

Biomass Stakeholder Views and Concerns: Environmental Groups and Some Trade Associations

Elizabeth Peelle
Energy Division
Oak Ridge National Laboratory

Date of Issue: January 2000

Prepared for
Office of Transportation Technologies
Office of Fuels Development
U.S. Department of Energy
EB 52 03 00 0

Prepared by the
Oak Ridge National Laboratory
Oak Ridge, TN 37831-6422
managed by
Lockheed Martin Energy Research Corp.
for the
U.S. Department of Energy
under contract number DE-AC05-96OR22464

Available electronically from the following source.

Web site: www.doe.gov/bridge

Reports are available in paper to the public from the following source.

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 1-800-553-6847
TDD: 703-487-4639
Fax: 703-605-6900
E-mail: orders@ntis.fedworld.gov
Web site: www.ntis.gov/ordering.htm

Reports are available in paper to U.S. Department of Energy (DOE) employees, DOE contractors, Energy Technology Data Exchange (ETDE) representatives, and International Nuclear Information System (INIS) representatives from the following source.

Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831
Telephone: 865-576-8401
Fax: 865-576-5728
E-mail: reports@adonis.osti.gov
Web site: <http://www.osti.gov/products/sources.html>

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, makes 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.

Table of Contents

Executive Summary	v
I. Introduction	1
II. Methods and Approach	1
Developing the Study Design	2
Developing the Interview List	2
Creating a Sampling Strategy	3
Developing the Discussion Agenda	4
Collecting the Data	4
Limitations and Caveats	4
III. Views on Biomass & Bioenergy	5
General Views on Bioenergy and Biomass	6
Differential Views on Various Biomass Feedstocks	7
Costs of Bioenergy and Biomass Fuel Cycles	8
Conversion of Biomass to Bioenergy: Cofiring	8
Concerns about Land Use and Vulnerable Areas	9
Questions and Requests for More Information	10
Comparisons Wanted	10
IV. Issues	11
Global Warming - a Driver Issue	13
Variation Within and Between Groups	14
Sensitive Issues	15
V. Discussion and Assessment	16
VI. Conclusions	19
VII. Recommendations	20
Research and Analysis to Enable Life Cycle Analysis of Net Benefit	21
From DOE to External Stakeholders	21
Interaction and Involvement with External Stakeholders	21
From External Stakeholders to DOE	22
Acknowledgments	22
Appendix A. Discussion Agenda	23
Appendix B. Interview Notes	25
Appendix C. Groups & Individuals Interviewed	49
Appendix D. Information Requests & Questions	53

Executive Summary

This exploratory study of the views and concerns of 25 environmental organizations found high interest and concern about which biomass feedstocks would be used and how these biomass materials would be converted to energy. While all favored renewable energy over fossil or nuclear energy, opinion diverged over whether energy crops, residues, or both should be the primary source of a biomass/bioenergy fuel cycle. About half of the discussants favored biomass “in general” as a renewable energy source, while the others were distributed about equally over five categories, from favor-with-conditions, uncertain, skeptical, opposed, to “no organizational policy.”

Considerable concern was expressed in the discussions about land use implications of energy crops, especially since increasing land areas for this purpose could affect marginal and ecologically sensitive areas (wetlands, wildlife habitat) and Conservation Reserve Program (CRP) lands. The environmental impacts of developing/growing/ harvesting biomass crops and the collection of residues and wastes for conversion were discussed as well as chemical inputs to crops, and impacts on soil, water, and air. Possible impacts upon national forests and use of forest residues drew much concern, as did use of municipal solid wastes.

Conversion technologies, particularly burning of wood and cofiring of wood or residues with coal, drew great interest and questions. About half of the discussants “had no problem” with burning trees, while others expressed concerns about bad experiences with incineration.

Most discussants were full of questions about every aspect of bioenergy fuel cycles and asked for more information. (See details in Appendices B & D). We found a highly variable information base about biomass and bioenergy which affected the study design. Discussants asked for comparisons among biomass sources and between biomass and other fuels.

Issues raised most often within our discussion agenda included sustainable agriculture and forestry, sustainable energy systems, and biodiversity. More issues were volunteered outside of the discussion agenda: land for food vs. energy, subsidies for fossil and nuclear energy vs. equalizing the playing field for renewables, centralized vs. distributed energy systems, how bioenergy fits with utility restructuring, visions of bioenergy futures, who will benefit from biomass programs and subsidies, and scale and size issues.

Values and concerns driving these responses appear to be within the context of moving toward an energy future based upon renewable resources. Other driver issues included concern about global warming and the global carbon balance; developing sustainable energy, agricultural and

forestry systems; and doing so in ways that enhance (or at least do not further damage) biodiversity.

Internal organizational issues and strategies are already impacting these stakeholders' reactions to and interest in bioenergy. For instance, groups working on global warming policy and legislation support development of bioenergy. The Sierra Club's campaign to end logging in the national forests and the several campaigns to upgrade or close old coal power plants (Izaak Walton League and others) probably raise obstacles or deflect policy away from biomass. Concern over effects of global warming on wildlife habitat (World Wildlife Fund and National Wildlife Federation) may push toward acceptance of biomass programs.

Sensitive issues and those which raise intense concerns have the potential to slow or stop program development. These may include: municipal solid waste (MSW), genetically modified organisms (GMOs), forest and forest residue use, cofiring as incineration, cofiring which extends the life of old polluting coal plants, and certain aspects of land use involving marginal and CRP lands.

Most of these stakeholders can be described as waiting hopefully for the promise of bioenergy to be demonstrated, but a sizeable minority are (influential) skeptics about the prospects. All want to have more information and analysis of the status, progress and prospects of biomass and bioenergy. The window of receptivity to information and dialogue is open now, but probably not for long.

Recommendations propose research and analysis to produce balanced information on net benefits of bioenergy fuel cycles, tailored outreach to external stakeholders, extended dialogue and involvement of stakeholders including periodic bioenergy/biomass roundtables, and developing the vision of bioenergy futures and various scenarios for achieving these futures.

I. Introduction

Now that biomass development within the DOE is approaching the scale-up demonstration phase as part of setting up renewable energy fuel cycles, the views and concerns of various constituent stakeholders assume more importance. The external stakeholders considered here are national and state environmental organizations with interests in renewable energy. To identify stakeholder concerns, exploratory discussions were held with persons representing selected national, state and local environmental organizations. Some industry and grower-producer stakeholders were also contacted in one corn producing state and in Washington, D.C.

Knowledge of both internal and external stakeholders and their interests and concerns will make it possible to define stakeholder interfaces essential to the development and functioning of viable renewable energy fuel cycles.

Discussions were held with persons representing 25 environmental groups and five industry, union and trade organizations. Forty-eight individual discussions and about 60 additional brief contacts were made. Section II describes how the study design and sampling strategy were developed. The views of staff and/or volunteer members on selected topics about biomass and bioenergy comprise Section III. Section IV assesses views on issues, both those solicited in the discussion and those volunteered by the discussants. Section V discusses and assesses the results. Conclusions and recommendations are in sections VI and VII. Appendices include the discussion agenda (A), detailed interview notes (B), list of organizations and discussants (C), and list of information requests and questions generated in the discussions (D).

While the discussions were not complete and descriptions of the organizations are not exhaustive, we learned a great deal about views and concerns of environmental organizations about bioenergy. We offer this account of the exploratory venture.

II. Methods and Approach

This investigation of environmental organization views and concerns on biomass began with exploratory discussions. We contacted a variety of national environmental organizations in order to define the questions and issues of concern and develop a useful method and approach.

The great variability encountered in these discussions helped develop a more inclusive discussion agenda and led to the conclusion that no structured questionnaire could be useful in this first phase of work. Major

differences were found in a) experience and focus of organizations, b) experience and focus of the individual being interviewed (frequent staff turnover is common), c) organizational structure, d) knowledge level about biomass/bioenergy, e) whether staff or volunteers are responsible for policy development and implementation, and f) whether the organization was local, state or national in scope, among other factors.

Developing the Study Design

On the basis of this knowledge, the study design and sampling strategy selected were adapted to encompass the range of variability of the major types of organizations, differing knowledge levels of staff and volunteers about biomass, and differing issue focus of the organizations. Geographic diversity was not pursued because of the limited resources of the effort.

Knowledge levels about biomass varied from highly detailed understanding about carbon dioxide levels, air quality goals and regulations relative to global warming actions; specific knowledge of biomass energy substitution potentials for fossil fuels; to no background in biomass at all. Discussants in the latter category often requested information and even a short tutorial in biomass characteristics and potentials. Thus the basis for discussions about biomass was highly variable and the resulting views and concerns about biomass should be considered accordingly.

In order to get started, it was often necessary to answer queries such as “What is biomass?”, “How do you get energy from crops and wastes” and “What sort of environmental impacts are there?” But having just supplied much of the person's knowledge base about bioenergy, we had to forego a more structured design using the responses in a more quantitative manner. Thus our original plans for more structured question and answer interviews became exploratory discussions.

Developing the Interview List

We used a variety of approaches to develop the list of environmental organizations to be contacted, according to the geographic scope of the organization. For national organizations we relied upon directories of environmental organizations as well as personal and colleague knowledge. This approach quickly produced a list so long that choices were required.

For the initial list of state and local organizations (Illinois, St. Louis, and Charlotte), we consulted phone directories, renewed contacts made in earlier work (1989 - Illinois), and asked our national organization contacts for their state level affiliates or chapters. As the discussions proceeded, interviewees provided the names of other persons and organizations with

relevant interests, which both extended our list and enabled focusing our selection as described below.

Creating a Sampling Strategy

Faced with a large number and wide variety of environmental organizations, we devised a sampling strategy that selected from different structural types, different action modes, and different issues or interests. Environmental organizations differ as to how and by whom policy is set and decisions made, and how they raise the funds to support their operations. They also differ on types of action they pursue (legislation, lobbying, demonstrations, campaigns, educational, policy assessment, etc.) Finally, they differ on their issue or interest focus. For instance, 31 organizations have joined together in the Climate Action Network (CAN), and several have independent or joint campaigns on forest or endangered species issues, or on coal plant cleanup and air quality issues.

By selecting some organizations from each of these major categories, we met our objective of encompassing as wide a variety of types of organizations as reasonably possible. These non-exclusive categories produced some overlap but assured coverage as seen below:

- ! membership organizations where policy is set by elected officers and/or members themselves - e.g., Sierra Club, Audubon Society, National Wildlife Federation, Izaak Walton League
- ! policy organizations supported by public donations but having only passive members (no “members” in the usual sense of the word since members' chief function is to supply money): e.g., Natural Resources Defense Fund, Union of Concerned Scientists, World Wildlife Fund, and Greenpeace. “Environmental charities” is the self-label used by some in their fund raising.
- ! conservation organizations that focus primarily on land, water, and wildlife issues, e.g., Nature Conservancy, Izaak Walton League, Audubon, National Wildlife Federation.
- ! public interest groups started by or following the Ralph Nader model which organize mail and door-to-door campaigns for financial and member support, e.g., Public Interest Research Groups (PIRGs), Critical Mass.
- ! think tanks or policy oriented, non-membership non-profit groups supported by grants and foundations, e.g., Environmental and Energy Study Institute, Renewable Energy Policy Project, and the Environmental Law and Policy Center in Illinois.

Developing the Discussion Agenda

The discussion agenda (see Appendix A) included a series of questions about general views on biomass, various biomass feedstocks and the details of developing more productive trees and grasses from seed selection to harvesting crops. Specific questions were asked about exotic species and burning or gasifying trees for power. The issues list was iteratively developed with the aid of discussants. Early discussants were asked to list issues they felt applied to biomass development and use. As the list was developed and used, later discussants were asked to review the list for any omissions and to select the issues that were pertinent to them.

Collecting the Data

Working down the list of organizations at the national level via a general sampling of the categories and issues listed above, we made two major field trips to discuss biomass views and concerns with national environmental organizations at their Washington, D.C., offices, and one major field trip to state and local level organizations in Illinois. Two short trips to St. Louis, Missouri and Charlotte, North Carolina completed the in-person discussions. The remainder of the discussions were held by phone. Besides direct interviews, we also collected various publications, brochures, reports, and mailings from the people we spoke with about their organization and its programs, and visited web sites.

