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Project B-166-3

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Prepared for
The Georgia Department of Commerce
Abit Massey, Director

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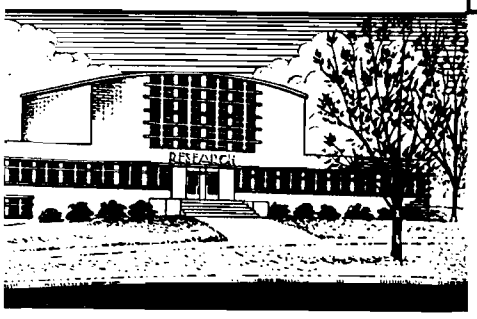

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia

Project B-166-3

A STUDY OF WOOD BRIQUETTING FUELS AND POSSIBILITIES IN APPLICATION IN GEORGIA

Prepared for
The Georgia Department of Commerce
Abit Massey, Director
100 State Capitol
Atlanta, Georgia

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Tze I. Chiang

Industrial Development Branch
Engineering Experiment Station
Georgia Institute of Technology
September 1959

Table of Contents

Tables

Acknowledgments

The writer is most indebted to many persons who answered our inquiries or spent time for consultation. They are Mr. M. C. Lagrone, Jr., Jellico Coal & Charcoal Company; Mr. C. M. Farrar, Vice President, Southeastern Retail Coal Association; Mr. W. R. Boie, General Manager, and Mr. Roy Huffman, Vice President, Wood Briquettes, Inc.; Mr. S. L. Parker, The Pacific Lumber Company; Mr. M. S. Sellner, Mr. J. B. Bishop, and Mr. Alan T. Smith, Weyerhaeuser Timber Company; Mr. W. Jeter Eason, Nickey Brothers, Inc.; and Dr. Hereford Garland, Director, Forest Products Research Division, Michigan College of Mining and Technology.

Deep appreciation is acknowledged to various members of the Industrial Development Branch for their advice and assistance in this project. Mr. William E. Durrett participated in the interviews. Dr. Ernst W. Swanson, Dr. George I. Whitlatch, Mr. John R. Peterson, Mr. Ben W. Carmichael and Mr. Robert Bullock reviewed the first draft. The second draft was reviewed by Dr. Kenneth C. Wagner and Mr. Robert E. Van Geuns. Their comments and suggestions were most helpful. The efforts of Mrs. Betty Jaffe in preparing the report is admirable and appreciated.

Summary

Two types of wood briquettes processed by "Pres-to-logs" machines are commercially successful in the United States. One is log-form briquettes used in fireplaces and railroad dining cars; the other, small-chunk briquettes used mainly as stoker fuels. Both products are made of sawdusts or wood residues.

There are 117 units of "Pres-to-logs" machines producing log-form briquettes and 21 units producing stoker-fuel briquettes in the United States. Buyers of log-form briquettes are interested in burning qualities, whereas buyers of stoker-fuel briquettes are interested in fuel economy. Thus, plants of log-form briquettes are adapted to uses in metropolitan areas or communication centers and plants of stoker-fuel briquettes are adapted in rural areas.

Wood briquettes, according to the experiment conducted by the Michigan College of Mining and Technology, have distinct advantages of various burning qualities such as ignition, rate of combustion, smoke, ash, holdfire and reactivity of flame.

Integrated wood briquette manufacture with the existing wood-working plants is the most important factor for assuring a successful operation. For the purpose of indicating all costs involved in establishing a new plant, a model of two "pres-to-logs" machines for producing log-form briquettes is adopted. The annual capacity of this model plant is 7,200 tons on a three-shift and 300-day working basis. A total investment of $133,000 is estimated. The profit on total investment will be -10% for one shift, 4% for two shifts, and 16% for a three-shift operation.

In Georgia, the absense of coal mining, the lack of gas facilities in many counties, a great number of houses without central heating systems, and the plentiful supply of sawdusts or wood residues in various localities may prompt one to look into other types of fuel which could utilize local raw material and be manufactured locally. Wood briquettes have distinct burning qualities and heating value. They, therefore, offer interesting potentials as a domestic fuel.

