

# Report on a Form: Establishing an Ethanol Production Facility in the Northeast

organized by

Northeast Regional Biomass Program  
Policy Research Center  
Coalition of Northeast Governors

prepared by

Barry R. Lawson  
*Barry Lawson Associates*

December 1994

## **Introduction**

Operating under a grant from the U.S. Department of Energy, the Coalition of Northeast Governors' Policy Research Center administers the Northeast Regional Biomass Program whose mission is to encourage and expand the use of renewable biomass energy. On October 12, 1994 CONEG held a forum in Windsor Locks, Connecticut on the establishment of an ethanol production facility in the Northeast. This forum, organized in cooperation with the U.S. Department of Energy and the National Renewable Energy Laboratory and the Connecticut Office of Policy and Management, was the second of two organized by CONEG. The other, held on September 27 in Philadelphia, Pennsylvania, addressed the issue of co-firing wood with coal in coal-fired electric-generating plants in the Northeast.

Participants in the ethanol forum represented companies that have ethanol-production facilities in other parts of the country; companies that have a stake in the introduction of ethanol production in this region; representatives from the US Department of Energy; regulatory officials from many states; and university and private research organizations. Approximately forty individuals participated in the day-long meeting.

The forum was led by Barry R. Lawson, Ph.D., a professional, neutral facilitator who worked with the group in confirming an agenda for the day, setting and maintaining a schedule for accomplishing the goals of the forum, helping participants determine the principal reasons why an ethanol plant has not yet been built in the region, and identifying the most appropriate steps to getting a facility constructed in the next two years. Dr. Lawson was also asked to prepare a draft report on the forum for review by all participants and, subsequently, to prepare a final report.

Stephen Morgan of Citizens Conservation Corporation documented the details of the forum discussions while Dr. Lawson maintained a flip-chart record of the major points and conclusions of the facilitated discussion. Julia Delain from BioFuels America also contributed notes on the recommendations that emanated from the forum. It is largely from these sources that this report has been prepared.

Eight representatives of organizations which have an interest in ethanol production were asked to help identify the major hurdles or issues that need to be addressed for an ethanol plant to become a reality in the Northeast. All participants had the opportunity to comment on or ask questions of these contributors during the morning and afternoon sessions.

### Purpose of the Forum

The Northeast Regional Biomass Program is an applied research and technology transfer program whose mission is to increase acceptance and application of appropriate biomass energy technologies by the private sector and local governments. The purpose of the forum was for the invited stakeholders to help make recommendations to facilitate the development of ethanol production in the Northeast. A series of recommendations did evolve from the forum, and they are some of the principal results.

### Attendees

The forty participants represented a variety of stakeholders including individuals and organizations who have indicated an interest in developing a biomass-to-ethanol facility in the Northeast. The general composition of the group was as follows:

- Ethanol producing companies;
- Organizations promoting ethanol production;
- State environmental regulatory officials;
- State energy offices;
- Private firms/contractors providing services and/or research to utilities;
- U.S. Department of Energy officials;
- State economic development officials;
- Firms which have feedstocks to convert to ethanol; and
- Northeast Regional Biomass Program personnel and contractors.

A list of individual participants is included in the appendix of this report.

## Schedule of the Forum

The forum opened with an introduction by the sponsors and hosts followed by opening comments on the agenda, schedule and procedures to be used during the meeting. A morning session featured an open-ended facilitated discussion, featuring several individuals who represent current or potential ethanol producers. Clarifying questions and comments from all participants led to a list of specific reasons why ethanol production has been slow to develop in the Northeast. Simultaneously, the dialogue illuminated a number of important factors related to ethanol production, use, and environmental effects, including ethanol's relationship to petroleum and methanol.

In the afternoon participants heard a brief presentation by Joel Gordes of Connecticut who suggested several creative ways for encouraging a wider group of investors to participate in ethanol production and to rehabilitate existing sites or facilities for ethanol production. Then, led by the facilitator, all participants discussed in some detail the several hurdles to ethanol development identified in the morning. With these observations as a back-drop, the forum then developed a series of recommendations for action by the Northeast Regional Biomass Program and others to achieve the goal of obtaining a commitment from some company or organization in two years to construct an ethanol production facility in the Northeast.

