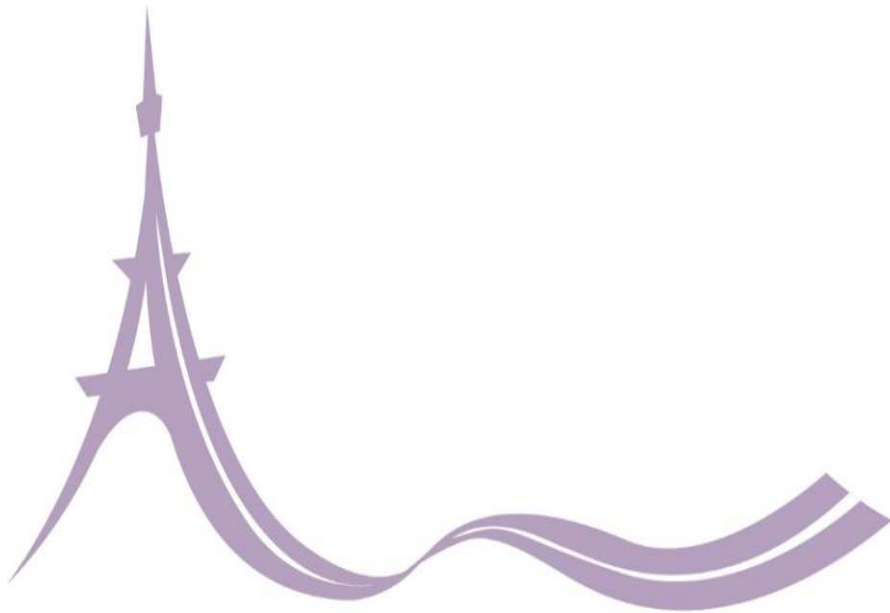


# MICHELIN

## Circular Economy Strategy



PAVEMENT PRESERVATION & RECYCLING SUMMIT

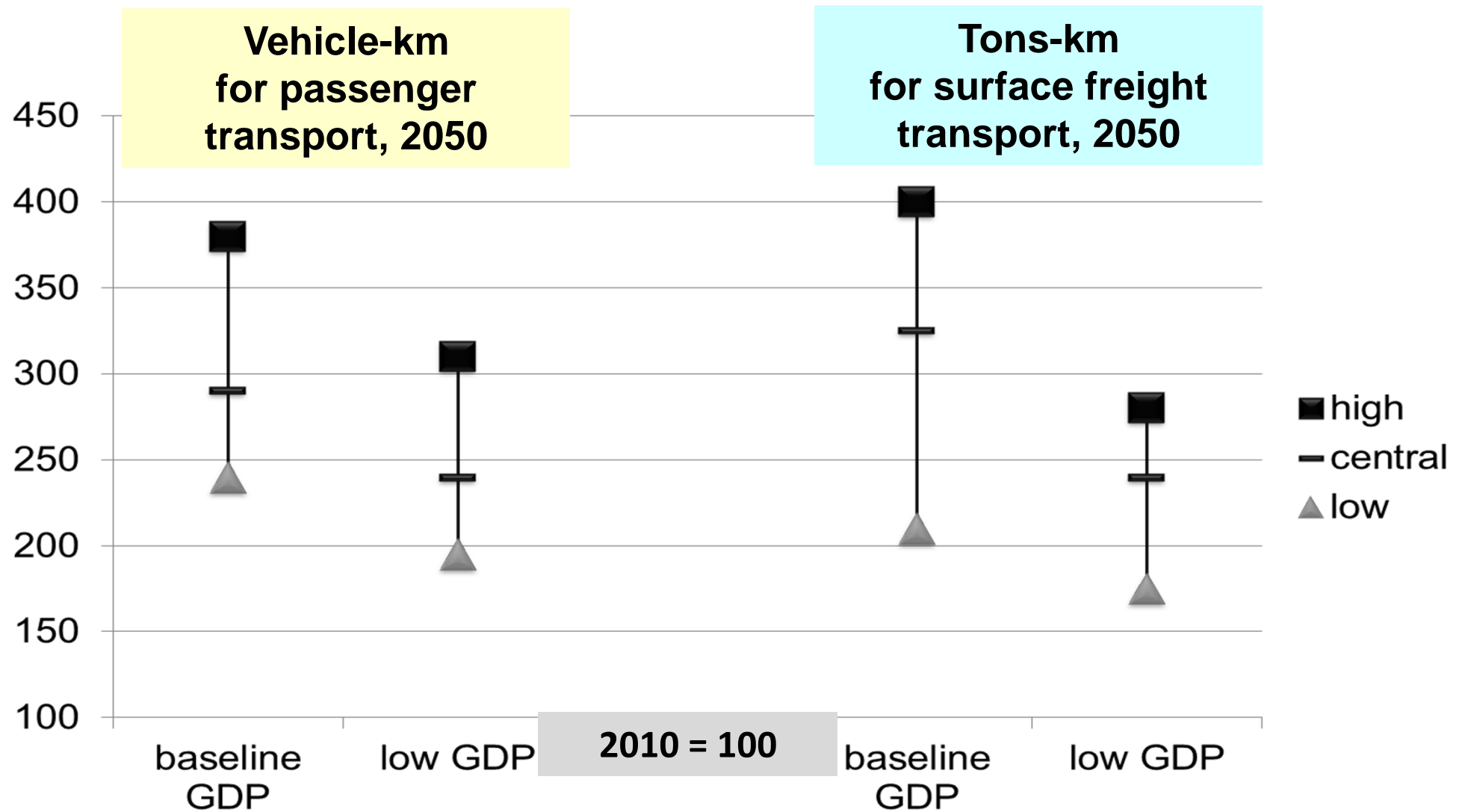
**PPRS** PARIS 2015  
FEBRUARY 22-25

Thierry  
WILLER  
MICHELIN





# Demand for mobility will continue to grow



## Road mobility challenges



1950 : 50 million vehicles  
2000 : 800 million  
2050 : 2 billion ?

Too many accidents  
18% of CO<sub>2</sub> emissions  
Fossil energy dependency  
Raw material availability  
Congestion in cities  
Local pollution  
Traffic noise

Mobility  
needs to be :

