



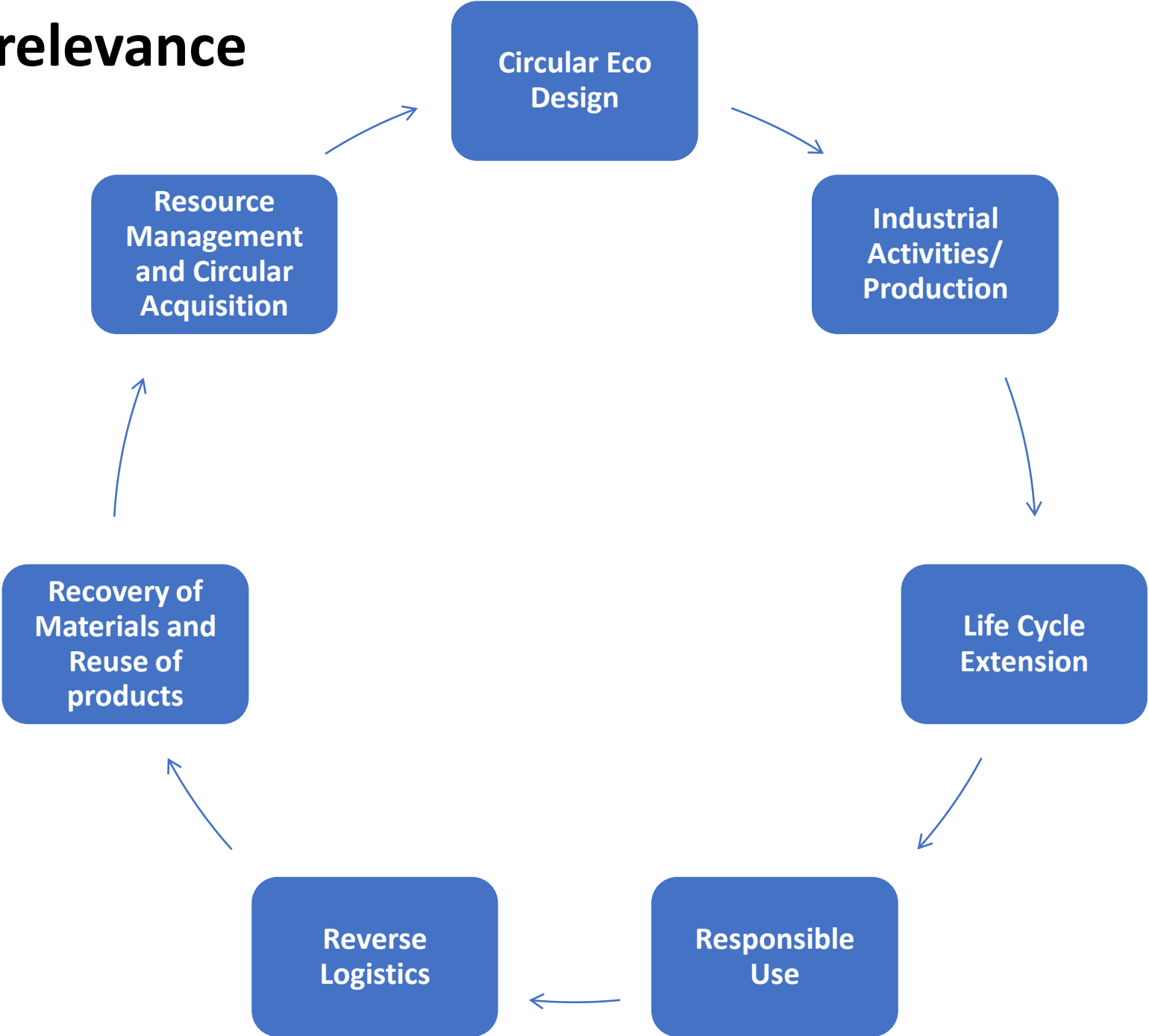
Vehicular Waste to Wealth

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Circular Economy and its relevance

Circular economy is based on the idea that **there is no such thing as waste**.

According to World Economic Forum, “A circular economy is an industrial system that is **restorative or regenerative** by intention and design.