Limitations and Caveats

Exploratory studies have many limitations since they are begun with partial knowledge and often must end before the explorations are complete. Our limitations include:

- ! possibly one-sided views of an organization based on discussions with 1-2 individuals who may have been either staff or volunteers.
- ! over-representation of organizations with Washington, D.C., offices. Many organizations have headquarters in other cities and maintain primarily legislative or lobbying staff in D.C.
- ! omission of some major environmental groups such as Environmental Defense Fund, Nature Conservancy, and Institute for Local Self Reliance.
- ! limited state-local contact. While brief visits to St. Louis and Charlotte produced a few interviews each, most of the local-state perspective results from work in Illinois. Illinois is a good place to probe opinions of environmental groups, being a top corn-producing state, having both large urban and rural areas, and having a well-developed environmental

network. Illinois is thus an excellent choice for bioenergy interests, but may not be typical of states nationwide.

- ! not all subjects (questions) were covered in every discussion. Some comparisons cannot be made, therefore, because of gaps in the data. Collection of organization material was not exhaustive.
- ! data and information gathered are incomplete and more qualitative than more extended follow-on studies could be.

This report should not be considered the final word about the policies of any organization. Policy formation in environmental organizations is a dynamic process with decisions and new directions being formulated continually. In very large organizations such as the Sierra Club with a member-driven policy process, a few individuals may not speak for the whole organization. For instance, we spoke with three citizen members on the Energy and Agriculture committees but did not attempt to reach dozens of other members of these committees. Our attempt is to show something of the vigor and range of views encountered.

Nonetheless, we learned a great deal and offer the following information, observations, and suggestions.

III. Views on Biomass & Bioenergy

This section summarizes responses by individual staff and volunteers of organizations to our questions about biomass and bioenergy. We asked about their general views toward biomass as well as specific views and concerns about particular biomass feedstock crops, including species selection and development, crop establishment, growth, harvesting and conversion to fuel, power or chemicals. We asked their views and concerns on different types of biomass (agricultural and forest residues, municipal and animal wastes). The discussion agenda outline is given in Appendix A. Comments are identified here by the interview number in the detailed interview notes given in Appendix B and the list of organizations and discussants in Appendix C. Appendix D lists questions and information requests.

Direct answers to our queries are given in the discussants' own words in Appendix B. Brief descriptions of each organization are also given. When using discussants' comments here in the text, we retain the brief, terse note-taking format used in the discussions.

We discuss the wide spectrum of general views on bioenergy, the many requests for more information and comparisons, the long list of questions generated, comparisons of feedstocks, concern for land use and vulnerable

areas, and queries about viability and costs of bioenergy. The issues raised in these discussions are reviewed in Section IV.

General Views on Bioenergy and Biomass

About half of the groups (12) made generally supportive statements, while the remainder were spread along a spectrum ranging from conditional support to opposition. Two or three groups fell into each of five additional categories set up to characterize the spectrum of views: conditional support (depending upon certain particulars), uncertain or under study, skeptical, opposed, and not-an-issue or priority. Categories are not exclusive and some organizations appear in more than one. The groups (identified by interview number in Appendix B) making supportive comments included # 1, 2, 8, 11, 12, 15A & B, 16, 17A, 19, 21, 22A & B, and 25. Comments of those who were supportive include:

- ! Biomass is a bridge to a sustainable future - 19
- ! Favor it at first glance - 19
- ! Energy crops look good - 12, 17A
- ! Good idea - dedicated crops offer job opportunities in rural areas - 15B
- ! Work with all feedstocks until you can decide which are best. Important area to work on - 15A
- ! Biomass is part of a renewable energy scenario. Should not put all our eggs in one basket, though - 21
- ! Want to see biomass take off in Illinois - 17A, 19
- ! Generally favorable. Bioenergy as a possible solution - 22A
- ! Bioenergy should be researched and supported - 22B

Those in the conditional support category said they supported biomass provided it meets certain other conditions such as:

- ! being done in a sustainable fashion - 10
- ! only some types of biomass - 3
- ! if water quality is better than for row crops - 17A

The undecided/uncertain group was:

- ! uncertain about the value and effects of biomass - 14
- ! researching the matter - 4
- ! seeking the answers to “where is the balance on biofeedstock development?” - 3

Those who were skeptical about the value or viability of biomass said:

- ! Looks like Armageddon for native plant species. See problems with emissions - 14
- ! Biomass and hydro - our two problem children among renewables - 9
- ! Expect no alternative fuels until fuel cells or hydrogen arrive. See problems in three areas - 24

Two individuals were opposed to biomass/bioenergy. One said it was a bad idea for the Great Plains and he opposed it - 5A. The other equated biomass with MSW (municipal solid waste), felt it was “still pie in the sky” (and)... haven’t seen any numbers I trust” - 18.

Biomass was not an issue/no policy for three groups. One said that biomass was “not a club priority” - 5C. Another said “not an issue” except indirectly through “our strong support for the Clean Air Act” - 23. A third said they had no formal bioenergy policy but wanted to get involved - 22.

The several individuals who made general statements about organizational policy encouraging the shift to renewables (#9, 10, 11, 15, and 16) were distributed throughout the above categories, from supportive to skeptical.

Differential Views on Various Biomass Feedstocks

Discussants had different and often strongly held preferences when it came to feedstocks. The discussion often centered on energy crops (EC) vs. agricultural and/or forest residues. Some favored one over the other, while others favored use of both crops and residues. Use of forest residues raised many concerns as well as additional related issues (see next section.) Possible use of industrial, animal, and municipal wastes also raised concerns. Most drew the line at municipal solid wastes (MSW) being used as a feedstock, in accord with then-current legislative efforts to define biomass to exclude MSW. Some sample comments illustrate the range of views on this subject:

- ! Favor both EC and agricultural residues at first glance - 19
- ! Favor cellulosic corn-based EC with co-products - 5B
- ! Use of residues and dedicated crops OK if environmental impacts acceptable - 22B
- ! Interested in energy crops but unsure on residues - 5B, 17A
- ! Residues should be used instead of EC - 8, 20, ...on marginal lands - 14
- ! Crop residue use OK but concerned about intensive practices - 10
- ! Crop residues rely on heavy duty monoculture - 4

- ! Favors forest residues included in biomass definition - 1
- ! Some use of forest residues OK - 22
- ! Forest residues a concern/question - 10, 11, 17A
- ! No clearcutting of old growth forests - 1, 5C
- ! Residues are the big story in California: concerned about agricultural wastes and forests - 5C
- ! Leave forest wastes in place - 9
- ! No animal wastes - 17A, 21
- ! Jury still out on animal wastes - 18, a problem - 1, 9
- ! Concern: forests becoming biomass source in 2020-2030 timeframe - 3

Costs of Bioenergy and Biomass Fuel Cycles

A common query received about biomass in these discussions with environmental stakeholders concerned costs, competitiveness and overall viability of renewable fuel cycles. Is biomass feasible? Can a biomass fuel cycle be economically sustained? This general question was offered by individuals from groups #14, 15, 16, 24, and 26 and inferred or suggested by many others. Some discussed subsidies for renewables and fossil energy. Other related comments were:

- ! Biggest concern: renewables are 3-4 times more expensive than fossil fuels - 8
- ! Biggest need is for a market - 11, 26
- ! What is the cost effectiveness of all these energy crops? - 21
- ! What will ECs cost if raised sustainably? - 10

Conversion of Biomass to Bioenergy: Cofiring

As the discussions moved to converting ECs to usable energy, stakeholders were asked their views on burning trees. The process and prospects of cofiring 10-15% biomass in existing coal plants were used as an example of ways in which biomass could reduce air pollution. Many discussants brought up their concerns about or objections to incinerators, citing bad past experiences and anti-incinerator groups that oppose burning of MSW, medical wastes, tires, and other materials. Two groups (#8 and #18) are actively promoting the upgrading or closing of old coal burning power plants that have been exempt from current air quality standards of the Clean Air Act

of 1970. Our discussants were about equally divided between those who favored cofiring and those who thought it was a bad or questionable idea, as seen in these comments:

- ! No problem with burning trees if minimal fertilizer is used -10
- ! No problem with burning trees - 15B, 16, 17B
- ! Supportive of biomass and cofiring - 8
- ! Cofiring is a foot in the door for biomass - 11
- ! Favor upgrading fossil plants to cofire wood - 25
- ! Burning trees is better than growing corn provided energy crops improve water quality - 17A
- ! Big concern in Illinois about burning and incinerators. The third rail in Illinois politics - 5B
- ! Incinerators are a problem for us. Not excited by burning trees - 9
- ! Against burning if some other conversion method possible - 21
- ! Seems like a step backward to be burning trees - 15A
- ! No incinerators - 17A
- ! Oppose burning food and trees for energy - 5A, 18

Concerns about Land Use and Vulnerable Areas

Many discussants expressed concern about the large areas of land that would be required for energy crops. They cited potential impacts, degradation or possible incursions into wildlife habitat, marginal lands, wetlands and other unique areas. Even many who were generally supportive of biomass and bioenergy expressed concerns about some aspect of EC land use. Some of their comments follow:

- ! Concerned about using farmland and natural areas - 20
- ! No wetlands should be tilled for ECs - 6, 20
- ! Use of marginal lands a bad idea. Sounds like Armageddon for native species -14
- ! Concerned about displacing animal habitats as biomass land use increases - 7
- ! Concerned about wildlife habitat - 24
- ! How close will power plants be sited to marginal lands? - 8
- ! "Marginal lands" are not marginal for everyone - 4
- ! Marginal lands should never be farmed. CRP lands should not be harvested if government is paying for them - 5A
- ! Energy crops are a bad idea for the Great Plains - 5A
- ! What lands are being used now for ECs, and in the future? - 3

Questions and Requests for More Information

Almost all discussants requested more information, including comparisons with other energy sources, and costs and viability of biomass and bioenergy fuel cycles. We list below nineteen of the several dozens of questions and requests received, selecting only a few to show the breadth of interest and range of concerns raised. All questions are listed in Appendix D.

- ! Why and how are energy crops beneficial? - 21
- ! Want information: environmental impacts on air, water, soil & public health - 16, 9
- ! What are long-term effects of growing and using ECs for energy? - 21
- ! Want information: all aspects of biomass land use, feedstock development, cultivation and harvesting practices and impacts of conversion. - 3
- ! What kinds of wildlife inhabit tree farms and switchgrass? - 6
- ! What is the biomass emission profile (from combustion, gasifying)? - 8, 1, 14
- ! What's the story on particulates? - 20
- ! Do high levels of nitrogen in alfalfa lead to higher NO_x emissions? - 8
- ! What happens to NO_x when N-rich fuel is gasified in N atmosphere? - 11
- ! Is it really CO₂ neutral? - 4, 8. What about claims about carbon sinks and carbon sequestration? - 4
- ! Will this hurt the national forests? - 15A
- ! Are forestry practices being done properly (re residues)? - 10
- ! Will this affect current overuse of national forests? - 24, 20
- ! What about agricultural and forestry residue use? That's controversial here. - 5B
- ! What's the size of the land area to supply a power plant? What if a hail storm ruins the whole crop in its supply zone? - 8
- ! How much land is this going to take? Sounds like a huge amount - 25
- ! Will raising ECs mean draining more wetlands? - 6
- ! Want to look at the whole fuel cycle - 9
- ! Want balanced information including the downside - 16

Comparisons Wanted

In addition to the many types of information requested by these environmental stakeholders, several requested explicit comparisons among energy crops and between energy crops and other fossil fuels.

- ! What are the carbon releases of ECs vs. natural gas? - 7

Numbers cited in this section refer to the group interview number listed in Appendix B

- ! Want 2 pages info on each biomass option. Want hard numbers - 9
- ! Compare air quality effects of biomass conversion process vs. fossil conversion process - 10
- ! Compare long term effects of biomass with other renewables and fossil fuel systems - 21
- ! Show comparison of energy crops and fairly clean alternatives like natural gas - 18
- ! He hopes to create a biomass hierarchy. Show which are truly green - 8

IV. Issues

We sought to elicit issues of importance relative to biomass from each organization. Though none of these issues could be explored in any depth, our discussants offered comments on those in the agenda and volunteered several more. Many stakeholder comments relevant to the issues below have already been listed in the previous section and will not be repeated here.