Safer

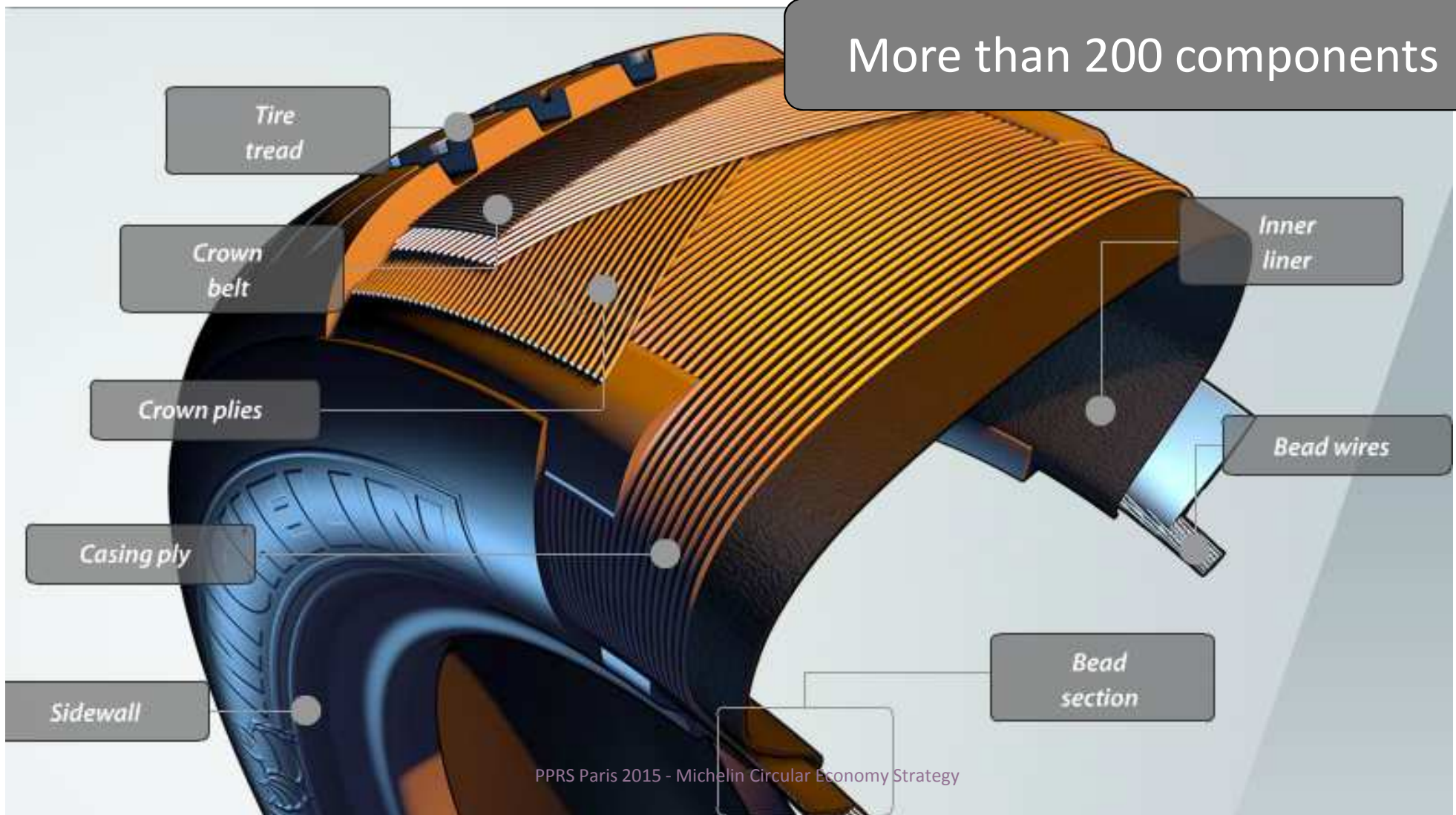
Cleaner

More Efficient

More enjoyable

# A multi-scale high technology composite product

More than 200 components



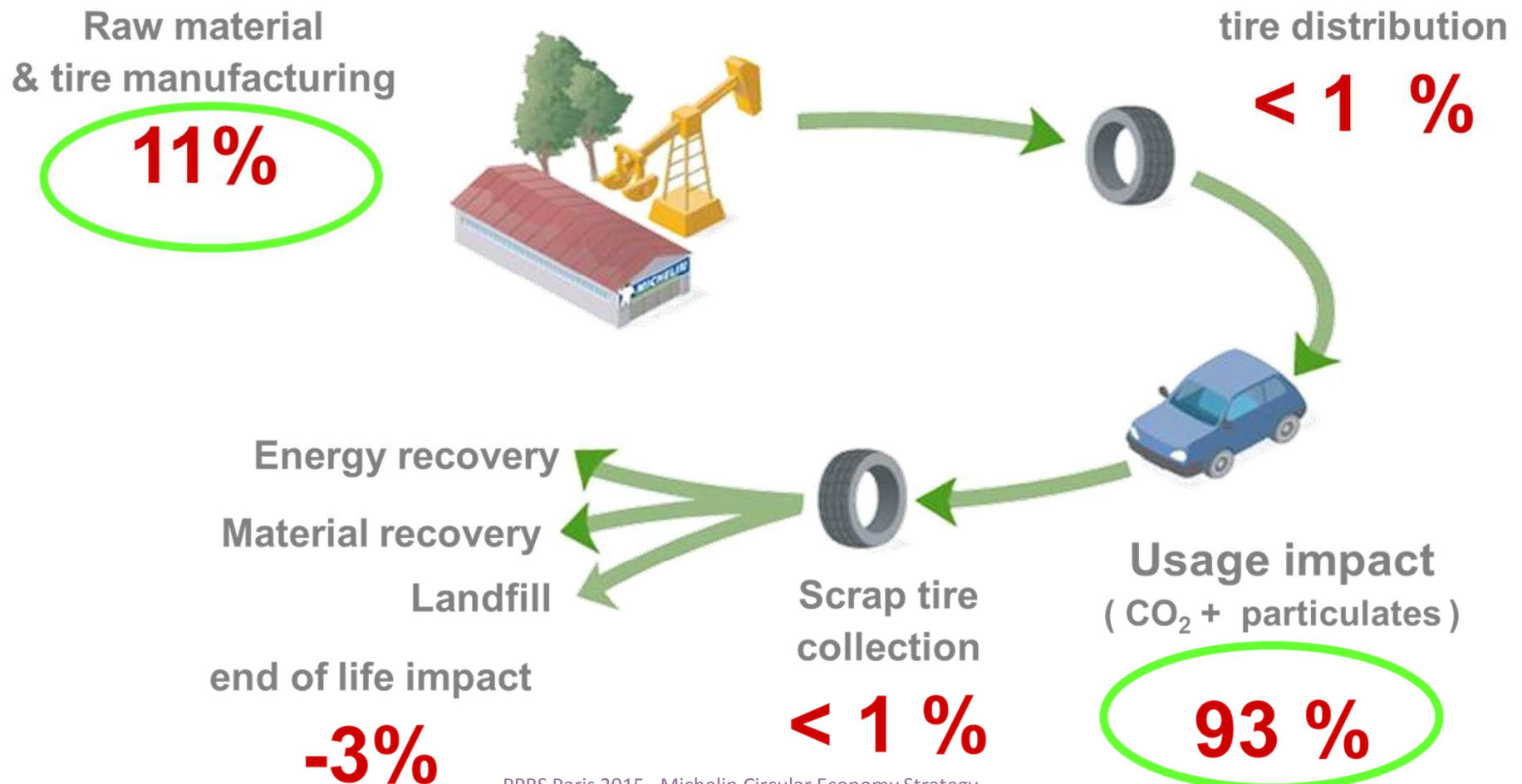
## Raw material needed for tires



### Rubber compound 83%

■ natural rubber	25 %
■ synthetic rubber	20 %
■ reinforcing fillers	26 %
■ chemical additives	12 %
■ steel cables	14 %
■ textile cords	3 %

