



Colorado's Waste Tire Program – Status of Waste Tire Recycling in Colorado




COLORADO
Department of Public
Health & Environment

Welcome

Colorado's 2016 Market Development
Waste Tire Conference:
The Value of Tire Recycling

Executive Summary

Calendar year 2016 marks the thirteenth year the Colorado Department of Public Health and Environment (the department) has compiled data related to waste tires, waste tire funds and the status of Colorado's Waste Tire Program. Waste tire processing facilities continue to process tires into different tire-derived products that are used for such things as alternative daily cover at landfills, tire-derived fuel by cement kilns and as a fencing and windbreak alternative.

Additionally, the department continues to work with our contractor, Tetra Tech, to promote and facilitate tire-derived product markets in preparation of the repeal of the End Users and Market Development Funds on January 1, 2018. Steps that were taken in 2016 to promote waste tire market development included department sponsorship of the third annual Colorado Waste Tire Market Development Conference held in June of 2016 and providing technical assistance to existing and potential companies interested in locating or expanding their waste tire operations and/or markets in Colorado.

This 2016 calendar year annual report on waste tire recycling in Colorado is transmitted to the Colorado General Assembly and the Solid and Hazardous Waste

Commission as required by Sections 30-20-1404 and 30-20-1406, C.R.S. The statute requires the department to issue a report to the committees of reference on or before July 1 each year. The report must include the following: information on the waste tire fee, the status of a priority abatement list for illegal waste tire disposal sites, an update of waste tire grant fund programs and the findings from the department and the Colorado Department of Transportation's regarding tire-derived aggregates. The total number of waste tires recycled in the state is also included to gauge the generation, management, flow and end use market. The regulated community submits this information to the department pursuant to the Regulations Pertaining to Solid Waste Sites and Facilities (6 CCR 1007-2, Section 10).

Annual reporting forms are submitted to the department from waste tire processing, collection and storage facilities, waste tire haulers, mobile waste tire processors and end users of tire derived products. Report information is also gathered from new tire fee return forms, funding and grant applications (end user and illegal waste tire clean up) and through waste tire inspection reports.



COLORADO
Hazardous Materials
& Waste Management Division

Department of Public Health & Environment

Solid Waste and Materials Management Program

Report Authors and Technical Assistance:

Shana Baker, Principal Author, Waste Tires Work Leader
Joe Schieffelin, Solid Waste and Materials Management Program Manager
David Snapp, Materials Management Unit Leader
Brian Gaboriau, Waste Tire Grants Administrator
Anna Maylett, Waste Tires Specialist
Cindy Smith, Waste Tires Specialist
Lisa Jeffrey, Waste Tire Fee Analyst
Paul Will, GIS Manager
Kelly MacGregor, Communications Specialist

Additional Information

This report and additional information not reported here are available on the Colorado Department of Public Health and Environment website. For more information, please visit: www.colorado.gov/cdphe/wastetires

Cover Photos (left to right, top to bottom): Tire-derived product on right foreground that will be used by a cement kiln as tire-derived fuel; tire-derived product that will be used as alternate daily cover at a landfill; wattles made from recycled waste tires used in stormwater inlet protection; illegal waste tires in Western Colorado staged for cleanup; welcoming slide for the Colorado 2016 Waste Tire Market Development Conference.

Waste Tire Update

Waste Tire Generation, Management and Flow

Colorado continues to generate waste tires at a rate higher than the accepted national industry standard of one waste tire per person per year. According to data submitted to the department by waste tire processors, end users, collection facilities, waste tire monofills and waste tire haulers, the waste tire generation rate was

