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Status and Potential of Michigan Natural Resources: Pulp, Paper, Allied Products and Wood Energy

Michigan State University Agricultural Experiment Station and Cooperative Extension Service

Special Report

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**SPECIAL
REPORT**

Michigan Agricultural
Experiment Station,
Michigan State University

**Status and Potential
of Michigan
Natural Resources**

**Pulp, Paper,
Allied Products
and Wood Energy**



Reports on the Status and Potential of Michigan Natural Resources

This special report is one of a series (listed below) prepared for a project of the Michigan Agricultural Experiment Station (MAES) called the "Status and Potential of Michigan Natural Resources" (SAPMINR).

The project was designed to take an inventory of the current status of Michigan natural resources, identify emerging trends, and appraise future opportunities. The purpose was to assist MAES in establishing priorities and planning programs.

Both overview and focused topic assessments have been made. The overview reports provide background information on the political, economic, and social environments influencing Michigan natural resources. The focus reports examine specific resources, including timberland resources, fisheries and wildlife resources, parks and recreational resources, and land and water resources.

The SAPMINR project began in early 1993. At that time, interdisciplinary teams of MSU faculty members, graduate students, federal and state government officials, and others collaborated to develop preliminary reports. In March 1994, a SAPMINR conference took place during MSU's Agriculture and Natural Resources Week. The objective of the conference was to provide a public forum for discussion of the preliminary reports. Based on interaction with conference participants, the authors prepared the final drafts of the special reports (SR).

This report should not be considered final. Efforts to analyze the past and forecast the future are ongoing. Even so, this report is a base for dialogue on both the status and potential of Michigan natural resources.

To receive any of the reports listed below, contact: MSU Bulletin Office, Room 10B Agriculture Hall, Michigan State University, East Lansing, MI 48824-1039.

Status and Potential of Michigan Natural Resources List of Reports

Overview Reports

- SR 67 --SAPMINR Highlights
- SR 68 --Michigan Natural Resources Policy
- SR 69 --Demographic, Social and Economic Trends
- SR 70 --Integrated Natural Resource Systems

Focus Reports

- SR 71 --Timber and Timberland Resources
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- SR 82 --Natural Resources and Communities

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Pulp, Paper, Allied Products and Wood Energy

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Pulp and Paper

The pulp, paper and allied products industry processes wood, wood fiber, wastepaper, cellulose and plastic film into products for a broad and strong consumer base. The U.S. industry has a worldwide reputation for low cost, high volume, high quality production. The industry has modern, well financed physical plants, renewable and recyclable raw materials, and a highly skilled labor force. Within the United States, the industry is eighth among manufacturing industries in value of shipments and second in capital expenditures (USDOC-ITA, 1993). In 1993, Michigan's pulp, paper and allied products industry exported \$133 million worth of goods to 73 countries throughout the world. This is up from \$127 million and 67 countries in 1989.

This manufacturing sector includes primary products industries (in sectors 261, 262 and 263) that produce pulp, paper and paperboard from wood or wood fiber, either new or recycled. It also includes secondary paper manufacturers, the paper converting sectors (264, 265

and 266), which include paper coating and glazing, envelopes, bags, die-cut paper and paperboard, pressed and milled pulp goods, sanitary paper products, stationery products, converted paper, paperboard containers and boxes, and building paper and board mills. The definitions of the SIC sectors are included in the glossary. The number codes for some industries were changed in 1987—a key to the 1977 and 1987 codes follows the glossary.

Michigan has 235 pulp and paper and allied manufacturing facilities (Table 1). The greatest number of firms are secondary manufacturers and are located in the southern Lower Peninsula (Figure 1). Primary manufacturers, pulp mills and pulp and paper mills, are spread more evenly from north to south and are concentrated along the Great Lakes (Figure 2).

Employment in the entire pulp, paper and allied products industry was 20,791 in 1992 (MESOC). First quarter total wages for 1993 were \$193,849,249 for the industry; just over \$75 million of this was from paper mills.

Wood Pulp (SIC 2611) and Paper (SIC 2621)

Wood pulp is the primary resource used in the manufacture of paper and paperboard. It is produced by breaking down wood and wood fibers—either mechanically grinding it or chemically digesting it—into pulp. Because Michigan's pulp mills are largely part of integrated pulp and paper products operations, these sectors are treated together.

Table 1. Michigan's pulp and paper industry by sector, 1992.

Industry and SIC Code	Number of units	Employment 1992
Pulp and paper mills—2611 and 2621	34	7,417
Paperboard mills—2631	15	2,938
Paper coating and glazing—2641	15	1,127
Envelopes—2642	9	290
Bags—2643	16	929
Die-cut paper & board—2645	17	615
Sanitary paper products—2647	2	427
Stationery products—2648	3	330
Other converted paper—2649	20	672
Paperboard containers & boxes—265	104	6,046
Total	235	20,791

Note: MESOC classifications do not match the MDNR Wood Products Manufacturers Directory for pulp mills, as SIC rules include non-wood pulp. Pulp mills and paper mills are, therefore, treated together in this report

Source: Michigan Employment Security Commission, 1993.

Seven mills in Michigan produce pulp as part of integrated pulp and paper products manufacturing. Three mills are located in the Upper Peninsula (in Escanaba, Quinnesec and Ontonagon), two are in the northern Lower Peninsula (Filer City and Alpena), and two are in the southern Lower Peninsula (Muskegon and Allegan). Employment in Michigan's pulp and paper mills was 7,417 in 1992 and it increased 8 percent from 1982 to 1991. First quarter wages for 1992 were \$83.5 million.