The potential of automotive ELV market

ELV (End of Life Vehicle): The vehicle that has reached end of its useful life and needs to be condemned

- 87 lakh obsolete vehicles by 2015
- 220 lakh obsolete vehicles by 2025
- 280 lakh obsolete vehicles by 2030

2 wheelers and commercial vehicles account for 90% ELVs



Vehicle Dismantling Process

Generation

Old vehicle sold to broker/dismantler

Fiscal/ other incentives

Collection

Vehicles are transferred to yards

Hub and spoke model of business

De-pollution

Pre-treatment

Separation of fuels, lubricants, coolants

Dismantling

Individual components are separated, tearing off

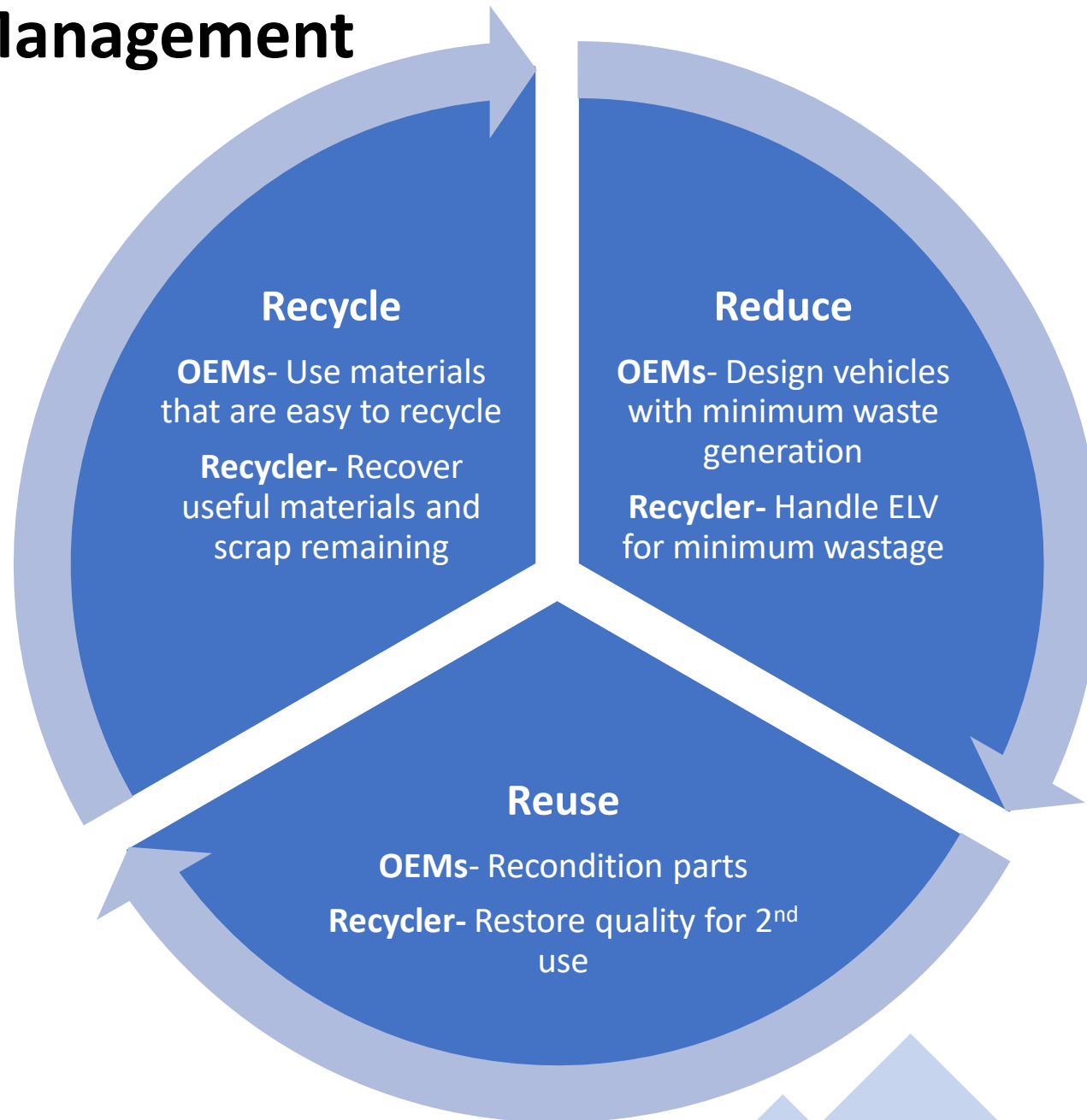
Separating useful components, marking them and send for re-use

