

# Where The Rubber Hits The Road

## Scrap tire stewardship in Canada

by Clarissa Morawski & Daniel Smith

**E**very year Canadians use and discard more than 28 million tires. From a secondary resource perspective, this represents a significant amount of material — about 210,000 tonnes of rubber, 40,000 tonnes of steel and 15,000 tonnes of fabric. The challenge in Canada, as in other countries, is to turn what has been typically thought of as a waste problem into a resource and opportunity. This means finding effective ways to recycle old tires into value-added end uses.

In the past, end uses for scrap tire material were limited and supply far exceeded demand. Consequently, tires accumulated into stockpiles — sometimes quite enormous ones. In Hagersville, Ontario in 1990 more than 14 million tires burned in the largest tire fire in the world. (See *Final Analysis in the February/March 2001 edition and editorial in the December/January 2000 edition.*)

The fire drew attention to the danger of storing tires and many provinces took action. Canada is now a leader in the field of scrap tire management programs.

Eight provinces operate stewardship programs for scrap tires. (See map.)

Ironically, though, Ontario (along with Newfoundland) operates no mandated recycling program for scrap tires at all. The provinces that have programs use backdrop regulations to level the playing

field. Consumers are charged a pre-disposal or recycling levy on the sale of new tires for licensed highway vehicles. These levies range from \$2 to \$4 per tire for car or light truck tires. Higher fees are



charged for large truck tires in some provinces.

Retailers collect the levies from consumers and remit the funds to a provincial scrap tire management agency. In most cases the funds collected are used independently and are kept separate from the provincial treasury. Stakeholders that represent industry, the public, and municipal and provincial government government management agencies or stewardship boards. (See Table 1.) This makes them accountable to the public and each stakeholder group.

The agencies or boards provide financial incentives to processors to produce value-added materials starting with shred and crumb, but ultimately including manufactured products. Incentives may also be available for collection and transportation of the scrap tires to the processor, for whole- and cut-tire applications, and for tire-derived fuel (in four provinces only).

In most cases incentives are provided based on proof of sale of the material or product to a third party. Some provinces also provide grants for marketing, development of new value-added manufactured products, public education and demonstration projects. (See Table 2.)

Markets have grown significantly; examples of end uses include: carpet underlay, rubber mats, paving stones, automotive parts, rubberized asphalt, loose crumb in playgrounds, animal mattresses, and so on. (See sidebar.)

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"Provinces such as Manitoba, Alberta, New Brunswick and PEI report no significant stockpiles."

## Table 1: Scrap Tire Stewardship

PROVINCE	Program	Year program started	Regulation	\$ levy per/unit	Tires (PTE) Generated	Annual revenue from fees	Collection	Processing (PTEs)	End-uses	Processed 1999/2000
British Columbia	Financial Incentives for Recycling Scrap Tires (FIRST) — administered by the Ministry of Environment, Lands and Parks (250) 387-9973	1991	X	\$3/tire (for all units over \$30 in value)	3.67 M	\$10.5 M	A transportation incentive is paid/unit. Tires are collected from retailers, salvage yards and landfill sites.	Approx.: 3.4 M PTEs	Crumb rubber products, blasting mats, road mat and tire derived fuel (TDF)	91%
Alberta	Tire Recycling Management Association (TRMA) (888) 999-8762	1992	X	\$4/tire	3.63 M	\$11 M	Collection is facilitated by processors from retailers.	Approx.: 3.25 M PTEs	Light-weight fill, loose rubber crumb, and molded products.	89%
Saskatchewan	Saskatchewan Scrap Tire Corporation (SSTC) (306) 721-8473	1995	X (1998)	\$3.50/tire (higher levies for larger tires)	0.88 M	\$3.1 M	"Approved" tire collectors pick-up scrap tires from retailers.	Approx.: 600,000 PTEs	Blast mats, stamped and cut products, curb mats, E-Z rizers.	68%
Manitoba	Tire Stewardship Board (204) 661-3242	1992	X (1995)	\$3/tire	1.4 M	\$2.2 M	Tires are collected from retailers and municipal landfills.	Approx.: 1.3 M PTEs	Blast mats, traffic cone weights, mats, mud flaps, truck box liners, feeders, fencing and scraper mats, and TDF	98%
Ontario	No Provincial program	—	—	none	10 M	none	Tires are being collected for processors' own use.	Approx: 3.5 M PTEs — in addition approx. 5 M PTEs exported.	Automotive parts, and rubber crumb	approx: 38%
Quebec	Quebec Program of Integrated Management of Scrap Tires — administered by Recyc-Quebec (514) 352-5002	1993	X (1999)	\$3/tire	6.4 M	\$17 M	Haulers are contracted to collect from retailers and deliver directly to processors.	Approx: 5.2 M PTEs — in addition approx 0.75 M PTEs exported.	Blasting mats, asphalt, sealants, carpet underlay, sport surfaces, barricades, sound proof panels and TDF.	83%
New Brunswick	New Brunswick Scrap Tire Board (506) 454-8473	1996	X	\$3/tire (\$9/med truck tire)	0.99 M	\$2.6 M	Collection is facilitated by processors from retailers.	Approx: 0.75 M PTEs	Cow mattresses, mats, and pylon bases for tire side-walls.	93%
Nova Scotia	Used Tire Management Program — administered by the Resource Recovery Fund Board (902) 895-7732	1997	X	\$3/tire (\$9/med truck tire)	1 M	\$2.9 M	Collection is facilitated by processors from retailers.	Approx: 0.83 M PTEs	Molded products, sports surfaces and road construction.	85%
Prince Edward Island	Tire Recovery Program — administered by the Island Waste Management Corporation (902) 894-0325	1999	X	\$2/tire	0.11 M	\$0.23 M	Island Waste Management Corporation is contracted to collect and process all PEI tires into end-uses	Approx: 100,000 PTEs	Tire bales used for erosion control.	100%
Newfoundland	No Provincial program	—	—	none.	0.54 M	none.	n/a	Approx. 100,000 PTEs	n/a	18%
NWT	No Provincial program	—	—	none.	0.05 M	none.	n/a	n/a	n/a	n/a

