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# Future Tire Technologies & Managing Processing Challenges

**What it feels like to be a presenter whose company is extremely cost conscious on marketing following a machinery manufacturer with huge marketing \$**



$$R = f(T^2 + E^2)$$

Recycling is a function of:

Technology (tire manufacturing and tire recycling)

&

Economics (markets and costs)

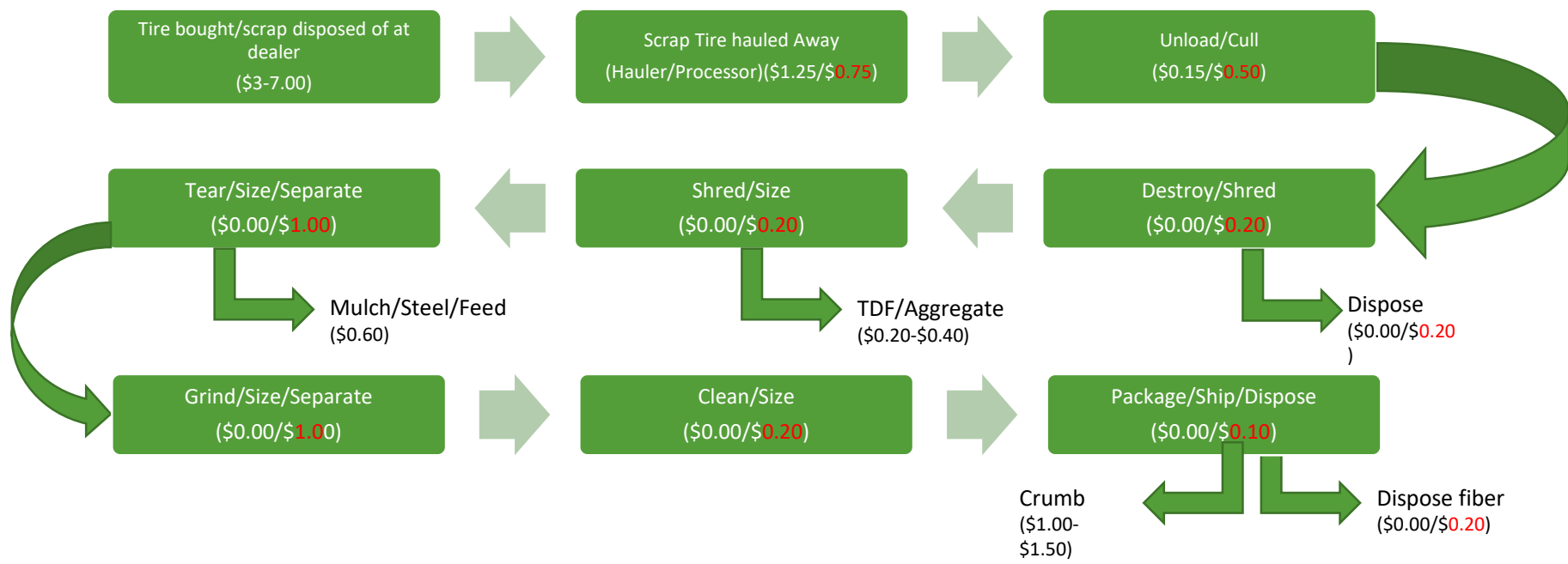
**Recycling in US (per EPA)**

<b>Ferrous:</b>	<b>51%</b>
<b>Glass:</b>	<b>33%</b>
<b>Plastic:</b>	<b>25%</b>
<b>Paper:</b>	<b>65%</b>
<b>Tires:</b>	<b>&gt;80%</b>

# General Challenges in Tire Recycling:

- Thermoset
- Multiple materials integrated into one product
- Waste built into process
- Low value end markets
- Sensitivity of end markets to contamination