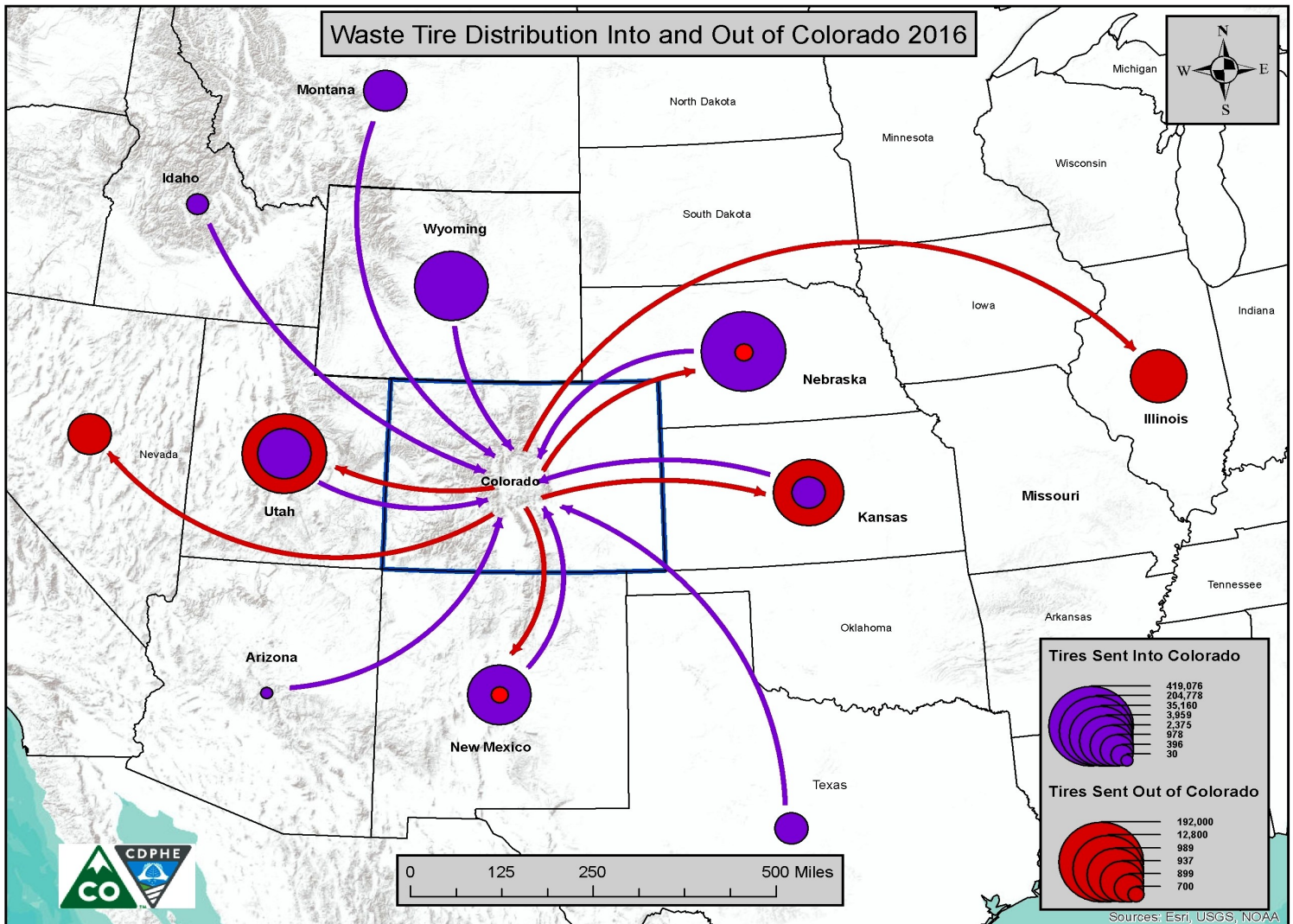
1.32 waste tire per person per year in 2016. During the same time 7,286,359 waste tires were generated in Colorado, which is 1,014,726 more waste tires than 2015 and a 16 percent increase from the prior year. This above average waste tire generation rate can be attributed to an improved economy, an increase in state population and increased collection of waste

tires by registered haulers.

Waste tires are received from and sent to neighboring states (see map below). Colorado received 667,730 waste tires from eight states, with Nebraska and Wyoming sending more than 623,854 waste tires into the state. This is an 22 percent increase over 2015. Colorado-generated waste tires were also sent to five states. A Utah recycling facility received

Continued on next page...

Regional Waste Tire Influences



Document Path: E:\DVI\General\SW\inspects\tires\tires_in_out_co_2016.mxd

Waste Tire Update

Continued from previous page...

92 percent (192,200 waste tires) of the waste tires sent out of state.

By the Numbers

In 2016, the total number of waste tires salvaged or recycled, including those brought into Colorado from surrounding states, was 7,954,089. 159 percent of the waste tires generated (in Colorado plus all the waste tires received from neighboring states) in 2016 were recycled or salvaged.

Figure 1 (page 6) provides an annual comparison of waste tire recycling and salvaging rates of Colorado-generated and imported waste tires. In 2016, the large increase in the recycling/salvaging rate was due to the specific end uses of waste tires discussed below.

Figure 2 (page 6) captures the top 10 direct use and end use markets for waste tires in calendar year 2016. Although the top five direct use and end markets remained unchanged from 2015, there were some significant changes in the relative magnitude of the markets. For instance, over the past several years the largest end user of waste tires was tire-derived fuel used at Colorado cement kilns. In 2016, however, usage of tire shreds as alternate daily cover at landfills increased by 495 percent, making that end use the most common.

Figure 3 (page 7) reflects the number of waste tires recycled and salvaged versus the generation rate in Colorado. Since 2011, the amount of waste tires recycled or salvaged has outpaced or equaled the waste tire generation rate. In 2016, however, 12,685,144 waste tires were recycled or salvaged, a 78 percent

Since 2011, the amount of waste tires recycled or salvaged has outpaced or equaled the waste tire generation rate. In 2016, however, 12,685,144 waste tires were recycled or salvaged, a 78 percent increase from the prior year. Again, this increase was largely driven by the significant increase in the use of waste tires for alternate daily cover.

increase from the prior year. Again, this increase was largely driven by the significant increase in the use of waste tires for alternate daily cover. In addition, the increased use of waste tires in fencing and windbreaks and direct/end use of salvaged tires

(reuse/retread) also improved the recycling/salvaging rate.

Figure 4 (page 7) represents the number of waste tires added to waste storage inventories since 2010. This graph clearly shows the waste tire storage inventory decreased dramatically by 4,739,190 waste tires in 2016. This was mainly due to removal of a large number of waste tires from one large monofill for use as alternative daily cover. A second large monofill removed a portion of their waste tires from their inventories for use as tire-derived fuel.

Waste Tires Summary and Outlook

In 2016, Colorado met its goal of recycling all waste tires generated in Colorado and waste tires brought in from other states. Waste tires were removed from monofills and waste tire processors processed waste tires in numbers exceeding previous years. Compared to 2015, 5.5 million more waste tires were used in 2016. Although this number may decrease in 2017, End User Fund projections indicate that Colorado's waste tire recycling rate will be well over 100 percent in 2017.



