Pictures . . .

I was finally well enough to go home, but the day before I left a heavy melancholy settled on me, and I probably puzzled and embarrassed my newest roommate, a twenty-five year old vet, by briefly mentioning it and wondering where it came from. But I had been in that room long enough to feel it was my own, and I could say whatever I wanted in it. The melancholy may have been for my own privileged life, or for my mortality, or for Hal's or Arthur's, or for the damage done to the blond farmboy, or for the separations between us that one yeams, at one's best, to close. But the next day I left knowing that I probably would never see these people again, and might not recognize them if I did.

THE BUMPER STICKER

The fat cat stood ten feet behind his car
And eyed the sticker and he puffed on his cigar
Deep- atisfied, he smugly smiled.

He slipped into his leather-cushioned seat
And bade 200 horses pull him down the street.
Thus he the village folk beguiled.

What said this sticker he so neatly placed
On bumper of his shiny guzzler that he raced
About the country-side? The gist

of it (put on with supercilious smirk)
Was—but I quote! "Hungry? And out of work?
Eat an environmentalist."

John Van de Water
Environmentalist (and proud of it)

Woodchip . . .

BYPRODUCTS—The combustion of wood leaves a proportionally small amount of residual ash. This usually amounts to 0.5 to 1 percent of the dry weight of the wood. This byproduct might also be used as a fertilizer as it is a source of potash, phosphorus and calcium.

RENEWABILITY—If harvested in the context of the utilization of annual growth, the supply of wood is renewable; a ton/acre/year could be harvested regularly as an agricultural crop.

OWNERSHIP—The ownership of the forest resource in New York State is in the hands of many small landowners who own most of the 2,600,000 acres of commercial forest land in the region.

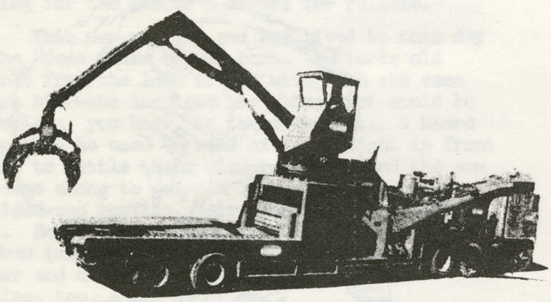
ECOLOGICAL IMPLICATIONS—The availability of this market would offer the practicing forester an opportunity to upgrade the quality of existing forests by thinning to stimulate growth of a healthy forest environment. This cutting would improve most wildlife populations by improving food and habitat.

[Information provided by Black River-St. Lawrence Resource Conservation & Development Project, Potsdam, New York 13676]

WOOD CHIP ENERGY SEMINAR: A PEEK AT THE FUTURE

BY WAYNE CORDWELL

A seminar on wood chips for fuel and energy was held at Clarkson Hall, Clarkson College, Potsdam, New York on January 11, 1978. This informative conference was sponsored by the Black River-St. Lawrence Resource Conservation and Development Project, Clarkson College and New York State Legislative Commission on Energy Systems. Welcome of participants and opening remarks were presented by President Robert A. Pane, Clarkson College and Assemblyman Angelo Orazio, Chairman, New York State Legislative Commission on Energy Systems. The seminar program consisted of speakers and slide presentations on 1) availability, harvesting, transportation, and marketing of wood chips; 2) types of wood chip combustion systems; 3) a consulting engineer's viewpoint on converting to wood chips; and 4) a walk through a wood chip conversion by a present user.



A slide presentation on the giant Total Tree Chiparvestor was an interesting highlight. This machine can transform a sixty foot tree into wood chips (which are blown into a van) in a very short period of time. An entire harvesting operation of trees to wood chips can be done completely by machine—untouched by human hands!