## Principal Conclusions

By way of background, ethanol is basically alcohol -- a member of the methane family. Ethanol can be produced by fermenting organic materials. Feedstocks can be vegetables, agricultural and food wastes, cheese whey, wood waste, forest biomass including brush and other vegetative materials, removed from forests to facilitate growth of higher value species, and many others. Ethanol can be and is produced from feedstocks indigenous to the United States. Ethanol can be used as an additive to, or in pure form, as an auto/truck fuel. Ethanol is thus, potentially, an economically desirable substitute for imported petroleum products -- especially in the Northeast which depends heavily on fuels refined from Middle Eastern petroleum.

When forum discussion began, it was assumed that formidable hurdles needed to be overcome for an ethanol facility to become a reality in the Northeast. During the discussion, however, it became clear that although an ethanol plant had not been built, it was just a matter of time before one would be. Companies are already screening possible sites in at least two states, and the prospects for development are positive. Therefore, the focus of the forum shifted to understanding the factors that would encourage and accelerate such development, including the strengths of the Northeast states in that direction. The initial discussion covered some of the major reasons why an ethanol facility had not been built to date.

### Factors That Have Favored Ethanol Development in Other Regions

- Ethanol plants have depended, to date, primarily on grain (i.e., corn), and there is little grain available in the Northeast.
- Only recently has new technology become available for using feedstocks other than grain.
- The use of waste paper has not been promoted as a feedstock (to some degree this is a waste management issue).
- Technical risks (associated with a new technology) have driven up the cost of capital and construction costs (to mitigate risk).
- Permitting is more problematic for a first-of-a-kind plant.
- Investors have to be assured that there is a market for the ethanol produced, as long-term contracts are generally unavailable.
- Officials in some Northeast states may need additional information to be convinced of the lower emissions from ethanol plants.
- No commercial demonstration utilizing a cellulosic feedstock (biomass) has been made in the Northeast.
- The biomass-to-ethanol process is not familiar to state officials, who may incorrectly consider it incineration (as applied to waste paper).
- A current lack of properly equipped service stations means that product distribution would be problematic for neat (pure ethanol) fuel.

### Factors Favoring Ethanol Development in the Northeast

- Ethanol production is a natural for the Northeast given the large amount of biomass waste feedstocks.
- Requirements regarding reformulated gasoline in the Clean Air Act for 1995 may positively affect the market for ethanol.
- The Northeast is a leader in exporting technology. The region cannot afford to sit and wait, but must be proactive.

## Other Related Facts and Issues

- A need to keep production costs low implies the use of waste feedstocks.
- Biomass conversion needs to be considered as waste stream recycling in order to get valuable credits from state-mandated recycling rate goals (or landfill diversion programs) for any materials diverted to a biomass conversion facility.
- There is likely to be natural competition between the use of wood waste for ethanol feedstocks and other forms of recycling.
- The competing petroleum industry strongly protects its market.
- Scattered sources of biomass means potentially costly transportation. A fifty miles radius is about the economically maximum range for hauling biomass from its source to a plant.
- Although biomass feedstocks are available, there may be increasing competition with incinerators, which are replacing landfills and which are seeking these feedstocks to keep running.
- Ethanol plant development is essentially a financing issue. First question: Is a proposed plant economically viable? Second question: Can one raise the necessary money? Two financing options exist: (1) recourse (in-house) financing which is easiest but least likely; and (2) non-recourse financing from a bank or other source of capital. A bank will be interested in a developer having control of the site for at least the length of any loan. It will also be interested in the developer's prognosis for success with regard to permitting, a sensitive issue given the NIMBY environment, and given available infrastructure and transportation. Good quality contracts with reputable organizations for periods of time at least as long as the term of a loan for feedstocks and for markets will also be important. With regard to technology, it is desirable to have guarantees or warranties with construction contractors. The bottom line is that the lending people have to be satisfied.
- Facility development can also be viewed as a two-fold process. From the developer's point of view, locating a reliable feedstock, providing satisfactory technology, and dealing with facility siting are key. From the financing point of view, the cost of capital, obtaining necessary permits, and identifying markets are key. State regulations can hinder or help a developer according to the ways in which the state categorizes its wastes as reusable or not.
- Ethanol can be used as a fuel as (1) a blend with gasoline; (2) to produce ETBE (which can also be blended at 10% with gasoline); and (3) as a pure fuel (neat).
- Pure ethanol is better overall for emissions than ethanol used as an additive, at the additive levels used today. And both are better than straight gasoline.

