



Sustainable mobility – how to bring it on the road?

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Tire Label Legislation & Marketing Conference
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LANXESS
Energizing Chemistry

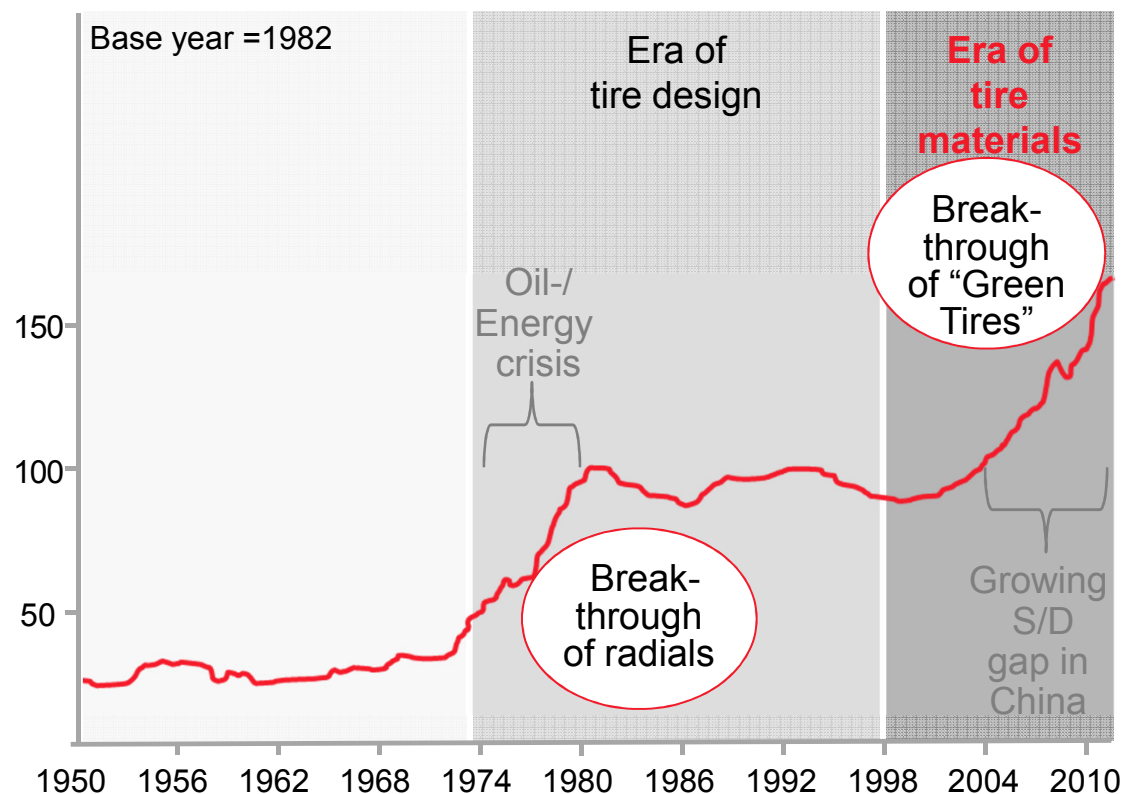
Agenda

- **Introduction**
- Market needs / supply & demand
- LANXESS brings it on the road



Tire costs as well as consumer expectations for “added value” are constantly increasing

History of tires is subject to constant change



- Global market conditions have been changing over time
- Shift of focus from tire design to materials
- Raw materials become scarcer resulting in higher material costs
- Tires are expected to contribute to global CO₂-emission reduction goals

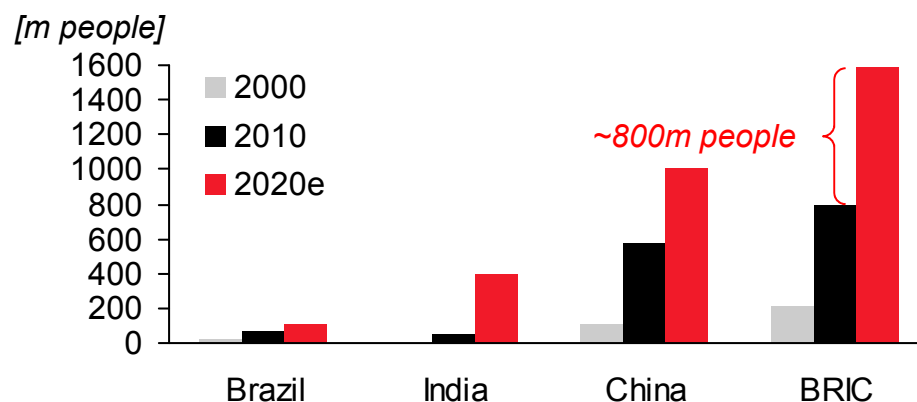
Rubber production must adapt to changes

Megatrend: mobility

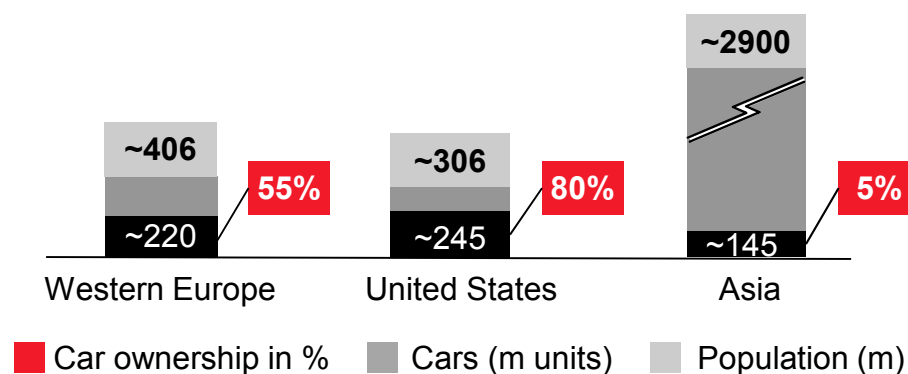
- Rising worldwide prosperity, particularly in China and India
- Enables an increasing number of new middle-class families to achieve personal mobility
- Millions of trade-ups to be realized soon
 - Bicycles for motorcycles
 - Motorcycles for cars
- Leading to increased car ownership, especially in Asia

