



KNORR-BREMSE



Fact Book

2019

1 Introduction

2 Key Company Highlights

3 Rail Vehicle Systems (RVS)

4 Commercial Vehicle Systems (CVS)

5 R&D Focus

6 Financials

7 Sustainability

8 Capital Markets Summary

9 Appendix

The Knorr-Bremse leadership team



Bernd Eulitz
CEO

- 2019-today: Knorr-Bremse
CEO
- 2004-2019: Linde AG
Exec. Vice President Americas
COO EMEA
- 2000-2004: A.T. Kearney
- Diploma in Process/Chemical
Engineering

Professional
Experience

25

Years with
Knorr-Bremse

1



Ralph Heuwing
CFO

- 2017-present: Knorr-Bremse
CFO
- 2007-2017: Dürr (MDAX listed)
CFO
- 1990-2007: The Boston
Consulting Group
Partner and Managing Director
- Diploma in Mechanical
Engineering, Master of
Business Administration (MBA)

Professional
Experience

29

Years with
Knorr-Bremse

2



Dr. Peter Laier
Head of CVS

- 2016-present: Knorr-Bremse
Head of CVS
- 2014-2015: Benteler
International
COO
- 2013-2014: Osram Licht
CTO
- 2000-2012: Continental
Executive Vice President
- PhD and Diploma in
Mechanical Engineering

Professional
Experience

23

Years with
Knorr-Bremse

3



Dr. Jürgen Wilder
Head of RVS

- 2018-present: Knorr-Bremse
Head of RVS
- 2015-2017: DB Cargo AG
CEO
- 2013-2015: Siemens AG
Mainline Transportation Global
Business Unit CEO
- 2011-2013: Siemens AG
Head of Strategy Infrastructure
and Cities Sector
- Doctorate in Physics

Professional
Experience

19

Years with
Knorr-Bremse

1

Notes: RVS - Rail Vehicle Systems; CVS - Commercial Vehicle Systems

Knorr-Bremse – One of Germany’s most successful industrial companies



KNORR-BREMSE



Family-Ownership,
heritage and unique DNA



Global market leader
for braking systems



Shared pneumatics
experience between RVS
and CVS



Technology leadership

2018 key financials

Sales
€6.6bn
(>10% CAGR¹⁾
since 1989)

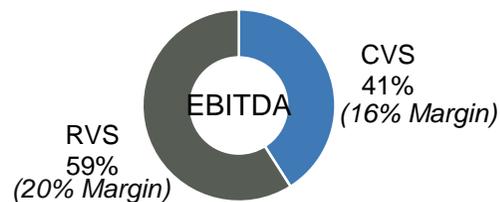
EBITDA
€1.2bn
(margin 17.8%)

EBIT
€973m
(margin 14.7%)

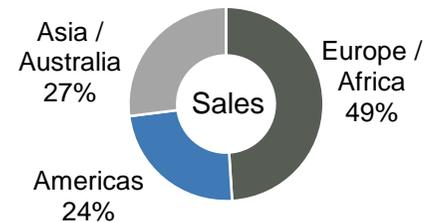
R&D
€364m
(~5.5% of sales)

Aftermarket
~34% of sales

Balanced portfolio²⁾ ...



... and diversified global footprint with high local content



- 30+ countries
- 100+ sites
- c. 28k employees³⁾

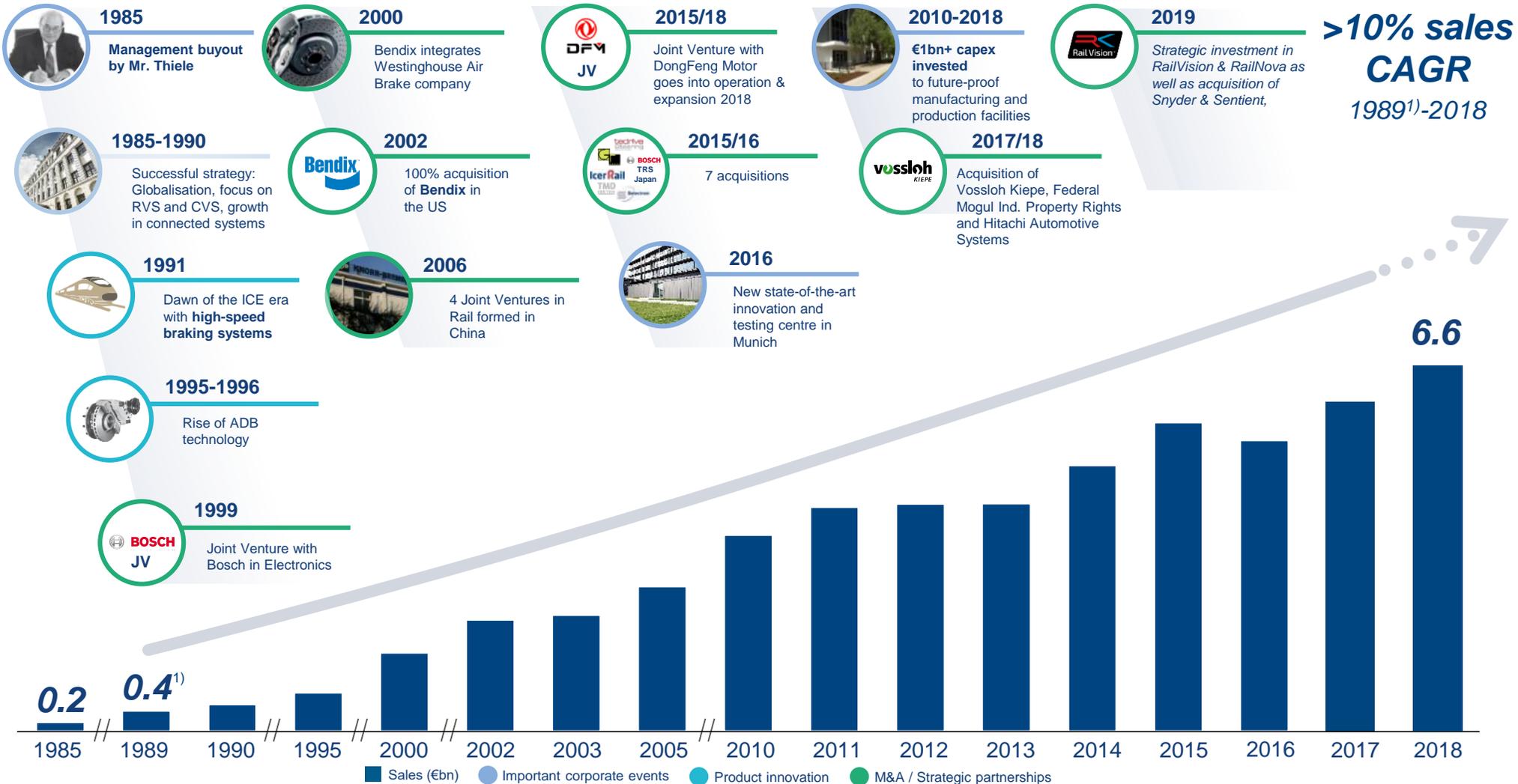
Notes: Sales, EBITDA, EBITA, and EBIT for 2018 based on annual report prepared in accordance with IFRS, other financial figures for 2018 prepared in accordance with German GAAP (HGB); Aftermarket share based on German GAAP (HGB) where BilRUG sales allocated proportionally between OE and aftermarket; RVS – Rail Vehicle Systems; CVS – Commercial Vehicle Systems;

¹⁾ CAGR 1989–2018 based on German GAAP (HGB), 1989 – first year when consolidated accounts are available; ²⁾ Excluding consolidation/other; ³⁾ Including human resources leased staff;

Source: Knorr-Bremse information



Over 30 years of consistent strong growth



Notes: 1986-2018 based on financial statements prepared in accordance with German GAAP (HGB) and 2017 and 2018 based on financial statements prepared in accordance with IFRS. ¹⁾ 1989 – first year when consolidated accounts are available; Source: Knorr-Bremse information

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Knorr-Bremse – A best-in-class industrial company

- 1 Global #1**

Number one supplier for braking systems and a leading supplier of other safety critical rail and commercial vehicle systems protected by high barriers to entry
- 2 Synergistic business**

Technology and scale benefits between rail and commercial vehicles
- 3 Market outperformance**

Consistent outperformance of attractive end-markets driven by megatrends and increasing content per vehicle
- 4 The industry innovator**

Driving innovation in mobility and transportation technologies through R&D, quality excellence and edge in connected systems
- 5 Resilience**

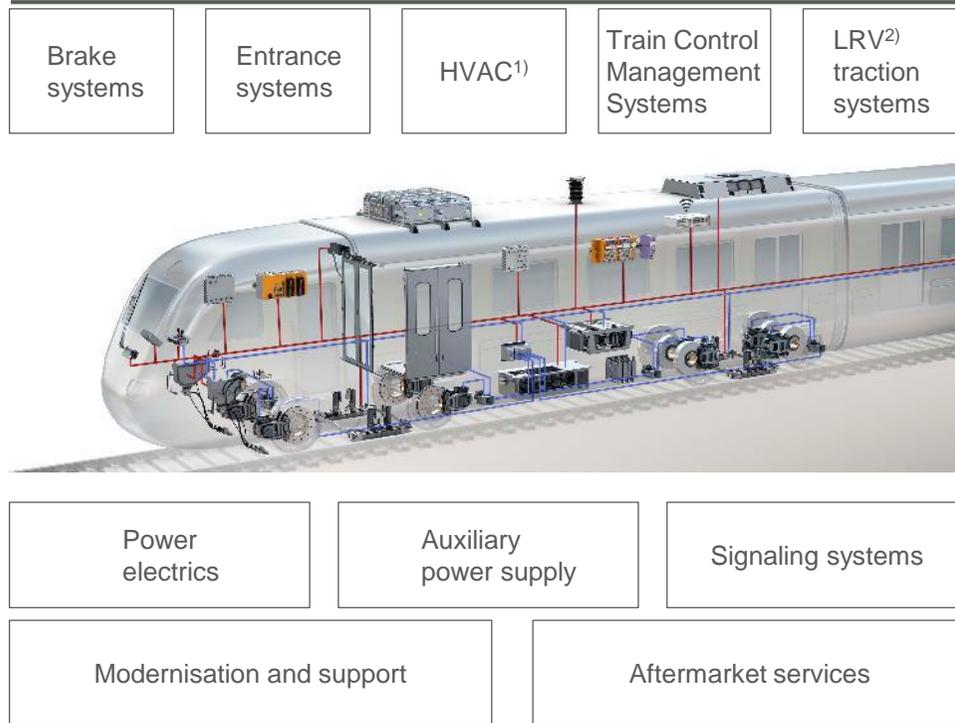
Resilient business model, supported by broad geographical and customer diversification, high aftermarket exposure and strong localisation
- 6 Superior financial profile**

Strong growth, profitability, and cash generation with high earnings visibility
- 7 Leadership excellence**

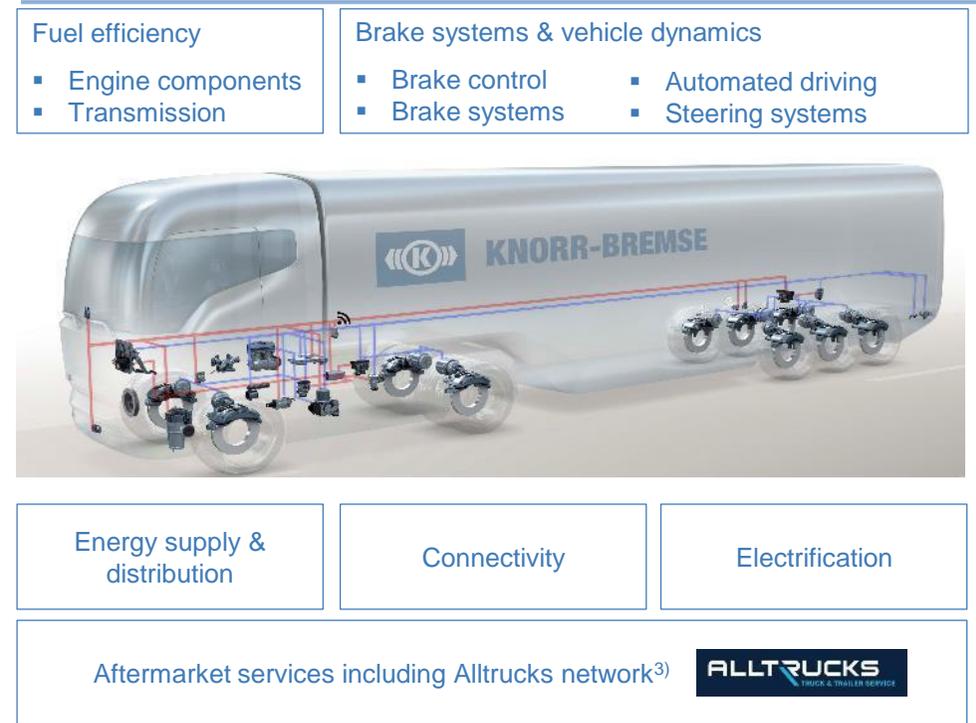
Highly experienced management team with strong track record and clear vision for future value creation

1 Global #1 – The world's leading supplier of safety critical rail and commercial vehicle systems

RVS offering (2018: 52% of sales, 59% of EBITDA)



CVS offering (2018: 48% of sales, 41% of EBITDA)

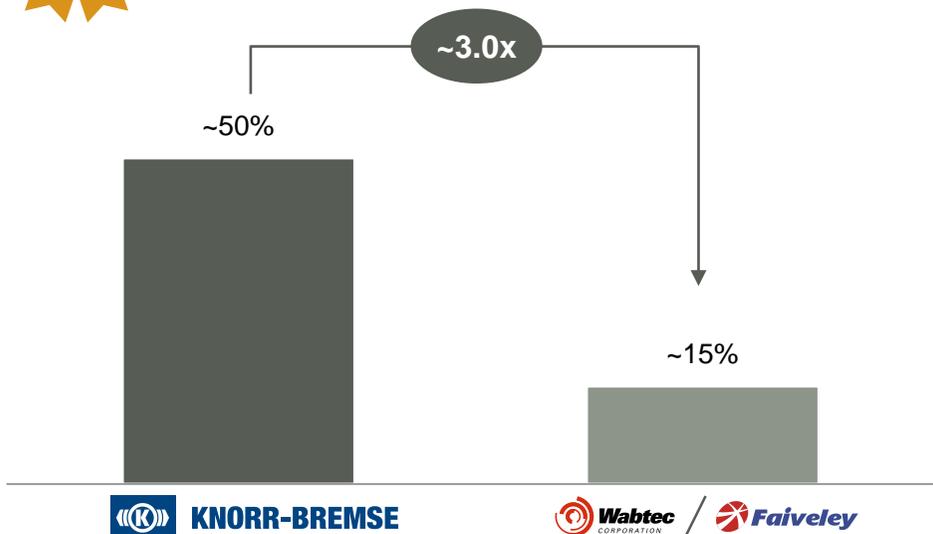


Preferred partner for all major OEMs⁴⁾ and operators across the globe



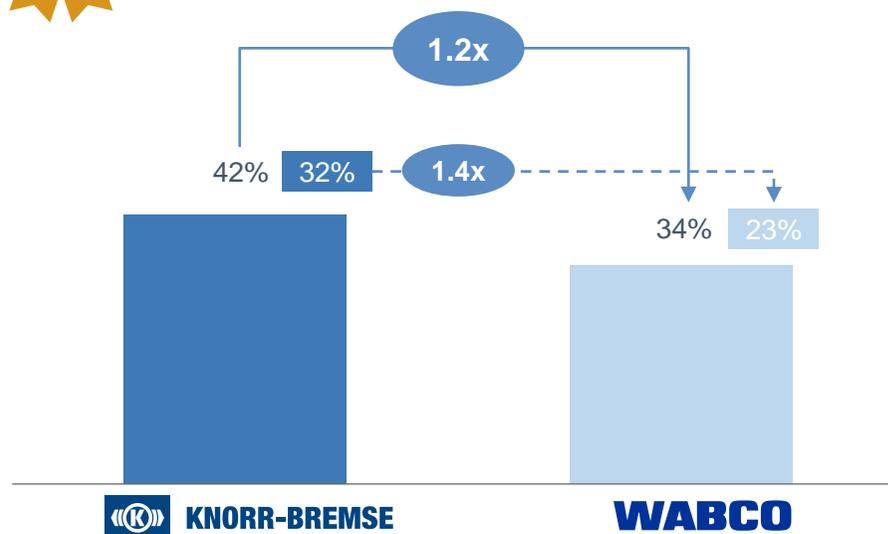
Notes: 2018 financials based on IFRS excluding consolidation/other; ¹⁾ HVAC – Heating, ventilation and air conditioning; ²⁾ LRV – Light rail vehicle; ³⁾ Joint Venture between Bosch, Knorr-Bremse and ZF providing a range of workshop services relating to the repair and maintenance of commercial vehicles across all brands; ⁴⁾ OEM – Original Equipment Manufacturer; Source: Knorr-Bremse information

1 Global #1 – Number one supplier for braking systems and a leading supplier of other safety critical rail and commercial vehicle systems ...