Material Processing

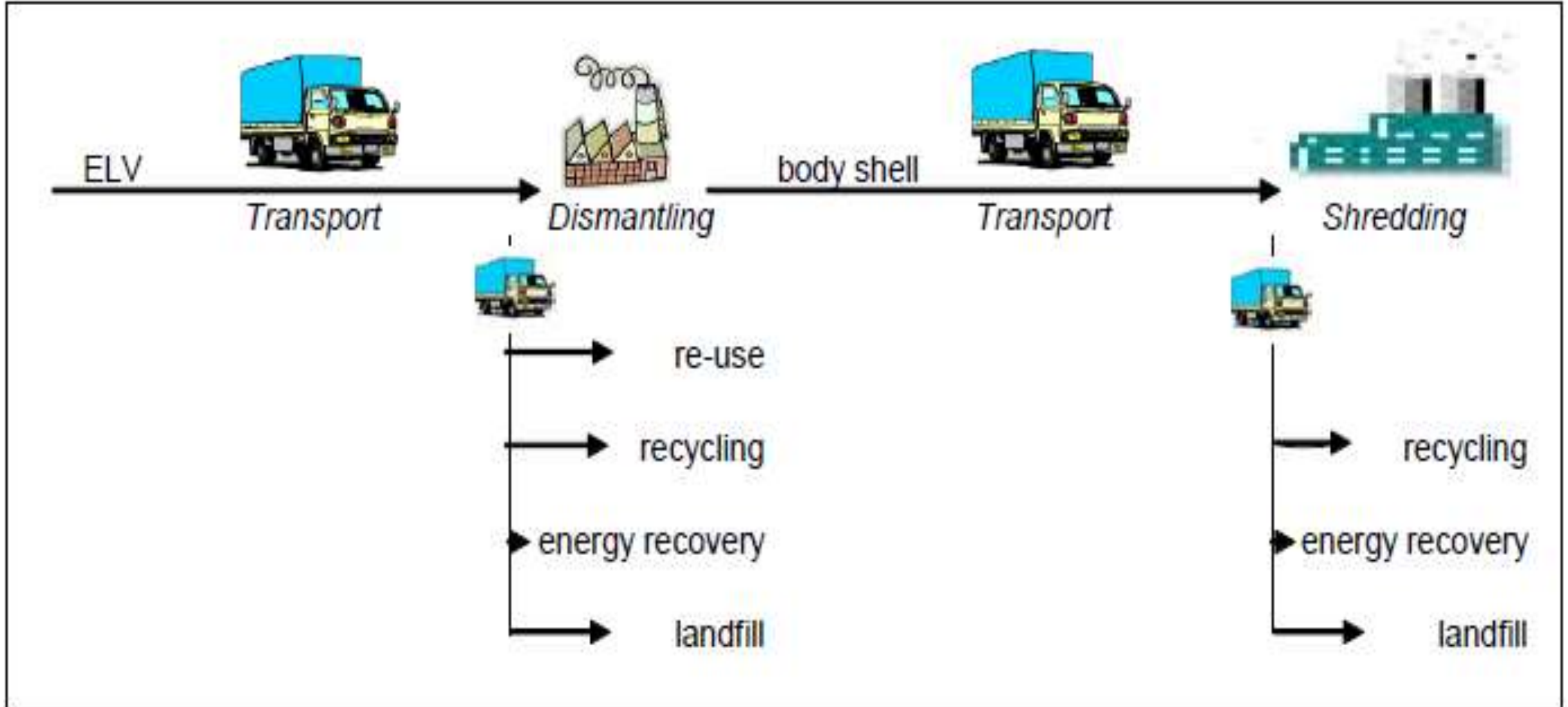
Sold to material recycles

Metals, plastics, rubbers, e-waste

3 R's of Waste Management



Bird's Eye View of ELV Management Process





What goes inside a vehicle?

- **Steel**- varying grades, material properties and compositions
 - About 45-50 % of vehicle weight
 - Cassis, body, engine, transmission, exhaust, beams, etc
- **Plastics/ foams/ synthetics**- Account for about 8% of vehicle's weight and 50% of volume
 - Dashboards, handles, airbags, ventilation, etc
- **Aluminium**- 25% of vehicle weight
 - Wheels, engine blocks, etc
- **Rubber**- 10% by weight
 - Tyres, hoses, seals, belts, etc.
- **Others**- Copper, Lithium, Cobalt, Nickel, Zinc, precious materials, Lead, Magnesium, etc.