I. INTRODUCTION

Wood residues of various forms such as sawdust, shavings, slabs, and edges, created a disposal problem to many wood-using industries. Although many discoveries have been made in the utilization of wood residues, a great part of them still remain as "left over," with no practical use.

Many attempts have been made to process wood wastes for commercial fuel in the past; most of them failed due to the high costs involved in the processing or the keen competition from other types of fuel. Only one type of process has proved to be commercially successful--"Pres-to-logs" wood briquettes.

There are two types of wood briquettes processed by the "Pres-to-logs" machines. One is a cylindrical briquette approximately 4 1/8 inches in diameter and 12 3/4 inches in length, with a weight of approximately eight pounds. It is used primarily for fireplace and "chunk" fuel heating equipment. The second type of product by the same process is a small briquette suitable for use in domestic stokers. It is 1 1/8 inches in diameter, and from 3/4 to one inch long.

It may be worthwhile to look into these two wood waste briquettes in some detail for the following reasons:

1. There are quite a few low-income families in Georgia without central heating facilities. Domestic stokers and coal furnaces are still used in the rural areas.
2. There is no major coal industry in the State. Most industrial and domestic coal has to be imported from out-of-state suppliers.
3. Continuously rising costs of gas and oil in recent years may cause users to change their fuels for economic reasons if a new fuel is attractive to them.
4. Some firewood dealers have indicated difficulty in securing an adequate supply of oak in recent years.
5. It is noted that a great amount of wood wastes exist throughout the State. Finding uses for them is an important task from the economic standpoint of the State as a whole.

II. EXISTING WOOD BRIQUETTE INDUSTRIES IN THE UNITED STATES

The only known wood briquette machine maker with a commercially established market is Wood Briquettes, Incorporated at Lewiston, Idaho. Their trade name is "Pres-to-logs." This company manufactures two types of machines--a wood briquette machine and a stoker fuel machine. These machines could be purchased or leased on the basis of an initial payment and an additional charge per ton of fuel produced. More detailed information dealing with the technical matter and costs involved in setting up a plant can be obtained from Wood Briquettes, Incorporated. The company will send advertising material and is prepared to offer detailed plans and engineering services to prospective buyers or lessors.

"Pres-to-logs" Wood Briquetting Machines

There are 117 machines for wood briquettes located in 25 places over the nation. Most of them are located on the West Coast, with a few on the Canadian border. The geographic distribution of the "Pres-to-logs" machines for log form briquettes is shown in Table 1.

Market outlets of "Pres-to-logs" wood briquettes are through the distribution of fuel dealers, food stores, groceries, service stations, ice delivery service, and direct sales to customers at the manufacturing plants. Through advertising and promotion, wood briquettes gradually found uses in furnaces, fireplaces, dining car galleys, ship galleys, restaurants, camping, brooder stoves, service stations, lunchrooms, barbeques, schools, and hot water heating. The pattern of market outlets has varied by places of manufacturing and firms. Generally speaking, wood briquettes are mostly used in fireplaces and largely marketed in specific and localized areas. They could be considered a luxury item because a house with a fireplace usually has some other type of heating. Thus, buyers of wood briquettes are more interested in their burning qualities than in fuel economy.

The market on the West Coast, according to reports, is good. For example the Vancouver plant, with eight machines operating, was oversold from 1949 to 1953. In February 1953, the retail price was $25.32 per ton while the best quality domestic coal was selling for $19.80 per ton.[1/] Vancouver

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1/ Gibbons, A. B., "Wood Waste Briquetting Plant," Timber Technology, Vol. 61, No. 2167, May 1953.

is a city where fuel oil, gas, and coal are all abundant and where dry fir logs can be purchased for less than one quarter of this price.[1/]

"Pres-to-logs" Stoker Fuel Machines

This type of machine is a newer product of the Wood Briquettes, Incorporated in Idaho. The machine is designed to compress wood waste into stoker fuel. Many families are still using furnaces or stokers in rural areas. In view of the shortage of coal mines in Georgia, wood briquettes for stoker fuel may be a possibility for development. The geographic distribution of "Pres-to-logs" stoker fuel machines is shown in Table 2.