Waste Tire Grants

End Users Fund

The End Users Fund provides financial rebates for the beneficial use of waste tires and tire-derived products to End Users, Retailers and Processors. Monthly rebates were set at a Solid and Hazardous Waste Commission approved \$80 per ton rate for 2016 (6 CCR 1007-2, Section 10.12.5). An End User is defined as a person who uses a tire-derived product for a commercial or industrial purpose, uses a whole waste tire to generate energy or fuel, consumes/uses a tire-derived product in its final application or makes a new material that is sold. A Retailer is a person who sells a small quantity of tire-derived product to a customer. A Processor is eligible for the rebate when they sell their tire-derived product to an out-of-state end user.

For calendar year 2016, the department provided rebates totaling \$8,470,280 for a total of 105,878 tons of end used tire-derived product (see chart below). A total of 25 entities participated in the End Users Fund, including 8 new applicants. A total of 33,164.29 tons were approved for the new applicants, equaling 2,947,937 waste tires.

| 2016 – Type of Tire-Derived Product | Amount That Received a Rebate in 2016 (tons) |
|--|--|
| Alternate Daily Cover | 65,745.92 |
| Tire Derived Fuel | 34,809.76 |
| Tire Bales for Windbreakers/ Fences | 4,040.99 |
| Landscaping | 551.43 |
| Agricultural—silage covers | 314.87 |
| Stormwater/Erosion Control | 282.04 |
| Recreational Surfaces | 133.50 |
| Total: | 105,878.51 |

Waste Tire Inspection Grants

In 2016, 10 local health agencies participated in the Waste Tire Inspection grant program, in which local governments conducted waste tire inspections on behalf of the department. Local partners conducted 870 inspections and technical assistance visits in 2016 (see chart on right). The majority of these inspections and visits were of waste tire generators (e.g., retail tire shops), but many waste tire haulers and illegal waste tire sites were also evaluated.

Local Government Inspections/Visits

| Agency Name | Jurisdiction | # of Inspections | # of Technical Assistance Visits | Total Inspections & Tech Assist Visits |
|---|---|------------------|----------------------------------|--|
| Alamosa County Public Health | Alamosa, Costilla, Conejos, Rio Grande, Saguache and Mineral Counties | 9 | 18 | 27 |
| Delta County Health Department (West Central Public Health Partnership) | Delta, Montrose, Gunnison, Ouray, San Miguel and Hinsdale Counties | 71 | 1 | 72 |
| El Paso County Public Health | El Paso County | 180 | 72 | 252 |
| Garfield County Public Health | Garfield County | 2 | 31 | 33 |
| Jefferson County Public Health | Jefferson County | 135 | 0 | 135 |
| Las Animas-Huerfano Counties District Health Department | Las Animas, Huerfano and Custer Counties | 11 | 15 | 26 |
| Montezuma County Public Health Department | Montezuma County | 13 | 25 | 38 |
| Otero County Health Department | Otero and Crowley Counties | 0 | 5 | 5 |
| Pueblo City-County Health Department | Pueblo County | 72 | 18 | 90 |
| Tri-County Health Department | Adams, Arapahoe and Douglas Counties | 148 | 44 | 192 |
| | Total: | 641 | 229 | 870 |

