Recycling process extracts oil from waste rubber tires

By Sally Johnston

Television's J.R. Ewing would love to have thought of it—turning a dump of millions of worn rubber tires into oil and other useful products.

That's the aim of a Quebec scientist and an Ontario businessman who plan to build a tire recycling plant to process one million discarded tires a year. They want to establish similar plants in every major city across Canada within five years.

Chemical engineer Christian Roy, who developed the recycling process, and Hamilton lawyer John Unsworth believe it will be highly profitable, but money isn't their only motive: they say the process will also help solve a major environmental problem in large cities.

"Tire dumps are eyesores, potential fire hazards and health risks because mosquitoes are attracted to the rainwater which collects in the tires," says Unsworth. "It's a problem facing every metropolitan area."

In North America, an average of one tire for every person on the continent is hurled into a dump each year. Canada's mountain of unwanted tires grows by 240,000 tonnes—24 million tires—annually.

Unsworth, a businessman who specialises in high-tech industries, has set up a company called Petro-Tire that hopes to start construction of a full-scale demonstration plant and have it operational by fall 1990.

He expects it to be located at Hagersville, south of Hamilton, where 15 million abandoned tires lie in Canada's largest rubber graveyard. Though Hagersville is his first choice, Unsworth has his sights set also on the Montreal area, where there are two dumps containing a total of six million tires.

"We are in discussion with both the Ontario and Quebec governments," he says. "We'll start construction wherever we get the go-ahead first."

The recycling scheme uses a method developed by Roy, associate professor in chemical engineering at Laval University, Quebec City. It involves vacuum pyrolysis, the breaking down of a compound—here it's rubber—into its component materials by heat.

Roy heats the tires in a sealed chamber which has a vacuum pump to draw off volatile gases produced as the rubber breaks down. The process can almost totally recycle a tire, reclaiming components which can be sold back to industry, explains Roy.

It recovers heavy oil, which makes up 55 per cent of a tire's weight—and can be further refined—plus some lighter oil. Carbon black, which makes up 25 per cent of the tire, can also be extracted and reused in the manufacturing of other rubber products.

Steel, which comprises up to 10 per cent of the tire, can also be recovered by using magnets. Another five per cent is Kevlar, a fibre that could be sold to textile industries, and the remaining five per cent are gases that are channelled into fuelling the process.

The cycle is completely enclosed inside the plant: no air can get in or out. The processor is sealed at the inlet by a column of oil from the pyrolysis process and at the outlet by a column of water used to cool one of the by-products. Therefore, "it causes no pollution," says Roy.

The system was used briefly at the former Petro-Sun experimental plant in Ste-Amable, near Montreal. When Petro-Sun went bankrupt (for unrelated reasons), Roy convinced oil refiners Ultramar Canada Inc. to buy the $750,000 plant for $15,000 to save it from the scrap heap.

He then began hunting for new investors willing to underwrite commercialization of the recycling scheme.

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