It won’t be long before all the scrap tires generated in much of the U.S. are recovered. Processors will then begin to work on reducing old tire piles.

by Jerry Powell
Resource Recycling

Led by improved markets and concerted government action, more scrap tires are recovered than ever before. In several regions of the country, owners of stockpiles finally have processors fighting to get their hands on the tires.

The tire recycling industry is undergoing significant change (see “The hottest trends in tire recycling” in the December 1996 issue). But slowly rising demand for old tires and new actions by state and provincial agencies suggest that the tire reclamation industry will continue growing in 1997.

Market diversification
Markets increased modestly in 1996, with about 70 percent of scrap tires now utilized (about 180 million tires). Although in the past too much attention was paid to processing tires and not enough to developing market capacity, scrap tire reclamation is becoming a true industry. Market capacity is now gradually catching up with processing volumes. A review of recent market trends shows there is more than one way to skin a tire.

Tire-derived fuel. TDF remains the biggest use of scrap tires, with the potential to process 190 million to 210 million tires into fuel annually. Although three or four processors (e.g., ICD of Ogden, Utah) fell by the wayside in the last year, primarily because they made low-quality TDF, more firms than ever before are producing TDF. And these processors are doing a better job, particularly given the development of second- and third-generation processing systems. (For information about scrap tire processing equipment, circle 833 on the reader service card in this issue.) Waste Recovery (Dallas) is the nation’s largest TDF producer. The firm processes about 27 million scrap tires annually, or about 10 percent of the total generated in this country each year.

TDF markets are growing in Illinois, Tennessee, Texas and Wisconsin. For instance, Illinois Power now consumes about seven million scrap tires annually in its power plants, and Wisconsin Power & Light burns another 2.5 million tires.

Cement kilns. Nearly three dozen cement kilns in the U.S. burn tires, and another 20 or
so kilns may start using scrap tires in 1997. In recent months, the cement-kiln market has heated up in California and Texas.

This industry plays a major role in tire utilization, because a cement kiln can consume a large quantity of tires. The Texas Industries kiln in Hunter, Texas uses two million tires per year. Also, in several low-population states, the use of scrap tires in cement kilns is the primary market. In Idaho, for example, the Ash Grove cement plant in Incom consumes more than one million tires per year, the large majority of the total generated in the state annually.

Crumb rubber. Ground rubber markets are solid, with demand rising. From a level of five million to six million tires processed for crumb rubber in 1995, maybe seven to eight million tires were handled last year and as many as 10 million will be ground up in 1997. Many crumb rubber consumers report growing sales of recycled products. Twelve-year-old R-B Rubber (McMinnville, Oregon) had record production and sales in its last fiscal year, with sales up 50 percent over the year-earlier level. The firm makes rubber mats and protective surfaces, such as horse stall flooring, from recycled tire rubber. The company was founded in 1985 and went public in 1995.

Several crumb rubber producers consume fairly large volumes of tires. For instance, BAS Recycling (San Bernardino, California), National Rubber (Toronto) and Parco Recycling (Los Angeles) process a combined 85,000 tons per year of old tires and other forms of rubber scrap.

A good sign of market strength is the fact that the crumb rubber market in the last few months hasn’t declined as it typically does when the road construction industry takes a breather during the winter (the primary market for crumb rubber is in making rubber-modified asphalt). Arizona, California, New Mexico and Texas are strong markets for rubber-modified asphalt.

Helping to strengthen this market is the recent development of scrap tire crumb-rubber specifications by the American Society of Testing and Materials (West Conshohocken, Pennsylvania). According to Michael Blumenthal of the Scrap Tire Management Council (Washington), the development of these specifications is one of the last barriers to commodity trading of scrap tire crumb rubber. STMC is working to get scrap tire crumb rubber listed as a recyclable on the Chicago Board of Trade cash exchange for recyclables.