Note: Processing rates include all tires generated provincially, but do not include off-road tires.  
Note: Tires generated is shown as Passenger Tire Equivalents (PTEs) — roughly 9 kgs/PTE

# ONTARIO'S "TIRED" PROCESS

Ontario generates an estimated 10 million scrap tires annually — nearly 40 per cent of the Canadian total. Of these approximately 3.5-million tires are processed in the province by various shredding and crumbing companies. Most of the remaining 6.5 million tires are shipped out of province for tire-derived fuel, stockpile and landfill. Once again, this places Ontario last in Canada when it comes to responsible management and stewardship of recyclables.

On top of this, last fall Michigan and Quebec closed their borders to Ontario tires, making it harder to get rid off them. Don Campbell, president of the Rubber Association of Canada says, "The Ontario scene may get quite difficult very shortly, because tire dealers will soon feel the changes in cost from the legitimate haulers, which will encourage the fly-by-nighters. This could lead to more stockpiles and abandoned tires on Ontario road sides."

However, a solution does exist — one that has shown excellent results elsewhere. In 1998, a multi-stakeholder group known as The Scrap Tire Stakeholder Group (including tire manufacturers, recyclers, haulers, dealers, municipalities and related associations) submitted a stewardship plan to the Ontario Ministry of Environment. Based on the model successfully used in Alberta and Manitoba, the plan proposes an Ontario Tire Stewardship Council to collect revenues from retailers, pay out incentive fees and manage the program.

This plan received support from all stakeholders as well as the Recycling Council of Ontario, Corporations Supporting Recycling, the Association of Municipal Recycling Coordinators and the Solid Waste Association of North America. But in spite of strong endorsement Ontario is sluggish to move on the required legislation and regulation.

In October 1998, then-Minister of Environment Norman Sterling stated that the newly announced Waste Diversion Organization (WDO) will "initiate programs for other problem wastes such as used oil, paint and tires so that these wastes too can be re-used, recycled or disposed of in the best environmental ways." But the Scrap Tire Stewardship Group was not consulted and one year later when the WDO was officially formed, scrap tires somehow were excluded from the list of products/packaging it was to address. Even after several meetings with the minister and his staff (the last one being in August 2000 with former Minister Newman) the group has still been given no indication from the ministry on how it intends to deal with the situation.



Abandoned tire dump near Hagersville, Ontario — site of the famous fire.

Photo by Guy Cliftenden

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Tire stockpiles exist in parts of the country but these are being depleted through incentive credits and other efforts. Most provinces have either completely cleaned up their stockpiles or are close to doing so. Provinces such as Manitoba,

**"Ontario and Newfoundland don't operate mandated tire recycling programs."**

Alberta, New Brunswick and PEI report no significant existing stockpiles; Nova Scotia and BC expect to eliminate theirs in the next few years.

## Table 2

Financial Incentives Awarded For Scrap Tire Recovery In Canada										
Incentives	BC	AB	SK	MN	ON	PQ	NB	NS	PEI	NF
Collection	x	x	x		N/A	x	x			N/A
Whole (TDF)	x			x		x				
Whole / Cut	x	x		x		x	x	x	x	
Shred	x	x	x	x		x	x			
TDF (Shred)	x							x		
Crumb	x	x	x	x		x	x	x		
Product	x	x	x	x		x	x			

On average, in 1999-2000 Canada recycled nearly 62 per cent of the scrap tires generated (by weight), including re-use and recycling. Tires used for fuel domestically account for another seven per cent, and an additional 24 per cent

were exported (for tire derived fuel and reuse applications) — for a total diversion rate of 93 per cent.