Future mobility demand results in significant consumption of tires and rubber

People entering middle class*



Car ownership in Asia still around only 5%*



Source: Goldman Sachs Global Economics Group, 2010; Michelin estimates;

* Population with income >\$6,000 and <\$30,000/capita in BRIC countries

Globalization and scarce resources point at ever increasing complexity

Global drivers of rapid equalization



Fast proliferation of tire labeling / spillover effect



Global market orientation of OEMs



Increasing information flow globally



Material focus to balance labor cost difference globally

Examples

China

- Adoption of performance tires in new 5-Year Plan
- Retreading rate of 25% by 2015

Americas

- Safe oil adoption

Declining resources

- Need for CO₂ reduction: environmental requirements becoming increasingly strict
- Finite oil and petrochemical supply
- Sustainable use of renewable resources
- Important accelerator: increasing demand for mobility due to fast growing (middle-class) population

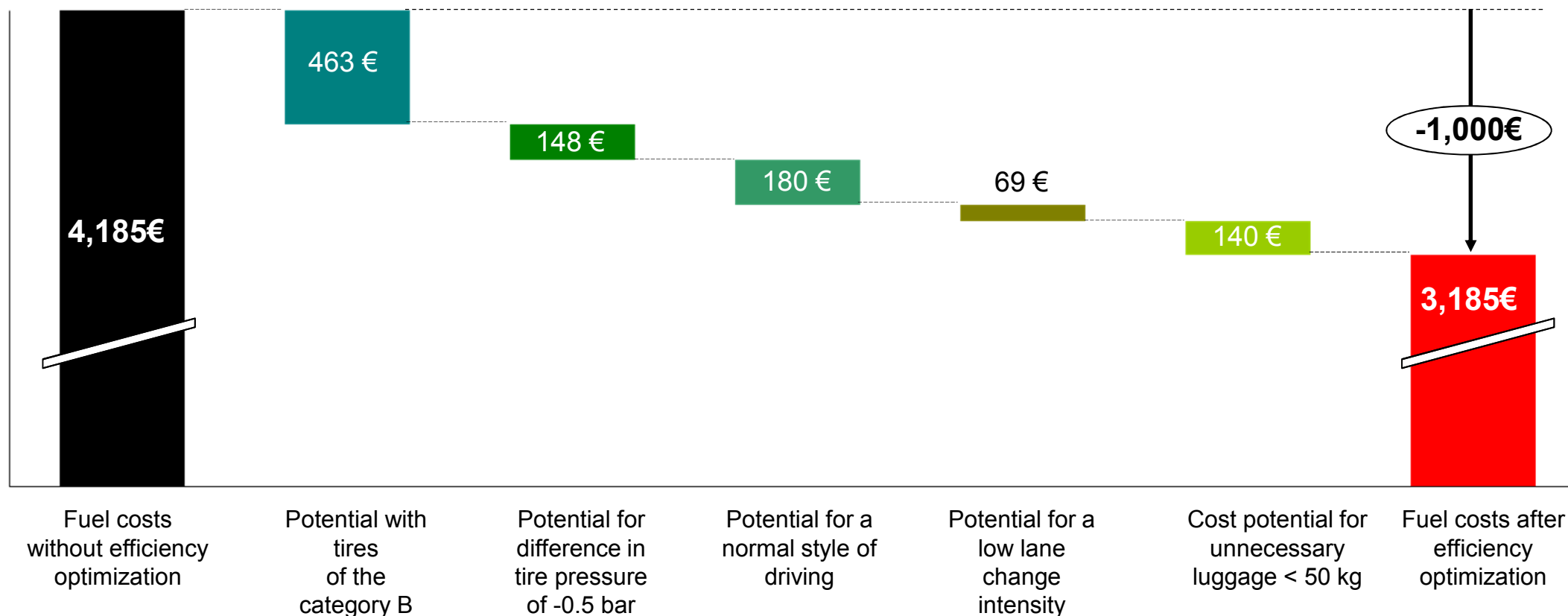
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Case Study: the correct choice of tires offers the consumer the largest cost advantage with savings of 1,000 Euros per 30,000 km

