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# Status of Fiber Fuel Use in Minnesota With Emphasis on Automated Systems

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review draft

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For : Governor's Council  
 Development  
 Fiber Fuels Institute  
 Minnesota Department of Natural Resources  
 1984



## FOREWARD

The fiber fuels industry in Minnesota is in an active growth stage. Producers, consumers and associated service industries are all feeling the exhilaration of this growth and occasionally the frustration of not having a clear view of how this growth is taking place. This summary of the status of the fiber fuels industry in Minnesota is designed to alleviate some of the latter frustrations.

The fiber fuels industry in Minnesota is moving quickly. This review draft of the Status of Fiber Fuel Use in Minnesota certainly has inadvertent omissions of important industry developments. The reader is invited to make additions or corrections on the comment sheets at the back of this booklet and send them to the address on the comment sheets. Corrections and additions will be incorporated in the final draft of Status of Fiber Fuel Use in Minnesota.

## ACKNOWLEDGEMENTS

This review draft of the Status of Fiber Fuel Use in Minnesota is a cooperative effort to bring together the current happenings in the fiber fuels industry. Contributors include:

- 1) Governor's Council on Rural Development
- 2) Governor's Staff
- 3) Fiber Fuels Institute
- 4) Minnesota Department of Energy and Economic Security
- 5) The many agencies, institutions and private businesses who so promptly provided information when asked.

Information in this status report was compiled and edited by the Minnesota Department of Natural Resources.



# STATUS of FIBER FUEL USE in MINNESOTA

## With Emphasis on Automated Systems

Prepared For

Governor's Council on Rural Development

and

The Fiber Fuels Institute

By

Minnesota Department of Natural Resources

February 1984

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# CHRONOLOGY OF FIBER FUELS DEVELOPMENT IN MINNESOTA

## Pre 1970

- Fossil fuels continue to be relatively inexpensive.
- Approximately 3 wood industries burn residues for energy and waste disposal.
- 200,000 cords of wood burned annually for residential heating.
- Ottertail Power Company produces electricity from wood at a small plant in Bemidji.

## 1970 1975

- Price of fossil fuels rises dramatically due to Arab oil embargo.
- Grand Marais School District becomes the first to burn wood.
- NuPly Division of Superwood Corporation purchases the Ottertail Power plant in Bemidji and uses the wood boilers to produce steam for their board plant.
- Minnegasco makes application to lease 200,000 acres of stateowned peatlands for the purpose of producing substitute natural gas.

## 1976 1980

- Wood pelletizing plants are established at Marcell and Stillwater.
- Guaranty Performance Co. plant at Stillwater fails.
- Laporte School is the first to burn pelletized fuel. St. Joseph School and McGregor School follow suit.
- Residential fuelwood use increases to 1.3 million cords per year. This is a 600 percent increase over the pre1970 period.
- Thirteen wood industries convert to using wood waste as an energy source.
- Three nonwood related companies convert to wood (i.e. PolyFoam, Len Busch Greenhouse, and Earl Holasek Greenhouse).
- The Department of Natural Resources initiates the Minnesota Peat Program and the Peat Inventory Project.
- The Legislative Commission on Minnesota Resources provides the DNR with special funding to study the suitability of peat as a fuel.
- DNR Regional Headquarters in Grand Rapids becomes the first state facility to heat with wood.
- A cooperative investigation by the Minnesota Energy Agency and Department of Natural Resources shows that considerable wood energy development could take place without limiting the supply of traditional wood products.
- Two "Minnesota Coal" conferences in Brainerd bring industry, government and community leaders together to examine the use of wood for energy.
- The first fuel pellets to be produced from agricultural residues are comprised of sunflower hulls and come from Rivard's Quality Seeds and Red River Alfalfa.

## 1981 to Present

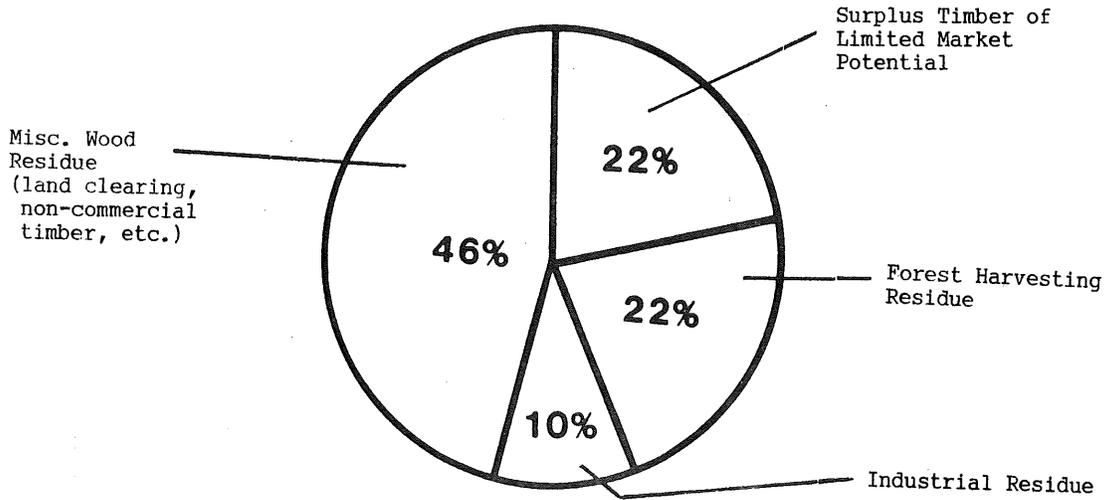
- Wood fuel briquetting plants become established at Pine River, Grand Rapids Blackduck, and Virginia.
- Aspenal Inc. purchases the Stillwater plant and moves it to Virginia. They also retrofit an agricultural pelletizing plant in Thief River Falls to handle wood. Over capacity in the pelletizing industry causes Aspenal to encounter financial difficulties and their plants become idle.
- Aspen Fiber Corporation at Marcell continues as the primary pellet supplier.
- Northwest Experiment Station installs and operates a demonstration pellet burner in their sheep research facility at Crookston.
- Northwest Economic Development, Inc. receives funding for a demonstration project that installs pellet furnaces in the homes of Fuel Assistance recipients. The program puts 6 units on line initially and expands to 34 units.
- Blandin Paper Company begins using wood waste on a large scale to produce electrical power for their paper mill in Grand Rapids.
- Eight (8) other wood industries install waste wood energy systems.

- Aitkin Ironworks establishes a central heating system that provides heat for their facilities plus five public buildings in the City of Aitkin.
- Fortysix (46) additional schools begin using fiber fuels.
- The Department of Natural Resources installs automated wood burning systems at General Andrews Tree Nursery, Scenic State Park, French River Hatchery and Tower Soudan State Park.
- The Western Lake Superior Sanitary District begins using wood chips to incinerate sludge at their facility in Duluth.
- The total number of public institutions and facilities using fiber fuels rises to 25.
- In excess of twenty businesses and commercial establishments install systems designed to burn chips or densified fuel.
- Two counties begin to use densified fuel in their highway maintenance facilities.
- Peat extraction using the extrusion process is initiated by operators at Zim and Pierz.
- A Fiber Fuels Association is formed to promote the use of all biomass fuels in Minnesota.
- The Minnesota Legislature passes legislation to allow for the conversion of state facilities to fiber fuels through third party financing and paid for by shared fuel savings.
- A Fiber Fuels Conference is sponsored by this association and held in Crookston. The conference brings together 300 people representing fuel producers and users and opens lines of communication between them.
- Northern BioFuel builds a pelletizing plant at Crosby.
- American BioEnergy purchases the Aspenol plant at Gilbert.
- IRRRB runs peat harvesting tests with Swedish equipment using both the milled and sod approaches.
- The Department of Natural Resources initiates a comprehensive statewide project to identify, prioritize and carry out potential conversions to automated fiber fuel systems in their buildings.
- American BioEnergy and Cole Forest Products densify peat for fuel suitability tests sponsored by the Department of Energy Planning and Development.
- The Department of Energy Planning and Development test burns peat in a variety of forms at the Virginia Public Utilities, U.S. Bureau of Mines and U of M, Duluth.

Future Developments •Two additional schools have initiated the process of installing wood conversion systems.

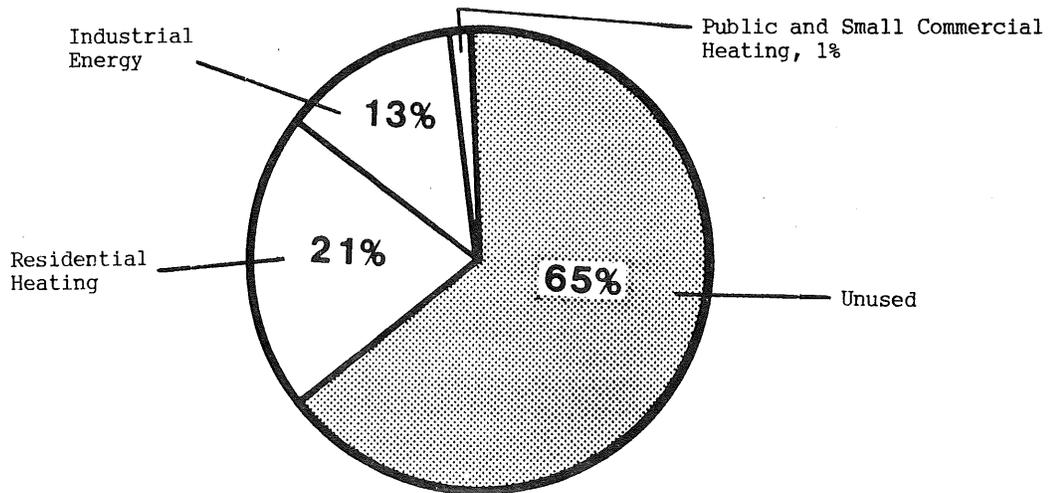
- Camp Ripley Military Reservation has begun the process of evaluation in the form of a preconversion engineering study.
- Bids have been solicited for third party financing arrangements at several large state facilities including: Brainerd State Hospital, St. Cloud State University, Bemidji State University, Ah Gwah Ching Nursing Home and correctional facilities at Oak Creek and Lino Lakes.
- The Fiber Fuels Institute has undertaken the task of facilitating market expansion through the development of a glossary of terms, descriptions of common fuel forms and fuel quality standards.