Marketing of wood briquette stoker fuel is different from wood briquette logs. It has to compete with low cost domestic coal and with highly convenient fuels such as gas and oil. Wood briquette stoker fuel is adapted to an area not reached by natural gas facilities and with high cost coal or oil. Land-locked areas without sea or river ports but with abundant wood residues make an ideal location for this type of operation.

1/ Gibbons, A. B., "Wood Waste Briquetting Plant," Timber Technology, Vol. 61, No. 2167, May 1953.

Table 1

GEOGRAPHIC DISTRIBUTION OF "PRES-TO-LOGS" MACHINES FOR WOOD BRIQUETTES

City	State	Number of Machines
Vancouver	British Columbia	12
Victoria	British Columbia	4
Sacremento	California	5
Scotia	California	4
Caldwell	Idaho	2
Coeur D'Alene	Idaho	2
Lewiston	Idaho	12
Potlatch	Idaho	4
Altona	Manitoba, Canada	2
Libby	Montana	6
Missoula	Montana	3
Reno	Nevada	2
Fredericton	New Brunswick, Canada	1
Port Newark	New Jersey	2
Bernalillo	New Mexico	2
Fort Williams	Ontario, Canada	6
Klamath Falls	Oregon	4
Salem	Oregon	2
Springfield	Oregon	4
Johnson City	Tennessee	2
Memphis	Tennessee	4
Deer Park	Washington	4
Everett	Washington	12
Longview	Washington	14
Spokane	Washington	2
	Total	117

Table 2

GEOGRAPHIC DISTRIBUTION OF "PRES-TO-LOGS" STOKER FUEL MACHINES[1/]

Location	Corporation
Vancouver, British Columbia	MacMillan S. Bloedel, Ltd.
Barbados, British West Indies	D. M. Simpson and Company
Lewiston, Idaho	Potlatch Forests, Incorporated
Libby, Montana	J. Neils Lumber Company
Missoula, Montana	Missoula Pres-to-logs Company
Swastika, Ontario, Canada	Haileybury Lumber Company
Memphis, Tennessee	Nickey Brothers, Incorporated
Colville, Washington	Fred Draper Lumber Company
Deer Park, Washington	Deer Park Pine Industry
Seattle, Washington	Fred C. Christensen
Spokane, Washington	Spokane Pres-to-logs Company
Twisp, Washington	E. Wagner and Son

1/ Ranging from one to three machines per installation, total 21 units.

III. SOME CHARACTERISTICS OF WOOD BRIQUETTES

The briquetting technique was applied to hydrocarbons without introducing heat as early as 1856 in England. It was used on an immense scale by the German brown coal industry to reduce costs in transportation and help the war economy. This conception of space-saving method has been realized effectively in the post-war development in Europe and America. Wood briquettes are an example.

"Pres-to-logs" wood briquettes are heat-bonded by the natural wood lignins. The raw material consists of sawdust, shavings or ground wood that has been dried to less than 10 per cent moisture content and graded to fairly uniform particle size. No binder or other material is added. The pressure used is enough to generate sufficient heat to render the interlocking of wood particles.

The "Pres-to-logs" press was originally developed for softwoods such as white pine and Douglas fir. It is known that different combinations of softwood and hardwood residues could be used with fairly good results.

Michigan College of Mining and Technology conducted an experiment on stoker wood briquettes through help from Wood Briquettes (Lewiston, Idaho). Three types of wood briquettes were tested: (1) all softwood, (2) half hardwood and half softwood, and (3) all hardwood. The result was that the all softwood product was of maximum quality from the standpoint of strength and density of the briquettes required for handling and stoker firing. The half softwood-half hardwood was not as strong as the all softwood but quite suitable for the purpose. The all hardwood was not quite adequate for stoker firing.

A summary of the conclusions reported by the Michigan College of Mining and Technology which were based on several tests on wood briquettes[1/] is listed below:

1/ Garland, Hereford, Possibilities for Production of Wood Briquettes Stoker Fuel in Northern Michigan, Forest Products Research Division, Michigan College of Mining and Technology, Houghton, Michigan, June 1950.