Civil engineering applications. Significant progress is being made in using scrap tires in civil engineering applications, with 10 million to 12 million tires per year consumed. The Federal Highway Administration (Washington) has helped develop guidelines for scrap tire use, which are being distributed to state departments of transportation. Also, the U.S. Corps of Engineers (Vicksburg, Mississippi) will likely help determine the cause of problems in 1995 and 1996 when several roadways in Oregon and Washington State, which were built over fills treated from tire shreds, caught fire.

In Canada, a processor has developed a

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**Scrap tire uses**

- Tire-derived fuel projects turn up to 210 million scrap tires into fuel annually.
- Up to 10 million scrap tires will be used this year for crumb rubber applications.
- Civil engineering projects consume up to 12 million scrap tires annually.
- Pyrolysis projects continue to find investors despite failures.
new civil engineering application. Alberta Waste Resources & Energy Corp. (Calgary, Alberta), the operator of scrap tire processing plan in Calgary and Edmonton, is working with the City of Leduc to use 2,000 tons of tire shreds in a landfill leachate collection system. The system will be completed this summer.

**Pyrolysis.** Only a tiny number of scrap tires are processed using pyrolysis technology, even though dozens of firms (and thousands of investors) have tried to make a go of it. Pyrolysis entails the heating of tires in an oxygen-starved environment to produce three items: a fuel-like liquid, a carbon char and steel. Nearly every pyrolysis project has failed because of the inability of the system to produce marketable fuel and/or char.

But a seemingly endless stream of vendors say they have the solution to this problem. Thermal Systems plans to build a pyrolysis plant in Niagara, New York, financed, in part, by $18.3 million in government-issued industrial development bonds. Using a technology developed by the University of Missouri, Thermal Systems will burn whole or chopped tires at high temperatures in sealed ovens and recover fuel and carbon black. Emery Recycling Corp. is using a $250,000 state loan to establish a 25-ton-per-day pyrolysis plant in Huntington, Utah, and United Tire Recycling is seeking additional private funding to build a $27 million, 200-ton-per-day plant in California City, California. ECO2, Inc., a publicly traded firm, continues to perform research at a prototype pyrolysis plant at its headquarters in Hawthorne, Florida. FRT Recycling Technologies (Norman, Oklahoma) plans to build and operate pyrolysis plants in California and Texas.

**Investors are wary**

But even though the scrap tire market has diversified and matured, stockholders lack confidence, which is reflected in significantly lower prices for several scrap tire recycling stocks at the end of 1996 compared to the end of 1995.

For example, by the end of 1996, ECO2 had fallen 85 percent and GreenMan Technologies (Jackson, Georgia) dropped 84 percent. R-B Rubber looked good by comparison, falling only 44 percent by the end of 1996.

**New technologies being assessed**

Several new ways to handle scrap tires are being considered.

The vulcanization process -- which increases the strength, elasticity, resistance to degradation, and durability of rubber -- consists of using sulfur compounds to bind rubber molecules together. Robert Romine, a chemist at the Pacific Northwest National Laboratory (Richland, Washington), has discovered that a bug that dines on sulfur in mineral hot springs will also attack powdered scrap tire rubber. The microbes break down the chemical bonding that sulfur provides and thus help produce recycled rubber that can then be used in making new tires. Romine says new tires may be able to use up to 15 percent old rubber. A test of the recycling system will soon get underway at Rouse Rubber Industries (Vicksburg, Mississippi). A patent for the process was issued in late January and assigned to Battelle Memorial Institute in Richland.

When tires were made primarily from natural rubber, reclaimers used chemical. heat
and other processing techniques to “devulcanize” the tire to recover the rubber. Now we are hearing more and more about the potential devulcanization of the modern synthetic-rubber tire. Although this processing technology is unlikely to be widely used for some time, if ever, to process scrap tires, technology development is underway, particularly in terms of processing nontire scrap rubber. STI-K Polymers America (Washington) and National Feedscrew (Massilon, Ohio) are two firms involved in this field.