In 1991, Michigan's mills produced 1.3 million short tons of wood pulp, twice the 1975 level. Michigan's share of regional production grew from 18.6 percent to 27.4 percent. The North Central region, which increased 35 percent to 4.7 million short tons, was the fastest growing region in the U.S. for pulp production from 1975 to 1991. Nationally, wood pulp production increased 49 percent to 64.2 million short tons. (Unless otherwise noted, regional information in this report pertains to the entire North Central region, which is

divided up into two subregions, the East North Central and the West North Central. The East North Central is made up of Ohio, Indiana, Illinois, Michigan and Wisconsin; the West North Central is made up of Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas.)

Paper production in Michigan from 1975 to 1991 grew from 0.8 million short tons to 1.6 million short tons. Michigan's share of regional production increased to 18 percent in 1991. Over that time, production in the North Central region increased 82 percent, from 4.9 million to 8.9 million short tons. The North Central's rate of increased production was exceeded only by the South's at 83 percent. The North Central's increased paper production surpassed the Northeast's production to become the number two producer of paper in the country. National paper production increased 68 percent during this period. Trends show all regions increasing their contributions to national production except the Northeast.

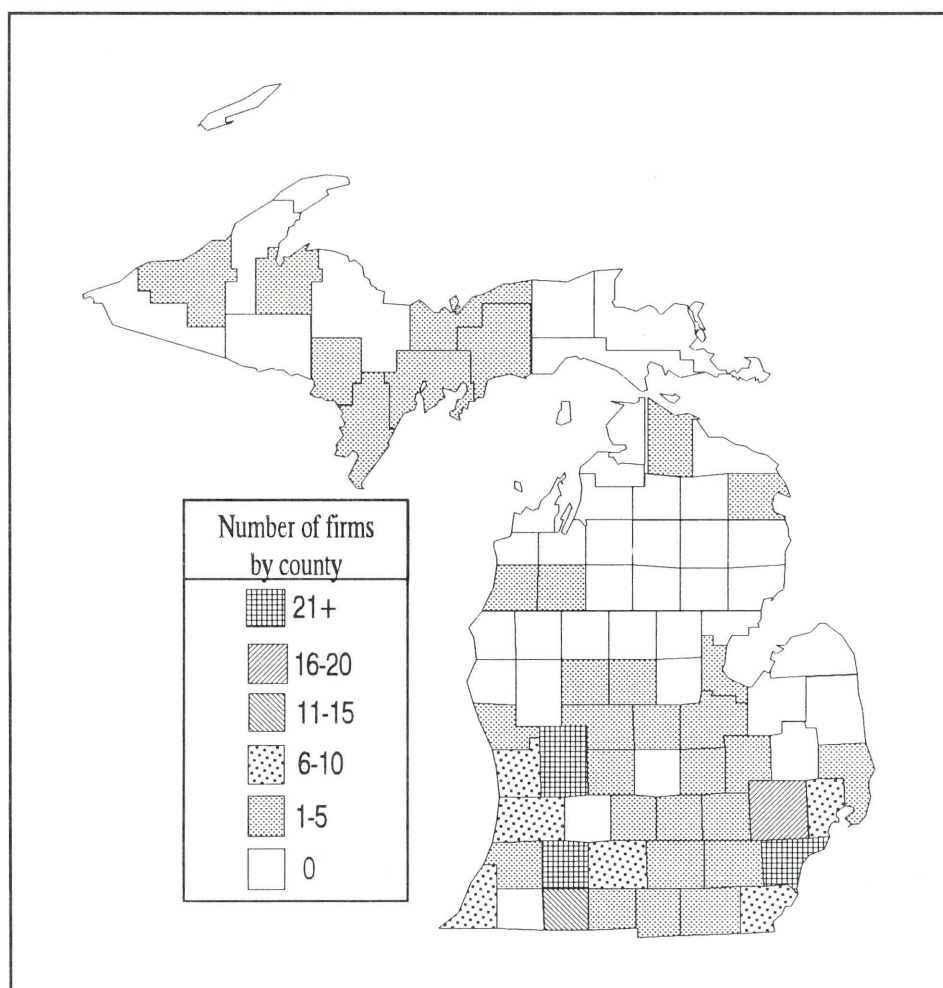


Figure 1. Distribution of secondary pulp, paper and allied manufacturing facilities in Michigan by county.

