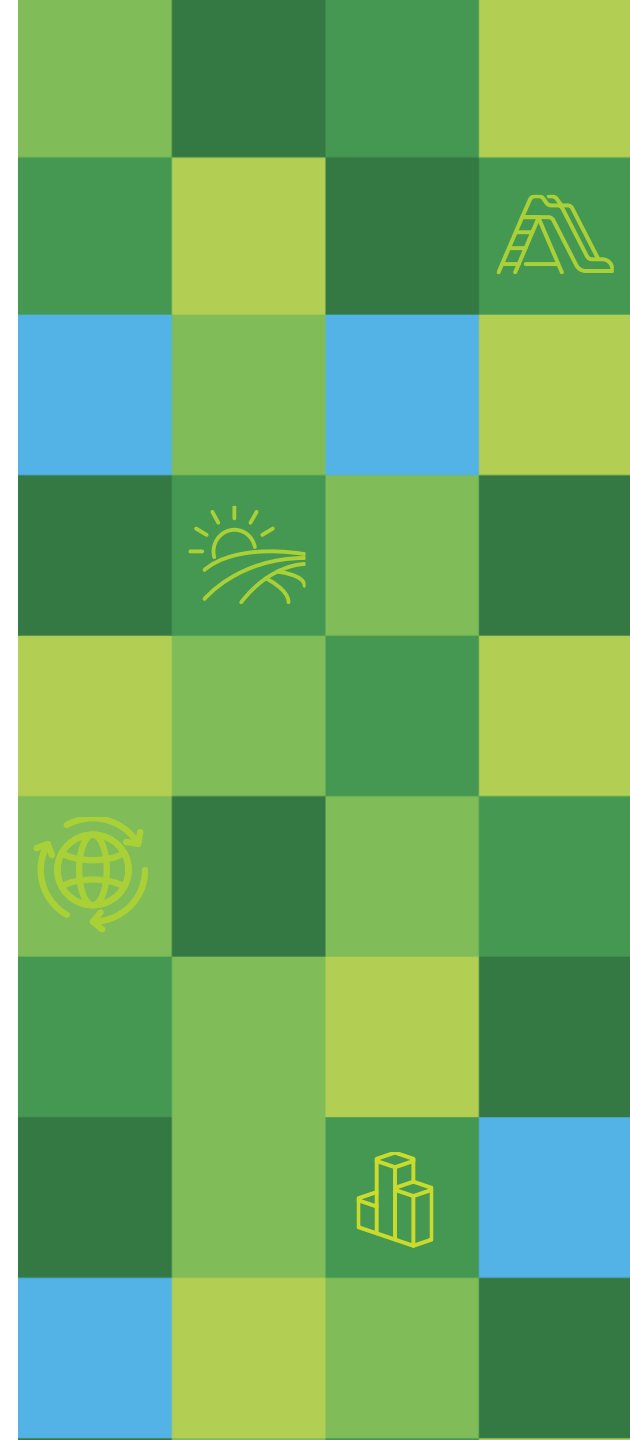




Keeping Pace With Tire Waste

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Why Is It Important?

- The U.S. produced 300 million+ end-of-life tires each year.
- Public solid waste officials ranked tires as #2 most difficult material to manage.
- The take up space, fire hazard, and host rodents and vectors.
- Decay very, very slowly if left to their own devices.
- And because we all use tires, they can end up anywhere...

Ubiquitous, Durable, Difficult

For Instance...

**In rural Maryland
(from a hot air balloon)**



**On the banks of the
Potomac River**



**And sometimes as
exercise equipment**



Despite dumping, tires are well managed

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

How Tires Are Managed



Solving for then vs. now

Control The Flow

- States did not know what to do with tires
- Tire fires were high profile
- Mosquito breeding ground
- Landfills restricting tires
- A billion tires on the ground

Higher & Better Markets

- 97% of tires are managed
- 80% of tires are recycled
- Still 874,000 tons to landfills
- Large but shrinking fuel market
- Diversification is key

From....To



How states handle tires

There is variation between state programs, but they can be categorized as follows:

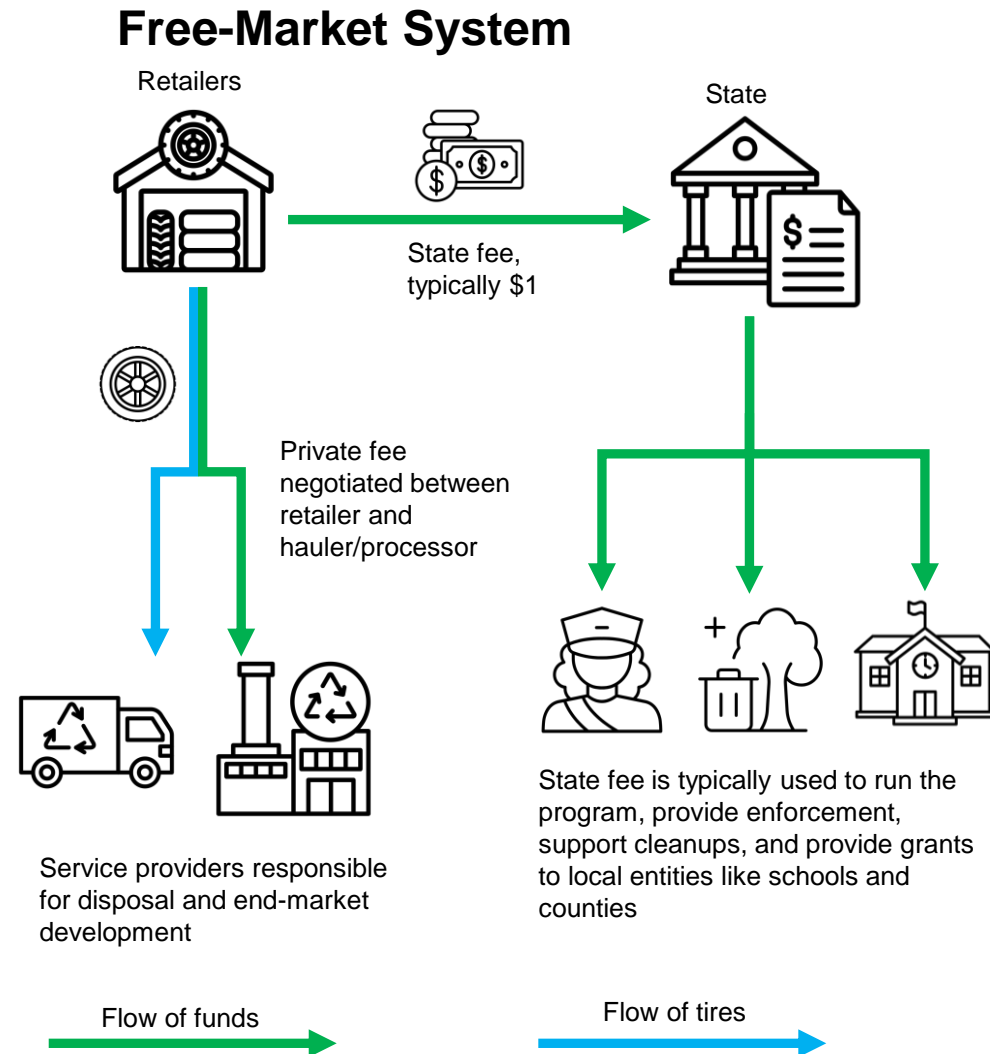
System	# Of States	Description
Free-Market with State Fee	24*	Private sector covers most of the costs; the state program supplements by providing funding for enforcement, cleanups, amnesty days, and grants.
Free-Market with No State Fee	14	Private sector covers most of the costs; costs for cleanups, etc. either come out of general revenues or are paid for by local entities.
Incentives Driven	7*	Private sector still covers most costs, but state uses incentives to increase collections and push more rubber to higher and better uses.
County Led / Public System	5*	Provides free state-wide disposal to decrease illegal dumping; counties sit in the middle of the system to ensure proper disposal. State reimburses counties based on a formula, but any excess costs are borne by the counties.