1. Ignition of the briquettes was rapid.
2. Rates of fuel consumption during periods of holdfire[1/] operation were very satisfactory and appreciably less than required for coal. Ignition was maintained through one 15-hour overnight period without operation of the stoker.
3. The wood briquettes were very responsive to heat demand during periods of intermittant operation and the rate of burning was very uniform during periods of continuous operation.
4. Although the rate of heat released by the stoker furnace unit was only slightly more than half of that obtained with coal (using the same feed speed), the "Pres-to-logs" fuel fed at 20-24 pounds per hour at a feed setting that normally feeds coal at 30-33 pounds per hour.
5. The ash from the wood briquettes does not form clinkers and is light and fine. A considerable portion of it leaves the furnace as fly ash.
6. The density of emitted smoke was negligible and was not objectionable even during the period right after the stokers were shut off, when smoke densities are highest with coal.
7. The required air is low in comparison with coal at the same feed rate.

A comparison between stoker wood briquettes and stoker coals was also made by the Michigan College of Mining and Technology in terms of holdfire fuel consumption, uniformity of combustion and reactivity of flame.

1. Holdfire consumption: Coals requiring more than five minutes per hour to maintain combustion are regarded as unsatisfactory for household stoker use. Wood briquettes required only one minute per hour.
2. Uniformity of combustion: Although coal produced higher heat value (14,000 BTU per pound) than wood briquettes (8,350 BTU per pound), coals have an ideal heat value of only 60 per cent of their BTU due to variation between complete and incomplete combustion. Wood briquettes have a uniform combustion comparable to gas.

1/ Holdfire is the term used to describe the automatic operation of the stoker for a few minutes each half-hour or hour merely to prevent the fire from dying out.

3. Reactivity of flame: Wood briquettes have another advantage over stoker coals in the reactivity of flame after the "off" period. Shortly after the beginning of an "on" period the briquette bed attains full flame.

IV. ECONOMICS OF MANUFACTURING

There are many factors which will affect cost and return of a manufacturing plant. In the case of a wood briquette plant, integrated operation seems to be the most important factor of all. Due to low value of product, small marketing distance and keen competition of other fuels, wood briquette production must be kept under a least-cost basis. Utilization of wood waste of an existing plant would provide a free supply of raw material which has, otherwise, to be purchased at a cost. Under the advantage of integrated operation, investment costs of building and auxiliary equipments may be partially cut down or even entirely eliminated. Costs incurred in salary, wage, supplies, etc. are also expected to be lowered to some degree by using the existing resources. As a matter of fact, most of the existing wood briquette plants are operated on this basis.

The extent of integration is different from one plant to another. For the purpose of indicating all costs involved, a model plant is set up, based upon an entirely independent operation. Although no general cost data could be applied in a specific situation, the figures shown in this section nevertheless serve as a rough guide. Visits to existing plants will help a potential investor in understanding a plant operation and in obtaining information which he cannot otherwise get.

Some major considerations, raw material, capitalization, and cost and return, will be discussed in connection with this model plant.

Raw Material

Softwood sawdusts are generally adapted to briquetting. Edges, tops, shavings, etc. could be ground for this purpose. Sawdust of different species could be sent to Wood Briquettes, Incorporated, for testing suitability of making wood briquettes.

Each "Pres-to-logs" machine has a capacity of 12 tons dry wood material or 20 tons of green material per 24 hours. Green materials with a moisture content greater than eight to 10 per cent should go through a drying process first. If the source of raw material is seasonal or otherwise irregular, some provision should be made for storage and rehandling.

Capitalization

The initial fixed investment will vary considerably according to the facilities already available at a proposed site and the moisture content of

the raw materials. A one-machine "Pres-to-logs" plant will cost around $45,000 and a two-machine plant will cost slightly less than twice as much. A "Pres-to-logs" stoker fuel machine costs about $10,000 less than the "Pres-to-logs" machine. Other plant construction costs would be approximately the same.

Extra equipment is required when wood residue is in green condition. A flash drier which would cost from $7,500 to $10,000 is needed.

One man is sufficient for operating two machines and an extra man is almost essential on the day shift. Besides, one or two helping hands may be needed in warehousing and yard works.