# Passenger car tire life cycle assessment



## MICHELIN 4R Strategy



**REDUCE**



**REUSE**



**RECYCLE**



**RENEWABLE**





## REDUCE

Michelin tires are lighter



Michelin tires last longer



Michelin tires save fuel

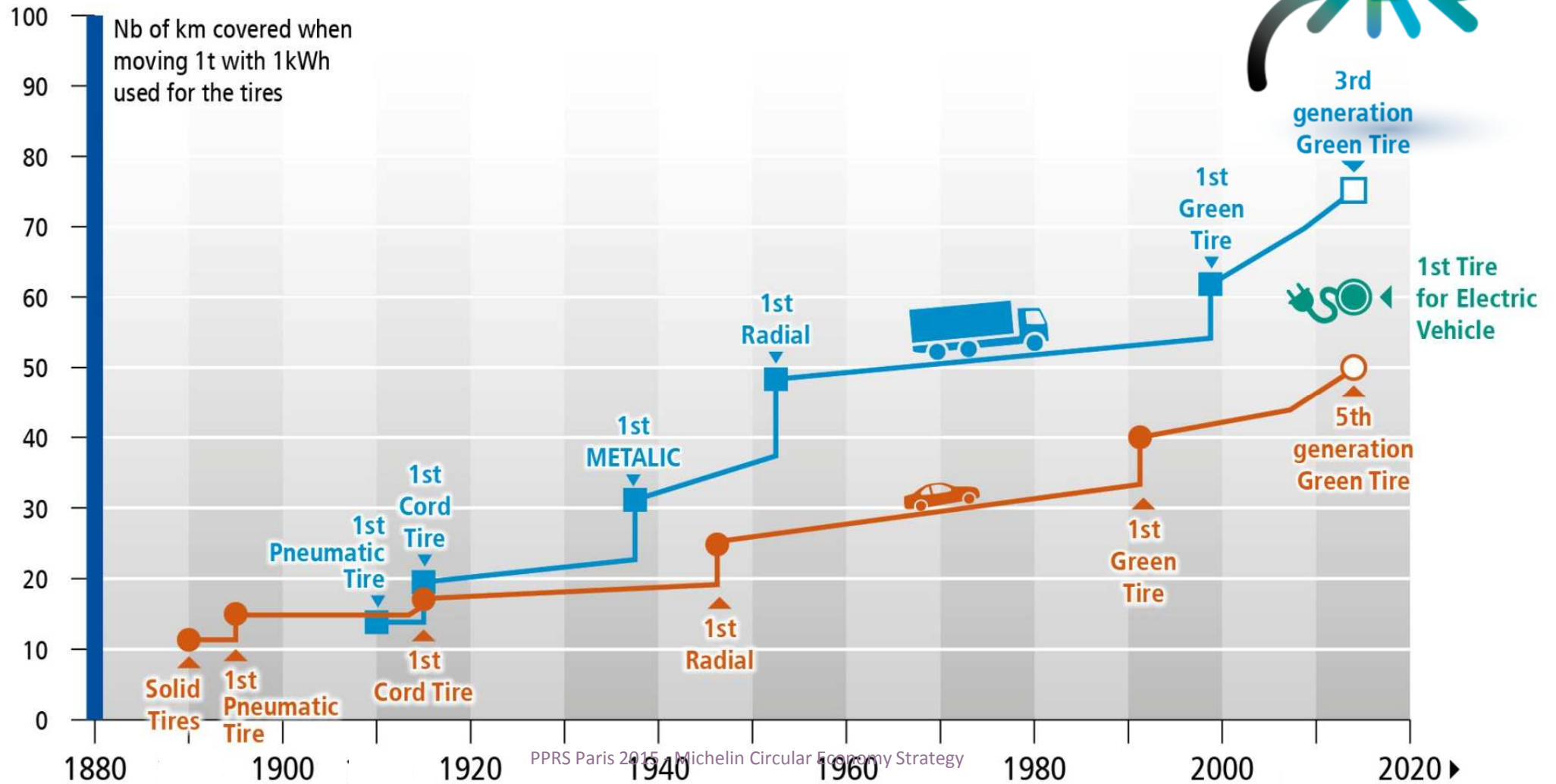


Michelin Functional Economy





# 100 years of Tyre Energy Efficiency evolution





## REUSE



*repairing*



*regrooving*



*recapping*



# RECYCLE

## Material recovery



*shreds*