New trends require new material

Crash worthiness- High strength steel, composites, new joining techniques, airbags

Emission- precious metals, light weight substitutes, electronic circuits

Noise- Absorbing materials, aerodynamic structures, anti-vibration isolators

Fuel efficiency standards- Light weight material, smart materials, composites, plastics and other polymers

Electrification- Copper, Lithium, coolants, semiconductors

Opportunities and Advantage of Vehicle Recycling

Crude Bill Import

- Replacement of old vehicles by new ones will minimize fuel bill
- Estimated import saving 955 Crore by 2025

Metals Import Bill

- Domestic steel scrap will replace import of steel scrap
- Benefits up to 6550 Crores by 2025

Improvement of Air quality

- Reduction in NOx and PM
- BS1 vehicles are more than 30 times polluting than BS VI vehicles

What happens to various parts

Vehicle Part	Recycled
Windows (Glass)	Powdered and recycled
Seats (Foam and Fibre)	Soundproof material
Body, trunk, hood and doors (steel)	Car parts and general steel products
Wire harness (Copper)	Copper and engine products
Bumper (resin)	Bumper, interiors, tool boxes, etc

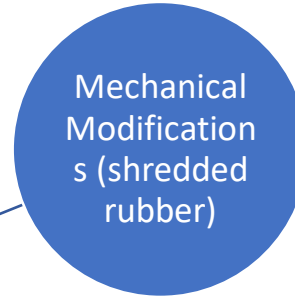
Vehicle Part	Recycled
Radiators (copper and aluminium)	Gun metal ingots and aluminium products
Coolant, engine and gear oil (oils)	Alternative fuels for boilers and incinerators
Engine, transmission, suspension, wheels (steel and aluminium)	General steel and aluminium products
Catalytic converter (Precious metals)	Recycle materials and reuse
Tyres (rubber)	Several uses

Value Chain Example: Tyres

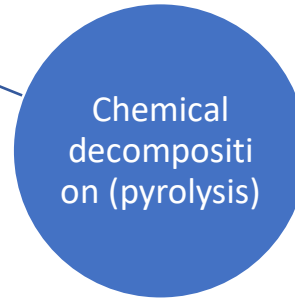
- Tyre recycling business- 2nd largest in the world
- No part goes waste!
- Major problems:
 - Environmental Pollution (Air, water and land)
 - Informal sector and heavily un-regulated



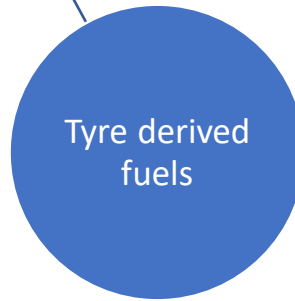
- Use in 2nd market
- Extending life



- Treads, beads and walls- shoe liners, doormats, water storage tanks, etc
- Rubber crump (reclaimed)- base raw material, moulded plastics
- Steel from plies- Steel industry
- Use in road surfacing as additive in bitumen



- Gaseous fuels, oils, char, carbon black
- Industrial use as substitute material