By the Numbers: Overview of Waste Tire Activity

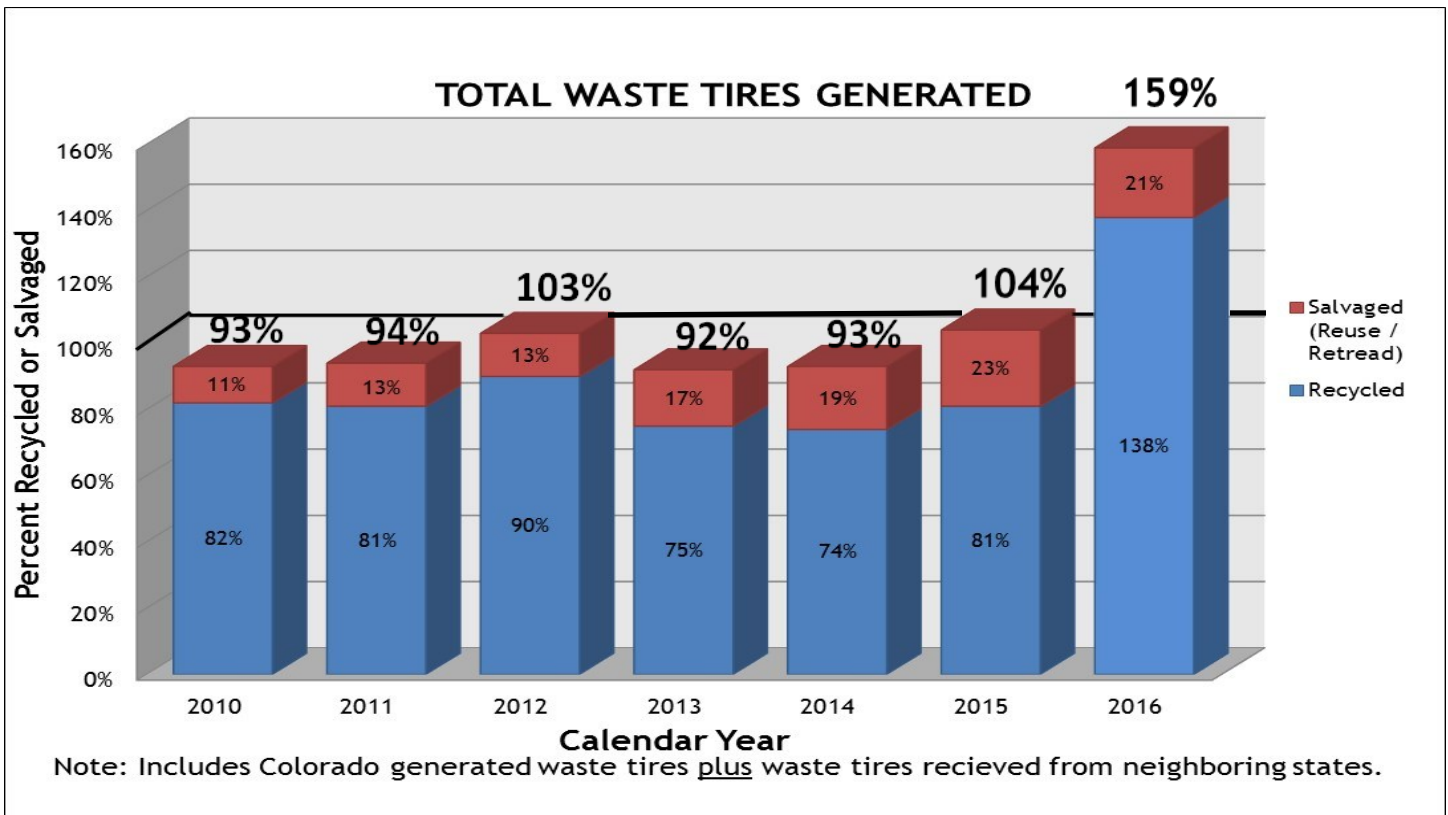


Figure 1

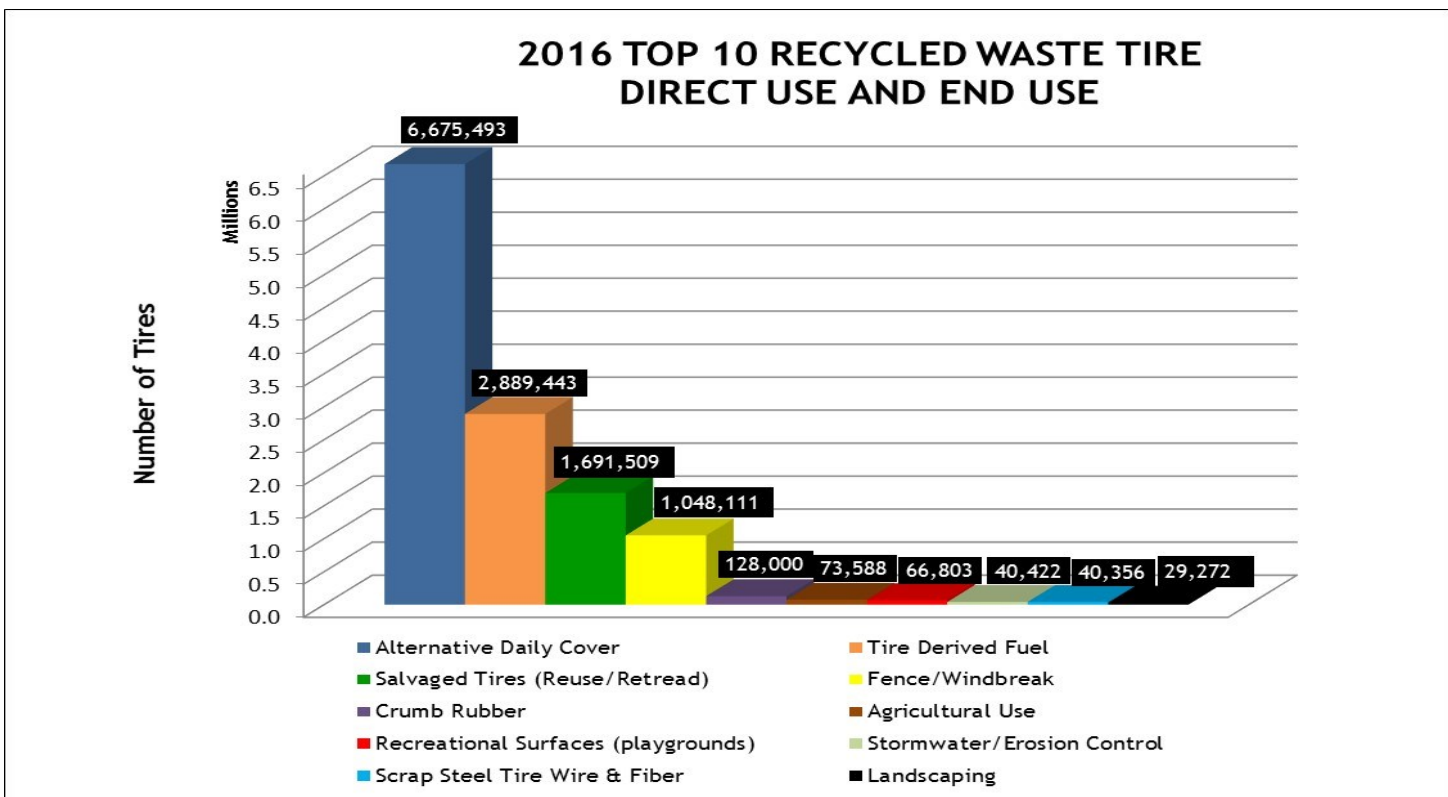


Figure 2

By the Numbers: Overview of Waste Tire Activity

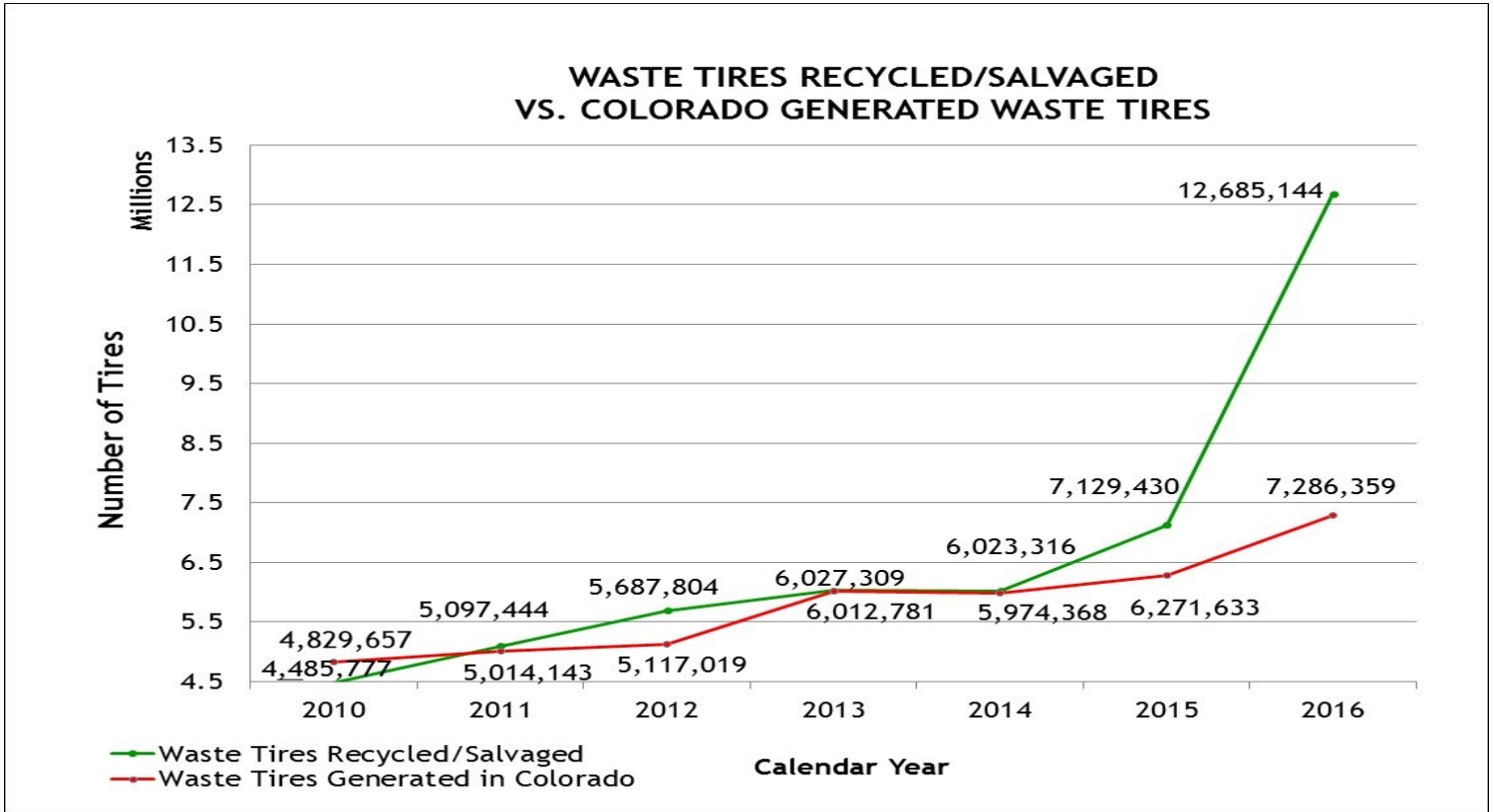


Figure 3

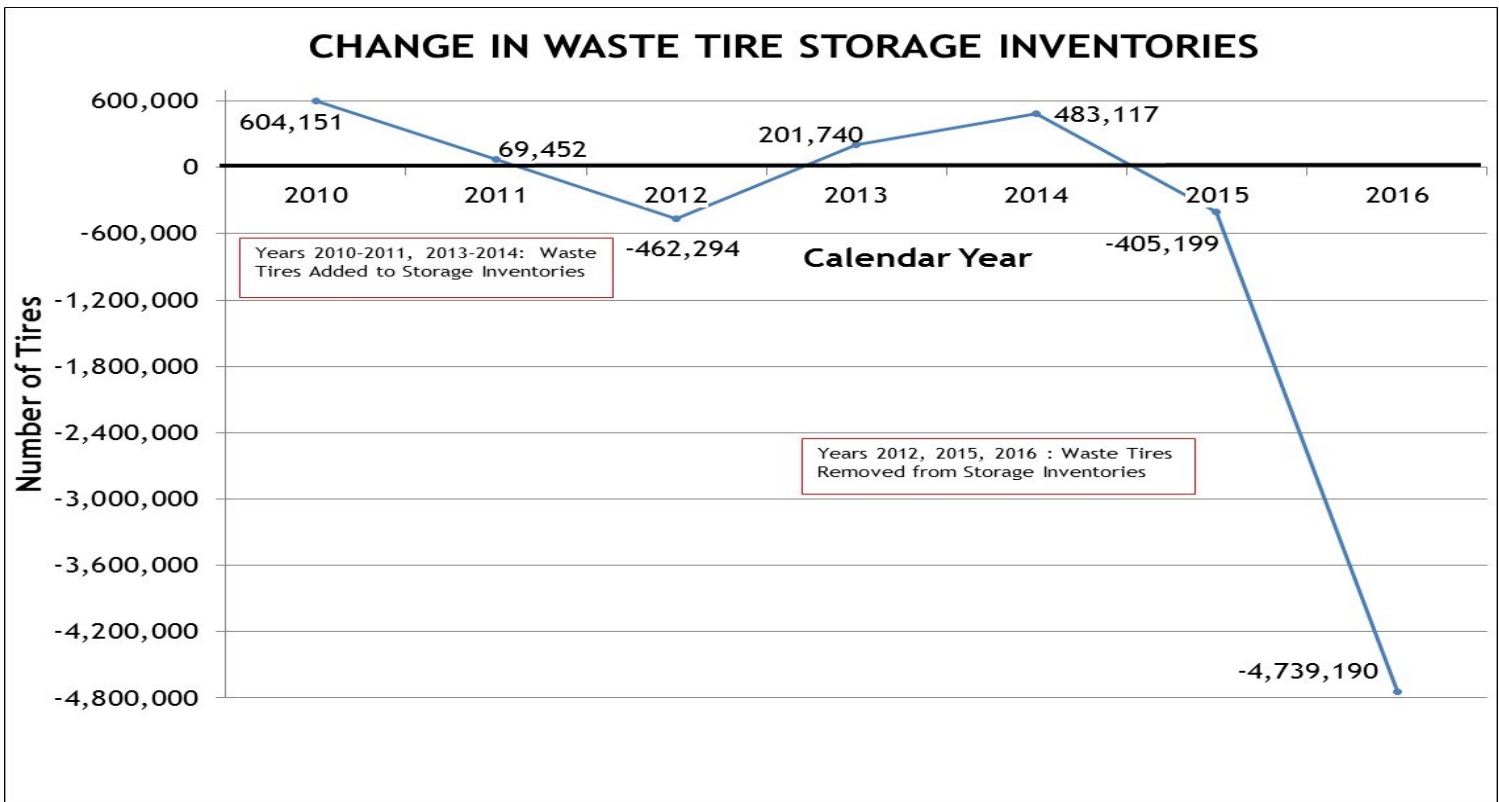


Figure 4

Waste Tire Grants

continued from page 5...

Common issues identified by the local health agencies included a) facilities unregistered with the department, b) failure to submit the waste tire fee, c) generators not using a registered waste tire hauler, d) incomplete or no manifests kept on site, e) violating waste tire storage limits, f) litter and vegetation control and g) decals not being posted onsite. The total amount awarded to local agencies in 2016 was \$119,821.

The department's goal is to have partnerships with local governmental agencies in every county to conduct these inspections. These inspections help ensure that waste tires are properly managed in the state. The department conducted outreach in 2016 to promote this grant opportunity to local governmental agencies by presenting and exhibiting at the Colorado Environmental Health Association Annual Education Conference and corresponding with local agencies through the department's Office of Planning, Partnerships and Improvement. The department will continue to conduct outreach to local health and other governmental agencies to expand the program statewide.

