumber; agricultural waste; animal waste; and paper-making waste. However, once there is agreement on a list of specific issues the Round Table will address, a narrower definition of biomass may be appropriate.

Identification of Issues the Round Table May Address

During the remainder of the day the members discussed what issues the Round Table could address and organized subcommittees to further refine the possible issues list.

The Round Table members decided to organize their issues list around the following themes (See Attachment B):

- Cost/Pricing/Value
- Resources/Technology
- Regulatory
- Public/Private Policy

Subcommittees were formed for each category. For the next meeting subcommittees will:

- clarify what is meant by the issues listed under each category;
- recommend what issues the Round Table should focus on over the next six months, and the reason for the selection;
- identify resource and data needs, experts needed by the Round Table to adequately address the issue;
- provide a brief written report from the subcommittee to the Round Table. These reports will be delivered at the next meeting.

Support from CONEG/NRBP staff is available to assist the subcommittees with conference calls, securing data, and contracting for experts to assist the subcommittees.

Ground Rules

The Round Table reviewed the Draft ground rules and Abby Arnold agreed to rewrite the ground rules incorporating the following comments (See Attachment C, Draft Ground rules):

- Under section I: Objective will be inserted once the Round Table agrees on an objective.
- Under section II: Membership, part B. The members will try to represent the viewpoint which provides for the most open and free exchange of ideas.
- Under section II: Membership, part C. Alternates need to know what is discussed at each meeting. One alternate will be selected by each member. Alternates will not be required to attend all meetings. It will be the responsibility of the members to inform the alternate and keep them up-to-date on all Round Table activities.

- Under section IV: Decision Making. There was agreement on points A (Members make decisions and take positions by consensus. Consensus means that any Round Table member can exercise a veto on a proposed action, and that no member can be out-voted. If consensus is not reached on an issue, the meeting summary written for each meeting will record the differences of opinion. The majority and differing view(s) will be reported in the findings to the CONEG Governors.); C (The agenda for each meeting will be developed by a subcommittee and adopted by consensus of the full group.); D (Small work-groups may be formed. These groups will operate by consensus, and are not authorized to make decisions for the Round Table.); but no resolution on point B (Members not at the final meeting will have the opportunity to comment on the final product and determine if they want to be part of the consensus reached).

The ground rules were not officially adopted at this meeting. They will be discussed and approved at the next meeting.

Round Table Meeting Schedule in 1994

The Round Table agreed to scheduling meetings on the following dates: June 14, 15 in Burlington, Vermont, September 13 and November 1.

The members also agreed that they would develop a product by November or December 1994 for the Governors consideration in early 1995.

The meeting adjourned at 4:50 p.m.

TO: NRBP Steering Committee (New England & New York)

FROM: RICK HANDLEY

SUBJECT: PRESS RELEASE

DATE: January 14, 1994

The attached press release has been approved for release. I expect it may be in print as early as Sunday January 16. In the briefing package you received is a list of the newspapers that are getting the release. Also attached is a list of state contacts for the press. These are the people identified by each state for the press to contact if they have questions about NRBP involvement in the exchange program, such as why NRBP is promoting the changeout or what NRBP money is paying for. The press may ask some technical questions about performance of the woodstoves, or about numbers of participating dealers and those questions can be referred to Jeff Wakefield at Kelliher/Samets/Volk. If you have further questions please call me or Steve Morgan.

Attachment

ANNE D. STUBBS
Executive Director

Northeast Energy Program Takes Aim at Old Woodstoves

(202) 624-8450

Rebates of Up to \$200 Are Offered to Consumers Exchanging Older Stoves for New, Clean-Burning Ones

For Immediate Release

Contact: Jeff Wakefield
Kelliher/Samets/Volk
(802) 862-8261

With more than 3 million cords of wood burned annually in New England and New York, wood has always been a home heating staple in the Northeast.

