Scrap Tire Beneficial End Markets

The Environmental Show of the South
Chattanooga, TN

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Office of Policy and Sustainable Practices

Our office has three teams- Business, Community, and Government- that support our customers through:

- Environmental Policy Projects
- Coordination of Customer Focused Government Reporting
- NEPA Review and Comment Coordination
- Monitoring of State and Federal Legislation and Rulemaking
- Title VI and Environmental Justice
- Grants, and
- Education, Technical Assistance, and Recognition Programs
  - Tennessee Environmental Education Initiative
  - Get Food Smart TN
  - Governor's Environmental Stewardship Awards
  - Tennessee Green Star Partnership
  - Tennessee Higher Education Initiative
  - Tennessee Materials Marketplace
  - Tennessee Radon Program
  - Tennessee Sustainable Spirits
  - Sustainable State Government
  - Unwanted Household Pharmaceuticals Program
Why Recycle Scrap Tires?

It begins with a few tires left behind in the woods.
Why Recycle Scrap Tires?

It ends as an environmental nightmare.
Confucius say, man who runs behind car will get exhausted, but man who runs in front of car will get tired.
Recycling scrap tires is not a new concept. Scrap tires have been repurposed since 1924. Herschel Davis started Davis Rubber Company in an abandoned derailed boxcar near Cartney, Arkansas. The tires were cut using leather tools to create patches for car tires.
Scrap Tire Processing

- Processing scrap tires usually begins with shredding the tire to the size required for tire derived fuel (TDF) or tire derived aggregate (TDA).
Scrap Tire Processing

• The tire processor can also shred the tires into chips and continue processing to create granules and powder.
• Further processing that creates the granules and powder is more costly. However, the end product becomes more marketable and more profitable.
Tire Derived Fuel (TDF)

According to the U.S. Tire Manufacturers Association, the TDF market used 117 million tires in 2015 (over 48% of the total annual scrap tire generation for the year).

- TDF requires the minimum amount of processing.
- TDF is the most common use for processed scrap tires in the United States. TDF is used as fuel at paper plants, cement kilns and power plants.
- The Packaging Corporation of America (PCA), located in Counce, Tennessee, uses TDF to stabilize BTUs for the boiler and consumes approximately 2 million tires a year and can use as many as 4 million tires when running at capacity.
Beneficial End Uses

Tire Derived Fuel
Tire Derived Aggregate (TDA)

According to the U.S. Tire Manufacturers Association, TDA and ground rubber consume approximately 38% of the total annual scrap tire generation for the year (2015 totals).

- TDA is shredded tires in various sizes depending on the end market. Some wire remains and cloth is present in TDA.
- Civil Engineering Uses - Larger sizes of TDA can be used as backfill in construction, road stabilization, daily cover for landfills and mulch.
- Approved tire aggregate can be used for septic field line backfill in Tennessee.
Beneficial End Uses

Tire Derived Aggregate
Granulated and Ground Rubber Applications

- Ground rubber is created by granulating or grinding scrap tires into different size particles. Wire and cloth is removed during the process producing a “clean” rubber product.
- Uses include new rubber products, landscaping mulch, rubber mats, porous walkways and rubberized asphalt.

Beneficial End Uses
Beneficial End Uses

Rubber Modified Asphalt

Getting rubber into the asphalt can be accomplished two ways.

The “Wet” Method
The rubber is introduced to the binder at and asphalt plant.

The “Dry” Method
The rubber is introduced to the asphalt mix with the aggregate.
Beneficial End Uses

Porous Walkways and Tree Surrounds Containing Granulated Scrap Rubber

- Porous rubber paving materials are products that are made with scrap tires and in compliance with the ADA requirements as well as being environmentally friendly.
- Porous rubber paving materials use approximately one scrap tire for every three square feet of material installed.
Beneficial End Uses

Scrap Tire Pyrolysis

Pyrolysis is the process of recycling scrap tires by breaking it down to metal, oil, and carbon black. This is accomplished by heating the tires to extremely high temperatures in an oxygen free environment. Pyrolysis requires more energy than conventional tire processing and a large amount of capital investment to be successful.