Market positions in key product groups (2017)

- #1 Brake Systems¹⁾
- #1 Entrance Systems¹⁾
- #2 HVAC¹⁾



Market positions in key product groups (2017)³⁾

- #1 Brake Systems & Vehicle Dynamics (incl. Automated Driving)
- #1 Energy Supply & Distribution
- #1 Fuel Efficiency (Joint)

Notes: ¹⁾ 2017 RVS market share estimates for OE and aftersales without labour; Wabtec includes Faiveley; For the competitor an estimate was used; Market shares rounded to the nearest multiple of 5%; ²⁾ 2017 Market share estimates for Truck and Bus OEM sales only including Air Disc Brake, Brake Control and Air Supply (excluding Drum Brakes and Brake Rotors; Drum Brakes are mainly produced by the OEMs and Brake Rotors are mainly sourced separately), excluding aftermarket and Trailer; Knorr-Bremse data based on market intelligence and experts estimate in 2017; ³⁾ For 2017 global addressable Truck, Bus and Trailer OE, excluding aftermarket; Source: Knorr-Bremse information and internal market research

1 Global #1 – ... protected by high barriers to entry

Barriers to entry for RVS and CVS markets

- ✓ Regulation / homologation
- ✓ Low volumes, high number of variants with high level of customisation
- ✓ High initial capital requirements, highly protected IP landscape and economies of scale
- ✓ Highest quality and safety requirements
- ✓ Long lifecycle with resulting customer loyalty, long gestation period for aftermarket
- ✓ Same industry leaders since creation of the industry over 100 years ago

Market specifics

RVS

Only supplier worldwide

certified for all global and local standards and norms (GOST, UIC, AAR, ARA)

Vast array of product variants to homologate

(e.g. >100k active brake articles by Knorr-Bremse)

Homologation time typically 4-8 years

for recent Knorr-Bremse products

CVS

One of only two suppliers able to offer harmonised products globally

Continuously increasing safety and emission standards requirements

2 Synergistic business – Technology and scale benefits between Rail and Commercial Vehicles

Interdependence of RVS and CVS today

- ✓ Same core technologies
- ✓ Shared components and materials
- ✓ Comprehensive research and IP base

Future technology development

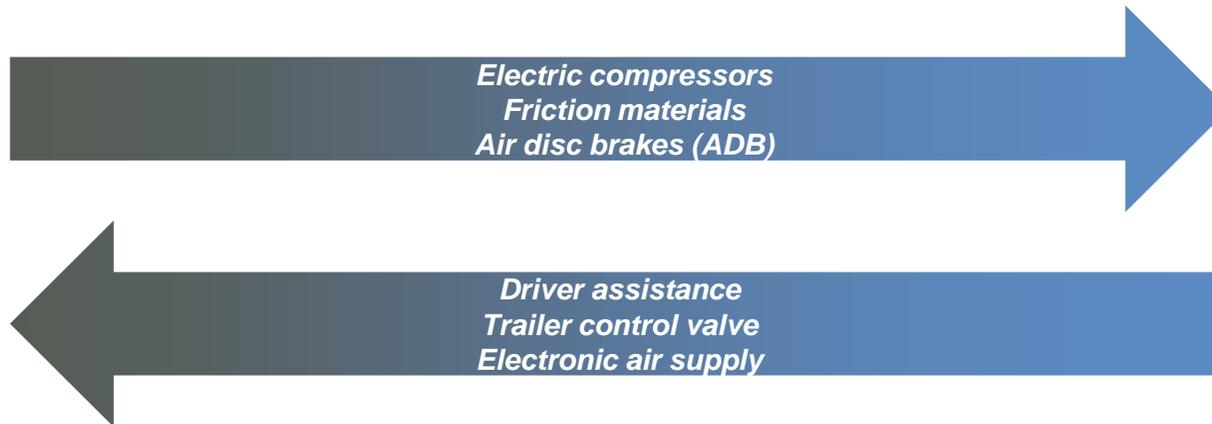
- ✓ Shared research centres
- ✓ ADAS¹⁾ / HAD²⁾ technology transfer
- ✓ Condition monitoring, condition-based and predictive maintenance
- ✓ Electrification and connectivity
- ✓ Electromechanical brake systems

Unique scale benefits

- ✓ ~2x size of main competitors³⁾
- ✓ Balance sheet strength for M&A
- ✓ Global footprint

RVS

CVS



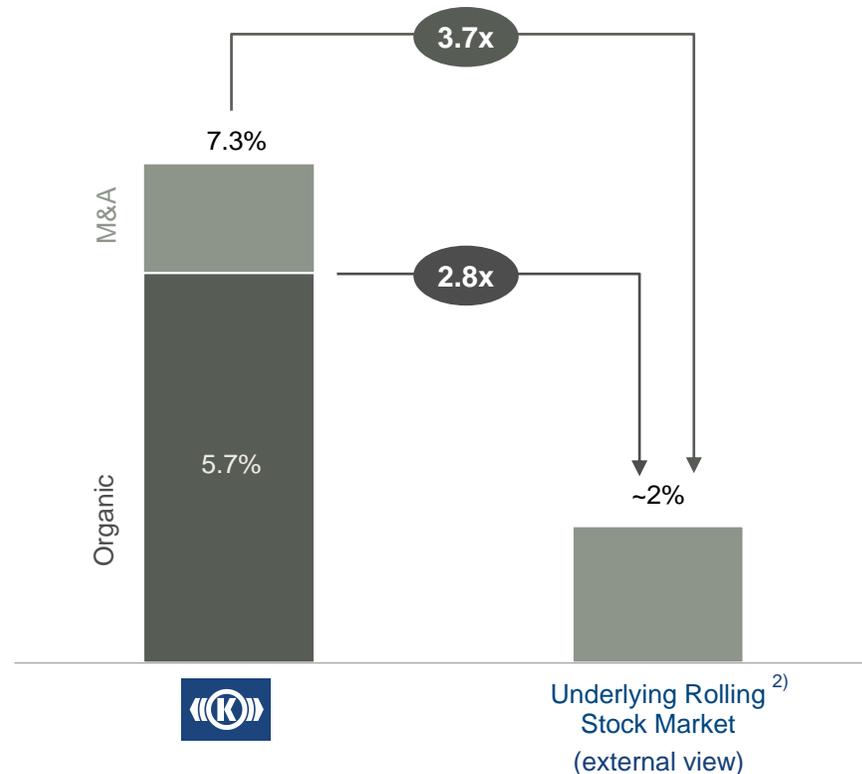
Notes: ¹⁾ ADAS – Advanced driver assistance system; ²⁾ HAD – Highly automated driving; ³⁾ Based on 2017 sales and status quo pre-Wabtec merger with GE Transportation; 2017 €/USD FX: 0.83346 used as of 31 December 2017; Source: Knorr-Bremse information; WABCO and Wabtec / Faiveley information based on Annual Report 2017

3 Market outperformance – Knorr-Bremse is well positioned to deliver continued growth above rail industry levels



Knorr-Bremse with strong track record of industry outperformance

CAGR (2010-2017) RVS sales¹⁾ (HGB) and market



Key future growth drivers

Asia Growth <ul style="list-style-type: none"> Chinese high-speed esp. AM Mass urban transport in APAC Expansion and upgrade of Indian rail rolling stock CRRC international expansion 	Outsourcing <ul style="list-style-type: none"> Outsourcing from rail OEM's (trend towards de-verticalisation)
Digitisation <ul style="list-style-type: none"> Increasing demand for connected systems and other digital solutions 	Aftermarket <ul style="list-style-type: none"> Global rail services and aftermarket for rolling stock

- ✓ Certification capability for all global core markets
- ✓ Partner of many Chinese OEMs and large installed base
- ✓ Leading control and monitoring technology
- ✓ Excellent engineering and R&D system and a connected systems innovation leader

Notes: ¹⁾ Based on German GAAP (HGB); ²⁾ Underlying OE rolling stock and aftermarket volume as defined by Roland Berger (July 2018). Market CAGR based on 2010 to 2016 market volumes; Source: Knorr-Bremse information, Roland Berger - Analysis of rail vehicle market report (July 2018) for growth rate of underlying rolling stock market

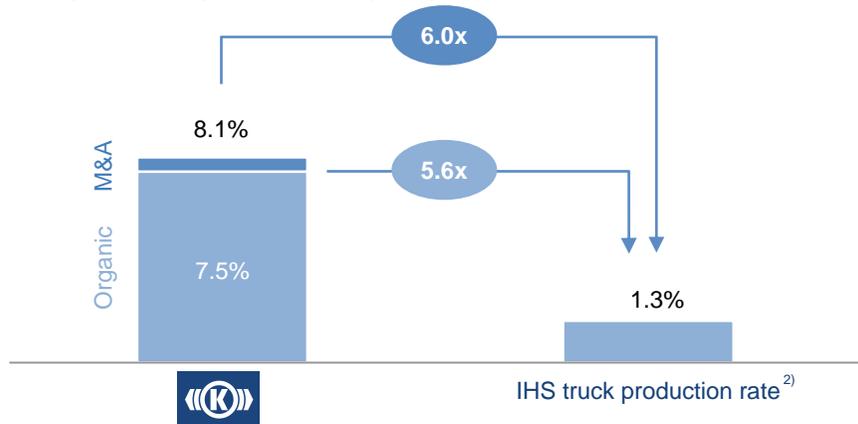


3 Market outperformance – Strong growth in content per vehicle expected to result in continued outperformance of global commercial vehicle market



Knorr-Bremse with strong track record of industry outperformance

CAGR (2010-2017) CVS sales¹⁾ (HGB) and market



Significant market content per vehicle (CPV) growth

Market CPV CAGR³⁾ (% , 2010-2017)



Key future growth drivers

Megatrends and conversion of regulatory standards

- Global megatrends provide attractive growth opportunities
- Convergence of regulatory standards drives global adoption of technologies
- Disc brakes replacing drum brakes

Content increase

- Traffic Safety
- Fuel efficiency

Market share gains

- Product upgrading
- Regional expansion strategy

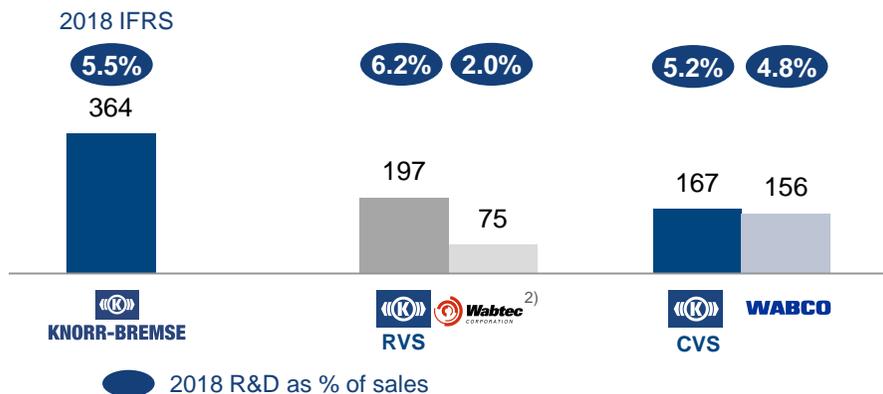
- ✓ Market leader in a consolidated industry with only 2 global players
- ✓ A strong technology innovator shaping the industry
- ✓ Multiple trends driving growth independent of underlying market dynamics
- ✓ Ideally positioned to win in market defining trend towards ADAS/HAD⁴⁾

Notes: ¹⁾ Based on German GAAP (HGB); ²⁾ Global Truck and Bus market excluding aftermarket and Trailer; ³⁾ Addressable Truck, Bus and Trailer OE market for "Brake Systems & Vehicle Dynamics (incl. Automated Driving)", "Energy Supply & Distribution" and "Fuel Efficiency"; ⁴⁾ Advanced Driver Assistance Systems/Highly Automated Driving; Source: Knorr-Bremse information; IHS for truck production rate

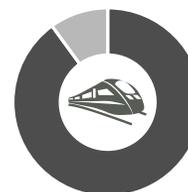


4 The industry innovator – Driving innovation in mobility and transportation technologies through R&D leadership and edge in connected systems

Knorr-Bremse invests more in R&D¹⁾



Consistently pioneering “first to market” innovations...



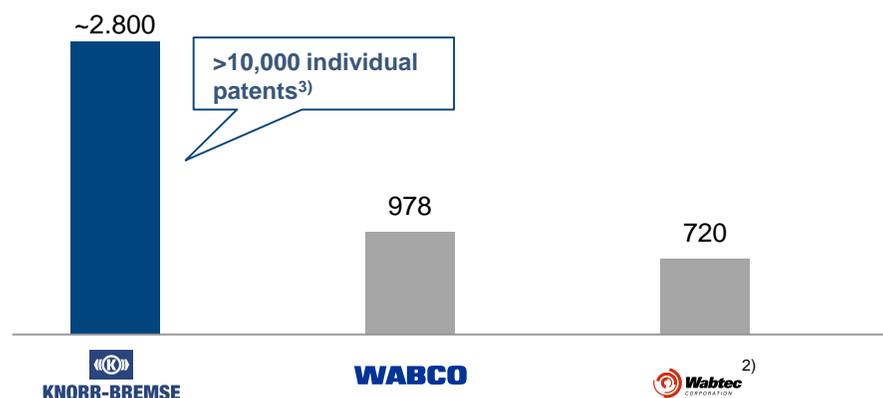
9 out of 10 of most industry-defining innovations⁴⁾ come from Knorr-Bremse



8 out of 10 of most industry-defining innovations⁴⁾ come from Knorr-Bremse

Knorr-Bremse has a larger patent portfolio than its peers

Portfolio size based on patent families (public)

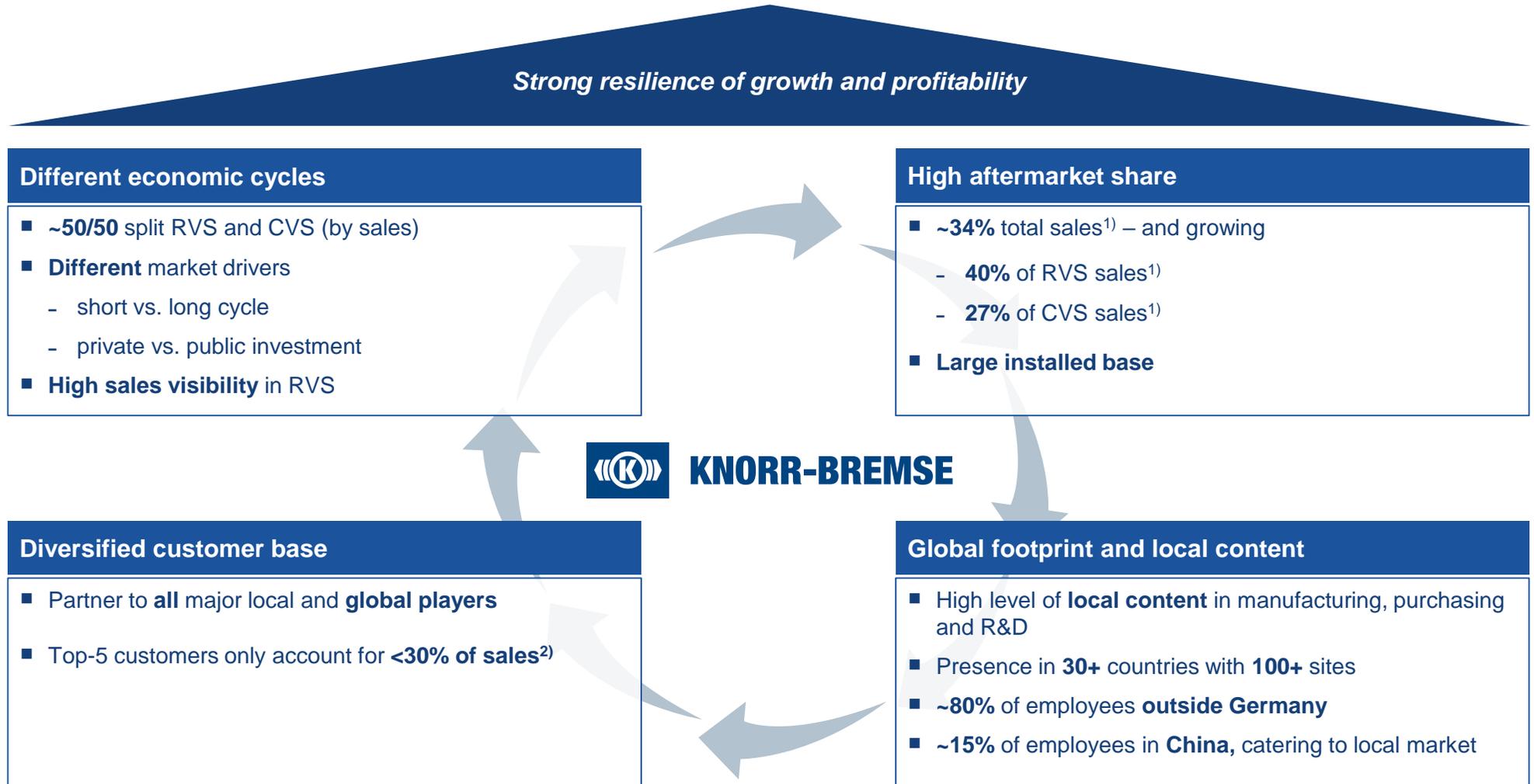


... supported by focused M&A and partnerships

Autonomous	Safe	Connected
 Hitachi Automotive Systems (RailVision, (Steering, (TCMS, 2019) 2016, 2018) 2015)	 (Braking, 2016) (Braking, 2015)	 (Telematics, 2016)
Efficient		
 (Electrics, 2017)	 TRS Japan (Transmission, 2016)	 (Engine air, 2016)