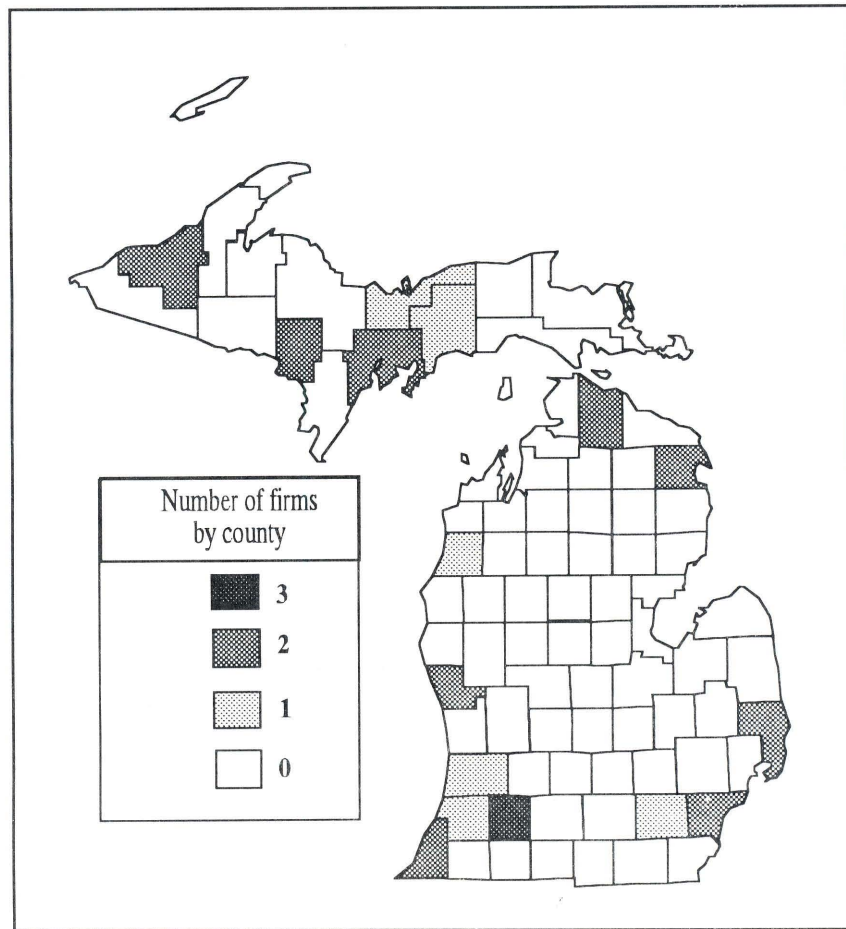


Figure 2. Distribution of primary pulp, paper and allied manufacturing facilities in Michigan by county.

Paperboard (SIC 2631)

Containerboard and boxboard are the two major products in the paperboard sector. Containerboard is the larger portion of the sector. It consists of manufacturers of linerboard and paper for corrugating in the manufacture of shipping containers and other corrugated products. Boxboard (or cardboard) includes paperboard for non-corrugated packaging such as cereal and processed food boxes, fiber cans and tubes, and paper for construction wallboard and automobile panelboard.

Michigan's 15 paperboard mills are located mainly in the southern Lower Peninsula, with the exception of one large mill in Manistee County and another in Delta County. Paperboard production in Michigan was 1.5 million short tons in 1991, an increase of 52 percent from 1984. (Before 1984, Michigan paperboard data are unavailable because of disclosure restrictions. Regional data, however, are available.) State growth again exceeded regional growth (26 percent), bringing the production level to 5.3 million short tons. National growth was only

21 percent. Michigan's share of regional production grew to 29 percent. Over the longer period of 1975 to 1991, North Central production grew at 60 percent, a lower rate than in the South (75 percent) and the West (65 percent).

Employment in Michigan paperboard mills was 4,224 in 1991, a decrease of 46 percent from 1982. First quarter wages for 1993 were \$31.6 million.

Converted Paper and Board (SIC 264) and Paperboard Containers and Boxes (SIC 265)

Michigan has 82 mills that produce coated or glazed paper, envelopes, paper bags, die-cut paper and board, sanitary paper products, stationery products or other converted paper (Table 2). These mills employed 4,390 people in 1992, an increase of 13 percent from 1982. First quarter wages for 1993 were \$32.4 million. Die-cut paper and board has been the fastest growing sub-sector—employment increased 290 percent from 1982.

Though data were not disclosed in Michigan for 1987, regional data are available. Capital expenditures declined slightly from 1985 to 1986 (4.9 percent), and more significantly between 1986 and 1987 (19.3 percent). This suggests that the trend in capital expenditures for Michigan may have continued to fall as well. Trends in capital expenditures on the national level are similar to those on the state and regional levels, increasing 102.1 percent from 1976 to 1986.

Future Prospects

Trade

Trade prospects for U.S. paper and allied products continue to be excellent. The total value of Michigan's exports of pulp and paper products has risen in the 1990s. As the U.S.-Canada Free Trade Agreement encouraged continued growth of U.S. exports to Canada, the North American Free Trade Agreement (NAFTA) is expected to do the same for trade with Mexico. Barriers to trade for pulp, paper and paperboard are scheduled to be phased out over the next five years under NAFTA. The General Agreement on Tariffs and Trade (GATT) and U.S.-Japanese trade negotiations will further open markets to U.S. manufacturers. Exports in pulp and paper products are expected to grow faster than domestic consumption (USDOC-ITC, 1993). Removal of international trade barriers may lead many additional manufacturers into export markets.

Environmental Issues

Rates of waste recovery and use of recycled fiber continue to increase in the industry. The 1993 wastepaper recovery rate was 42 percent, and recycled paper made up nearly 31 percent of the fiber used at U.S. paper and paperboard mills. New U.S. government requirements for purchasing paper will continue to encourage use of recycled fibers.

The Clean Water Act and the Clean Air Act standards continue to be revised. When the proposed new standards become regulations in late 1995, there are expected to be implications for bleached pulp mills with respect to dioxin. The Clean Air Act amendments significantly changed emissions standard regulations for sources of ozone, carbon monoxide and particulates. This will have the largest effect on mills in areas where the ambient air does not meet national, health-based, quality standards (USDOC-ITA, 1993).

Wood Energy Use In Michigan

Wood Energy

Worldwide, the greatest use of wood is for energy. It is also a significant and growing use in Michigan. At least 578,000 households burn fuelwood and more than 150 commercial and industrial facilities produce wood energy for their own use or for sale.

Wood energy in the state comes from solid wood, wood chips, wood wastes, wood processing residues, logging residues and black liquor from pulp production. Wood fuel is produced as a primary product and as a residue from roundwood production, primary wood products manufacturing and secondary manufacturing.

Industrial Wood Energy

Primary production of wood fuel for consumption is growing in Michigan — 18 million cubic feet of fuelwood were produced in 1992 (Table 3). This is equivalent to 4.6 trillion Btu. Primary production of industrial fuelwood is concentrated in the northern Lower Peninsula, which has 99 percent of recorded production.

