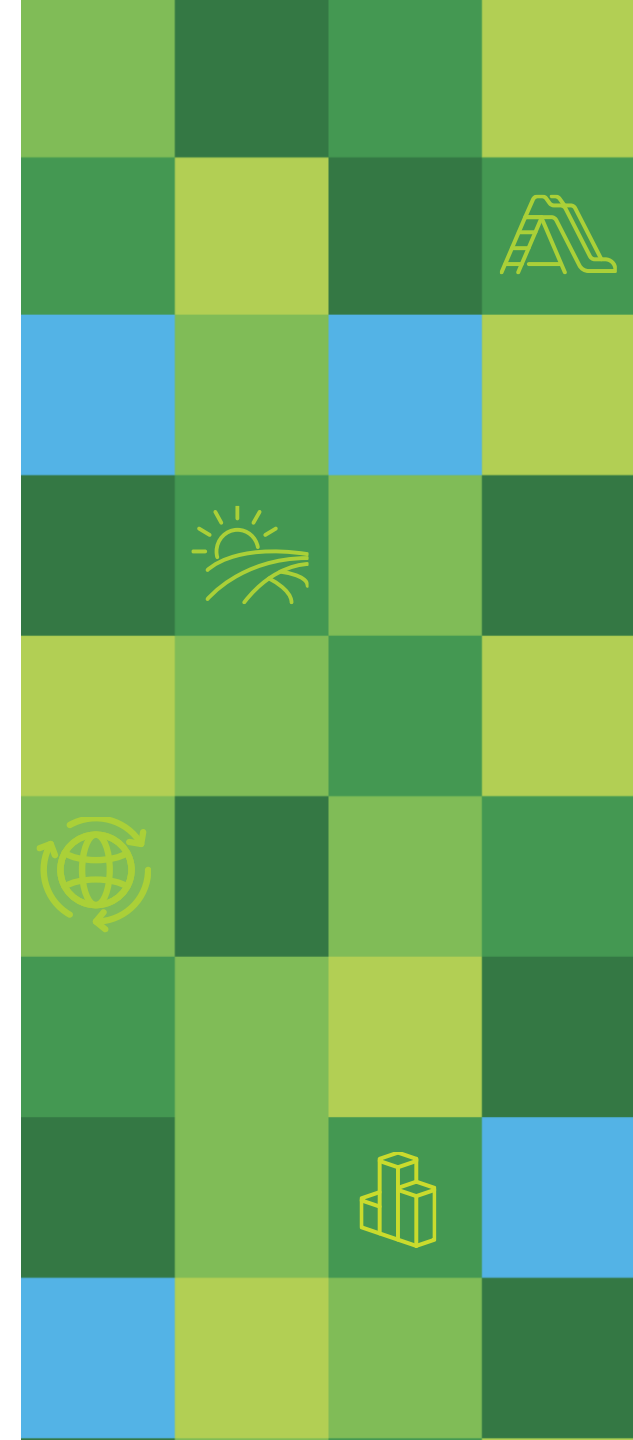




Treading New Ground: Emerging Best Practices in Tire Recycling

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Who is Liberty?

The only coast-to-coast full-service tire recycler. From picking up your old tires, to processing them, to manufacturing products you can buy in your local Walmart. We do it all.



#1 Safety Record in the Industry

#1 Only ESG Program in the Industry

60 Locations Across North America

53 States / Provinces Liberty Operates In

3BN+ Pounds of Rubber Diverted Annually From Landfills

- ★ Corporate Headquarters
- Collection / Processing Facilities
- Mulch & Molded Goods Facilities
- Regional / Administrative Offices