Notes: €/USD conversion 0.83; ¹⁾ Knorr-Bremse R&D financial information based on 2018 IFRS, R&D ratio as reported in annual reports; ²⁾ PF Faiveley and excl. GE Transportation acquisition; ³⁾ Granted and applied patents; ⁴⁾ Information as per Knorr-Bremse management view; Industry defining are considered to be the top 10 innovations in the past 30 years in the rail and commercial vehicle industry; Source: Knorr-Bremse information; 2018 annual reports of Wabtec / Faiveley and WABCO; PatentSight

5 Resilience – Business model supported by high aftermarket exposure, broad geographical and customer diversification and strong localisation

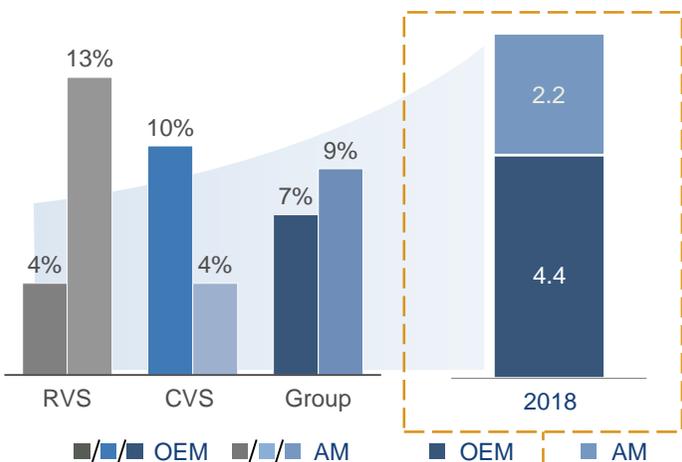


Notes: ¹⁾ Based on German GAAP (HGB) for 2018; BilRUG sales allocated proportionally between OE and aftermarket; ²⁾ Based on German GAAP (HGB) for 2018; Source: Knorr-Bremse information

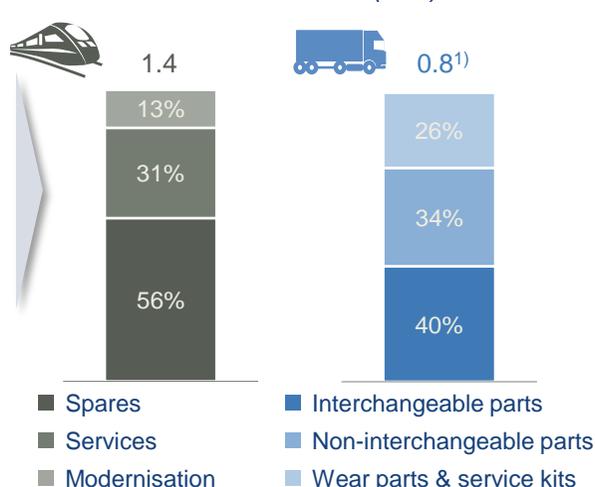
5 Resilience – Attractive aftermarket business with comprehensive service offering drives profitability and contains high future potential

Aftermarket is the growth and resilience backbone

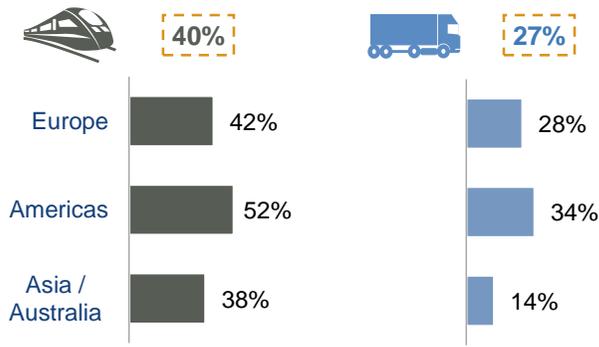
Sales CAGR (2010-2017) HGB (€bn)



Aftermarket sales 2018 (€bn)



Share of aftermarket 2017 (%)



34%

share of aftermarket as % of sales 2018

Key features

Annuity-like

- Regulated maintenance intervals
- Leverages high installed base
- 20-30 year long relationships

Close to the customer

- RVS:
 - 36 service centres²⁾
 - 20 service locations at customers' premises
- CVS:
 - >1,600 certified service partners
 - >500 Alltrucks workshops

Strong customer retention

- High switching costs
- Focus on safety and quality
- IP protection

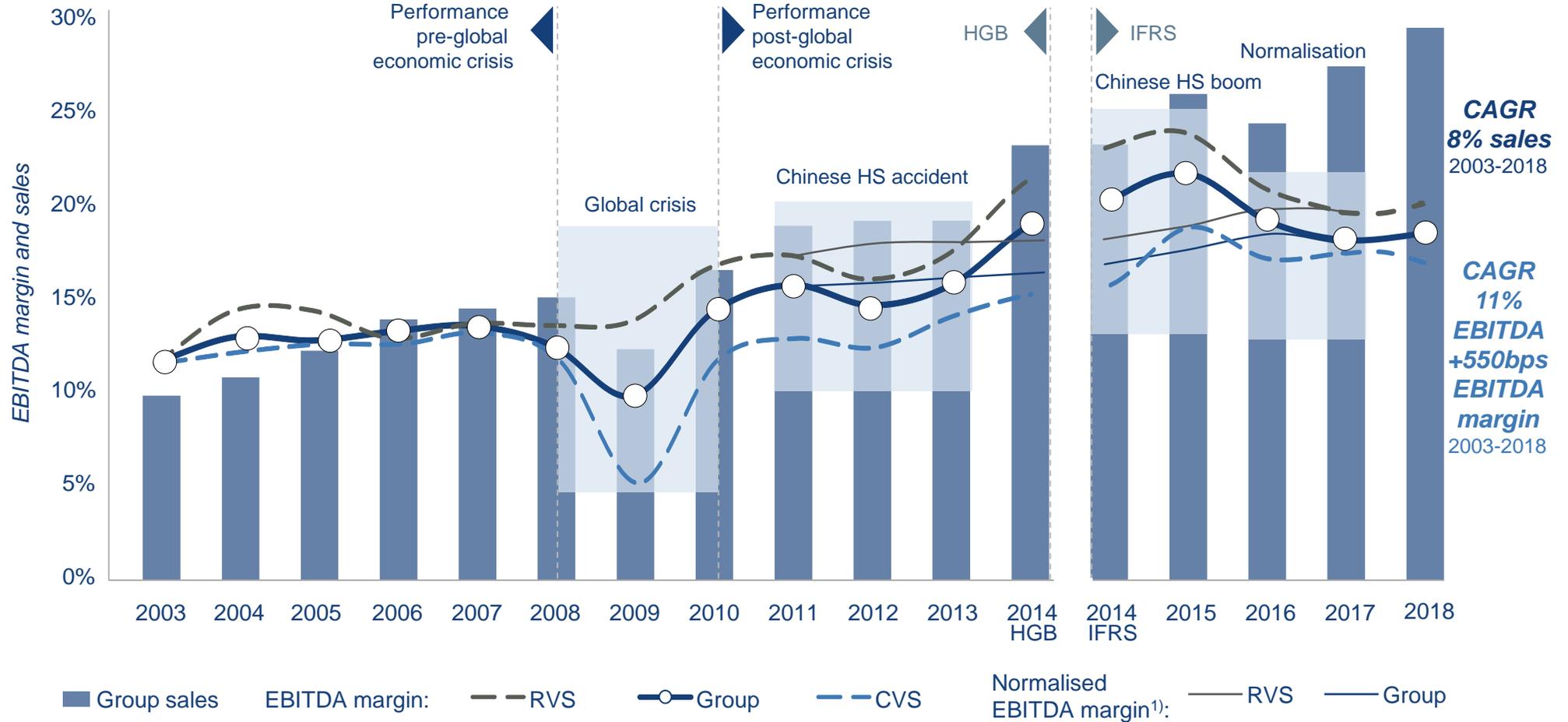
Innovative business model

- New connectivity-based business models
- Preventive
- Predictive

Notes: Based on prelim. German GAAP (HGB); BilRUG sales allocated proportionally between OE and aftermarket; ¹⁾ Total CVS aftermarket sales and independent aftermarket sales EMEA (excl. South Africa & Skach) as proxy for the global split; ²⁾ Does not include service locations at customers' premises; Source: Knorr-Bremse information

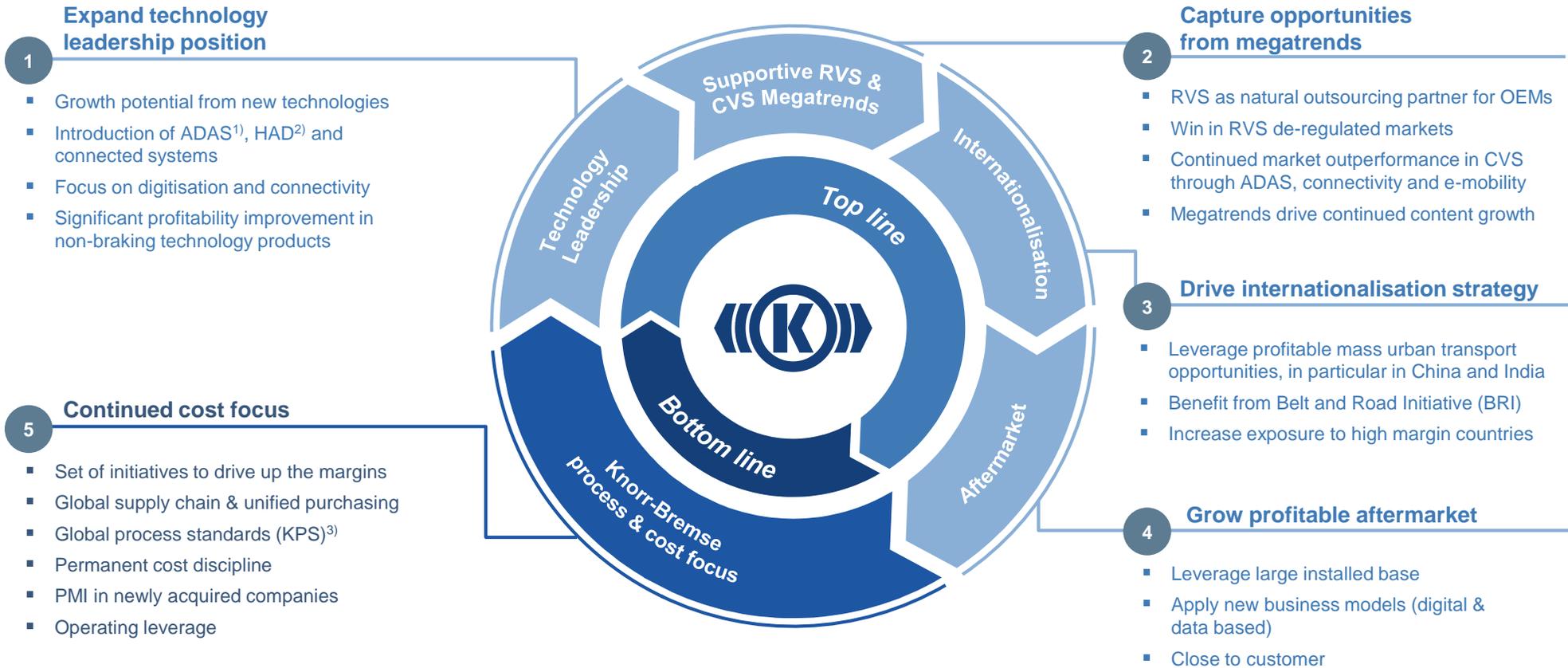
6 Superior financial profile – Outstanding track record of growth and profitability improvement

Strong track record of resilient and profitable growth



Notes: Financials based on German GAAP (HGB) prior to 2014 and IFRS 2014-2018; Data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; ¹ Normalised margin estimate for China accident impact and recovery; Estimate based on Knorr-Bremse assumptions; Source: Knorr-Bremse information

7 Leadership excellence – Clear vision for future value creation



Consistent M&A and integration strategy

Medium-term target organic growth of 4.5-5.5% p.a. complemented by value-add M&A

Target medium-term EBITDA margin expansion of +150bps

Notes: ¹⁾ ADAS – Advanced driver assistance system; ²⁾ HAD – Highly automated driving; ³⁾ KPS – Knorr-Bremse production system; Source: Knorr-Bremse information

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RVS with high-quality business model – Outperformance and resilience

1	Market leadership	<u>Global market leader</u> , scale advantage
2	Technology leadership	<u>Strong technology innovator</u> shaping industry standards, return on R&D spend outperforming peers
3	High barriers to entry	<u>Safety-critical products</u> with significant homologation barriers, RVS only supplier certified for all standards and norms globally
4	Strong growth profile	Attractive transportation and mobility end-markets, <u>long track record of outperforming underlying markets</u> – through both OE and AM business
5	Resilience	Steadily growing business through customer/region/product mix, <u>strong aftermarket</u>
6	Profitability	<u>Outstanding profit margins</u> and track record of margin expansion and cost management

Rail Vehicle Systems – Nucleus of Knorr-Bremse’s success: the leading safety critical systems supplier for rail with a track record of market outperformance



Highlights



Rail brake systems supplier globally¹⁾



Rail entrance systems supplier globally¹⁾



HVAC systems supplier globally¹⁾



Global brakes market share¹⁾



Present in 50-55% of global installed base²⁾



c.16k employees
2.0k o/w engineers

2018 key financials

€3.5bn sales

6.9% CAGR 2010-2018³⁾

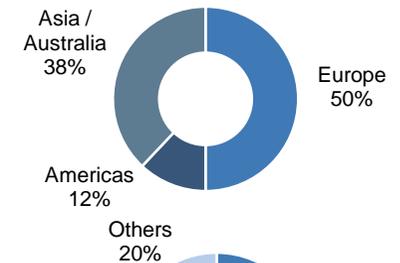
€693m EBITDA (20.0% margin)

€585m EBIT (16.9% margin)