A new program, sponsored by the Northeast Regional Biomass Program (NRBP), CONEG Policy Research Center and the Northeast Hearth Products Association (NEHPA) will help consumers in New England and New York reduce air pollution while getting more heat at lower cost from the wood they use.

Called the Clean Heat Woodstove Exchange, the program offers rebates of up to \$200 on new, clean burning woodstoves certified by the Environmental Protection Agency if buyers turn in older, uncertified stoves. The old stoves, which are up to 25 times more polluting, will then be recycled, taking them permanently out of circulation.

All EPA-certified woodstoves are marked with a large, rectangular plaque on the back of the stove.

The Clean Heat Woodstove Exchange will be in effect for January 18 through February 28, 1994. Consumers can take part by contacting one of the more than 60 woodstove retailers, in Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and, Vermont, who are participating in the program.

To learn the location of the nearest retailer, consumers should call 1-800-423-7283. In addition to selling EPA-certified stoves, retailers will also pick up and recycle old stoves.

Overstaying Their Welcome

Retailers have been barred by the EPA since 1990 from selling anything but new, certified woodstoves. Thousands of older stoves sold prior to that date are still in use, however, and continue to emit smoke and gases in excess of current regulations.

"Wood is an abundant renewable resource in the Northeast, and using it to heat your home makes good sense environmentally -- providing you're not using an old-fashioned smoker," said Rick Handley, project director for the Northeast Regional Biomass Program.

--more--

"We are pleased with our partnership with NEHPA. The Clean Heat Woodstove Exchange is designed to inform people about the difference between certified and uncertified stoves, and to give them an incentive to invest in the new technology," he said.

Heat from Smoke

EPA-certified stoves use two different technologies to reduce emissions by up to 95 percent. Catalytic stoves force the smoke -- which is essentially unspent fuel -- through a honeycomb-like, ceramic structure called a catalytic combustor, similar to a catalytic converter in a car, to lower the temperature at which gases will burn. After the smoke passes through the combustor, it ignites rather than exiting through the chimney. Noncatalytic stoves use extensive passageways within the stove to force the smoke into a second burning chamber -- and in some cases a third and fourth chamber -- until it becomes hot enough to ignite.

The poorest emissions performance in old stoves resulted in 50 grams or more of particulate an hour. The best emissions performance of the new stoves reduce emissions to under 2 grams per hour.

"The new stoves not only reduce the amount of smoke that's in the air, they also significantly increase fuel efficiency," said NEHPA executive director Rex Morgan.

"That means less work reloading the stove, and better economy, since you're buying less wood for the same amount of heat."

Programs like the Clean Heat Woodstove Exchange have been successfully implemented in Seattle, Denver, and other western cities. The Clean Heat Woodstove Exchange is the first program of its kind to be undertaken in the Northeast.

The Northeast Regional Biomass Program is a cooperative technology transfer program of energy officials of 11 northeastern states. It is administered by the CONEG Research Policy Center Inc. Funding for the communications effort behind the woodstove exchange is being provided by the Center through a grant from the Department of Energy. The Northeast Hearth Products Association is a regional trade organization whose members are providing the rebates and will fund the recycling portion of the program.

--end--

**Clean Heat Woodstove Exchange - State Contacts
Not For Public Distribution**

Connecticut - Mr. John Bartok
Engineering Department
University of Connecticut
Storrs, Connecticut 06269-4087
(203)486-2840

Maine - Mr. Jim Connors
Economic Division State Planning Office
State House Station #53, Hallowell Annex
Augusta, ME 04333
(207)624-6040

Massachusetts - Ms. Suzann Schulze
Division of Energy Resources, Suite 1500
100 Cambridge Street
Boston, MA 02202
(617)727-4732

New Hampshire - Mr. Woody Keeney
Governor's Energy Office
57 Regional Drive
Concord, NH 03301-8506
(603)271-2771

New York - Mr. Greg Dolan
New York State Energy Research
and Development Authority
2 Rockefeller Plaza
Albany, New York 12223
(518)465-6251

