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GEORGIA FOREST RESEARCH PAPER

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JANUARY, 1980



WOOD AS A HOUSEHOLD **ENERGY** SOURCE IN GEORGIA

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ACKNOWLEDGEMENT

The author is indebted to Mr. Jere L. Atchison who helped in the design of the sampling methodology, Professors Robert L. Chaffin and Albert A. Montgomery for their assistance in reviewing and editing this paper, and the many staff members of the Georgia Forestry Commission who did all the field work and interviewing for this study.

WOOD AS A HOUSEHOLD ENERGY SOURCE IN GEORGIA

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Georgians are discovering the value of wood as a source of energy in the home. Confronted with the rising cost of natural gas, fuel oil, and electricity, a large and growing number of Georgia households are turning to the state's plentiful and renewable supply of wood as a means of minimizing home heating costs. This increasing use of wood for home heating can significantly reduce Georgia's dependence on scarce and costly fossil fuels.

The harvesting of hardwoods for firewood will provide Georgia timberland owners with an opportunity for earning a cash return on otherwise unmerchantable timber. Further, it will facilitate the management of Georgia's pine forest resource by reducing the cost of forest practices needed to increase the supply of pine to Georgia's important forest products industries.

In order to determine the current importance of wood as a source of home energy, a survey of over 2000 Georgia households was undertaken in the summer of 1979 by the Georgia Forestry Commission and the Contract Research Division of the College of Business Administration at Georgia State University. This survey is a statistically valid sample enabling reliable estimates of the use of firewood for home heating, cooking and water heating by Georgia households.

SURVEY FINDINGS

HOME FIREWOOD USE IS WIDESPREAD

In Georgia a total of 375,000 homes, one in four, use wood as a source of energy. Nearly all of these homes used wood for home heating. Less than five percent or 20,000 homes used wood for cooking, water heating, and other household purposes.

WOOD IS PRIMARILY A SUPPLEMENTAL HOME FUEL

Most homes use wood as a supplemental fuel for home heating. Among all households surveyed, including those who did not use wood, more than two-thirds, or one million homes, used gas as the major fuel for home heating. Electricity ranked second as a source of space heating, accounting for nearly one-fourth or 350,000 households. But five percent of all Georgia households, or 74,000 homes, reported using wood as the primary source of space heating. This is twice the number of households reporting oil as the major space heating fuel.

| Major Source of Fuel for Home Heating | Households | |
|--|------------|-----------|
| | Proportion | Number |
| All Fuels | 100.00% | 1,462,368 |
| Gas | 68.5 | 1,001,722 |
| Electricity | 23.9 | 349,798 |
| Wood | 5.1 | 73,996 |
| Oil | 2.2 | 32,611 |
| Other | .3 | 4,241 |

The supplemental characteristic of wood as a fuel source is indicated by the response from nearly two-thirds of the wood-using households that wood accounts for 25 percent or less of space heating requirements. There were, how-

ever, 141,000 homes that obtained more than 25 percent of heat requirements from wood, and nearly 45,000 homes depended on wood for over 75 percent of space heating needs.

| Proportion of Home Heating from Wood | Households | |
|--------------------------------------|------------|---------|
| | Proportion | Number |
| Wood-Using Homes | 100.0% | 375,204 |
| 25 percent or less | 62.4 | 234,240 |
| 26 to 50 percent | 18.9 | 71,101 |
| 51 to 75 percent | 6.7 | 24,989 |
| 76 to 100 percent | 12.0 | 44,874 |

The type of wood-burning equipment used relates importantly to the manner in which wood is used in the home. A limited number of homes utilize more than one type of wood-burning equipment; the 375,204 homes in Georgia using wood for heating contained 392,051 pieces of equipment. Among wood-using homes the most widely used type of equipment is the fireplace, with 85 percent of the homes reporting its use. This was followed in order by circulating heaters, airtight stoves and Franklin stoves as shown below:

| Type of Wood-Burning Equipment | Households | |
|--------------------------------|------------|---------|
| | Proportion | Number |
| Fireplace | 85.1% | 319,149 |
| Circulating heater | 7.6 | 28,440 |
| Airtight stoves | 6.7 | 25,214 |
| Franklin stoves | 3.4 | 12,832 |
| Central wood furnace | .4 | 1,613 |
| Other | 1.3 | 4,803 |