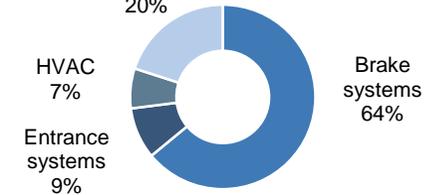
40% aftermarket share⁵⁾

2017 sales split⁴⁾

by region (€ 3.5bn)



by product



by channel



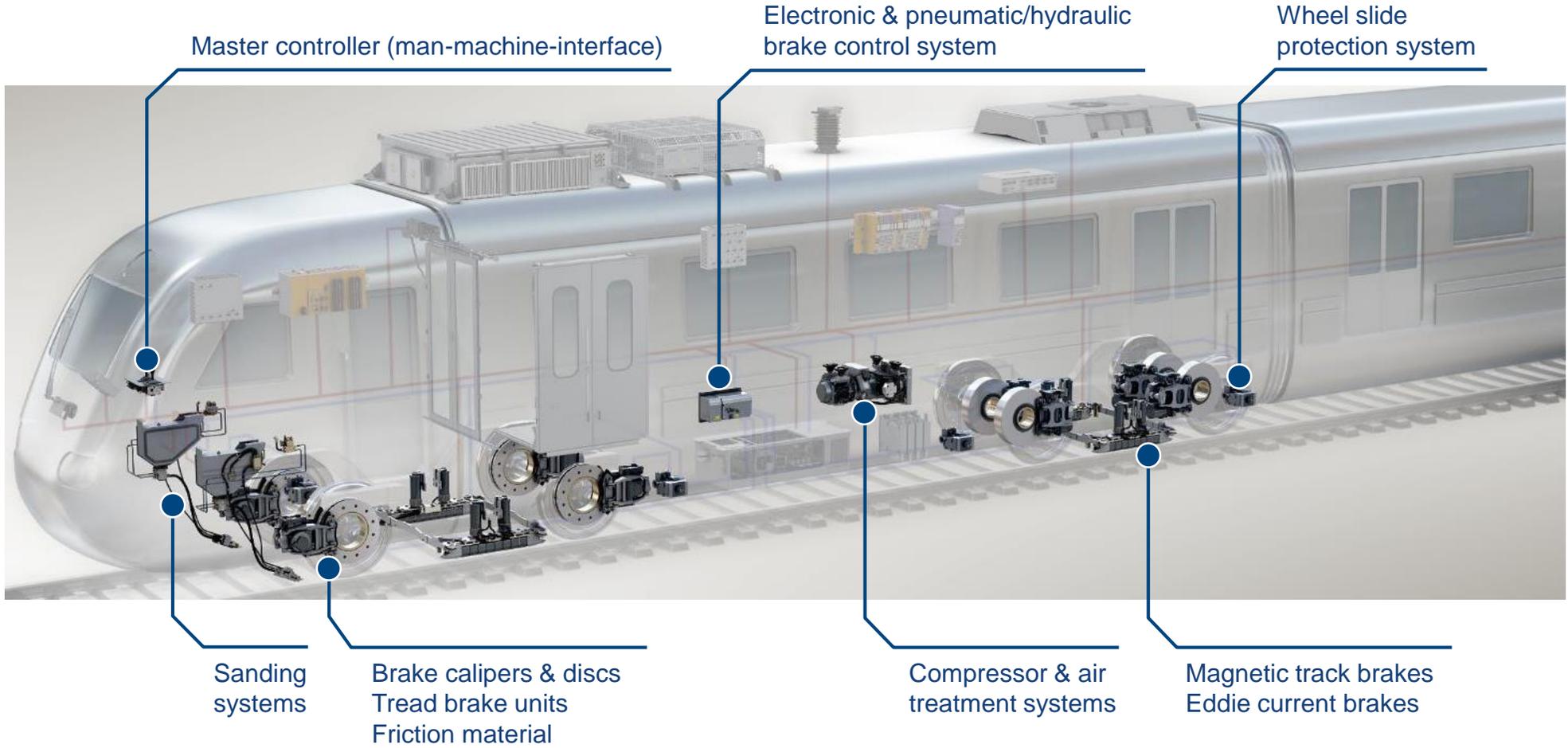
Notes: Sales, EBITDA and EBIT based on IFRS, other figures based on German GAAP (HGB), BilRUG sales allocated proportionally between OE and aftermarket; ¹⁾ 2017 RVS market share estimates for OE and aftersales without labour; ²⁾ All active rail vehicles without freight cars with a minimum of one Knorr-Bremse system related to brakes, entrance systems and HVAC installed; ³⁾ Total reported RVS sales growth including OE and aftermarket at actual currency based on German GAAP (HGB); ⁴⁾ Sales split by region based on IFRS; Other splits based on German GAAP (HGB); ⁵⁾ Based on German GAAP (HGB) for 2018; BilRUG sales allocated proportionally between OE and aftermarket;

Source: Knorr-Bremse information and internal market research



Deep dive into RVS braking technologies of Knorr-Bremse (1/2)

Key elements of a braking system in RVS



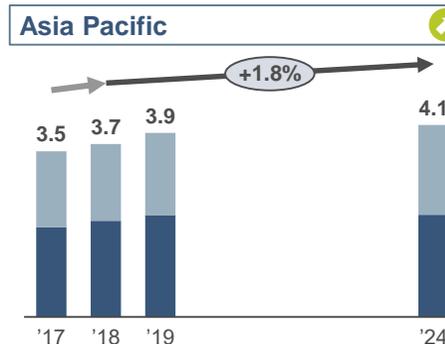
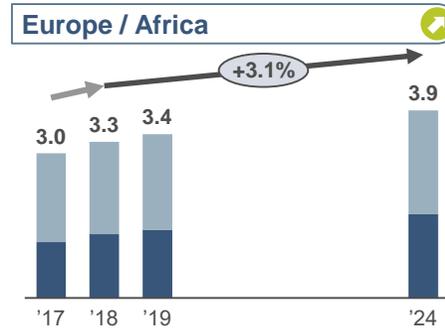
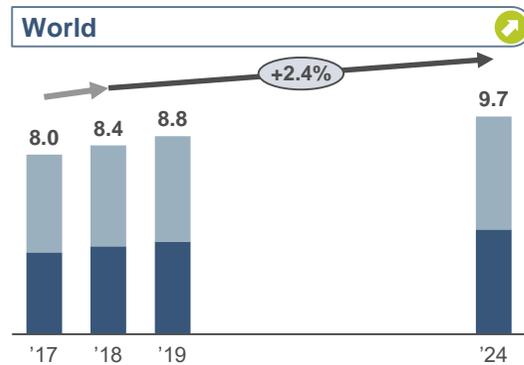
Source: Knorr-Bremse information

Underlying global rail market with steady and robust growth

Development of markets

Market volume Brakes, Doors, HVAC, incl. labour [€bn, CAGR in %]

AM OE



Original Equipment (OE)

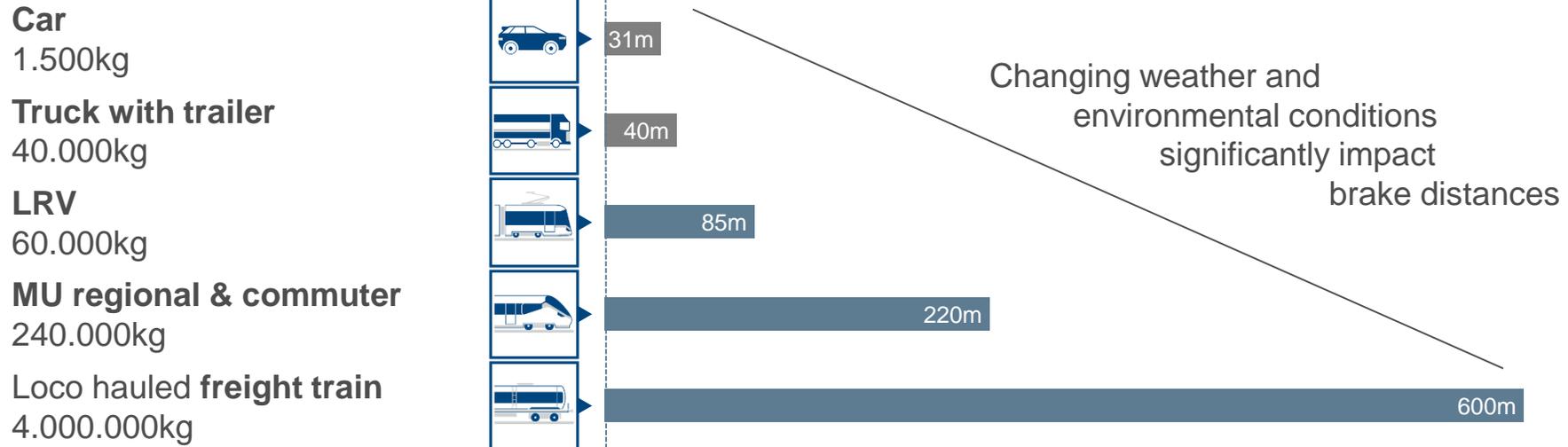
- Europe and Asia Pacific will see a further increase in the Passenger market until 2021
- North America expects a slow down in Freight business, but an increase in Passenger business from 2020 on

Aftermarket (AM)

- Aftermarket growth in all regions, volume wise mainly in Europe and Asia Pacific

The enormous brake distances in Rail require outstanding braking performance

Different braking distances at 80km/h

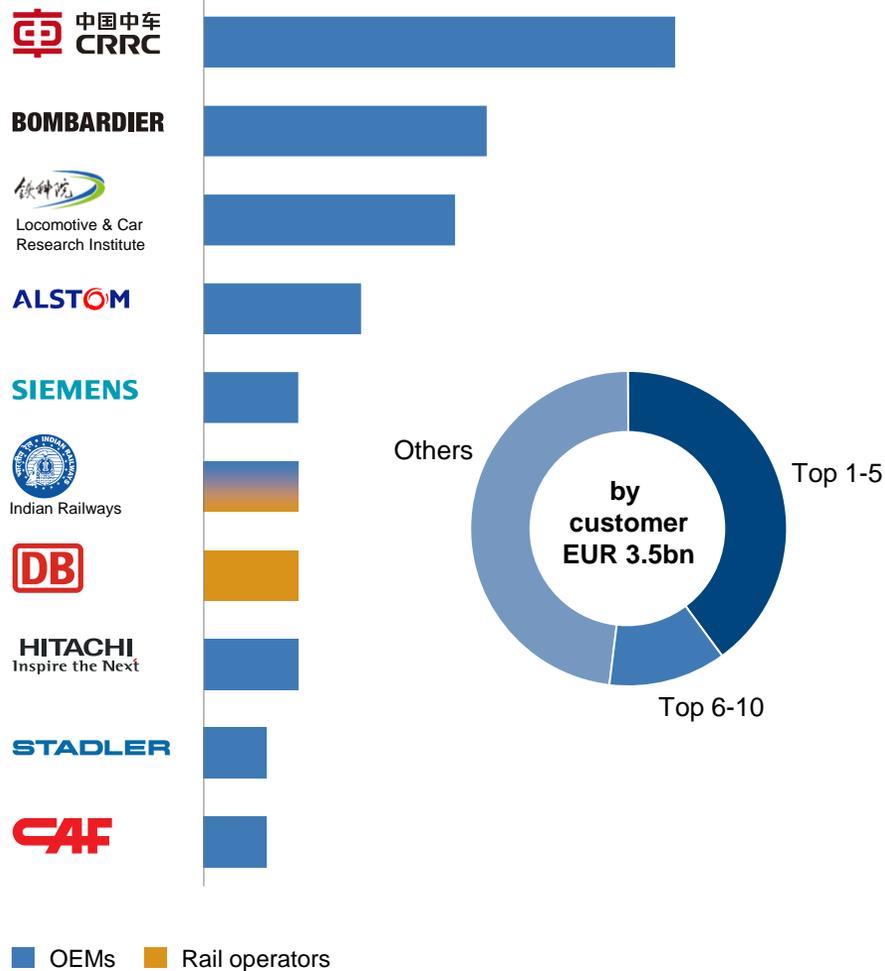


Different braking distances at 330km/h



Global Tier-1 partner of choice for OEMs and rail operators in all regions

Top 10 customers 2018 (% of sales)



Other major Knorr-Bremse customers

>>>300 Relevant rail operator customers



>50 Relevant OEM customers

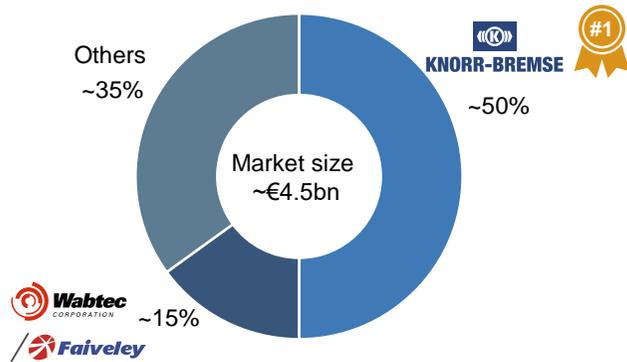


Notes: Sales based on German GAAP (HGB); Share of top 10 customers as % RVS sales 2017 may not add up due to rounding; Source: Knorr-Bremse information

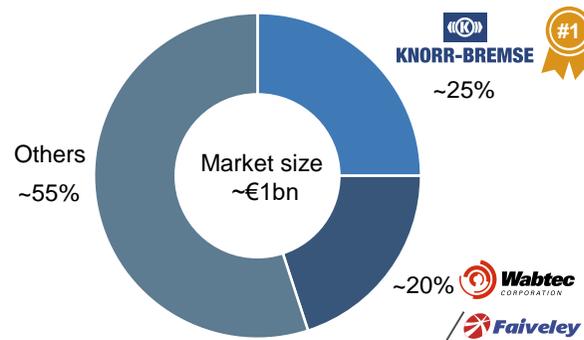
Knorr-Bremse is the global #1 across key product categories

Global market share 2017¹⁾ (% of sales)

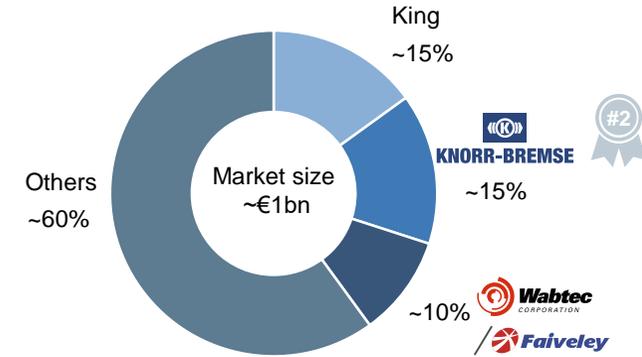
Brake systems (66% of RVS sales)



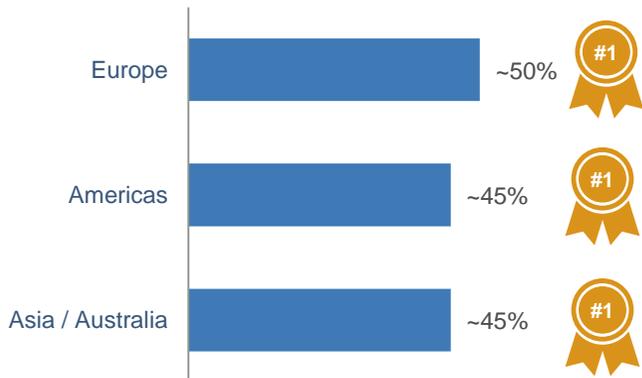
Entrance systems (9% of RVS sales)



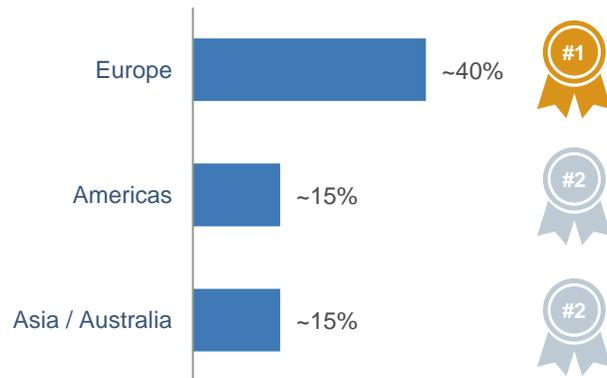
HVAC (6% of RVS sales)



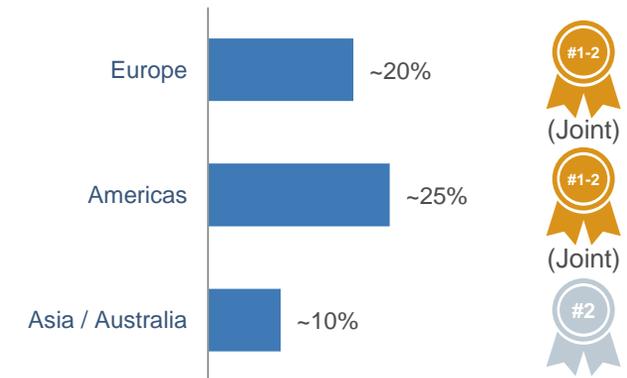
Market share by region



Market share by region



Market share by region

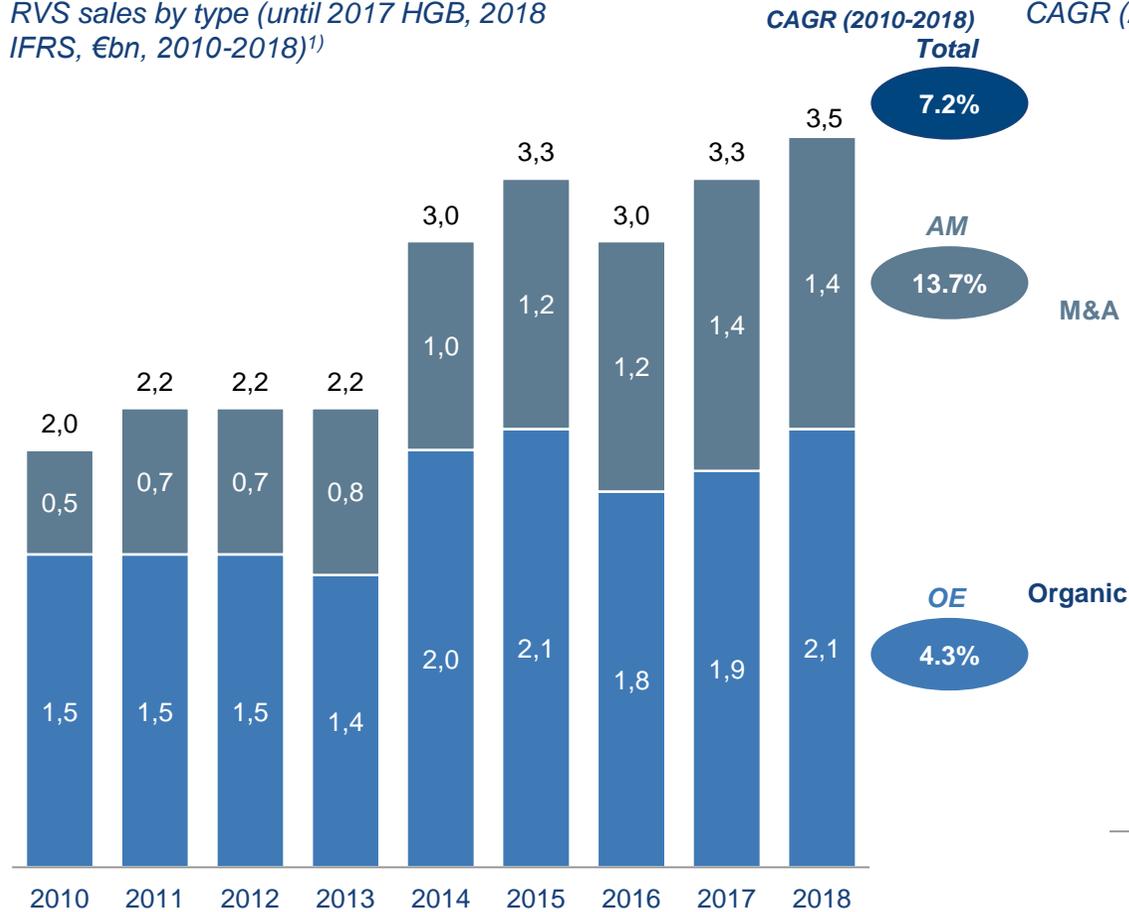


Notes:;; Market share estimates are rounded to the nearest multiple of 5%; For competitors a price estimate was used; ¹⁾ Market share estimates for OE and aftermarket without labour. Wabtec includes Faiveley; Source: Knorr-Bremse information and internal market research