**WOOD FUEL AVAILABLE IN MINNESOTA: FROM WOOD RESIDUE, ANNUAL VOLUME**



An equivalent of 4.7 million cords of wood residue is available annually for energy use.

**WOOD FUEL USED IN MINNESOTA: ANNUAL VOLUME**



65% (equivalent to approx. 3 million cords) of the wood residue annually available for energy use is currently unutilized.

## MINNESOTA PEAT RESOURCES

Minnesota contains between 6 and 7 million acres of peatland. Deposits are found throughout the state, except in the extreme southwest and southeast. Large, contiguous peatlands occur in the northern half of the state, while smaller, scattered peatlands occur in the southern half.

Approximately 50 percent of the state's peat resource is publicly owned, with most of the public ownership concentrated in the northern part of the state. The disposition and use of the resource therefore becomes an easier matter than in cases where peatlands have multiple and fragmented ownership patterns.

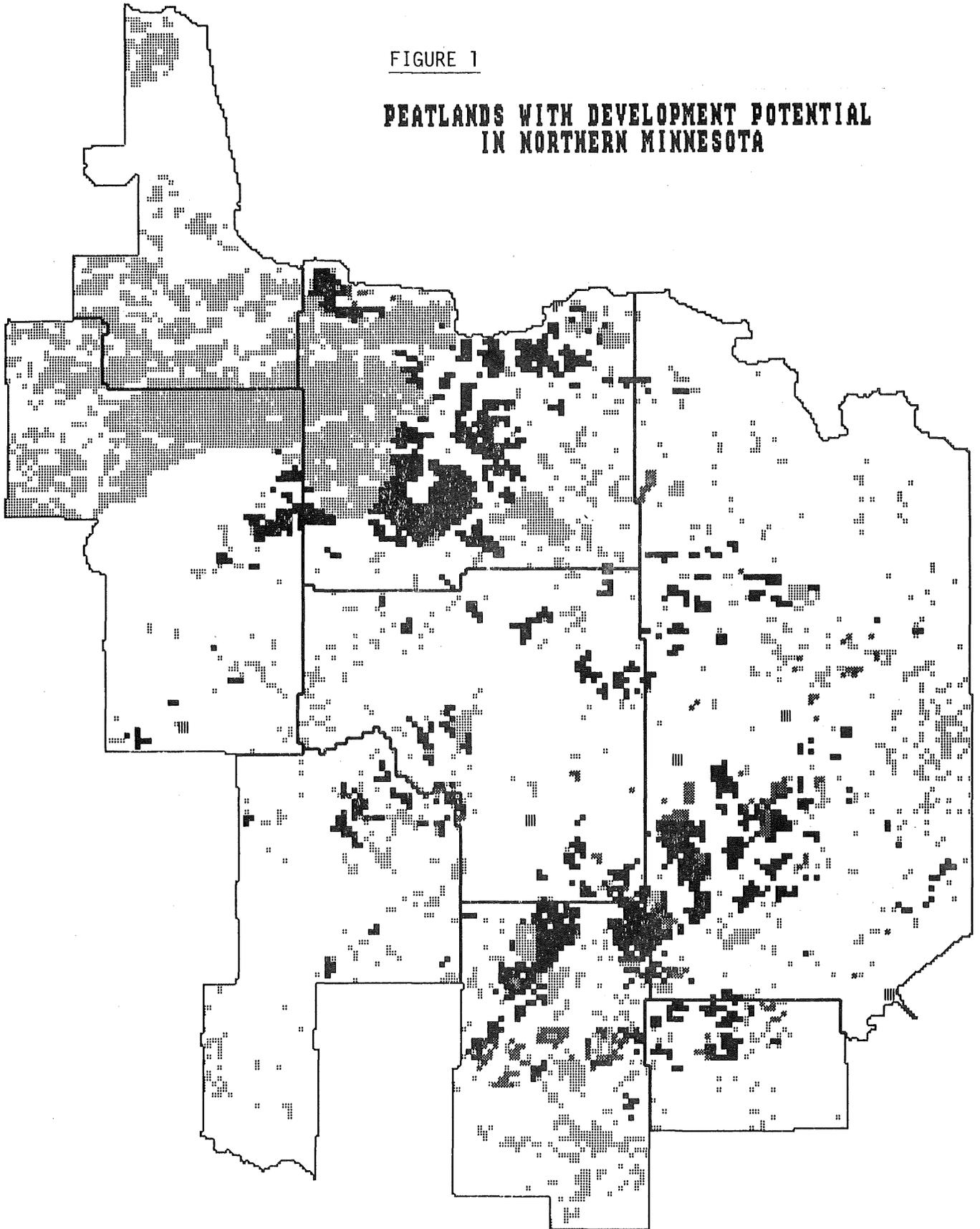
The development of peatlands is dependent upon several factors, including the resource characteristics, transportation, and ownership. For example, it is estimated that approximately 10 percent of Minnesota's peatlands have energy potential, based on the resource characteristics of humification and botanical origin. About 90 percent of these peatlands would be suited for milled peat harvesting, while about 10 percent would be suited for sod peat.

A model (Fig. 1) was developed for an eight-county area of northern Minnesota (including Aitkin, Beltrami, Carlton, Cass, Itasca, Koochiching, Lake of the Woods, and St. Louis counties) to consider several of the development factors. The area chosen for the study is viewed as a likely place for development, especially for energy, because (1) over half of the state's peatland acreage is found here, (2) many of the peatlands are available for state leasing, and (3) the peatlands are contiguous, rather than dispersed, making development more efficient.

The modelling process identified about 1 million acres of peatland, or about 26 percent of the peatland area in this region, that met the following criteria: the peatlands had to (1) cover at least 1000 contiguous acres, (2) lie within 50 miles of one of six northern Minnesota cities (Duluth, Virginia, Hibbing, Grand Rapids, Bemidji, and International Falls), measured along paved highways, (3) lie within one mile of these highways, and (4) be state-owned or state-administered. Because of transport costs, peatland areas extending farther than six miles from the paved highways were excluded. In addition, any peatlands that lie within protection areas were eliminated from consideration to minimize the areas of potential conflict between uses.

FIGURE 1

PEATLANDS WITH DEVELOPMENT POTENTIAL  
IN NORTHERN MINNESOTA



	SYMBOL	COUNT	PERCENT	ACRES	LEGEND	
		1	95	0.1	15200.0	CITIES: BEMIDJI, DULUTH, GRAND RAPIDS, HIBBING, INTERNATIONAL FALLS, VIRGINIA
	■	2	6334	6.8	1013440.0	STATE AVAILABLE
	▣	3	704	0.8	112640.0	PRIVATE
	▬	4	13445	14.5	2151200.0	OTHER PEATLANDS
	░	5	72260	77.8	11561600.0	MINERAL OR WATER

## AGRICULTURAL FIBER RESOURCES FOR PROCESSED FUEL

(Highlights of a presentation given by E.C. (Gene) Miller, Northwest Experiment Station, University of Minnesota, Crookston, to the June 13-15, 1983 National Fiber Fuels Conference at Crookston, Mn.)

- 1) Agricultural fiber resources for processed fuel are readily available today.
- 2) The 250,000 acres of sunflowers planted annually in the Red River Valley produce 125,000 tons of reasonably easy to collect field residue in addition to sunflower seed hulls.
- 3) Minnesota produces 10.2 million dry tons of crop residue per year. A million dry tons would fuel 2000 small high schools or 216 average hospitals.
- 4) Herbage as a crop grown for energy could have a potential to add an additional 12.7 million dry tons annually to Minnesota's fiber fuel resource.
- 5) Harvesting equipment is well known and available. There are 40,000 balers in Minnesota.
- 6) Roadside grasses produce about 2 tons per acre. The roadside between Crookston and Grand Forks (20 miles) could fuel 200 homes.