No attempt was made to rank or prioritize issues in this exploratory phase, but some were mentioned more frequently. We have arranged the list in Table 1 in order of decreasing frequency of mention. While this exercise is aimed at illustrating the relative importance of issues, we caution the reader that many discussions did not cover all issues, and that number of mentions does not reflect the intensity of concern of the stakeholder.

Table 1 - Key Bioenergy Issues

1. Sustainable agriculture and forestry
 - soil quality
 - water quality
 - air quality
 - national forest logging, use and protection
 - chemical inputs
 - residue use & removal - forests - agriculture including corn stover
2. Sustainable energy systems
 - global warming/carbon sequestration
 - renewable vs. fossil energy
 - ethanol and alternative fuels
 - conservation of energy
 - energy efficiency
3. Biodiversity
 - monoculture
 - genetically modified organisms (GMOs)
 - suitability for wildlife habitat
 - exotic and invasive species
4. Conversion technologies
 - combustion and cofiring
 - combustion as incineration
 - gasification
5. Land use
 - use of marginal, ecologically sensitive or unique lands - draining wetlands
 - use of Conservation Reserve Program lands
 - land use competition
 - landscape effects
 - food vs. energy
6. Economic viability
 - cost
 - subsidies of fossil fuels, biomass
 - competition with fossil fuels, other renewables
 - developing markets, market opportunities
7. Rural economic survival

As seen above, the top three issues in our informal discussions were sustainable agriculture and forestry, sustainable energy systems and biodiversity. Several people responded that all the listed issues were important. The components of issue #1, sustainable agriculture and forestry, received 56 comments, making it the top issue area. Then, if one adds most of the 59 additional comments received on the type or choice of feedstock discussed in the previous section, the components of sustainability were mentioned over 100 times by 19 groups.

The second most frequently mentioned issue, sustainable energy systems, received 51 comments from 23 organizations. All organizations supported renewable energy in principle over fossil energy. Of the 13 organizations that mentioned ethanol, alternative fuels or blended fuels, 4 were doubtful or opposed to generation of fuel ethanol from biomass. Four other groups

specifically favored a shift to cellulosic sources for ethanol. The power of global warming as an issue is shown in the acknowledgment by the most skeptical of our discussants that they would still consider biomass because of the gravity of concerns about global warming.

Biodiversity and its components, the third most frequently mentioned issue, received 30 comments from 17 organizations, including some of the greatest (most fervent) concerns about monocultures, GMOs, and wildlife habitat.

The fourth most commonly mentioned issue was conversion technologies with 23 mentions by 16 organizations. Here it was cofiring and combustion as incineration that brought forth great concerns. To complete the list of issues, economic viability was mentioned 20 times by 14 groups, land use stimulated 17 mentions by 12 groups, and rural economic survival was of concern to four groups.

Additional issues volunteered by discussants included:

- ! Land for food vs. energy
- ! Subsidies for fossil and nuclear fuels and equalizing the playing field for renewables
- ! Centralized vs. distributed energy systems
- ! How bioenergy fits with utility restructuring
- ! How the infrastructure for renewable energy cycles will be created
- ! Who will benefit from biomass programs and subsidies
- ! Need for vision of the future in bioenergy
- ! Scale of operation - differing impacts with size and scale - conversion technology size - base load or farmyard size

Global Warming - a Driver Issue

Along with the desire to move from dependence on fossil fuels to renewable energy, global warming concerns were clearly a major idea impelling groups to interest in and possible action toward enabling biomass and bioenergy cycles. Of the 25 groups selected for discussions in this study, at least six national and one state environmental organization are active on global warming issues. Both NRDC and UCS have been active at the national policy level in support of biomass legislation. The Izaak Walton League lobbied the Senate to pass the Kyoto protocol. Greenpeace has set up research efforts and global warming task forces in preparation for action. Two organizations concerned with wildlife habitat have refocused their efforts to include global warming concerns (World Wildlife Fund and National Wildlife Federation). At the state level, the Missouri Environmental

Coalition has objected to anti-Kyoto actions of the legislature. (Note that we held discussions with eight of the 31-member Climate Action Network.) Some comments from the discussions are:

- ! Energy crops are an important part of the solution to global warming - 1
- ! Goal: help the public recognize the importance of climate change - 7
- ! Global warming is critical so we haven't given up on biomass yet - 8
- ! Global warming is the only area of urgency (relative to biomass) - 18
- ! Concerned about global warming, so I support biomass - 21

Variation Within and Between Groups

While there was general agreement on the importance of major issues, this surface agreement may conceal very different definitions, interpretations, priorities and agendas. Further discussion revealed some of these differences. But an exploratory study cannot probe all the reasons, experiences, and value differences involved. The criteria used were often unclear. More dialogue and interaction is needed to help explore the criteria used by different organizations.

In some cases, priority issues could be anticipated from the group's focus: Prairie Rivers, for instance, was most interested in water quality, wetlands, and all types of runoff, soil erosion, and waterway pollution that could occur. Rural economic survival, not mentioned by most, was of major importance for the National Farmers Union, World Wildlife Federation and a major interest of Environmental and Energy Study Institute. The Izaak Walton League, while focused upon air emissions for the coal power plant project, also said that wetlands impacts were more important than soil impacts.

For some groups such as USPIRG, environmental impacts were primary. They requested a short comparative list of the environmental impacts of each biomass option. PIRG's other priorities in order were global warming, biodiversity, and cost - particularly who pays.

For NRDC, a major player in global warming policy, the carbon balance was the primary issue and other issues such as the net energy balance (of ethanol) were declared to be irrelevant.

Some groups focused upon a single facet of a single issue - e.g., global warming and carbon sequestration (NRDC), while others were multi-issue in focus: concerned about sustainability, biodiversity, and the economics of energy crops. World Wildlife Fund has a major climate change initiative, and said that all the listed issues were important. The WWF discussant listed

first order priorities as rural economic issues, biodiversity and general land use, and sustainability.

In the Sierra Club, known for its vigorous internal debates and struggles over policy issues, energy over-consumption is the key concern of the agriculture committee chair - 5A. He wants energy conservation in lifestyle and in agriculture, and feels biomass development is fatally tainted by the bigness (scale) problem. His negative view of bioenergy crops, however, may not be shared by the Club's executive director who has endorsed high yield agriculture including bioengineered crops in order to save wildlife habitat and wild species - 5D. Other Sierrans were more interested in and supportive of the prospects of biomass and a bioenergy based fuel cycle - 5B & 5C.

Differences between East and West coast environmental views and priorities were highlighted by a Californian, with examples from within the Sierra Club as well as other organizations.

Sensitive Issues

As seen in the concerns listed in the previous section, both old and new highly sensitive areas surfaced. Old issues include sustainability of forests if forest residues are used, and great concern about particular conversion technologies such as combustion because of its similarity to incineration. These sensitivities are heightened by current campaigns by environmental groups such as the Sierra Club's effort to stop logging on all Forest Service lands. Other old sensitivities included wetlands vulnerability and possible harvesting on lands committed to the Conservation Reserve Program (CRP).

New sensitivities included use of genetically modified organisms (GMOs) and use of marginal lands. GMOs were of great concern to discussants #4, 10, 14 - (opening Pandora's box), 15A and 21, and received cautions (more study) or conditional support from #18, 16, 17B and 22B. While some organizations declared GMOs to be outside their priorities or said they had no policy yet (3, 5C, and 17), several others suggested that GMOs are the new "hot button issue" in the environmental arena.

Municipal solid wastes and their potentially toxic components were of great concern to discussants #9, 15A, 17A, and 20. MSW has now been excluded from current proposed legislation defining biomass. Problems with MSW figure prominently in the reluctance about incineration, another sensitive issue.

V. Discussion and Assessment

Though neither the data nor the design of exploratory studies can support extended analysis or firm conclusions, our findings do suggest important areas of concern. Several of these concerns need further study and analysis while others warrant immediate responses and dialogue with stakeholders. Based on the listening and interaction carried out so far, we offer this assessment.

Just what types of biomass feedstocks should be used brought forth diverse views on preferential use of either energy crops, residues, or both. Stakeholder evaluations of energy crops, residues and wastes were made in terms of *expected environmental and sustainability impacts*, as seen in the previous section.

Understanding the “driver issues” and criteria for judgment is an important baseline in dealing with stakeholders. In addition to the two such issues already mentioned (moving from fossil to renewable energy, global warming), it appears that sustainability and biodiversity values serve as “drivers” for environmental stakeholders. We would order them as follows:

1. Moving from fossil energy sources to renewable energy
2. Threats posed by global warming
3. Sustainability of agriculture and forestry practices
4. Sustainability of energy systems
5. Maintaining biodiversity of plant and animal species

We found wide interest but highly variable knowledge base about bioenergy. Most interviewees requested more information. Because the type and amount of information needed varies widely, a tailored outreach and information effort appears desirable. Information should be tailored according to the stakeholder's interest and background.

The current absence of outreach about bioenergy affected our effort in major ways. Because many of the environmental organization staffs knew little or nothing about bioenergy, it became necessary to do initial outreach ourselves, often providing basic tutorials before asking about their views and concerns. These circumstances shaped and altered the research design as described in Section II.

Views about bioenergy and biomass were about equally divided between those generally favorable and those who were conditionally favorable, uncertain, skeptical, opposed or without an organizational policy. There was also a strong trend toward deep skepticism or reserving judgment. Many were skeptical about the proclaimed benign nature of this renewable energy

source and asked for data, “hard numbers” and information about environmental impacts so that comparisons could be made before commitments of support. “Wait and see” describes the stance of many. Both supporters and doubters wanted to know about the economic viability and likely prospects of renewable energy cycles based upon biomass.

Some sources of the observed skepticism include disappointment and impatience with past failures and misfires in bioenergy trials and demonstration projects. Others tap into the current deep national distrust and skepticism of efforts and projects associated with government.

Some asked the “big picture questions” and would like to consider energy goals as envisioned by biomass cycle developers and others. “Where does biomass fit with other renewables? How is this going to be unrolled?” “What will a fully developed biomass fuel cycle look like?” There is need for ongoing discussion of renewable “visions” as well as various scenarios of how to get there.

Asking for “concerns about biomass” brought forth a great variety of responses. Some are general or philosophical in nature while others reflect specific opposition to particular actions or issues. Several groups are involved in long-term campaigns concerning national forest lands policy. Possible use of forest residues was thus a major issue for these groups. Another concern dealt with the difficulty of moving forward with an alternative energy source for which 1) markets are uncertain or non-existent, and 2) most major new pieces of infrastructure and their relationships must be created.

Until now we have not considered the impact of organizational issue focus and strategies upon the data collected here. While the global warming focus of some organizations as discussed is an obvious driver toward support of bioenergy, the impact of other issues and strategies in other organizations is not fully realized. A beginning list of such foci and strategies would include:

- ! campaign to stop logging in the national forests (Sierra Club)
- ! efforts to encourage sustainable agriculture (Sustainable Energy for Economic Development (SEED) groups in Midwest)
- ! campaigns to upgrade or close old polluting coal plants (Izaak Walton League, Illinois Environmental Coalition, Greenpeace and others)
- ! efforts to protect wildlife habitat from land use incursions, and from damage from global warming (World Wildlife Fund, National Wildlife Federation, and many local/state groups)
- ! efforts to protect rivers and streams (Prairie Rivers)

As expected, environmental organizations will evaluate new initiatives such as bioenergy in terms of their core interests and ongoing programs. Their reactions are useful in understanding the decision criteria they use.

These environmental organization programs and internal strategies are already affecting responses seen here. Witness the concerns about forest residue use and impacts upon national forests, cofiring reluctance of some, and the intense interest in emissions data from conversion technologies. Since cofiring with biomass would extend the life of these old, out-of-compliance coal plants, it is hardly surprising that our two most skeptical discussants are directly involved in the effort to upgrade or close down old coal plants.

Responses about concerns may thus reflect both tactical and strategic organizational interests as well as major internal organizational differences about issues and priorities. Ongoing internal conflicts between “purists” and “pragmatists” were acknowledged in more than one organization. The former typically pursue principles and sharpen differences while the latter may seek compromise and partial wins in the interest of “getting something done.”