*indicates states charge a fee, regardless of model

Free-market model

Most States Operate Under A Free Market System:

- In a market-based system, the tire fee does not pay for the cost of disposing of a tire
- The state fee supplements the market system by providing funding for enforcement, oversight, and end-market grants
- Retailers and private-sector haulers and recyclers negotiate fees directly
- 36 states charge some sort of state fee ranging from 25 cents to \$5—with \$1-\$2 being the most common

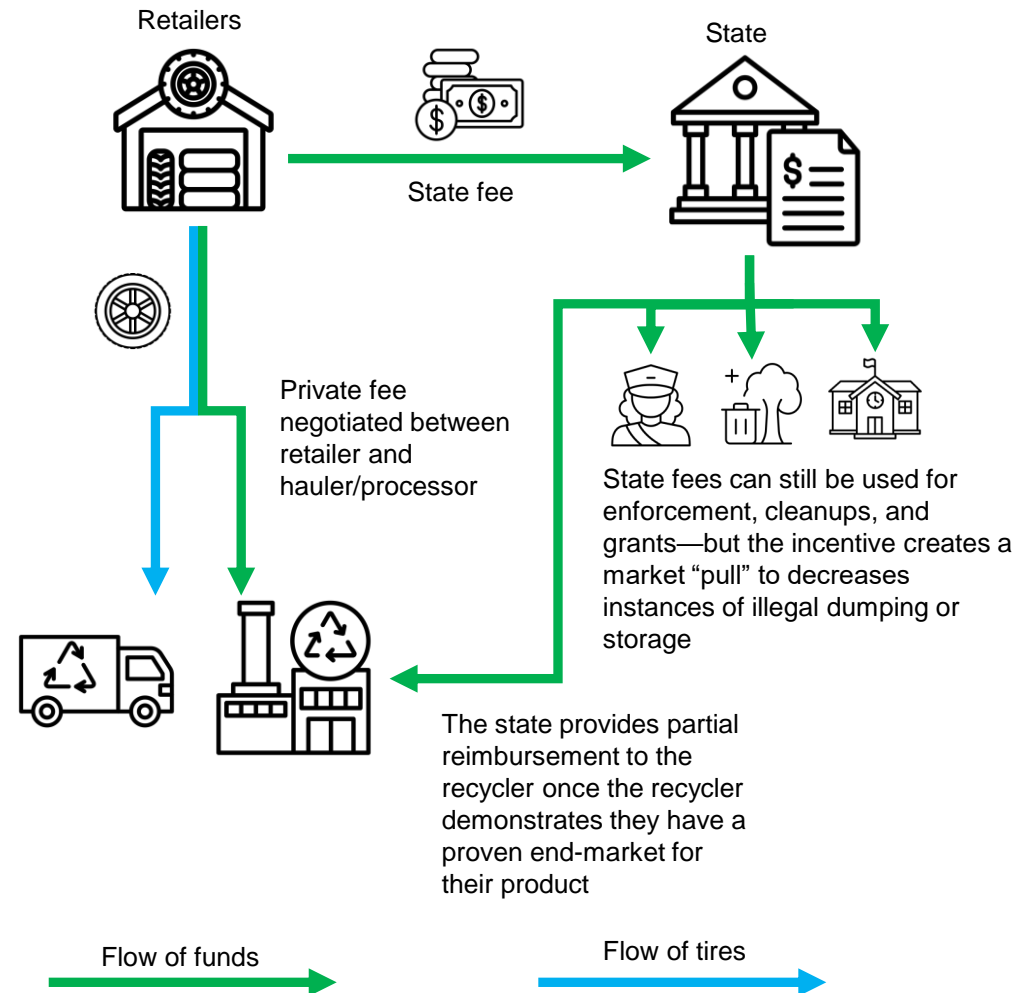


Incentive model

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

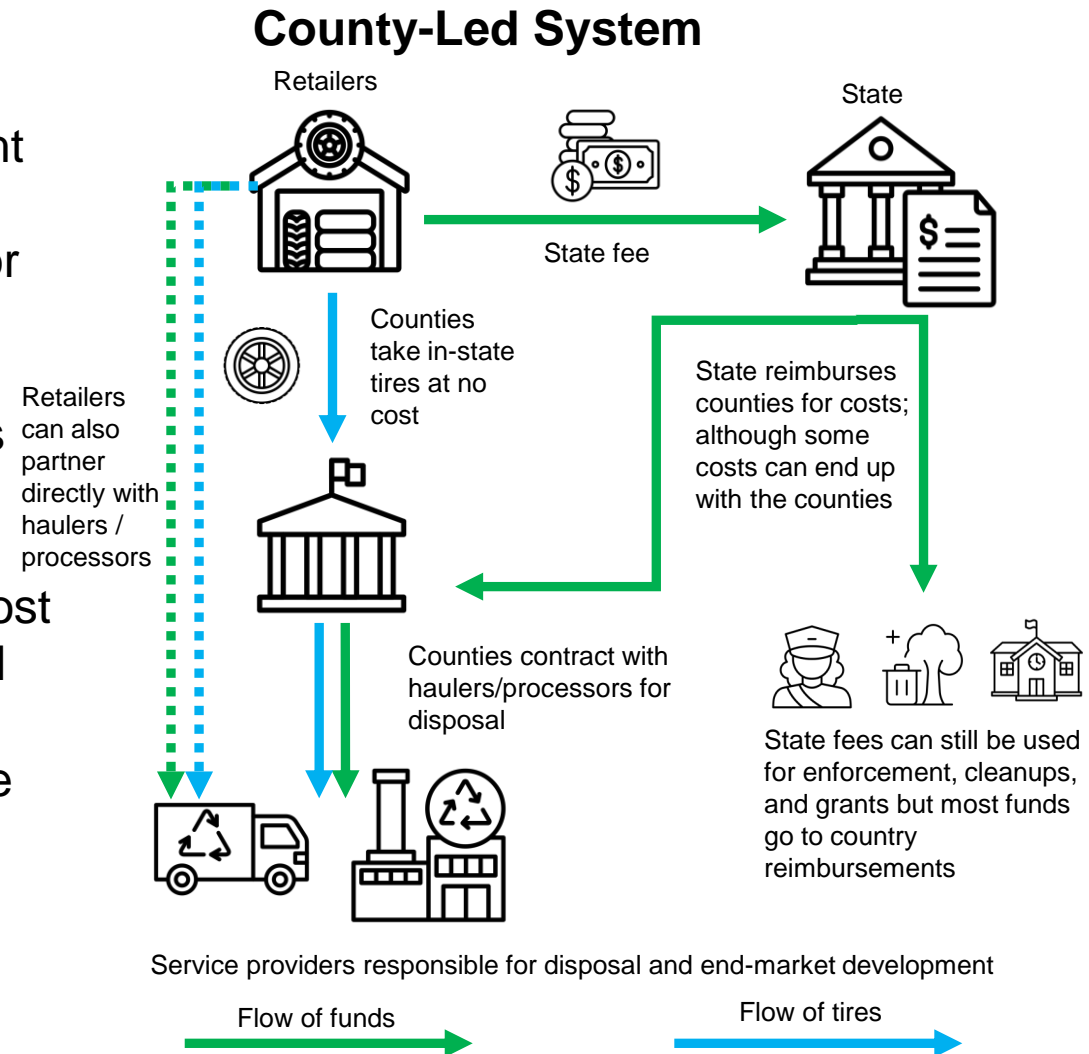
Market System With Incentives



County-led system

A Small Number Of States Operate A County-Led System:

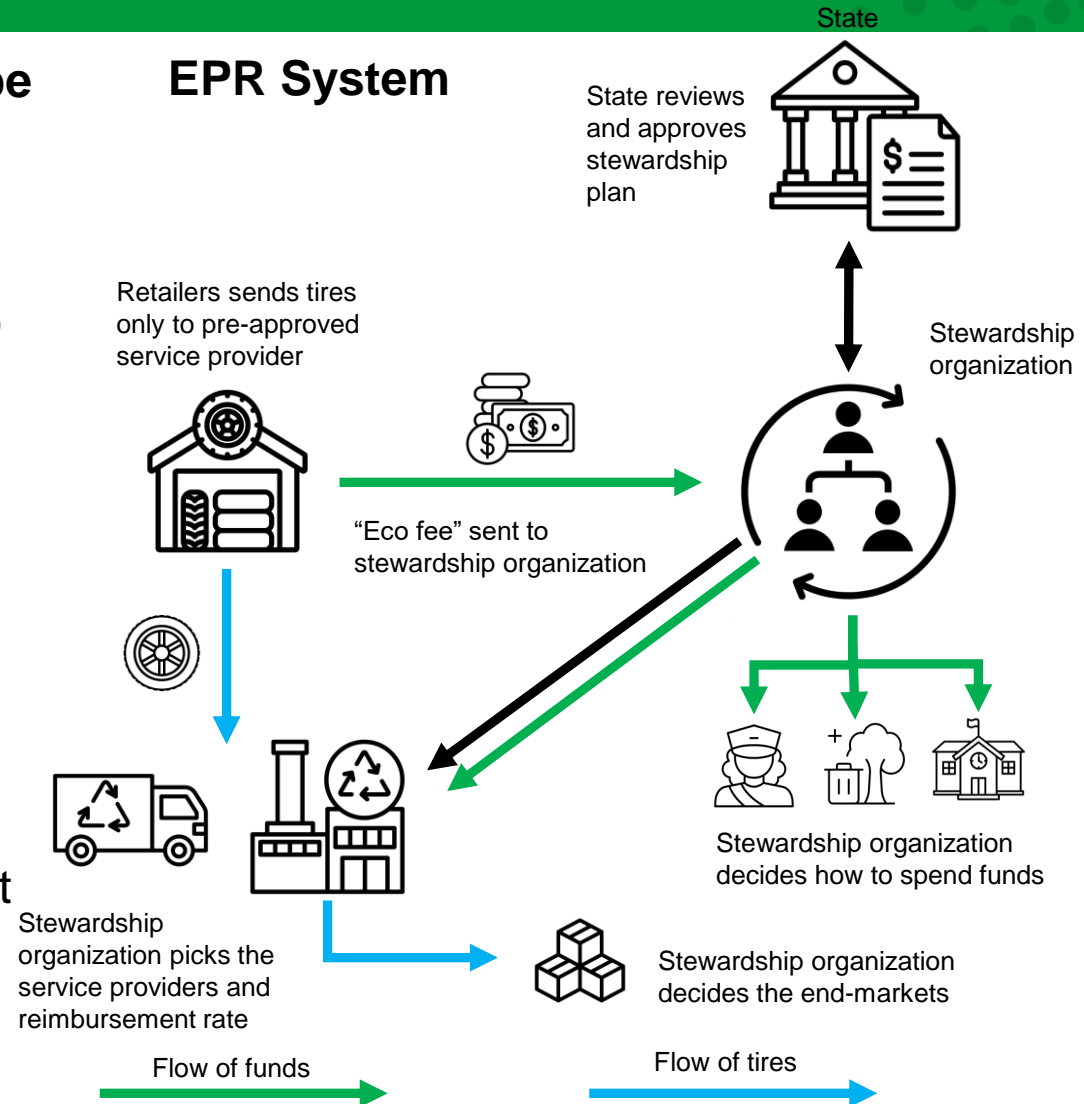
- This system can be best thought of as a public-private system
- The counties are responsible for establishing free drop off locations for tires but they contract with private companies to handle disposal
- The state uses the tire fee to reimburse counties, although cost overruns can end up being paid by the county
- This is the system in Tennessee and North Carolina



EPR system

EPR Is Primarily Found In Europe And Canada:

- EPR systems create a “stewardship organization” that has a legal monopoly over fees, service providers, and end-markets for tires
- EPR systems are good at collections but are not good at creating new end-markets for products
- The most successful tire EPR systems have high fees—\$6.50 for passenger tires
- Connecticut has passed, but not yet implemented, tire EPR

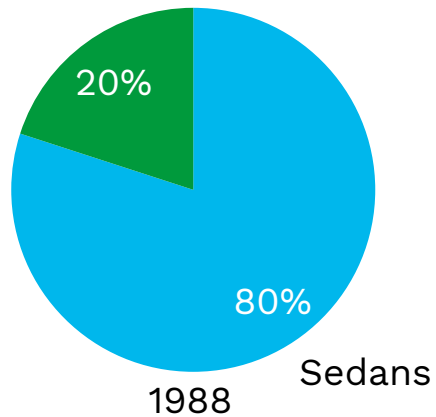


A lot has changed since the 1980s...