Illegal Waste Tire Cleanup Grants

The Illegal Waste Tire Cleanup Grant program provides funding for the cleanup of illegal or abandoned waste tire sites. The department is notified of illegal waste tire sites by the public, local governmental agencies, other state agencies and by our inspectors. The "Illegal Waste Tire Stockpile Identification Form" is available online for local governmental agencies to report potential illegal waste tire sites. A general complaint form is also available online for the public to report potential illegal waste tire sites.

Waste Tire Inspectors in the department inspect potential waste tire cleanup sites to assess the size of the pile, the physical lay-out of the site, if the site is an active or abandoned site and the risk to public safety and the environment in the immediate area. The department also determines if enforcement action against a liable party is appropriate for site cleanup.

To prioritize the order of abatement, sites are ranked. The site is assigned a ranking that is calculated on a point system based on several factors observed by the Waste Tire Inspector, such as the number of waste tires; population, topography and infrastructure near the site; and stockpile

characteristics. Illegal sites ranked "High" and "Medium" are considered priority abatement projects for the department. The following table lists identified illegal waste tire sites by county, ranking and the total estimated illegal waste tires (as of December 31, 2016):

| Location (County) | Ranking (High, Medium, Low) | Estimated Number of Illegal Waste Tires |
|---------------------|-----------------------------|---|
| Logan (2 locations) | High | 63,672 |
| Prowers | Medium | 5,700 |
| Saguache | Medium | 57,223 |
| Costilla | Low | 33,094 |
| Las Animas | Low | 1,100 |
| Routt | Low | 500 |
| | Total: | 161,289 |

Currently the department has identified an additional 36 potential illegal waste tire sites in the state. Waste tire inspectors will inspect these sites in the coming months to determine eligibility for cleanup funds.

The department completed 3 illegal waste tire cleanups in 2016 (see table below). Cleanups using illegal waste tire cleanup funds will continue in 2017.

| Grantee Name | Funds Spent for Cleanup | Tires Removed |
|----------------|-------------------------|----------------|
| Larimer County | \$248,204 | 58,080 |
| Mesa County | \$105,786 | 59,519 |
| Weld County | \$2,450 | 430 |
| Total: | \$356,440 | 118,029 |

In 2016, the department funded 9 collection events for counties and municipalities. These events allow the public to drop off unwanted tires at little or no cost. A list of department-funded collection events, funds spent and waste tires collected can be found on the next page.