Most environmental stakeholders are still receptive and quite interested in information about biomass and bioenergy. Their stance could be described as one of hopeful, watchful waiting. They give tentative or conditional support for this developing fuel cycle. They are waiting for results of studies and demonstrations, for help in visioning the structure and operation of the fully developed bioenergy cycle, and for life cycle analysis of net benefits of biomass and bioenergy. The skeptics among them will demand no less, and the good will apparent among the more hopeful will not last forever without some confirmatory results. A window of opportunity for constructive interaction with these stakeholders is open now, but may not last long.

Timing will be important. Several organizations reported they were just now ready to begin paying attention to biomass. Our approach was timely but needs to be followed up promptly with responsive interaction and more complete information.

Intensity of concerns is a key to potential showstoppers. As shown regularly in recent times, it requires only one dedicated, bent-out-of-shape stakeholder to slow down or derail siting and other aspects of project development. Intensity of concern was not the focus of and is not captured by this effort, except in this qualitative assessment. Those subjects evoking more intensity of concern included MSW, GMOs, forest use and forest residues, cofiring as incineration and certain aspects of land use (marginal and CRP lands). There is reasonable prospect of direct conflict with the organizations and other environmental supporters of the coal plant campaigns. Understanding these areas and avoiding such conflicts will require more interaction and consultation with stakeholders.

None of the issues listed in this report could be discussed in depth in this exploratory format. We have inadequate knowledge about issues important

to stakeholders, how these are prioritized in organizational terms, how “driver issues” relate to development of positions, what criteria affect intensity of concern, and how concerns are translated to policy and action. Deeper understanding of these factors and comparative data across organizations will assist in conducting dialogue with both external and internal stakeholders.

Two other points need acknowledgment. We have not analyzed the differences in responses according to whether energy and energy crops/biomass were or were not on the organization agenda. Second, we note that the apparent general agreement we found on many issues left the criteria for organization decisions unspecified. We did not press for clear definitions or fuller understanding in these exploratory contacts. These remain to be clarified in the next phase of investigations and dialogue.

Finally, I interpret the direct requests for balanced information and the many questions as requiring a *detailed life cycle analysis of net benefits*. People want balanced information which acknowledges problems and presents possible negatives as well as emphasizing benefits of untried and untested technologies. More research is needed to answer the detailed environmental impacts questions as well as impacts on land use. Mere assertions of benefit will not satisfy experienced and sophisticated environmental stakeholders. They want to know the basis of both benefits and disbenefits.

VI. Conclusions

This section offers some conclusions about our wide-ranging discussions with environmental, trade group and union stakeholders.

General support for renewables does not automatically translate into support for biomass or bioenergy systems.

Support for biomass is by no means certain among the majority of environmental stakeholders. Their support is hopeful, tentative, and often conditional as they await solid data, answers to questions, and results of demonstrations. Most are looking for more evidence about outcomes.

A strong skeptical stance characterizes some influential environmental stakeholders.

There are diverse views on which feedstocks are appropriate and concerns about how they should be converted to energy. Cofiring raises concerns among some because 1) it may prolong the life of some older, polluting coal plants, and 2) it is seen as incineration by many who oppose that.

Great interest and concern were expressed about environmental impacts, land use impacts, and wildlife and plant habitats.

Certain issues arouse intense concerns. These include use of municipal solid waste, genetically modified organisms, use of forest residues, similarity of cofiring to incineration, and certain categories of land use, among others.

Stakeholders request factual and balanced information about problems as well as benefits in social, environmental and economic venues. A life cycle analysis of net benefit for every stage of the bioenergy cycle is needed rather than one-sided claims of benefit.

Expanded outreach, tailored information and programs to involve stakeholders in dialogue about these issues and concerns is needed.

There is concern and speculation over the size, shape and characteristics of the full-fledged bioenergy cycle that may emerge. Stakeholders should be involved in some visioning exercises with planners, developers, and others as we seek to create a renewable energy cycle and its supporting infrastructure. In this way alternative scenarios can be constructed and discussed from many points of view.

We have inadequate knowledge about issues important to stakeholders, how these are prioritized in organizational terms, how “driver issues” relate to development of positions, what criteria are used in determining level of concern, and how concerns are translated to policy and action. Deeper understanding of these factors and comparative data across organizations will assist in conducting dialogue with both external and internal stakeholders.

The considerable goodwill found in these exploratory contacts is based on hopeful expectation of more concrete data, information and developments to come. How long stakeholders will wait before assuming positions is unknown. A window of opportunity is open now but may not remain open for long in these dynamic organizational settings where organization policies are being continually developed and priorities set.

VII. Recommendations

Based on our contacts and discussions with the stakeholders described, we recommend various actions by DOE. They involve 1) research and analysis to enable answering the questions and information requests from environmental stakeholders, 2) using that information in tailored, factual ways to communicate with, and 3) interact with stakeholders. The latter two

ideas involve information flow from DOE to stakeholders, stakeholder involvement activities, and information flow from stakeholders to DOE.

Research and Analysis to Enable Life Cycle Analysis of Net Benefit

Continue conducting research and analysis to address questions about environmental impacts, sustainability (forestry, agriculture, energy systems), biodiversity, land use and conversion technologies to enable performing a net benefit analysis for every stage of the bioenergy cycle. This analysis should be periodically updated as progress is made and shared with all stakeholders, internal and external.

From DOE to External Stakeholders

Tailored information about biomass/bioenergy and thorough outreach to stakeholders is needed to address their interests and questions in a timely and responsive manner.

Factual rather than promotional information is desired. Evenhanded discussion of problems, disadvantages and costs should be included as well as advantages and benefits.

Interaction and Involvement with External Stakeholders

Stakeholder involvement should be sought in developing and articulating bioenergy visions of the future and a variety of possible scenarios for achieving these visions.

Stakeholder involvement should be sought to help define criteria by which bioenergy effects and bioenergy importance are assessed.

Intensive dialogue with these stakeholders can address their concerns. Dialogue subjects could include sharing the latest research and development findings as well as soliciting input and ideas for ongoing research and problem solving. Since many organizations have not formulated firm biomass positions, continuing dialogue is especially necessary for DOE during this process in order to continue addressing issues that are pertinent.

DOE should address the concerns of many that cofiring biomass in existing coal plants will extend the life of polluting plants that lack emissions controls.

From External Stakeholders to DOE

Sponsor periodic Bioenergy/Biomass Roundtables for stakeholders. Roundtables seem appropriate for this development and demonstration stage before markets are established and the shape of a full renewable energy cycle emerges.

Acknowledgments

We acknowledge and appreciate the help of all the discussants around the country who gave of their time and attention to consider my many questions and requests for information. Their ideas and concerns comprise the bulk of the information in this report.

We received valuable assistance and encouragement from the Bioenergy Feedstock Development Group at ORNL, particularly Janet Cushman, Lynn Wright, Virginia Tolbert, Sandy McLaughlin, and Mark Downing.

Three thoughtful and helpful reviews of the document led to significant improvements. The reviewers were Marty Schweitzer, Bruce Tonn and Ellen Smith of ORNL.

Appendix A. Discussion Agenda

Discussion Points for National Environmental Groups

Views on biomass and using dedicated crops in a renewable fuel cycle

1. FEATURES - about Biomass and Bioenergy

- General views
- Do you see a difference in the many kinds of Biomass?
 - i. dedicated crops (switchgrass, hybrid poplar, willow)
 - ii. crop residues - corn stover, rice straw, sugar cane, bagasse?
 - iii. forest residues - post logging, forest improvement
 - iv. animal wastes
 - v. municipal solid wastes
 - vi. industrial wastes (wood, other organics)
- What about burning/gasifying trees for power?
 - i. converting biomass to power/fuels chemicals
- Do you have interests/concerns about any aspect of biomass feedstocks cycle?
 - i. developing/selecting most productive/hardest stocks
 - ii. manipulating genetic content
 - iii. harvesting crop - coppicing willow, baling switchgrass or alfalfa
- Exotic species - bamboo, kudzu, miscanthus

2. ISSUES

- sustainability
- biodiversity -wetlands
- environmental impacts - water, air, soil quality, wetlands
- global warming
- carbon sequestration
- renewable vs. fossil energy
- others?

ORGANIZATIONAL POLICY ACTIONS, STRUCTURES

- Policy
- Actions - history - plans
- How is policy developed?

Appendix B. Interview Notes

Direct answers to our queries on biomass and bioenergy are given in the discussants' own words. Our somewhat terse discussion notes are in brief, note-taking format. They are largely unaltered except for some re-ordering and occasional clarification of context. Brief descriptions of each organization are also given.

Organizations are grouped together according to the categories used for sampling. These included policy organizations (environmental charities), membership organizations, public interest groups, think tanks, and state and local organizations in three states - Illinois, North Carolina and Missouri. A few discussions with persons in industry, union and trade groups conclude the list. Since discussants often held multiple roles (board member and project X director), we indicate by number (1, 2, 3, etc.) how *many* people were included in the discussion.

Policy Organizations

1. Natural Resources Defense Fund (NRDC) - Washington, D.C.

Often called the legal arm of the environmental community, the organization employs "an interdisciplinary legal and scientific approach to crafting innovative solutions to environmental problems" (NWF Directory of Conservation Organizations-1998.) NRDC has been among the leading environmental groups active in the area of global warming and climate change policy. It was a major contributor to the U.S. positions on global warming at the Kyoto Conference. The U.S. arm of the Climate Action Network (31 organizations) was organized and initially housed in NRDC, beginning in 1993. Discussion held with principal climate change expert.

a. General views: Energy crops are an important part of solutions to global warming. Very involved with global climate change, carbon sequestration, CO₂ balance and sinks, utility restructuring and biomass tax credit. Net energy balance re corn to ethanol is irrelevant. The Carbon balance is the vital thing.

b. Specific concerns

- Need to move quickly to cellulosic based ethanol production.
- Wants more info on air emissions from biomass conversion. Environmental support is needed to pass tax credits for biomass, but environmentalists need this data in order to decide to support it.
- Where should we draw the line on biomass definitions? - ag residues? - municipal solid waste (MSW)? This is key for the anti-incinerator groups.

- Favors expanding definition of closed loop biomass to include forest residues.
- Seeking input on these issues in preparation for drafting legislation.
- Colleagues are concerned with animal waste and chicken litter per Senator Roth's proposals.
- An emerging issue: How does biomass fit into utility restructuring.

2. Union of Concerned Scientists (UCS) - Washington, D.C.

A leading environmental organization with expertise in global warming. While not organized on a membership-chapter basis, UCS helps fund five state level coalitions SEED (Sustainable Energy for Economic Development) in Midwestern and Great Plains states. Discussion with Washington, D.C., community organizer-legislative staff.

a. General views: UCS legislative objectives for 1999 include extending the producer tax credit on biomass, expanding the definition of biomass beyond the current closed loop but not including MSW, increasing the size of DOE's budget on renewables, and inserting renewables portfolio standards (RPS) in utility restructuring legislation.

b. Specific concerns: not asked....discussion foreshortened.

3. World Wildlife Fund (WWF) - Washington, D.C.

Focusing upon protection and rescue of endangered species throughout the world. Uses direct mail to fund campaigns to save particular species (gorillas, pandas, tigers, Arabian oryx) and their supporting habitats and ecosystems. A major international campaign underway in 25 countries on effects and dangers of climate change for health, wildlife, forests, national parks, oceans, the Arctic, etc. In preliminary stages of getting involved in biomass. Working on agricultural issues. Phone discussion: national legislative liaison (formerly first U.S. organizer of Climate Action Network and current WWF member of CAN steering committee).

a. General views

- Objectives of WWF: 1) bring about reductions in U.S. CO2 production, 2) trying to keep fossil fuels in the ground.
- Detailed economic & technical studies underway for WWF re biofuels, cofiring. We're looking at cellulosic sources only.
- Interested in efficiency gains for renewables.
- Presently prefer cofiring of some biomass.
- Wants info on all aspects of biomass land use, feedstock development, cultivation and harvesting practices, impacts of conversion, etc.
- Where is the balance on biofeedstock development? Don't know yet, but seeking the answer(s).

- No position yet on genetically modified organisms (GMOs), all ancillary costs and benefits, or scale issues.

b. Specific concerns

- Worried that forests will become source of biomass in 2020/2030 time frame.
- Rural economic issues are a first line concern.
- Chemical use.
- What lands being used for biomass, to be used in future?