A stoker fuel machine requires a space six by seven feet. For a "Pres-to-logs" machine, a 12 by 10-foot space is ample. Including storage and operation, a space of 5,000 square feet under simple construction should be needed for a two-machine plant.

Cost and Return

Production costs vary greatly from place to place and from one firm to another. For the purpose of estimating production costs, a model plant of two "Pres-to-logs" machines is adopted. The operating conditions are: 12 ton output capacity per day per machine in a three shift and 24 hour operation; 300 operating days per year; and purchased green wood residue. The production cost of this model plant is expected to be higher than the plant with integrated operation.

All cost figures used in this study represent approximations, without a specific commitment or guarantee that a plant could be built and operated for the specific cost given.

For the model, a summary statement is presented, followed by a break-even chart. This chart illustrates the relationship among sales, costs, and the resulting profits. Variable costs are those that change directly in proportion to changes in production volume. These costs are the raw material costs, labor costs associated with production, and certain overhead costs. Fixed costs are the costs which do not change in proportion to changes in production volume. These are the costs of administration, insurance, taxes, and depreciation. The production output, where total costs and sales are equal, is the break-even point. It is illustrated by the intersection of the total costs and sales line on the break-even chart. The break-even point is 4,012 tons of wood briquette sale, which will cover

not only all costs paid currently but also the cost of replacing fixed assets through a depreciation charge. Sales beyond 4,012 tons will make a profit and sales below 4,012 tons will incur a loss. This is a long-run concept.

In the short run, sales should be made to cover all out-of-pocket costs such as salaries, insurance and property taxes, plus all variable costs. The breakdown point is 3,225 tons, which is the volume for covering current costs but is below the level required to replace fixed assets.

After the summary statement and break-even chart, there are detailed statements of income, expenses, and investment. Readers can go from the summary statement to any degree of detail desired.

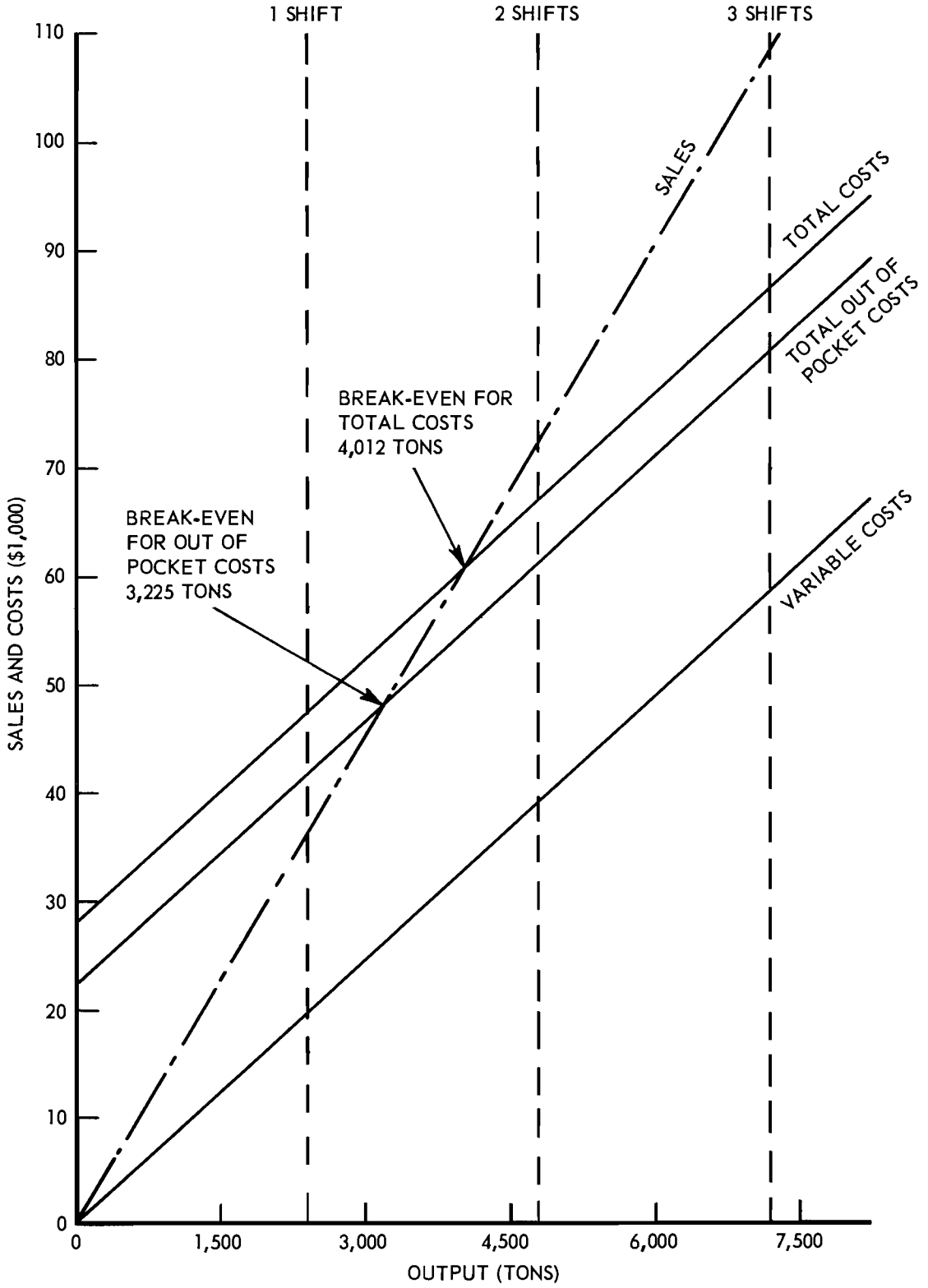
All statements and figures of cost and return in this section is for log-form wood briquettes. As for stoker-fuel wood briquettes, all conditions required for production are identical with log-form briquettes except for $10,000 less in equipment cost per machine. For this reason, fixed costs incurred by a stoker-fuel briquette manufacturer will be 50 cents less than log-form briquettes per ton on a three shift basis.