Waste Tire Grants

continued from previous page...

| Location of Collection Event (Town/ Area) | Cleanup Funds Spent | # of Waste Tires Collected |
|---|---------------------|----------------------------|
| Dolores County | \$5,000 | 1,000 |
| Center | \$2,168 | 605 |
| Ft. Lupton | \$2,080 | 728 |
| Milliken | \$2,500 | 500 |
| Montezuma County | \$3,250 | 1,000 |
| Nucla/Naturita | \$1,819 | 459 |
| Parachute | \$900 | 185 |
| Rifle | \$2,000 | 1,000 |
| San Luis | \$3,250 | 1,000 |
| Total: | \$22,967 | 6,477 |

Due to continued interest from counties and municipalities, the department will continue to fund waste tire collection events in 2017. The request form is available at www.colorado.gov/pacific/cdphe/illegal-waste-tire-cleanup-grants.

Waste Tire Market Development Fund

Waste Tire Program Goals

A goal of the Waste Tire Program is to develop sustainable markets for the end use of waste tires and tire-derived products.

With the sunset of the End Users Fund and Market Development Fund in 2018, the state will move from a subsidy-based system to a free market system. The department, through the Market Development Fund, is currently working on several initiatives to assist the state during this transition.

The department put the following performance measures in place in 2014 to determine the effectiveness of the program:

- Increase the tonnage of waste tires end uses approved in the End User Fund by 5% over the 2014 baseline.
 - ◊ 2014 end use tons approved: 39,187
 - ◊ 2015 end use tons approved: 40,196
 - ◊ 2016 end use tons approved: 105,365

This goal was met as end use increased by 168.9% from 2014 to 2016.

- Conduct at least 5 outreach events to promote the Waste Tire Program (the program) and market development opportunities each year.
 - ◊ Three outreach events were held in 2016:
 - 1) June 2016 – The Waste Tire Market Development Conference
 - 2) September 2016 – Colorado Environmental Health Association Annual Education Conference
 - 3) October 2016 – Colorado Rocky Mountain Chapter of the Solid Waste Association of North America Annual Conference

This goal was not met due to limited outreach opportunities in 2016.

- Increase technical assistance outreach visits with existing and new companies by 10 percent over the 2014 baseline.
 - ◊ 2014 technical assistance outreach: 23
 - ◊ 2015 technical assistance outreach: 33
 - ◊ 2016 technical assistance outreach: 40

This goal was met as outreach increased by 73.9% from 2014 to 2016.

- Increase the overall waste tire state recycling rate by 3% over the 2014 baseline.
 - ◊ 2014 Recycling Rate: 93%
 - ◊ 2015 Recycling Rate: 104%
 - ◊ 2016 Recycling Rate: 159%

This goal was met as recycling increased by 66% from 2014 to 2016.

2016 Summary

Tetra Tech was awarded \$199,000 in 2016 to assist the department to implement many of the recommendations in the market development plan. Some of the initiatives include holding a waste tire market development conference, offering technical assistance for both current and potential end users of tire-derived products and assisting with the development of statutory and regulatory changes for the program.

As required by Section 30-20-1404, C.R.S., the department must report any findings or usage of tire-derived aggregates (TDA) by the Colorado Department of Transportation (CDOT). CDOT did not complete any tire-derived aggregate projects in 2016.

Market Development Conference

Continued on next page...

Waste Tire Grants

continued from previous page...

In June 2016, the third annual Waste Tire Market Development Conference was held in Greenwood Village, Colorado. Nineteen speakers provided the latest information on regional markets, market development and trends, technologies and beneficial end uses for waste tires. Presentations covered new technology-driven products, a panel discussion from the state's three monofills, a Toxic Substance Control Act (TSCA) overview for pyrolysis facilities, an update on the crumb rubber in synthetic turf studies from California (CalRecycle) and EPA, a review of the economics of rubberized asphalt and the use of tire-derived aggregates in smaller civil engineering projects. There were 118 conference attendees, including Waste Tire Processors, Retailers and End Users; state and local regulators; transportation officials; landfill operators; equipment dealers; and industry consultants. Additionally, there were 10 vendors that exhibited and displayed their products. Pictures from the conference are located on the back page of this report.

Regional state regulators met before the conference. Ten states, plus the EPA Region 8 Office, attended this meeting to discuss current waste tire regulations; enforcement techniques; subsidy programs; regional markets for tire-derived products; waste tire operators and haulers; market development and trends; current and emerging tire-derived product technologies; and beneficial end uses for waste tires.

Based on positive feedback, a fourth waste tire marketing development conference is scheduled for

June 2017. The conference will continue discussions on the development of new markets and further development of existing markets. Sessions planned include the status of the federal action plan on crumb rubber infill in synthetic turf, new technology driven products, current pyrolysis status, off-the-road tire recycling, the use of tire-derived aggregate in smaller civil engineering projects and state DOT's perspective on rubberized asphalt.

Technical Assistance

The department, in partnership with Tetra Tech, conducted technical assistance for existing and potential companies who either are interested in locating or expanding their waste tire operations in Colorado (see charts on this page). Many of these companies inquire about issues such as waste tire availability, current markets, business incentives, registration requirements and permitting requirements. The department meets with these companies regularly to advise them on registration or permitting requirements and what department grant opportunities could be beneficial to them. The department also conducts outreach with other state agencies interested in learning about and using tire-derived products. Tetra Tech will provide support by providing advice to these companies, researching market barriers or opportunities and/or conducting an onsite visit to meet with the company and review their current or proposed operations.