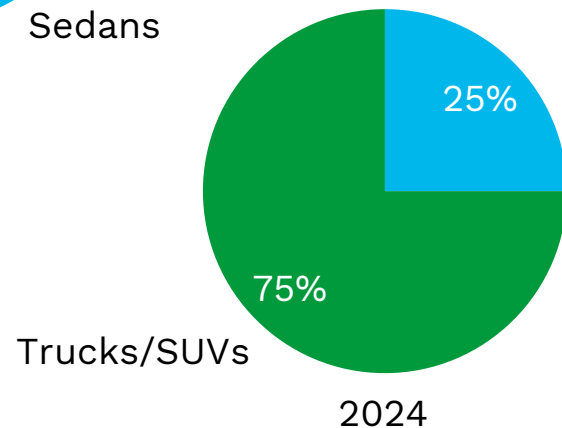


Including what we drive

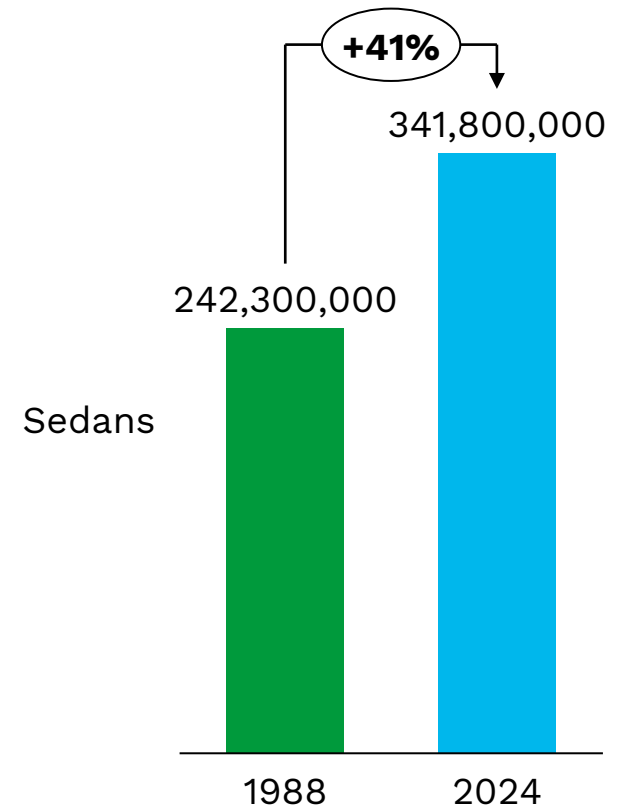
Trucks/SUVs



**Bigger Vehicles
On the road**



**Bigger
US Population**



But not our tire laws

Typically challenges

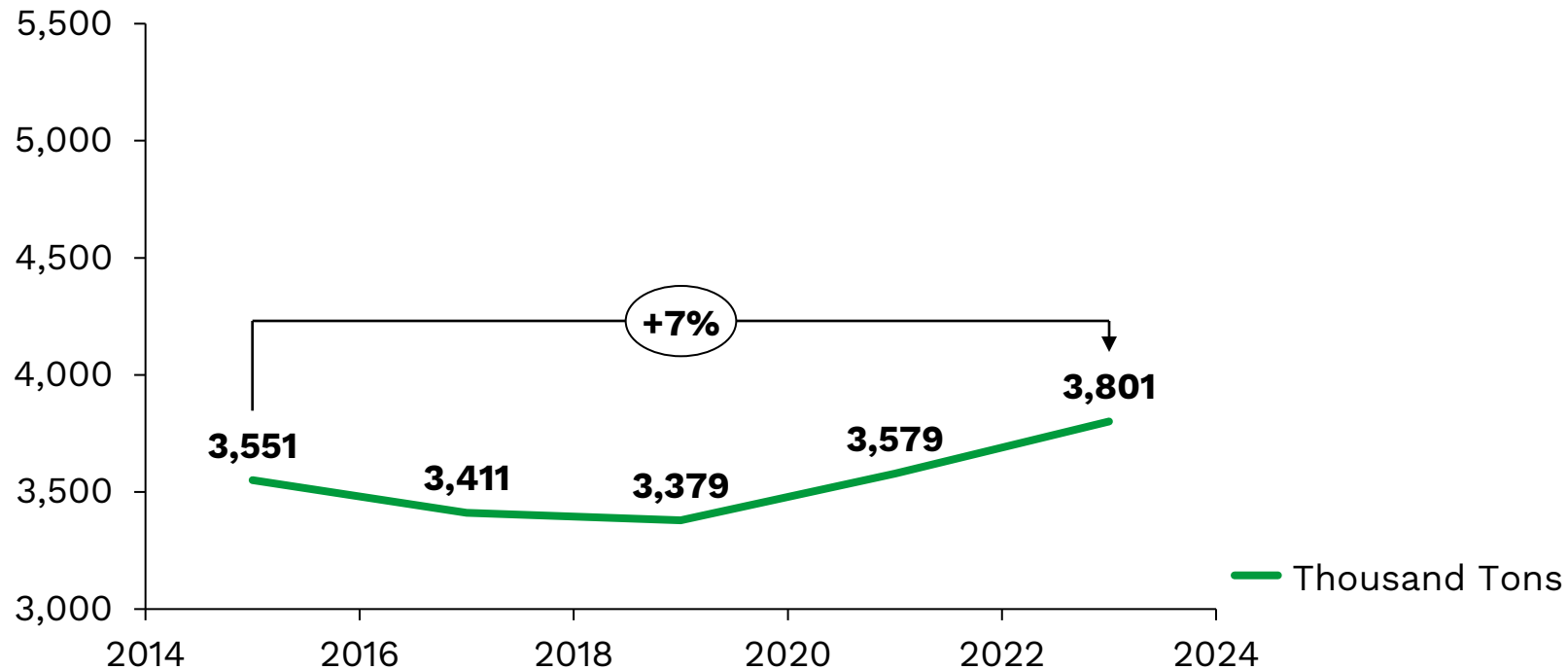
- Laws pre-dated the industry, so they were a best guess
- Laws were designed for flow, not higher use
- Most states collect tire fees but spend the money elsewhere
- Most state fees have rarely been adjusted.
- Most states have programs where it's too easy to operate without “skin in the game”

Where They End Up



What's the status of tire recycling?

End-Of-Life Tires To Beneficial Use



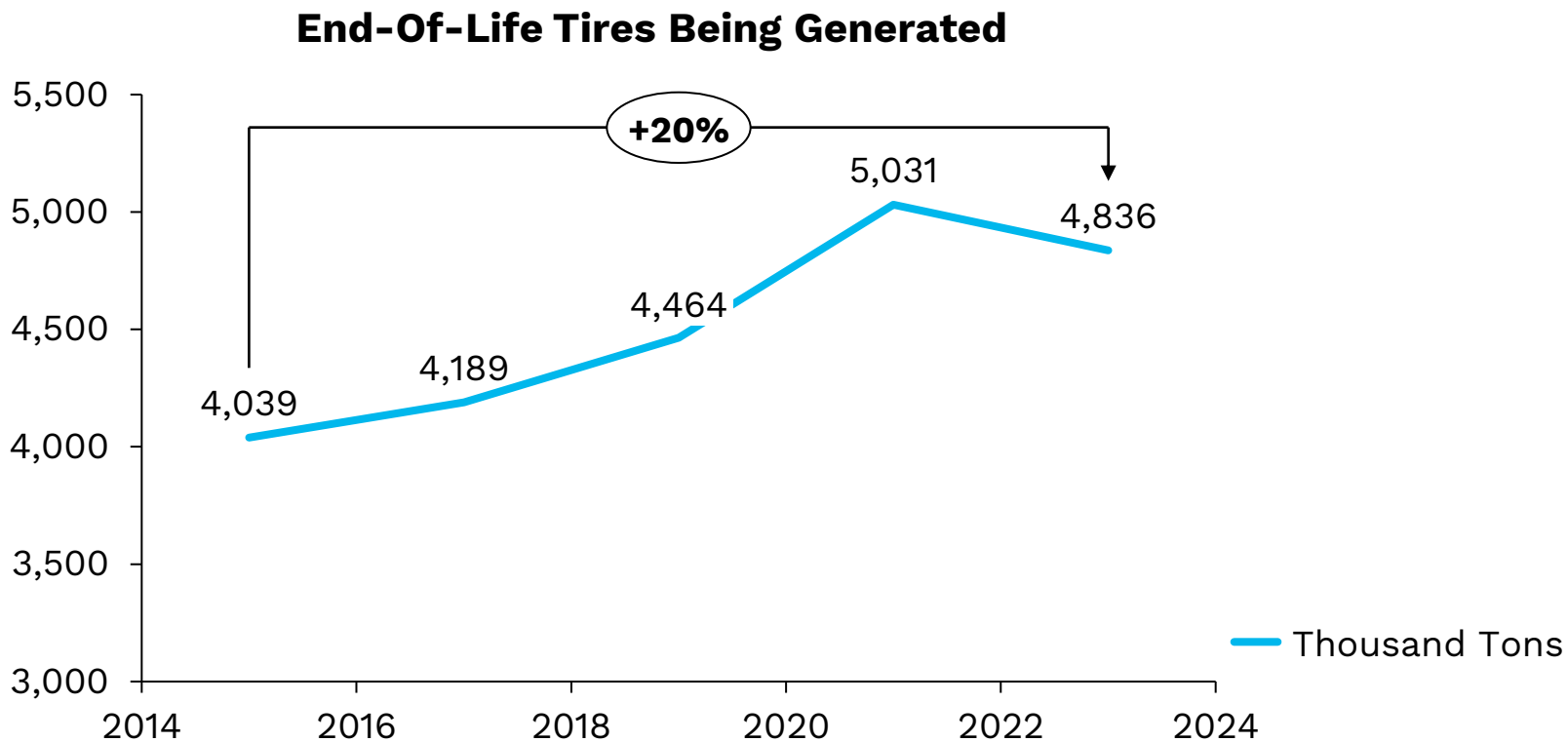
79%

Beneficial Use Rate

2nd

Highest Recycled
Product

So, what's the problem?