# CURRENT STATUS OF FIBER FUEL USE IN MINNESOTA

## PUBLIC INSTITUTIONS - SCHOOLS/UNIVERSITIES

### Utilizing Densified Fuels (pellets & briquettes)

- |   |                                |
|---|--------------------------------|
| 1. Laporte  | 23. Backus                     |
| 2. St. Josephs School<br>& Church, Red Lake Falls | 24. Menahga                    |
| 3. McGregor                                       | 25. Blackduck                  |
| 4. Clearbrook                                     | 26. Grand Rapids Middle School |
| 5. Walker   | 27. Bovey Middle School        |
| 6. Floodwood                                      | 28. Coleraine High School      |
| 7. McIntosh                                       | 29. Keewatin/Middle Elementary |
| 8. Northome                                       | 30. Gilbert                    |
| 9. Cohasset                                       | 31. Biwabik                    |
| 10. Swanville                                     | 32. Aurora                     |
| 11. Bigfork                                       | 33. Cass Lake Elementary       |
| 12. Gonvick                                       | 34. Cass Lake High School      |
| 13. Greenbush                                     | 35. Duluth Central             |
| 14. Badger  | 36. Pequot Lakes               |
| 15. Clarissa                                      | 37. Crookston                  |
| 16. Red Lake Falls High                           | 38. Barnesville                |
| 17. Littlefork                                    | 39. Oramia                     |
| 18. Goodridge                                     | 40. Mt. Iron                   |
| 19. Park Rapids                                   | 41. Dilworth                   |
| 20. St. Scholastica                               | 42. Argyle High School*        |
| 21. Pine River High School                        | 43. Battle Lake*               |
| 22. Pine River Elementary                         |                                |

### Utilizing Green Wood Fuels

- |                                     |                              |
|-------------------------------------|------------------------------|
| 44. Grand Marais                    | 50. Two Harbors High School* |
| 45. Bemidji Middle School           | 51. Two Harbors Elementary*  |
| 46. Hill City                       | 52. Ely*                     |
| 47. Barnum                          | 53. Buhl* (gasification)     |
| 48. Aitkin High School <sup>1</sup> | 54. Babbitt*                 |
| 49. Bemidji High School*            | 55. Chisholm                 |

### Under Consideration - Fuel Type Undetermined

- |                     |                                |
|---------------------|--------------------------------|
| 56. Roseau          | 58. Bemidji State University   |
| 57. Parkers Prairie | 59. St. Cloud State University |

\* Approved or Under Construction

<sup>1</sup> Purchase Steam from Aitkin Iron Works

## PUBLIC INSTITUTIONS - OTHER FACILITIES

### Utilizing Densified Fuels (pellets & briquettes)

1. Virginia Public Ut., Virginia
2. St. Louis Co. Garage, Virginia
3. Itasca Co. Garage, Bigfork
4. DNR: General Andrews Nursery, Willow River
5. DNR: Scenic State Park Shop, Bigfork
6. Northwest Experiment Sta., Barn, Crookston
7. DNR: French River Hatchery, Duluth\*
8. Community Center, Floodwood
9. Chisholm/Hibbing Airport\*
10. Itasca Memorial Hospital, Grand Rapids\*
11. DOT District Office, Bemidji\*
12. DNR Regional garage/shop, Grand Rapids\*
13. DNR: Tower Soudan State Park (two units)

### Utilizing Green Wood Fuels

14. DNR: Regional Hdqts., Grand Rapids
15. Grand Marais Hospital
16. Aitkin Co. Courthouse
17. Aitkin Public Utilities
18. Aitkin City Hall<sup>1</sup>
19. Grand Marais Recreation Complex
20. Grand Marais School Bus Garage
21. Western Lake Superior Sanitary District, Duluth
22. Aitkin Co. Jail\*<sup>1</sup>
23. Riverview Hospital, Crookston\*
24. St. Gabriels Hospital, Little Falls\*
25. St. Francis Campus, Little Falls\*

### Under Consideration - Fuel Type Undetermined

26. Camp Ripley Military Reservation
27. Brainerd State Hospital
28. Oak Creek Correctional Facility
29. Lino Lakes Correctional Facility
30. Ah Gwah Ching Nursing Home

\* Approved or Under Construction.  
<sup>1</sup> Purchase steam from Aitkin Iron Works.

## WOOD PRODUCTS INDUSTRIES/BUSINESSES

### Utilizing Densified Wood Fuels (pellets & briquettes)

1. Marcell Mill & Lumber, Marcell
2. Durkee Mfg., Pine River
3. Cole Forest Products, Grand Rapids

### Utilizing Green or Dry Wood Fuels

- |  |  |
|--|--|
| 4. Potlatch Corp, Cloquet              | 21. Hedstrom Sawmill, Grand Marais         |
| 5. Potlatch, Inc., Bemidji             | 22. Thompson Hdw. Lbr., Mpls.              |
| 6. Potlatch, Inc., Cook                | 23. Foldcraft Co., Kenyon                  |
| 7. Blandin Paper Co., Grand Rapids     | 24. Tuohy Forest Products Corp., Chatfield |
| 8. Blandin Wood Products, Grand Rapids | 25. Bagley Kiln & Component Parts, Bagley  |
| 9. Boise Cascade Corp., Int'l Falls    | 26. Anoka Sawdust & Shavings, Anoka        |
| 10. Diamond Match Co., Cloquet         | 27. Rajala Sawmill, Bigfork                |
| 11. Superwood Corp., Duluth            | 28. Rajala Timber Co., Deer River          |
| 12. Superwood Corp., Bemidji           | 29. Corcoran Timber Co., Bemidji           |
| 13. St. Regis Paper Co., Sartell       | 30. Remer Timber Co., Remer                |
| 14. Northwood Panelboard, Bemidji      | 31. Ferche Millwork, Inc., Rice            |
| 15. Woodcraft Ind., St. Cloud          | 32. Woodland Container, Aitkin             |
| 16. Foreston Dimension Co., Foreston   | 33. Aspen Fiber Corp., Marcell             |
| 17. Lake Elmo Hdws., Lake Elmo         | 34. Blackduck Pressurized Wood, Blackduck  |
| 18. Anderson Windows, Bayport          |  |
| 19. Marvin Windows, Warroad            |  |
| 20. H.C. Hill & Sons, Cook             |  |

# PRIVATE INDUSTRIES / BUSINESSES / INSTITUTIONS

## Utilizing Densified Fuels (pellets & briquettes)

- |   |   |
|---|---|
| 1. Coca Cola Bottling Co.,<br>Crookston     | 15. Rivard Quality Seeds, Argyle                    |
| 2. Associated Plumbing,<br>Crookston        | 16. Gustafson Apts., Warren                         |
| 3. Red Pine Alfalfa,<br>Crookston           | 17. Mjolsness Shop, Felton                          |
| 4. Eickhof Building,<br>Crookston           | 18. Thompson's Green House,<br>St. Joseph           |
| 5. LePier Tire, Crookston                   | 19. Village Laundromat, Aitkin                      |
| 6. Glenmore Foundation,<br>Crookston        | 20. Pine River Group Home,<br>Pine River            |
| 7. D&J Machine Shop, Brainerd               | 21. GT Auto Parts, Floodwood                        |
| 8. Anderson Construction Co.,<br>Brainerd   | 22. Baptist Church, Floodwood                       |
| 9. Anaco Mfg. Co., Ironton                  | 23. Lutheran Church, Floodwood                      |
| 10. Spaulding Hotel, Crosby                 | 24. Floodwood Hardware, Floodwood                   |
| 11. Crosby Theater, Crosby                  | 25. Northern Mfg. & Engineering,<br>Staples         |
| 12. Crosby Car Wash &<br>Laundromat, Crosby | 26. Roy Apts., Grand Rapids                         |
| 13. Osterberg Furniture Store,<br>Mora      | 27-31. Turkey raising operations,<br>Swanville area |
| 14. Dan & Jerry's Green House,<br>Buffalo   | 32. Camp Shamineau, Motley                          |
|   | 33. Jesus is King Church, Thief<br>River Falls      |
|   | 34. Herbies Market, Red Lake Falls                  |
|   | 35. Berger Apts. & Store, Erskine                   |
|   | 36. Garth Meschke Turkey Farm,<br>Little Falls      |

## Utilizing Green Wood Fuels:

- |  |  |
|--|--|
| 37. Poly Foam Inc., Lester Prairie                       | 47. North Shore Bldg., Grand Marais                |
| 38. Nutting Truck & Caster Co., Faribault                | 48. Bearskin Lodge, Grand Marais                   |
| 39. Len Busch Greenhouse, Hamel                          | 49. Gehling Implement, Preston                     |
| 40. Park Rapids Greenhouse, Park Rapids                  | 50. The Crest Motel & Supper Club,<br>Caledonia    |
| 41. Earl Holasek Greenhouse, Chanhassen                  | 51. Gessell Feed Mill, Swanville<br>(gasification) |
| 42. Advance Machine, Bloomington                         | 52. Humble Stove Co., Rushford                     |
| 43. Aitkin Ironworks, Aitkin                             | 53. 3M Chemolite Plant, Cottage<br>Grove*          |
| 44. St. James Catholic Church, Aitkin <sup>1</sup>       | 54. Tomteboda Motel, Grand Marais                  |
| 45. Midway Service Station & Laundromat,<br>Grand Marais |  |
| 46. North Shore Dairy & Laundromat,<br>Grand Marais      |  |