Why it matters—300M+ annually

Ubiquitous



Durable

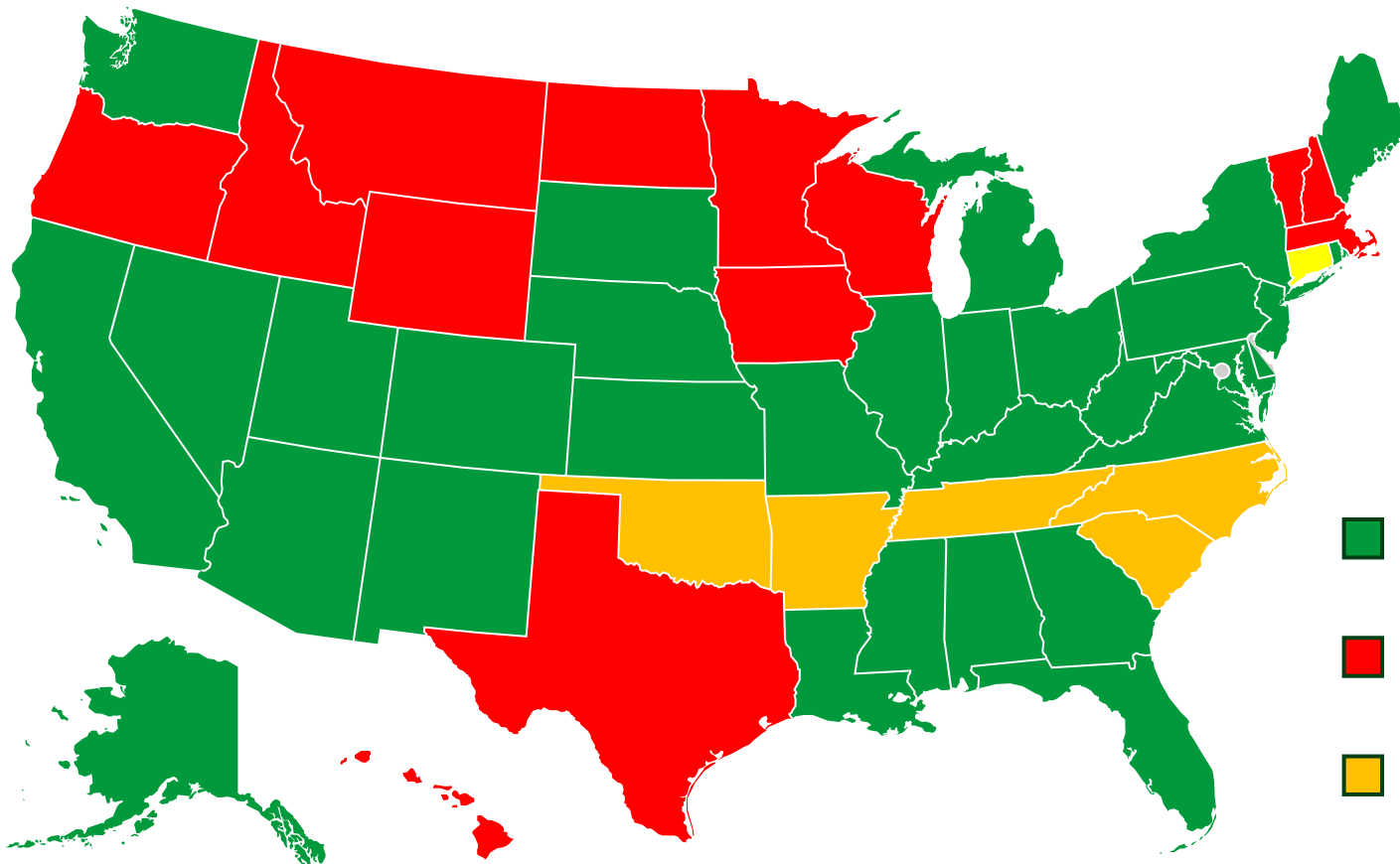


Difficult







Quick Primer On State Models





Despite the various state programs, the primary drivers of recycling in the U.S. are disposal rules and end markets.

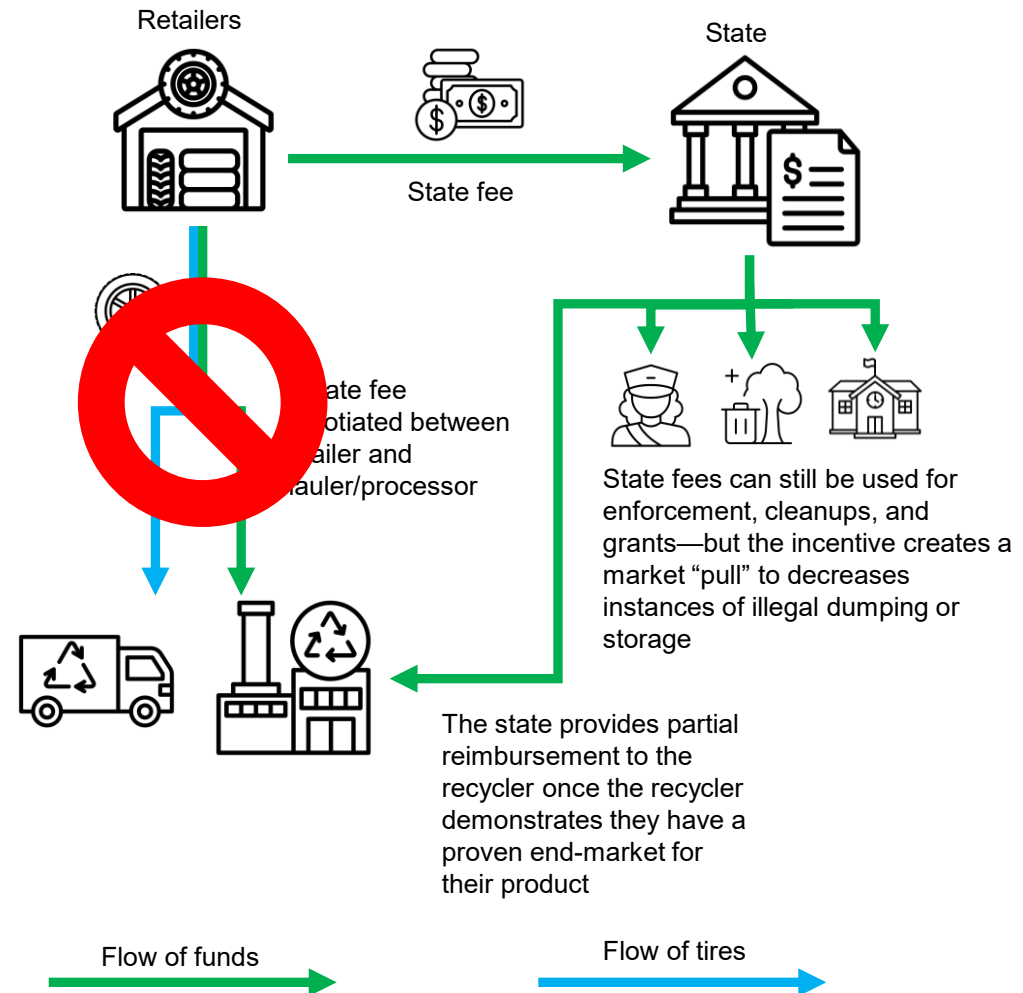
-  Market-based w/fee
-  Market-based no fee
-  Public-hybrid system
-  EPR pending

Louisiana is an incentive system

Market-Based With Incentives:

- In a market-based system with incentives, the tire fee does not pay for the cost of disposing of a tire
- Rather, the state fee incentivizes higher and better uses for recycled rubber products by providing a partial reimbursement
- For instance, crumb rubber will be reimbursed at a higher rate than tire-derived fuel
- The result is a system still driven by the free market, but the state is encouraging higher end recycling

Market System With Incentives



We've made huge progress on tires

1B+

Scrap Tires On The
Ground In 1990s

<48M

Scrap Tires On The
Ground In 2023

97%

Tires Managed

300M+

ELTs Each Year

44

States With Disposal
Rules

2nd

Highest Recycled
Product

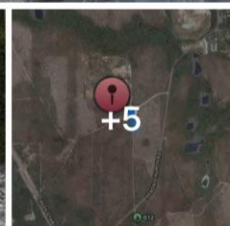
But we still have too much of this



Christy Phillips · [Follow](#)

May 13 · 🌐

This is a crying shame. Large loads of used tires littering our forest roads. OP states he is in contact with authorities about the site off west Aenon. Now 3 other sites have been reported. Those of us on the edge of our forest areas won't put up with this. 😞 If you can't afford to dump your tires, get out of the biz.