We were also treated to a presentation on wood chip combustion in the "Fluidized Bed Burner". The "Fluidized Bed Combustion Chamber" represents a relatively new technology in the design of high heat combustion of wood and wood gas. The "bed" of the chamber consists of inert particles (similar to sand) which, upon startup of the unit, are quickly preheated by an automatic oil or gas-fired burner to a temperature of 750° F. At this point the burner shuts off, air flow through the bed is increased, and the bed assumes the dynamic characteristics analogous to that of a bubbling lava-like material. The wood chips are then blown downward toward the fluidized bed. Spontaneous combustion of the wood fuel takes place above, as well as in, the fluidized bed. This combustion drastically increases the temperature throughout the entire chamber to 2,000 to 3,000°F. It is these extremely high temperature burning wood gases, continuously developed without the aid of fuels other than wood chips, that are utilized to generate steam and electricity, operate kilns or heat buildings. The energy output of these units ranges from the heat load equivalent of 50 to 780 average-sized homes!

The discussion on a wood chip conversion and a consulting engineer's viewpoint gave the prospective user an excellent look at problems to avoid, comparative costs, wood chip storage and handling, and investigations to conduct. Both speakers welcomed inquiries and visits to their facilities.

Finally, the highlight of the seminar was the demonstration of a wood/gas generator and burner system. Although available units are for very high energy applications, this small model (about the size of a typical woodstove) could heat an average home. Standing outside the Lewis House, all of us watched it operating flawlessly—the absence of smoke testified to its clean burning. One onlooker remarked "we are looking at the future" and I thought to myself, "Indeed we are."

Names of manufacturers of wood chip-related equipment, speakers and participants at the seminar can be obtained from Conference and Information Center, Clarkson College, Potsdam, New York 13676.

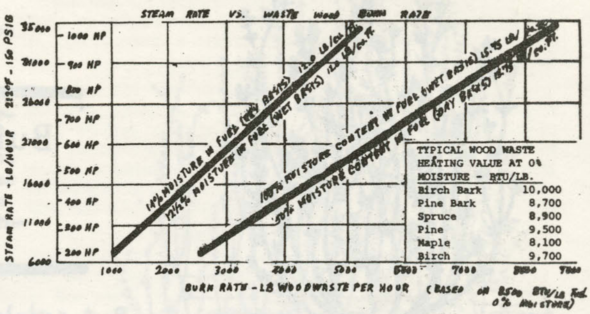
Fuel Value Comparison Charts

FUEL	MC* DRY BASIS	UNIT	FUEL BTU CONTENT	EFFICIENCY	USABLE BTU
Natural Gas	-	100 cu. ft.	100,000	77.8%	77,800
#2 Oil	-	gal.	139,600	82.5%	115,170
#4 Oil	-	gal.	145,100	82.5%	119,707.5
#6 Oil	-	gal.	152,400	82.5%	125,730
Coal$_{9}$	(MC & Grit) varies	pound	9,000	80%	7,200
Coal$_{10}$	"	pound	10,000	81%	8,100
Coal$_{11}$	"	pound	11,000	82%	9,020
Coal$_{12}$	"	pound	12,000	83%	9,960
Coal$_{13}$	"	pound	13,000	84%	10,920
Coal$_{14}$	"	pound	14,000	85%	11,900
Wood	100%	pound	4,500	66.72	3,002.4
Wood	90%	pound	4,737	68.08	3,224.9
Wood	80%	pound	5,000	69.39	3,469.5
Wood	70%	pound	5,294	70.73	3,744.4
Wood	60%	pound	5,625	72.07	4,053.9
Wood	50%	pound	6,000	73.04	4,382.4
Wood	40%	pound	6,429	74.74	4,805.
Wood	30%	pound	6,923	76.08	5,267.
Wood	15%	pound	7,826	78.08	6,110.5
Wood	Oven Dry	pound	9,000	80.08	7,207.2