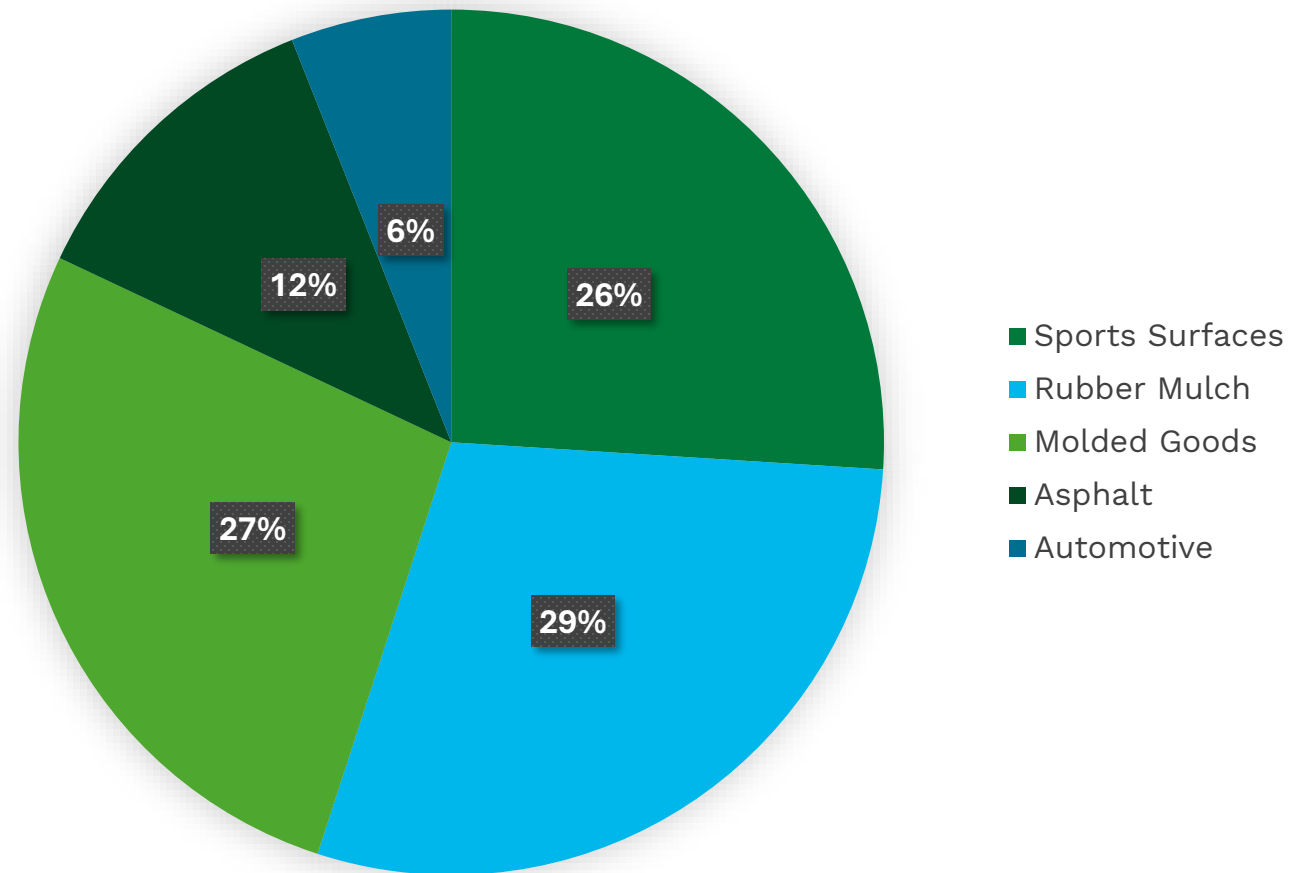
Despite progress—the number of tires coming off the road is increasing faster than recycling. Driven by more vehicles, heavier vehicles, and EVs.

Ground rubber by destination

Ground Rubber Markets 2023

Ground Rubber Markets

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

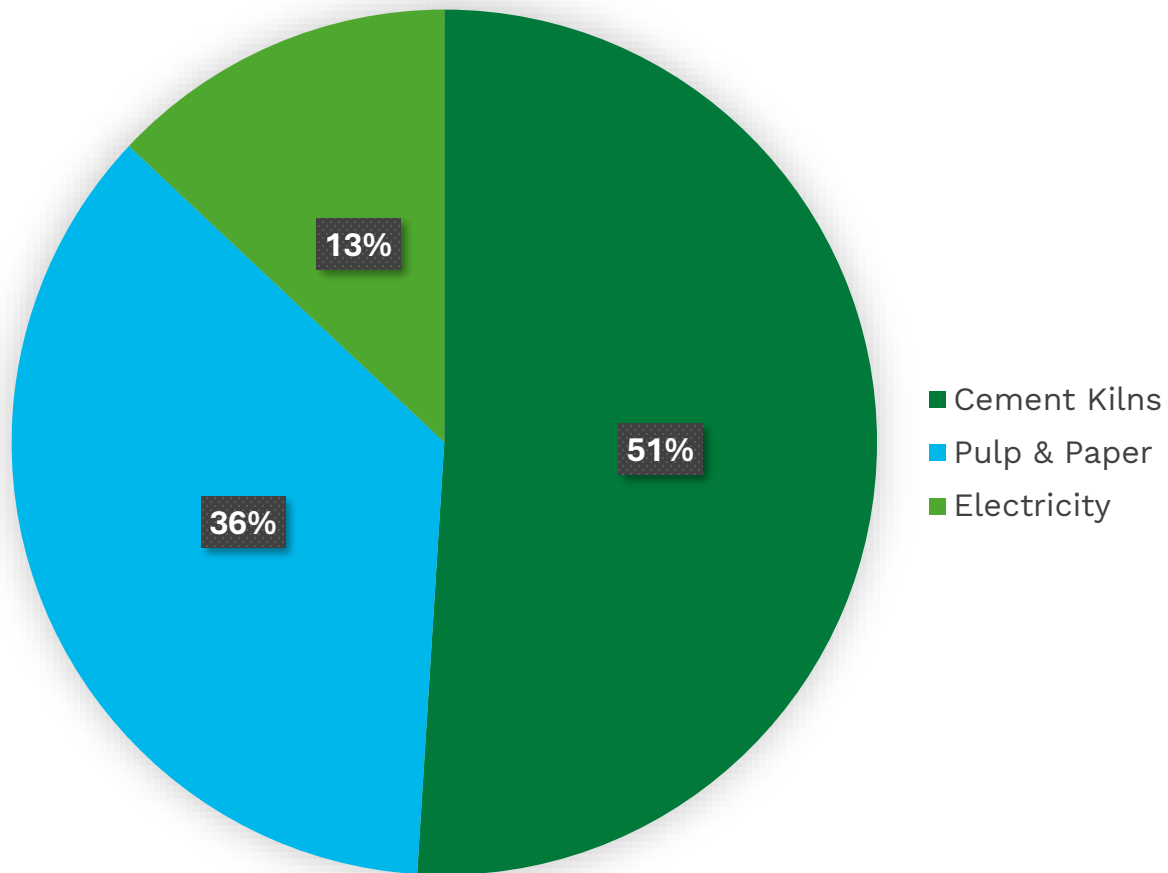


Ground rubber: what does it look like?



