SUSTAINABLE RAW MATERIALS
RECLAIMED RUBBER

India Rubber Meet
23 rd February 2024

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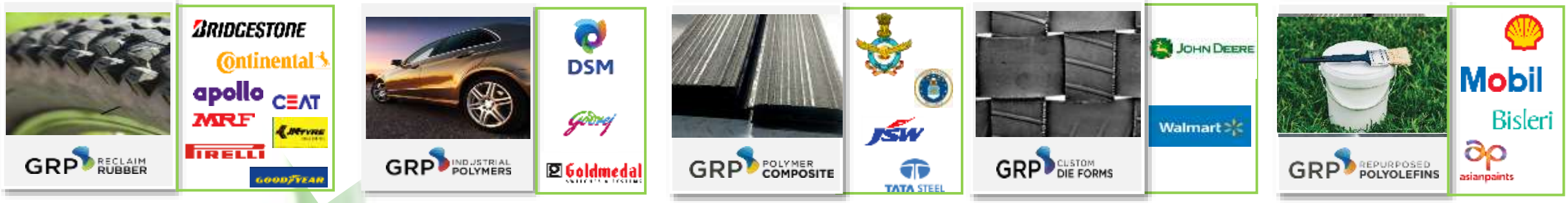
GRP is a sustainable materials' producer that helps brand owners fulfil obligations for responsible use of end-of-life waste

60+	300+	400+	20	5
Countries	Customers	Vendors	Distributors	Manufacturing Locations

VERTICALS



Source: Internal estimates

Leading automotives, OEMs and other large manufactures are increasingly moving towards closed-loop manufacturing with a focus on sustainability and circularity

~70%

of rubber produced is used in tyre/auto industry

Auto sector is one of the largest contributors to GHG emissions and is one of the key focus area for governments globally in order to move towards eco-friendly manufacturing

*"In 2021, battery recycling and its subsequent secondary use was a major focus for us. While circular processes are not new for us, we have made great strides in recent years by **increasing the volume of materials we recycle,** in particular with our closed-loop system for steel and aluminum ingots."*

Mercedes-Benz

*"Mercedes-Benz Group's **vision is to transform its entire value chain into as closed a cycle as possible**. One of the ways to do this is to return our production waste and end-of-life materials to the material cycle. The same applies to the batteries from electric vehicles, which still contain a great deal of valuable materials."*

HONDA
The Power of Dreams

*"Honda is **engaging in structural design that takes into account easier recycling and maintenance**, use of easily recyclable materials and recycled resins, and display of contents of materials for resin/rubber components, etc. In addition, **Honda labels resin and rubber parts with their constituent materials wherever possible to facilitate recycling**."*

SPARK MINDA

*"**The use of recycled materials in auto components manufacturing is an important step towards sustainable production**. In addition to recycled metals, there are several other recovered materials that are utilized by auto component suppliers."*

Source: Company sustainability reports and annual reports, Rubber board

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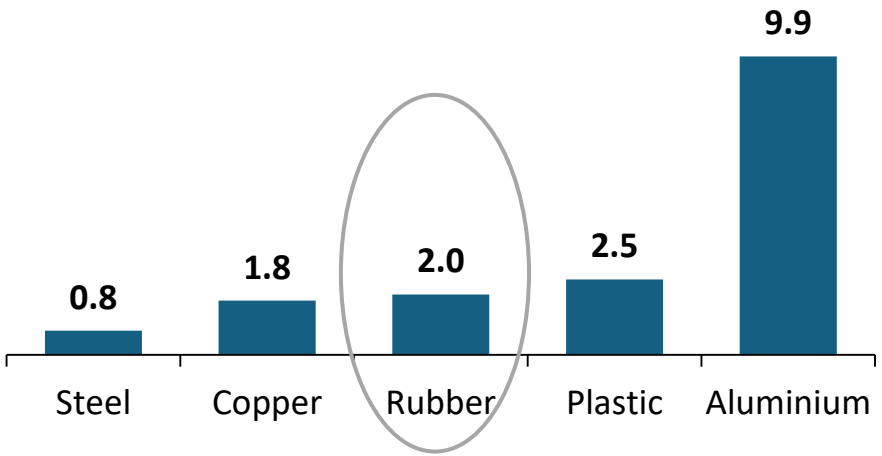
Key Advantages of Recycling

Recycling 4 tyres saves

147 kg of CO_2 emissions

68 liters of gasoline

GHG Saved (in MT) by Recycling per MT Material



Potential of GHG saving

1.6mn MT
Of EoL material recycled

3.2mn MT
Of GHG saved

Source: Global Automotive Circular Economy Growth Opportunities by Frost & Sullivan, Internal evaluation based on market intelligence