SUMMARY STATEMENT

A MODEL WOOD BRIQUETTE PLANT WITH TWO "PRES-TO-LOGS" MACHINES

Income (Schedule A)		1 Shift	2 Shifts	3 Shifts
Unit Sales at Capacity		2,400 tons	4,800 tons	7,200 tons
	Per Ton			
Sales	$15.00	$ 36,000	$ 72,000	$108,000
Variable Costs	8.10	19,440	38,880	58,320
Variable Profit	$ 6.90	$ 16,560	$ 33,120	$ 49,680
Out of Pocket Fixed Costs		22,304	22,304	22,304
Cash Income		$ -5,744	$ 10,816	$ 27,376
Non-cash Fixed Costs (Depr.)		5,890	5,890	5,890
Net Income		$-11,634	$ 4,926	$ 21,486
Break-Even (Tons)				
To Cover Out of Pocket Costs		3,225	3,225	3,225
To Cover All Costs, Including Depr.		4,012	4,012	4,012
Investment				
Fixed Investment (Schedule B)		$110,000	$110,000	$110,000
Working Capital (Schedule C)		7,680	15,360	23,040
Total Investment		$117,680	$125,360	$133,040
Per Cent Return				
On Fixed Investment		-10.58%	4.48%	19.53%
On Total Investment		- 9.89%	3.93%	16.15%
Payout Period				
Period for Cash Income to Cover Fixed Investment		---	10 Years	4 Years