Logging residues are an even greater source of potential wood energy. Harvesting operations in Michigan created 82.6 million cubic feet of residue in 1992 (Table 4). If all logging residues were used for energy, they would

Table 3. Industrial fuelwood production by region, 1988 and 1992.

Region	1988		1992	
	Cords	Million cubic feet	Cords	Million cubic feet
Eastern Upper Peninsula	2,601	0.17	450	0.03
Western Upper Peninsula	0	0.0	2,875	0.20
Northern Lower Peninsula	322,487	21.66	254,609	17.80
Southern Lower Peninsula	1,889	0.12	0	0
State	326,977	21.94	257,934	18.03

Source: Smith et al., 1988 and MDNR, unpublished.

produce 21.2 trillion Btu. The Upper Peninsula produces 60 percent of the logging residue; the northern Lower Peninsula produces most of the remainder.

Over one-third of the residue from Michigan primary wood processing facilities is used for fuel. Residues from these facilities yielded approximately 472,500 green tons of wood fuel, or 4.6 trillion Btu used for energy in 1992 (Table 5). Seventy-three percent of the residue is hardwood. The northern Lower Peninsula uses two-thirds of the residues. Use of these primary processing residues for energy grew substantially (34 percent) from 1984 to 1988 and declined slightly (8 percent) from 1988 to 1992.

Residential Wood Energy Consumption

A total of 518,123 households consumed 869,803 cords of wood in Michigan in 1992 (May et al., 1993). Of these, 103,610 households use wood as their primary source of energy, consuming 397,423 cords of wood. In the southern Lower Peninsula, 458,636 households consumed 518,187 cords. The northern Lower Peninsula was the second largest consumer of wood fuel. In this region, 90,817 households consumed 268,192 cords. In the Upper Peninsula, 28,670 households consumed 83,424 cords.

Wood Energy Facilities

There are 154 known industrial and commercial wood energy facilities in Michigan (MDNR, Air Quality Division, 1990). The Great Lakes Regional Biomass Program Directory (1988) lists 90 of these users. Their facilities annually use a total of 1,279.5 cords of solid wood and 250,657 dry tons and 823,768 wet tons of wood chips, wood chunks and mill residues. Almost half the facilities are in the southern Lower Peninsula. The others are distributed almost equally between the Upper Peninsula and the northern Lower Peninsula (Figure 3). Many are part of primary and secondary wood process-

ing plants. The sizes of Michigan's wood energy facilities vary from a small operation using 20 wet tons per year to a large mill using more than 400,000 wet tons per year.

More than half the facilities produce heat, a total of 824,000 Btu per hour. More than one-third produce steam from wood fuel. Production ranges from 20 pounds per hour at 1 pound per square inch gauge (psig) to 465,000 pounds per hour at 1,500 psig. Thirteen percent use wood fuel for electric generation or co-generation. The smallest plant produces 400 kilowatts of electricity; the largest produces 22,700 kilowatts.

The number of wood energy facilities increased dramatically in the past decade (Figure 4). From 1925 to 1977, development was slow, with an average of less than one plant per year beginning operations. However, eight plants began operations in 1980 and 13 began in 1983.

Wood Fuel Prices

Real prices for industrial wood fuel have declined in the past five years (Figure 5). For the first two quarters of 1991, real prices were near their pre-1983 energy crisis levels. Prices paid by residue users vary by plant. As the cost of landfilling residues increases, however, the cost of wood residue energy decreases. The cost to some users may even be negative—i.e., as the savings from disposal avoided are greater than the additional costs of a wood fuel plant.

Given current fuel costs, wood can compete with fuel oil and natural gas if it is available at less than \$25 per ton (Figure 6). To compete with coal, it must cost less than \$15 per ton. Current wood fuel prices are within this range.

Table 4. Logging residues from timberland generated during roundwood production by region, 1984, 1988, and 1992.

Region	Million cubic feet, 1984	Million cubic feet, 1988	Million cubic feet, 1992
Eastern Upper Peninsula	15.9	21.4	19.5
Western Upper Peninsula	20.5	26.4	29.7
Northern Lower Peninsula	22.6	26.6	27.8
Southern Lower Peninsula	4.3	4.6	5.6
State	63.3	79.0	82.6

Source: Smith et al., 1990 and MDNR, unpublished.

Social Benefits from Wood Energy

Fuel prices paid by the users invariably do not reflect the total cost to society of production and consumption. These additional costs are known as "externalities". They include the costs of air pollution from fuel burning, water pollution from the disposal of process water, impacts on stream flows from water uptake, and hazardous and non-hazardous waste disposal (Michigan Council on Environmental Quality, 1991). When environmental externalities were counted in energy costs, wood fuel became even more inexpensive. Estimated environmental costs from wood were less than 1 cent per kilowatt hour, higher only than solar and wind energy. In 1991, coal's environmental costs, by contrast, ranged from 4.5 to 6.5 cents per kilowatt hour, and nuclear fuel's costs were 3 cents per kilowatt hour (Figure 7).

Wood and other biomass energy production is more labor intensive and less capital intensive than oil and gas, gas utilities and electrical utility energy production. Biomass energy creates three times more direct jobs per million dollars invested and twice as many direct and indirect jobs than other energy systems (Stanton, 1991). In the Great Lakes states, approximately 18,500 people are employed in wood energy, where they earn \$350 million in personal income (Employment Research Associates, 1985).

