



Automotive

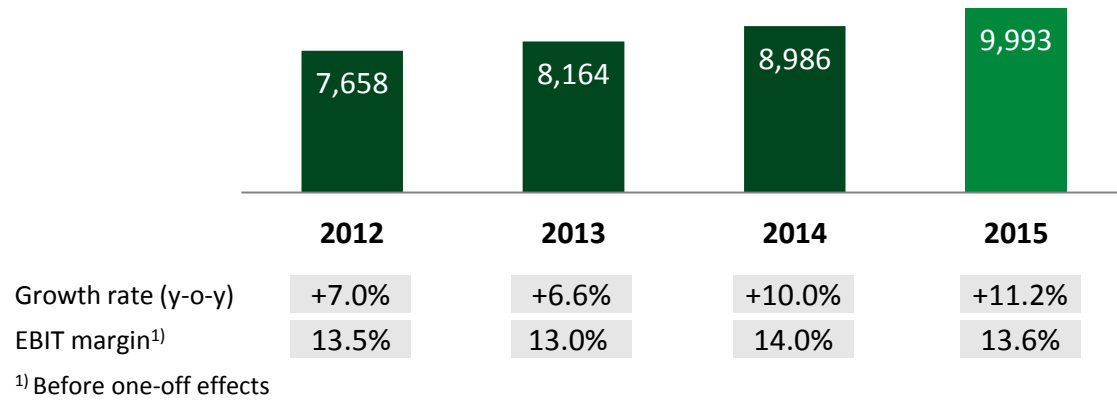
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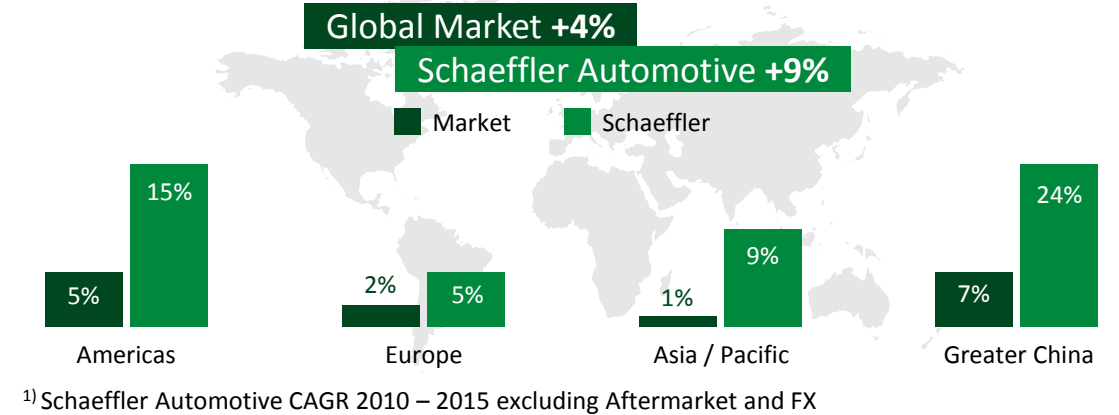
- 1 Overview
- 2 Above-market growth
- 3 Flagship initiative "E-mobility"
- 4 Outlook
- 5 Summary and key statements