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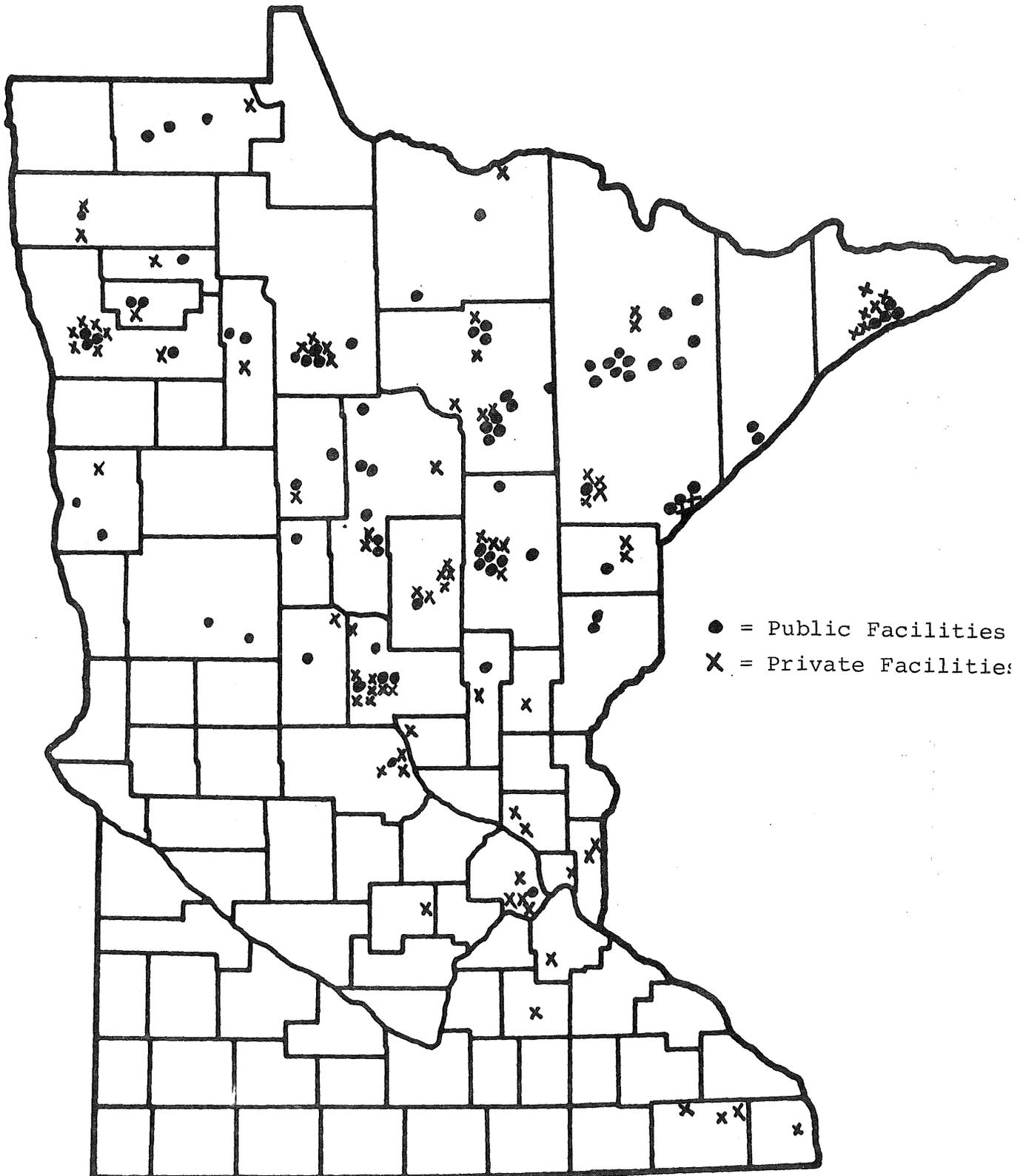
## TOTALS: (Operational, Planning, Approved or Under Construction)

Schools/Universities	= 59
Other Public	= 30
Wood Products Industries/Businesses	= 34
Private Industries/Businesses/ <u>Institutions</u>	= 54
Known Facilities Utilizing Fiber Fuels for Energy	= 177

\* Approved or Under Construction

<sup>1</sup> Purchase Steam from Aitkin Iron Works -10-

# Facilities Using Fiber Fuels for Energy



# CONSULTANTS IN THE FIBER FUELS INDUSTRY

Consultants are listed by company name and services offered. See the following page for complete company addresses and telephone numbers.

	SERVICES				SYSTEM TYPES				SIZE				
	DESIGN	PROJECT FEASIBILITY	SYSTEM ANALYSIS	INSTALLATION	GREEN FUEL	DRY FUEL	DENSIFIED FUEL	GASIFICATION	RESIDENTIAL	COMMERCIAL	INSTITUTIONAL	INDUSTRIAL	COGENERATION ETC.
1. Anchor Gas Co.	X	X	X	X	X	X		X		X	X	X	X
2. Aqua Chem, Inc.	X					X	X			X	X	X	X
3. Architectural Resources, Inc.	X	X	X		X	X	X	X		X	X	X	
4. Blesi-Evans Co.	X		X		X	X	X	X		X	X	X	X
5. Brown, Robert O. Co.	X	X	X		X	X	X	X		X	X	X	X
6. California Pellet Mill Co.	X	X	X				X						
7. Edeskuty & Assoc.	X		X			X				X	X	X	X
8. Enerdyne Corp.	X					X		X		X	X	X	
9. Energy Consult Corp.		X	X		X	X	X	X	X	X	X	X	X
10. Energy Control Engineering	X	X	X	X		X	X			X	X	X	
11. Energy Resource Systems	X	X	X	X	X	X	X	X	X	X	X	X	X
12. Fisher, John			X		X	X	X		X	X	X	X	
13. Fluidyne Engineering Corp.	X		X	X	X					X	X	X	X
14. Fond Du Lac Commerce & Trade	X		X	X				X	X	X	X	X	X
15. Forest Fuels, Inc.	X	X	X	X	X	X	X		X	X	X	X	X
16. Gorman, R.W. Associates, Inc.	X				X	X				X	X	X	
17. H.D.R. Techserv	X	X	X		X	X	X	X		X	X	X	X
18. Horty-Alving & Assoc.	X	X	X		X						X	X	X
19. Hovarter, Floyd M. & Assoc.		X			X	X	X	X			X	X	X
20. ie. Associates	X		X		X	X	X	X		X	X	X	X
21. K-Engineering	X	X	X	X	X	X	X	X		X	X	X	X
22. LWSM Consulting Engineers	X		X				X		X	X	X	X	
23. M.E.S. Corp.	X	X	X		X	X	X	X		X	X	X	X
24. M,C,H,E	X	X	X		X	X	X	X		X	X	X	X
25. Mechanical Construction Eng.	X		X		X	X	X			X	X	X	X
26. N.T.H., Inc.	X	X	X	X	X	X				X	X	X	
27. Northwood Associates	X	X	X	X			X		X	X	X		
28. Peat Energy Systems		X			X	X							
29. Posko Associates, Inc.	X	X	X		X	X	X	X	X	X	X	X	X
30. Richwood Company	X	X	X		X	X	X	X	X	X	X	X	
31. Spaulding Engineering, Ltd.	X		X		X	X	X	X		X	X	X	X
32. Stegmeir, Paul			X		X	X	X		X				
33. Stewart, Sam & Assoc.	X	X	X		X	X	X			X	X	X	X
34. TDKA	X		X		X		X			X	X	X	X