Prospects for Wood Energy

Wood energy in Michigan has good prospects. Use of wood for energy is expected to grow 19 percent in the Great Lakes states between 1985 and 1995 (Public Sector Consultants, 1985). This increase is supported by Michigan's overall surplus of timber (though not for all species and products in all regions). Declining real

prices indicate that an ample economic supply of industrial fuelwood existed over the past decade. The use of wood is sensitive to many market factors, notably the price of fossil fuels, especially coal. Wood energy will be affected by both the cost of acquiring coal and the cost of burning it. The greater the emissions restrictions for coal, the more costly it is to burn and the more attractive wood is as a fuel.

Primary wood energy users, however, face challenges to supplies. All roundwood users face increased costs because of increased demands for environmental sensitivity and increased regulation. For example, greater restrictions are being placed on areas that may be harvested for timber and on harvesting methods. House Resolution 434 (Rep. Alley, 1991), which proposed a moratorium on clear-cutting on all state lands, is an example of societal forces pushing costs upward. Indications of timber scarcity are the rising real stumpage prices for aspen pulpwood, hard maple sawtimber, and oak pulpwood and sawtimber over the past decade. Fuelwood production costs may rise with the increase in real timber prices. Users of wood residues face a better situation. Increasing landfill costs for residue and increasing societal pressure to reduce waste will make energy production from wood more attractive.

Users of any wood fuel will continue to be particularly challenged by environmental regulations and permitting procedures. Obtaining air quality permits for wood boilers will continue to be difficult. More research needs to be done on emissions from specific fuel and specific boiler combinations and the resulting information disseminated to regulatory agency personnel so that each installation application does not need to be

Table 5. Wood residue produced at primary wood-using mills and used for industrial or domestic fuel, by region, 1988 and 1992.

Region	1988		1992	
	Softwood	Hardwood	Softwood	Hardwood
	(thousand tons green weight)			
Eastern Upper Peninsula	17.97	163.20	14.63	38.28
Western Upper Peninsula	12.32	68.87	6.66	63.65
Northern Lower Peninsula	67.80	137.59	103.88	199.28
Southern Lower Peninsula	2.50	51.50	0.77	45.36
State total residues for energy	100.59	421.16	125.94	346.57
State total residues	279.6	1,132.7	299.62	1,005.73

Source: Blyth et al., 1988 and MDNR, unpublished.

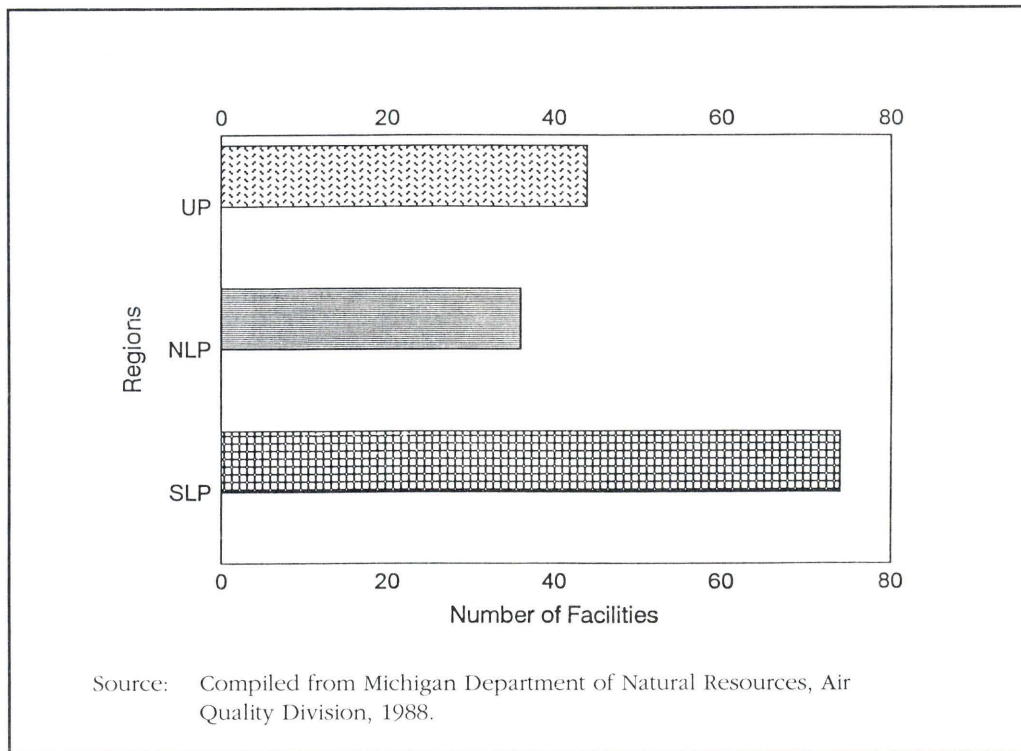


Figure 3. Wood energy facility regional distribution, 1988, by region.