Significant historical market outperformance through consistent focus on fastest growing markets and segments especially in aftermarket

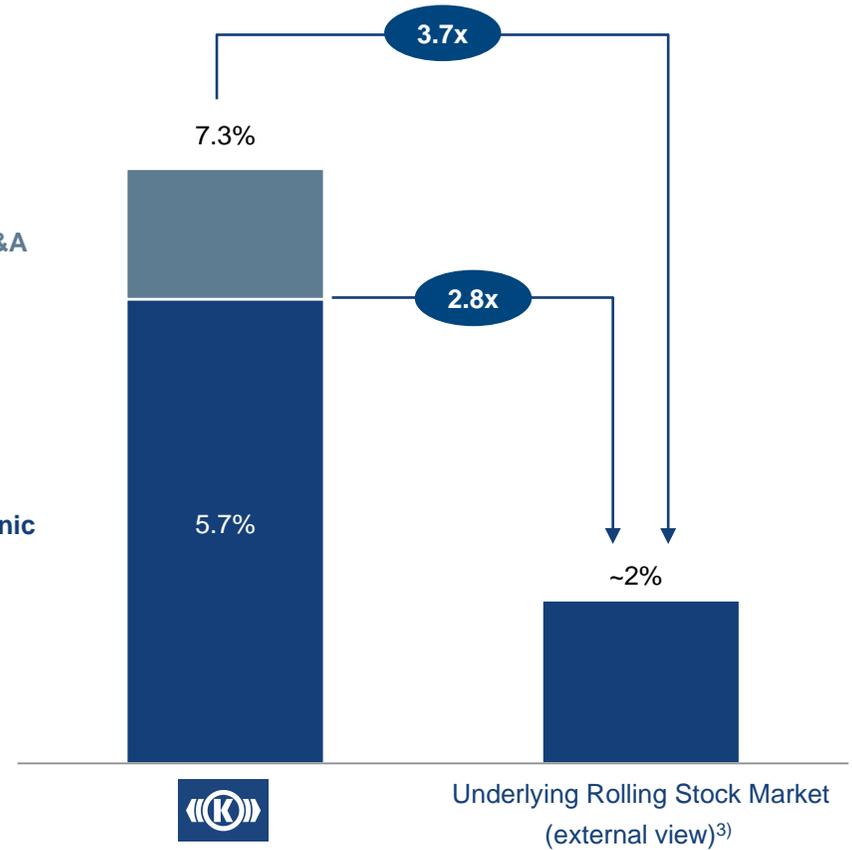
Strong growth both in OE and AM

RVS sales by type (until 2017 HGB, 2018 IFRS, €bn, 2010-2018)¹⁾



Significant outperformance of rolling stock market

CAGR (2010-2017) RVS sales²⁾ (HGB) and market



Notes: ¹⁾ Sales based on German GAAP (HGB), BilRUG sales allocated proportionally between OE and aftermarket; ²⁾ Based on German GAAP (HGB); ³⁾ Underlying OE rolling stock and aftermarket volume as defined by Roland Berger (July 2018). Market CAGR based on 2010 to 2016 market volumes; Source: Knorr-Bremse information and internal market research; Roland Berger - Analysis of rail vehicle market report (July 2018) for growth rate of underlying rolling stock market

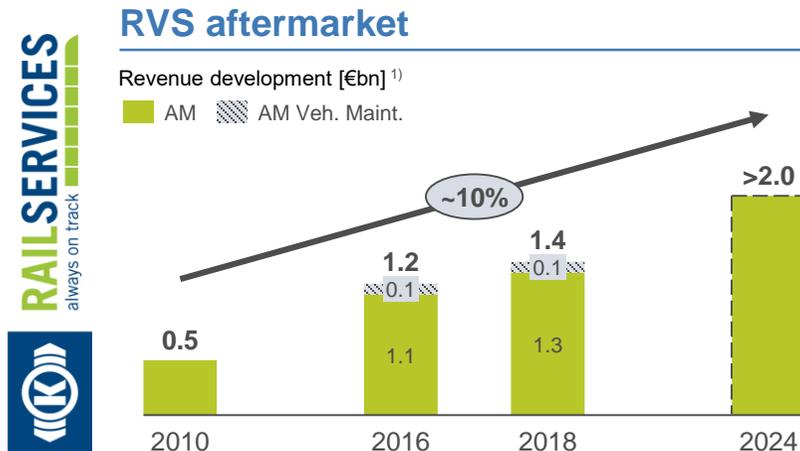
Aftermarket (RailServices) business expected to grow beyond € 2bn by 2024

Characteristics aftermarket

- Long customer relationships & loyalty of >30 years
- Through tear & wear very attractive, high margin business
- Underlying global Rail market 2010-2016 CAGR 2-3%

Development aftermarket

- Higher focus on **lifecycle costs** and **availability commitments** (contractually binding)
- **Digitization** with new players
- Increased business demand for **reduced energy** consumption



- **Global footprint with a strong local presence**
- **High installed base**
- **High customer retention rate**
- **Additional data driven business models**
- **Development of energy efficient solutions**

Knorr-Bremse is the only supplier worldwide certified for all local standards and norms

Market protected by unique level of complexity ...



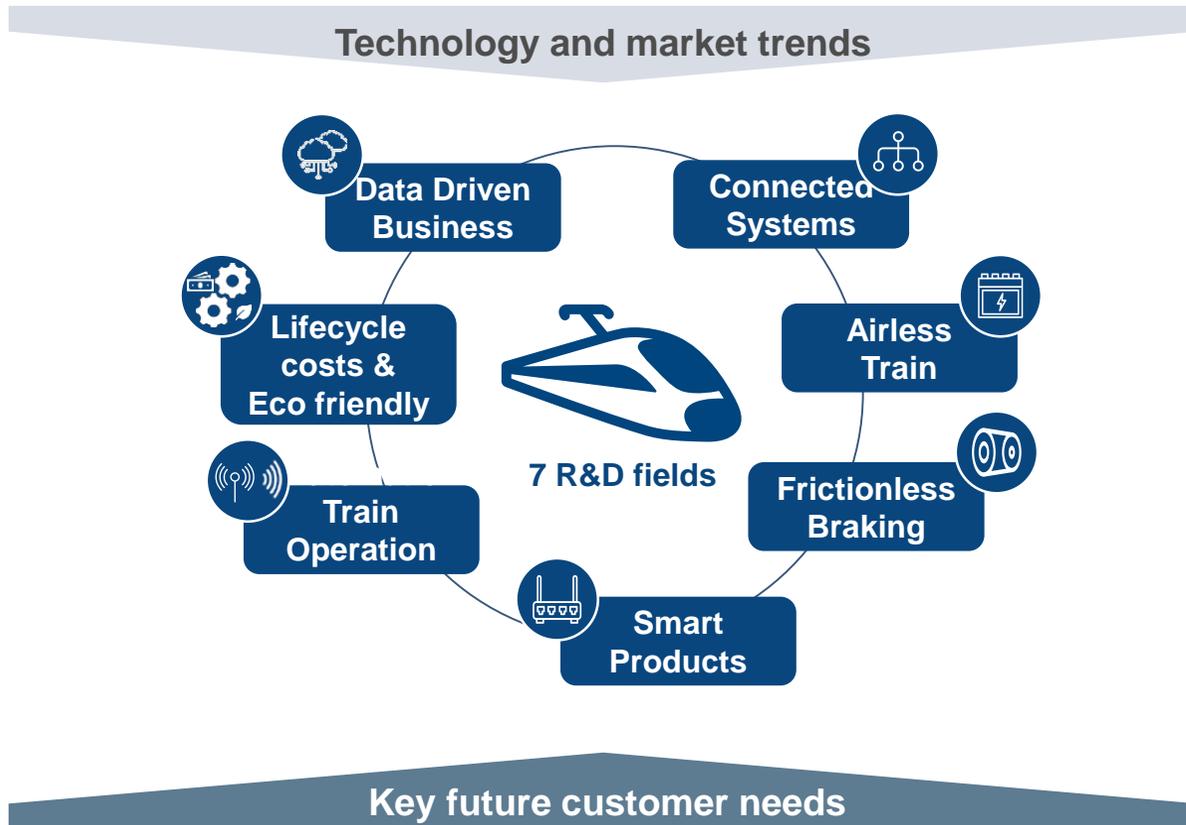
... and long homologation time for each component

Standard ¹⁾	Key regions	Typical time-to-market	
		Development (yrs) ²⁾	Certification (yrs) ²⁾
			
			
			
			

Combination of IP ownership and homologation creates high barriers to entry

Notes: ¹⁾ GOST based on actual recent homologation process, other norms based on expert estimates by Knorr-Bremse; ²⁾ Estimated average required "time-to-market" of a basic freight car solution
 Source: Knorr-Bremse information

RVS' R&D agenda is focused on customers' needs – staying ahead of competition



Deep Dive Knorr-Bremse solutions for specific customer needs

- Optimized lifecycle costs
- Standardized solutions
- More intensive use of existing infrastructure
- Reliability & passenger comfort

Local growth strategies to optimally capitalise on positive rail infrastructure developments in China and India



Mainline network

(Very) High Speed vs. Regional & Commuter

Metros

Localisation requirements



- Large installed base and trusted relationships with leading Chinese railway players



- Infrastructure improvements prioritised
- Aggressive network growth plans
- Strong HS²⁾ train and VHS³⁾ development
- Underdeveloped R&C⁴⁾ train network
- Steady growth, doubling every 5 years
- In 3rd tier cities only monorail and LRV⁵⁾
- Localisation political requirement
- Local ownership & technology control



- Entrepreneurial culture with close alignment on key customers' needs



- Electrification and modernisation
- Dedicated and high-speed freight corridors planned
- Limited HS²⁾ train rail network
- Developed EMU⁶⁾ commuter network
- Networks to grow mainly in 6 mega-cities
- Metros currently only in mega-cities
- No political requirement (but 50% local content preferred)
- Local value added, local employment

Notes: Sales based on external (third party) sales German GAAP (HGB); FTE includes leasing (EOP); TCI (Technology Centre India) allocated to India; ¹⁾ Converted at actual average FX rates; ²⁾ HS – High-speed; ³⁾ VHS – Very high-speed; ⁴⁾ R&C – Regional and commuter; ⁵⁾ LRV – Light rail vehicle; ⁶⁾ EMU – Electric multiple unit; Source: Knorr-Bremse information and internal market research; Chinese 13th 5-year-plan

RVS confirms positive market outlook and mid-term guidance of 5 to 6% revenue growth



- Steadily growing market with record backlog for RVS customers
- RVS #1 market position in key growth markets
- Dense service network & new service models will lead to > € 2bn aftermarket business by 2024
- Key innovations will open doors for software-based feature upgrades in products
- Margin expansion primarily through aftermarket growth and efficiency improvements

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4 Commercial Vehicle Systems (CVS)

5 R&D Focus

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CVS with high-quality business model – Outperformance and resilience

1	Market leadership	<u>Global market leader</u> with increasing market share
2	Technology leadership	<u>Technology leader</u> with innovation power shaping major industry trends
3	High barriers to entry	<u>Safety-critical highly technological products</u> One of only two suppliers with global technology know-how and capabilities
4	Strong growth profile	<u>Attractive end market</u> in goods and people transport (incl. buses) Continuously <u>outperforming markets</u> through content and market share growth
5	Resilience	<u>Strong aftermarket share and content per vehicle growth</u> Strength in cost efficient operations
6	Profitability	<u>Attractive margins</u> based on differentiation, scale advantage and consequent cost management

Commercial vehicle systems – Knorr-Bremse is one of two global leaders with an outstanding position in braking and safety relevant systems



Highlights



Global market position¹⁾



Technology leader



Global market share



17.3m ADB³⁾ sold



c.11k Employees
1.6k o/w engineers

2018 key financials

€3.2bn sales

8.0% CAGR 2010-2018⁴⁾

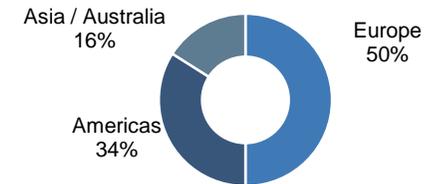
€516m EBITDA (16.3% margin)

€434m EBIT (13.7% margin)

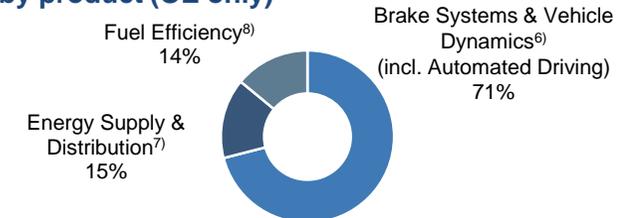
27% aftermarket share

2017 sales split⁵⁾

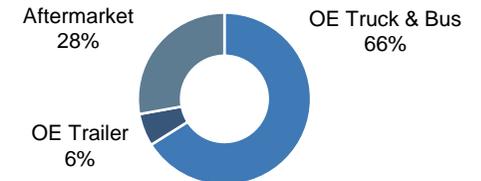
by region



by product (OE only)



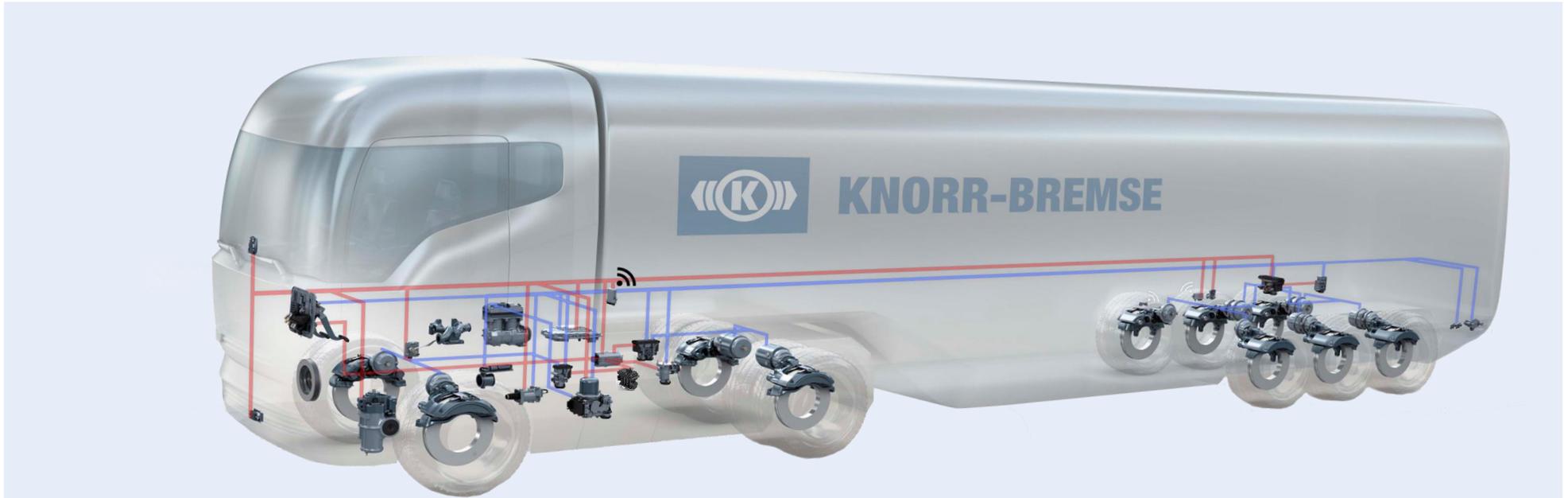
by end-market



Notes: Sales, EBITDA, EBIT and respective margins based on IFRS; other figures based on German GAAP (HGB); BilRUG sales allocated proportionally between OE and aftermarket; ¹⁾ 2017 global addressable Truck, Bus and Trailer OE market, including "Brake Systems & Vehicle Dynamics (incl. Automated Driving)", "Energy Supply & Distribution" and "Fuel Efficiency"; excluding aftermarket; Knorr-Bremse data based on market intelligence and experts estimate in 2017; ²⁾ Knorr-Bremse management view; ³⁾ Air Disc Brakes sold between 2008-2017; ⁴⁾ Total reported CVS sales growth including OE and aftermarket at actual currency, 2017; based on German GAAP (HGB); ⁵⁾ Sales split by region based on IFRS; Other splits based on German GAAP (HGB); ⁶⁾ Air Disc Brake, Valves / Pedal Unit, Actuators, Foundation Drum Brake, Steering, ABS, EBS, ESP, DAS, ELC; including segment Others; ⁷⁾ Compressors, Air Treatment; ⁸⁾ Vibration Dampers, Engine Air Control, Transmission - Gear Actuation, Transmission - Clutch Actuation; Source: Knorr-Bremse information and internal market research