Customer benefit calculation of energy efficient tires



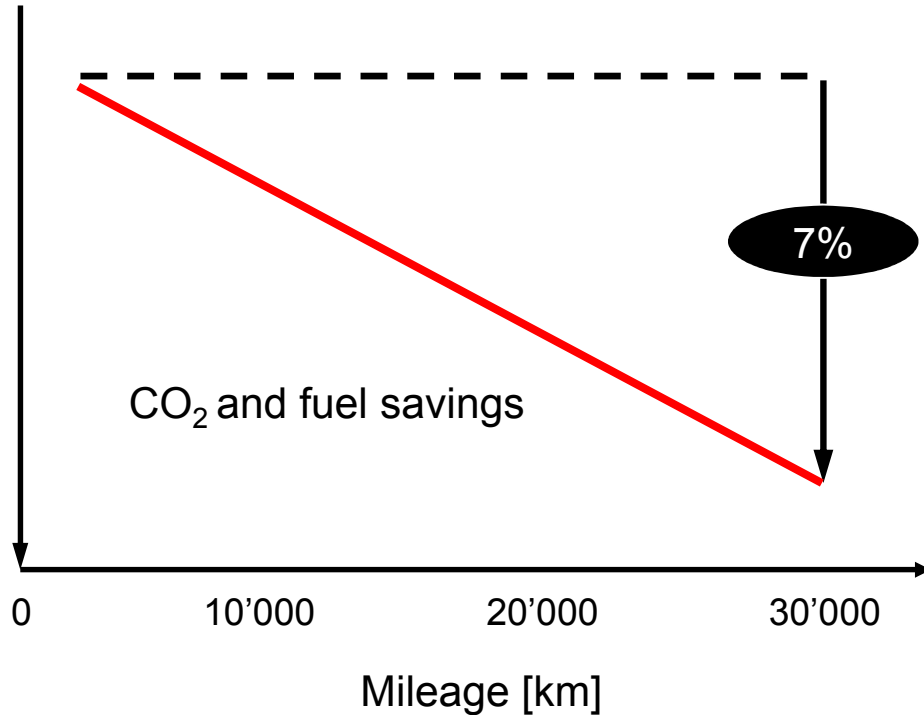
Sources: TCW Transfer-Centrum GmbH & Co. KG für Produktions-Logistik und Technologiemanagement; Energy Efficient Tires & Tire Labeling in Europe

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Case Study: performance tires reduce fuel consumption as well as CO₂, particulate matter and noise emissions

Performance tires

Savings [l, kg]



- 1,000€ cost savings
- 700 kg less CO₂ emissions
- 30% reduction of particulate matter
- 20% reduction of noise emissions

Economic and ecologic effects for a mileage of 30,000 km

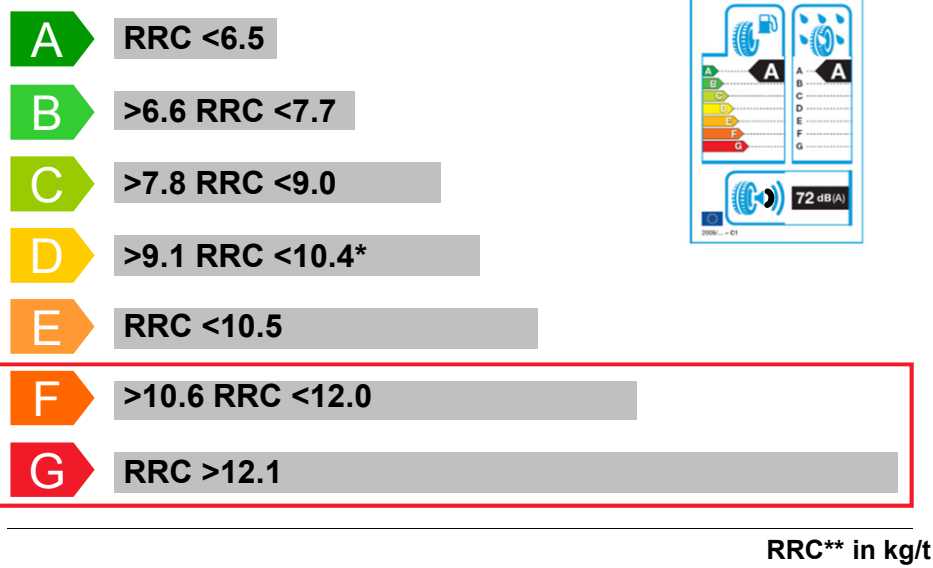
Sources: TCW Transfer-Centrum GmbH & Co. KG für Produktions-Logistik und Technologiemanagement; Energy Efficient Tires & Tire Labeling in Europe

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The introduction of tire labeling will empower consumers to choose and evaluate their tires for the first time at point of sale...

European legislation effective from 2012

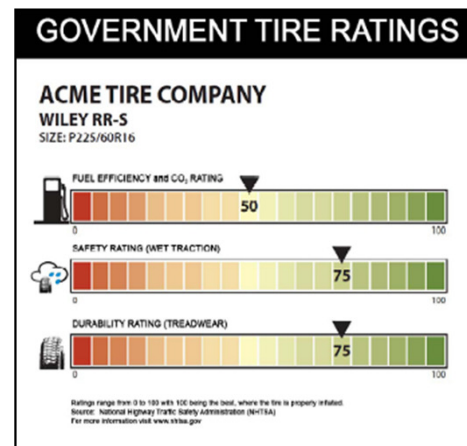
Fuel efficiency classes, passenger tires



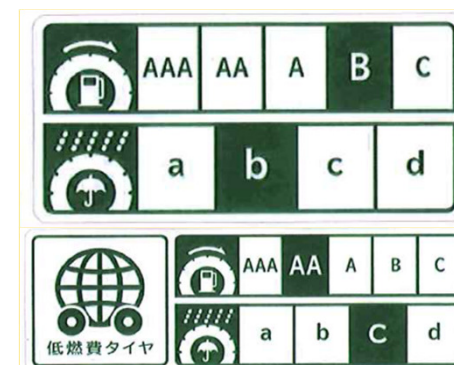
F and **G** will be banned as of 2016

Regulations in preparation in US and Japan

Tire labelings in several countries other than EU



U.S.