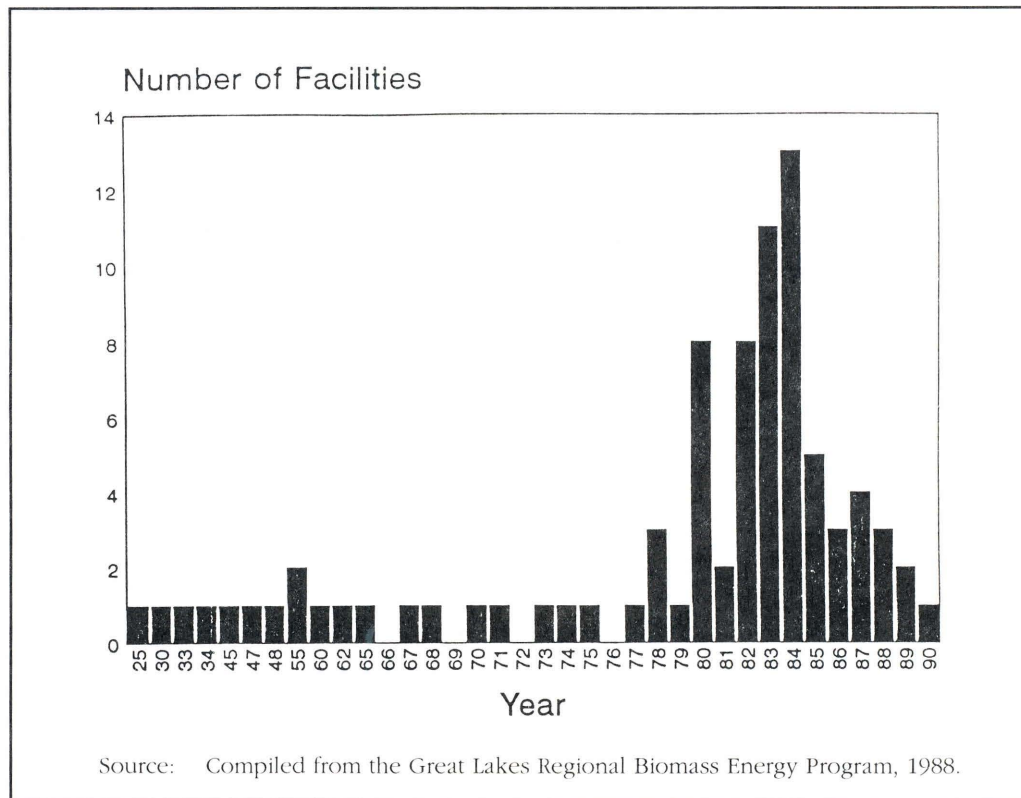


Figure 4. Trends in wood energy facility startup, 1925-1990.

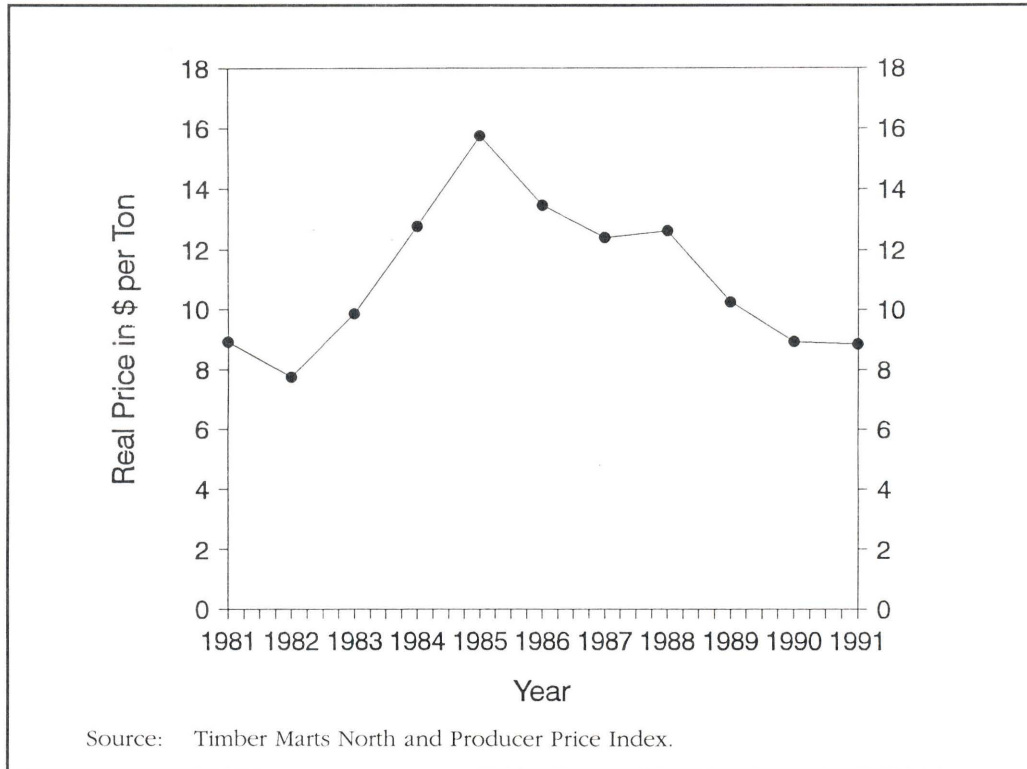


Figure 5. Real hog fuel prices, FOB, 1981-1991.