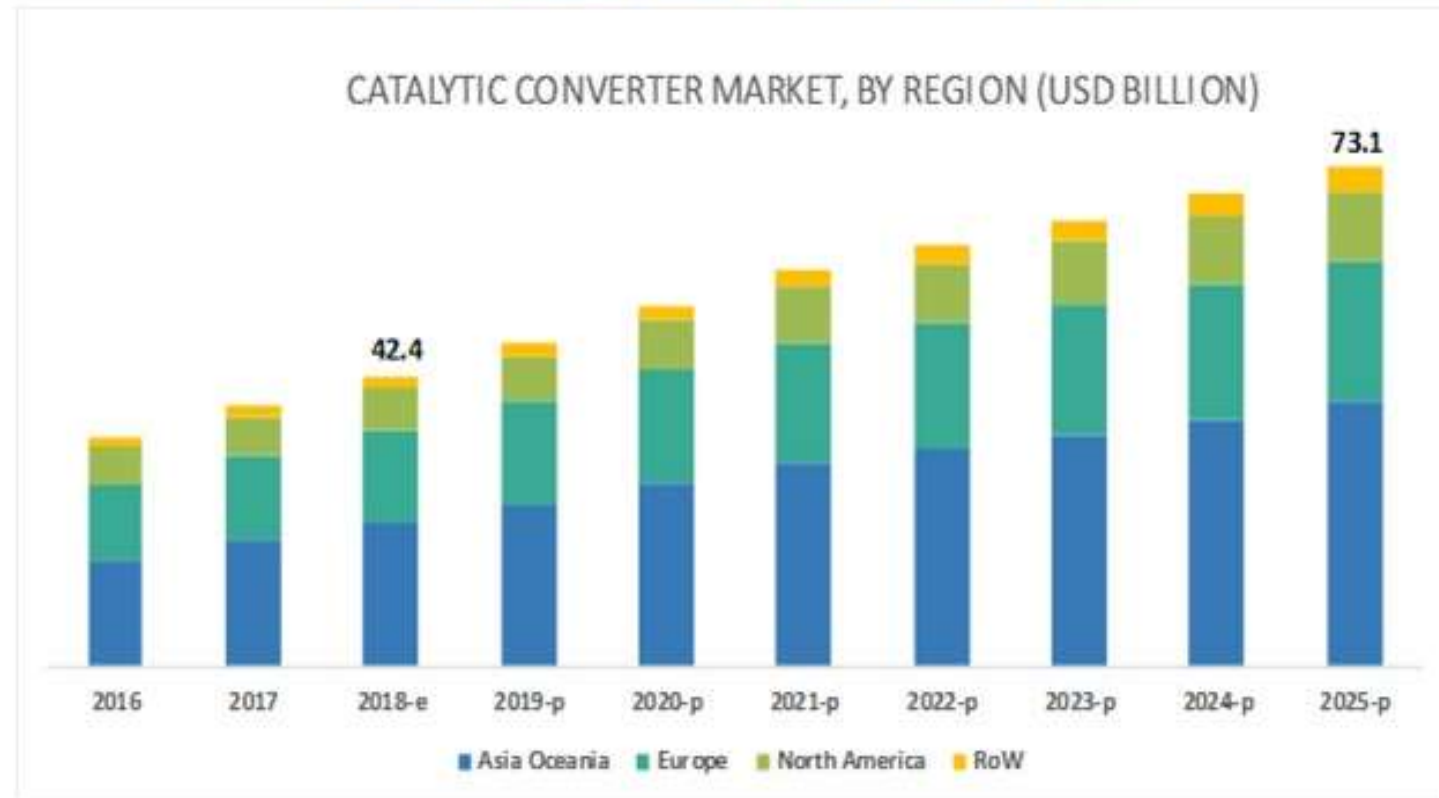
- Brick making industry
- Source of warmth

Value chain example: Catalytic Converters

- Most expensive scrap
- Rhodium, Palladium and Platinum have a great value
- Dismantling and segregation is done extensively in India
- Scrap is exported for material recovery