Complementary product portfolio provides foundation for positioning as key integrated systems and services provider

Knorr-Bremse CVS comprehensive offering - 2018 sales by product segment (%)



Brake Systems & Vehicle Dynamics¹⁾ (incl. Automated Driving)

- Brake System
- Brake Control
- Electronic Levelling Control
- Steering
- Automated Driving



Energy Supply & Distribution

- Air Treatment
- Compressors



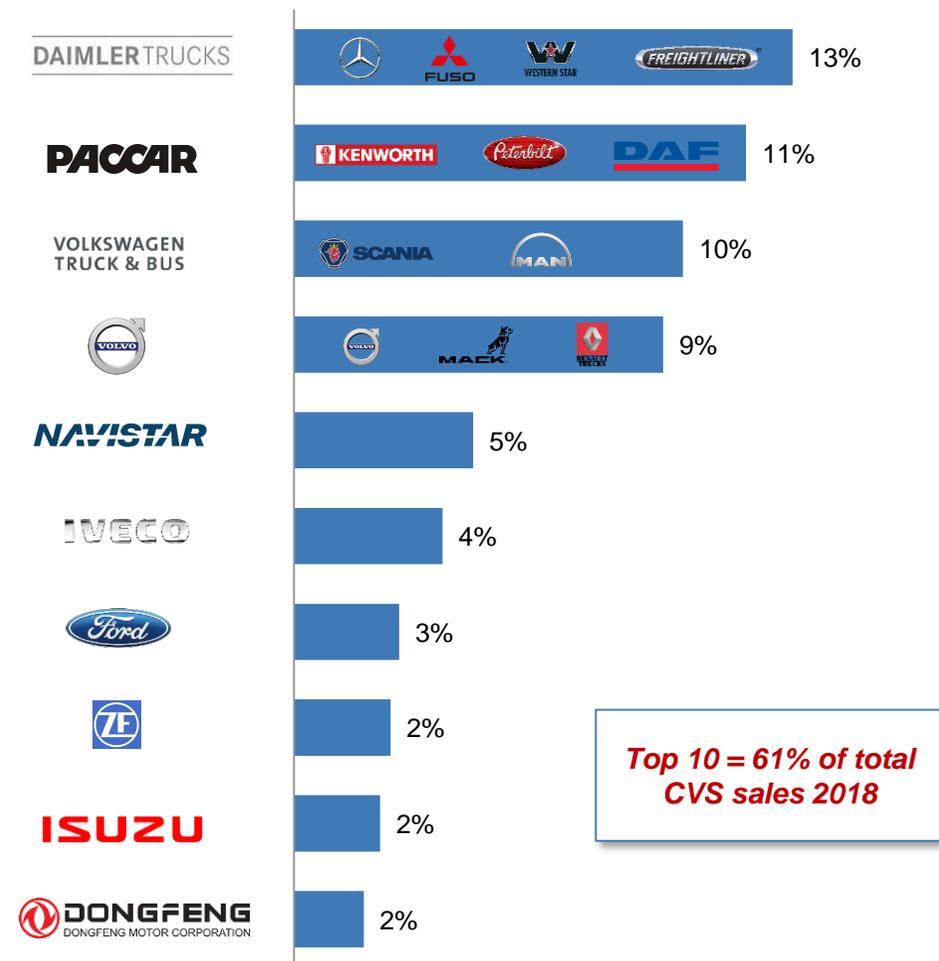
Fuel Efficiency²⁾

- Engine Components
- Transmission Sub-systems

Notes: Sales split by product as of 2017 based on OE only; based on German GAAP (HGB); ¹⁾ Air Disc Brake, Valves / Pedal Unit, Actuators, Foundation Drum Brake, Steering, ABS, EBS, ESP, DAS, ELC; including segment Others; ²⁾ Vibration Dampers, Engine Air Control, Transmission - Gear Actuation, Transmission - Clutch Actuation; Source: Knorr-Bremse information

Knorr-Bremse is the partner of choice for global OEMs with long-standing relationships

Top 10 customers 2018 (% of sales)



Years of relationship



Other major Knorr-Bremse customers

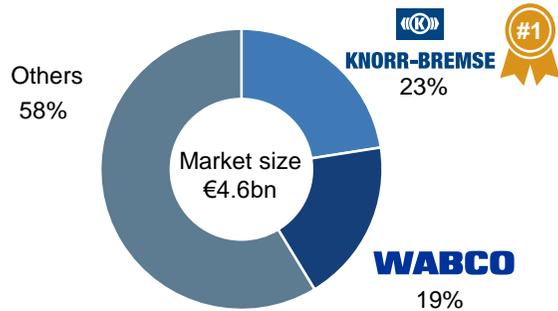


Notes: Based on German GAAP (HGB); share of top 10 customers as % CVS sales 2018; Source: Knorr-Bremse information

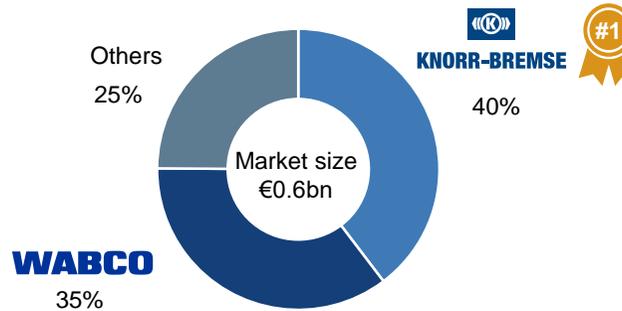
Knorr-Bremse is a global leader in safety-relevant products across key geographies

Global market share 2017¹⁾ (% of sales)

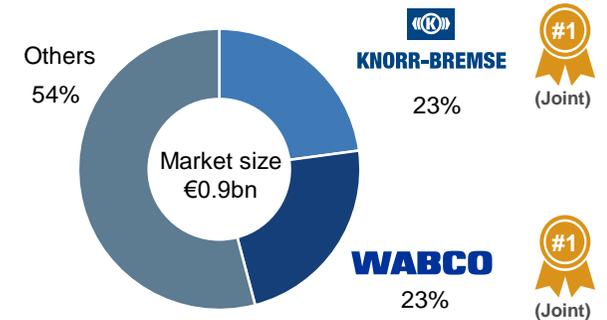
Brake Systems & Vehicle Dynamics (71%)²⁾ (incl. Automated Driving)



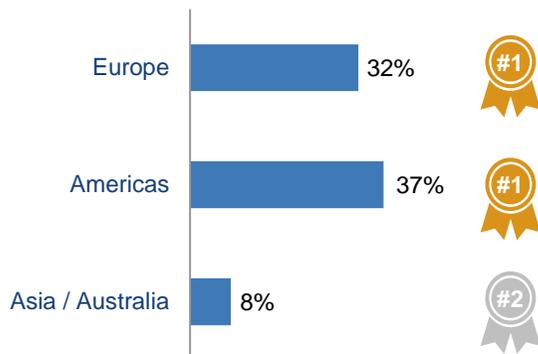
Energy Supply & Distribution (15%)³⁾



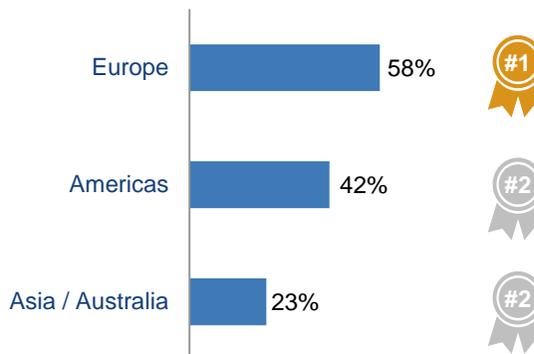
Fuel Efficiency (14%)⁴⁾



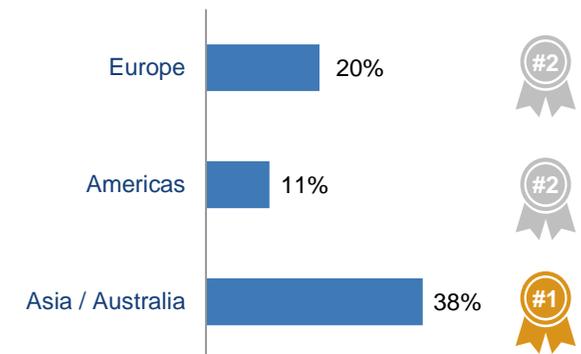
Market share by region



Market share by region



Market share by region

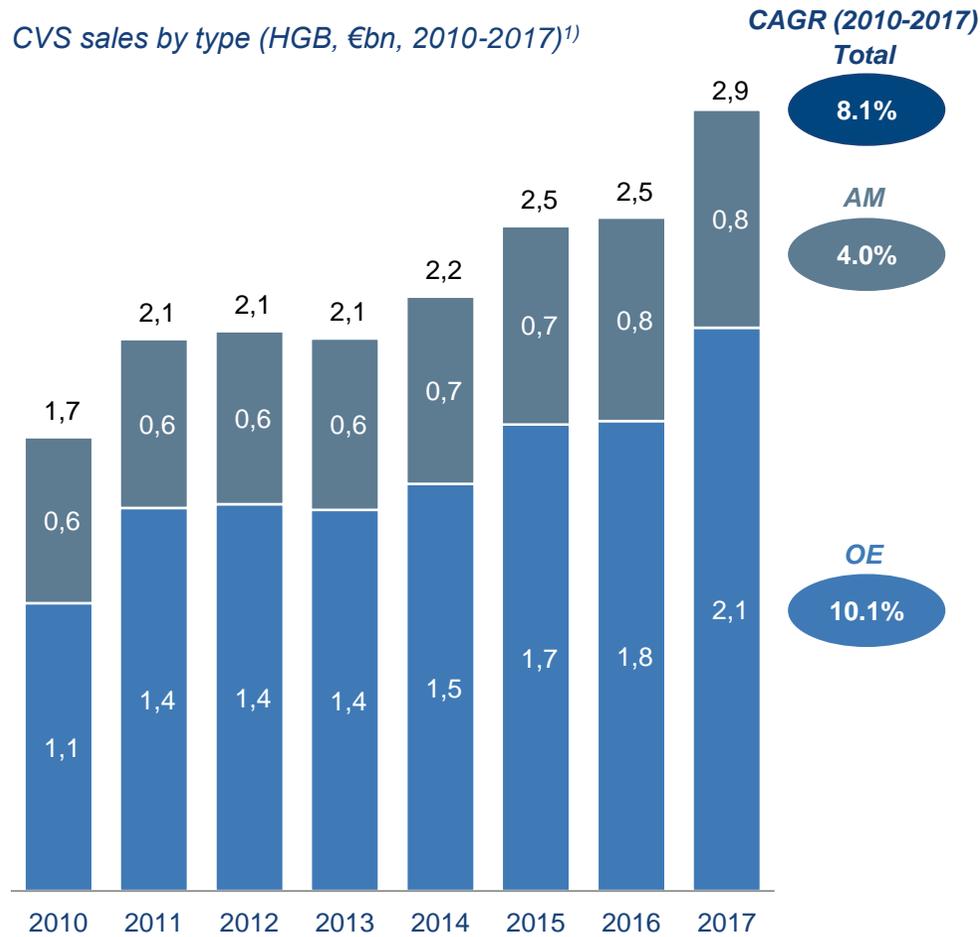


Notes: 1) 2017 addressable Truck, Bus and Trailer OE market, including "Brake Systems & Vehicle Dynamics (incl. Automated Driving)", "Energy Supply & Distribution" and "Fuel Efficiency"; excluding aftermarket; Knorr-Bremse data based on market intelligence and experts estimate in 2017; 2) Air Disc Brake, Valves / Pedal Unit, Actuators, Foundation Drum Brake, Steering, ABS, EBS, ESP, DAS, ELC; including segment Others; 3) Compressors, Air Treatment; 4) Vibration Dampers, Engine Air Control, Transmission - Gear Actuation, Transmission - Clutch Actuation; Source: Knorr-Bremse internal market research

Historical market outperformance with strong position to take further advantage of the highly attractive and stable aftermarket opportunity