## CONSULTANTS IN THE FIBER FUELS INDUSTRY

Refer to Page 12 for Services Offered

- |  |  |   |
|--|--|---|
| <p>(1) Anchor Gas Co.<br/>Anchor Energy Division<br/>Marshall Johnson/Addison Kilibarda<br/>Virginia, MN 55792<br/>1-800/662-3586</p>  | <p>(13) Fluidyne Engineering Corp.<br/>David Decoursin<br/>5900 Olson Hwy.<br/>Mpls., MN 55422<br/>612/544-2721</p>  | <p>Mechanical Construction Engineering<br/>William Harrington<br/>1545 6th St.<br/>P.O. Box 3870<br/>Green Bay, WI 54304<br/>414/499-0451</p> |
| <p>(2) Aqua-Chem, Inc.<br/>Energy Systems Division<br/>Donald Love/Richard Wright<br/>Box 421<br/>Milwaukee, WI 53201<br/>414/961-2894</p>   | <p>(14) Fond Du Lac Commerce &amp; Trade<br/>Wilhelm Reindl/Gary Fields<br/>105 University Rd.<br/>Cloquet, MN 55720<br/>218/879-6735 or 612/644-5301</p>          | <p>N.T.H., Inc.<br/>Clinton Nesselth/Bryce Nesselth<br/>Barron, WI 54812<br/>715/537-3686 or 3861</p>   |
| <p>(3) Architectural Resources, Inc.<br/>Parnell Satre, P.E.<br/>704 East Howard St.<br/>Hibbing, MN 55746<br/>218/263-6868<br/>Duluth office: 218/727-8481<br/>Ashland office: 715/682-8535</p> | <p>(15) Forest Fuels, Inc.<br/>Bob Despot/Wayne Cummings<br/>1020 Washington St.<br/>Brainerd, MN 56401<br/>218/828-0904</p>                                       | <p>Northwood Associates<br/>Bill Dumke<br/>Rt. 11, Box 102<br/>Brainerd, MN 56401<br/>218/829-0904</p>  |
| <p>(4) Blesi-Evans Co.<br/>Robert Hanson<br/>2533 24th Ave. So.<br/>Mpls., MN 55406<br/>612/721-6237</p>   | <p>(16) R.W. Gorman Assoc., Inc.<br/>Richard W. Gorman<br/>200 So. Washington Ave.<br/>Washburn, WI 54891<br/>715/373-2632</p>                                     | <p>Peat Energy Systems<br/>Bruce Schmidt<br/>P.O. Box 69<br/>Rosemount, MN 55068<br/>612/423-5181</p>   |
| <p>(5) Robert O. Brown Co.<br/>Robert Brown<br/>6885 Washington Ave. So.<br/>Edina, MN 55435<br/>612/941-8843</p>  | <p>(17) HDR Techserv<br/>Jack Kattner/Jim Booty<br/>300 Parkdale 1<br/>5401 Gamble Dr.<br/>Mpls., MN 55416<br/>612/544-7741</p>                                    | <p>(29) Posko Associates, Inc.<br/>Tom Posko/Peter Zak<br/>20720 W. Watertown Rd.<br/>Waukesha, WI 53186<br/>414/786-7200</p>                 |
| <p>(6) California Pellet Mill Co.<br/>Bob Massengill<br/>2524 118 Lane N.E.<br/>Coon Rapids, MN 55433<br/>612/755-6841</p>   | <p>(18) Horty-Alving &amp; Assoc.<br/>Jim Alving<br/>505 East Grant St.<br/>Mpls., MN 55404<br/>612/332-4422</p>   | <p>(30) Richwood Company<br/>Bob Jacenko<br/>P.O. Box 723<br/>Detroit Lakes, MN 56501<br/>218/847-1688<br/>Mpls. office 612/721-5068</p>      |
| <p>(7) Edeskuty &amp; Associates<br/>Joseph V. Edeskuty/Robert VonEdeskuty<br/>730 2nd Ave. So.<br/>Mpls., MN 55402<br/>612/333-6675</p>   | <p>(19) Floyd M. Hovarter &amp; Assoc.<br/>Floyd M. Hovarter<br/>P.O. Box 46<br/>Ashland, WI 54806<br/>715/682-8024</p>  | <p>(31) Spaulding Engineering Ltd.<br/>Roy Spaulding/Tom Williams<br/>1821 University Ave.<br/>St. Paul, MN 55104<br/>612/644-5676</p>        |
| <p>(8) Enerdyne Corp.<br/>Charles Eumarian<br/>7340 Washington Ave. So.<br/>Mpls., MN 55344<br/>612/944-7220</p>   | <p>(20) i.e. Associates<br/>Tom Abeles<br/>3702 E. Lake St.<br/>Mpls., MN 55406<br/>612/721-5066</p>   | <p>(32) Paul Stegmeir<br/>2334 Buford Ave.<br/>St. Paul, MN 55100<br/>612/644-3848</p>  |
| <p>(9) Energy Consult Corp.<br/>Mark Mason/Jim Fisher<br/>310 Cedar St.<br/>St. Paul, MN 55101<br/>612/224-1700</p>  | <p>(21) K-Engineering<br/>Milton Kroschel<br/>1306 West Co. Rd. F<br/>St. Paul, MN 55112<br/>612/636-6242</p>  | <p>(33) Sam Stewart &amp; Assoc.<br/>Sam Stewart<br/>1171 W. Co. Rd. B,<br/>Suite S-207<br/>Roseville, MN 55113<br/>612/636-9811</p>          |
| <p>(10) Energy Control Engineering<br/>William B. Webb<br/>13555 Simonet Drive<br/>Elk River, MN 55330<br/>612/441-2345</p>  | <p>(22) LWSM Consulting Engineers<br/>Leonard Lundquist/Kenneth Schultz<br/>821 Raymond<br/>Suite 300<br/>St. Paul, MN 55114<br/>612/642-9771</p>                  | <p>(34) TKDA<br/>Art Heuer/Lynn Englehorn<br/>2500 American Natnl. Bank Bldg.<br/>St. Paul, MN 55101<br/>612/292-4400</p>                     |
| <p>(11) Energy Resource Systems<br/>Walt Horton/John Erickson<br/>2117 Lyndale Ave. So.<br/>Mpls., MN 55405<br/>612/871-5400</p>   | <p>(23) M.E.S. Corp.<br/>John Larson<br/>2200 Northwestern Finance Center<br/>7900 Xerxes Ave. So.<br/>Bloomington, MN 55431<br/>612/893-9400</p>                  | <p>(35) GRO Engineering &amp; Sales, Inc.<br/>G. Raymond Olson<br/>11420 West Park Ridge Drive<br/>Minnetonka, MN 55343<br/>612/545-6492</p>  |
| <p>(12) Aspen Fiber Corp.<br/>John Fisher<br/>1112 East 1st St.<br/>Duluth, MN 55805<br/>218/728-2582</p>  | <p>(24) Michand, Cooley, Hallberg, &amp; Erickson<br/>(M.C.H.E.)<br/>Douglas Cooley/Sherman Cooley<br/>310 Plymouth Bldg.<br/>Mpls., MN 55402<br/>612/339-4941</p> | <p>(36) SUNTEC Systems<br/>Don Anderson/John Davison<br/>2101 Wooddale Dr.<br/>St. Paul, MN 55125<br/>612/735-7600</p>                        |
|  |  | <p>(37) R.C. Johnson &amp; Assoc.<br/>Robert Johnson<br/>1819 South Central, Suite 84<br/>Kent, WA 98031</p>                                  |

# FIBER FUELS SUPPLIERS/DISTRIBUTORS

## DENSIFIED WOOD PELLETS - Wood, Peat, & Agricultural Residues (artichoke, sunflower, rice, oat, & flax hulls)

Aspen Fiber Corporation (wood)  
P.O. Box 14A  
Marcell, MN 56657  
(218)832-3600

Northern Bio-Fuel (wood, peat)  
P.O. Box 1  
Crosby, MN 56441  
(218)546-5677

Rivard Quality Seeds  
(agr. residues)  
Box 303  
Argyle, MN 56713  
(218)437-6638

Red River Alfalfa  
(agr. residues)  
Box 496  
Crookston, MN 56716  
(218)281-1455

Northern Sun Products  
(agr. residues)  
Gonvick, MN 56644  
(218)487-5279

Fenco (peat)  
Rt. 1, Box 94  
Iron, MN 55751  
(218)744-3976

Plus Peat (peat)  
Ogilvie, MN 56358  
(612)983-6853

Peat Resources Inc. (peat)  
812 Lilac Drive  
Golden Valley, MN 55422  
(612)529-9259

The Peatalizer People (peat)  
P.O. Box 305  
Red Lake Falls, MN 56750  
(218)253-4243

American Bio-Energy  
(wood, peat)  
P.O. Box 848  
Gilbert, MN 55741  
(218)749-1818

Rapid River Grain & Seed Co.  
(wood, peat)  
Box 458  
Baudette, MN 56623  
(218)634-2041

West Central Energy Products  
(agr. residues)  
Frazee, MN 56544  
(218)334-6640

Fiber Fuel Co. (agr. residues)  
Box 1032 Moorhead, MN 56560  
(218)236-8354

Wallace Bustad Crane Service  
(peat)  
Austin, MN 55912  
(507)433-1772

Tretter Peat (peat sods)  
Rt. 1  
Pierz, MN 56364  
(612)468-6046

Consolidated Wild Rice  
Processors (sunflower & rice  
hulls)  
Industrial Park  
Bemidji, MN 56601  
(218)751-8500

Wildung Alfalfa Mill  
(artichokes)  
Owatonna, MN 55060  
(507)451-2205

Watson Turf Nursery (peat)  
Rt. 2, Box 59A  
Bethel, MN 55005  
(612)753-1132

LeCrosse Mill Co.  
Cochrane, WI 54622  
(608)248-2222

Westwayl Trading Co.  
Box 588  
Mapleton, N.D. 58059  
(701)282-5010

Forest Fuels Corp. (wood)  
P.O. Box 205 B1  
Mason, WI 54856  
(715)746-2452

Froelich Feed Co. (sunflower)  
LaMouve, N.D. 58458  
(701)883-5311

Jask Biomass Products (flax)  
Watertown, S.D. 57201  
(605)262-1965

Whetstone Pelleting (flax &  
sunflower)  
Rt. 1, Box 52  
Milbank, S.D. 57252  
(605)432-5160

Biomass Energy Supply, Inc.  
(wood)  
Marquette, MI 49855  
(906)228-5353

Alfalfa Pelleting Lmt.  
(sunflower)  
West Fargo, N.D. 58078  
(701)282-4421

## DENSIFIED FUEL LOGS AND/OR BRIQUETTES

Cole Forest Products  
River Road  
Grand Rapids, MN 55744  
(218)326-9661

Durkee Mfg. Co., Inc.  
Box 69  
Pine River, MN 56474  
(218)587-4432

Blackduck Pressed Wood Products  
Inc.  
Blackduck, MN 56630  
(218)835-4616

Environmental Energy, Limited  
P.O. Box 1208  
Virginia, MN 55792  
(218)749-6440

Nagel Lumber Co.  
Land-O-Lakes, WI 54540  
(715)547-3842

Pohoenix Corp.  
Shawano, WI 54166  
(715)526-3171

## DENSIFIED FUEL DISTRIBUTORS

Grand Rapids Wholesalers  
P.O. Box 101  
Grand Rapids, MN 55744  
(218)326-9477

Wenstrom Hardware  
P.O. Box 327  
Floodwood, MN 55736  
(218)476-2343

Forest Fuels, Inc.  
521 Charles Street  
Brainerd, MN 56401  
(218)828-0904

Nordhiem Sheet Metal Co.  
1st Street & Minnesota Ave.  
Bemidji, MN 56601  
(218)751-3923

GREEN FUEL SUPPLIERS

Green wood fuel is generally available from three sources:

- Wood Processing Industry
- Tree Service Companies
- Full Tree Chippers

Wood Processing Industry

There are over 700 sawmills and 1,000 secondary manufacturers statewide that can supply wood residues in the form of bark, sawdust, slabs and edgings, cut-offs, shavings, and sanderdust. Of the sawmills, about 30 have debarking and chipping machinery that produce chips which are available for fuel.

Tree Service Companies

Most municipalities throughout the state are serviced by tree service companies. Most of these companies have facilities that produce chips which are available for fuel.

