Tractor Generates Its Own Fuel "On The Go"

(Continued from cover page)

Europe during World War II, can be updated and refined to play a key role in beating the high cost of fuel for farm tractors, cars and trucks. In addition to producing its own fuel "on the go" for field work, a wood-gas tractor could also be used for other applications. For example, it could be used to power a generator which, in turn, could produce the farm's electricity, Bohlen points out.

Once converted to wood-gas, a gas or diesel tractor (or car or truck) can be returned to normal operation on gas or diesel fuel. Or, it can be equipped to run as a dual unit, using the wood-gas fuel system after being started on conventional gasoline or diesel fuel.

Bohlen notes that his wood-gas tractor is very clean burning. There is no smoke in the exhaust and very little carbon dioxide. It gets the equivalent of 3 gal. of gasoline from each 45 lb. load of wood burned in the stove. "On a gas tractor, there is a reduction in power of about 30%," he points out. "However, this is easily overcome by increasing the tractor's compression ratio, and adjusting the carburetor to provide a 1:1 ratio of air to wood-gas," Bohlen points out.

Here are other modifications he made in rigging up his experimental wood-gas tractor:

The tractor's engine was modified by installing a T-shaped pipe on the air intake pipe to the carburetor. One branch of the "T" is the wood-gas input, and the other branch feeds air to the carburetor when the tractor is operating on regular gas. "This is a hybrid gas/wood-gas conversion because we want fast starts with no cold morning hassles," Bohlen explains. "The unit has been so reliable, however, that the regular gas option really hasn't been necessary for cold-morning starting."

The idler pipe of the generator leads to a particle separator, or cyclone. From there, gas goes to a cooler mounted in front of the tractor radiator. The cooled gas is then sent through a filter to rid it of impurities. Suction from the engine keeps gas flowing out of the generator and into the engine. The system must be kept scrupulously clean or else particle matter will find its way into the engine, causing trouble of all kinds, including premature "seizing" of the pistons. This can be avoided by examining filter components and draining down the accumulation of water in the cyclone and gas cooler.

The system's chemical process is quite simple, says Bohlen: "Combustion of wood-gas yields carbon dioxide (CO_2) and water, plus some methane and hydrogen in very small amounts. The CO_2 then is drawn through the combustion zone while hot and, in the process, passes through hot charcoal. This passage of the gas produces carbon monoxide (CO) and water. The CO is the produced gas that, after cleaning, powers the engine. The water breaks down into its component parts, with the hydrogen becoming a part of the fuel cycle.

If you'd like to experiment with a wood-gas generator on an older tractor, Bohlen would be happy to answer whatever questions you may have. Just send a self-addressed envelope and a quarter (to cover postage) to: FARM SHOW Followup, Jim Bohlen, Director, Greenpeace Experimental Farm, Route 1, Denman Island, British Columbia VOR ITO (ph 604 335-0322).

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UNDERGROUND "PIT FURNACE" BURNS CONTINUOUSLY ALL WINTER LONG

Look What He's Doing With "Smolder Energy"

by Mark Newhall, Associate Editor

George Woods spotted something unusual last spring on the coal slag heap which covers several acres outside his small Prospect, Ohio, manufacturing facility. The pile was steaming.

Woods, who also farms, investigated and found the pile hot to the touch, although there was no smoke or smell. He sunk a thermometer into it and found, to his surprise, a reading of 500° F just below the surface. Something was burning.

"To see what would happen, I dumped a load of wood chips right over the hot spot," he relates. "Instead of burning off, it rained on them and they just steamed."

He then shoved a thermometer into the pile and found the chips had reached 240° F and stayed there. Four months went by and nothing changed, although in the summer he had to add water to keep the chips wet. But the chips didn't deteriorate and the coal underneath never stopped smoldering.

"The slag contains coal cinders, carbon and other things. Our factory was a coal-fired power plant at one time," says Woods, explaining the huge pile of used coal refuse. "When it kept burning and began giving off methane gas, I knew I had something. If it burned like that when uncontrolled, what would it do if I could control it."

To find out, George built a pit furnace last fall and, along with it, tried to duplicate conditions in the coal heap as closely as possible. He dug a 10 by 10 by 15 ft. hole just 100 ft. from his house. He plans to heat it all winter with his newly-discovered "smolder energy".

George filled the pit with alternating layers of coal dust, cinders, and other combustibles. Vent pipes carry oxygen into the pit and let him control the rate of burn all the way to the bottom of the pit.

Across the top, he heaped a pile made up of wood chips, straw, grass, manure and other items that will compost rapidly from the heat of the pit. This pile is laced with several old steam radiators connected together with 1-in. pipe. The pipe runs underground to the house, carrying water which has picked up heat in the smoldering "pit" furnace.

George Woods checks temperature of continuously smoldering underground pit which heats his home.

furnace and carries it back to the house.

Over the composted material, George piled a layer of dirt about 3 ft. deep to seal the pit and keep the moisture in. A layer of plastic is "domed" over that to seal it air tight.

George is convinced that much of the heat in the composting material comes from bacteria, fired into action by the high temperatures. The pit also gives off methane gas which George plans to salvage (via a pipe running out the top of the domed pit) for fuel.

"Burning coal gives off hydrogen and natural gas and that may be what's burning below in the heap, rather than the coal itself," says George. "That would explain why the pile never burns down or deteriorates."

Since he lit the pit furnace last fall, it's been smoldering steadily all winter. "The only expense will be to empty the pit in the spring — if it's burned out. Cinders and coal dust are available for practically no cost," he says. He spent around $500 to complete his experimental pit. Since he already had hot water heat in his house, most of the expense was in running underground water pipes out to the pit. There are quick-release fittings on the steam radiators so they can be easily removed when the pit has to be restocked.

"There's more heat there than we can use, so we'll be heating other buildings with it. This winter, we're working out the bugs," George told FARM SHOW. He has patent protection on the idea and plans to market it commercially.

For more information, contact: FARM SHOW Followup, George Woods, Wood's Carriers, Inc., P.O. Box 32, Prospect, Ohio 43342 (614 494-2821).

The lost art of driving without gasoline

One of the best references on wood-gas generators we know of is "The Pegasus Unit", an illustrated 133 page book co-authored by Niels Skov, a professor at Evergreen State College, Olympia, Wa., and Mark Papworth. The name Pegasus is short for "petroleum, gasoline substitute systems". The book details the European history of wood-gas generators, how they function, fuel choices, and dozens of detailed drawings and pictures which show a wide variety of wood-gas generator systems for cars and tractors.

Cost of the book is $10.95. Also available for $24.00 is a detailed set of do-it-yourself plans for building a wood-gas generator designed to convert wood into fuel for powering a car or tractor.

For more details on either the book or the plans, contact: FARM SHOW Followup, Pegasus Publishers, P. O. Box 121, Olympia, Wa. 98507.