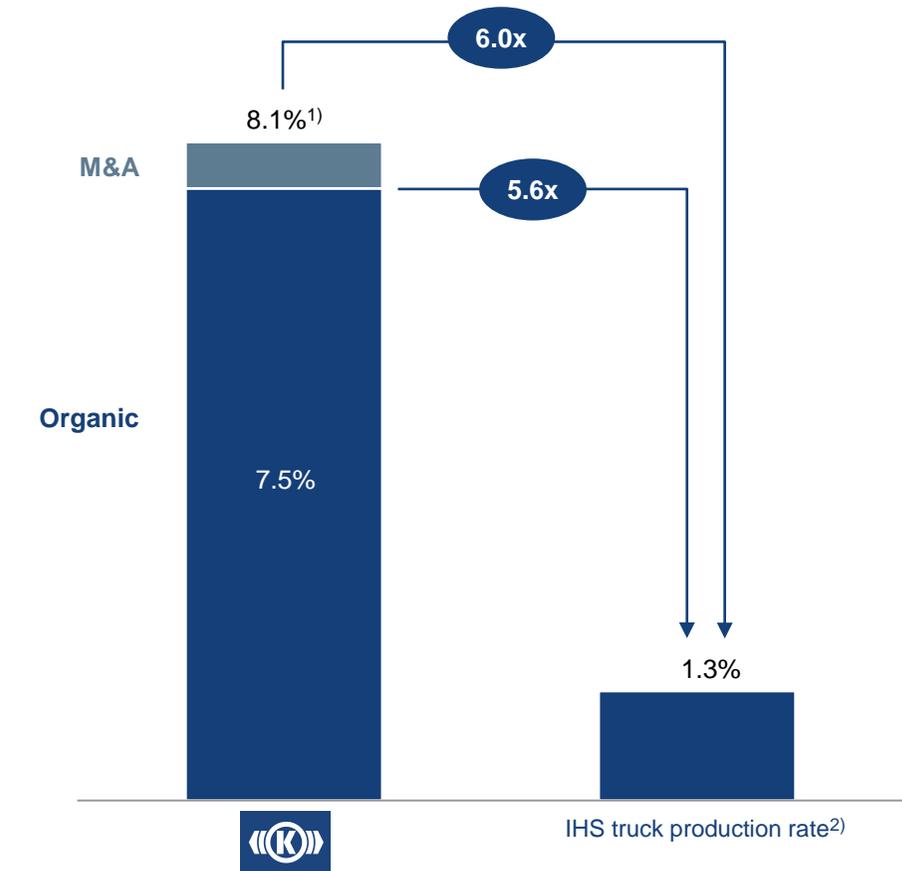
Strong growth both in OE and AM

CVS sales by type (HGB, €bn, 2010-2017)¹⁾



Strong market outperformance

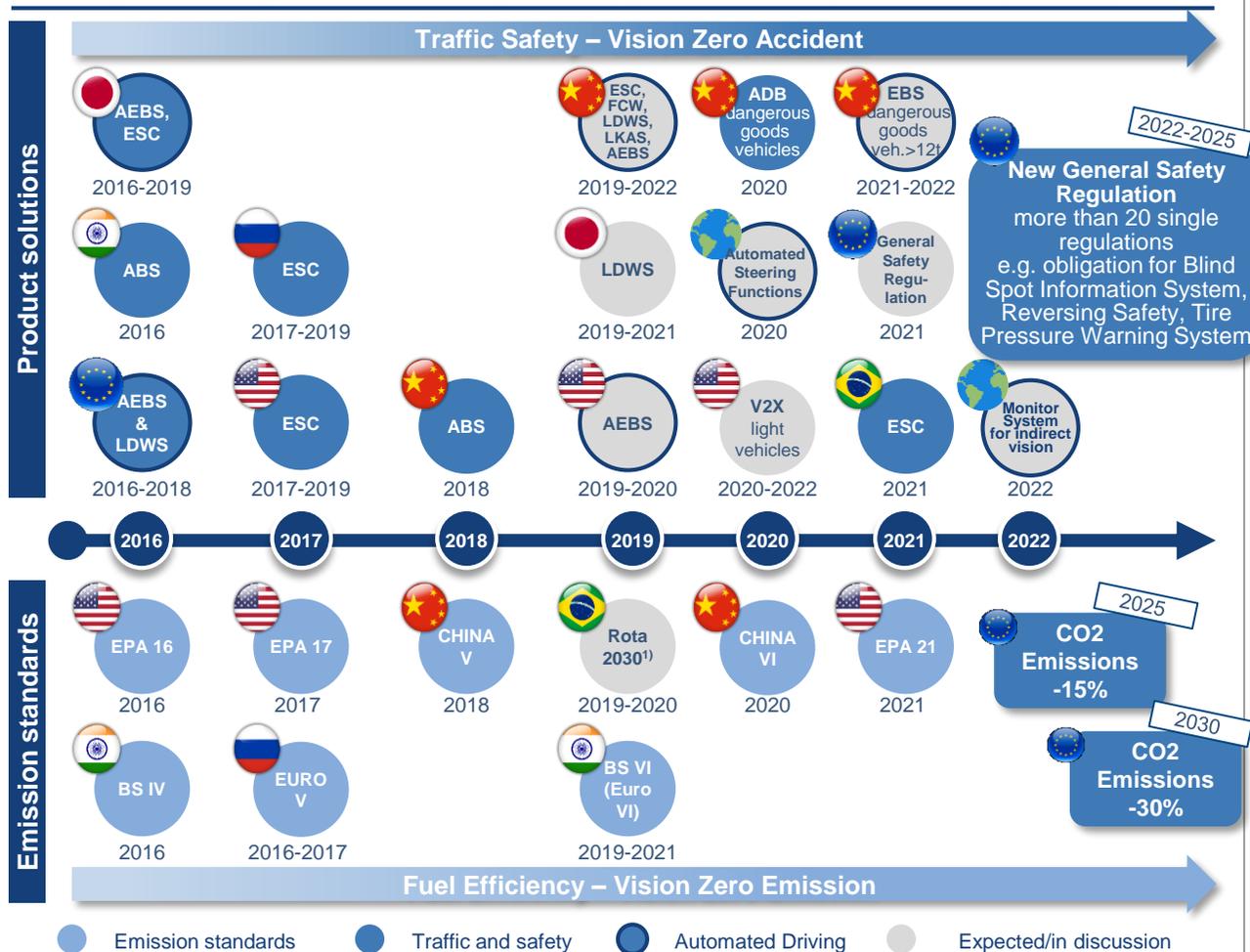
CAGR (2010-2017) CVS sales¹⁾ (HGB) and market



Notes: ¹⁾ Based on German GAAP (HGB); BilRUG sales allocated proportionally between OE and aftermarket; ²⁾ Global Truck and Bus market excluding aftermarket and Trailer; Source: Knorr-Bremse information and internal market research; IHS for truck production rate

Conversion in legislation drives the global adoption of technologies provided by Knorr-Bremse

Convergence of legislation creates growth opportunities for products respectively



Case studies

- ### 1 Blind Spot Assistant

 - New framework for general safety and protection of vulnerable road users²⁾
 - Mandatory measures for trucks:
 - Blind Spot Information System
 - 3 Reversing Safety measures
 - Tire Pressure Monitoring System
- ### 2 Air Disc Brake

 - Increase safety of dangerous goods vehicles
 - 2020 onwards: Need to be equipped with disc brakes³⁾
 - Affects both, truck & trailer brakes
- ### 3 Engine Air Management Valves & Dampers

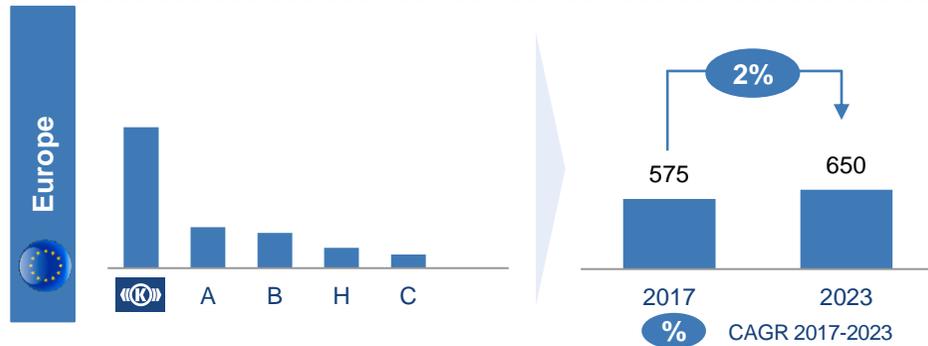
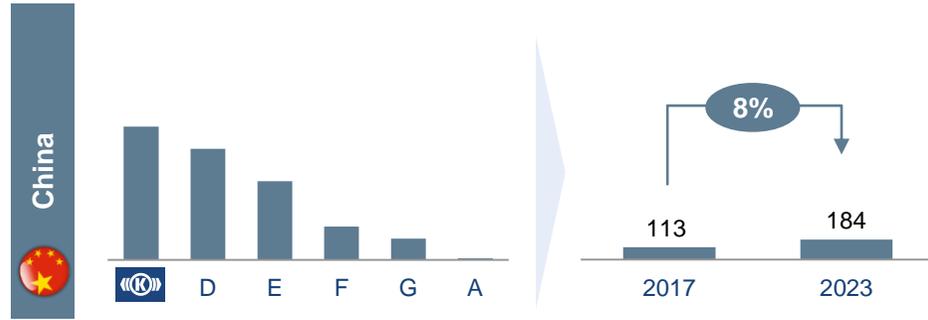
 - Increasing legislative emission standards
 - Technology as enabler to achieve norms
 - supports fulfilment of strictest standards

Legislative decisions foster demand for Knorr-Bremse solutions

Notes: ¹⁾ Approved in May 2018, government intends to stimulate efficiency & vehicle safety; ²⁾ European Commission: COM(2018) 286 & Vulnerable Road Users Directive (VRUD); ³⁾ General Administration of Quality Supervision, Inspection & Quarantine of People's Republic of China, technical specification for safety of power driven vehicles operating in roads; Source: Knorr-Bremse internal market research; Roland Berger market study: Trends in the truck & trailer market (August 2018)

Knorr-Bremse is clear market leader in Air Disc Brake with further strong market growth potential

Knorr-Bremse to benefit from strong ADB¹⁾ growth globally ...



... with growth opportunities independent of TPR ...

1

- Growth opportunity in geographies predominantly using drum brakes ✓
- Driven by convergence of legislation and higher safety standards ✓
- Independent of underlying truck production market growth ✓

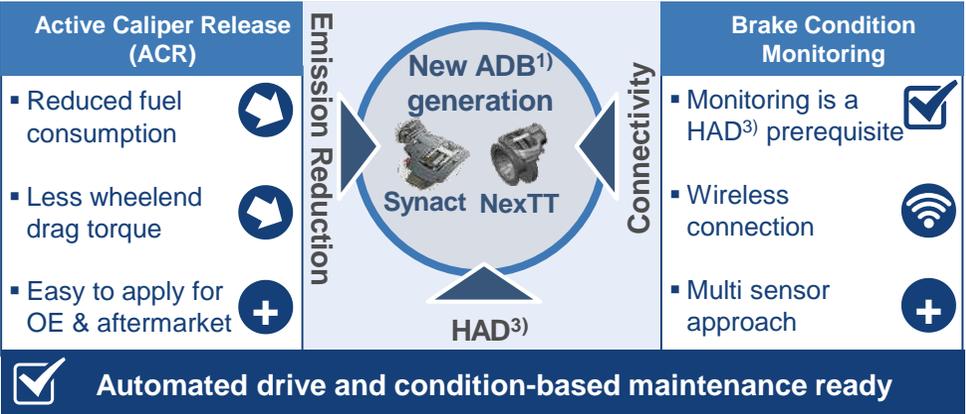
... and next generation ADB¹⁾

2

Defined fields of action as enablers for growth & upside protection

- Fuel Saving and Emission Reduction
- Predictive maintenance
- Enablers for Highly Automated Driving

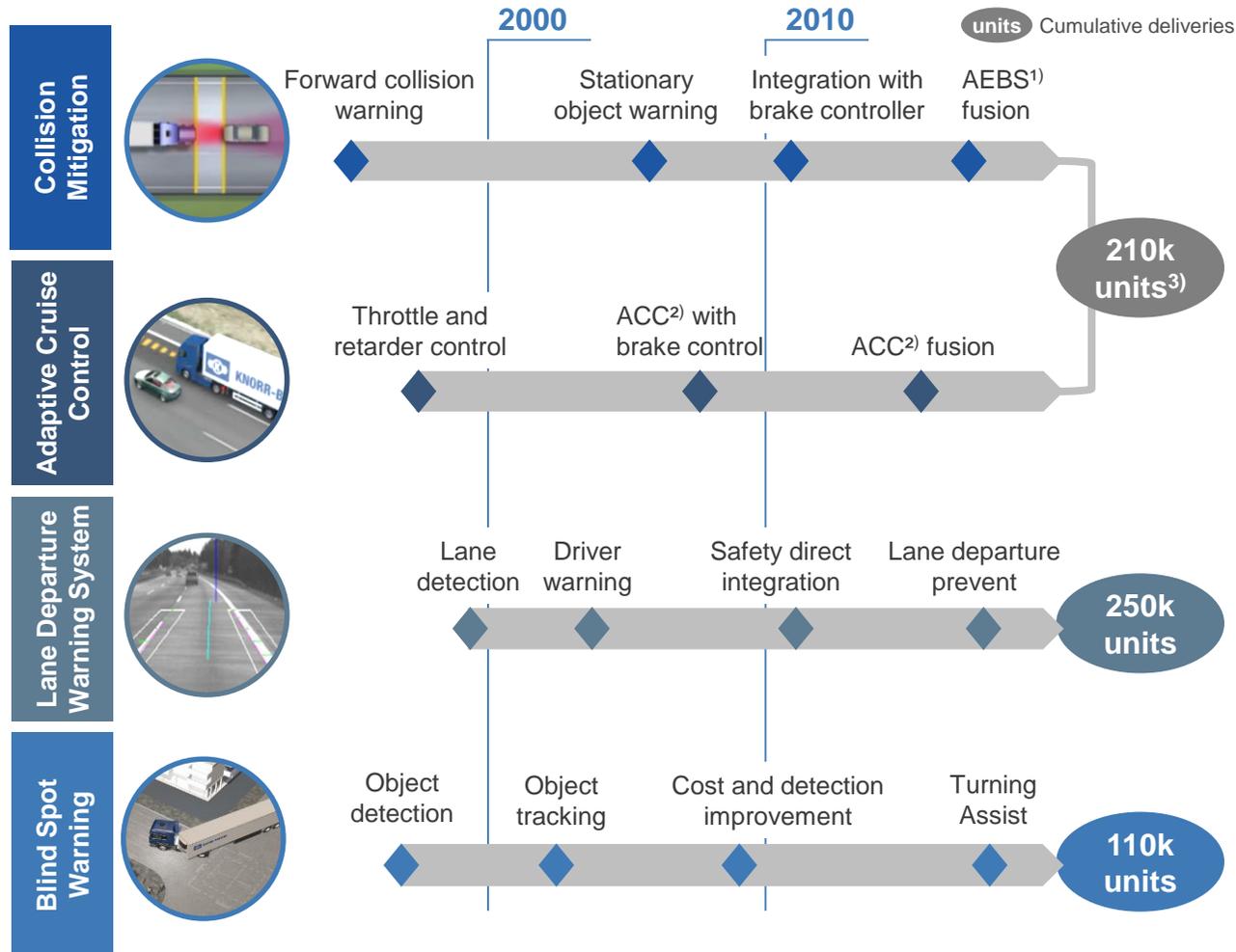
Trends to be considered for next Air Disc Brake generation



Notes: ¹⁾ Air Disc Brake; ²⁾ Indicative estimates based on Knorr-Bremse market intelligence and interviews with experts; ³⁾ Highly Automated Driving; Source: Knorr-Bremse internal market research

Automated Driving: Knorr-Bremse is a technology leader in Driver Assistance Systems

Timeline of Knorr-Bremse's product innovation in Driver Assistance Systems

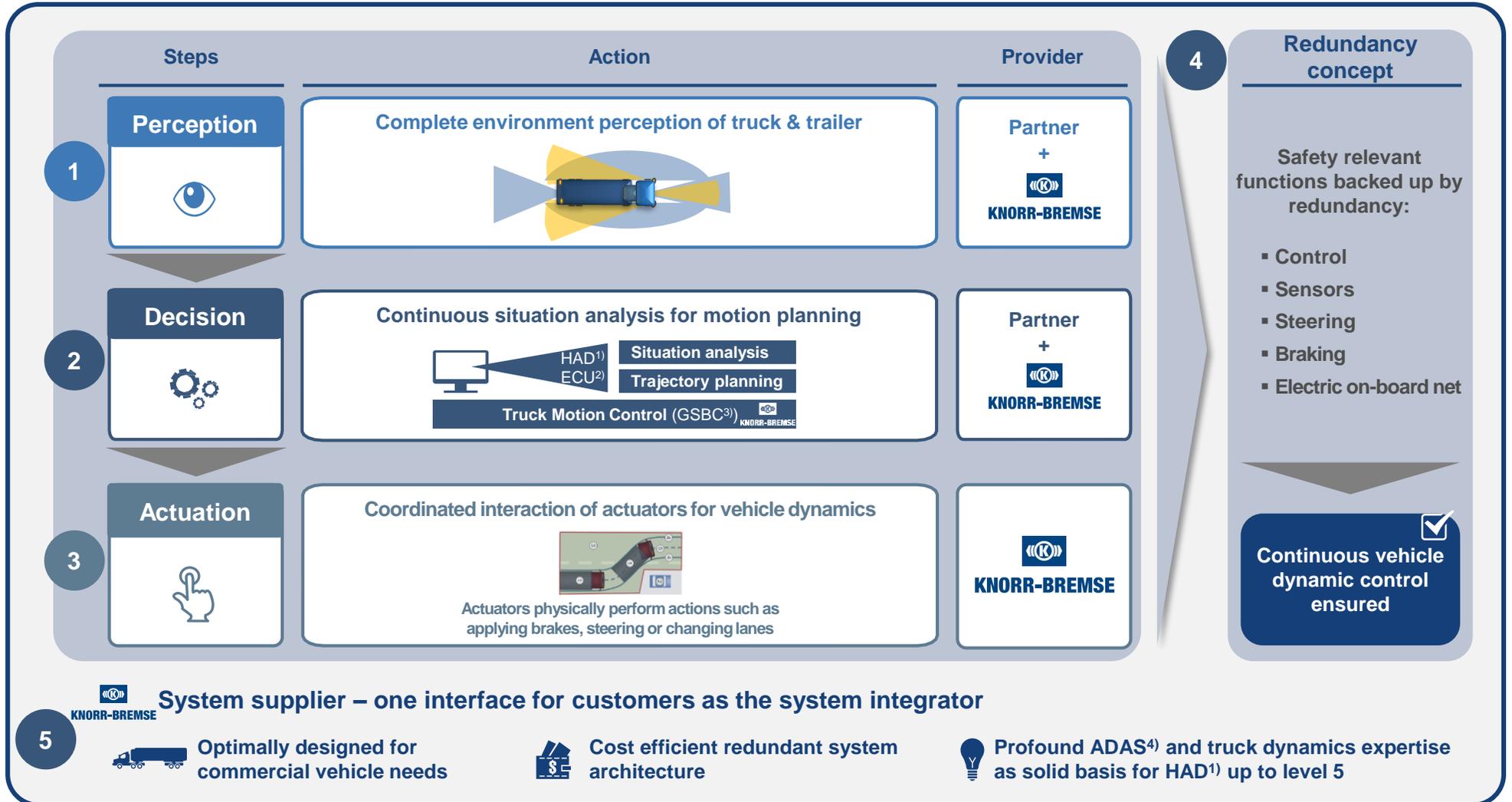


Knorr-Bremse capabilities

- ✓ > 20 years of experience
- ✓ ~ 600k units installed base globally
- ✓ Technology leadership: (e.g. Brake Systems, Steering, ADAS⁴⁾)
- ✓ System know-how & system supplier
- ✓ Broad customer base
- ✓ Retrofit initiative in North America
- ✓ Competence in driving dynamics
- ✓ Know-how in vehicle model simulation