Japan

**Performance and innovation will become visible!
Forcing tire manufacturers to create more value with less resources**

Source: EU parliament; * LANXESS estimates; ** Rolling resistance coefficient

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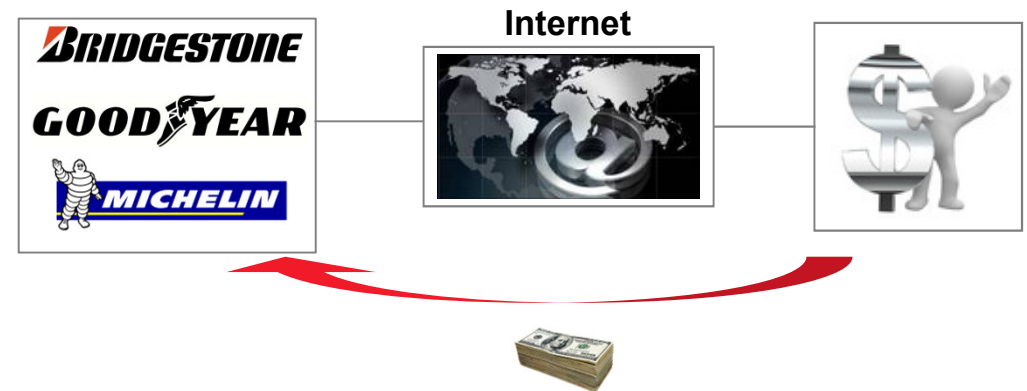
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...putting the purchasing power in their hands

Example: tire labeling as a game changer for the consumer



- Traditionally, the average consumer is unable to distinguish the difference in a variety of tires available on the market
- They have relied on the expertise of tire dealers for guidance in their purchases

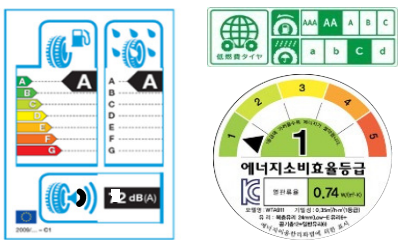


- With tire labeling and availability of information on the internet will allow consumers to compare and evaluate tires for themselves
- This will allow the proliferation of internet-based sales/service platforms from tire manufacturers

Purchasing power in the hands of the consumer!

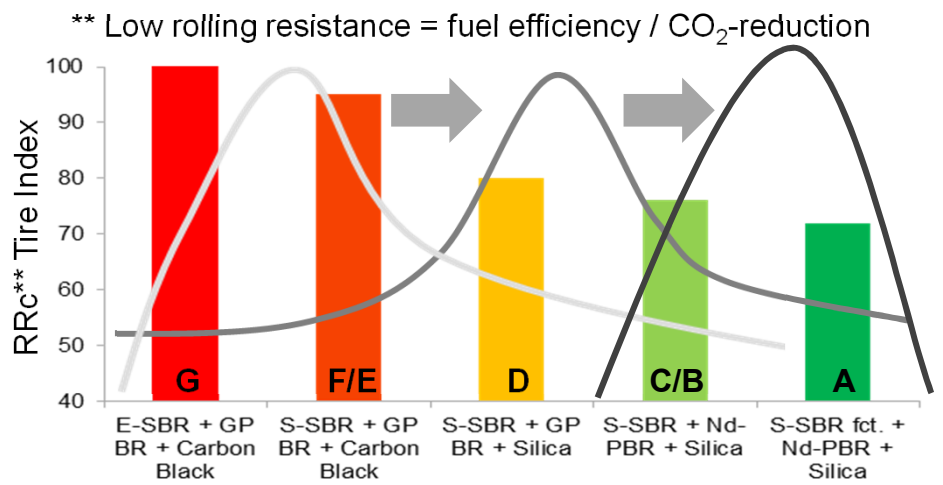
Globally, pressure on tire producers to improve the performance of their products is increasing

High performance tires will soon become global standard



AA-tire race“ already started...

Non-performance tires Performance tires



- Tire labeling initiatives push the demand for fuel-efficient tires
- Tighter specifications and more critical approval procedures are expected
- Performance requirements equalize, leading to
 - Proliferation of performance rubbers globally
 - Transfer from the tire (tread, sidewall) to other applications (e.g. retread, TBR*)
- First AA (concept) tires already in development

Retread industry is growing due to global drivers such as the new policy on retreading in China*

Outlook for the retreading and truck tire industry*

Main drivers

Recycling

Raw material costs

Fuel prices

Sustainability

Effects

Retreading reduces recycling cost/km

Growing cost advantage of retreaded tires

Increased demand for tires with low rolling resistance

Consequences

Growing number of retreads

Increasing performance of retreads

Great potential for S-SBR and Nd-PBR

Accelerators

Labeling

Fleet management

Big tire producers

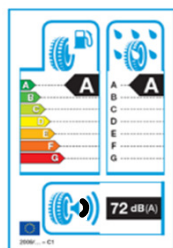
Source: S-SBR Global Market Study, project team * China's Ministry of Industry has set new rules that aim to reach 25 percent retreading by 2015