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

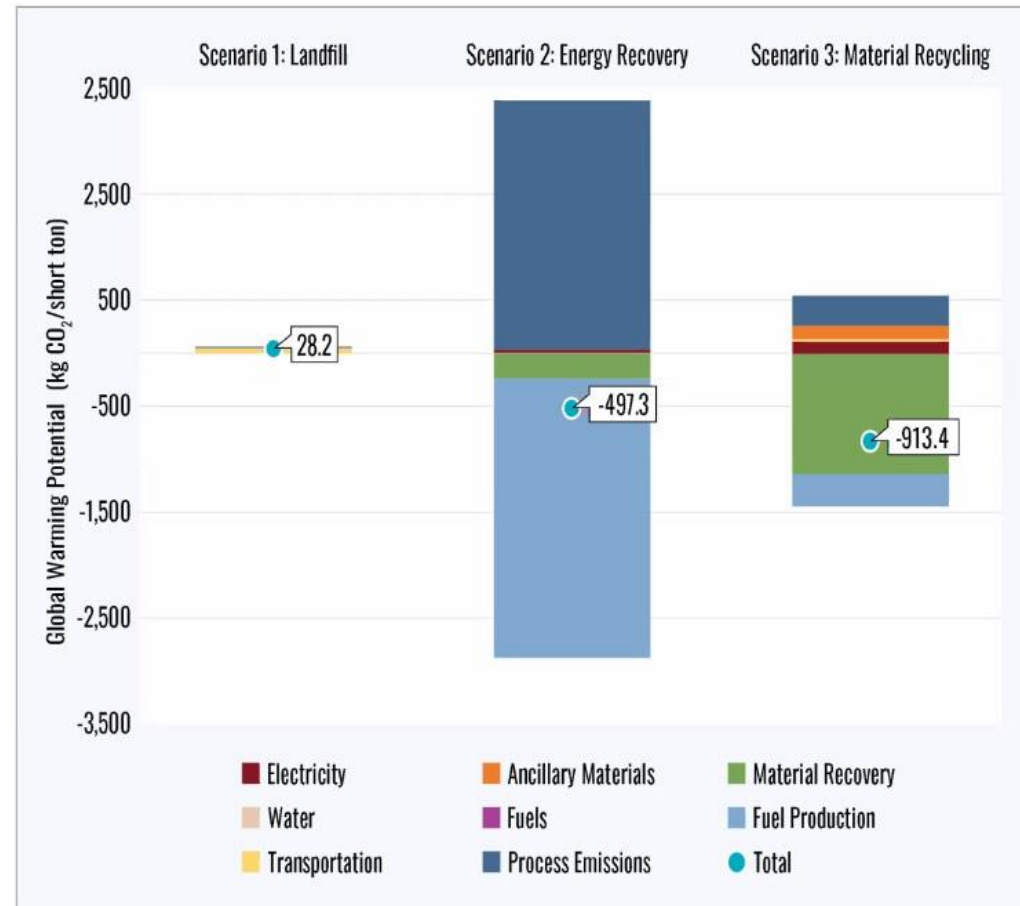
TDF: Examples



TDF: Emissions savings

Life Cycle Impact Assessment Results

- **Landfill** : Minimal impacts across most categories evaluated.
- **Energy Recovery**: High process emission but also high impact savings.
- **Material Recycling**: Process emissions for the material recovery pathway are a primary driver of gross impacts and energy consumption.



Recycling means investment and jobs

Waste into Wealth

All told, the U.S. rubber recycling industry is keeping more than 7 billion pounds of rubber, steel, and fiber out of landfills each year. In the process, it creates an annual economic impact of \$2.5 billion and supports 12,000 jobs nationwide.

U.S. System Strengths

Unlike Canada and Europe, the U.S. system is largely free-enterprise driven, so the risk falls on the private sector and, in the process, keeps costs low for consumers and business compared to other models while producing similar environmental outcomes.

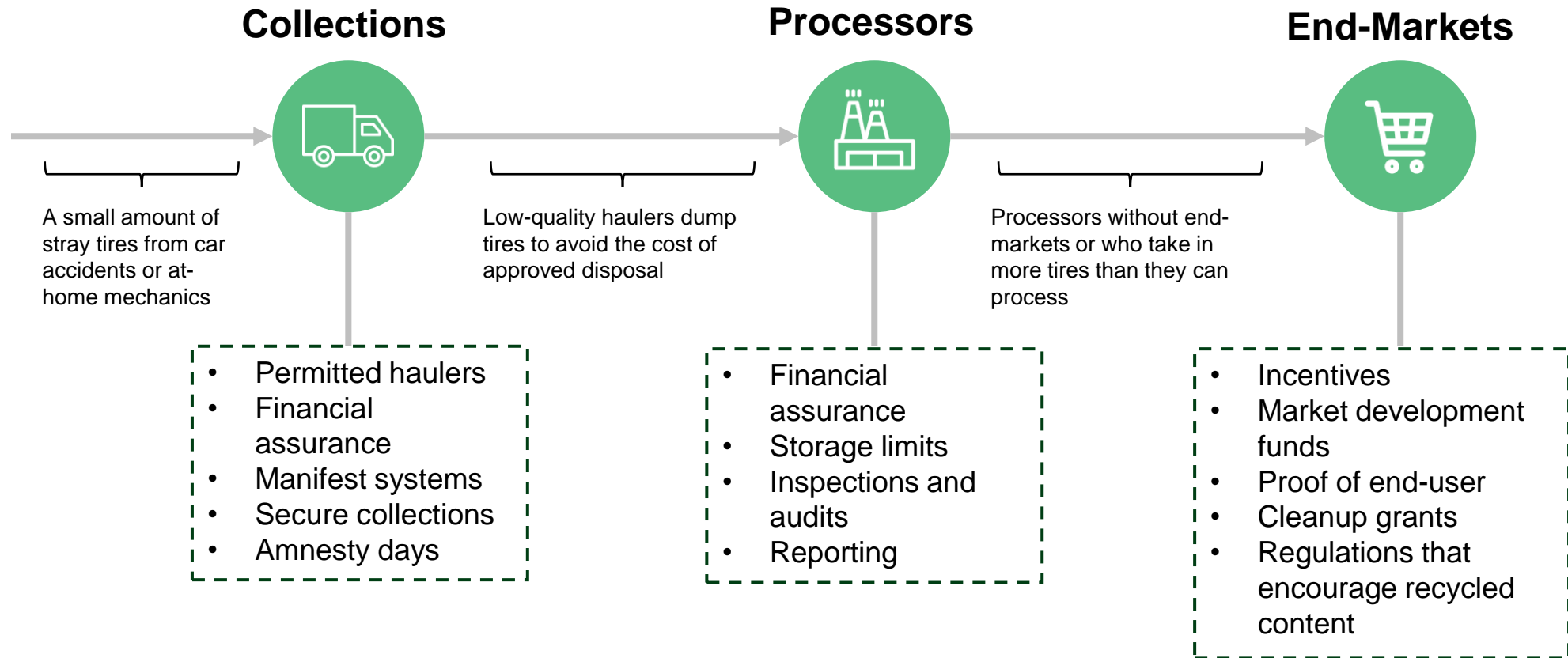
Why Illegal Dumping?



What is driving dumping?