Schaeffler Automotive – Growing profitably above market

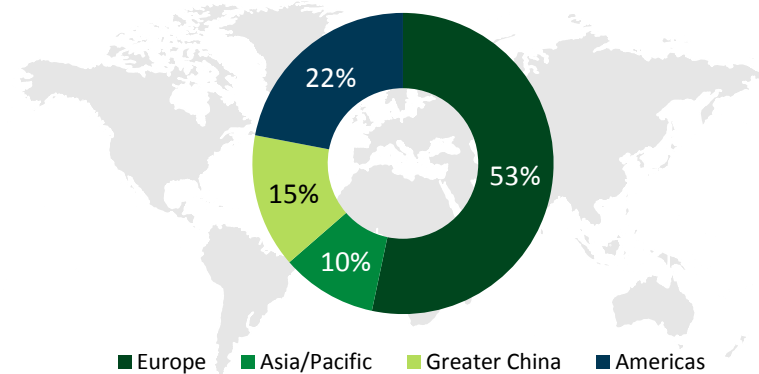
Sales and EBIT margin



Out-performance in all regions¹⁾

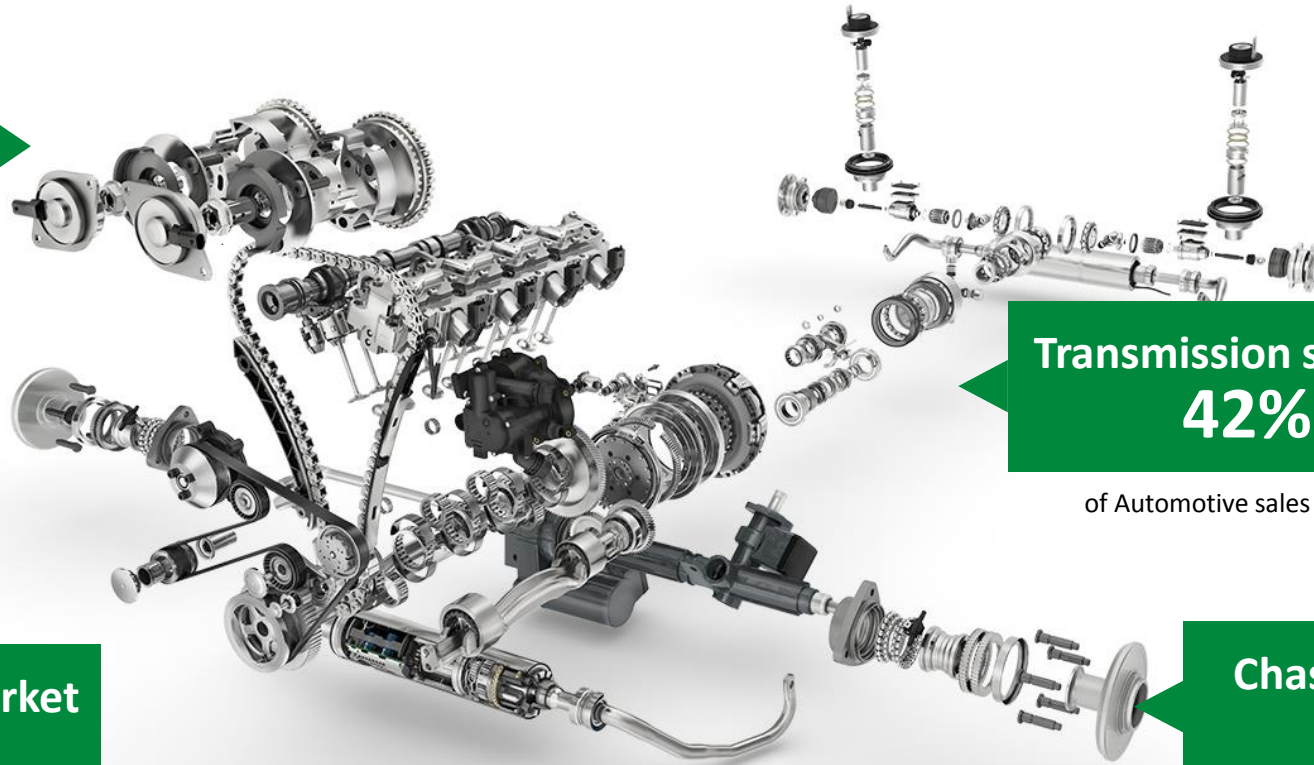


Sales by region



Broad customer mix





Engine systems
26%

of Automotive sales in 2015

Transmission systems
42%

of Automotive sales in 2015

Automotive Aftermarket
17%

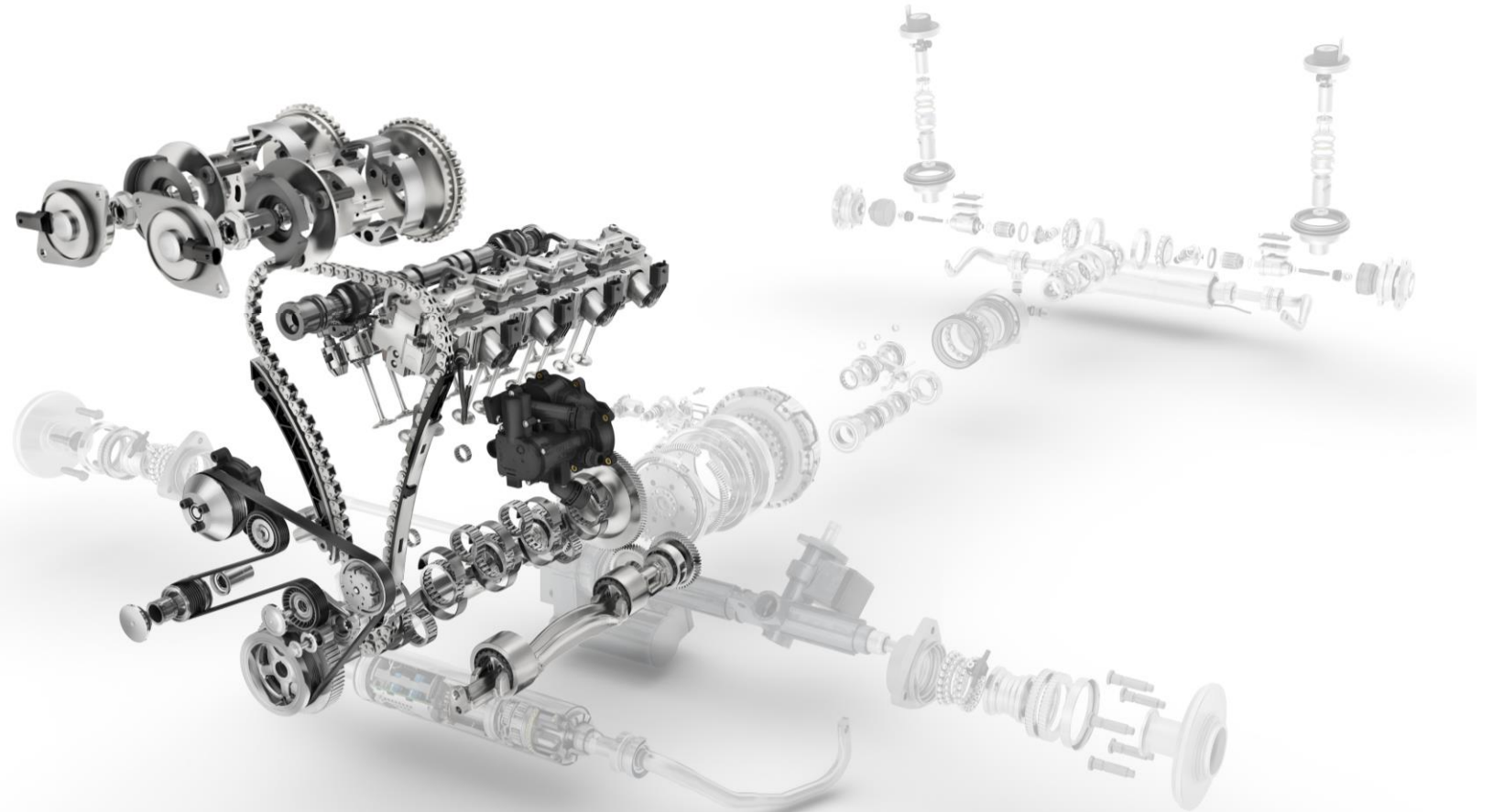
of Automotive sales in 2015

Chassis systems
15%

of Automotive sales in 2015

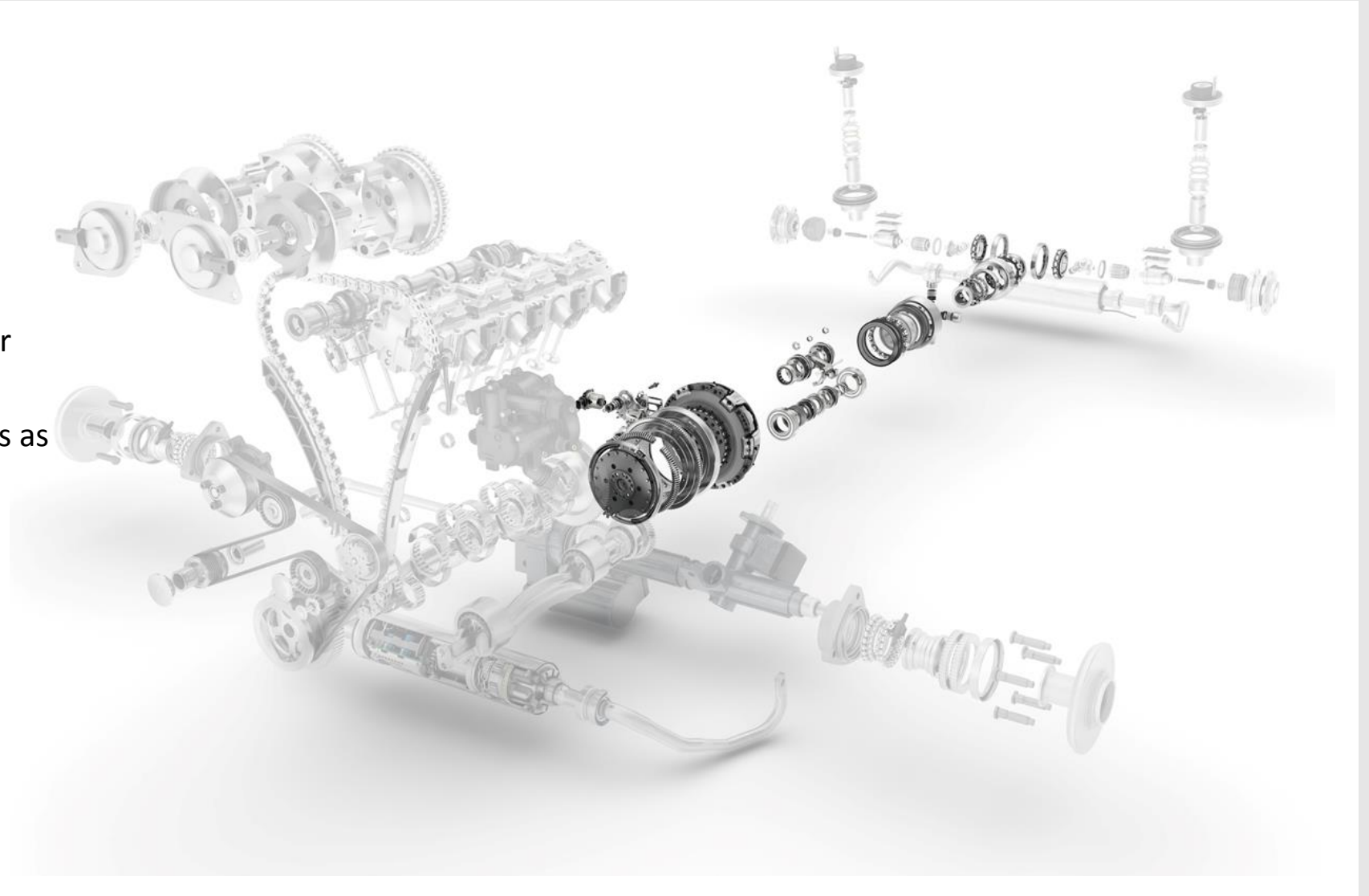
Engine systems

- ▶ Valve train components & systems
- ▶ Engine bearings and applications
- ▶ Hydraulic and electro-mechanic phasing systems
- ▶ Belt & chain drive systems for primary and accessory drives
- ▶ Thermal management modules