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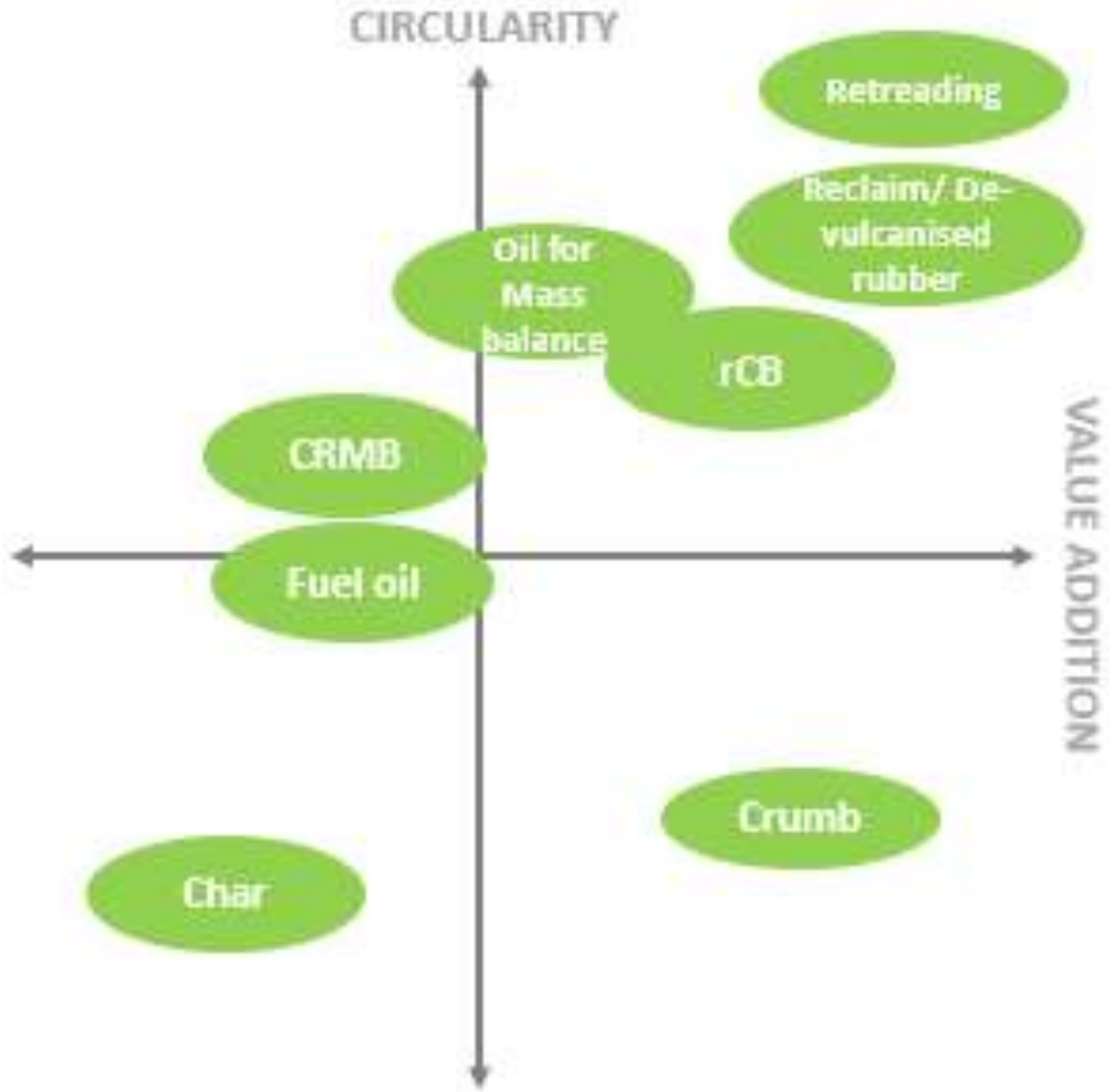
Tyre Recycling



MASS BALANCE
approach and
CIRCULAR
MATERIALS that help
brand owners to achieve
CARBON NEUTRALITY

Source: Global Automotive Circular Economy Growth Opportunities by Frost & Sullivan, Internal evaluation based on market intelligence

28mn
vehicles are produced every year

20mn
vehicles are nearing EoL by 2025(F)

if untreated ends up in landfills (ROW)