👍👎👤 You and 2 others

1 comment 2 shares

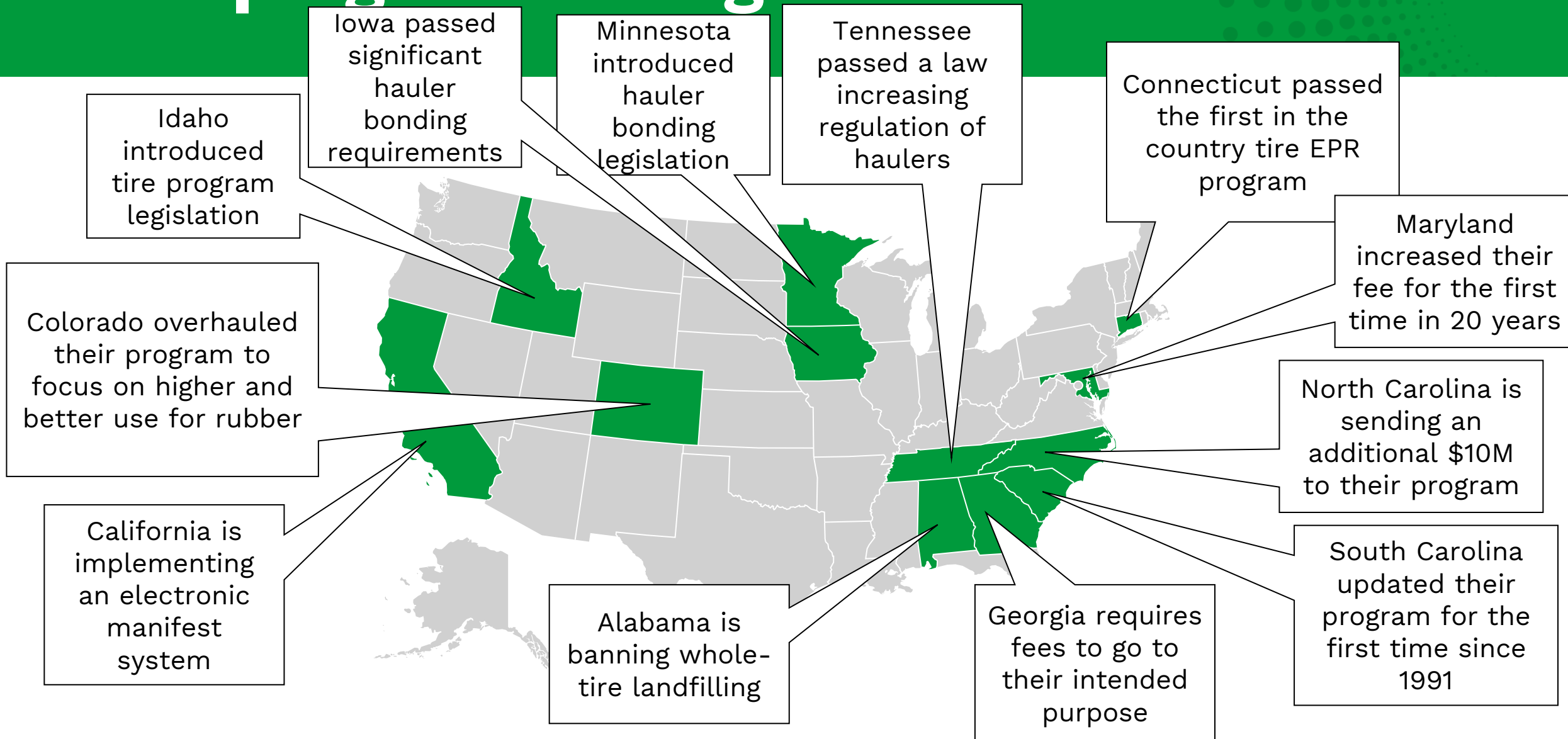
😞 Sad

💬 Comment

📧 Send

➦ Share

But progress is being made!



Taking On Illegal Dumping



Sources of illegal dumping



At-Home Mechanic

Impact: Infrequent, Small



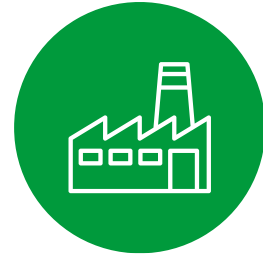
Low-End Hauler

Impact: Frequent, High



Unregistered Used Tire Shop

Impact: Frequent, Medium



Defunct Processor

Impact: Infrequent, High



Retail Theft

Impact: Frequent, Medium

Where do individuals take tires?



At-Home Mechanic

- Changes their own tires at home
- Does not have an easy or free way to dispose of them
- Abandons them or dumps them

Impact: Small



People like my friend Greg.

Policy Mechanisms

- Amnesty days
- Free drop-off for non-commercial sources
- Consumer education at the retailer
- Enforcement and penalties

Low-end haulers are too frequent



Low-End Hauler

- Sees “easy money”
- Undercuts on price
- Has no plan for recycling or disposal
- Culls resalable tires
- Illegally stores or dumps tires

Impact: High



Billy the tire hauler.

Policy Mechanisms

- High bonding requirements
- Disposal plan
- Storage permits
- Electronic manifests
- Proof of insurance
- State and local enforcement
- Penalties, including revocation of permit

Used tire shops are a black box



Unregistered Used Tire Shop

- Big difference between registered, legal operations and “cash only” operations
- Low margins, so cheapest disposal
- Either hires illegal haulers or dumps tires themselves

Impact: Unknown

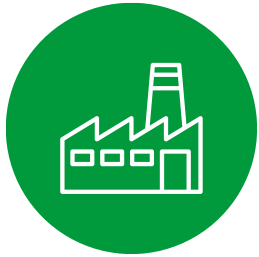


\$25 tires; cash-only; mounted using fire.

Policy Mechanisms

- General safety inspections
- Inspections to ensure disposal fees are being collected and remitted
- Education and posting of fees and requirements
- State and local enforcement
- Innovations at the local level like Baton Rouge and new tire permit

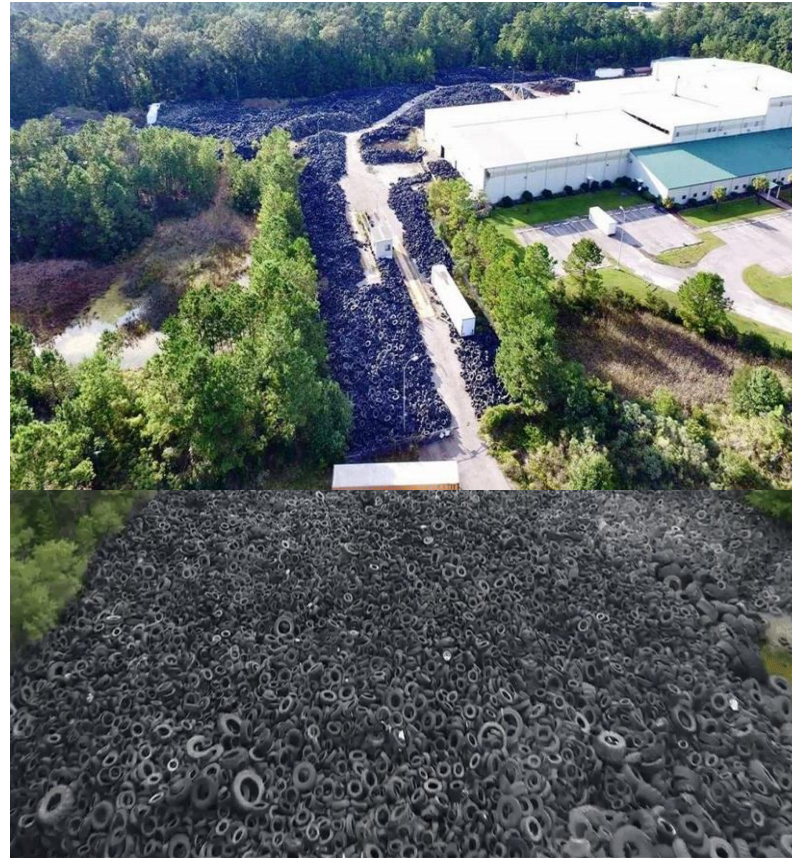
Processors failures are rare but big



Defunct Processor

- Shredding is the easy part
- End-markets are hard
- Takes in tires with no end-markets
- Eventually runs out of space or experiences a fire

Impact: Infrequent,
High



Startup funded in the name of bringing more competition to the market.