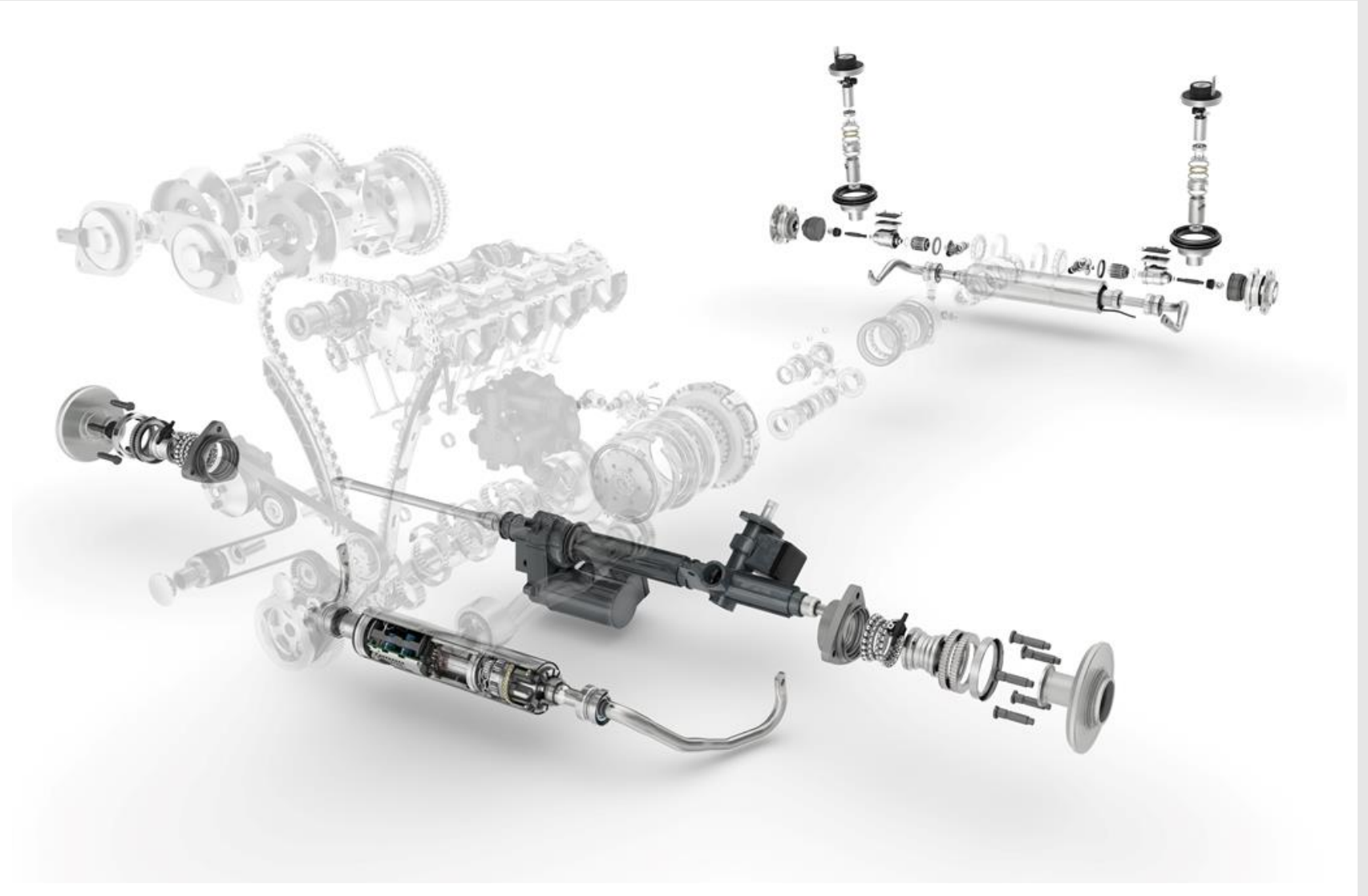
Transmission systems

- ▶ Clutch systems, E-Clutches and damping technology (e.g. dual mass flywheels)
- ▶ Double clutches, torque converter and CVT technologies
- ▶ Bearings for all transmission types as and inside the transmission products
- ▶ Hybrid modules and e-axes



Chassis systems

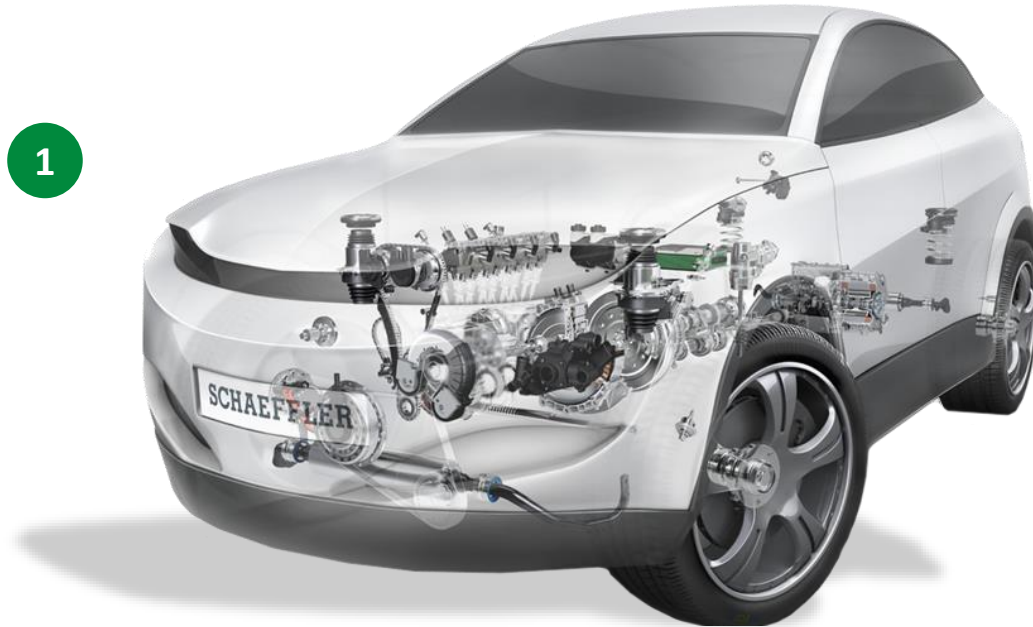
- ▶ Chassis bearings
- ▶ Wheel bearings
- ▶ Ball screw drives for electric parking brakes and electro-mechanic steering
- ▶ Electro-mechanic roll stabilizer



Automotive trends relevant for Schaeffler

**CO₂ & Emission
reduction**

1



2

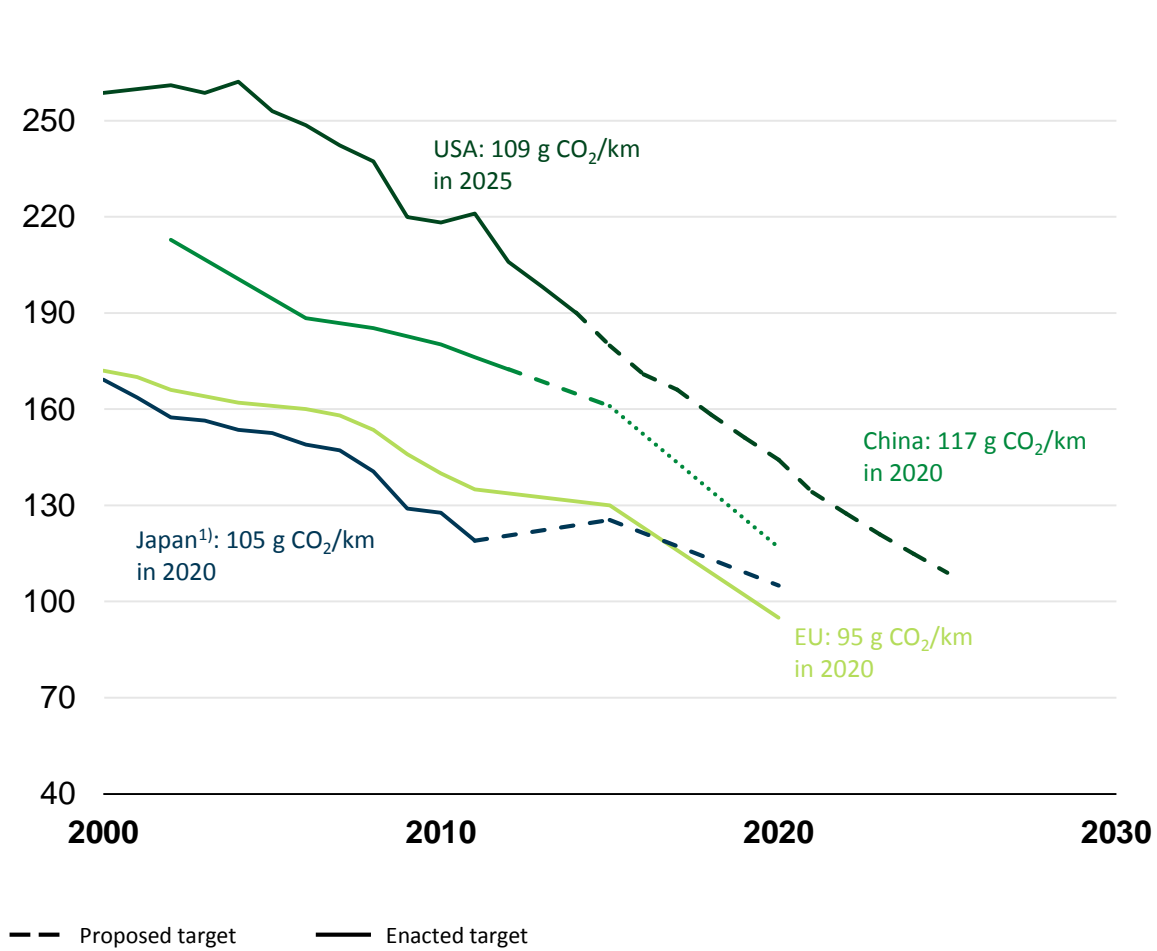
**Continuous growth
in Emerging Markets**