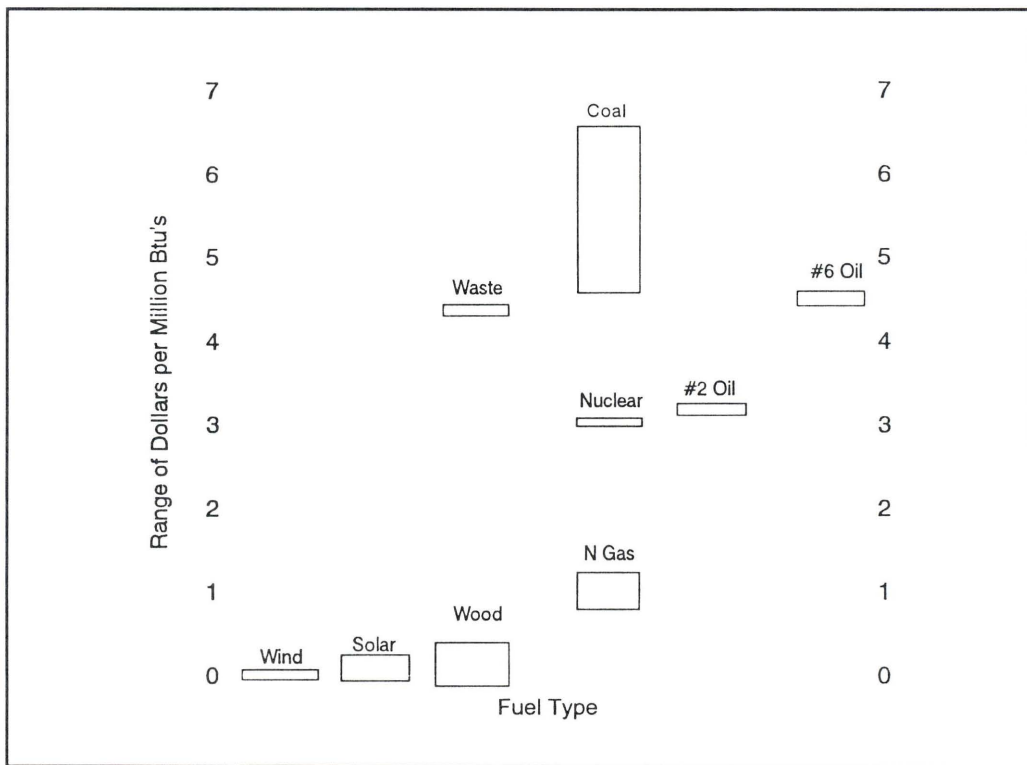


Figure 6. Cost comparisons for alternative fuels.

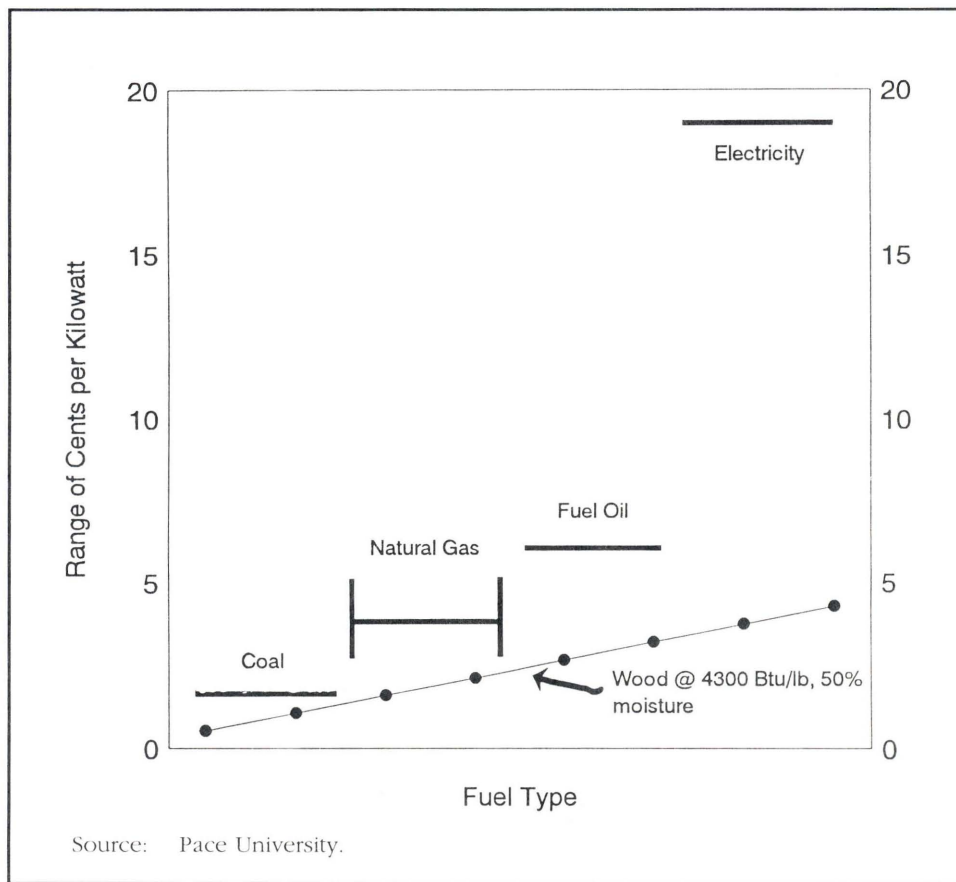


Figure 7. Environmental cost summary for alternative fuels.

Disposal of wood ash will also pose challenges for all users. Although agricultural land application of wood ash looks promising, many regulatory hurdles must be overcome before it is practical.

Public policy will affect the future of wood energy. Programs such as the Michigan Energy Conservation Program, which increased consumer knowledge of wood energy technology and economics, have a significant, positive influence on wood energy development. Policy that increases the availability of loans and grants for energy conversions and funds energy research is also effective in promoting wood energy development.

Summary

Residential fuelwood use, industrial fuelwood production and use of wood processing residues for energy are significant in Michigan. In addition to the 578,123 households burning wood, there are 154 commercial or industrial wood energy facilities. Though they vary greatly in

size of operation, many involve substantial capital investments in their energy plants.

Industrial fuelwood prices have declined recently despite rising real prices for many types and species of stumpage. Wood can compete well with oil, natural gas and coal. The cost to society from fuelwood is significantly less per Btu than the cost of fossil fuel or nuclear power.

Primary fuelwood users face the same challenges as other solid wood users. Greater restrictions on forest management and harvesting practices will decrease wood supply. Wood residue users will continue to benefit from avoiding increasing landfill costs and see fuel from residues become even more competitive. Pollution regulation and the permitting process with environmental agencies may be the biggest challenge that all fuelwood users face. Research and education are needed to help shorten the permitting process and to allow beneficial uses of wood ash.

Glossary

F.O.B. Freight on board, usually referring to the value of the product when delivered to the mill.