4. Greenpeace - Washington, D.C.

Noted as a worldwide environmental activist organization, Greenpeace has mounted high-visibility campaigns to protest nuclear testing and open seas nuclear transport, commercial killing of whales and seals. Beginning a global warming campaign involving four teams aimed at fossil fuel phaseout. Discussion with national climate change staff.

a. General views:

- Global warming is a major concern now so looking into biomass seriously.
- High awareness of ethanol subsidies and net carbon idea.
- Our short term vision of the future includes wind power and photovoltaics.
- Now examining how biomass fits.

b. Specific concerns

- Is biomass really carbon neutral? What about claims on carbon sinks and carbon sequestration?
- Genetic engineering is a big concern, especially when it involves mixing different life forms (bacteria genes in plants).
- Land for food vs. fuel.
- Crop residues rely on heavy duty monoculture.
- "Marginal lands" are not marginal for everyone.
- Yes, there is a big conflict between the "larger vision" and strategy considerations.

Membership Organizations

5. Sierra Club

This 550,000 member organization is probably the oldest (founded 1892), largest and most influential environmental organization in the U.S. Policy is developed by members in chapters and national committees. Active campaigns include ending logging in national forests, bringing CAFOS (concentrated animal feeding) under regulation, and slowing

urban/suburban sprawl. We held phone discussions with 3 members of the national Energy and Agriculture Committees, and cite statements of the club's executive director from the web.

5A Agriculture Committee chair. - Nebraska.

a. General views

- No use for energy crops or crop residues.
- Very skeptical of it all, including ethanol here in Nebraska.
- Biomass development continues wasteful pattern of energy over-consumption.
- Favors conservation of energy in agriculture and lifestyle.
- Diverse agriculture is healthy agriculture.
- Only exceptions if local and small scale - burning wood for home heating or gasification of biomass for methane on-farm level.
- But manure should be returned to the land.

b. Specific concerns

- Against monocultures.
- Marginal lands should never be farmed.
- Energy crops bad idea for the great plains.
- Worried by federal policies that seek more sources to continue wasteful ways of energy consumption.
- No harvesting of CRP lands if government paying for it. CRP should be permanent grass cover.
- Size is the problem - country subsidizes bigness.
- Objections to burning food and trees for energy.

5B. Energy Committee member - Illinois, and formerly state political chair for Sierra Club in previous state.

a. General views

- Worked on climate change action plan with DNR in former state.
- Now interested in forestry and urban land use issues.
- Favors cellulosic corn based crops with co-products.
- What's potential for combining switchgrass with gasification?
- Interested in energy crops but not so sure on residues.
- Surprised that energy potential of animal wastes is so low.
- Interested in the balance of all renewables.

b. Specific concerns

- Send info on all that stuff - feedstock development, harvesting, herbicide use, residues, MSW, special microbe stews to make more ethanol.

- Special Illinois concern on industrial and municipal incinerators (now banned) and burning things. That's the third rail of Illinois politics.
- What about agricultural and forest residues? Controversial around here.

5C. former Energy Committee chair, California

a. General views

- Biomass not a Sierra Club priority.
- Very different priorities of east coast/west coast Sierra Club members. We're concerned about old growth forests, geothermal resources, national forest use and logging policy; residues the issue.
- Sierra Club has continuing tension between the purists and the pragmatists. We get into policy quagmires regularly on where to compromise. Question is: what is best means to shape public policy?
- Lots of activity in California on ag wastes (rice straw) and air quality. Last year's initiative with tax credits failed. Resolution unclear as yet. Legislature restructuring the area - subsidies for biomass only if there are also environmental benefits.
- GMOs and exotics - not my issues.

b. Specific concerns

- Not clear that energy crops can be sustainable as regards soils and water. What you heard from our Agriculture Committee chair is probably it.
- Forest residues a touchier problem even though new sawdust burners use fluidized bed combustion. Biggest problem is public perception of logging companies' stewardship - colored by their past record. ("Are they really burning slash?")
- It seems unfair to be more picky on crops for biomass than for food.....

5D. Carl Pope, Sierra Club Executive Director - California

a. General views

- Endorses high-yield agriculture including bioengineered crops because high farm yields will help save wildlife habitat and wild species...(Newswire via NewsEdge Corporation - 1.14.99)
- Favors sustainable agricultural production systems that combine high yields with reduced chemical inputs and more biodiversity.will require research and changes in farming practices. ---Sierra Club web site, 1.27.99

6. National Audubon Society - Washington, D.C.

This membership organization is changing from a regional structure to state directors -twenty so far. Primary focus is upon wild bird species, their habitat and safe migration routes in U.S. and elsewhere. Recent national campaigns have included Save the Everglades, wetlands, population, and wildlife refuges. Active local chapters in many states sponsor bird watching, bird counts, educational and other environmental activities. Missouri has 11 chapters, for instance. Interviewed national director for agricultural policy.

a. General views: No time for anything but one issue - wetlands.

b. Specific concerns

- What kind of wildlife inhabit tree farms and switchgrass?
- Do you burn the land in between?
- Will growing energy crops mean draining any more agricultural wetlands? They (agricultural wetlands) are the easiest to convert to other uses and 50% of wetlands have already been lost.
- Changes are coming in Conservation Reserve Program (CRP) lands. Some economic use should be made of CRP's marginal lands.
- Prairie potholes produce 50% of the ducks - all four major flyways go through that area.
- Concerned that recent farm bill dismantled many protections for wetlands.

7. National Wildlife Federation (NWF) - Washington, D.C.

With 46 affiliates in U.S and Canada, NWF focuses upon safeguarding habitat for wildlife. NWF recently added a climate change specialist to its national staff. Members largely interested in hunting, fishing, and outdoor recreation. National meeting in 2000 will be presented with proposed climate change policy and possibly a biomass policy for vote. Discussions with climate change staffer.

a. General views

- Hope energy crops will help slow climate change.
- Want to support alternative transportation fuels.
- Will help public recognize threat of climate change as well as viable solutions to global warming.
- Recognize that some tradeoffs will be needed.
- Likes our approach of asking stakeholder concerns early.

b. Specific concerns

- As biomass share of land increases, will this displace natural habitats?
- What is the balance in displacing agricultural lands (for energy crops)?
- What is the carbon release of energy crops vs. that of natural gas?

8. Izaak Walton League (IWL) - Minneapolis, Minnesota

"IWL has twin goals of educating the public and promoting enjoyment and wholesome utilization of resources." (NWF Directory of Conservation Organizations.- 1998) Originally founded 75 years ago to protect water and streams and to encourage fishing, IWL is now a leader in promoting renewable energy. Organizing power plant campaign for the midwest to require older coal plants to meet air quality standards, foregoing their long-term exemption. National policy is set by a ground-up process starting in chapters, forwarded by state divisions, and voted upon at national meetings. 55,000 members, 2000 in Illinois. Phone discussion with director of coal power plant initiative in Minneapolis, Minnesota. Headquarters in Maryland.

a. General views

- Supportive of biomass and cofiring.
- Windpower is rich resource here but intermittent.
- A greater share for renewables requires a base load power resource.
- Prefer projects that rely on residues rather than dedicated crops.
- We like sustainable agriculture.
- MnVAPP might have survived if they'd been willing to scale back their overly-large plans.
- Developing a biomass hierarchy this summer: Which are truly green? Which are less damaging to the environment?
- Climate change is a concern so not willing to dump biomass prospects yet.

b. Specific concerns

- Our jury still out on animal wastes. Do we incentivise large animal operations if we use their waste?
- Problems with dedicated crops: What if hail storm ruins whole crop in a power plant supply zone? Power plants want indemnity.
- What is the size of the area needed to supply a power plant?
- Farmers grow alfalfa every 4th year here - not every year.
- What are the shipping costs for a 150 mile supply radius?
- Intensive monocultures require heavy chemical inputs and switchgrass is a low value crop.
- Where will the power plants be sited - how close to marginal lands?
- Do high levels of nitrogen in alfalfa lead to higher NOx levels?
- Is growing hybrid poplars in plantations a sustainable exercise?
- What is the biomass emission profile?
- Is it enough better than coal to warrant support?
- Is it really CO₂ neutral?
- Big concern on renewable startup costs. They're 3-4 times more expensive. Going to be a tough sell.
- Demonstration project failures are making supporters dubious.

9. Public Interest Research Groups (national) (PIRGs) - Washington, D.C.

Active chapters on college campuses and in cities raise funds by direct canvassing on campuses and neighborhoods. Issues are often urban oriented, e.g., mass transit, air pollution, toxic toys, ATM fees, etc. Twenty three state chapters are active in 38 states. Discussion with national energy director in D.C. office.

a. General views

- We promote policies that help shift from polluting energy to renewables.
- Not as much problem with dedicated crops (as with forest residues and logging).
- Favor clean energy subsidies and taking down budget caps.

b. Specific concerns

- Biomass and hydro are our two problem children among renewables.
- Incinerators are a problem for us.
- Want to see MSW excluded (from biomass definition.)
- Is it clean?
- What other environmental impacts on land, water, etc.?
- Want to look at whole fuel cycle.
- Forest residues are a tough one...leave them in place. Logging industry uses "forest management" to further destroy the forest ecosystem.
- Very skeptical about this.
- Not excited about burning trees.
- I want 2 p. on each biomass option.....Want to see the hard numbers.

10. Critical Mass Energy Project of Public Citizen - Washington, D.C.

Public Citizen was originally founded by Ralph Nader to encourage citizen action on many fronts. Direct mail campaigns raise funds to support watchdog operations on nuclear power, nuclear plant safety, and nuclear decommissioning. Organization opposes any nuclear expansion and hopes to shut down all nuclear plants. Discussions with D.C. office staffer who is former biomass staff and co-author of *Powering the Midwest*.

a. General views

- Not doing much on biomass except supporting Green e (electricity) and RPS (renewable portfolio standard).
- Generally supportive of biomass as long as it's done in sustainable fashion.
- Excited by the prospect of cofiring and gasification but utility deregulation has stalled these.

- Crop residues are appropriate but concerned on current intensive agricultural practices.
- No problem with burning trees so long as minimum fertilizer is used.
- Rural electric co-ops would be helpful.

b. Specific concerns

- Incineration, toxics and MSW are worrisome.
- Forest residues are a concern. Are forestry practices being done correctly?
- Prefers shift from intensive cultivation practices.
- Concerned about where genetic manipulation is going.
- Want to compare air quality effects from biomass conversion with fossil conversion.

Non-Profit Think Tanks

11. Energy and Environmental Study Institute - Washington, D.C.

A public policy and educational organization dedicated to promotion of sustainable energy sources and sound environmental practices. Begun by bipartisan group of environmentally conscious congressmen in 1984 (spinoff of a Congressional committee). EESI continues to provide policy analysis, assessment and promotion of various environmental issues, climate change, transportation, and energy efficiency and sustainable energy. Knowledgeable about current legislative issues and about Minnesota - MnVAPP background. Interviewed executive director (also member of Climate Action Network steering committee) and bioenergy staff person (2).

a. General views

- Want to see extension of tax credit and expansion of biomass definition.
- Forest activists need more info on biomass and tree crops.
- Another Bioenergy roundtable is needed as follow on to 1995.
- Cofiring is a foot in the door for biomass. Opportunity to bring state energy and ag officials on board. Those ailing farm economies should motivate them.
- Environmental groups sometimes don't see the forest for the trees.

b. Specific concerns

- It's critical to develop markets, especially for residues.
- What happens to NOx when N-rich fuel is gasified in nitrogen atmosphere? Is reburn technology good enough yet?
- Need to ensure no clearcutting of old growth forests. Does forest thinning and use of residues legitimate logging industry?
- More outreach is needed.

12. Renewable Energy Policy Project (REPP) - Washington, D.C.

Funded by various public and private grants, REPP's mission is to assess relationships among policy, markets and the public. Focusing on growth strategies for emerging renewable energy technology markets. Discussions with research director and research associate (2).

a. General views

- We focus mostly on electricity in U.S.
- Don't understand biomass well enough yet.
- Need info and data.
- Favor biomass as an energy substitute for fossil fuels or a carbon sequestration sink.
- Environmental groups look at the negatives more.

b. Specific Concerns:

- What are the criteria by which environmental organizations assess biomass?
- Where does distributed energy fit with biomass?