**Comfort &
Safety**

Connectivity

1 CO₂ & Emission reduction – More stringent environmental targets

CO₂ legislation worldwide in g-CO₂/km

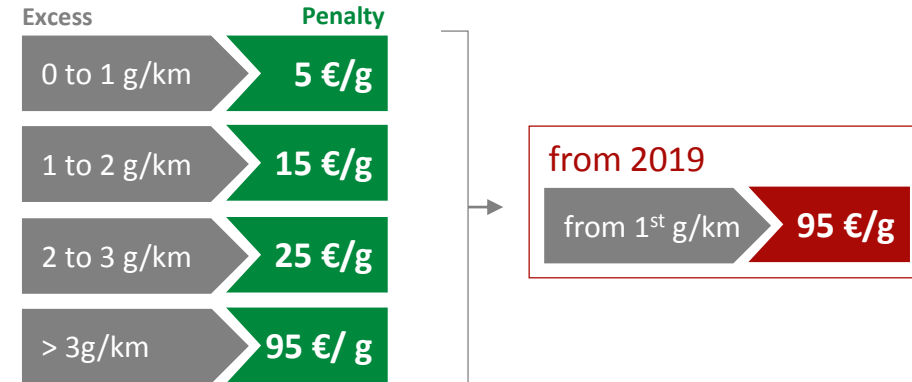


Source: icct, 2015

¹⁾ Japan has already exceeded the 2020 target in 2013

Key aspects Europe

- ▶ High penalties, if targets are exceeded



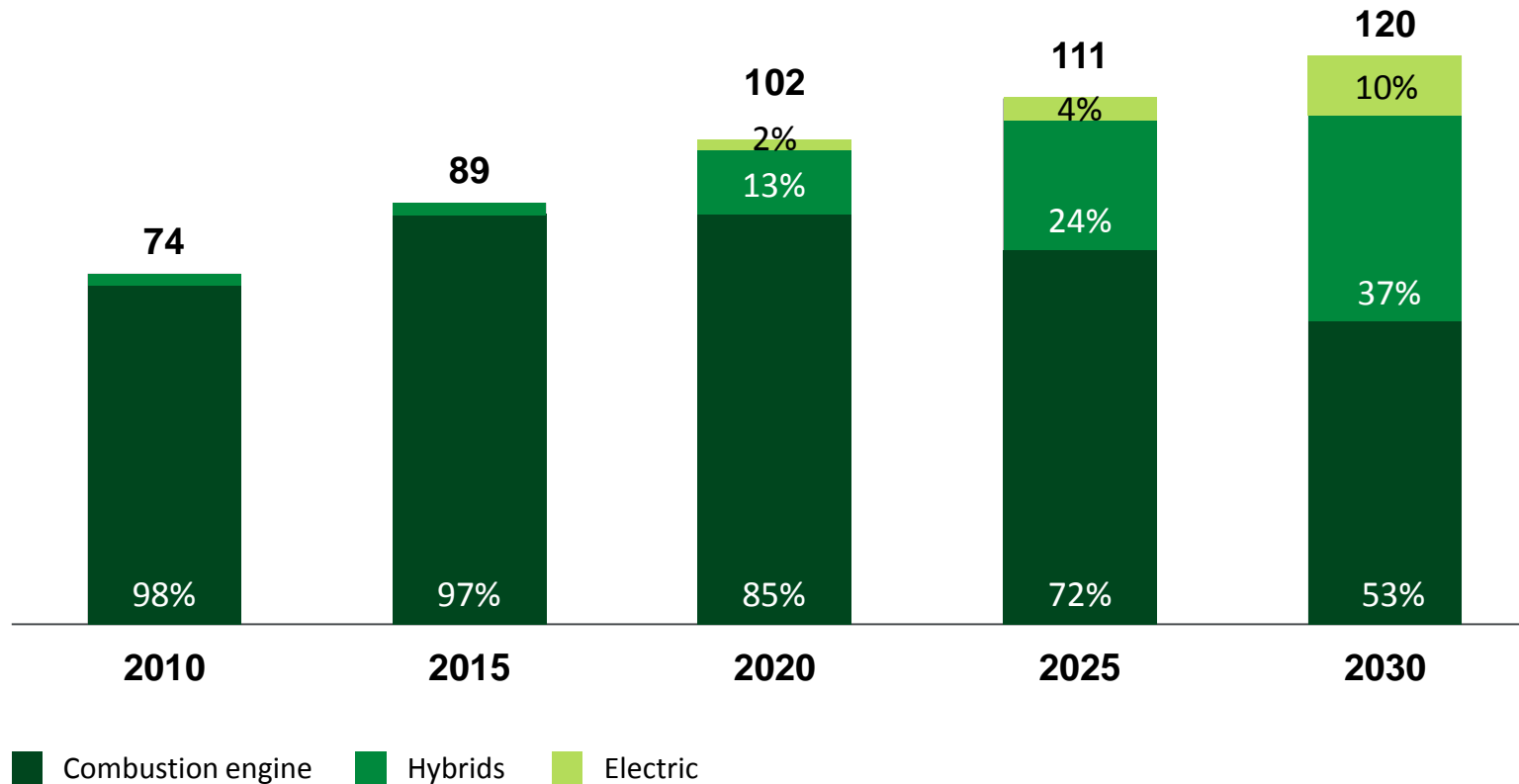
- ▶ Admission- / access-restrictions for conventional cars enacted in several large cities (e.g. in China) and planned in several other countries (e.g. in Norway)
- ▶ New challenging drive-cycles currently being introduced, e.g. WLTP / RDE in EU
- ▶ Stricter emission-legislation after 2025 expected

Further optimization of conventional drivetrain in combination with higher share of hybrids and electric vehicles necessary

1 CO₂ & Emission reduction – Electrification of powertrain will increase gradually

Powertrain concepts

Light vehicle production (in mn)