BREAK-EVEN CHART



STATEMENT ON THE MODEL PLANT'S INCOME AND EXPENSE

Schedule A

		1 Shift	2 Shifts	3 Shifts
Unit Sales at Capacity		2,400 tons	4,800 tons	7,200 tons
	Per Ton			
Sales	$15.00	$ 36,000	$ 72,000	$108,000
Variable Costs				
Wood (Schedule A-1)	$ 2.80	$ 6,720	$ 13,440	$ 20,160
Labor (Schedule A-2)	2.50	6,000	12,000	18,000
Overhead (Schedule A-3)	2.80	6,720	13,440	20,160
Total Variable Costs	$ 8.10	$ 19,440	$ 38,880	$ 58,320
Variable Profit	$ 6.90	$ 16,560	$ 33,120	$ 49,680
Fixed Costs				
Out of Pocket Fixed Costs				
Salaries (Schedule A-4)		$ 9,000	$ 9,000	$ 9,000
Insurance (Schedule A-5)		2,661	2,661	2,661
Property Tax (Schedule A-5)		2,661	2,661	2,661
Maintainance (Schedule A-5)		3,991	3,991	3,991
Development and Sale (Schedule A-5)		3,991	3,991	3,991
Total Out of Pocket Fixed Costs		$ 22,304	$ 22,304	$ 22,304
Cash Income		$ -5,744	$ 10,816	$ 27,376
Non-Funds Fixed Costs				
Depreciation (Schedule A-5)		$ 5,890	$ 5,890	$ 5,890
Net Income		$-11,634	$ 4,926	$ 21,486

Wood Cost

Schedule A-1

1 ton of sawdust or shavings costs $1.50 at green weight of 2,000 lbs. with 40% moisture.

1 ton yield:

1,200 + 77 = 1,277 lbs. (dried to 6% moisture)

1,277 × .85 = 1,085 lbs. (process shrinkage)

$1.50 ÷ 1,085 lbs. = .14¢ per pound

Cost per ton: 2,000 × .14¢ = $2.80

Labor Cost

Schedule A-2

Machine operator $1.50/hour

Odd job $1.00/hour

Operation	No. Men	No. Shifts	Hours	Daily Cost
Machine operator	1	3	24	$36
Yard	1	2	16	16
Warehouse	1	1	8	8
Total			48	$60

Cost per ton: $60 ÷ 24 = $2.50

Variable Overhead Costs

Schedule A-3

Supplies (Labels, oil, ink, wire, etc.)	$10/day	$0.42/ton
Power: 122 KWH/ton, @ 1.6¢/KWH		1.95/ton
Fuel Wood for heat: 850 lbs./ton, $1/ton		0.43/ton
		$2.80/ton

Salaries

Schedule A-4

Plant Manager	$6,000
Stenographer	3,000
	$9,000

Annual Depreciation and Other Charges For Fixed Investment

Schedule A-5

	Original	Annual Charge
Building depreciation at 20 years	$ 28,800	$ 1,440
Equipment depreciation at 16 years	71,200	4,450
Taxes at 2% of total investment (three shifts)	133,040	2,661
Insurance at 2% of total investment (three shifts)	133,040	2,661
Maintainance at 3% of total investment (three shifts)	133,040	3,991
Development and sale at 3% of total investment (three shifts)	133,040	3,991
Total		$19,194

Fixed Investments		Schedule B
Building		
Construction	$ 23,000	
Foundation	3,200	
Land	2,600	
Total Building		$ 28,800
Equipment		
Two "Pres-to-log" machines and auxiliary equipment	$ 61,200	
One flash drier	10,000	
Total Equipment		$ 71,200
Total Fixed Investment, Estimated		$100,000
Contingency (10%)		10,000
Total Fixed Investment		$110,000

Working Capital Investment			Schedule C
	1 Shift	2 Shifts	3 Shifts
3 Months Wood Supply	$ 1,680	$ 3,360	$ 5,040
1 Month Finished Goods	3,000	6,000	9,000
1 Month Invoice Payable	3,000	6,000	9,000
Total	$ 7,680	$15,360	$23,040

V. POSSIBILITIES OF MANUFACTURING WOOD BRIQUETTES IN GEORGIA

Georgia has a rather short winter season compared with the northern states. The market demand for domestic fuel is not comparable to the cold areas. On the other hand, many houses in Georgia have no central heating system, due to the short winter season. For this reason, fireplaces may be used for heating purposes during the winter by many people. Moreover, the absence of coal mining and the lack of gas facilities in many counties in Georgia may prompt one to look into other types of fuel which could utilize local raw material and be manufactured locally. Wood briquettes have distinct burning qualities and heating value. It may therefore be worthwhile to recommend them as a domestic fuel.