- To run an engine with 85% ethanol, an engine needs some modifications -- to affect the air-to-gas ratio -- at an expense of about \$300.
- Ethanol provides fewer BTUs per gallon than "normal" gasoline, but there is no real difference in automobile mileage by using a mixture. The net effect of ethanol is that it is more energy efficient, but one needs more of it for a combustion engine.
- California is aggressive in the use of methanol primarily because of poor air quality (two-thirds of the state is out of compliance with the Clean Air regulations). More than 10,000 methanol-using vehicles are on the road. The state also has a serious waste problem, over one million tons of rice straw and hulls as well as other biomass being available. Combined with the state's economic problems, there are great incentives for using indigenous fuels.
- California is a single entity. In comparison the Northeast has many states which means that to be successful in developing an ethanol alternative, these states will have to cooperate.
- Ethanol plant siting studies focus on transportation costs for feedstock, but variations in construction and labor can become factors, transportation costs being essentially equal.
- How much biomass is needed to fuel an ethanol plant? For a 15-million-gallon plant, 500 tons of fuel are required every day for 330 days per year. A 7- to 7.5-million-gallon plant would be about the smallest that would be built given economies of scale.
- A capital cost of about \$4 per gallon of capacity can be assumed for a non-grain feedstock ethanol production facility, but the specific costs will vary given local conditions. The cost could be less if there are opportunities to retrofit some equipment or recycle facilities.
- One can assume that different biomass feedstocks would be used at different times of the year, given the seasonality of some sources.
- If one were to depend on fast growing trees (biomass crops), a 5- to 7-year lead time would be required; reliance on sustainable biomass would be essential initially. Certainly, one would use the cheapest options for feedstock first.

#### Detailed Discussion of Selected Issues and Recommendations

Several issues emanating from the morning session were selected for more extensive discussion in the afternoon portion of the forum. Twenty specific recommendations for CONEG action were put forth by various participants; however, they do not necessarily reflect consensus among all participants. These recommendations are highlighted, and could become the foci for actions to be taken by CONEG or by others, including participants in the forum.

## A. Feedstocks

So far there are mixed opinions among states on possible feedstocks, and experience will tell what feedstocks are most appropriate, economical, and available. It may be challenging for a developer to identify a feedstock provider with whom to write a long-term contract given that contracting with trash haulers may be problematic, and municipalities and regional groups operate on a spot market basis. A subsidiary of Champion Paper in Texas has developed a long-term contract for feedstock with the City of Houston.

**RECOMMENDATION #1 - CONEG should support the U.S. Department of Energy's initiative for using biomass for ethanol production.**

Feedstocks may be more easily obtained from the agriculture sector, foresters, and the pulp and paper industry.

A C. T. Donovan Associates report can help describe the type of biomass that will be available for ethanol production in the Northeast. However, greater detail is needed. It would be useful to have this type of information available from one source and at a low cost.

**RECOMMENDATION #2 - CONEG should conduct an assessment of available feedstocks in the Northeast.**

## B. Technology and Engineering

The basic question for creditors and regulatory agencies is, has this type of facility been built before?

**RECOMMENDATION #3 - CONEG should help with finding funding for promoting and spreading an understanding of ethanol technology and engineering.**

Financial risk is a key issue. One idea is to get state governments to use ethanol fuel in their automobile or state (piston) aircraft fleets. Another risk-reduction strategy could be to use corn, a proven feedstock, along with biomass.