190 mn
new tyres are available in domestic market every year

~1.6 mn MT
of EoL material is generated,

Value Addition and Recovery in INDIA 98%

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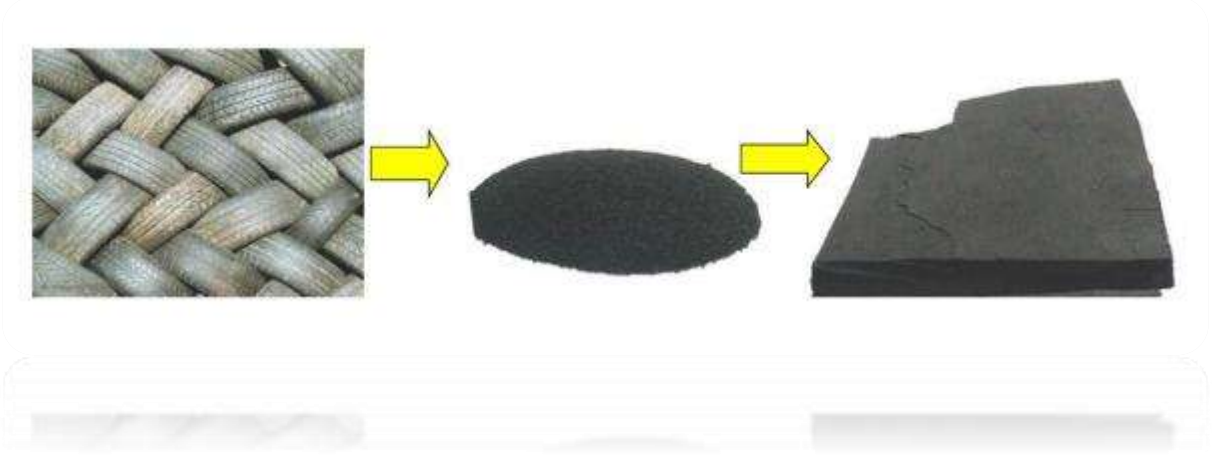
Source: ATMA, Centre for Science and Environment (CSE), Science Direct paper on Advanced Industrial and Engineering Polymer Research and Internal Estimate based on rubber board
Note: New tyres = Production+Import-Export

Reclaim Rubber

- Reclaimed rubber is produced by partial de-vulcanization of rubber granulates obtained from end-of-life tyres , Tread peeling, Scrap tubes and other rubber products.

- The Reclaimed rubber has almost the original plasticity of virgin rubber, permitting the same to be compounded, processed and re-vulcanized.

- Reclaimation can occur either by breaking the existing cross links in the vulcanized rubber (partial de-vulcanization) or by promoting scission of the main chain of the polymer (breakage of C-C bonds) or a combination of both under the influence of thermo mechanical chemical conditions .