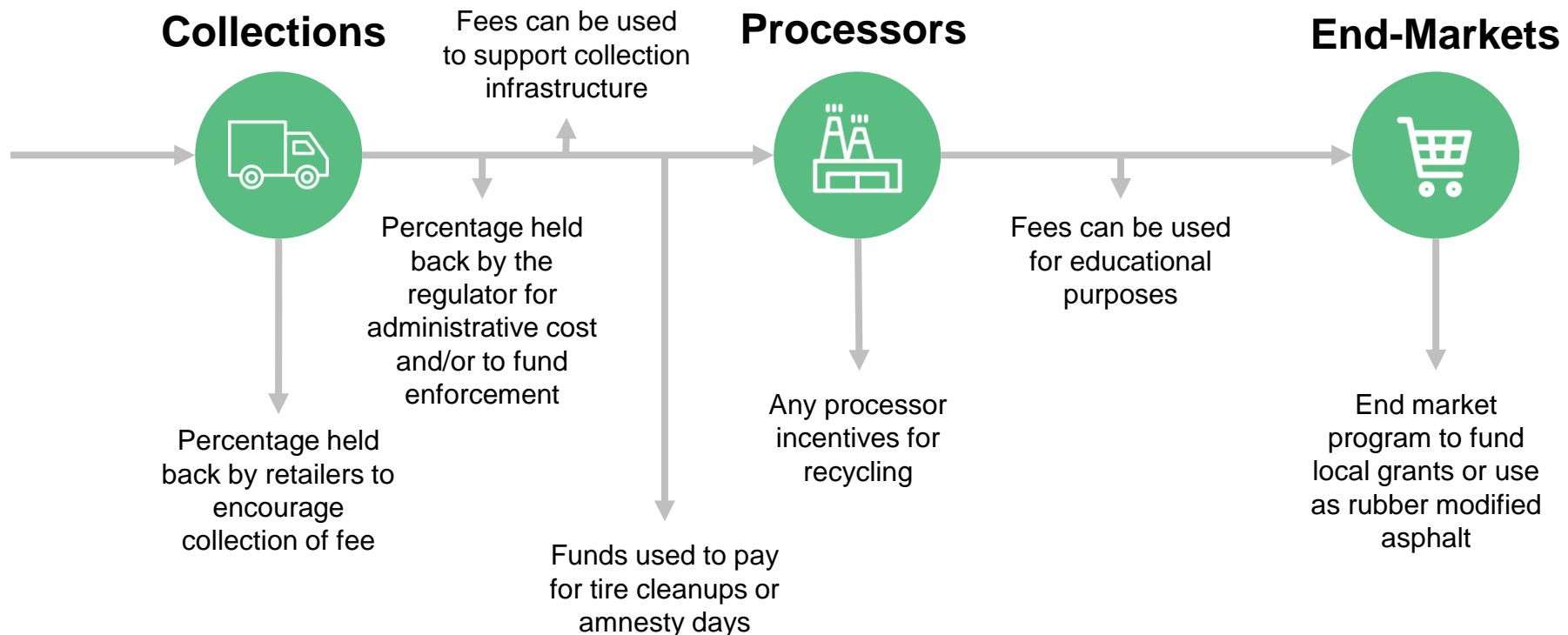
- There are a lot of them = 300M+ in the U.S. each year, so a 97% management rate still means 3% unknown
- Weak laws allow bad actors
- Agency resources are limited and might not have enforcement authority they need
- Paper manifests are ineffective
- Used tire shops are often operating un/under regulated
- Tires are difficult to transport so sometimes people are lazy... (illegal dumping is a problem in EPR as well)

But tire dumping can be targeted



And tire fees put to better use

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.



System Outcomes



EPR vs. market system

Tire Extended Producer Responsibility

Strengths:

- High recycling rate
- More transparency
- High-level of service and collections

Weaknesses

- Higher upfront cost to consumers
- Higher administrative burdens
- End-market challenges
- Legal monopoly means “all your eggs in one basket”

Tire Free Market Systems

Strengths:

- Minimal administrative burden
- Lower upfront costs to consumers
- Capital to develop new markets

Weaknesses

- Variable recycling rate
- No free disposal = barrier
- Lower transparency on pricing and outcomes
- Creates patchwork of rules

National level outcomes

European Union

- 3,123,353 tonnes
- 97% of tires recycled
- 55% material recovery
- 42% energy recovery
- Concerns about illicit exports and market restrictions

United States

- 4,387,145 tonnes
- 79% recycled
- 43% material recovery
- 33% energy recovery
- 19% landfilling
- 5% to exports
- Concerns about illegal dumping

Canada

- 438,297 tonnes
- 92% recycled
- 90% material recovery
- 2% energy recovery
- Concerns about number of PROs
- Concern about U.S. exports

Comparison: State / Province

European Union

- Country highs of 100% recycling rate—both EPR and free-market systems
- Country low rates of 75%
- Driving factors: markets and implementation

United States

- State highs of 99% recycling rate
- State lows of 50% recycling
- Driving factors: markets and disposal rules

Canada

- Province highs of 100% recycling rate
- Province low of 68% recycling rate***
- Driving factors: markets and governance structure

***There is a difference in definitions that have led to the PRO and CATRA coming to different conclusions on recycling rates.

Summary: The Details Matter

At the end of the day there are pros and cons to the different systems for managing end-of-life (ELT) tires.

Market-based systems, extended-producer responsibility systems, and hybrids systems have inherent strengths and weaknesses.

However, at the end of the day, the details matter. You can build a really great or really bad ELT system regardless of whether it is market-based or EPR-based.

Rubber Chemical Safety



U.S. EPA on recycled rubber safety

Federal Research On Recycled Tire Crumb Used On Playing Fields and Playgrounds

Background:

- Multi-agency federal effort
- Formed in 2016
- Last report issued in 2019
- Looked at exposure differences in players who used synthetic turf with crumb rubber and players who used grass fields



Findings:

- Reinforces the literature demonstrating recycled rubber is low-or-no risk
- Metals, chemicals, and air emissions findings were “not different,” “similar,” and “no differences”
- Endorses findings from other studies that found “playing sports on these fields is safe”
- States that although chemicals are present, any exposure is likely limited

EPA Report Finds No Significant Difference in Chemical and Metal Exposure Between Natural Fields and Synthetic Fields with Recycled Crumb Rubber

In April 2024, the Environment Protection Agency (EPA), in collaboration with the Centers for Disease Control and Prevention (CDC), the Agency for Toxic Substances and Disease (ATSDR) and Consumer Product Safety Commission (CPSC), released the largest tire crumb rubber study ever conducted in the United States.

The study explored chemical exposure levels associated with synthetic turf fields that use recycled tire crumb rubber, which is the same as other types of recycled rubber. The EPA found low chemical levels in athletes who regularly use synthetic turf fields. The report also found no significant differences in PAH (polycyclic aromatic hydrocarbon) levels between turf and natural field users, and no significant increase in metal exposure levels for turf field users.




Study Overview
The EPA conducted a study to assess the safety of synthetic turf fields using recycled tire crumb rubber. Researchers conducted biomonitoring on participants who regularly used synthetic or natural grass fields to determine chemical and metal exposure levels. Methods included questionnaires, air samples, urine samples, and blood samples.

Main Findings
The study found that the exposure to chemicals from recycled tire crumb rubber was minimal and comparable to natural grass fields. Key findings include:

Urinary PAH Concentrations	Metal Concentrations
<ul style="list-style-type: none">• There were no significant differences in pre- and post-activity urinary PAH concentrations between users of synthetic turf and natural grass fields.¹	<ul style="list-style-type: none">• There was no significant increase in metal concentrations in blood samples after field use,² and concentrations were similar to those in the general population.³ Exposures to zinc and lead are expected to be lower than background environments.⁴

Other Key Takeaways

- **Finds low chemical exposure levels:** Chemicals present in recycled tire crumb rubber are at low levels.
- **Determines turf comparable to natural grass:** The exposure levels for synthetic turf users are similar to those for natural grass field users.
- **Controlled for background chemicals:** Some detected chemicals originate from other environmental sources, not solely from the crumb rubber, indicating broader environmental exposure rather than field-specific risks. Metals (including lead)⁵ and PAHs are also often found in natural grass fields.⁶
- **Supports findings from previous studies:** The findings are consistent with earlier studies by the Netherlands National Institute for Health and Environment, National Toxicology Program, and European Chemicals Agency.