Policy Mechanisms

- High bonding requirements
- Disposal plan
- Closure plan
- Through-flow requirements
- Strict storage permits
- Fire safety and mosquito control requirements

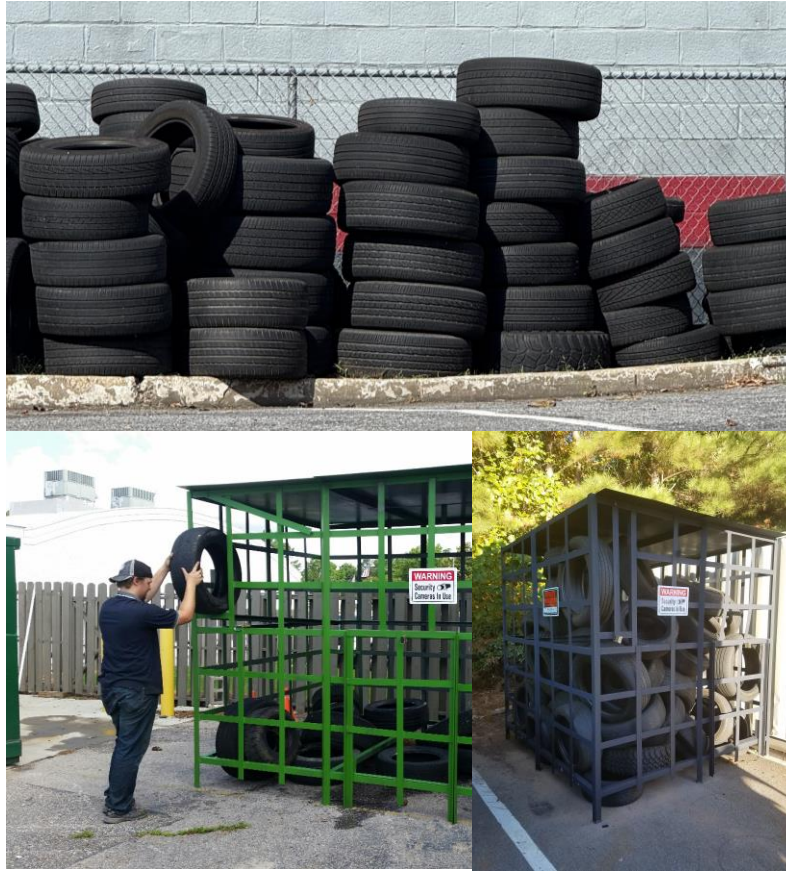
And tire retailers have thefts



Retail Theft

- Tires with some use left on them often get changed with end-of-life tires
- Thieves will steal tires from outside of retailers and dump the tires they cannot resell

Impact: Frequent,
Medium



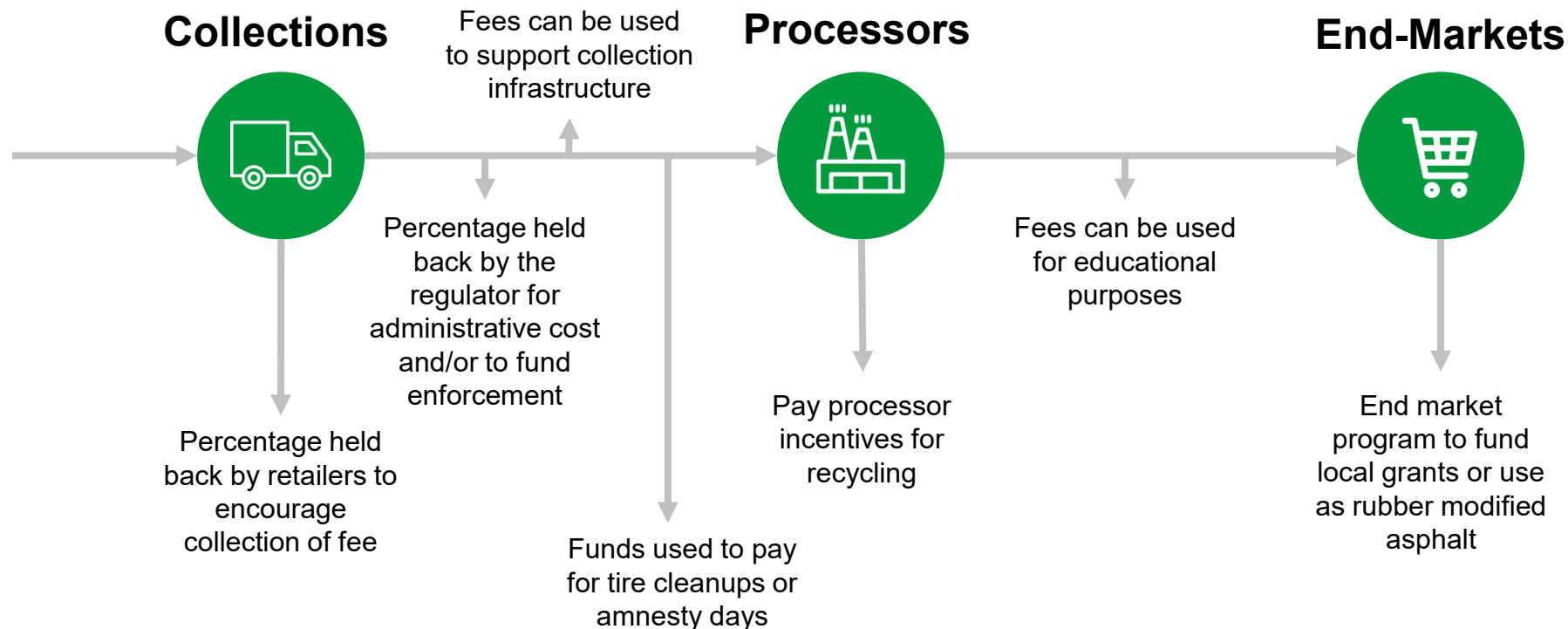
Storage vs. secure storage.