The department released a new grant application for funding of research and development of new and existing tire-derived products. Funding is available for for-profit companies, nonprofit entities, state governmental agencies and institutes of higher education. Two projects were awarded grant funding for projects to be completed in 2017: civil engineering use of tire-derived aggregate in geothermal heating and cooling systems and product testing of tire-derived erosion control products.

| Industry Type Provided/Technical Assistance | Number provided Technical Assistance by Industry Type |
|---|---|
| Waste Tire Processor | 6 |
| Crumb Rubber Products | 2 |
| Molded Products | 4 |
| Tire-Derived Fuel | 4 |
| Pyrolysis | 14 |
| State Agencies | 1 |
| Federal Agencies | 1 |
| Civil Engineering | 5 |
| Asphalt | 1 |
| Alterative Daily Cover | 1 |
| Equipment Dealers | 1 |
| Total: | 40 |

| Methods of Technical Assistance | # Of Technical Assistance By Method |
|---|-------------------------------------|
| Phone Conversations (one-time or ongoing) | 40 |
| Site Visits | 3 |
| Grant Projects | 1 |
| Meetings | 3 |
| Technical Document Review | 1 |

Waste Tire Program: Trends & Accomplishments

Waste Tire Fee

The program has continued the collection of the \$1.50 waste tire fee on the sale of each new tire. In 2016, 1,800 retailers collected the waste tire fee. Additionally, the program added 564 new waste tire fee accounts. The graphic below shows the total number of new tires sold in the state and the total waste tire fees collected. After taking over the collection of the waste tire fee from the Department of Revenue, the program has increased the amount of waste tire fees collected by \$1 million dollars in 2015 and \$700,000 in 2016.

Program Update

2016 continued to be a busy year for the program. Program highlights included:

- Hosting 3 quarterly mountain region states waste tire regulator conference calls.
- Convening 2 stakeholder meetings in July and August to set the 2017 End Users Fund rebate rate and update the Waste Tire Regulations.
- Holding the 3rd Annual Waste Tire Market Development Conference and pre-conference regulators meeting.

The program continued outreach by providing regulatory information to local governments and the

waste tire community. Staff presented and exhibited at the 2016 Colorado Environmental Health Association Annual Education Conference in Breckenridge and presented at the 2016 Colorado Rocky Mountain Chapter of the Solid Waste Association of North America Annual Conference in Keystone.

Program staff conducted 197 waste tire inspections and compliance assistance visits in 2016. Of these 197 visits, 132 waste tire generator facilities selling new tires were evaluated for compliance with the requirements for submittal of the waste tire fee. Because of these inspections, new tire fee accounts were established for those facilities who had not previously submitted the waste tire fee. Additionally, the program issued 11 compliance advisories (informal enforcement actions) and 2 Compliance Orders (formal enforcement actions; one Order on Consent and one Unilateral Order) for the non-compliance with waste tire laws and regulations.

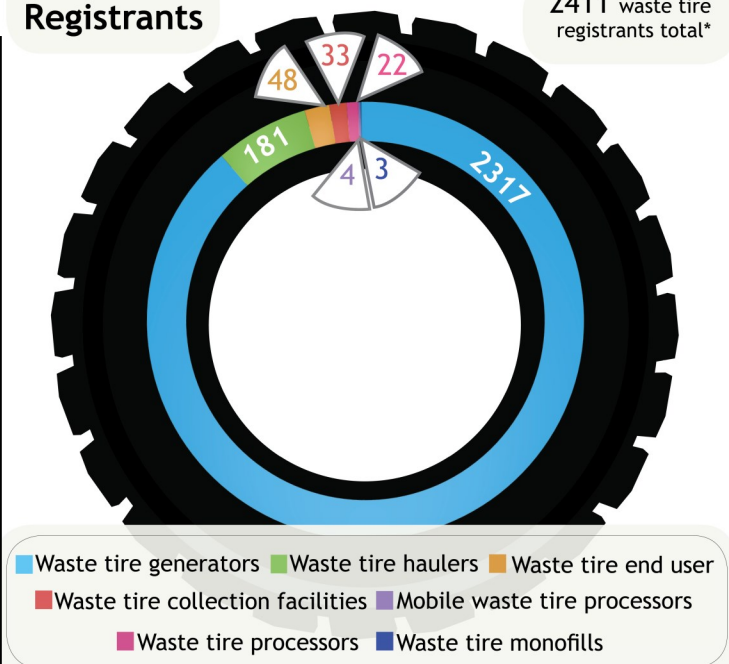
Program staff continued to process and issue waste tire registrations. The program issued 589 waste tire registrations in 2016. End of 2016 registrant numbers are represented in the graphic below.

2016 Waste Tire Fees

| Tires Sold | Month (2016) | Waste Tire Fees Collected |
|------------------------------|--------------|---------------------------|
| 307,093 | January | \$460,639 |
| 291,135 | February | \$437,023 |
| 313,557 | March | \$470,335 |
| 318,256 | April | \$477,384 |
| 343,581 | May | \$515,371 |
| 377,419 | June | \$566,129 |
| 382,881 | July | \$574,321 |
| 404,614 | August | \$606,921 |
| 432,118 | September | \$648,177 |
| 516,887 | October | \$775,330 |
| 551,097 | November | \$826,646 |
| 516,248 | December | \$774,372 |
| 4,754,886 tires total | | \$7,132,648 total |

Waste Tire Registrants

2411 waste tire registrants total*



*one registrant can be registered in multiple categories

Colorado's 2016 Waste Tire Market Development Conference: The Value of Tire Recycling



John Sheerin, from the Rubber Manufacturers Association, introducing the regulator panel from CO, NM, AK, and OK .



Product, on display from a presenter, from recycled tires used in an all-in-one sprinkler irrigation curbing system.



The 10 vendors that exhibited their products or services.



Conference attendees. There was a total of 118 attendees.