Full Tree Chipper Operations

The following is a partial list of full tree harvesting operations which could supply green chips for fuel:

Bergstom Logging Company  
RR 9, Box 586  
International Falls, MN 56649  
(218)377-4482

Ratzlaff Logging & Lumber  
508 1st Street  
Princeton, MN 55371  
(612)389-3801

McCabe Forest Products  
119 West Lewis Street  
Duluth, MN 55803  
(218)724-8070

Larry Pelland  
Loman, MN 56654  
(218)279-3344

Arthur Newgren  
RR 1  
Cromwell, MN 55726  
(218)644-3630

Richard A. DeMars  
Ray, MN 56669  
(218)875-3375

Roger Anwiler  
RR 2, Box 55A  
Bovey, MN 55709  
(218)245-1057

Dave Baumgarten  
Superior Forest Products  
2555 London Road  
Duluth, MN 55812  
(218)728-5159

Alvin Lindquist  
Hill City, MN 55748  
(218)697-8296

Bill Peterson  
Mesabe Logging  
Cook, MN 55723  
(218)666-2975

Korhonen Timber Products  
221 East Park Drive  
Hibbing, MN 55746  
(218)263-7420

Ken Hendrickson/Larry Mannausau  
Northwoods Chipping, Inc.  
International Falls, MN 56649  
(218)276-2316

Katzenberger Logging  
Cook, MN 55723  
(218)666-2275

Ken Ziemba  
Littlefork, MN 56653  
(218)278-6735

Alvin Hasbargen  
Birchdale, MN 56629  
(218)634-2174

Stanley Bairds  
Stan's Skidder Service  
Big Falls, MN 56627  
(218)276-4441

# Fiber Fuels Institute

310 Cedar Street  
Suite 400  
St. Paul, Minnesota 55101

114 South Main Street  
Crookston, Minnesota 56716

Phone 612 224 7366

Phone 218 281 1776



## Fuel Cost Comparisons Per Million BTUs

Fuel	Price	Cost Per Million BTUs of Useable Heat	Fuel	Price	Cost Per Million BTUs of Useable Heat
<b>Electricity</b>	Per KWH	Per MM BTUs	<b>Wood, Peat, Agri. Fuel Pellets or Briquettes</b>	Per Ton	Per MM BTUs
3,415 BTUs/kwh	\$ .035	\$10.79	8,000 BTUs/lb. @ 8% M.C.	\$50.00	\$ 4.00
Eff.=95%	.045	13.87	Eff.=78%	55.00	4.41
	.055	16.96		60.00	4.81
	.065	20.05		65.00	5.21
	.075	23.11		70.00	5.60
				75.00	6.01
<b>#2 Oil</b>	Per Gal.	Per MM BTUs	<b>Eastern Coal</b>	Per Ton	Per MM BTUs
138,000 BTUs/gal.	\$ .90	\$ 8.16	13,250 BTUs/lb.	\$70.00	\$ 3.39
Eff.=80%	1.00	9.06	Eff.=78%	75.00	3.63
	1.10	9.98		80.00	3.80
	1.20	10.88		85.00	4.11
	1.30	11.79		95.00	4.60
<b>Propane</b>	Per Gal.	Per MM BTUs	<b>Western Coal</b>	Per Ton	Per MM BTUs
90,600 BTUs/gal.	\$ .60	\$ 8.49	9,000 BTUs/lb.	\$40.00	\$ 2.96
Eff.=78%	.65	9.20	Eff.=75%	45.00	3.33
	.70	9.91		50.00	3.70
	.80	11.32		55.00	4.07
				60.00	4.44
<b>Natural Gas</b>	Per MCF	Per MM BTUs	<b>Wood Chips</b>	Per Ton	Per MM BTUs
1 million BTUs/MCF	\$4.00	\$ 5.00	4,700 BTUs/lb. @ 45% M.C.	\$18.00	\$ 2.95
Eff.=80%	4.50	5.63	Eff.=65%	20.00	3.27
	5.00	6.25		22.00	3.60
	5.50	6.88		25.00	4.09
	6.00	7.50		30.00	4.90
	6.50	8.13			
<b>Firewood</b>	Per Cord	Per MM BTUs	<b>Lignite</b>	Per Ton	Per MM BTUs
20 million BTUs/cord Air Dried	\$40.00	\$ 3.64	7,000 BTUs/lb.	\$40.00	\$ 3.81
Eff.=55%	60.00	5.45	Eff.=75%	45.00	4.29
	80.00	7.27		50.00	4.76
	100.00	9.09		60.00	5.71
	120.00	10.91			
<b>#5 &amp; #6 Oil</b>	Per Gal.	Per MM BTUs	<b>Peat</b>	Per Ton	Per MM BTUs
143,000 BTUs/gal.	\$ .60	\$ 5.25	Sods or Milled	\$20.00	\$ 2.45
Low Sulfur	.65	5.69	6,000 BTUs/lb. @ 30% M.C.	25.00	3.06
Eff.=80%	.70	6.12	Eff.=68%	30.00	3.68
	.75	6.56		35.00	4.29
	.80	7.00			

\*Useable heat costs are comparable. The cost per million BTUs as received (gross heating value) of each fuel is divided by the firing efficiency to yield the cost per million BTUs of useable (net) heat. For example: (1) #2 oil has 7.25 gal. per million BTUs. At 90¢ per gal., the as-received cost per million is 7.25 gal. x 90¢ = \$6.53. \$6.53 ÷ 80% efficiency = \$8.16 per million BTUs of useable heat. (2) Fiber fuel briquettes or pellets have 16 million BTUs per ton as received. At \$60.00 per ton, the as-received cost per million BTUs is \$60 ÷ 16 = \$3.75. \$3.75 ÷ 78% efficiency = \$4.81 per million BTUs of useable (net) heat.

# FIBER FUELS PROGRAM DIRECTORY

Government agencies and public institutions are doing and have done much to encourage the growth of the fiber fuels industry in Minnesota. This directory lists past, current and on-going programs affecting the fiber fuels industry.

For purposes of this directory, a program is defined as an individual project or planned effort designed to produce information or services relating to the fiber fuels industry. Programs are listed by program type in the following order.

<u>Type of Program</u>	<u>Description</u>	<u>Pages</u>
Information	Programs designed to provide information to fiber fuels producers or users.	18-27
Research	Programs producing new knowledge of importance to fiber fuels users or producers.	27-33
Financial	Programs providing financial assistance or information to fiber fuels producers, users, research etc.	33-36
Public Bldg. Conversions	Information about current public building fiber fuels conversion programs.	36-38
Legislation & Policy	Information about fiber fuels legislation and policy development programs.	38