One way to reduce the capital costs, at least initially, would be to build an ethanol plant modularly. In this way, a plant could be started on a small scale, perhaps for as little as \$14 million rather than the typical \$50-100 million.

**RECOMMENDATION #4 - The Northeast governors should consider joining the Governors' Ethanol Coalition (GEC) that currently represents 19 states.**

The GEC has already demonstrated interest in developing strategies for economic development in the Northeast, has generated information on the economic benefits of cellulosic ethanol, and could provide information that will help the Northeast learn more about ethanol production and use. The Governor of Nebraska is the chairman of this group, which is not exclusively representative of corn-producing states.

**RECOMMENDATION #5 - CONEG should also support, as has the U.S. Department of Energy, the creation of a proposed ethanol institute, and suggest its possible location in the Northeast.**

#### C. Ethanol Plant Siting

About twenty acres are required for an ethanol plant. This includes a plant site of 2 to 4 acres plus sufficient space for storage of feedstock, turnaround area, and a buffer zone. A list of siting requirements may be obtained from National Renewable Energy Laboratory (NREL). In some states, e.g., Oregon, site development and siting control are managed through a specific state agency or commission.

**RECOMMENDATION #6 - CONEG should support the preparation of siting studies in the Northeast.**

**RECOMMENDATION #7 - In anticipation of possible NIMBY problems with facility siting, CONEG should support the preparation of an issue paper that describes the types of issues that potential opponents and other stakeholders may raise regarding a proposed ethanol plant.**

Agencies that are already working on siting ethanol facilities in the region could be approached for assistance.

**RECOMMENDATION #8 - Using an assessment of available feedstocks (see Recommendation #2), CONEG should evaluate ten sites for an ethanol facility, performing necessary studies, assisting in understanding what permitting would be necessary to get the sites ready for a developer, and analyzing the top five biomass feedstocks.**

Siting studies are currently underway in New York and other states.

#### D. Capital Costs and Availability

Hawaii has floated a bond to generate low-interest loans for the development of ethanol facilities in that state. This has been done in anticipation of the loss of sugar jobs, and the cost to the state will be offset by unemployment claims avoided.

Venture capital is not needed for an ethanol plant. Banks (and insurance companies) are suitable sources of capital. Fifteen percent is the minimum "hurdle" or discount rate for a typical project, while a 20% rate of return is a typical goal.

**RECOMMENDATION #9 - CONEG, or each Northeast state, should either offer low-interest loans for plant development or ante-up funds to help reduce debt and/or provide equity to a plant developer.**

**RECOMMENDATION #10 - CONEG should develop a list of all agencies that could serve as sources of capital or of low-interest loans. At the same time, CONEG could identify and inform other CONEG programs (beyond the Biomass Program) of the potential for ethanol and enlist their support and coordination.**

#### E. Permitting of Plants

One should not underestimate the time required for obtaining permits or for meeting monitoring requirements. One possible way to alert regulatory staffs and better prepare ethanol developers' proposals would be to run a prototypical plant plan through the state environmental process to establish the infrastructure for evaluating an ethanol plant and show how a plan for obtaining permits would work. New York and Connecticut indicated that this may be difficult, if not impossible, given their specific requirements for permit applications. Some way needs to be found to help developers and the states to prepare for such proposals.

**RECOMMENDATION #11 - CONEG should develop a state-by-state description of the likely ethanol plant permitting process for developers.**

**RECOMMENDATION #12 - CONEG should provide each state's permitting staffs with information on ethanol facility siting before an actual proposal is submitted.**

#### F. Markets

Ethanol can be used either for ETBE feedstock for refining or for neat fuel (pure ethanol).

**RECOMMENDATION #13 - CONEG, or the state governors, should encourage/persuade petroleum refiners to add ethanol to their gasoline.**

Minnesota, Wisconsin and Hawaii use a "producer's credit," that is, they provide a guaranteed payment per gallon produced.