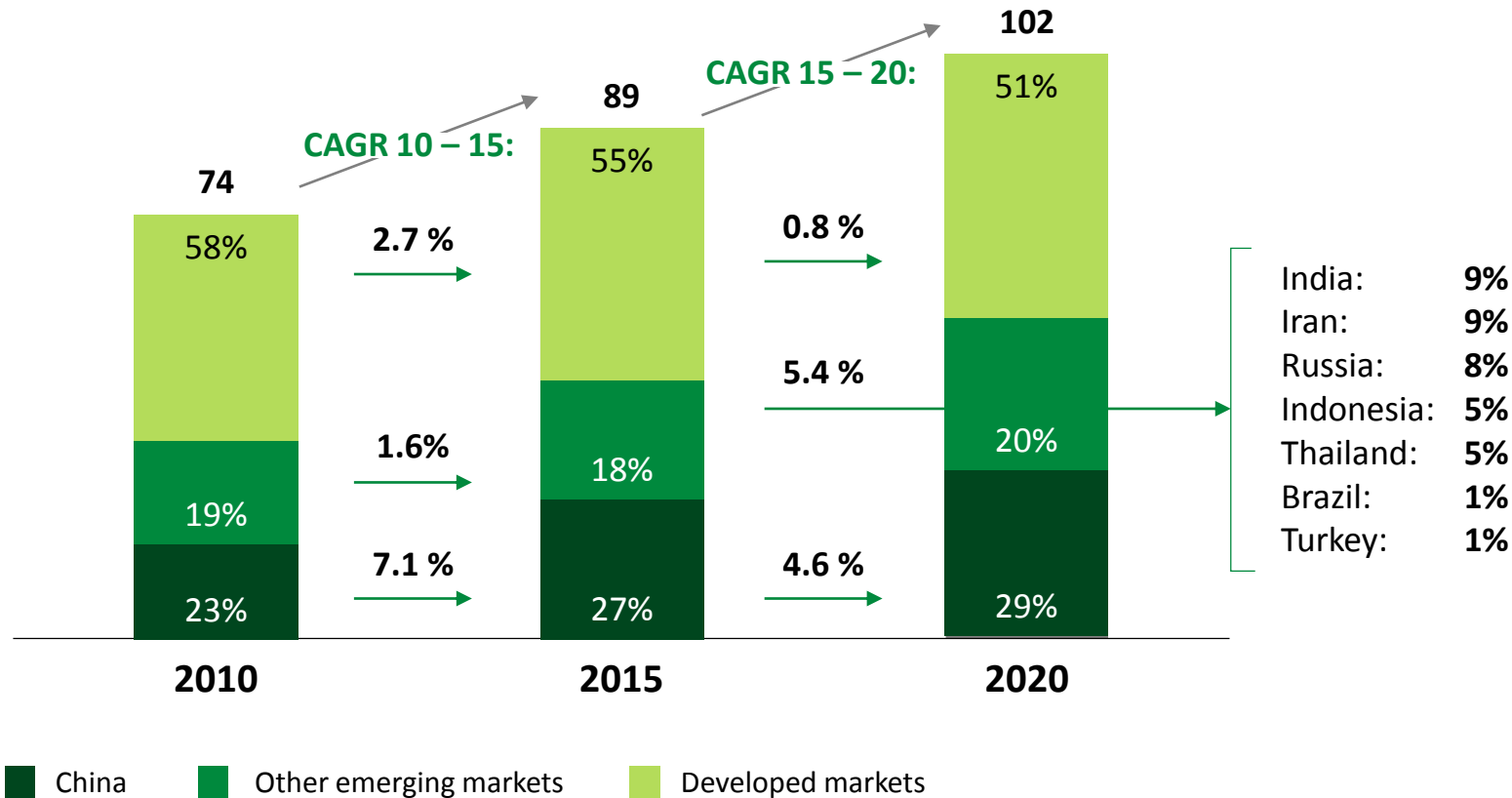
Source: IHS and Schaeffler assumptions

Key aspects

- ▶ Gradual shift towards full electrification of the drivetrain
- ▶ By 2020, the absolute number of pure combustion engines driven light vehicles is expected to be at the same level as today
- ▶ By 2020, 98% of light vehicles are expected to still have a combustion engine – thereof, 13% are expected to be in combination with an electric engine (hybrids)
- ▶ Emission legislation will be the key driver toward more electrification, in many markets combined with consumer incentives

2 Continuous growth in emerging markets – China to grow above average

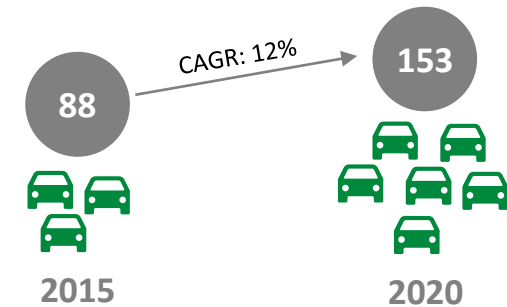
Share of emerging markets
in % of light vehicle production



Source: IHS

Key aspects

- ▶ By 2020, China is expected to produce 29% of global light vehicles
- ▶ Growth rate 2015 – 2020 in China expected to be lower than in 2010 – 2015, however, low vehicle density in China¹⁾ still shows a lot of potential:



- ▶ Growth in other emerging markets expected to accelerate in the next five years
- ▶ Growth in Poland and Mexico mainly driven by carmakers moving production to lower-cost countries

¹⁾ Passenger cars per 1,000 inhabitants; Source: IHS

Four growth pillars for Schaeffler Automotive

Most relevant Automotive trends



CO₂ & Emission reduction

Continuous growth in Emerging Markets

Comfort & Safety

Connectivity

Growth pillars

- 1 Growth from **new technologies / products**
- 2 Growth from **higher systems share**
- 3 Growth from **new customers and markets**
- 4 Growth from **Aftermarket business**

Current examples

Finger follower (not switchable)



~ 4 x more content¹⁾



Finger follower (switchable)

Conventional clutch



~ 10 x more content¹⁾



Double clutch with actuation and control unit

+15% pts installation rate²⁾



Ball screw drive for electric brake China

Dual mass flywheel (single parts)



> 4 x faster growth³⁾

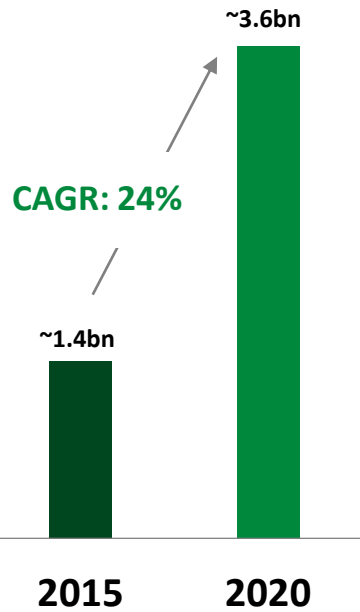


RepSet dual mass flywheel

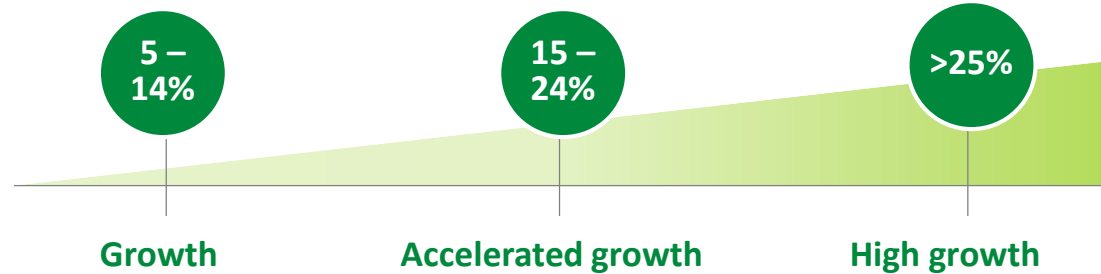
¹⁾ based on unit price; ²⁾ installation rate 10% in 2015, 25% in 2020; ³⁾ Sales CAGR 2015 – 2020

1 Growth from new technologies / products

Expected OE sales from innovations launched since 2012



We are positioned in a number of fast growing technologies¹⁾



- | Growth | Accelerated growth | High growth |
|---|---|---|
| <ul style="list-style-type: none"> ▶ Next-generation Dual Mass Flywheels ▶ Double Clutches ▶ Next-generation Torque Converters ▶ Hydraulic and electro-mechanical Phasing Systems ▶ Clutch Actuators | <ul style="list-style-type: none"> ▶ Crankshaft Decoupler Systems ▶ Turbocharger Ball Bearings ▶ Fully variable Valve Train Systems (Uniair) | <ul style="list-style-type: none"> ▶ Start Stop: Belt Alternator Starter Tensioner (48V) ▶ E-Clutch ▶ Switchable Finger Followers ▶ Thermal Management Modules ▶ Electro-mechanic Roll Stabilizer ▶ Hybrid Module ▶ Electric Axles |
-
- ▶ Mechanical components / systems
 - ▶ Mechatronic systems (mechanic systems with electronic content)