- Metals are easily sold to metal recyclers.
- The oil and syngas can be used for energy to back into the process.
- The carbon black can be sold for profit but requires extensive chemical engineering to become a valuable commodity.
Beneficial End Uses

OTR Wheel & Engineering/Green Carbon
Beneficial End Uses

Waste to Energy

Waste to energy is a relatively new technology to the United States but is used in Europe. The process will combine organic waste, solid waste and shredded tires to create a fuel source for a gasification process. Scrap tires are often needed to increase the BTU value of the waste. The gasification process differs from pyrolysis because it uses lower temperatures and does not require a complete lack of oxygen. The process also produces a biochar byproduct that may have use in agriculture and chemical processes that require activated charcoal.
Creative Scrap Tire Uses
TDEC Involvement in Scrap Tires

- In 2015 Governor Bill Haslam’s “State of the State” speech stated that scrap tires are one of the priorities for the upcoming years in Tennessee.
- The Tennessee Automotive Association volunteered to collect fees for tires on new car sales and this money was placed in a grant program.
- The Tennessee Legislature created the Tire Environmental Act to manage the revenue generated from new car sales.
- TDEC’s Office of Sustainable Practices (OSP) was designated to manage the new Act and developed the Tire Environmental Act Program (TEAP). This is a grant program designated to find beneficial end-markets for Tennessee scrap tires.
Tire Environmental Act Program (TEAP)

- TEAP was drafted and approved in the Spring of 2016 and it was designed as a matching funds program. TEAP will reimburse 50% of the approved project expenses in Tennessee. This means that if a Tennessee entity is approved to purchase a piece of equipment that costs $100,000.00, the entity will purchase the equipment and apply to be reimbursed $50,000.00 after the equipment is delivered.

- The entity must be located in Tennessee to be eligible for TEAP and the projects must recycle Tennessee scrap tires.
Some Awarded TEAP Projects

- **Rockwood Construction Recycling, LLC - City of Lebanon Waste to Energy Initiative**
  
  Funds Awarded - $123,655.00  
  Purchase of tire shredding equipment

- **UT/TDOT - Rubberized Asphalt Projects**
  
  Funds Awarded - $114,995.00  
  Testing and research for three rubberized asphalt projects

- **Patriot Recycling, Inc. - Facility and Equipment Upgrades**
  
  Funds Awarded - $537,916.50  
  Purchase tire shredding equipment and upgrade facility
The world’s largest downdraft gasifier was commissioned in October 2016 in Lebanon, Tennessee. The energy plant will process up to 64 tons per day of waste and produce up to 400 Kw of electricity. Commercial wood waste that was previously dumped into area landfills will be blended with hundreds of tons of discarded, scrap tires and sewer sludge to provide the fuel for the clean gasification process.

TEAP funds were awarded to Rockwood Construction Recycling, LLC to purchase tire shredding equipment to provide tire derived fuel for the plant.
Shredded Tires - Fuel for Gasification
Rubberized Asphalt in Tennessee

• The Tennessee Department of Transportation (TDOT) used rubber in several test projects in 1998 and 2011 with mixed results. TDOT was not impressed enough to pursue the use of rubber in future projects.

• In 2016 TDOT teamed with TDEC and UT and conducted three rubberized asphalt projects in three TDOT Regions across the state.

• TEAP funds were awarded to UT and TDOT for research and development on these projects.
TDOT Rubberized Asphalt Projects

Region 1 Contract CNQ160
Washington County, Resurfacing of US 11E

Region 2 Contract CNQ205
Rhea County, Resurfacing of SR 29

Region 3 Contract CNQ185, Davidson County, Resurfacing of SR 45
Region 2 Project Pictures
Future Rubber Modified Asphalt Projects

- T.O. Fuller State Park in Memphis is converting former golf cart trails into 2.9 miles of walking trails that are compliant with the Americans with Disabilities Act guidelines. The project will take a serious blight in the Memphis community and turn it into a useful resource for the local population.
Tennessee State Parks have been researching materials to use for trail construction that meets the requirements established in the Americans with Disabilities Act (ADA) and environmental concerns.
Flexi®-Pave Pilot Project Cedars Of Lebanon
Approximately 70 Scrap Tires Used
More Ideas for Scrap Tires Always Welcome

- TDEC’s Division of Solid Waste Management and the Office of Sustainable Practices are always looking for new and innovative beneficial uses for scrap tires.

- TEAP funds are available for **Tennessee** based entities that create projects to accomplish continued beneficial end uses for **Tennessee** scrap tires.

- TEAP is a 50/50 matching funds program (i.e.; the program will match an awarded contract dollar for dollar).
Questions & Contact Information

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