California on recycled rubber safety

California's EPA Synthetic Turf & Crumb Rubber Study

Background:

- Tough regulator
- Started in 2015
- Full risk assessment for all demographics related to turf and rubber infill
- Evaluated acute health, sensory irritants, reproductive health, cancer risk, and non-cancer health risks



Findings:

- Overall, this risk assessment study found no significant health risks to players, coaches, referees and spectators from on-field or off-field exposure to field-related chemicals in crumb rubber infill from synthetic turf fields based on available data. differences”
- Evaluated long-term use and “worst case” scenarios and found low concern.

Safety & Science Data

- ✓ 100+ peer-reviewed studies confirm safety
- ✓ Multiple international regulatory validations
- ✓ Comprehensive human exposure analysis
- ✓ Long-term performance verified

Appendix



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

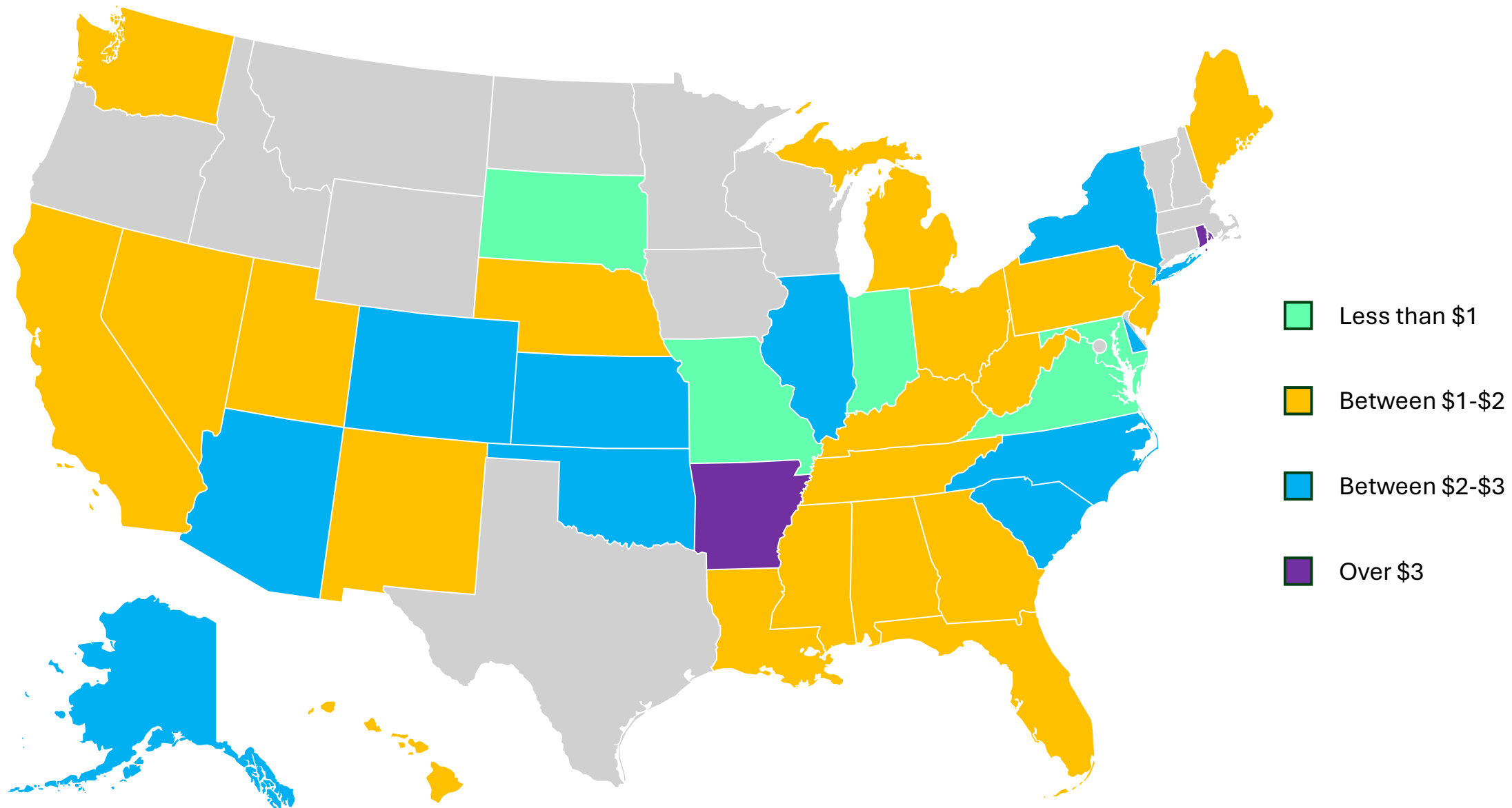
60 Locations Across North America

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

State Passenger Tire Fees



Registration and financial assurance

Purpose

- **Registration requirements:** 38 states require scrap tire haulers to register in order to ensure scrap tires go to authorized recycling or disposal facilities
- **Financial assurance:** 37 states require scrap tire haulers to provide some form of financial assurance in order to provide the state a mechanism for recouping costs if the hauler violates their permit

Example: Iowa

- **Registration:** *A waste tire hauler shall register with, and obtain a certificate of registration from, the department before hauling waste tires in this state.*
- **Financial assurance:** *The department shall require that a waste tire hauler have on file with the department...a surety bond executed by a surety company authorized to do business in this state in the sum of a minimum of one hundred fifty thousand dollars*

Manifest systems

Purpose

- **Manifest systems:**
Manifest systems require haulers to document tire movement from generation to final disposal or recycling. Manifests help authorities to track tire movements, identify discrepancies, and focus enforcement efforts to reduce illegal dumping.

Example: California

(c) The following persons and entities shall comply with the Waste Tire Manifest System:

- (1) waste or used tire haulers when hauling any amount of waste or used tires at any one time with a registered vehicle;*
- (2) waste or used tire generators;*
- (3) Federal, State, and local governments when hauling 10 or more waste or used tires at any one time;*
- (4) any person hauling 10 or more waste or used tires at any one time for agricultural purposes;*
- (5) exempted common carriers when hauling 10 or more waste or used tires at any one time;*
- (6) a facility when accepting 10 or more waste or used tires at any one time;*

Storage, reporting, penalties

Purpose

- **Storage limits:** Provide an exemption below a certain number of tires for legitimate tire generators (retailers, retreaders, etc.)—recognizing the need for legitimate businesses while not providing a loophole for people diverting tires to illegal disposal
- **Reporting:** Require haulers to submit annual reports to the state for enforcement and oversight purposes.
- **Penalties:** Violation of registration rules involves some combination of civil penalties, denial of registration, and bond forfeiture if illegal dumping has occurred

Example: Ohio

- Ohio provides specific exemptions from tire storage permits for retailers, salvage yards, manufacturers, and tire retreading businesses

Example: Texas

- *Scrap tire transporters, as well as owners or operators of scrap tire facilities and scrap tire storage sites, must submit an annual report to the TCEQ and include information related to their tire management activities during the calendar year.*

Example: California

- Provides tiered offenses with fines starting at \$1,000-\$3,000 and increasing based on number of offenses and number of tires involved

Cascading requirements

Purpose

- **Minor Waste Tire Facility Permit, Rather Than Exempt:** Outside of specific exemptions (type of business and minimum number of tires), some states require collection-only sites to register with the state, with cascading requirements based on the number of tires stored on location. The intent is so that tires can be tracked for proper disposal, sites are maintained in a way that supports public health and safety, appropriate bonding requirements can be applied, and sites are subject to inspection to ensure they are not violating their permitted use. Any form of processing, including baling, is regulated.

Example: Michigan

- All sites above 500 tires must register; additional requirements for sites above 2,500 tires; additional requirements for sites above 100,000 tires

Example: California

- Requires permits for all sites above 500 tires but distinguishes between minor (up to 4,999 tires) and major waste tire facilities (5,000 and above)