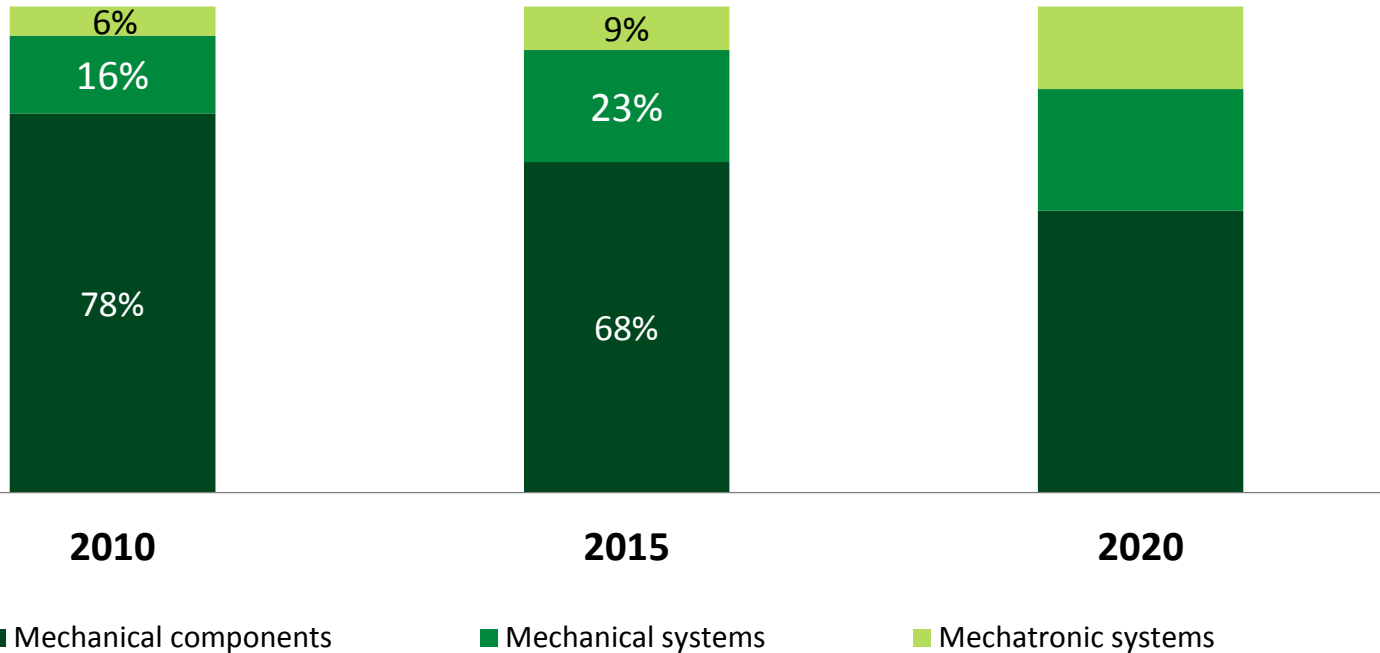
Key aspects

- ▶ In 2020, we expect EUR 3.6 bn of OE sales from innovations launched since 2012 (CAGR of 24%)
- ▶ Major CO₂ emission regulation trends for combustion engines persist, i.e. friction reduction, growing variability of the valve train
- ▶ Complex mechatronic systems gain market share, i.e. fully variable valve train systems
- ▶ Shift towards more automated transmissions continues over the coming five years
- ▶ Increasing electrification of the drivetrain enables new innovations, i.e. E-Clutch, 48V start-stop systems, hybrid modules, electric axles

¹⁾ Market growth rates CAGR 2015-2020

2 Growth from higher systems share

Systems share to grow by 2020 in OE business



Definition:

Mechanical systems: Products with Schaeffler components and high level of complexity

Mechatronic systems: Mechanical systems with electronic content

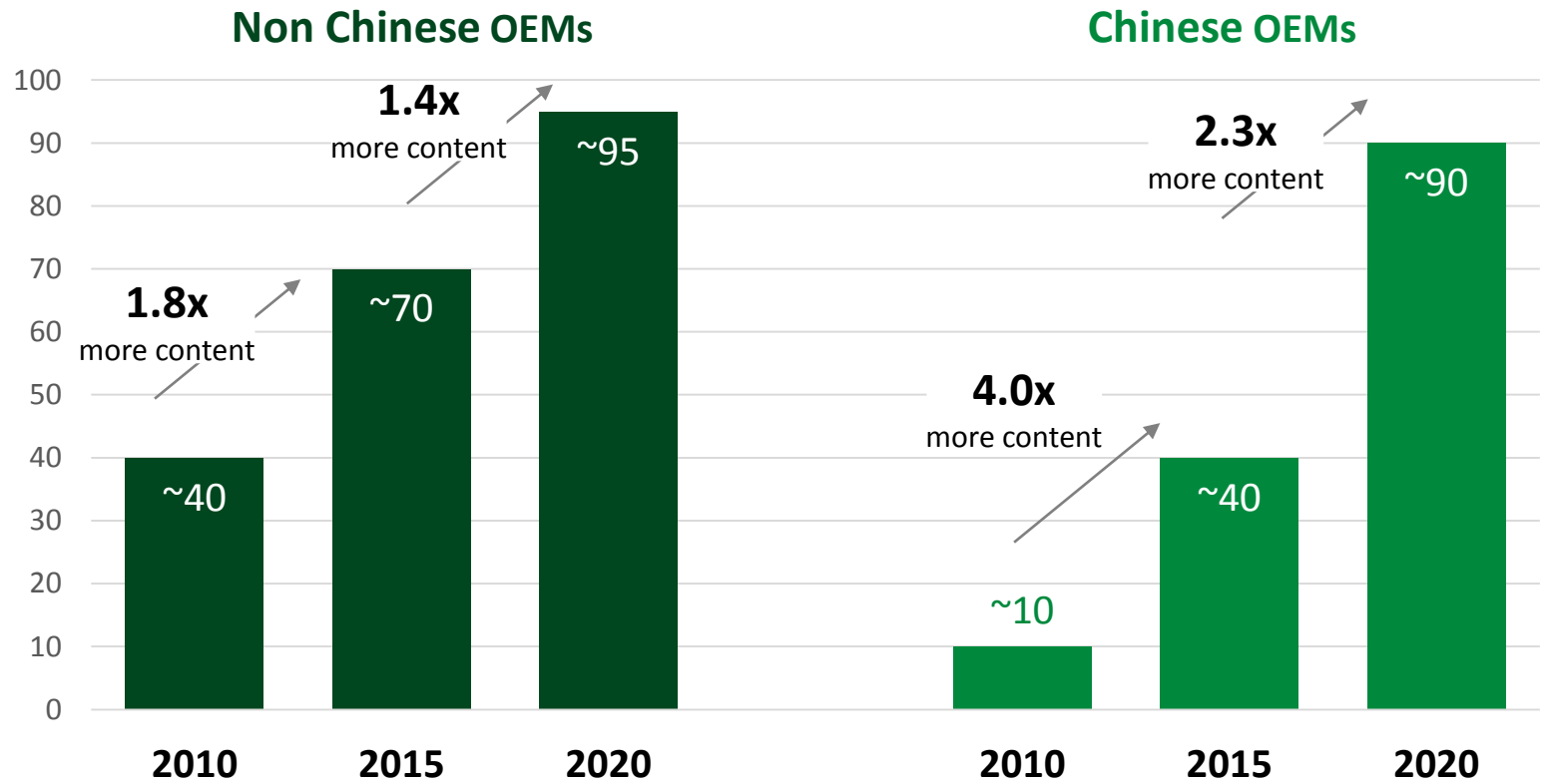
Key aspects

- ▶ Supplying components will remain our core business
- ▶ In addition, we will further expand our systems business
- ▶ Systems are becoming more complex (i.e. UniAir, Electro-mechanic Roll Stabilizer, E-Clutch); electronic content is growing
- ▶ As demonstrated in the past, we are confident to secure our value add in mechatronic systems (e.g. UniAir, Thermal Management Module)

3 Growth from new customers and markets

Content per car growth in China¹⁾

in EUR per Vehicle



¹⁾ For selected OE customers

Key aspects

- ▶ Schaeffler present in China since 1995
- ▶ The share of sales with local Chinese OEMs is expected to increase from 33% in 2015 to approximately 45% by 2020
- ▶ As a consequence, we will over-proportionally increase our content per car with Chinese OEMs
- ▶ Main growth drivers for Schaeffler in China in the next 5 years are thermal management module, double clutch transmission, CVT, hybrid module, e-axle
- ▶ Strong potential for Schaeffler Aftermarket business since relevant market size is expected to grow by 10%+ CAGR until 2020