13. Environmental Law and Policy Center (ELPC) - Chicago, Illinois

ELPC has been selected by the state legislature to manage the renewable energy trust fund of \$250 million (@\$20 M. per year). Phone discussions with grant manager and community organizer (1). (see Sierra Club volunteer #5B).

Illinois Environmental Organizations

14. Sierra Club Woods and Wetlands Group - Lake County, Libertyville, Illinois

Group of 2000 members focuses upon protecting woods, wetlands and endangered species in this rapidly developing area north of Chicago. Monthly meetings, newsletter, web site. Supported the Clean Energy Trust Fund in legislature. Active in CAFOS and Sierra. Won recent victory requiring river setbacks in siting. Energy efficiency is focus. Discussions with chair.

a. General views

- Uncertain about value and effects of biomass.
- Biomass is our biggest energy resource but it's so spread out it's hard to do it.

- Not much sympathy on energy (especially ethanol) in our group: biggest polluters are autos. Ethanol is added to our gas to meet air quality requirements.
- Prefer residues over dedicated crops on marginal lands.

b. *Specific concerns*

- Concerned about switchgrass on marginal lands. That's where our endangered native species are. Lake Co. has 100 endangered species, twice as many as any other Illinois county
- Bioenergy sounds like Armageddon for native species.
- What are byproducts...incidental problems of bioenergy cycles?
- Won't this burden our rural transportation system?
- Hesitant to support cofiring. Reluctant to support coal at any level.
- Emissions will be a problem.
- Opening Pandora's box on genetic manipulation.
- What is feasibility of energy crops?
- What can I do about this here in Lake Co? What fits? Don't see any renewables here except wind resources.

15. Champaign County Audubon Chapter - Urbana, Illinois

Group of 500 members. Organizes field trips, school presentations, education mini-grants to teachers. Discussions with former president and current treasurer (2).

15A. *Former chapter president & current education chair.*

a. *General views*

- Should look for renewables.
- Seems like a step backwards to be burning wood. Going to be a hard sell.
- Work with all feedstocks until decisions on which are usable and which are not. This is an important area to work on.
- Better whenever you can solve two problems at once: burning animal wastes removes a problem and supplies energy. So dedicated feedstock are lower on my priority list because that starts up a new operation.
- Environmental objective is to enable survival of species besides humans.
- Energy conservation is a two edged sword.

b. *Specific concerns*

- Problems with MSW and heavy metals from incinerators.
- Some concerns with tree farms. Will this hurt national forests?
- GMOs concern. Butterflies poisoned by pollen from a GMO corn.
- Will our local switchgrass demonstration take over the native prairie?
- Drawbacks of selective breeding= loss of diversity of genetic material.

- Exotics are a real problem. Hard to eradicate purple loosestrife, garlic mustard and honeysuckle.

15B. Treasurer - Audubon chapter

a. General views

- Government should equalize playing field.
- We need so much energy. We should use whatever we can.
- Look at the most productive ones. Consider economics and what's reasonably convenient.
- Favor more labor intensive options. Dedicated crops offer job opportunities.
- No problem with burning trees.

b. Specific concerns

- Re exotics: Need some good biologists on board to study things and warn of bad effects.

16. Illinois Citizen Action - Libertyville, Illinois

Seeks to slow rapid development of area by developers. 400 member group has actively opposed developer influence in county board elections and appointments and lobbied state legislature about proposed waste management facilities and forest preserve issues. Supported and helped pass Forest Preserve referendum for Lake Co. Defeated plans for waste incinerator for county. Discussions with executive director.

a. General views

- You have to win elections to get things done. That means going door to door with the right script.
- Theory of renewables (biomass) is fine but is it economically viable?
- Enthusiastic about biomass and energy crops. Wanted more info right away to share with group. No problem with burning willow (or other biomass).
- GMO - OK as long as you carry out experiments and don't hurt people. Allow time to judge if it's a safe process.

b. Specific concerns

- Concerned with industrial waste and air pollution. If dried sewage could be mixed with corn stalks (and converted) so pollution was within acceptable limits, that would solve two problems.
- Is biomass economically viable?
- Want to know about environmental impacts on air, water, soil and effects upon public health.
- What part can our organization play? (post-interview phone call). We can do public education with our 501(c)3 arm.

- Want balanced info on biomass, the downside as well as the benefits. Didn't find this in your literature, only in what you told me.

17. Prairie Rivers Network (formerly Central States Education Center) - Champaign, Illinois

Focuses upon Illinois rivers, river habitat, river recovery, water quality, reducing effects of industrial agriculture, runoff and pollution from all sources in rivers. In process of switching from grant and foundation funding to membership organization. Discussions with director and watershed organizer in person plus a board member by phone (3).

17A. General views

- Energy crops look good, especially switchgrass, provided water quality impacts are better than row crops.
- A net decrease in chemicals and runoff desirable.
- Not sure about crop residue use since they help soil and water quality when left in fields.
- Burning trees is better than growing corn but do not favor cutting woodlots and converting to row crops.
- Not involved in global issues or GMOs.
- Would like to see biomass take off, especially in Illinois.
- We'd support anything that restructures current agriculture.

b. Specific concerns

- Don't like burning animal wastes.
- Don't want to solve mega-hog problems by subsidizing that solution for them. Fewer animals are needed.
- Concerned about changing agricultural patterns and chemical inputs to agriculture.
- Absolutely no MSW because of dioxins.
- No incinerators.
- Questions about forest residue use.
- Opposed to use of exotics.

17B. Prairie Rivers Network - board member

a. General views

- If chemical and erosion runoffs are less with biomass, we favor it.
- What is the fully developed form/scenario of biomass for fuels and power?
- If biomass is to be a significant player, have to see the big picture - not just a niche view, but as if biomass were serving as source of most fuels.
- Small gasifiers for animal waste sound reasonable.
- No heartburn over burning trees.

b. Specific concerns

- Is biomass a really viable player? ... not just a *de minimus* player? Let's think it through: Do we subsidize this or hydrogen fuel cells?
- Let's compare environmental impacts. Are those energy crops and trees just huge roosting areas for starlings and crows?
- Current rural and farm devastation needs a more basic level approach - what's happening out there with drought, industrial agriculture, etc.
- Regarding genetic engineering: what are they selecting for and against? Just do it slowly enough to fix your mistakes.

18. Illinois Environmental Council - Carbondale, Illinois

Statewide coalition of 70 groups and individual members. Heavily engaged in campaign to require old coal power plants to meet current air quality standards. Local campaigns spearheaded by board members. Phone discussions with director and coordinator of power plant clean up project (1).

a. General views

- Generally skeptical of biomass. Views shaped 2 years ago as we developed legislation for the Renewables Trust Fund: people generally understood wind and solar but not biomass. Ran into high amount of skepticism about reducing NOx.
- Yes, got UCS reports but it's still pie in the sky. Have yet to find persuasive info.
- My general reaction: quality work needed to show comparison with fairly clean alternatives like natural gas. Infrastructure already there for natural gas.
- See urgency only on the global warming side. That's the unsustainable part.
- But we focus more on SOx and NOx than CO₂.
- Aren't we better off just to shut down coal plants?

b. Specific concerns

- How is this going to be unrolled?
- Will it displace coal? Will burning tires be included?
- Negative experience with cofiring. So far biomass = MSW.
- Two main obstacles for biomass acceptance:
 - bad experience with other fuels - tires, MSW, ethanol
 - ethanol seen by environmentalists as farmer subsidy using more energy.
 - lack of hard data based on experience. Show me where this fits into the energy mix.
- Not crazy about subsidies. You can never subsidize enough when old coal plants are exempt from standards. Would rather level the playing field.
- Genetic engineering needs more scrutiny - increasingly the hot button.

- Uncertain benefits.
- This still sounds like monoculture. Seems better to harvest switchgrass for forage than to burn it.
- My bigger concerns are later on - setting up the infrastructure (for the bioenergy fuel cycle).
- Is this the right country for this? Sounds better for third world country without existing infrastructure.
- Where will this fit in the energy mix? I don't see where it fits. Maybe there are niches I don't know about....

19. Nuclear Energy Information Service - Evanston, Illinois

15 year old organization. Staff eager to work on their second objective - to replace nuclear power with renewable, sustainable power sources. Discussions with director.

a. General views

- Biomass is our viable ace in the hole in Illinois if backers can be found. It's a bridge to a sustainable future.
- Wind & biomass are better than active solar (cadmium).
- Blended fuels are positive.
- At first glance favor dedicated crops and ag residues.

b. Specific concerns

- Unfortunately many environmentalists focus on biomass as a problem. Its reputation is not good in environmental community.
- Emissions are a concern. What about dioxins?
- Need to move to decentralized sources eventually.

20. Izaak Walton League - National Energy Committee chair - Champaign, Illinois

While fishing and clean water resources are still major interests, IWL now has an Energy committee interested in renewable and sustainable energy. Global warming and coal plant grandfathering are concerns. Urged U.S. Senate to ratify Kyoto Agreement. Restoration of Grand Kankakee National Marsh recently proposed. Supporting mitigation measures regarding flooding of Quad Cities landfill next to natural area. Seven of nine members from four upper midwest states. Discussions with chair of national energy committee.

a. General views

- Favors use of residues over energy crops.
- GMO does not bother him.
- Renewables are easier to get at and harvest than coal or oil.

- Fertilizers and herbicides are OK if done right. Farmers now do better at putting on the right amount.

b. Specific concerns

- Worried about doing crops for biomass. This means more farmland and cutting into natural areas.
- Concerned with impact upon national forests. What happens to wildlife when dedicated tree crops grow?
- Concerned that natural areas will be vulnerable to dedicated crops.
- How do energy crops affect national forests that are now being chopped down every 10 years?
- Don't want more wetlands tiled to grow willow or poplar.
- Concerned about toxic components of MSW. Incinerators for power repealed in Illinois on this basis.
- Must energy crops be done on a big scale? Are small operations feasible?
- How do energy crops affect no-till practices? What is the tradeoff regarding erosion?
- What's the story on particulates (emissions)? Assume it's no worse than coal. Use scrubbers if needed to monitor emissions.
- What happens to the leaves and bark of energy crops in burners, gasifiers? What percentage of sawdust, etc. goes unused?
- Transportation of biomass and building more roads would be a problem around here.
- You've got to get to consumers about renewables. They'll determine the course taken.

21. Community Alliance for Protecting the Environment (CAPE) - Bourbonnais, Illinois

Citizen group formed to oppose IDOT plans for bridge over Kankakee River and wetlands has been inactive since recent state elections. Leader hopes to revitalize group and focus on broader energy issues like biomass. Phone discussion with chair.

a. General views

- Favors all renewables - solar, wind, biomass - shouldn't put all eggs in one basket.
- Biomass should be one part of renewable energy scenario. Have them work together.
- Wants basic info on how everything is grown and harvested.
- Why and how are energy crops beneficial? People need this info.
- Educate us about these processes! Liked *Energy Crops Forum* and its examples.
- Thinks rural agricultural development would be advantageous.
- Pleased that energy crops have less runoff than row crops.

- Global warming a big concern.

b. Specific concerns

- Need concrete definition of biomass since people use all different definitions.
- Concerns about ethanol. Never saw it at gas pumps here.
- Worried about chemical inputs to agriculture. What kinds of chemicals used on biocrops? Wants safer herbicides and more efficient ways of using them.
- Against burning if energy can be converted some other way, but wants to know cost effectiveness of all renewable options.
- Huge concerns about using animal wastes - hormones & antibiotics being burned, etc.
- Against GMO, period.
- Vital that no advantage go to logging companies if forest residues used.
- What are long term effects of biomass option vs. others?
- Need level playing field for all energy options or get rid of ALL subsidies.

Missouri Environmental Organizations

22. Missouri Environmental Coalition - St. Louis, Missouri

Originally begun by Barry Commoner in 1969, the Missouri Environmental Coalition now focuses on growth and development issues, chip mill regulation, clean air efforts and animal feeding operations. Organization is changing from an organizational coalition to a membership-based effort. Discussions with acting executive director in person and environmental policy director by phone (2).