This directory is the result of a preliminary survey and, as such, is not a comprehensive list of all public agency or institutional programs affecting the fiber fuels industry in Minnesota. Omissions are not intended to be a reflection on programs not listed.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - General	Information - General	Information - General
PROGRAM NAME	Overall Econ. Dev. Program	MN Energy Information Center	Industrial/Commercial Use of Wood for Energy
ADMINISTERING ORGANIZATION	Northwest Reg. Econ. Development Com.	MN Dept. of Energy and Econ. Development	Univ. of MN Agricultural Extension Service
CONTACT PERSON	Thomas Jorgens	Chris Gilchrist	Harlan Peterson
ADDRESS	Executive Director 425 Woodland Ave. Crookston, MN 56716	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	University of Minnesota 202 Kaufert Lab 2004 Folwell Ave. St. Paul, MN 55108
TELEPHONE NUMBER	(218)281-1396	(612)296-5175 1-800-652-9747	(612)373-2343
PROGRAM DESCRIPTION	Collecting, analyzing, disseminating information on costs, paybacks, etc. related to energy, ag. processing.	Provides public with a wide variety of energy information on the production and use of fiber fuels.	An educational program with supporting literature to inform industry managers, owners & engineers about potential of wood for energy.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - General	Information - General	Information - General
PROGRAM NAME	Conservation & Renewable Energy Inquiry & Referral Service	Renewable Energy Information	Glossary of Fiber Fuels Terms
ADMINISTERING ORGANIZATION	U.S. Dept. of Energy	U.S. Dept. of Energy	Fiber Fuels Institute
CONTACT PERSON			Richard C. Wright
ADDRESS	U.S. Dept. of Energy Box 8900 Silver Springs, Maryland 20907	U.S. Dept. of Energy 1536 Cole Blvd. Golden, COLO 80401	c/o Fiber Fuels Institute 310 Cedar Street St. Paul, MN 55101
TELEPHONE NUMBER	1-800-523-2929	1-303-231-1000	(612)224-7366
PROGRAM DESCRIPTION	Information on all areas of renewable energy, including fiber fuels.	Information on all areas of renewable energy, including fiber fuels.	FFI has developed a glossary of fiber fuels terms for use by fiber fuels industry and users.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - General	Information - Marketing	Information - Demonstration
PROGRAM NAME	Fiber Fuels Industry Development	Retail Fiber Fuels Marketing	Curbside Delivery System Development
ADMINISTERING ORGANIZATION	NW Economic Development, Inc.	NW Economic Development, Inc.	NW Economic Development, Inc.
CONTACT PERSON  ADDRESS	Jim Shortridge  114 South Main St. Crookston, MN 56716	Jim Shortridge  114 South Main St. Crookston, MN 56716	Jim Shortridge  114 South Main St. Crookston, MN 56716
TELEPHONE NUMBER	(218) 281-1776	(218) 281-1776	(218) 281-1776
PROGRAM DESCRIPTION	Co-sponsor conferences and proceedings publications and assist development of Fiber Fuels Institute.	Encourage retail fiber fuels and furnace dealers.	Obtain funding, analyze, field test fuel delivery equipment and communicate results.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - Fuel	Information - Fuel Production	Information - Fuel Production
PROGRAM NAME	Fiber Fuel Standards	Directory of Fiber Fuel Producers	Peat Harvesting Demo.
ADMINISTERING ORGANIZATION	University of Minnesota	Fiber Fuels Institute	Iron Range Resource & Rehabilitation Board
CONTACT PERSON  ADDRESS	Gene Miller  NW Experiment Station University of Minnesota Crookston, MN 56716	Dennis Asmussen, Chair.  FFI Standards Committee c/o Fiber Fuels Institute 310 Cedar Street St. Paul, MN 55101	Gary Lamma  IRRRB Box 411 Eveleth, MN 55734
TELEPHONE NUMBER	(218)281-6510	(612)224-7366	(218)744-2993
PROGRAM DESCRIPTION	Compiling fiber fuel data and analysis for wood, peat and agriculture residue.	Compiling a directory of all existing fiber fuels producers and available products.	Demonstration of peat harvesting methods using proven equipment and technology.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Financial - Heating Assistance	Information - Fuel Production	Information - Fuel Production
PROGRAM NAME	Furnace Installation for Low Income Households	Drying of High Moisture Waste	Agriculture Fiber Fuels Production
ADMINISTERING ORGANIZATION	Tri-Valley Opportunities Council, Inc.	USDA Forest Service	NW Economic Development, Inc.
CONTACT PERSON	Gary J. Peterson	Howard N. Rosen	Jim Shortridge
ADDRESS	114 South Main St. Crockston, MN 56716	USDA Forest Service Forestry Science Lab Southern Ill. University Carbondale, IL 62901	114 South Main St. Crockston, MN 56716
TELEPHONE NUMBER	(218)281-5832	(618)453-2318	(218)281-1776
PROGRAM DESCRIPTION	Reduce heating costs to low income households by installation of fiber fuel furnaces.	Analyze economics of biomass fuel drying, compile results and sponsor a regional biomass drying conference.	Encourage cattle feed mill operators for production of agriculture by-product fiber fuels.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - Fuel Use	Information - Fuel Users	Information - Standards
PROGRAM NAME	Peat Test Burns	MN Residential Fuelwood Demand Study, 1979-80	Fiber Fuels Performance Standards
ADMINISTERING ORGANIZATION	Iron Range Resource & Rehabilitation Board	MN DNR, Division of Forestry	Fiber Fuels Institute
CONTACT PERSON  ADDRESS   TELEPHONE NUMBER	Gary Lamppa  IRRRB Box 441 Eveleth, MN 55734   (218) 744-2993	John Krantz  DNR, Division of Forestry Box 44 Centennial Building St. Paul, MN 55155   (612) 296-6491	Dennis Asmussen, Chair.  FFI Standards Committee c/o Fiber Fuels Institute 310 Cedar Street St. Paul, MN 55101   (612) 224-7366
PROGRAM DESCRIPTION	Determination of the feasibility of retrofitting to burn peat in existing boilers in MN.	In 1980 a study was done to determine the amount of fuelwood being used by MN households. The major findings included:  1) 33% of MN households burn fuelwood.  2) 1.3 million cords of fuelwood was used by households during the 1979-80 heating season.  A similar study is planned for 1984.	In 1984 FFI will develop universal fiber fuels performance standards against which fiber fuels products can be measured.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - Economics	Information - Economics	Information - Biomass
PROGRAM NAME	Analysis Systems for Harvesting Wood Fuels	Preliminary Economic Analysis for Wood Energy Systems	Wetland Biomass Production Education
ADMINISTERING ORGANIZATION	University of Minnesota	USDA Forest Service	University of Minnesota
CONTACT PERSON  ADDRESS	J. L. Bowyer  Dept. of Forest Products University of Minnesota 2004 Folwell Ave. St. Paul, MN 55108	Jon D. Schendel  USDA Forest Service 1992 Folwell Ave. St. Paul, MN 55108	Douglas Pratt  220 Bio-Sci Center 1445 Gortner Ave. University of Minnesota St. Paul, MN 55108
TELEPHONE NUMBER	(612)373-1210	(612)642-5330	(612)373-2211
PROGRAM DESCRIPTION	Computer model determination of costs of wood fuels harvested by various means.	ROI, cash flow, payback period and benefit cost analysis for potential wood fuel users. A free preliminary analysis.	Public information dissemination on biomass topics through publications, seminars, tours.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - Safety	Information - Demonstration	Information - Engineering
PROGRAM NAME	Heating the Home With Wood	Fiber Fuels Heating System Demonstration	Engineering Outreach
ADMINISTERING ORGANIZATION	University of Minnesota, Agriculture Extension Service	University of Minnesota	MN Dept. of Energy and Economic Development
CONTACT PERSON  ADDRESS   TELEPHONE NUMBER	L. T. Hendricks  University of Minnesota 206 Kaufert Lab 2004 Folwell Ave. St. Paul, MN 55108  (612)373-1211	Gene Miller  NW Experiment Station University of Minnesota Crookston, MN 56716  (218)281-6510	Ronald Sundberg  DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101  (612)296-9096
PROGRAM DESCRIPTION	An educational program, with supporting publications to encourage safe and efficient use of wood for home heating.	Demonstration fiber fuels furnace and heat delivery system with auto-controls.	Engineering expertise and assistance provided in the areas of alternative energy including fiber fuels.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - Business	Information - Resources	Information - Peat
PROGRAM NAME	Business Startup Assistance	MN Wood Residue Studies	Peat Development Project
ADMINISTERING ORGANIZATION	MN Dept. of Energy & Economic Development	MN DNR, Division of Forestry & MN Energy Agency	MN DNR, Minerals Division
CONTACT PERSON  ADDRESS   TELEPHONE NUMBER	<p>Madeline Harris</p> <p>DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101</p> <p>(612)296-5023</p>	<p>John Krantz</p> <p>DNR, Division of Forestry Box 44 Centennial Building St. Paul, MN 55155</p> <p>(612)296-6491</p>	<p>Ronald Visness</p> <p>DNR, Minerals Box 45 Centennial Building St. Paul, MN 55155</p> <p>(612)296-4807</p>
PROGRAM DESCRIPTION	<p>Information to business, including those involved in fiber fuels, on formal business requirements, regulations, taxation.</p>	<p>In 1979/80 a study was done to determine the amount, type, usage and future availability of wood residue in MN. The study shows the volume and characteristics of wood available for fuel use now and in the future.</p>	<p>A broad based peat development project including:</p> <ol style="list-style-type: none"> <li>1) Peatlands leasing</li> <li>2) State bldgs. conversions</li> <li>3) Peat survey</li> <li>4) Environment monitoring</li> <li>5) Fuel peat aquisition</li> <li>6) Mechanical dewatering</li> <li>7) Peat densification</li> <li>8) Combustion testing</li> <li>9) Gasification</li> <li>10) Peatland reclamation</li> </ol>

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Information - Licensing	Research - Bioenergy Crops	Research - Economic
PROGRAM NAME	Business & Environmental Licensing	Bioenergy Research	Camp Ripley Fiber Fuels Evaluation
ADMINISTERING ORGANIZATION	MN Dept. of Energy & Economic Development	MN Dept. of Energy & Economic Development	MN Dept. of Energy & Economic Development
CONTACT PERSON  ADDRESS	Charles Schaffer  DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	James Idzorek  DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	Ronald Sundberg  DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101
TELEPHONE NUMBER	(612)296-9078	(612)296-3741	(612)296-9096
PROGRAM DESCRIPTION	Provides information and assistance with state level business and environmental licenses and permits.	Develop bioenergy crop production methods and do economic assessments of bioenergy. University of Minnesota providing assistance under contract.	Evaluation of the feasibility of converting facilities at Camp Ripley to fiber fuels use.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Research - Economic	Research - Economics	Research - Marketing
PROGRAM NAME	Alternative Energy Business Barrier Study	Peat Costs & Production Volumes	Fiber Fuels Marketing Coop. Feasibility Study
ADMINISTERING ORGANIZATION	MN Dept. of Energy and Economic Development	Iron Range Resource and Rehabilitation Board	MN Dept. of Energy and Economic Development
CONTACT PERSON  ADDRESS	Drew Mattson  DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	Gary Lamppa  IRRRB Box 441 Eveleth, MN 55734	Ken Yeager  DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101
TELEPHONE NUMBER	(612)296-9097	(218)744-2993	(612)297-1193
PROGRAM DESCRIPTION	Detailed economic analysis of factors impeding development of alternative energy businesses in MN.	Determination of costs and efficiency of peat production in MN using proven equipment and technology for milled and sod peat.	Feasibility study for a fiber fuels marketing association.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Research - Peat	Research - Peat Combustion	Research - Fuel Manufacturing
PROGRAM NAME	Peat Development Project	Virginia Peat Burn	Compression - Drying of Wood Residue Fuel Chips
ADMINISTERING ORGANIZATION	MN DNR, Minerals Division	MN Dept. of Energy and Economic Development	University of Minnesota
CONTACT PERSON	Ronald Visness	James Idzorek	John G. Haygreen
ADDRESS	DNR, Minerals Box 45 Centennial Bldg. St. Paul, MN 55155	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	Dept. of Forest Products University of Minnesota 2004 Folwell Ave. St. Paul, MN 55108
TELEPHONE NUMBER	(612)296-4807	(612)296-3741	(612)373-1205
PROGRAM DESCRIPTION	<p>A broad based peat development project including:</p> <ol style="list-style-type: none"> <li>1) Peatlands leasing</li> <li>2) State bldgs. conversion</li> <li>3) Peat survey</li> <li>4) Environment monitoring</li> <li>5) Fuel peat aquisition</li> <li>6) Mechanical dewatering</li> <li>7) Peat densification</li> <li>8) Combustion testing</li> <li>9) Gasification</li> <li>10) Peatland reclamation</li> </ol>	<p>Combustion evaluation of peat and peat-coal mixtures in the Virginia Utility boilers.</p>	<p>Research on developing a process to reduce moisture content of green whole-tree chips.</p>