*M.C. = Moisture Content Percentage

EQUIV. PER TON/WOOD 80% MC	EQUIV. DELIVERED PRICE/UNIT W/80% MC WOOD @ $8/ton	$10/ton	$12/ton	$14/ton (wood cost)
89.19 100 cu. ft. Nat. Gas.	.09	.112	.135	.157
60.25 gal. (#2 oil)	.134	.166	.199	.232
57.97 gal. (#4 oil)	.138	.173	.201	.242
55.19 gal. (#6 oil)	.145	.181	.217	.254
964 lbs. coal$_{9}$ (2.08 T/wood = 1 T/coal)	16.60/T	20.75/T	24.90/T	29.05/T
857 lbs. coal$_{10}$ (2.33 T/wood = 1 T/coal)	18.68/T	23.35/T	28.02/T	32.68/T
769 lbs. coal$_{11}$ (2.60 T/wood = 1 T/coal)	20.80/T	26.00/T	31.20/T	36.40/T
697 lbs. coal$_{12}$ (2.87 T/wood = 1 T/coal)	22.97/T	28.71/T	34.45/T	40.19/T
635 lbs. coal$_{13}$ (3.15 T/wood = 1 T/coal)	25.18/T	31.47/T	37.77/T	44.06/T
583 lbs. coal$_{14}$ (3.43 T/wood = 1 T/coal)	27.44/T	34.30/T	41.16/T	48.02/T

WASTE TO ENERGY CONVERSION CHART



M.C. (dry) = $\frac{\text{Sample Wt.} - \text{OD wt.}}{\text{Oven Dry Wt.}} \times 100\%$

M.C. (wet) = $\frac{\text{Sample Wt.} - \text{OD wt.}}{\text{Sample Wt.}} \times 100\%$

EXAMPLE CALCULATIONS

A) You use 3,000,000 gal/yr and pay $.40/gal, #6 oil, and can purchase 80% MC wood delivered @ $12/ton. What are your fuel savings per unit? Per year?

(Your cost per gallon) - (Equivalent price/unit) = Savings/Unit
($.40/gal) ($.217) = $.183 savings/gal

B) (Annual usage/yr) X (savings/gal) = fuel dollars saved/yr.
3,000,000 X ($.183) = $549,000/yr savings

C) How many tons of wood (80% MC) do you need annually?

$\frac{\text{(Your annual usage/yr)}}{\text{Equiv. per ton/wood}}$ = Tons green wood per year

$\frac{\text{3,000,000 gals/yr}}{\text{55.19 gals.}}$ = 54,357 tons green wood per year

Note: Research shows wood fuel chips delivered direct from the chipper or sawmill will average 80% MC (dry basis) and have 5000 BTU content/pound green wood. 20-25 tons/load

Unit values do not include handling, storage, maintenance, amortization or other costs associated with type of fuel.

Efficiencies will vary with boiler-make, model, type, age, degree of maintenance, and type of fuel.

Commercial and industrial heating and/or electrical plants can improve energy efficiency, reduce fuel costs and develop a degree of independence from outside energy sources by substituting waste wood for expensive imported fossil fuels. Waste wood from local forests is now a very competitive source of energy.

PRICE—A price of $12/ton for green wood chips delivered at the plant site is very reasonable in today's market. On a BTU basis, this is the equivalent of coal at $33/ton, or heating oil at $.19/gallon. The difference between these equivalent prices and higher current prices for coal and oil indicates the potential savings.

AVAILABILITY—Using a traditional hauling radius of 50 miles, the perpetual supply of wood available for this market could amount to 200 tons/day in as many as 25 locations in this region. Its delivery would not be dependent on railroads or shipping, but on local independent truckers.

LABOR INTENSITY—The harvest of forest crops involves a considerable amount of moderately skilled rural labor. It takes one man-day of labor to deliver 20 tons of wood chips. The impact of the energy market would be to provide a steadying influence on the demands for this labor, as well as to increase the overall demand. The market for fuel will not fluctuate as the timber and pulp markets do.

AIR POLLUTION—Wood smoke is relatively free of sulfur. There are fine particulates, however, which can easily be removed by mechanical scrubbers.

ENERGY DOLLAR DISTRIBUTION—Money spent on wood for energy would be distributed within the region which developed it and used it. This multiplier effect doubles and triples benefits to the area. It also helps the national fuel budget.

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