22A. Executive Director

a. General views

- No formal bioenergy policy but want to get involved. Want to be more proactive, less reactive. See bioenergy as a possible solution. Web site has link to "sustainability."
- Coalition and Sierra Club suing EPA over noncompliance in regional air quality standards. Autos are 50% of the pollution, coal and refineries contribute the remainder.
- Interest in sponsoring Missouri conference on bioenergy, perhaps with annual State Environmental Leadership Conference (Seattle).

b. Specific concerns

- Bad experience with incinerators at Times Beach and Weldon Springs.

- Concerned about concentrated animal feeding. 6000 Missouri hog farmers gave up last year. Family Farms for the Future - member of our coalition.
- Chip mills in state raise concern re biodiversity. Talked with governor.
- Opposed wetlands development of highway across Missouri River to St. Charles - Page Ave. extension.

22B. Environmental Policy Director (Missouri Coalition)

a. General views

- Generally supportive. Has seen hybrid poplar sites at Westvaco. Heard industrial hemp presentation to governor's chip mill committee. Bioenergy should be researched and supported. Have to get off fossil and nuclear energy somehow.
- Use of residues OK, dedicated crops OK if environmental impacts are acceptable.
- Use of herbicides may be necessary. Want minimum application.

b. Specific concerns

- Are there adequate controls if industrial wastes to be used?
- Animal wastes - hog farms- a big problem here. Proliferating. Something needs to be done .
- High capacity chip mills a problem here.
- MSW a concern. OK if toxics controlled.
- Some use of forestry residues OK. Wants to know about nutrient cycling in forest soils and erosion potential.
- Environmental community has concerns on biotechnology which we share. Go slowly. Urge caution. Avoid charging ahead full speed before effects better understood.
- Prefers native species for energy crops. Avoid disasters with exotics.
- Global warming a concern. We fought state legislature's opposition to Kyoto.

23. Missouri PIRG (MOPIRG) - St. Louis, Missouri

Canvassing neighborhoods for financial support, this college chapter based effort has concentrated upon urban issues such as air pollution, toxic toys, ATM fees, hunger and homelessness. No bioenergy project. 8000 members including students and community members. St. Louis chapter is based at Merrimack Community College. Phone discussion with state canvass chair.

a. General views

- Membership: Students do the majority of our grass roots actions. PIRGs are student run and student funded.

- Our big push this year to be Citizens Right to Know Act. We want toxic list expanded from 120 to? Everything dangerous and toxic should be known. We do yearly neighborhood canvass.
- Biomass not an issue for us, except through Clean Air Act which we support strongly.

North Carolina Organizations

24. Sierra Club - Central Piedmont Group, Charlotte, North Carolina

Concentrates on hiking and outdoor expeditions plus some environmental issues. Discussion with Transportation and Air Quality chairman. I gave a short explanation and information about biomass first.

a. General views

- Wants more info. Will go through the packet.
- Knew of methanol production in Kansas.
- Particularly interested in anything automotive, especially race engines. Expects no alternative fuel until hydrogen or fuel cells become available.

b. Specific concerns

- Three problems I see right off: wildlife habitat, reduction of national forests and soil erosion.
- How much land will this take?
- Interference (of energy crops) with food crops?
- How much will this cost?
- Will this affect current overuse of national forests?

25. North Carolina Wildlife Federation - Charlotte branch, Charlotte, North Carolina

Concentrates on water quality and sustainability issues. Raises funds by door-to-door staff canvassing. Supports a state legislative lobbyist. 47 affiliates in state. Discussions with training director and 5 canvasser staff. As requested by training director, I gave a short tutorial to the group.

a. General view

- Sounds good but we need more info.
- I'd see it supplementing fossil, upgrading fossil plants to cofire wood.

b. Specific concerns

- This is going to take a huge amount of land. How much land will be needed for growing switchgrass?th n roadsidech lan (buuntitid?d. HAs) Tj T* -0.0055

- Can I plant these poplars for biomass....and then what? How feasible are they for home use?
- Concerned about wetlands. Favors no net loss of wetlands in N.C.

Industry, Union and Trade Associations

26. American Bioenergy Association - Washington, D.C.

An advocacy group for bioenergy industry formed in 1997 from American Biofuels Assn. Comprised of industrial corporations processing various bioenergy crops. Discussion with director.

a. *General view.*

- Environmental benefits greatly outweigh adverse effects but environmental organizations worry more about adverse effects.
- Conversations with conservation groups would be very important.
- Bioenergy is in a real updraft now. Proposed cofiring tax credit could be big. Climate change and ethanol could give us a big surge.
- We should "show the promise. Bring out all the evidence."

b. *Specific concerns*

- Major need is for a market.
- Current combustion technology doesn't burn wood very well.
- Scale up factors - too many trucks, etc.
- Biomass has big hurdles to overcome: it sounds too good to be true. Serious communication problems: difficult, complicated to explain. General public in disbelief: "You're going to burn trees?" Have to explain that thinning forests and growing energy crops is not same as clearcutting.
- Competitive interests spread disinformation. Took a long while to counter the disinformation about ethanol.
- Hope environmental organizations will recognize the scale of the benefit.
- Sustainability is a different concern in U.S. than in Brazil or other developing countries. Using biomass in poverty stricken countries puts more pressure on their natural resources.

27. National Corn Growers Association - Washington, D.C.

Industry group supporting economic interests of corn growers and processors. 31,000 farmer members in 25 state organizations. Delegate body sets policy. States represented in delegate body according to amount of corn grown. Board elected by delegates implements policies and sets budget. Corporate members not allowed but corporate sponsors support research and lobbying budgets. Corn ethanol projects funded at \$0.5 M out of total \$6 M budget. NCGA involved in ethanol support and promotion of tax

incentives since 1980s. Heavily involved in E-85 programs and promotions. Research programs carried out at St. Louis national headquarters. Interviewed Director of Energy and Analysis who specializes on regulatory issues and legislation in D.C.

a. General views

- Big legislative issues for 99 include reformulated gas and low sulfur gas, taxation and appropriation for climate change.
- Always been interested in cellulosic ethanol - a major new starting place with opportunities for new technologies.
- Also working on new air quality regulations and Clean Air act.
- Corn is a very profitable crop. Big processors always interested in new uses. Genetic improvements continue via seed producers (Monsanto, Dow, Pioneer and Novartis) so that more corn raised with fewer inputs.

b. Specific concerns

- No requirement for car dealers to even inform buyers of flex-fuel vehicles about the flex-fuel feature.
- Just how a carbon tax would work so it doesn't penalize farmers.

28. Illinois Corn Marketing Board - Bloomington, Illinois and Illinois Corn Growers Association- Bloomington, Illinois

These two associated organizations share the same office and staff and work interchangeably. They concentrate upon services to their farmer members and seek more marketing opportunities such as developing coproducts and other outlets for corn uses. Discussion with marketing director and ICGA executive director (2).

a. General views

- Ethanol from starch is the main technology and focus. If focusing upon cellulosic sources, we would first concentrate upon using the rest of the kernel for a 10% increase with existing plants.
- Using corn stover is the next jump. It's easy to collect. Three of our farmers want to talk stover opportunities.
- Amount/percentage of stover that should remain in the fields varies markedly depending upon how dense planting was (26k plants/A up to 34k plants/A), drought conditions, slope, soil type, etc. Current thought is to leave 2 tons per acre of 4 tons per acre total.
- We're geared to grain, not stover. Very little production effort. We no longer think that stover is free. Weather here bad for baling after harvest. Would support farmer groups that initiated stover projects.
- As the second-ranking corn growing state and with large urban areas uninterested in agriculture, we had to develop more concentrated, innovative ways to market corn and to reach our legislators. Different political and social landscape than Iowa. We're more research-oriented

and fund more research. With 41% of Illinois corn going overseas and the big Decatur ethanol plant, corn prices are higher here.

b. Specific concerns:

- Disappointed that Sierra Club still repeating old incorrect info that biomass from ethanol uses more energy than it produces. Our UCal-Davis contact accepts the ANL DECA study, but Sierra Club said recently they didn't believe it.
- What are environmental groups saying? How knowledgeable are they? Wish we had more common ground with environmental organizations.
- Corn stover handling: if it has to be dried, probably becomes too expensive.
- Need to understand what happened in the Minnesota failure (MnVAPP).
- Don't try to go against economic realities (in developing renewable fuel cycle.)
- Market evolution going on now means farmers must get bigger or vertically integrate in order to survive.

29. Central Illinois Fiber Association, LLC - McLean, Illinois and Agricultural Guild of Illinois - Bloomington, Illinois

Both groups work with industry to “increase the value chain up and down” to bring more revenue to producers. Interested in harvesting and processing cellulose. Fiber Assn. formed to collect and transport corn stover to Dickey Environmental Systems for horse bedding - 1998. 50-60 members. Agricultural Guild with 34 members considering forming LLC or cooperative. Discussions with 3 producer members involved in both organizations.

a. General views

- We learned a lot about corn stover by making and transporting bales last year to Dickey Systems. Used our tractors hauling their machinery.
- Very small time window for stover harvesting. Moisture should be less than 18% but evening dew, early snows interfere. Big square bales of shredded stover keep longer and are high quality. If dry enough, raking can be eliminated from the shred/rake/bale process.
- Economics didn't work. Only 60% of product was usable - rest was in dust and fines unusable for Dickey horse bedding product. Would be great for composting or pulping. Economics would work if whole bale could be used.
- Our production end seemed to work. Produced several thousand wrapped bales and 7000 more unfinished. Fire in Dickey warehouse day after bankruptcy declared.
- Failure of the venture from inadequate marketing effort [high value product competing against a commodity (wood chips)], bigger warehouse than needed, and only 60% of product usable.

b. Specific concerns

- What would be cost of pilot or demo plant built here? How far to truck the stover? What kind of storage facilities and where to site?
- Concerned about moisture limits, compaction (three extra trips over the fields), the hassle factor.
- Our work and preparations included:
 - 10,000 acres ready to be harvested
 - producer willingness
 - infrastructure knowledge - trucking co.
 - site selection committee
 - good working relationships with local & state government
 - harvesting experience - 5000 big square bales of stover
 - a visible, accessible location

30. National Farmers Union - Washington, D.C.

This national union of 300,000 farmers is organized into 23 independent state federations plus 6 cooperating entities. Started in Plano, Texas 97 years ago from prairie populist roots, national office is now in Aurora, Colorado. Largest federation is in Oklahoma. As a non-profit organization, it helped establish three major midwest farming cooperatives. Policy is developed at the state level and voted upon by farmer members at national meetings. No corporate memberships or support. Discussion with Washington office legislative representative (former Congressional staff on Agriculture Committee).

a. General views

- Very supportive of biomass development though energy policy is not a priority this year.
- Some experience with cofiring of peanut hulls in Georgia.
- Aware of kenaf being planted in the south.
- Many corn grower members interested in ethanol. Organization supported California efforts to end use of oil-based oxygenates and make way for ethanol.
- Working with White House on global warming.
- Very interested in supporting biomass initiatives and in establishing farmer connections.