The main reason respondents gave for using wood to heat homes is related to the role of wood as a supplemental energy source. A total of 196,000 homes, representing 52 percent of wood-burning households, reported that wood was used to reduce fuel costs. The next largest group, 120,000 homes, reported the enjoyment of the atmosphere of a fire as the main reason for using firewood. A summary of the main reason households burn firewood is tabulated below:

| Main Reason for Using Firewood | Households | |
|--------------------------------|------------|---------|
| | Proportion | Number |
| Wood-Using Homes | 100.0% | 375,204 |
| Cut fuel costs | 52.3 | 196,419 |
| Enjoyable atmosphere | 32.0 | 120,028 |
| Supplemental heat | 12.8 | 48,026 |
| Heat or convenience | 2.9 | 10,731 |

HOUSEHOLD WOOD USE IS INCREASING

Significantly, the widespread use of wood as a supplemental or major household fuel is a recent development. Although some households have been using wood for 20 years or longer, the average period of wood use is seven and one-half years. Indeed, half of the wood-using households reported they have been using wood for three years or less. This recent transition to wood by half of the current users importantly reflects the rising cost of energy since the 1973 oil embargo. An equally significant finding is that 208,000 of all Georgia households report plans to install new wood-burning equipment. If all households planning to install new wood-burning equipment actually do so, current wood consumption would increase by 55 percent. Facilitating this potential growth in the number of wood-using households and the volume of household wood use is the finding that 95 percent of existing wood users report satisfactory service from wood-burning equipment.

ANNUAL CONSUMPTION AND VALUE OF WOOD USED FOR HOME HEATING

The 375,000 households that use wood for home heating reported the use of 800,000 cords annually. This level of firewood use represents an average of just over two cords per year per using family.

Households obtain firewood from numerous sources, with the majority or 200,000 families cutting wood from their own land. Among respondents, some of whom acquire firewood from more than one source, 24 percent cut wood from land owned by others while 32 percent purchase wood from dealers. The importance of firewood sources is summarized below:

| Source of Firewood | Households | |
|--------------------------|------------|---------|
| | Proportion | Number |
| Cut from own source | 53.3% | 199,984 |
| Cut from friend's source | 21.2 | 79,543 |
| Cut from state land | .5 | 1,876 |
| Cut from federal land | 2.3 | 8,630 |
| Buy from dealer | 31.7 | 118,940 |
| Other | 2.0 | 7,504 |

The economic consequence of firewood consumption is significant. The

households that purchased wood reported using 237,000 cords in 1978. The outlay cost for this quantity of purchased firewood was \$11,250,000, representing an average price of \$47.38 per cord. It should be noted that the average price of \$47.38 represents wood purchased as cut, split, delivered, and ready for burning at a higher price, and also wood purchased on the stump at a lower price because the buyer did the cutting and splitting.

If households install wood-burning equipment as planned, the estimated demand for firewood will rise by an additional 445,000 cords per year. Of this increased quantity, nearly 132,000 cords would be purchased at a cost of \$6,250,000 assuming no change in the 1978 average price. Wood consumption per year for home heating would then total nearly 1,250,000 cords, of which 370,000 cords would be purchased at a cost of \$17,500,000. The supplying of firewood is an embryonic growth industry in Georgia.

IMPLICATIONS

WOOD VERSUS FOSSIL FUELS AS AN ENERGY SOURCE

With the current emphasis on efficient alternative fuel sources, the increasing use of firewood in Georgia can contribute significantly to energy conservation and help reduce our dependency on imported oil and gas and also on the use of electricity for home heating. Firewood is not only a less expensive source of heat, it is also in plentiful supply in Georgia.

The heat value of wood is highly dependent on the species and grade of firewood and the type of wood-burning equipment used. In one study of air pollution in the pulp and paper industry, sponsored by the U. S. Environmental Protection Agency, oil and wood fuel sources were given the following heat values when burned in power boilers:

| | | |
|------|------------------|---------|
| Oil | Btu's per gallon | 149,000 |
| Wood | Btu's per pound | 4,600 |

Firewood which has dried to 40 percent moisture content is estimated to weigh



This North Georgia resident made a detailed study of wood burning stoves before purchasing heaters for his home and store. He said he is well pleased with efficiency of the airtight

stoves and has realized a very substantial savings in fuel costs since converting from electricity and oil to wood.

4,500 pounds per cord. Each cord of wood, then, has the heating equivalency of 139 gallons or 3.3 barrels of oil.

At these comparative heating values, the annual consumption of 800,000 cords of wood is equivalent to 2,640,000 barrels of oil. At a conservative cost of \$22 per barrel this use of wood is equivalent to oil imports of \$58,000,000. If wood consumption reaches 1,250,000 cords as planned with new equipment, the oil equivalency of its heating value would be 4,125,000 barrels with a value of \$90,000,000 at today's oil prices.