4 Growth from strong Aftermarket business

Key aspects

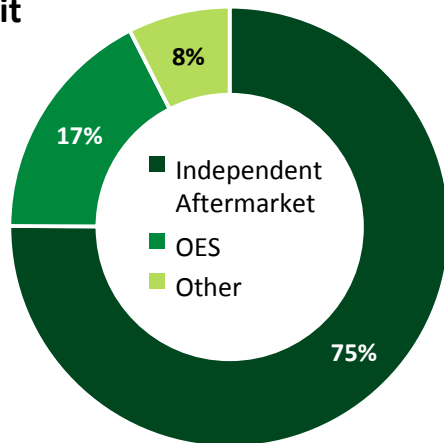
- ▶ We are among top 3 market leaders in our core product groups
- ▶ We combine the innovation power of our OE business with the ability to offer market-driven repair solutions
- ▶ We support our customers with outstanding workshop know-how through our RepXpert platform (online & offline)

Key growth trends

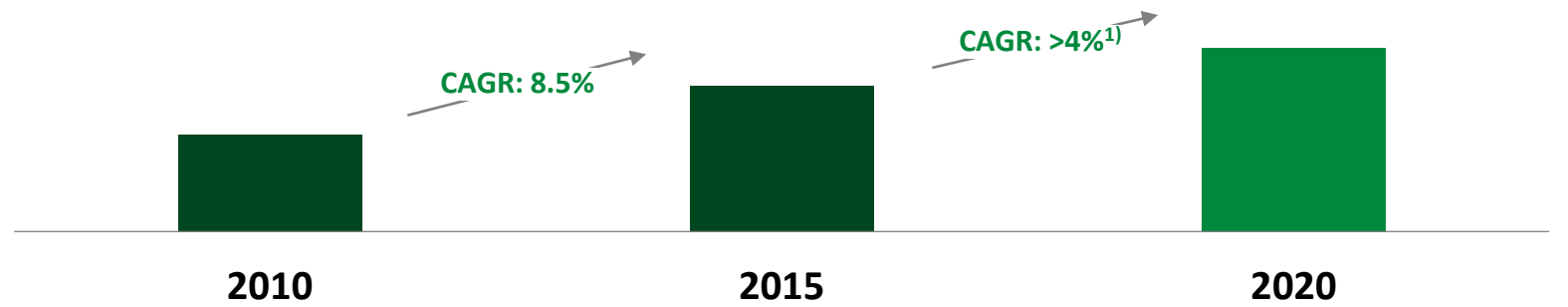
- ▶ From parts to solutions:
 - ▷ Complexity of repairs and interaction between components remain key drivers for new repair solutions and services
 - ▷ European sales share generated with kits & sets is expected to increase from 53% in 2015 to around 60% by 2020
- ▶ Expansion into emerging markets
- ▶ Full range product solution offering
- ▶ Use of cross selling opportunities



Sales split



Sales growth Schaeffler Automotive Aftermarket



¹⁾ Expected CAGR at constant currency



3 Schaeffler USPs in e-mobility

20 years
of experience in
transmission
technologies

1990
first automatic
clutch

17 years
e-mobility knowhow

Mechanical know-how

We know how to bring the power on the road. Requirements are similar to a combustion drive, i.e. performance, space, long-term durability, weight, acoustics.

Integration know-how

We know how to integrate E-drive modules into powertrains. Requirements are similar to a combustion drive, i.e. installation space neutrality, efficient design.

Vehicle and Drive-train know-how

Based on long-term experience in engine, transmission and chassis systems we are able to provide optimal system solutions for future drivetrains in different regions of the world.

1999

1st Schaeffler E-mobility symposium

2002

1st E-mobility concept car

2005

1st serial production of components for hybrid modules

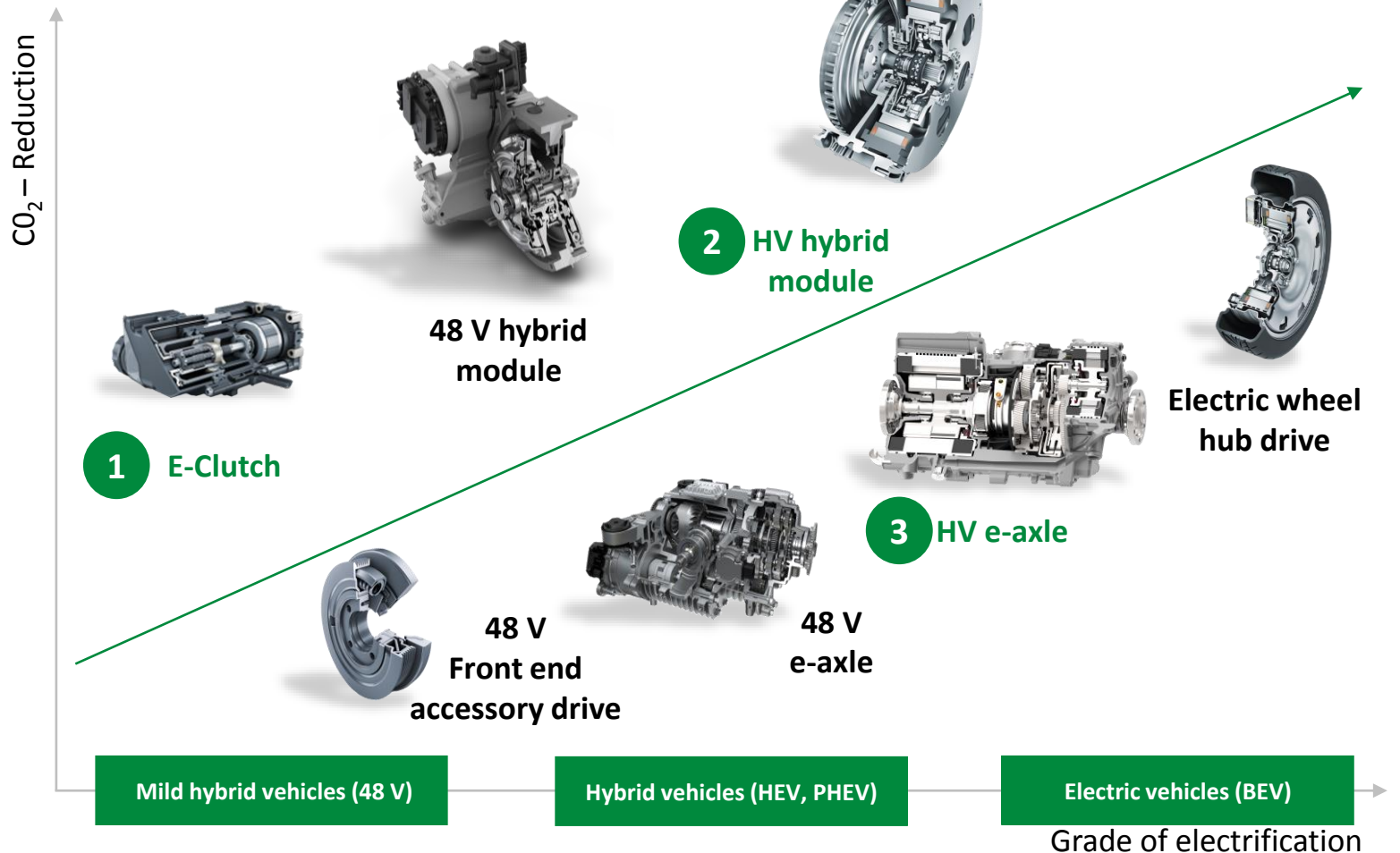
2016

- ▶ 500 Million Euro investment to date
- ▶ 1,200 employees globally in R&D and manufacturing of mechatronics, hybrid technologies and e-mobility
- ▶ 4 customer projects for hybrid modules
- ▶ 4 customer projects for e-axles

2020

- ▶ Further 500 Million Euro investment
- ▶ Doubling of employees in R&D and manufacturing