Appendix C. Groups & Individuals Interviewed

These are presented in the same order as in Section III - Views & Concerns

1. Natural Resources Defense Council (NRDC), Washington, D.C.
Discussant: Dan Lashof, Senior Scientist
2. Union of Concerned Scientists (UCS), Washington, D.C.
Discussant: Ron Sundergill, Washington Representative for Energy and Transportation
3. World Wildlife Fund, Washington, D.C.
Discussant: Jennifer Morgan, Legislative Liaison
4. Greenpeace, Washington, D.C.
Discussant: Iain MacGill, Climate Campaign
5. Sierra Club (committees)
Nebraska - Bob Warrick, Agriculture Committee chair
Illinois - Hans Detweiler, Energy Committee
California - Rick Ferguson, Energy Committee & former chair
Carl Pope, Executive Director
6. National Audubon Society, Washington, D.C.
Discussant: Maureen Hinkle, Director, Agricultural Policy
7. National Wildlife Federation, Washington, D.C.
Discussant: Patty Glick, Climate Change & Wildlife Program Coordinator
8. Izaak Walton League, Minneapolis, Minnesota
Discussants: Bill Grant, director (see also Illinois- IWL Energy Committee chair)
9. U.S. Public Interest Research Groups, Washington, D.C.
Discussant: Anna Aurilio, Energy Director & Polluter Pork Campaign
10. Critical Mass Energy Project of Public Citizen, Washington, D.C.
Discussant: Wenonah Hauter, Director
11. Energy and Environment Study Institute, Washington, D.C.
Discussants: Carol Werner, Executive Director
Tom Rosenberg, Biomass Staff

12. Renewable Energy Policy Project, Washington, D.C.
Discussants: Adam Serchuk, Research Director
Bernard Moore, Research Associate
13. Environmental Law and Policy Center, Chicago, Illinois
Discussant: Hans Detweiler, Community Organizer
14. Sierra Club Woods and Wetlands Group, Lake County, Libertyville, Illinois
Discussant: Evan Craig, chair
15. Champaign County Audubon chapter, Champaign, Illinois
Discussants: John Chato, treasurer
Beth Chato, educational chair, former president
16. Illinois Citizen Action, Libertyville, Illinois
Discussant: Earl Johnson, Executive Director
17. Prairie Rivers Network, Champaign, Illinois
Discussants: Robert Moore, Executive Director
Marc Miller, Watershed Organizer
Clark Bullard, Board member
18. Illinois Environmental Council, Carbondale, Illinois
Discussant: John Thompson, director & coordinator power plant cleanup project
19. Nuclear Energy Information Service, Evanston, Illinois
Discussant: David Kraft, senior staff
20. Izaak Walton League, Champaign, Illinois
Discussant: John Dickel, national Energy Committee chair
21. Community Alliance to Protect the Environment, Bourbonnais, Illinois
Discussants: Philip Zonkel, chair
22. MOPIRG (Missouri Public Interest Research Group), St. Louis, Missouri
Discussants: Dan Schneiderjohn, state canvass chair
Holly Dunning, Merrimack Community College representative
23. Missouri Coalition for the Environment, St. Louis, Missouri
Discussants: Russ Myler, Acting Executive Director
Roy Hengerson, Environmental Policy Director
24. Central Piedmont Group, Sierra Club, Charlotte, NC
Discussant: John Chapman, chair Transportation & Air Quality committee

25. North Carolina Wildlife Federation - Charlotte branch, Charlotte, NC
Discussants - Tom Gestwicki, Training director
5 staff canvassers
26. American Bioenergy Association, Washington, D.C.
Discussant: Reid Detchon, Executive Director
27. National Corn Growers Association, Washington, D.C.
Discussant: John McClelland, Director Energy and Analysis
28. Illinois Corn Growers Association & Illinois Corn Marketing Board,
Bloomington, Illinois
Discussants: Rod Weinzierl, Executive Director - ICGA
Philip Shane, Executive Director - ICMB
29. Central Illinois Fiber Association & Agricultural Guild of Illinois,
Bloomington, Illinois & McLean, Illinois
Discussants: David Greene, Ron Fitzhorn, and Brad Wade
30. National Farmers Union, Washington, D.C.
Discussant: Christopher Schepis, Government Relations Representative

Appendix D. Information Requests & Questions

Each item is numbered according to the organization number given in both Appendix B and Appendix C. Questions have been grouped according to general topic. A few are repeated in more than one category if appropriate.

Information Requests

3. Want information on all aspects of biomass land use, feedstock development, cultivation and harvesting practices, impacts of conversion.
9. Want 2 pages on each biomass option. Want hard numbers.
16. What are environmental impacts on air, water, soil and public health?
16. Want balanced information on biomass, the downside as well as the benefits.
18. Quality work needed to show comparison with fairly clean alternatives like natural gas.
21. Want basic information on how everything is grown and harvested.
- 22B. Want to know about nutrient cycling in forest soils and erosion potential.
24. Want more information.

Energy Crops

21. Why and how are energy crops beneficial?
14. What is the feasibility of ECs?
- 17B. Are those ECs just huge roosting areas for starlings and crows?
21. What kinds of chemicals are used on biocrops?
24. Will ECs interfere with food crops?
25. How will these crops affect biodiversity?
How tall is this stuff? (switchgrass).

Land and Land Use

3. What lands are being used for biomass now, and to be used?
6. Do you burn the land in between (switchgrass and trees)?
Will growing ECs mean draining more agricultural land?
7. As biomass share of land increases, will this displace natural habitat?
What is the balance in displacing agricultural lands (for ECs)?
8. What is size area to supply a power plant with switchgrass, poplars?
Where will power plant be sited near marginal lands?
24. How much land will this take?
25. How much land needed to grow switchgrass?

Can roadside land and interstate medians be used?

Forests and National Forests

- 5B. What about agricultural and forest residues?
- 10. Are forestry practices being done correctly? (re residue collection).
- 11. Does forest thinning & residue use legitimate logging industry?
- 15A. Will this hurt national forests?
- 20. How will this affect national forests now being chopped down every 10 years?
- 24. How will this affect national forests?

Emissions and Air Quality

- 8. What is biomass emission profile? Enough better than coal to warrant support?
- 9. Is it clean?
- 10. Want to compare air quality effects of biomass conversion with fossil conversion.
- 11. What happens to NO_x when N-rich fuel is gasified in N atmosphere?
- 19. What about dioxins in emissions from cofiring and gasification?
- 20. What's the story on particulates?

Environmental Impacts

- 8. Renewables - which are less damaging to the environment?
- 9. What are other environmental impacts on land and water?
- 20. How do ECs affect no-till practices? What's the erosion tradeoff?
- 24. What about effects on wildlife habitat and soil erosion?

Wildlife Impacts

- 6. What kind of wildlife inhabit tree farms and switchgrass?
- 20. What happens to wildlife when dedicated crops grow?

Carbon Dioxide, Carbon Sinks

- 4. Is biomass really C neutral?
What about claims on C sinks and C sequestration?
- 7. What is the C release of ECs vs. natural gas?
- 8. Is it really CO₂ neutral?
- 27. Just how would C tax work and not penalize farmers?

Economics and Feasibility

- 14. What is the feasibility of energy crops?
- 16. Renewables sound great in theory but ...is biomass economically viable?
- 17B. Is biomass a really viable player, not just a *de minimus* player?
- 21. What is cost effectiveness of all renewable options?
- 24. How much will this cost?
- 29. What would it cost to set up a corn stover gasification plant here?

Biomass Subsidies - Who Gets the Benefits?

- 8. Do we incentivise large animal operations if we use their waste?
- 11. Does forest thinning and residue use legitimate logging industry?
- 21. Vital that no advantage go to logging companies if forest residues used.
- 17B. Do we subsidize this or hydrogen fuel cells?

Conversion Technologies

- 5B. What is the potential for gasifying switchgrass?
- 11. Is reburn technology good enough yet?
- 20. What happens to leaves, bark from ECs in burners or gasifiers?
What percentage of sawdust goes unused?

Sustainability

- 8. Is growing hybrid poplars in plantations a sustainable exercise?
- 3. Where is the balance on biofeedstock development? Seeking answers.

Comparisons

- 7. What is C release of ECs vs. natural gas?
- 8. What is biomass emission profile... enough better than coal to warrant support?
- 9. Want to look at whole fuel cycle.
- 10. Compare air quality effects of biomass conversion vs. fossil conversion.
- 18. Aren't we better off just to shut down coal plants?
Quality work needed to compare biomass with fairly clean alternatives like natural gas.
- 21. What are long term effects of biomass option vs others?

Biomass/Bioenergy Cycle - Infrastructure - Vision of the Future

- 8. What if hail storm ruins whole crop in power plant supply zone?
- 12. Where does distributed energy fit in biomass cycle?
- 14. What are the byproducts and incidental problems of bioenergy cycles?
- 17B. Is biomass a really viable player...not just a *de minimus* player?
- 18. How is this going to be unrolled?
Will it displace coal?
Is this the right country for this? Sounds better for third world countries without existing infrastructure.
Where will this fit in the energy mix?
- 20. Must energy crops be done on a big scale?
Is small scale bioenergy feasible?
- 25. Can I plant these poplars for biomass.....and then what?

Miscellaneous

- 14. What can I do about biomass here in my county? What fits?
- 17B. About genetic engineering: What are they selecting for and against?
- 8. What are shipping costs for a 150 mile radius to gasification plant?
- 14. Won't this burden our rural transportation system?
- 12. What are criteria used by environmental organizations to assess biomass?
- 22B. Are there adequate controls if industrial waste is to be used?

INTERNAL DISTRIBUTION

1.	G. E. Courville	126-145.	E. B. Peelle
2.	T. R. Curlee	146.	D. E. Reichle
3-117.	J. H. Cushman	147.	R. B. Shelton
118.	D. E. Fowler	148-157.	L. L. Wright
119.	S. G. Hildebrand	158.	Central Research Library
120.	G. K. Jacobs	159-161.	ESD Library
121.	P. Kanciruk	162-163.	Laboratory Records Dept.
122.	R. M. Lee	164.	Laboratory Records, ORNL-RC
123.	J. M. Loar		
124.	C. I. Moser		
125.	T. E. Myrick		

EXTERNAL DISTRIBUTION

165. Lilia A. Abron, PEER Consultants, P.C. 1460 Gulf Bld. Apt 1103, Clearwater, FL 33767
166. Phil Badger, Southeast Regional Biomass Energy Program, General Bioenergy, Inc., P.O. Box 26, Florence AL 35631-0026
167. Douglas Bauer, Commission on Engineering and Technical Systems, National Research Council, Harris 280, 20001 Washington Ave. NW, Washington, DC 20007
168. Liu Chang, U. S. Department of Agriculture, Resource Econ. & Social Sciences Div., P.O. Box 2890, Rm. 6162, USDA-S, Washington, DC 20013-2890
169. Ray Costello, U.S. Department. of Energy, Biomass Power Program, 1000 Independence Ave, SW, EE-13, Washington, DC 20585
170. Kevin Craig, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden CO 80401
171. E. G. Cumesty, ORNL Site Manager, Department of Energy, Oak Ridge National Laboratory, P.O. Box 2008, Oak Ridge, TN 37831-6269
172. Susan L. Cutter, Hazards Research Lab, Department of Geography, University of South Carolina, Columbia, SC 29208
173. J. E. Ferrell, U.S. Department of Energy, Office of Fuels Development, 1000 Independence Avenue, EE-31, Washington, DC 20585
174. J. P. Giesy, Michigan State University, College of Natural Science, Department of Zoology, 203 Natural Science Building, East Lansing, MI 48824-1115

175. Jeff Graef, Nebraska Energy Office, P.O. Box 95085, Lincoln, NE 60509-5085
176. Richard Handley, Northeast Regional Biomass Energy Program, 400 N. Capitol Street, NW, Suite 382, Washington, DC 20001
177. Jeff James, U.S. Department of Energy, Pacific Northwest & Alaska Biomass Program, 800 5th Avenue, Suite 3950, Seattle, WA 98104
178. Jacob Kaminsky, U.S. Department of Energy, Biomass Power Program, 1000 Independence Avenue, EE-13, Washington, DC 20585
179. Fred Kuzel, Great Lakes Regional Biomass Energy Program, Council of Great Lakes Governors, 35 E. Wacker Drive, Suite 1850, Chicago, IL 60601
180. A. A. Lucier, National Council of the Paper Industry for Air and Stream Improvement, Inc., P.O. Box 13318, Research Triangle Park, NC 27709-3318
181. M. C. MacCracken, Director, Office of the U.S. Global Change Research Program, Code YS-1, 300 E Street, S.W., Washington, DC 20546
182. Ralph Overend, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden CO 80401
183. P. Richard Rittlemann, FAIA, Burt Hill Kosar Rittelman Associates, 400 Morgan Center, Butler, PA 16001-5977
186. L. Robinson, Director, Environmental Sciences Institute, Florida A&M University Science Research Facility, 1520 S. Bronough Street, Tallahassee, FL 32307
- 187-196. Sarah Sprague, U.S. Department of Energy, Office of Fuels Development, EE 31, Forrestal Bldg., 5F-044, Washington DC 20585
197. Susan F. Tierney, The Economic Resource Group, Inc., One Mifflin Place, Cambridge, MA 02138
198. Mike Voorhies, U.S. Department of Energy, Regional Biomass Program, 1000 Independence Ave, SW, EE-31, Washington, DC 20585
199. C. Michael Walton, Department of Civil Engineering, University of Texas at Austin, Austin, TX 78712-1414
200. Art Wiselogel, National Renewable Energy Laboratory, 1617 Cole Blvd., Golden CO 80401