Data on the heating values of natural gas were obtained from the Atlanta Gas Light Company. Based on 1,025,000 Btu's per 1,000 cubic feet of natural gas,

the current consumption of 800,000 cords of firewood represents the heat obtainable from more than 16 billion cubic feet of natural gas. The projected consumption of 1,250,000 cords of wood would be the equal of over 25 billion cubic feet of natural gas at a cost of \$72 million.

Electricity has a heating value of 3,413 Btu's per Kw, according to the Georgia Power Company. The comparative heating value, then, of one cord of wood is 6,065 Kw of electricity. The current annual consumption of 800,000 cords of firewood in Georgia is equal in heating value to five billion Kw. At a projected level of firewood use of 1,250,000 cords annually, the equivalent generation

of heat would require 7.5 billion Kw of electricity.

Based on the foregoing analysis, the relative costs of 1,000,000 Btu's of heat energy generated by various fuel sources can be summarized as follows:

| | <u>Cost per</u> | |
|-------------|------------------------|--------------|
| | <u>1,000,000</u> | |
| <u>Fuel</u> | <u>Cost per Unit</u> | <u>Btu's</u> |
| Wood | \$47.38 per cord | \$2.29 |
| Oil | \$22.00 per barrel | \$3.52 |
| Natural gas | \$2.87 per 100 cu. ft. | \$2.80 |
| Electricity | \$.045 per kwh | \$13.20 |

These varying energy sources involve the use of many types of heating equip-

ment. The heating values used in this analysis represent the number of Btu's of heat energy than can be extracted per standard unit of fuel. The type of heating equipment used significantly determines the efficiency with which these varying sources of fuel energy are converted into usable heat in the home.

It can be anticipated that the use of wood as a supplemental fuel, currently and in the future, will have its greatest impact in altering the use first of natural gas and secondly of electricity in home heating. As noted earlier, 68 percent of homes in Georgia use gas as the major source of fuel while 24 percent use electricity. The actual savings on fuel oil imports can be expected to be minimal as only about two percent of homes use oil as a major fuel.

IMPACT ON FORESTRY INDUSTRY

The current consumption of 800,000 cords of wood for home heating and the expected increase to 1,250,000 cords per year has had and will continue to have a significant influence on the forests in Georgia. One measure of the magnitude

of wood used for heating homes is to compare it to the amount of wood used by the pulp and paper industry, a leading industry in Georgia. The current consumption of wood for home heating is equivalent to ten percent of the wood volume used in the pulp and paper industry.

It should be pointed out that the hardwoods utilized for home heating are not generally favored as forest products. Thus, the expanding demand for hardwoods as firewood will provide Georgia timberland owners with an opportunity to earn a cash return from otherwise unmerchantable timber.

Pine forest management can also benefit from the demand for firewood. The removal of undesirable competing hardwoods from existing stands tend to favor the growth of the remaining pines to merchantable size. By the same token, as natural stands are harvested for pine sawtimber and pulpwood, there is most often a substantial residue of cull hardwoods that must be disposed of if, the pine stands are to be regenerated by plantation or seed tree methods. Because of the high cost of removing these competing

hardwoods, many landowners are reluctant to make the necessary investments for improving and regenerating pine stands. With a cash return from selling their cull hardwoods as firewood, many landowners may now be able to practice the pine forest management which is needed if Georgia is to meet the growing demands of forest products industries on the forest resource.

SUMMARY

Georgians cannot remove themselves from the adverse economic influences of the scarcity and high cost of petroleum and other sources of energy. The use of wood for home heating can, however, give substantial relief in one high expense area and at the same time make greater use of a natural resource with which Georgia is abundantly endowed. The recent increase in the use of wood as a fuel for home heating can be expected to further increase. As home wood-burning equipment becomes more efficient and easier to use, the advantages of wood should become more apparent and the impact of its use even greater.



This stand of cull hardwood represents the type of timber that is being used as fuel wood. It is the type material that can-

not be marketed for the manufacture of lumber and other products and would otherwise remain in the forest as waste.



Well seasoned wood is the key to good efficiency in wood burning stoves. Here is one excellent method of curing wood. Note that all surfaces of the split hardwood are exposed to air.

Received

MAY 13 1981

DOCUMENTS
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A. Ray Shirley, Director
John W. Mixon, Chief of Forest Research

Cost \$903.60
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