Energy and Greenhouse emission

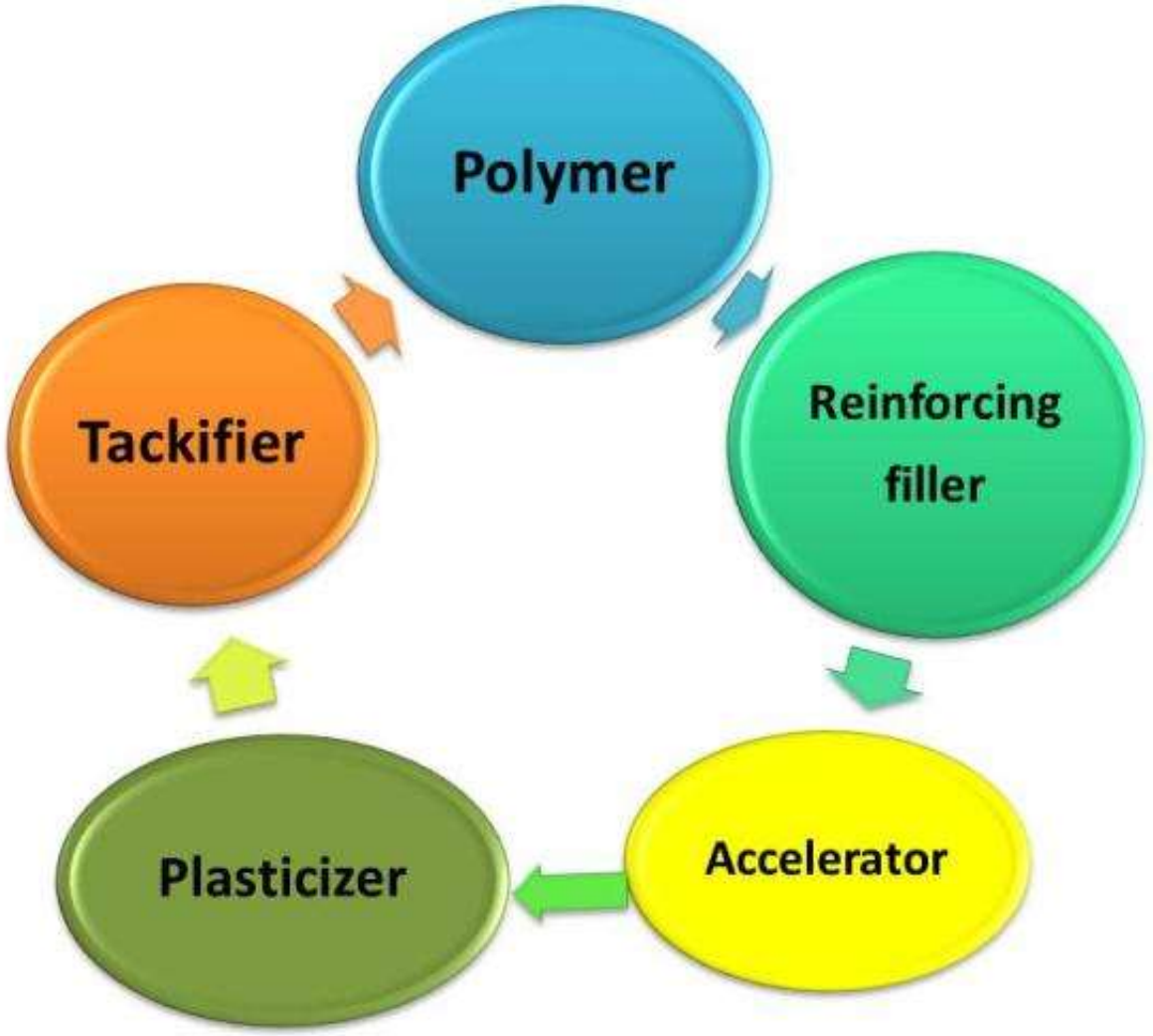
Material	Energy required for production (MJ/kg)	Greenhouse emissions ($kgCO_2/kg$)
Natural Rubber	8	1.0
Synthetic rubber	145	5.0
Carbon black	125	5.7
All other additives	100	8.2
Fabric	45	2.1
Steel tyre cord	36	3.2
Manufacturing per kg tyre	11.7	1.9
Reclaim Rubber	**2.1**	**0.1**

- Saves **10-50 times pollution equivalents** due to CO2 emission from virgin rubber.

Saves energy consumption **4 times**

Source: US EPA, JATMA, UK Environment Agency

Reclaim Rubber- A universal compounding ingredient



Versatile ingredient

INFINITE POSSIBILITIES

Trailer beds (Rubber composite)

Rubber Pads (Custom Die Forms)

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Benefit of replacing Polymer

Polymer Replacement Ratio		
	At 5 %	**At 10 %**
Area(Sq Mtr)	2,348,984	4,697,971
Energy(GJ)	42,318,637	84,637,388
Oil(Gallons)	30,800,000	61,600,000

Area : Due to landfill reduction
Energy : Savings in GJ / Kg of rubber
Oil :Gallons saved in production of a tire when substituting virgin polymers

At the current level of 4% substitution, there is an annual saving close to USD 500mn for the rubber industry.

Source : Physics and Chemistry to integrate Economics and Ecology : Recycling and Reuse of Waste PPT by Rajeev Pandya

High performance material- Targeting increasing sustainability

- ✓ GRP High performance material is a unique material that is being developed for increasing usage of sustainable material in tyres and rubber compounds,
- ✓ It offers exceptionally better performance in Physical properties (TS 110+,EB 360+), flex properties, Abrasion resistance properties, etc
- ✓ This unique material can be blended at master stage of the compound mixing which in turn offers wide range of advantages in the mixing process.
- ✓ The tyre / rubber products made from HPM performs better than with standard reclaim rubber. Allowing higher PHR replacement.
- ✓ Strong R & D efforts for further improving performance

Summary

- ✓ Reclaim rubber is widely used in tyre and rubber compounds due to benefits it provides.
- ✓ Reclaim Rubber usage helps in reducing Green House gases (GHG)
- ✓ Reclaim Rubber enhances circularity and hence supports meeting steep sustainability targets
- ✓ Reclaim Rubber is manufactured by Thermo/Chemical/Mechanical process, quality consistency is assured by having stringent quality standards.
- ✓ Focus on enhancing properties of Reclaim Rubber by selectively breaking (C – S) bond – devulcanizing.
- ✓ GRP is actively developing High Performance Materials (HPM) to support Tyre and Rubber companies to meet sustainability targets.

THANK YOU

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