Policy Mechanisms

- Incentivize secure storage with higher storage limits
- Offer grants to help offset costs of secure storage
- Implement other mechanisms like manifests that make it harder to resell stolen tires

Tire-fees can encourage recycling and combat illegal dumping

State tire program fees, typically collected in the form of a fee per tire—and sometimes based on tire type and size—can support tires along their entire end-of-life journey from collections to recycling.



Health & Safety of Recycled Rubber



You have probably heard this...



Turf Wars: How Safe Are The Fields Where We Play?

"In 2014, I saw Amy Griffin's list. Five years before, the former U.S. women's national team goalkeeper and current University of Washington goalkeeper coach had started gathering a list of athletes who had played on crumb-rubber synthetic turf and had been diagnosed with cancer. She started the list when two goalkeepers she knew with lymphoma had suspected it may be from 'those black dots.' Then, other goalkeepers Griffin knew and coached were revealed to have cancer."

But did you hear this?



Investigation of Reported Cancer among Soccer Players in Washington State (2017)

“We found that the number of cancers among all soccer players reported by Coach Griffin **was less than expected given rates of cancer in Washington residents.** This was also true for the number of cancers among select and premier players and goalkeepers on the coach’s list”

“Thus, the Washington State Department of Health **recommends that people who enjoy soccer continue to play irrespective of the type of field surface.**”

You have probably heard this...



Senators Ask White House to 'Spearhead' Study of Crumb Rubber Turf

"In a Thursday letter to Obama, Sens. Bill Nelson of Florida and Richard Blumenthal of Connecticut said the possibility of a link between turf and cancer warrants more scrutiny, and asked for the White House to 'spearhead' a study that draws on the expertise of the Environmental Protection Agency, the Consumer Product Safety Commission and the Centers for Disease Control."

But did you hear this? U.S. EPA...

Feds declare turf, rubber playgrounds
'generally' safe



EPA and CDC release findings affirming safety of
synthetic turf fields with recycled tire crumb rubber

Study Confirms Crumb Rubber is Safe

- Study conducted by the U.S. EPA, CDC, and CPSC
- Looked at biological fluids from players—blood, sweat, and urine—before and after play on fields
- The report concluded there is little to no difference between measurements taken from players using fields with crumb rubber infill versus players using grass fields.

*“In general, the findings from the report support the premise that while chemicals are present as expected in the tire crumb rubber, **human exposure appears to be limited** based on what is released into air or simulated biological fluids.”*

Or this ten-year long risk assessment?



California EPA launched a study looking at the risks of turf using crumb rubber made from recycled tire rubber in 2015.

Notably, unlike the U.S. EPA study, **this was an exposure and risk assessment.** Specifically, California used the “worst-case” scenarios to calculate risk.

The results released in 2025 were conclusive.

“...**did not find any chemical exposures** associated with the turf fields **that would pose immediate (acute) health hazards.**”

“...long-term use of the fields **does not result in exposures to chemicals that pose significant non-cancer health hazards.**”

“...people using the fields were **not exposed to levels of chemicals that can cause harm** to childhood development or the male or female reproductive systems.”

“Cancer risks from the crumb rubber infill used in the artificial turf fields, on average, **are insignificant for athletes, coaches and referees...**”

Or these?

Netherlands Public Health study: Studied 100 Dutch playing surfaces that used recycled rubber granulate. "The uncertainty about playing football on synthetic grass with rubber crumb is gone," the KNVB said in a statement. "Footballers, parents, clubs and the KNVB can move on.

The signal is safe."

European Chemical Health Agency study: Studied safety for children, players and workers exposed to surfaces. "**Very low level of concern**" for players and workers.

New York State, New York City, and the State of Connecticut health agencies studies: collected air samples on synthetic and natural turf fields during use. The studies concluded that inhalation exposures resulting from playing on synthetic turf fields were insignificant, and **not different from inhalation exposures on natural turf fields.**

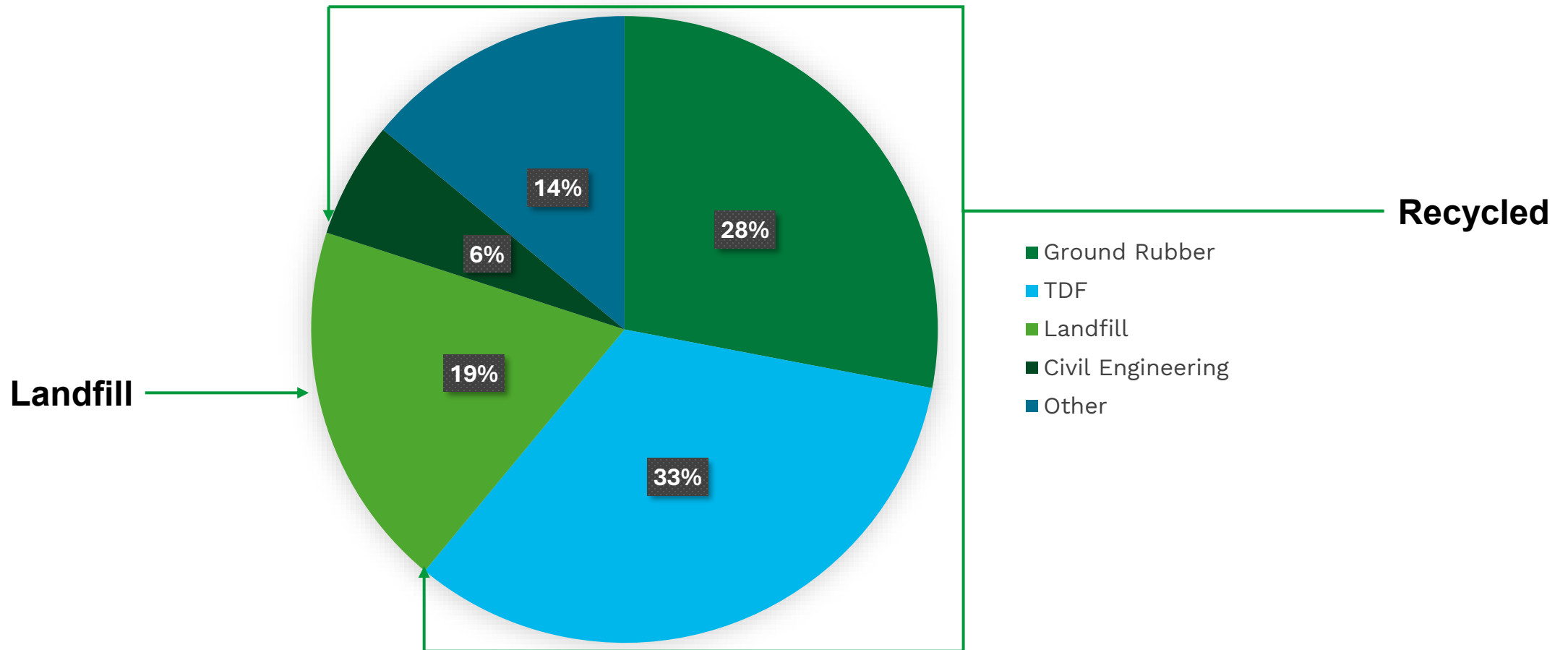
Italian major league study: found that inhalation **exposures resulting from playing on synthetic turf are negligible**, and that exposures associated with motor vehicle emissions in the areas near the fields during the same time period were about ten times higher.