# Flow of the Scrap Tire:



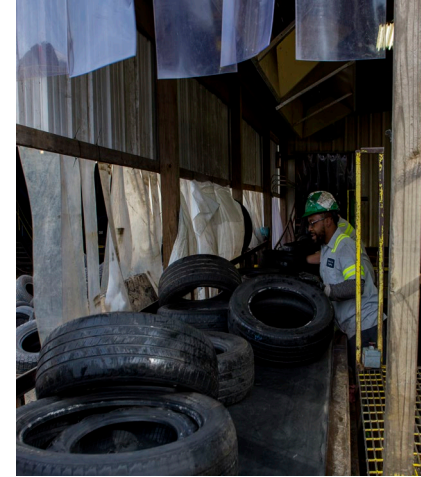
# Life cycle of the tire

- initial process steps post consumer

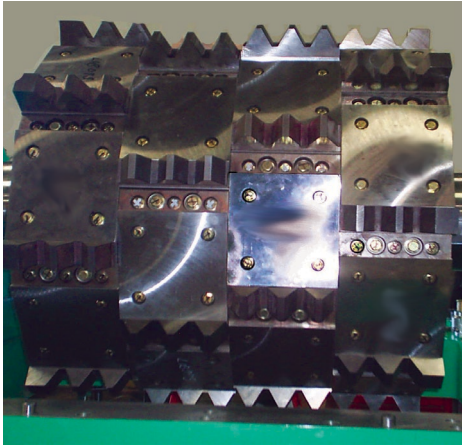




# Life cycle of the tire



# Life cycle of the tire and the Technology





# Technological Challenges in Tire Recycling

- Capital intensive; good equals extremely heavy duty
- Equipment engineering based on existing tire technology
  - Bead size and blade tolerances
- Change in components of tire can have huge impacts
  - Run Flats
  - Kevlar
  - Waste vs revenue materials

# Market Challenges to Tire Recycling

Materials (other than steel) compete in extremely competitive markets

- TDF vs natural gas
- Rubber vs organic infills
- Recycled rubber plus binder vs virgin materials

Testing and studies required for most uses

- Air emissions
- Environmental studies

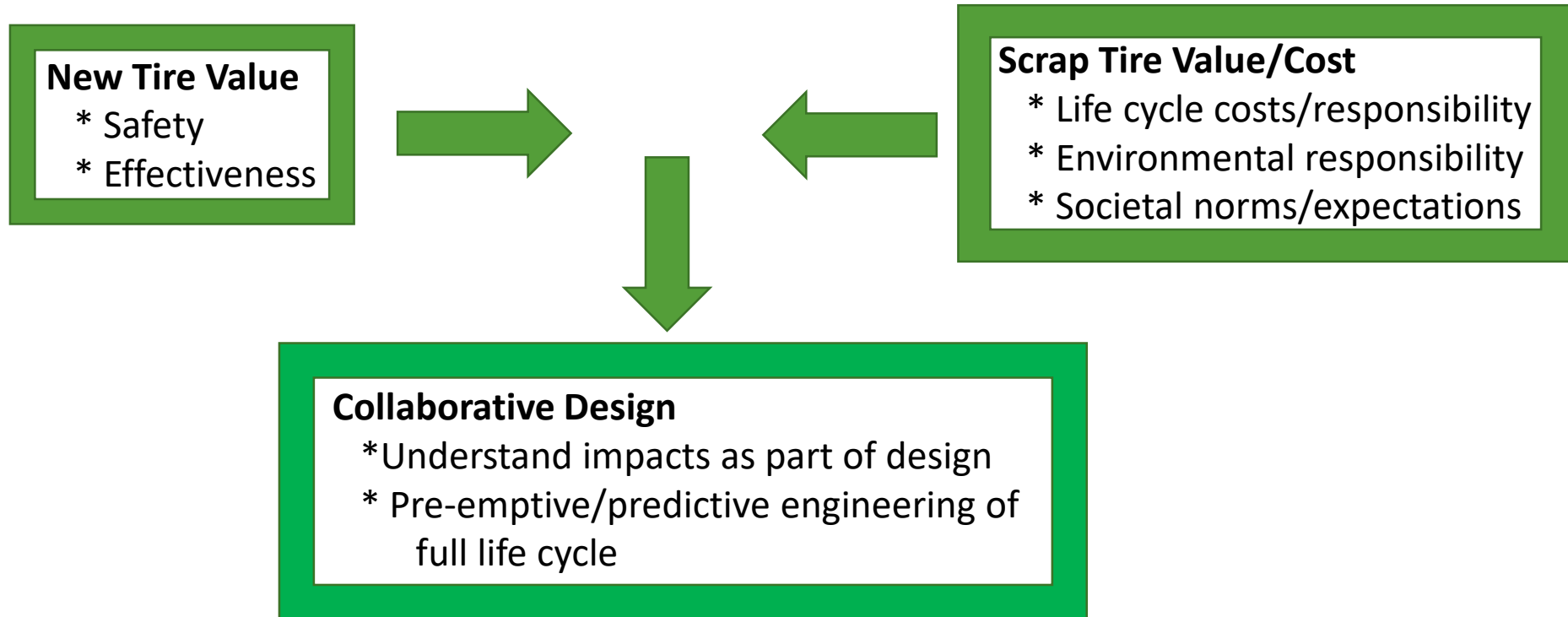
Changing components or chemistry can derail market

- TDF and emissions studies
- Turf and environmental studies
- Brand and industry reputation
- Kevlar caused recalls

Increases in waste proportion dramatically effect economics

- Fiber alone @20+% causes large delta in car crumb vs truck

# Conclusion: Manufacturing and Recycling need to work together to optimize future.



## Questions? Comments?

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