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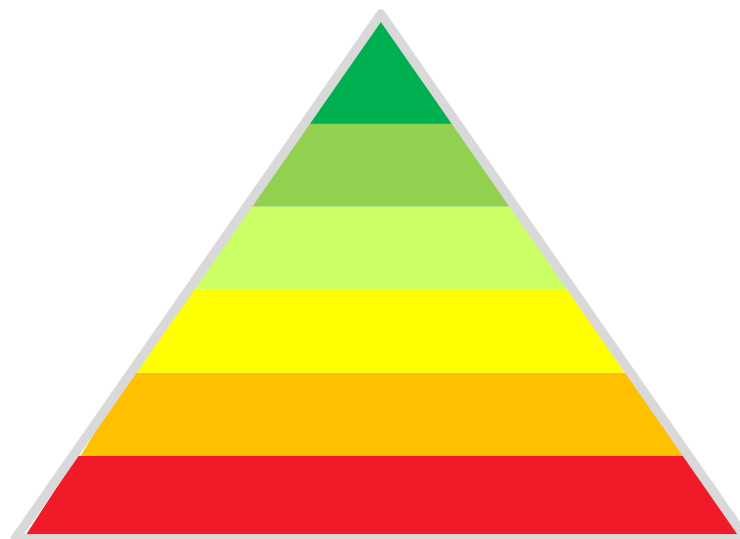
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LANXESS supports tire initiatives by focusing on global technological progress for “greener” tires”

Focusing on total technological progress based on Nd-PBR and S-SBR



Performance boost through projects targeting the (ultra) high performance segment (“differentiation”)



Performance proliferation through projects targeting high-volume tire applications globally
→ already possible today due to LANXESS' technology and application knowledge

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Increasing demand for high-performance tires

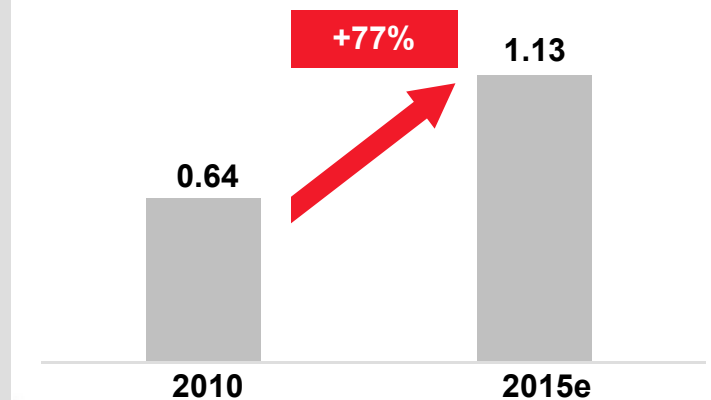
Demand for high-performance tires is growing

- By 2015, the high-performance tire segment will have increased by 77%
- Rolling-resistance-optimized tires are expected to replace regular tires and become the standard in Europe
- The implementation of new EU regulations will challenge the global rubber, tire and automotive industries to adapt their products and processes to the CO₂ emission requirements

**LANXESS offers the right products for high-performance
“Green Tires”**

Increasing tire demand

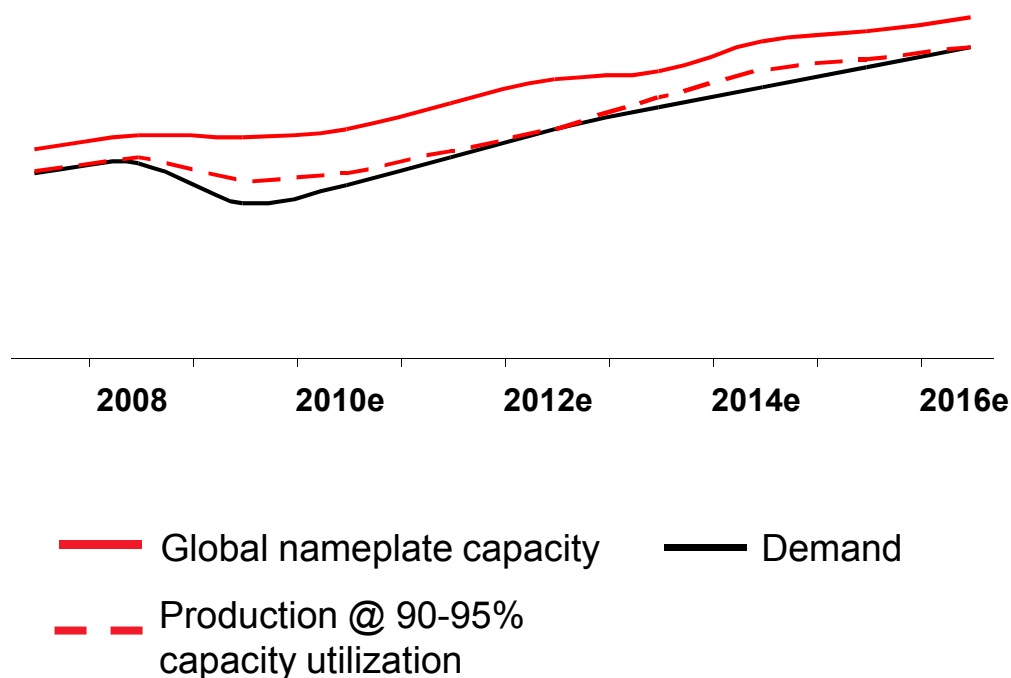
Global production of (high-)performance tires [bn units]



Supply / demand expected to tighten mid-term based on need to improve tire performance, especially for HP rubbers like Nd-PBR

HP rubbers expected to grow by ~10% p.a.