Payroll. Gross earnings to all employees of a firm.

S.I.C. Standard industrial classification as designated by the Office of Statistical Standards, Executive Office of the President, Bureau of the Budget. The number codes for some industries were changed in 1987. A key to the 1977 and 1987 codes follows the glossary.

S.I.C. 2611. Pulp mills. Establishments primarily engaged in manufacturing pulp from wood or from other materials, such as rags, linters, wastepaper and straw. Logging camps operated by pulp mills and not separately reported are also included in this industry.

S.I.C. 2621. Paper mills. Establishments primarily engaged in manufacturing paper (except building paper) from wood pulp and other fibers, which may also manufacture converted paper products. Pulp mills combined with paper mills and not separately reported are also included in this industry. Types of products include bag paper, sanitary tissue stock, wrapping paper stock, lining paper, news tablet paper and writing paper.

S.I.C. 2631. Paperboard mills. Establishments primarily engaged in manufacturing paperboard—including paperboard coated on the paperboard machine—from wood pulp and other fibers, which may also manufacture converted paperboard products. Pulp mills combined with paperboard mills and not separately reported are included. Products include kraft, corrugating and containerboard, boxboard, cardboard, folding boxboard and paperboard.

S.I.C. 2641. Paper coating and glazing. Establishments primarily engaged in manufacturing coated, glazed or varnished paper from purchased paper. Products include bread wrappers, cellophane adhesive tape, coated paper, gummed tape, labels, masking tape, tarpaper, thermoplastic coated paper, waxed paper and wrapping paper.

S.I.C. 2642. Envelopes. Establishments primarily engaged in manufacturing envelopes of any description from purchased paper and paperboard.

S.I.C. 2643. Bags. Establishments primarily engaged in manufacturing bags from purchased paper, cellophane, acetate polyethylene, and similar sheet or film materials.

S.I.C. 2644. Wallpaper.

S.I.C. 2645. Die-cut paper, paperboard. Establishments primarily engaged in die-cutting purchased paper and paperboard and in manufacturing cardboard by laminating, lining or surface coating paperboard. Products include cardboard panels and cut-outs, egg cartons, filing folders, and index and other cut cards.

S.I.C. 2646. Pressed and molded pulp goods. Establishments primarily engaged in manufacturing all kinds of pressed and molded pulp goods. Products include fiber conduits, cups, dishes, egg cartons, papier-mâché articles, and utensils.

S.I.C. 2647. Sanitary paper products. Establishments primarily engaged in manufacturing, from purchased paper, sanitary paper products such as facial tissues, table napkins, toilet paper, towels, sanitary napkins and tampons.

S.I.C. 2648. Stationery, tablets and related paper products.

S.I.C. 2649. Converted paper and paperboard not elsewhere classified. Establishments primarily engaged in manufacturing, from purchased paper or paperboard, miscellaneous converted paper or paperboard products not elsewhere classified. Products include laminated building board and paper, confetti, corrugated paper, crepe paper, desk pads, gift wrappers, looseleaf fillers and reamed paper, newsprint tablets and pads, and bound notebooks.

S.I.C. 2651. Folding paperboard containers and boxes. Establishments primarily engaged in manufacturing folding paperboard boxes from purchased paperboard.

S.I.C. 2652. Set-up paperboard boxes. Establishments primarily engaged in manufacturing set-up paperboard boxes from purchased paperboard.

S.I.C. 2653. Corrugated and solid fiber boxes. Establishments primarily engaged in manufacturing corrugated and solid fiber boxes from purchased paperboard or fiberstock. Products include corrugated and solid fiber boxes, display items, hampers, pads, pallets, partitions, and corrugated or fiberboard sheets.

S.I.C. 2654. Sanitary food containers. Establishments primarily engaged in manufacturing food containers from purchased special food board. Products include milk containers, cups, dishes, drinking straws, pails, plates, spoons and utensils.

S.I.C. 2655. Fiber cans, tubes, drums and similar products. Establishments primarily engaged in manufacturing fiber cans, tubes, drums and similar products without metal ends from purchased materials. Products include fiber cans, cores, hampers, mailing cases, reels, tubes and wastebaskets.

Shipment values. The received or receivable net selling values, f.o.b. plant, after discounts and allowances and excluding freight charges and excise taxes.

Key to 1977 and 1987 SIC classifications.

1977 industry

Code	Short Title
2611	Pulp mills
2621	Pulp mills, except building paper Pulp and paper mills, primarily pulp Other paper mills
2631	Paperboard mills Pulp and paperboard mills primarily pulp Other paperboard mills
2641	Paper coating and glazing
2642	Envelopes
2643	Bags, except textile bags
2645	Die-cut paper and board
2646	Pressed and molded pulp goods
2647	Sanitary paper products
2648	Stationery products
2649	Converted paper products, not elsewhere classified (nec)
2651	Folding paperboard boxes
2654	Sanitary food containers Folding Other sanitary food containers
2661	Building paper and board mills Insulation board Paper

1987 industry


Code	Short Title
Part 2611	Pulp mills
Part 2611	Pulp mills
Part 2621	Paper mills
Part 2611	Pulp mills
Part 2631	Paperboard mills
2671	Paper coated and laminated packaging
2672	Paper coated and laminated, nec
2677	Envelopes
2674	Bags: uncoated paper and multiwall
2673	Bags: plastics, laminated and coated
2675	Die-cut paper and board
Part 2679	Converted paper products nec
2676	Sanitary paper products
2678	Stationery products
Part 2679	Converted paper products nec
2657	Folding paperboard boxes
Part 2657	Folding paperboard boxes
2656	Sanitary food containers
Part 2493	Reconstituted wood products
Part 2621	Paper mills

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