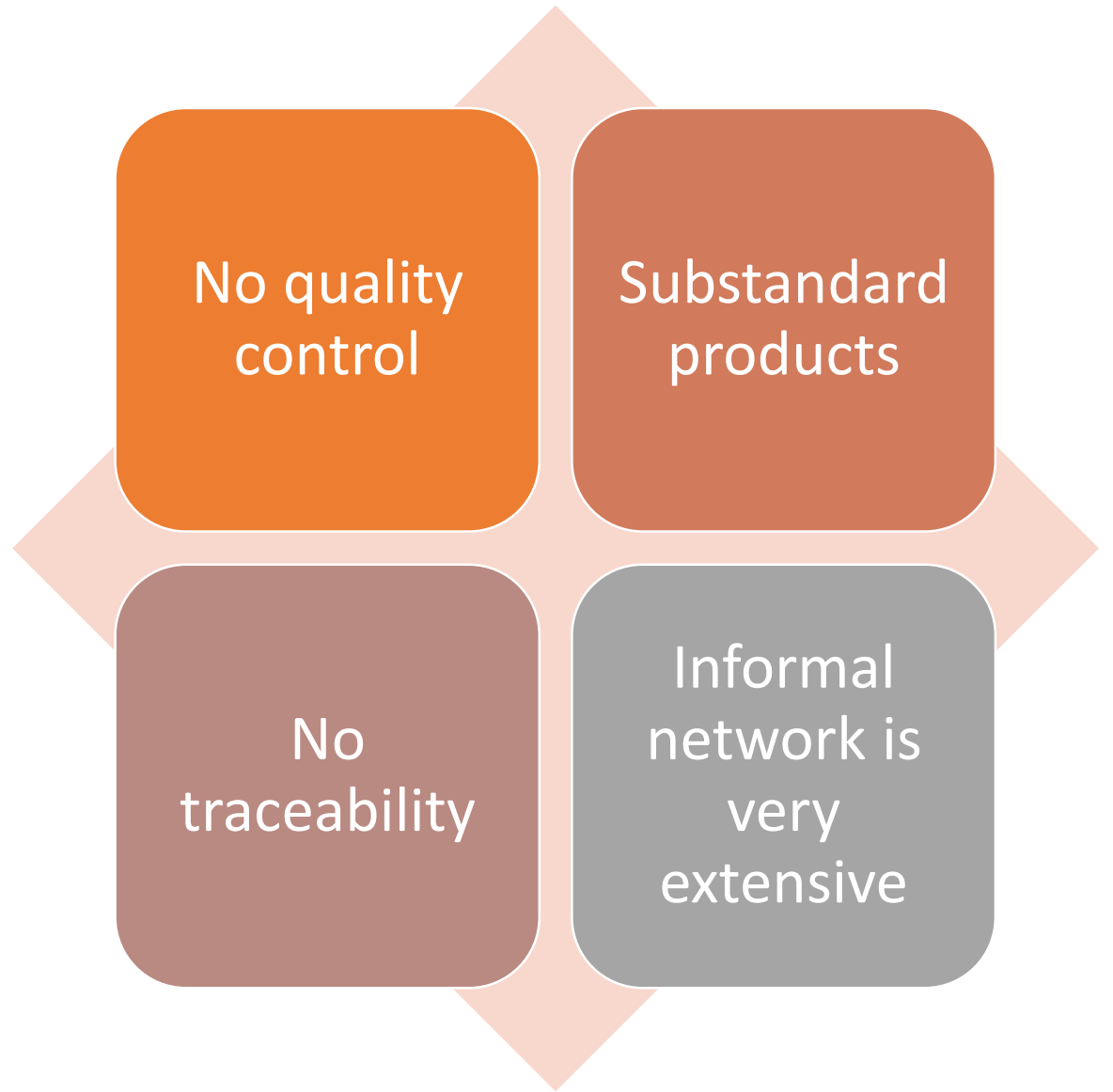
Catalytic Converter Market – Global Growth Trends



Battery Recyclability

- By 2030 worldwide 2 million Tons of LIBs will need to be recycled
- At the moment only about 5% are being recycled. Major constraints being:
 - Technical
 - Economic
 - Logistics
 - Regulatory
- Indian market is fast expanding and there is a need for establishing framework by 2025
 - The 2nd use market is picking up
 - Recyclability policy and EPR regulations should be linked
 - Technology should be established for affordable recovery of materials

Challenges of second use



EPR concept and provisions

EPR is the responsibility of Producers for management (in eco-friendly manner) of their products at post- consumer stage of the life cycle

International:

Several developed economies have RRR targets as a part of EPR (such as EU mandates Recovery- 95%, recycle- 85%)

India clearly defines EPR for following types of waste

- Batteries (Management and Handling) Rules 2001 as amended 2010
- Plastic Waste Management Rules 2016
- E waste (Management) Rules, 2016

AIS 129 Standard (related to approval of vehicles) requires 85% recovery to begin with. It is yet to be mandated

Need for further development

Efficient, environmentally compliant and cost-effective technologies should be developed for recycling/ material recovery of:

- Laminated safety glasses
- Lithium Ion and other advanced battery material
- Recovery of cat-con precious metal coatings
- Airbags- disposal and recovery

A pair of hands is shown holding a small, green globe of the Earth. The globe features white outlines of continents and a grid of latitude and longitude lines. Several vibrant green leaves are tucked behind the globe, partially obscuring it. The hands are positioned as if cradling the globe. The background is a soft-focus, lush green environment, likely a forest or garden, with sunlight filtering through the leaves, creating a bokeh effect of light spots.

Thank you for attention!
Save the environment!