**Governmental action plays important role**

Much of the recent action by tire recyclers is supported, in part, by state funding, with scrap tire management remaining a states’ rights issue, with the federal government taking a hands-off approach. And ever more states and provinces—particularly those with smaller populations—are launching or expanding tire management efforts.

Such programs include a wide range of projects. Some states are working to develop new markets for scrap tire products. Nebraska is testing the use of rubber-modified asphalt in a half-mile stretch of road in South Sioux City in the hope of getting this product approved for use in state and local government highway projects. Monies for the project come from a $1-per-tire fee assessed on new tire sales. Kansas has issued its first-ever waste tire market stimulation grant to Mid-Continent Resource Recovery (Wichita). The company will use $400,000 in state monies to expand its production of “Quick Bricks” made from recovered tire rubber. The bricks are used to make a variety of new products, including garden hoses.
used in patio and swimming pool decking and as welcome mats. The grant is funded by a 50-cent-per-tire excise tax, which generates about $1.2 million annually.

In South Dakota, a Groton firm received a $250,000 grant to expand its tire shredding operation by 167 percent. New Deal Tire Processing put a like amount of money into the project, which will result in the firm processing 4,000 scrap tires daily (which represents the majority of tires generated in the state). The shreds are used along with coal as fuel in a power generation plant. Fees are generated from a $1-per-vehicle surcharge on vehicle registration.

Following the closure of one of America’s busiest freeways because an illegal tire pile caught fire underneath an overpass and caused $6 million in damage, Pennsylvania lawmakers recently approved the nation’s newest tire recycling act. The law includes a market development component, requiring state agencies to consider using scrap tires in construction and engineering projects. The state program also provides $5 million dollars for processors to clean up local tire piles and $6 million for investment tax credits to purchase tire processing equipment. The Iowa Department of Natural Resources is also implementing a new tire management law, with $15 million to be expended over the next six years. The funding comes from a $5 fee on vehicle title transfers.

Canadian provinces are active
Provincial efforts in tire recycling are bearing fruit in Canada.

The programs often involve legislated fees on new tire sales to fund scrap tire management programs. Some provinces ban tires from disposal. As an example, since January, Nova Scotia has banned the landfilling of passenger car and light-duty truck tires and imposes a $3-per-tire fee ($CN) on new tire sales. Scrap tires will be collected and shipped to a soon-to-open $3.3 million, 50-employee re-
A recycling plant being built by Tire Recycling Atlantic Corp. Company officials expect the facility to handle 75 percent of the 900,000 tires generated in the province annually.

In a similar program in New Brunswick, TRAC has entered into an agreement with the provincial government whereby TRAC will receive $2.50 ($CN) per “passenger tire equivalent” for the first 30 percent of tires converted into tire-derived fuel or crumb rubber. The firm will be paid $2 per PTE for the remaining 70 percent of scrap tires successfully recovered. The firm opened its new plant in Minto in January; the plant is approximately the same size as the planned Nova Scotia operation.

The fastest growing segment of the Canadian market is in Alberta, where, because of the establishment of a provincial scrap tire management system, some 2.6 million tires per year are now being successfully utilized. Due, in part to the efforts of the provincial Tire Recycling Management Board, several processors have established or expanded operations in Alberta, including Alberta Environmental Rubber Products (Edmonton), Alberta Re-Tech (Vulcan), Alberta Waste Resources & Energy Corp., and Continental Waste Conversion (Calgary). As an example, the latter firm plans to build a $6 million tires-to-energy incinerator in Bow Island.

Do voluntary programs work?
Rather than use legislated fees on new tire sales, nearly half of Saskatchewan’s tire retailers have signed on to the province’s voluntary tire fee program. These vendors charge residents an additional $3.50 ($CN) per new tire to fund tire cleanup and recycling activities. Although scrap tires were originally sent to U.S. processors, a new 20-employee recovery operation being established by Prairie Rubber Corp. near Assiniboia will result in most, if not all, tires being handled in the province.

Impact-friendly scrap tire chips are used for playground cover