Supply / demand for PBR [volumes]



- Tire labeling makes innovation in rubber grades visible to customer
- Emerging markets shift towards performance applications
- Market for all polybutadiene rubbers in tight supply
- Smart debottlenecking of ~50kt of Nd-PBR fastest process to serve demand from Asia
- Almost all new BR investments have been in Nd-PBR

Source: LANXESS estimates based on CMAI, SRI, LMC

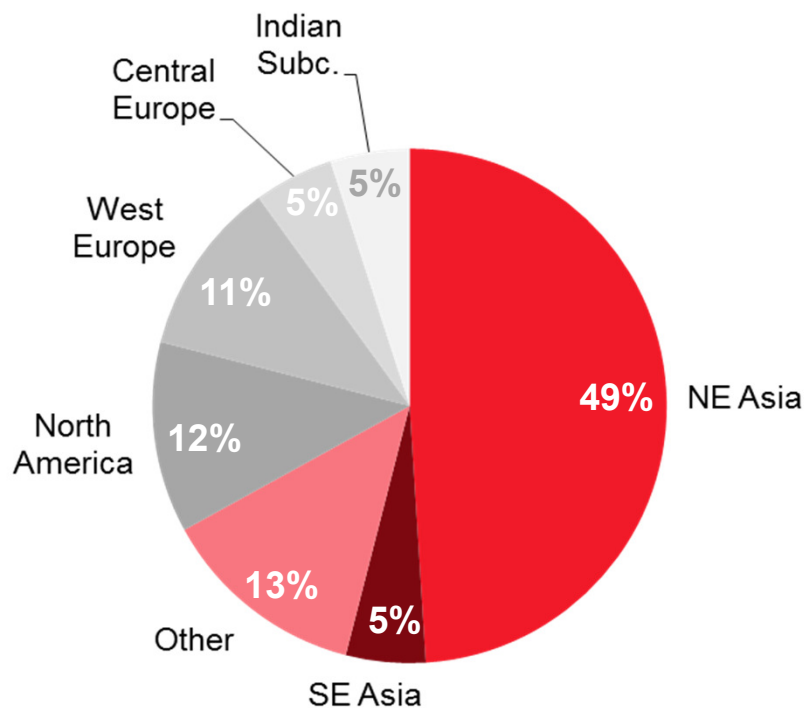
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Long term usage of SSBR likely around 30% of total SBR, mainly depending on SSBR capacities and performance proliferation

World tire production by region (2011)

Production = 3.9 bn passenger tire equivalents



	SSBR of SBR
EMEA	29%
NAFTA	22%
APAC	16%
LATAM	8%

2011 SSBR demand split



- Chinese Tire market is export driven
- Proliferation of performance in China is still on low level
- China will need large volumes of Nd-PBR and SSBR in order to compete on performance
- Brazil to accelerate introduction of tire labeling as Chinese imports of low cost tires present a huge problem
- EMEA / NAFTA show already over proportional SSBR usage with further room in NAFTA

LANXESS premium products for high-performance “Green Tires” – Neodymium polybutadiene rubber (Nd-PBR)

Characteristics

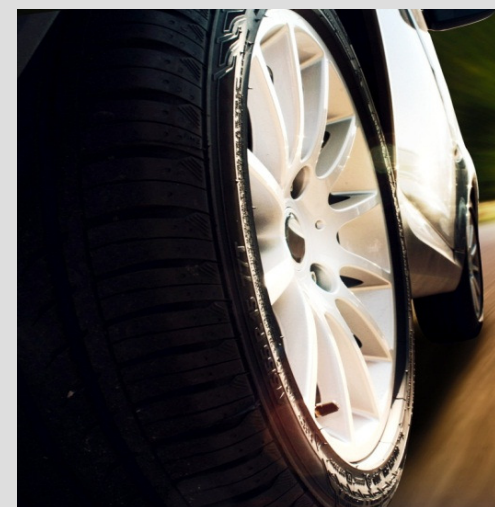
- Highest stereoregularity, narrowest molecular weight distribution and least branching within group of high cis-BRs → manufacture of tires with outstanding physical data
- Very linear and unique macrostructure → lower heat build-up and higher flexibility than other tire elastomers
- Strain-induced crystallization → greater resistance

Benefits

- Optimized rolling resistance → increased fuel efficiency and reduction of CO₂ emissions
- Excellent resistance to abrasion, flex cracking and fatigue → improved safety and durability