Therefore about 69 per cent of all scrap tires in Canada have domestic markets. Comparatively, Japan reports 90 per cent

# Tire Recycling and End-Uses

**T**ires are highly specialized goods that have been designed and built to be very durable and provide years of dependable use under the most demanding punishment. Tires are composed of a composite of materials (rubber, oil, steel, fabric and chemicals) that are combined under extreme heat and pressure.

The properties that make tires flexible and durable make them difficult to recycle. Like a cake, once it is baked it is nearly impossible to break it down into its original components. Instead, most recycling relies on mechanical means to break tires into smaller and smaller pieces. As they are broken down the steel and bits of fabric are separated, in the end leaving a relatively pure secondary material made up of small bits of blended rubber.

Over the years the number and variety of uses and applications for recycled rubber has grown. Recycled rubber can be used as a feed stock in the production of new rubber materials but it is essentially filler. New tire manufacturers have been trying for years to find a way of incorporating recycled rubber back into tires. Unfortunately only a small percentage can be added before performance begins to be effected.

The range of uses of scrap tires and rubber from scrap tires include:

- whole and cut tire uses, shredded tires (i.e., pieces of rubber larger than 15 mm in diameter, nominally about 50 mm in diameter);
- granulated rubber, usually called crumb (i.e., finely ground rubber 15 mm in diameter and less, usually steel-free); and,
- extruded products made from rubber crumb, rubberized asphalt and energy-recovery, usually called tire-derived fuel or "TDF" (not really recycling but a popular end-use elsewhere).

Some of the applications for these materials are briefly listed below. Please note that some of these uses are covered by various patents or may be protected by trademarks.

#### Whole and cut tires:

- Whole tires can be used baled or bolted together and used in civil engineering applications, such as breakwaters and erosion barriers.
- Cut tires are used to make mats, animal feeders, fencing, composters, planters, blasting mats, etc. This use also includes rubber parts punched from cut tires.

#### Shredded tires:

- Large tire shreds have been successfully used as lightweight fill material in roadbed and embankment stabilization projects. The material is also used as a leachate drainage material in sealed landfills to enhance drainage.

#### Rubber crumb:

- Medium-sized rubber crumb (5-10 mm) has become popular as a material for playgrounds to provide protection to children from falls and injuries. This same material size-range is being used in equestrian training arenas (usually mixed with sand) to provide a secure and safer footing for horses. It is also being used in golf courses and sports fields to protect turf and provide better drainage.
- Fine rubber crumb is a feedstock to a range of manufacturing processes.

#### Manufactured products:

- A full range of consumer products is manufactured from recycled rubber from tires. The main applications are where the rubber crumb is mixed with a binding agent and molded into products: rubber mats, paving stones and blocks, curb stops, railroad crossings, automotive parts, solid wheels, fatigue mats and truck-box liners.
- Loose rubber crumb is also being made

into animal mattresses for dairy cattle.

- Ultra fine rubber crumb can be made into sealants, soaker hoses, carpet underlay, and partially re-vulcanized rubber reclaim.

#### Rubberized asphalt:

- Recycled rubber crumb has been used in asphalt in two different ways: as a filler or aggregate replacement and as a binding agent. Rubberized asphalt has shown enhanced wear and traction performance, as well as minimizing the wear-related road rutting and frost deformation of roads in cold climates.
- A similar application is the pour-in-place surfaces for playgrounds and running tracks that use fine rubber crumb and a binding agent.


#### Energy recovery (TDF):

- Both whole and shredded tires are used extensively in other parts of the world in energy recovery. Controlled combustion of tires can be used to recover the energy in the hydrocarbons, but there are a number of environmental and economic, as well as social, issues related to this use.

The "holy grail" of tire recycling is devulcanization — the production of raw rubber (as well as oils and carbon blocks) from scrap tires. While this is theoretically possible and many claim to have produced devulcanized rubber from tires, there are no commercially viable processes in operation. There are many companies that produce various forms of partially devulcanized rubber that can be used as raw materials in manufacturing processes, but in most cases the rubber is an amalgam that does not have the same properties as the original rubber. It is kind of like trying to un-bake a cake. Once you have mixed all of the ingredients together and cooked them, it is nearly impossible to separate them again.

domestic markets for their scrap tires (including incineration), and Europe and the US report markets for about 65 per cent of their scrap tires. (Most exported tires are used for tire-derived fuel markets.)

Ontario and Newfoundland need to get

with the program and take the stewardship of scrap tires seriously. The rest of Canada has shown that stewardship programs can be effective and that solutions exist. 

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