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Research - Fuel Manufacturing	Research - Fuel Production	Research - Fuel Production
PROGRAM NAME	Wood and Agriculture Residue Drying	Agroforestry	Wetland Biomass Production
ADMINISTERING ORGANIZATION	USDA Forest Service, NCFES	University of Minnesota	University of Minnesota
CONTACT PERSON	Ed Pepke	William E. Larson	Paul Read
ADDRESS	USDA Forest Service 1992 Folwell Ave. St. Paul, MN 55108	1529 Gortner Ave. University of Minnesota St. Paul, MN 55108	305 Alderman Hall University of Minnesota St. Paul, MN 55108
TELEPHONE NUMBER	(612)642-5329	(612)373-1062	(612)373-1219
PROGRAM DESCRIPTION	Project will research drying of biomass fuels and generate an economic analysis of 3 drying methods.	Evaluation of MN peatlands to produce short rotation woody biomass energy crops.	Development of superior cattail genotypes for stand establishment.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Research - Fuel Production	Research - Fuel Production	Research - Fuel Production
PROGRAM NAME	Wetland Biomass Management	Wetland Biomass Fertilization	Wetland Biomass Harvesting
ADMINISTERING ORGANIZATION	University of Minnesota	University of Minnesota	University of Minnesota
CONTACT PERSON	Douglas Pratt	David Biesboer	Cletus Schertz
ADDRESS	220 Bio-Science Center 1445 Gortner Ave. University of Minnesota St. Paul, MN 55108	220 Bio-Science Center 1445 Gortner Ave. University of Minnesota St. Paul, MN 55108	Dept. of Agriculture Engineering University of Minnesota St. Paul, MN 55108
TELEPHONE NUMBER	(612)373-2211	(612)376-1558	(612)373-1341
PROGRAM DESCRIPTION	Study of wetland bio-energy crop establishment and management.	Study of wetlands nitrogen relations in order to decrease need for fertilization expense.	Development of harvesting methods and equipment for emergent aquatic bio-energy crops such as cattails.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Research
PROGRAM NAME	Energy From Forest Residues
ADMINISTERING ORGANIZATION	USDA Forest Service
CONTACT PERSON  ADDRESS	Ed Kallio  North Central Forest Experiment Station 118 Old Main UMD Duluth, MN 55812
TELEPHONE NUMBER	(218)724-1046
PROGRAM DESCRIPTION	<ol style="list-style-type: none"> <li>1) Analysis of policy options to encourage management and use of residue for energy.</li> <li>2) Analysis of economics and engineering for space heating system conversions.</li> <li>3) Analysis of long and short run demand for forest residue for energy in NE Minnesota.</li> <li>4) Develop forest growth and yield data to aid in timber supply analysis.</li> <li>5) Assess forest harvesting systems.</li> <li>6) Analysis of impact of forest residue fuels on economy of NE Minnesota</li> <li>7) Timber supply analysis of St. Louis County tax forfeited lands.</li> </ol>

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Research - Fuel Production	Financial - Loans	Financial - Loans
PROGRAM NAME	Solid Fuel from Forest Biomass	Energy Development Loan Program	Public School Energy Investment Loan Program
ADMINISTERING ORGANIZATION	Minnegasco, Inc.	MN Dept. of Energy & Economic Development	MN Dept. of Energy & Economic Development
CONTACT PERSON		Frank Altman	Financial Management Division
ADDRESS	Minnegasco, Inc. 201 South 7th Street Minneapolis, MN 55402	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55105
TELEPHONE NUMBER	(612)372-4664	(612)296-9090	(612)296-9078
PROGRAM DESCRIPTION	To evaluate a plant to produce solid fuel from short rotation forest biomass crops such as alder or willow on peat lands.	Direct loans to businesses for energy related purposes.	Full loans for conservation or alternative energy retrofits to public schools. Maximum of 10 year payback.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Financial - Loans	Financial - Loans	Financial - Tax Credits
PROGRAM NAME	Financing	Alternate Energy Loans	Energy Tax Credit
ADMINISTERING ORGANIZATION	MN Dept. of Energy & Economic Development	Iron Range Resource & Rehabilitation Board	Internal Revenue Service
CONTACT PERSON	David Molol	Gary Lamma	Mark Fisher
ADDRESS	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	IRRRB Box 441 Eveleth, MN 55734	Internal Revenue Service 316 North Robert Street St. Paul, MN 55101
TELEPHONE NUMBER	(612)297-1170	(218)744-2993	(612)725-7825
PROGRAM DESCRIPTION	Several below market rate loan programs are available to MN businesses for land, buildings and equipment.	Loans provided to selected private businesses involved in fiber fuels research, production and use.	Investment tax credits and biomass energy tax credits can apply to certain fiber fuels related capital expenditures.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Financial - Tax Credits	Financial - Grants	Financial - Grants, Loans
PROGRAM NAME	Minnesota Tax Credits	Institutional Conservation Program	Boiler Conversions
ADMINISTERING ORGANIZATION	MN Dept. of Energy & Economic Development	MN Dept. of Energy & Economic Development	Iron Range Resources & Rehabilitation Board
CONTACT PERSON	Charles Schaffer	Financial Planning Division	Gary Lamppa
ADDRESS	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	IRRRB Box 441 Eveleth, MN 55734
TELEPHONE NUMBER	(612)296-0617	(612)297-2103	(218)744-2993
PROGRAM DESCRIPTION	Certification of businesses eligible to participate in new (1983) technology transfer and equity investment tax credits.	50% matching grants to public and non-profit schools and hospitals for building audits and conservation and alternative energy retrofits.	Loans and grants are provided to various public institutions in NE Minnesota for conversion to fiber fuels use.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Financial - Insurance	Financial - Fuel Assistance	Public Building Conversions
PROGRAM NAME	Energy Loan Insurance Program	Fuel Supply Service to Low Income Homes	DNR Building Heating Systems
ADMINISTERING ORGANIZATION	MN Dept. of Energy & Economic Development	Anoka County Community Action Program	MN DNR, Division of Forestry
CONTACT PERSON	Frank Altman	Patrick McFarland	Carl Prosek
ADDRESS	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101	Executive Director, ACCAP  (or Jim Fisher, Pres. Energy Consult Corp. (612)224-1700)	DNR, Division of Forestry 1201 East Hwy. 2 Grand Rapids, MN 55744
TELEPHONE NUMBER	(612)296-9090	(612)572-0060	(218)327-1718
PROGRAM DESCRIPTION	Insure private loans to businesses for energy related purposes.	ACCAP has contracted with a consulting firm to develop a non-profit fuels supply service to low-income homes.	In 1/84 all DNR buildings over 1500 square feet were analyzed and prioritized for conversion to fiber fuel heating systems.

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Public Building Conversions	Public Building Conversions	Public Building Conversions
PROGRAM NAME	Peat Development Project	Camp Ripley Conversion	Convert Public Buildings to Fiber Fuels Use
ADMINISTERING ORGANIZATION	MN DNR, Minerals Division	Dept. of Military Affairs	MN Dept. of Administration
CONTACT PERSON	Ronald Visness	Ronald Visness	Donald T. Johnson
ADDRESS	DNR, Division of Minerals Box 45 Centennial Bldg. St. Paul, MN 55155	DNR, Division of Minerals Box 45 Centennial Bldg. St. Paul, MN 55155	G-26, Administration Bldg. 50 Sherburne Ave. St. Paul, MN 55155
TELEPHONE NUMBER	(612)296-4807	(612)296-9562	(612)296-8204
PROGRAM DESCRIPTION	A broad based peat development project including:  <ol style="list-style-type: none"> <li>1) Peatlands leasing</li> <li>2) State bldgs. conversion</li> <li>3) Peat survey</li> <li>4) Environmental monitoring</li> <li>5) Fuel peat aquisition</li> <li>6) Mechanical dewatering</li> <li>7) Peat densification</li> <li>8) Combustion testing</li> <li>9) Gasification</li> <li>10) Peatland reclamation</li> </ol>	Inter-agency coop. agreement to do feasibility study of conversion of Camp Ripley and selected armories to fiber fuels use.	Bids received to convert existing heating plants to fiber fuels use for:  <ol style="list-style-type: none"> <li>1) BSU</li> <li>2) AwGwah Ching Nursing Home</li> <li>3) St. Cloud State University</li> <li>4) Brainerd State Hospital</li> <li>5) Lino Lakes Correctional Facility</li> </ol> <p>All by 3rd party financing procedures.</p>

FIBER FUELS PROGRAM DIRECTORY

TYPE OF PROGRAM	Public Building Conversions	Legislation	Policy
PROGRAM NAME	Bemidji DOT Conversion	Fiber Fuels Task Force	Indigenous Energy Resource Opportunities Team
ADMINISTERING ORGANIZATION	MN Department of Transportation	MN House of Representatives Energy Committee	MN Dept. of Energy & Economic Development
CONTACT PERSON	Paul M. Jensen	Rep. Joe Quinn, Chair.	Marcia Janssen Keller
ADDRESS	Room G-20 Transportation Bldg. St. Paul, MN 55155	State Office Bldg. St. Paul, MN 55155	DEED 980 American Center Bldg. 150 East Kellogg Blvd. St. Paul, MN 55101
TELEPHONE NUMBER	(612)297-3591	(612)296-2439	(612)296-4685
PROGRAM DESCRIPTION	Gasification conversions for existing boiler.	Explore existing fiber fuels initiatives and recommend legislation to stimulate fiber fuels industry.	Recommend policy goals, assess current programs, identify opportunities, recommend action by state government to accelerated development of indigenous energy resources.

## CORRECTIONS - ADDITIONS - SUGGESTIONS

Please note corrections, additions and suggestions on this sheet and send to the address listed below. Your input will be used in the preparation of the final draft of Status of Fiber Fuel Use in Minnesota.

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SEND TO: Jim Fisher, Secretary  
Fiber Fuels Institute  
Suite 400  
310 Cedar Street  
St. Paul, Minnesota 55101  
(612/224-7366)



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