Wood briquettes for stoker fuel or fireplace are not on the Atlanta market at the present time. Most fuel dealers interviewed did not know of their existence. It is believed that these two products are not sold in Georgia because the bulky nature and low sale value of the products limit the distance of transportation. The existing out-of-state plants mostly serve their own localities.

In considering a wood briquetting plant for Georgia one should ask how large the market is. Two questions have to be answered: (1) an estimate of the present consumption of different type of fuels in a specific locality, and (2) the possibility and rate of replacing other type of fuels by wood briquettes.

Marketing of wood briquettes of log form is different from wood briquette stoker fuel. The first product is used in fireplaces, furnaces, dining cars, etc. Buyers of this product may be interested more in its burning characteristics such as cleanliness, little ash, no smoke, long burning time, full combustion, etc. rather than in the cost. Fireplaces are reported coming back in new houses. It is expected that more people would use firewood if a better wood fuel is introduced. Log form wood briquettes sell well in metropolitan areas. The logical site for a plant should be in the vicinity of Atlanta, Savannah, or other large cities in Georgia.

Atlanta has an annual market of $100,000 for oak wood used for fireplaces in 1958. Oak wood fuel was sold at $30 per cord in winter and $25 per cord in summer. Considering the cost, wood briquettes are similar to

oak wood in term of heating value, but with an advantage in burning qualities. It was reported that the supply of oak wood for fuel is becoming difficult in the recent years. Wood briquettes may capture one-third of the oak wood market without assuming an enlarged market created by a new product. Sale value ($33,000) would be the equivalent of approximately one half of 4,012 tons, which is the break-even point of a two-machine wood briquette plant.

Other outlets must be considered. A wood briquetting plant in Memphis, Tennessee, sold a great part of its product to the railway dining cars. It is quite possible that Atlanta's position as a rail center may provide an important outlet for Georgia. With six units of log-form wood briquette machine in operation in Tennessee, it should not be difficult to put a two-machine plant in Georgia.

Marketing of wood briquettes of stoker fuel presents a different problem. This product is used primarily in furnaces and stokers. It competes with coal, oil and gas in one way or another. The main consideration in competition with other fuels is in the economy in heating value and convenience in handling. Wood briquettes have distinctly better burning qualities over the best quality domestic coal, as was mentioned in the previous section. They are comparable with oil and gas in combustion. In considering economy of heating value, they are just below coal and gas but higher than oil. (See Table 6.) Based on these characteristics, wood briquettes may be able to compete successfully with other fuels in certain areas.

Table 3

ECONOMY OF HEATING VALUE OF DIFFERENT FUELS

Type of Fuel	Unit	No.	B.T.U.	Price[a/]	B.T.U./cent
Wood briquettes	Ton	1	16,700,000	$15.00	11,133
Coal	Ton	1	28,000,000	17.50	16,000[b/]
Gas	Therm	1	100,000	.08	12,500
Oil #2	Gallon	1	137,000	.16	8,563

a/ Based currently on available Atlanta prices. Price of wood briquettes is assumed.

b/ Coal combustion is irregular and its ideal heat value is only 60% of its B.T.U.

There is ample evidence that consumers do not take cost alone as a consideration for domestic fuels. The trend of domestic fuel consumption is going toward a more attractive, clean and convenient type of fuel such as gas, even if it costs more. Wood briquette stoker fuel has the qualities of high heat value and cleanliness. It should therefore be able to capture some part of the domestic fuel market in Georgia.

Farming towns and sawmill towns are logical sites for a wood briquette stoker fuel plant. The considerations for locating a plant in a rural area are (1) proximity to raw material supply, (2) the frequent absence of gas facilities, and (3) the fact that coal is easily replaced as a domestic fuel. Gas facilities are still not extended to most counties in the southeast and northeast regions of Georgia. Most of these counties have over 75 per cent of their land area in commercial forest and a lot of sawmills locate there. It should not be hard to find an appropriate site for a wood briquetting plant in these areas.

Numerous small scale sawmills and logging operations may pose as a real deterrent to any effective utilization of wood waste, however. Small plants do not have large enough excesses of sawdust or planer shavings on hand. Also, they do not have a large enough capital for investment. The pooling of several small plants' raw materials and funds under a cooperative may be one possible solution for utilizing wood wastes.