Rhode Island - Ms. Julie Capobianco
Governor's Office of Housing, Energy &
Intergovernmental Relations
275 Westminster Mall
Providence, RI 02903-3415

Vermont - Mr. Norm Hudson
Department of Public Service
State Office Building
120 State Street
Montpelier, VT 05620
(802)828-2393

MEMORANDUM

To: NRBP Steering Committee

From: Rick Handley/Tom Critzer/Steve Morgan

Subject: Steering Committee Meeting

Date: December 16, 1993

Attached is the Agenda for our next steering committee meeting. The meeting will officially get underway at 10:30 am. For those of you that are arriving early we will have coffee and baked goods to go along with some informal networking with your counterpart bio-energy representatives. At 10:30 The Program Manager's Report will include a briefing on: the Governor's Round Table; national bio-energy activities; and a discussion of your role in preparing a report on 10 years of state bio-energy programs. At noon we will have a catered lunch. As has been the custom in the past, we are asking that you contribute toward the cost of the lunch. At 1:00 we will have a speaker or speakers to discuss opportunities and barriers to co-firing wood and coal in the Northeast. We will conclude our day at 3:30 we will discuss potential new regional projects funded from our FY93 funds. If you have a project that you would like to submit for consideration, please send it to Rick by January 3rd so that we are able to get a copy of the proposal to steering committee members before the meeting. Attached is a recommended format for submitting regional projects to the steering committee.

Day two is reporting day. Steve will start things off with an update on all our regional projects not covered in detail in the afternoon. State reports will start at 9:30 and every state has 15 minutes to report on the highlights of their programs. Tom and Rick, mostly Tom, are putting together a summary of all the state projects so that each of you knows what is going on with your neighbors. Rick is inviting several guests to come and hear the reports. He is trying to get representatives from EPA, DOE, Forest Service, and the state's Washington representatives to come and learn more about the NRBP. Again on day two we will have a catered lunch. At 1:00 we will begin detailed reports by three of our current contractors and concluding around 3:15 to 3:30.

Those of you that would like any assistance with travel from or to the train station or the airport feel free to give Tom or Rick a call.

We look forward to seeing you all again and to a productive two days.

AGENDA
NRBP Steering Committee Meeting
January 10 & 11, 1994 Annapolis, MD

Monday January 10

9:00am	Coffee and a friendly Maryland welcome
10:30am	Program Manager's Report - Rick Handley
Noon	Lunch
1:00pm	Long range planning discussion with invited guests: Wood/Coal Opportunities and Barriers in The Northeast - Steve Morgan
3:30pm	New Project Discussion - Rick Handley

Tuesday January 11

8:00am	Technical Projects Update - Steve Morgan Liquid Fuels Pellet Conference Facilities Directory Economic Impacts Lessons Learned Ten Year Retrospective
9:30am	State Reports
Noon	Lunch
1:00pm	Wood Chip Guidebook - Tim Maker
1:45pm	Landfill Gas: Phase I Final Report and Phase II Update - Mike McGuigan
2:30pm	Environmental Externalities Update - Jim Easterly
3:00pm	Wrap-up scheduling next meeting - Rick Handley

NORTHEAST REGIONAL BIOMASS PROGRAM REGIONAL PROJECT PROPOSAL

Project Title:

Project Objectives:

Describe how this proposed project would meet the objectives of the NRBP: to increase the acceptance and utilization of biomass energy; protect the environment; and promote economic development in the region. Describe how the lessons learned from the project are applicable to the entire region/nation.

Approach:

Describe the approach that will be used to achieve the objectives stated above. Include how the objectives would be met, who will be charged with accomplishing the tasks, and how the lessons learned would be deployed.

Potential Partners:

Identify any potential partners/co-funders for this proposed project.

Required NRBP Funding:

Indicate the amount of NRBP regional project funding that will be necessary to initiate this project.

Project Sponsor:

List the names of the organizations and/or individuals who are sponsoring this proposal.