Recycled Rubber Markets in the U.S.



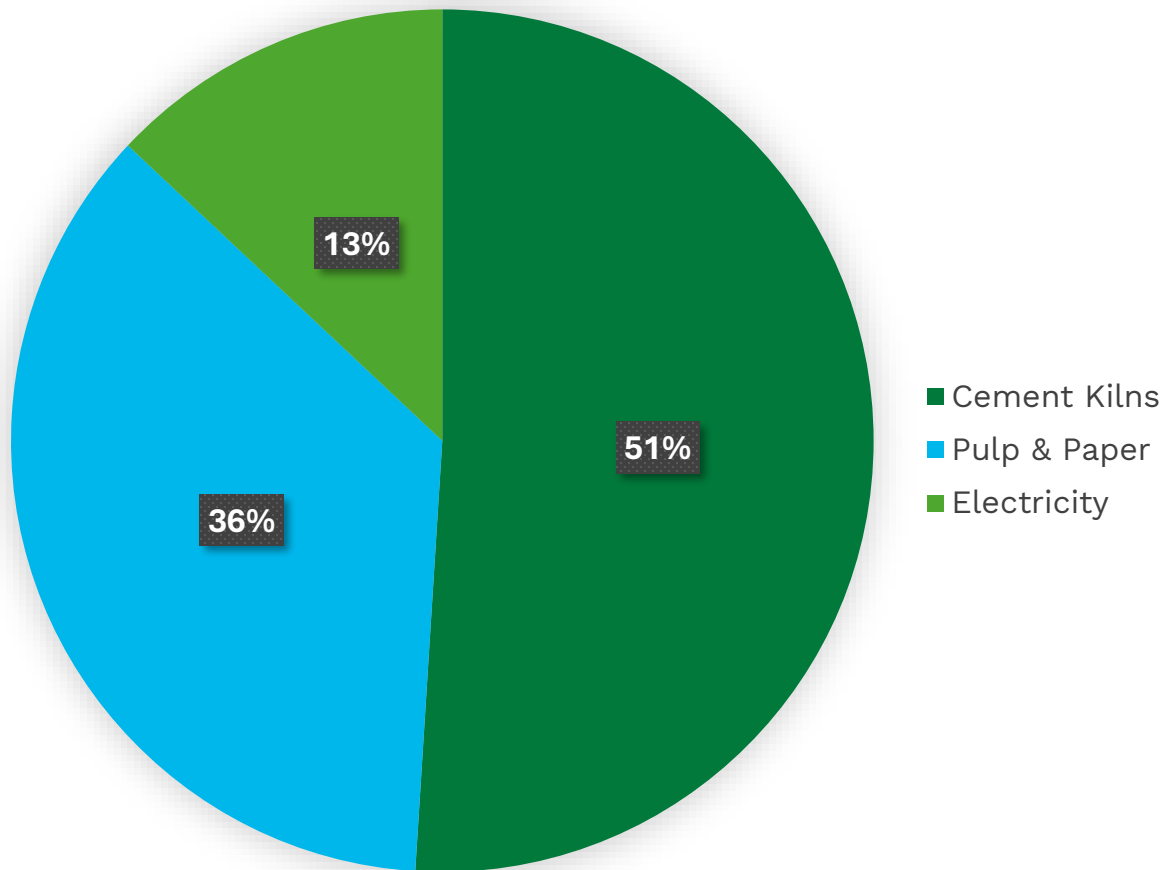
Recycled tires by destination

End-of-Life Tire Markets 2023



Tire derived fuel by market

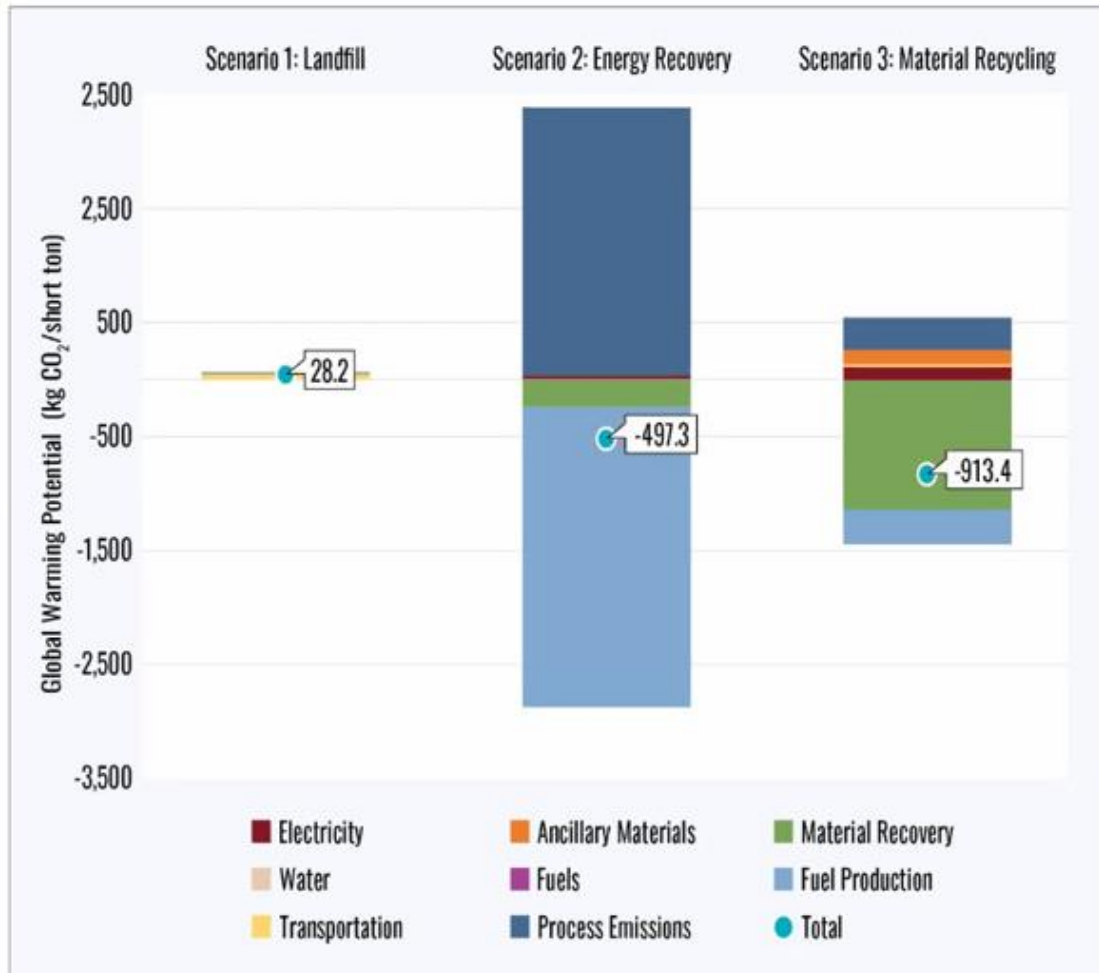
TDF Markets 2023



TDF Advantages & Markets

- High heat value
- Low bottom ash production
- Reduced GHG & Nox
- Production of clinker
- Complement to high-moisture, low-energy forest scraps

TDF Is A Low-Carbon Coal-Replacement



Tire-derived fuel is primarily used in cement kilns and pulp and paper facilities because of its high heat value and lower carbon footprint compared to coal and petroleum coke.

Some states recognize it as recycling, while others allow its use but do not consider it “recycling.”

TDF: Examples

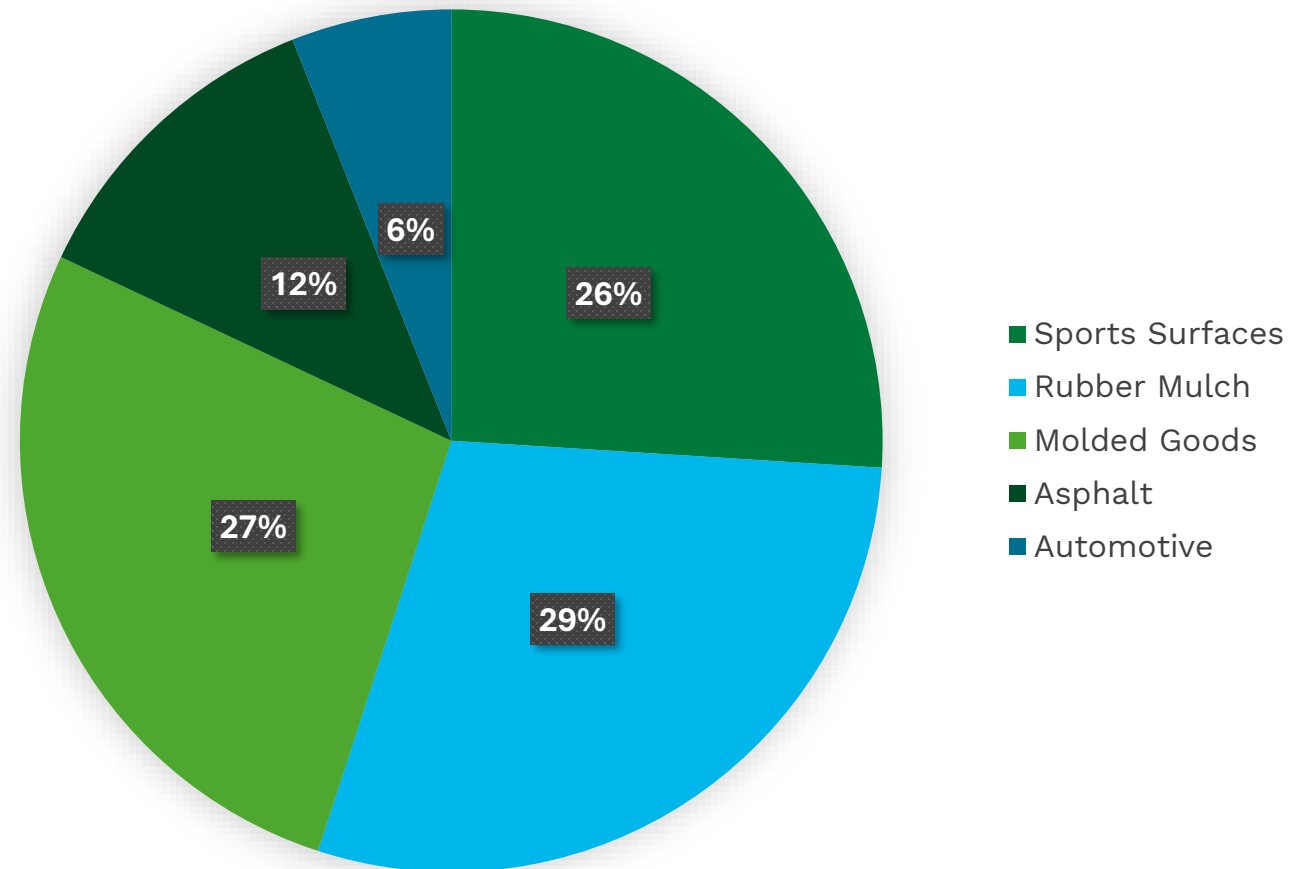


Ground rubber by destination

Ground Rubber Markets

- Track and fields
- Mulch for landscaping
- Mulch for playgrounds
- Poured-in-place surfaces
- Rubber-modified asphalt
- Flooring & tires
- Asphalt additive

Ground Rubber Markets 2023



Aggregate is infrastructure



Tire-derived aggregate (TDA) is made of shredded end-of-life tires and used as a sustainable and lightweight alternative to natural aggregate. The shreds can vary in size and are used as drain-fill material, backfill, permeable fill for infrastructure, and insulation.

10x
FASTER

TDA drains 10 times faster than soil.



1/3
WEIGHT

TDA weighs one-third of what soil does, lessening the stress on buried items.



Mulch is gardens & playgrounds

Lawn & Garden

Rubber mulch is a long-lasting, low-maintenance material for lawns and gardens that suppresses weeds, conserves soil moisture, and resists pest infestations. Made from recycled tires, it stays in place through rain and wind, rarely needs to be replenished, and does not decompose like traditional organic mulches.