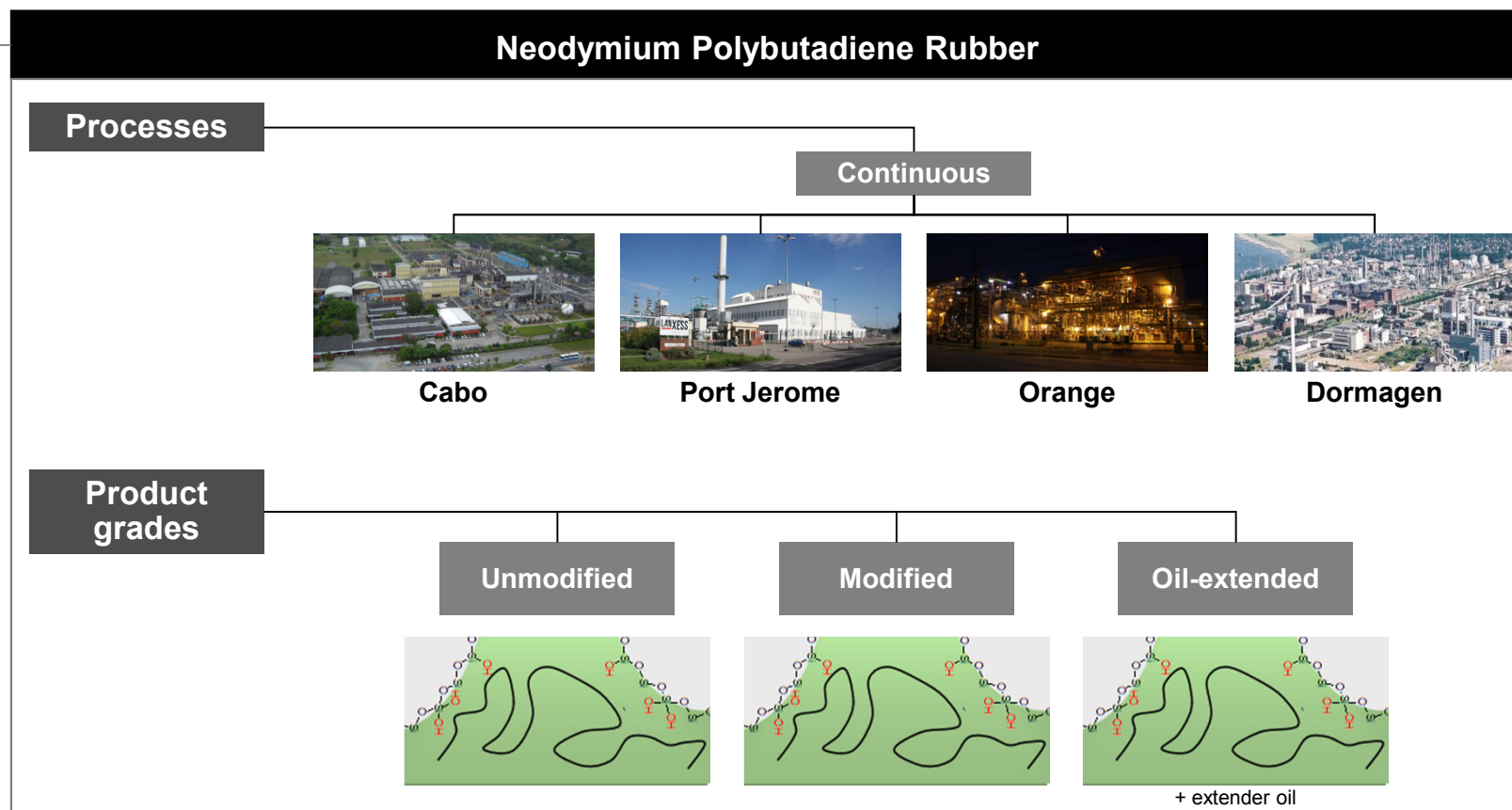
Main brands

X Buna[®] CB



LANXESS currently has 4 sites that produce Nd-PBR with a variety of product grades for high performance “Green Tires”

BU PBR product portfolio



X Buna[®] VSL

X Buna[®] CB

LANXESS premium products for high-performance “Green Tires” – Solution-styrene-polybutadiene rubber (S-SBR)

Characteristics

- High density of anchor points that connect particularly well to the hard filler particles
→ excellent bonding to silica
- Covering of the silica particles with a friction-reducing rubber skin → reduction of the internal friction of the reinforcing silica particles



Benefits

- Optimized rolling resistance → increase in fuel efficiency and reduction of CO₂ emissions
- Outstanding road grip → enhanced safety
- Very long service life → improved mileage