**RECOMMENDATION #14 - CONEG, or the state governors, should sell the idea of using neat ethanol for state-owned automobile or piston aircraft fleets to help stimulate and/or create a market and help build a market distribution system. Alternatively, the Northeast states should consider a minimum annual purchase of ethanol.**

If each Northeastern state would purchase a share of the output of a regional ethanol plant, this would help secure a market, thereby mitigating risk and making the project more attractive to investors. One must consider that qualified mechanics and emission testing sites would be necessary. However, a refueling infrastructure might be simpler, initially, for state-owned aircraft.

#### G. Promoting Biomass as a Feedstock and Overcoming Petroleum Industry Opposition

The petroleum industry is waging a campaign emphasizing the downsides of ethanol as a fuel, and this campaign needs to be offset with objective information. One problem is to find the money for such a campaign to overcome this so-called "credibility problem."

Several steps can be taken along these lines. First, the ethanol institute, although it will not be lobbying, can contribute to the goal of improving the credibility and explaining the reliability of ethanol. Second, labor groups should be approached, as should such environmental groups as the Sierra Club, who have only looked at the downside of corn-based ethanol without examining the positive aspects of biomass-based options. The Northeast states need information about the benefits of ethanol from biomass in relation to the production and use of other fuels.

**RECOMMENDATION #15 - CONEG should take a leadership role in endorsing ethanol at the federal and state levels. The case should be made that ethanol is a superior fuel alternative, based on its renewability, such environmental benefits as mitigating global climate change, and economic value in creating new jobs and economic activity in the Northeast.**

**RECOMMENDATION #16 - CONEG should reach out to other stakeholders in the region, e.g., labor unions and environmental groups, to educate and involve them in future discussions about ethanol production and use in the Northeast.**

**RECOMMENDATION #17 - CONEG and/or the states, should support the U.S. Department of Energy's budget initiative to build an ethanol plant in 1996.**

H. Building an Ethanol Infrastructure

It was suggested that in New York State, for example, there are a number of defunct pipelines that might be used as conduits for ethanol as an alternative to trucking.

I. Understanding Waste Streams

It could be useful to develop diagrams of waste streams for materials that can be used as biomass feedstocks. This could be helpful in the permitting process, especially for such emissions as CO<sub>2</sub> whose capture could be beneficial.

**RECOMMENDATION #18 - CONEG should ensure that the legislative and regulatory policies of each of the Northeastern states will credit biomass-to-ethanol as an appropriate recycling process for all cellulosic materials including, but not limited to, C&D wastes, waste paper, waste wood, paper mill sludge, food processing wastes and residues. All incentives applying to recycling or reusing these materials would also apply when these materials are converted to ethanol.**

J. Farm Bill Considerations

Congress will be revising the Farm Bill soon. The U. S. Department of Energy and the U.S. Department of Agriculture have a new initiative for producing "energy" crops. In addition, forest residues as a feedstock might be promoted in the Farm Bill.

**RECOMMENDATION #19 - CONEG should consider suggesting ways in which the Farm Bill could provide incentives for biomass production.**

K. Other Considerations

**RECOMMENDATION #20 - CONEG should consider sponsoring a study of the jobs created and other benefits related to the development of ethanol and the use of biomass feedstock in its production.**

## Partnerships and Commitments

At the conclusion of the forum, the participants considered a number of initiatives that each would be willing to undertake, either individually or collectively. Among those identified during the session are the following:

- Arkenol (an ethanol producing company) is currently pursuing the development of potential ethanol facilities around the United States and in the Northeast. Two sites are being examined in New York and another in New Jersey. The company expressed an interest in looking at other projects and sites in the region, and is "aggressive" in this pursuit.
- The Northeast states and the New England Regional Department of Energy Office will work together to maintain a dialogue on ethanol development.
- The list of recommendations from this forum should be distributed to interested parties.
- C. T. Donovan and Associates will be pleased to share information it has gathered on the availability of biomass feedstocks.
- The Department of Energy (Headquarters) and NREL will continue to be major contributors to the development of ethanol production.
- Stone and Webster is involved in a number of ethanol-related projects, many of which are sponsored by public monies. The results of these studies are "public information" and can be used by all. Some of these projects' reports are not yet complete, but are expected soon through the Department of Energy.