Playgrounds

Rubber mulch's fall height rating is 16 feet—the highest of any loose fill on playgrounds, achieving a rating three times that of sand and twice that of wood mulch when the material is six inches deep. A product's fall height rating measures how far someone can fall without sustaining a potential life-threatening head injury.



Crumb rubber is playgrounds & turf

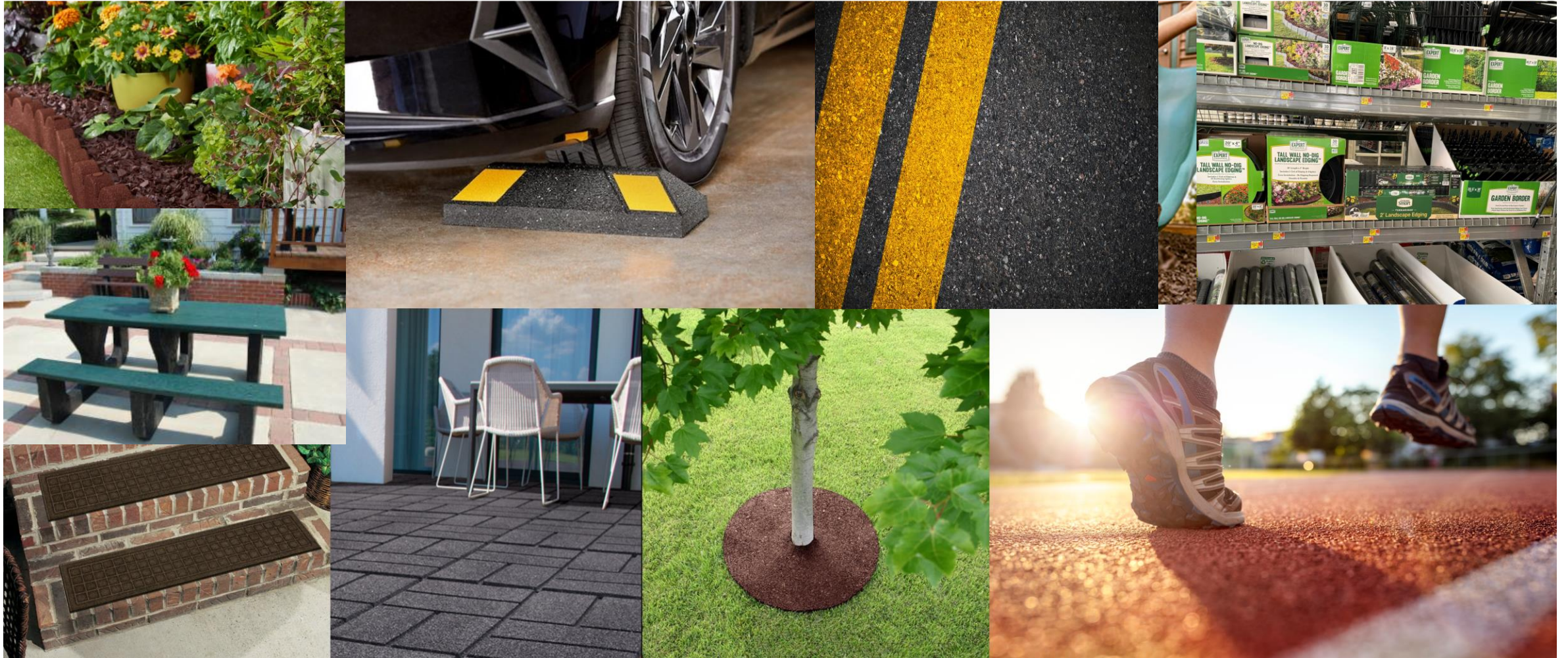


For sports infill, rubber is used in more than 80% of the synthetic turf fields nationwide. It drains more rapidly than any other infill product, dries quickly and is the most shock-absorbent infill material that can be used to protect kids and athletes alike from more serious injury.



For playgrounds, mulch is combined with a top-coat of EPDM rubber creates a smooth surface called poured-in-place (PIP). This nonslip, ADA-compliant surface is also widely used to create outdoor basketball courts, walking trails and other sports surfaces.

And in any number of products



Generally think of it as feedstock

Increasingly, crumb rubber is seen as an important manufacturing feedstock—not a final product itself.

As a result, we also supply manufacturers around the country with crumb rubber for flooring, construction materials, and rubber mats.



Closed loop investments are being made but need to grow

Pyrolysis

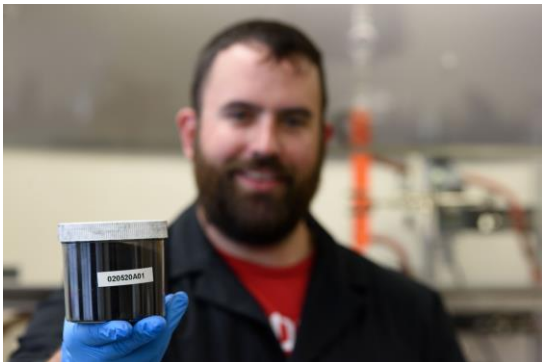
Companies that are making recovered carbon black and oil—90% less water and GHG emissions.



Bolder Industries



ECOLOMONDO



Devulcanization

Companies that use a mechanical or chemical process to make rubber pliable and reusable—supporting higher ratios of recycled material into new products.

PRISM
WORLDWIDE



Tyromer



Micronized

Companies that use cryogenic turbo-milling to transform scrap rubber into fine powders—able to replace petroleum polymers and fillers at lower emissions rate.

LT Lehigh
TECHNOLOGIES®



Final Thoughts



Local government is the front line

Even the best managed waste tire program is going to have some tires slip through the program.

Tire recyclers partner with local governments to collect tires from individuals and to clean up tires that are illegally stockpiled or dumped.



Industry needs to demonstrate solutions



These measures were initially designed to help fields meet European Union standards for reducing microplastic releases from crumb rubber infill. In testing done in Denmark, Sweden, and Spain, these measures have been shown to reduce infill microplastics release with results anywhere between 43% to 86% below the European limit (50kg annually).

We all need to invest in education



betterplaytoday.org/


The **better play** Initiative





About Resources Definitive Data Contact

Standing Up for Safe, Sustainable, All-Season Play

Get the facts on how communities can enable year-round activity, while protecting people and the environment.

[Learn more](#)



 100 Peer-reviewed studies confirm safety	 10x Higher utilization vs grass	 75% Lower maintenance costs	 220m Tires saved from landfills yearly
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