Main brands

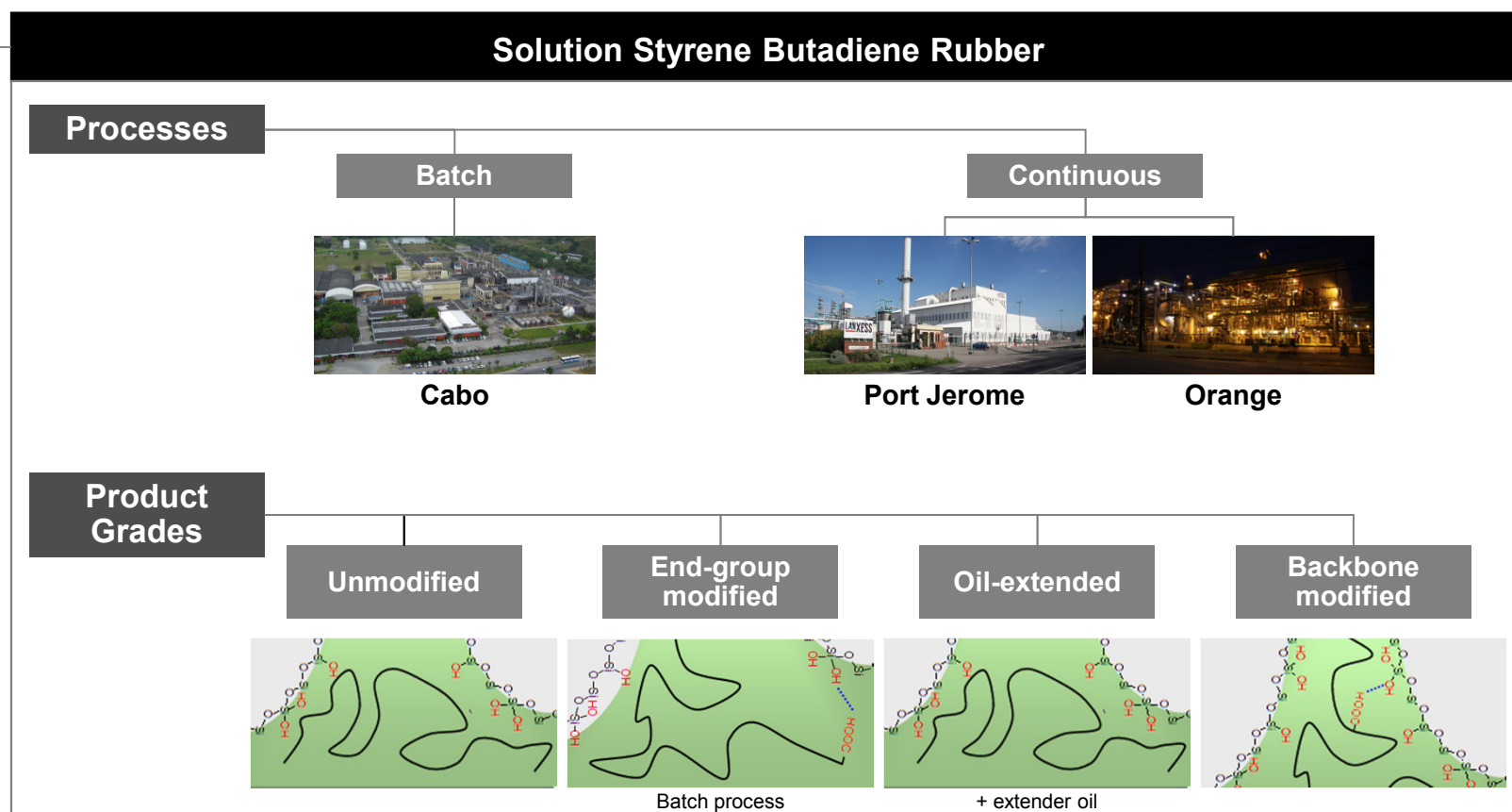
X **Buna**[®] **vSL**

LANXESS currently has 3 sites that produce SSBR with a variety of product grades for high performance “Green Tires”

BU PBR product Portfolio

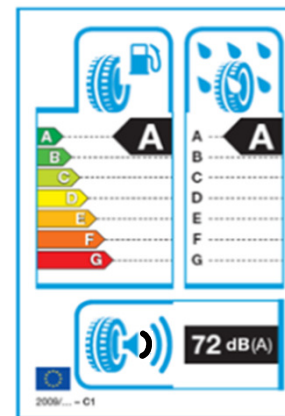
X Buna[®] VSL

X Buna[®] CB



LANXESS has created one of the world's first AA-rated tires under the new EU labeling regulations

- In order to commercialize AA-tires, durability of tires has to be optimized
- Yet, an improvement in durability usually comes at the expense of either rolling resistance or wet grip
- Using Nd-PBR, durability can be increased while still maintaining excellent properties
- The AA concept tire demonstrates the importance of Nd-PBR to increase durability
- It enables LANXESS to offer materials that have already been tested, enabling customers to shorten time-to-market



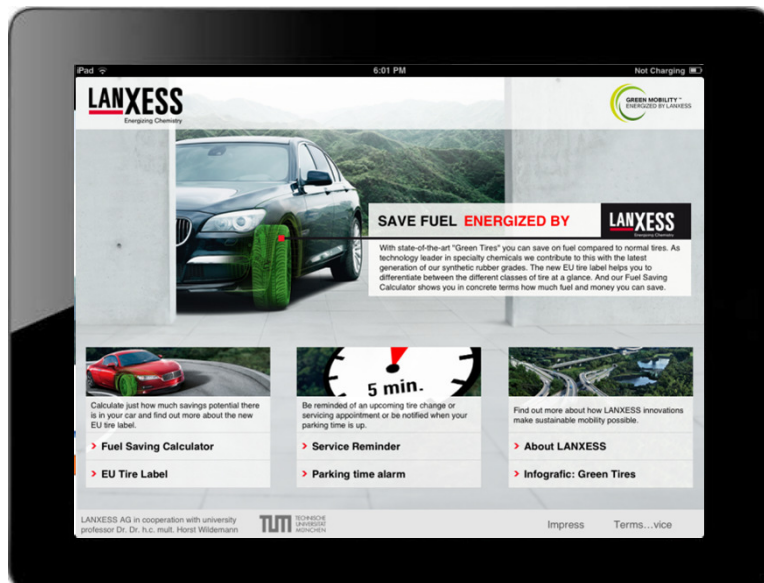
LANXESS – pushing the boundaries to enable “Green Tires”

The LANXESS Fuel-Saving App helps choosing the right tires

Fuel-Saving App: already a great success



11.600 app downloads
11.800 clicks on web-version
Time: June 2012 – End of September 2012



Rank 6 financial category



- The Fuel-Saving App helps to save fuel and money
- Developed by TU Munich, certified by TÜV Rheinland
- Main features
 - Fuel Saving Calculator
 - Information on EU tire label
- Additional features
 - Service Reminder
 - Parking time alarm
 - Information on “Green Tires”
- Available in German, English, French, Czech, Polish, Dutch, Slovenian

Rubber market in transition towards higher performance – LANXESS prepared to grow disproportionately

Market increasingly relies on performance rubbers to solve tomorrow's requirements



Market for all polybutadiene and solution styrene butadiene rubbers in tight supply



LANXESS SSBR and Nd-PBR go hand in hand to achieve maximum performance



Continue to strengthen LANXESS leading position in merchant rubber market



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Energizing Chemistry