Level of integration

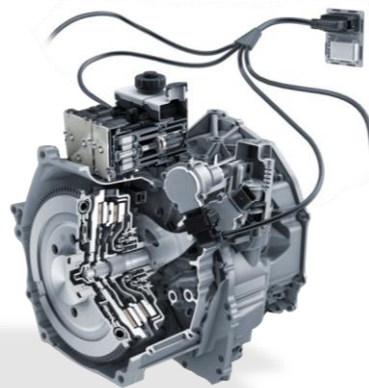


1 E-Clutch – Entry-level automation for manual transmission

Manual transmission



Double clutch transmission



Electronic clutch system



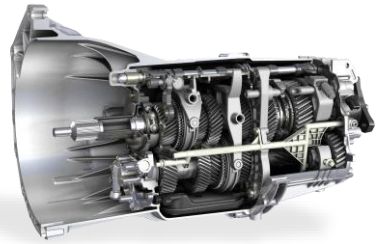
From components for manual transmission
over double clutch systems with innovative actuation and control units
to electric clutch systems

Key aspects

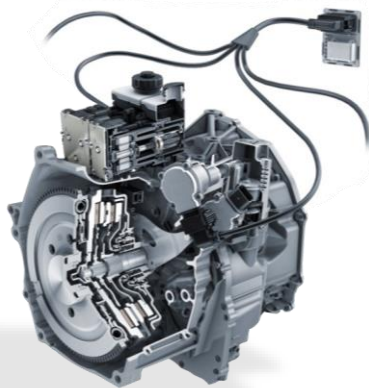
- ▶ 44% of all transmissions produced globally are manual transmissions (2020e: 40%)
- ▶ E-Clutch allows for significant reduction of CO₂ emission via sailing
- ▶ We provide partly or fully automatic clutch actuation (no clutch pedal needed)
- ▶ E-Clutch solutions are derived from Schaeffler clutch systems and actuation / software know-how
- ▶ Content in cars with manual transmissions to significantly increase through E-Clutch
- ▶ Start-of-production (SOP) expected in 2018/2019
- ▶ GreenTec Award winner 2016 for E-Clutch

2 Hybrid module – System expertise successfully transferred

Manual transmission



Double clutch transmission



Hybrid module



From clutches and dampers for manual transmission
over double clutch systems with innovative actuation and control units
to highly integrated P2 hybrid modules

Key aspects

- ▶ P2 hybrid module with clutch system integrated into the rotor
- ▶ Located between ICE and transmission – High flexibility to adapt to suit various engines and transmissions
- ▶ Includes electric motor, DMF damper, dry disconnect clutch and electromechanical actuator in an extremely compact design → High value add
- ▶ Can be used in 48V architectures and HV drive concepts
- ▶ SOP in 2017

3 Electric axle – Highly integrated system based on Schaeffler technologies

Conventional products



"Normal" differential



"Normal" planetary carrier

Schaeffler products



Lightweight differential
30% less weight
70% less axial space



Sheet metal planetary carrier
40% less weight
30% lower cost

Schaeffler electric axles



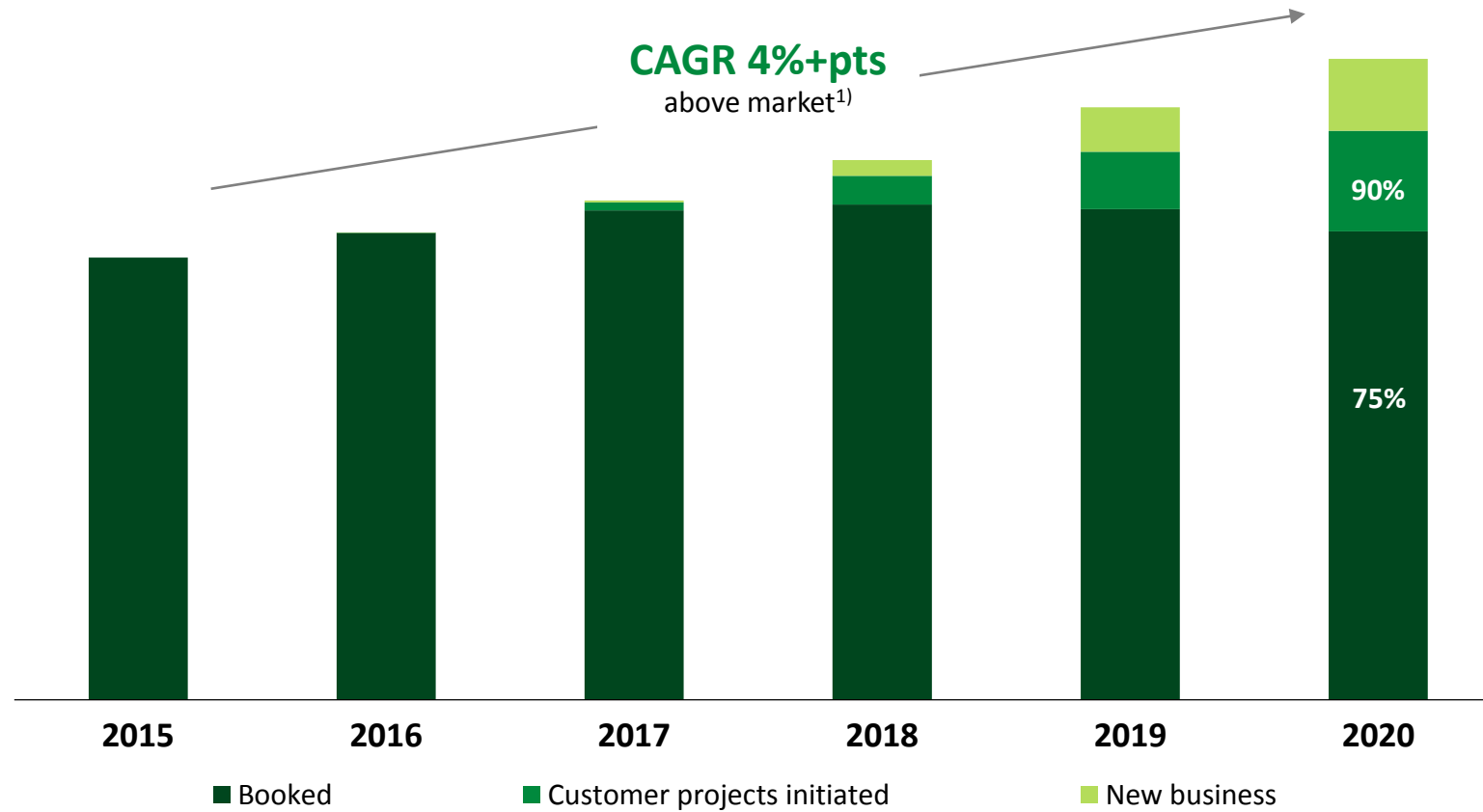
Key aspects

- ▶ Modular electric axle
- ▶ Compact design based on Schaeffler's planetary transmission and lightweight differential technology
- ▶ Two speed e-axle with gearshift actuator; second gear is required for high top-speed
- ▶ Basic configuration can be extended by adding functional elements, e.g. integrated torque vectoring technology for sporty driving
- ▶ Integrated control unit for actuation and power electronics for torque vectoring
- ▶ SOP in 2017

From conventional products
over significantly improved Schaeffler technology
to highly integrated P4 electric axles with differential and Schaeffler planetary transmission

Estimated share of booked business and initiated customer projects

in % of net sales (excluding Aftermarket)



¹⁾ At constant currency

Key aspects

- ▶ Around 90% of our OE business for 2020 is either booked business or customer projects that are already initiated
- ▶ We target an average growth rate of at least 4%-pts above market¹⁾ for our Automotive OE business until 2020
- ▶ Mix impact from mechatronics is expected to remain limited; we aim to maintain our high level of profitability
- ▶ We are confident to be able to secure our value add in mechatronic systems

Key messages

1 We expect **OE sales CAGR of at least 4%-pts¹⁾ above global market** and **Aftermarket growth of at least 4%¹⁾ CAGR in 2015 – 2020.**

¹⁾At constant currency

2 Supplying components will remain our core business. In addition we expect to **further increase our systems share** by 2020.

3 We plan to invest an **additional EUR 500 mn into E-mobility** by 2020.

4 Until 2020, we expect **our value add and our profitability to remain at a high level.**

**PROFITABLE
GROWTH ABOVE
MARKET**