*crumb*

*whole tire*



*powder*



*alcohol*



## Energy recovery



*steel industry*



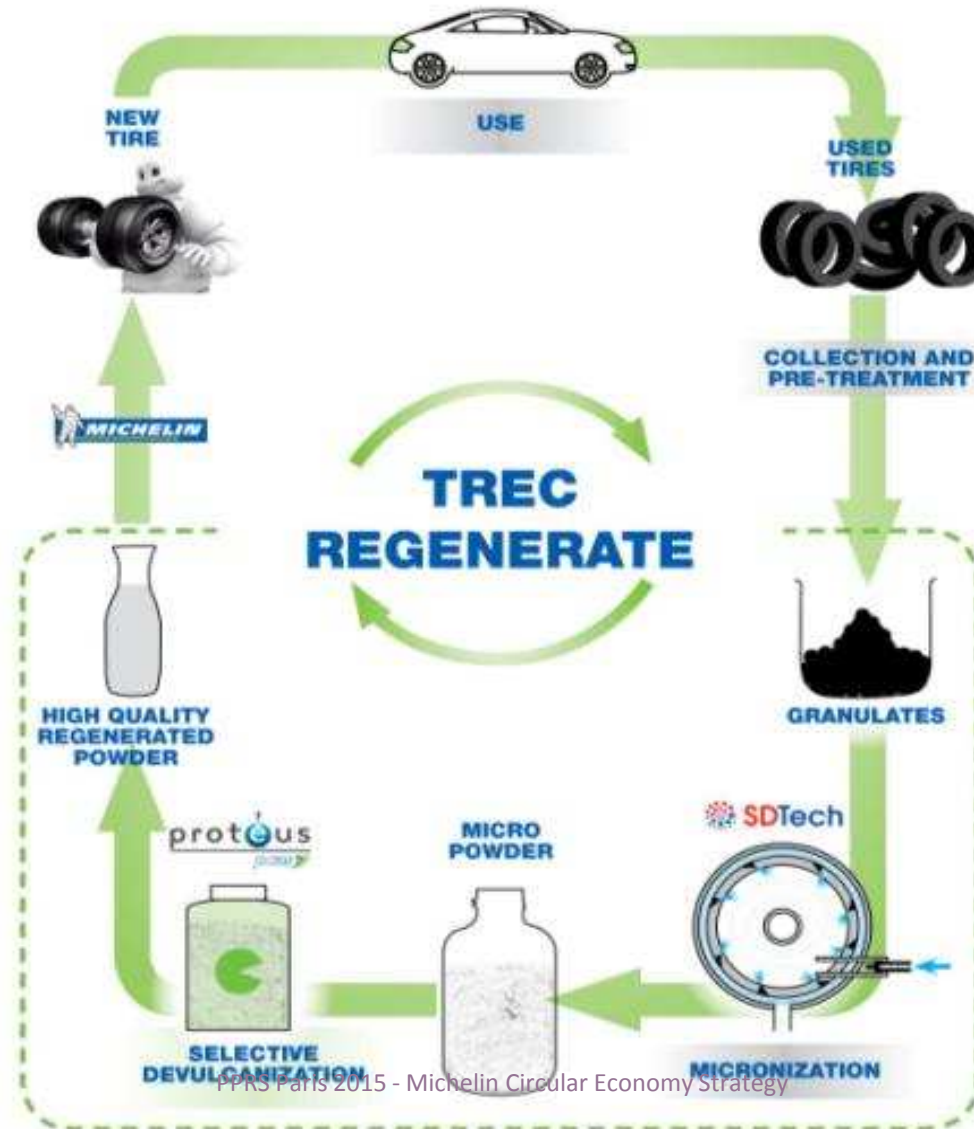
*cement factories*



*thermal power generation*



# RECYCLE





# RECYCLE





## RENEWABLE

*Natural rubber*



*Bio-sourced isoprene*



*Bio-sourced butadiene*



*Use of natural oil and natural resins in tire compound*





# RENEWABLE

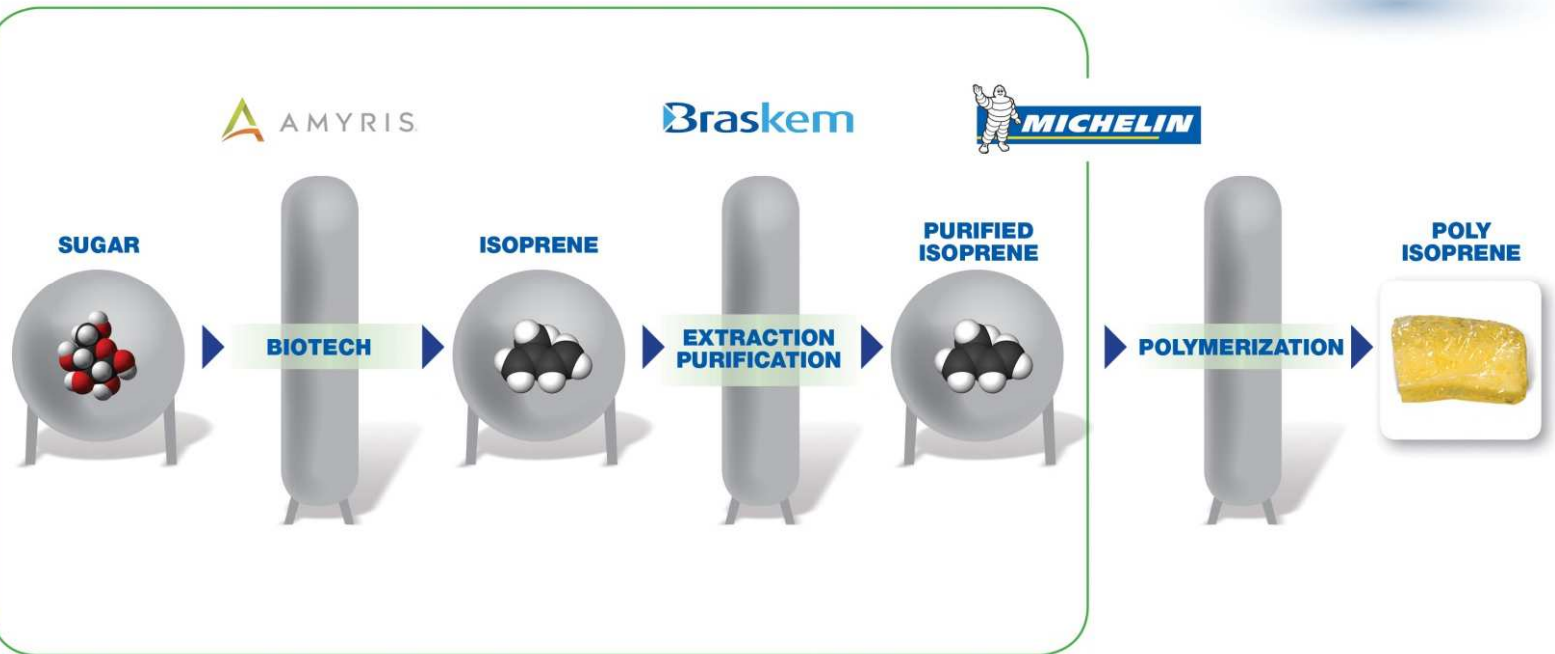


## Bio sourced Isoprene

1<sup>st</sup>, 2<sup>nd</sup> ET 3<sup>rd</sup>  
GENERATION  
BIOMASS



FERMENTATION







# RENEWABLE

## Bio-sourced butadiene : the “BioButterfly” Project



1<sup>st</sup>, 2<sup>nd</sup> et 3<sup>rd</sup>  
generation  
Biomass



Biotechnology  
Fermentation

Alcohols



Catalytic  
reactions  
Separation

Butadiene



Polymerization

Synthetic  
rubber



MICHELIN 4R

a win-win-win strategy



*for our customers*

*for the planet*



*for MICHELIN*

Thanks 4 your attention