Notes: ¹⁾ Advanced Emergency Braking System; ²⁾ Adaptive Cruise Control; ³⁾ Collision Mitigation and Adaptive Cruise Control are based on same hardware today, but applications use different software; often sold in a bundle; ⁴⁾ Advanced Driver Assistance Systems; Source: Knorr-Bremse information

Knorr-Bremse with clear strategy to be leading system supplier for Automated Driving



Notes: ¹⁾ Highly Automated Driving; ²⁾ Electronic Control Unit; ³⁾ Global Scalable Brake Control; ⁴⁾ Advanced Driver Assistance Systems; Source: Knorr-Bremse information

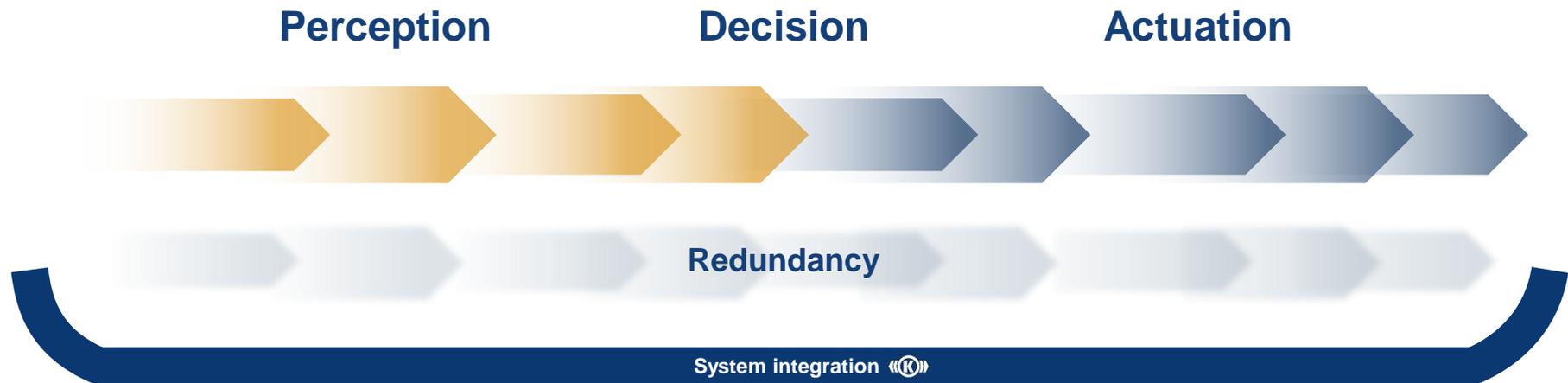
Knorr-Bremse teams up with Continental to become a leading Automated Driving system supplier for commercial vehicles



- Function know-how based on passcar experience & carryover from passcar
- Hardware for localization (radar, camera) and Automated Driving Control Unit



- Truck- & trailer-specific vehicle dynamics: Vehicle guidance and stability control
- Fail-operational architecture
- Commercial vehicle-specific function development, application and release



Consumer Benefits

- Industry benchmark perception decision and actuation from the one source
- Superior performance through full-system approach
- Cost-optimized systems for commercial vehicles

Joint Project Scope

- Development of systems, components and functionality for Automated Driving
- Validation and release of complete highly Automated Driving systems
- Collaboration in joint project house

Source: Knorr-Bremse information



Internationalisation: Global growth strategy focuses on North America penetration as well as Chinese and Indian market share expansion

Exploit leading position

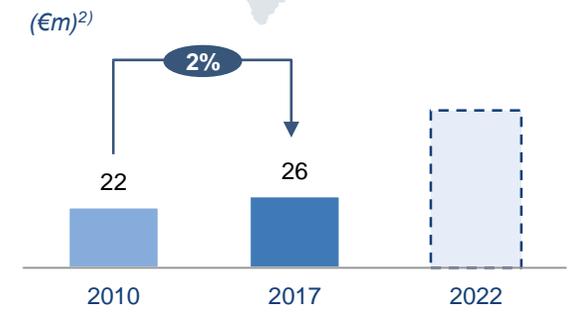
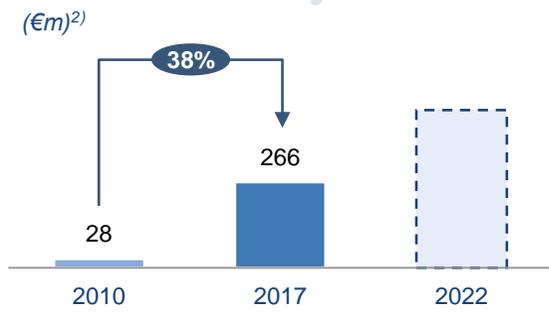
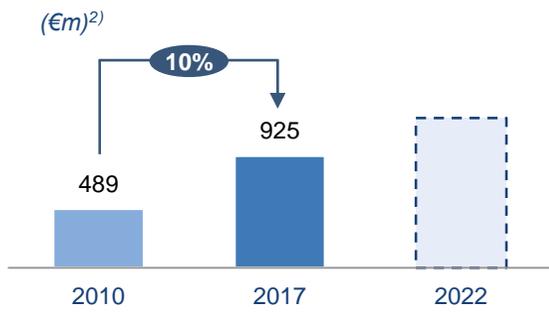
Leverage local presence

Expand market share

Footprint



Total sales



FTE



- Bendix acquisition as enabler for footprint expansion
- Capitalisation of technological expertise and brand
- Increased content per vehicle (technology as driver)
- Strong potential for growth from ADB roll-out (12% CAGR 2017-2023)⁴)
- Continuous cost structure improvements

- Intensive localisation with key local players
- Capitalise on strong position in OE channel
- Increased content per vehicle (technology as driver)
- Strong potential for growth from ADB roll-out (8% CAGR 2017-2023)⁴)
- Expand network to establish truck aftermarket
- Exploit position in electric bus

- Strong business growth with major Indian customers
- Expansion of product portfolio (dampers, drum brakes)
- Localisation programme creating scale effects

Notes: Based on German GAAP (HGB); FTE includes leasing (EOP) ¹) Plant under expansion; ²) Based on external third party sales; ³) TCI allocated to India; ⁴) Indicative estimates based on Knorr-Bremse market intelligence and interviews with experts; Source: Knorr-Bremse information

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R&D is at the very core of Knorr-Bremse's DNA

With over 10,000 patents¹⁾

Knorr-Bremse secures the future innovation roadmap. Largest patent portfolio in the industry²⁾

5 state of the art R&D centres

globally complemented by 23 local engineering entities with customer proximity

Focussed & disciplined approach

ensuring highest efficiency

Significant synergies between RVS and CVS

More than **80%** of the most industry-defining **innovations** over the last decades came from Knorr-Bremse

Extensive external network with over **15 R&D partnerships**

327 newly filed patents in 2017, out of which the majority in automated driving & connected systems

~50% of Knorr-Bremse's R&D efforts target new technologies and future related themes

5.5% of sales in R&D³⁾ – Knorr-Bremse invests more in future technologies than any of its competitors



Notes: ¹⁾ Granted and applied patents; ²⁾ Based on published number of patent families (granted and applied); ³⁾ Knorr-Bremse 2018 R&D financial information based on IFRS
Source: Knorr-Bremse information

Significant R&D portfolio synergies between RVS and CVS ...

 Services	 Vehicle control & automated driving	 Chassis systems	 Braking	 Driving	 Energy Supply & Distribution
Telematics (iCom maintenance, iTAP-push)	Driver assistance (ACC, AEB, ASR, LEADER)	Hydraulics	Wheelend/ bogie equipment	Conventional actuation	Compressed air
Remote & on-demand maintenance and diagnostics	Motion control	Electronics	Disc brake	Combustion engine components	Compressed air generation
Training drivers/ work shops (Safety direct, dimulator)	Brake control	HMI & driver information (iTAP, etc.)	Brake actuator	Electronic actuation (Kiepe)	Air treatment
Spare parts	ABS / wheel slide protection	Level control	Wear-resistant brakes	E-motor	
Remanufacturing	Emergency brake	Electronic board net / Charge regulation (Kiepe)	Electrodynamic brakes / recuperation	Converter / traction control	
Energy measurement	V2X communication	Pantograph (Kiepe)	Tread brake	Automated manual transmission	
Ticketing	Vehicle control (TCMS / UCS)	Windscreen wiper and wash systems	Electromagnetic brake system		
Transport and logistics optimisation	Brake distance management/sanding	Entrance systems / doors	Eddy current brake		
	Dynamic driving control (ESP)	Air conditioning	Drum brake & adjuster		
	Vehicle dynamics	Conventional steering	Exhaust brake		
	Torque overlay steering system				



In **>50%** of Knorr-Bremse's portfolio the underlying technology can be applied to **both divisions**

...resulting in high synergies and cross-proliferation

Cross-divisional R&D examples

1990:
Air Disc Brake



Technology transfer for ADB
from RVS to CVS



1992:
Air Disc Brake

1985:
Screw
Compressor



RVS Screw Compressor
technology adopted for CVS
applications



2011:
Screw
Compressor

2021/2022:
Collision
Avoidance



Collision Avoidance for RVS
based on CVS system know-
how within the field of sensor
technology



2008:
Collision
Avoidance



Source: Knorr-Bremse information



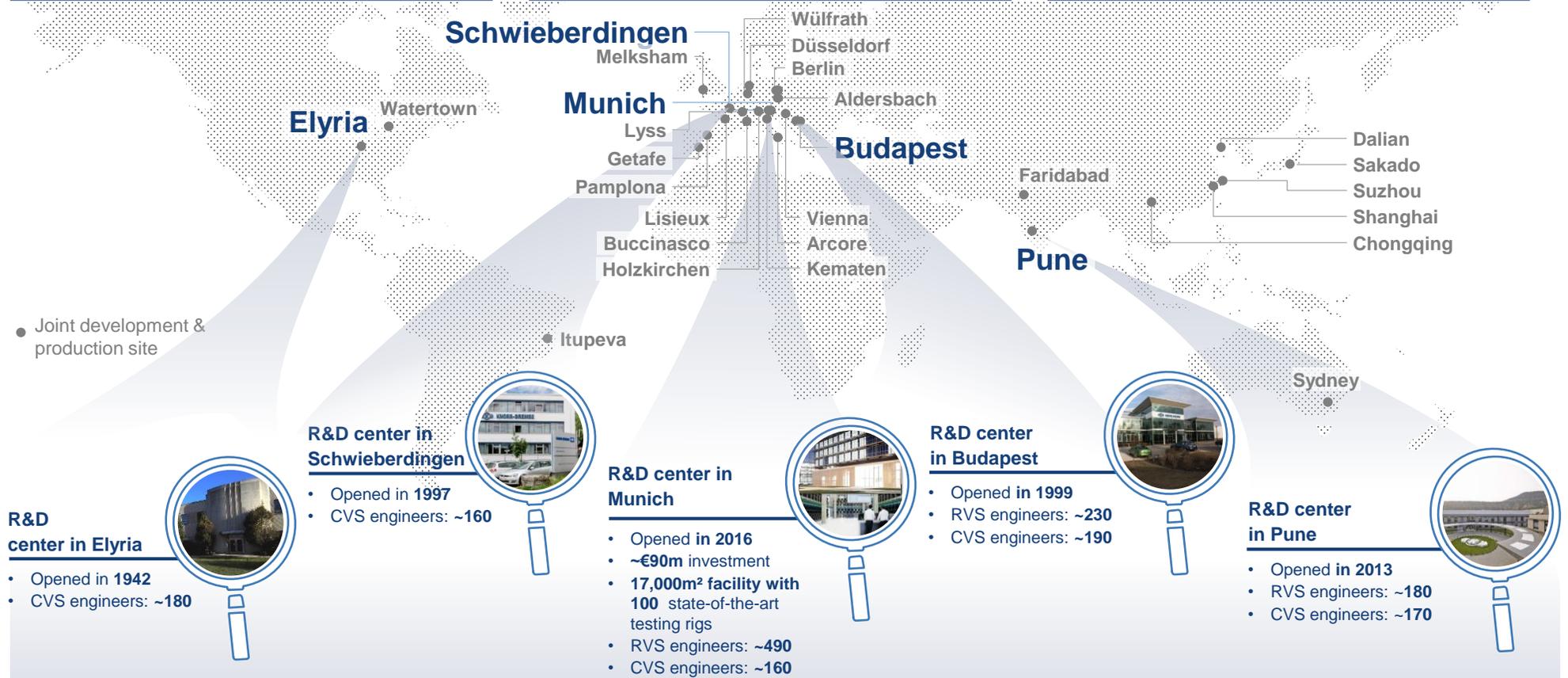
Knorr-Bremse Group

Leveraging Knorr-Bremse's synergies & partnerships: centres of excellence as basis for sustained technology leadership

Americas, Σ ~413 FTE¹⁾

Europe, Σ ~2,382 FTE¹⁾

Asia, Σ ~926 FTE¹⁾

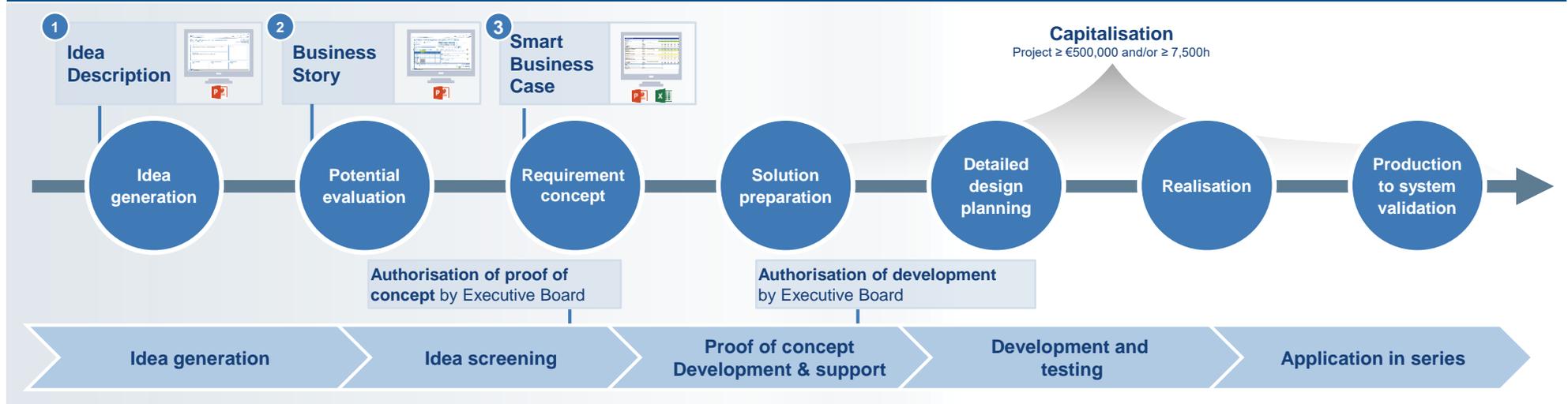


Knorr-Bremse's innovations are supported by a network of specialized development centres with joint production and R&D

Notes: ¹⁾ FTE refers to number of employees in R&D function (includes engineers, technicians, merchants) EOP 2017, TCI allocated to Asia
 Source: Knorr-Bremse information

Knorr-Bremse deploys structured and effective processes to drive innovation results

Knorr-Bremse R&D process



Knorr-Bremse's innovations are designed for clear customer impact...

- Optimisation of TCO¹⁾
- Reduction of energy consumption, noise, weight
- Safety & reliability
- Connectivity, wireless solutions, ethernet
- Adaption to regulation

...and maximum economic benefit for Knorr-Bremse

- All projects assessed based on NPV²⁾
- Prioritisation of projects according to IRR³⁾
- Optimise time to market
- Short payback time of investment
- Ability to leverage innovation across customer portfolio

Notes: ¹⁾ TCO refers to total cost of ownership; ²⁾ NPV refers to net present value; ³⁾ IRR refers to internal rate of return; Source: Knorr-Bremse information

Close cooperation with customers & strategic partners

GOVERNMENT PARTNERSHIPS

- Shift2Rail: EU supported initiative amongst suppliers and OEMs to jointly develop an efficient transportation system
- VDA¹⁾ participation in ~20 committees
- ✓ Design of norms/standards
- ✓ Early anticipation of industry trends
- ✓ Grants/subsidies



VC PARTNERSHIPS WITH STARTUPS

- Partnerships with accelerators
- Investment in start-ups
- ✓ Technology access
- ✓ R&D acceleration



PARTNERSHIPS WITH UNIVERSITIES

- Research cooperations
- ✓ Access to future talent
- ✓ Scouting of new technologies at minimal cost



JVS WITH OEMS / TECHNOLOGY PARTNERS

- 18 joint ventures globally
- Joining complementary competences to extend product and service lines, and capacities
- ✓ IP protection
- ✓ Local presence
- ✓ Flexible solutions for customers

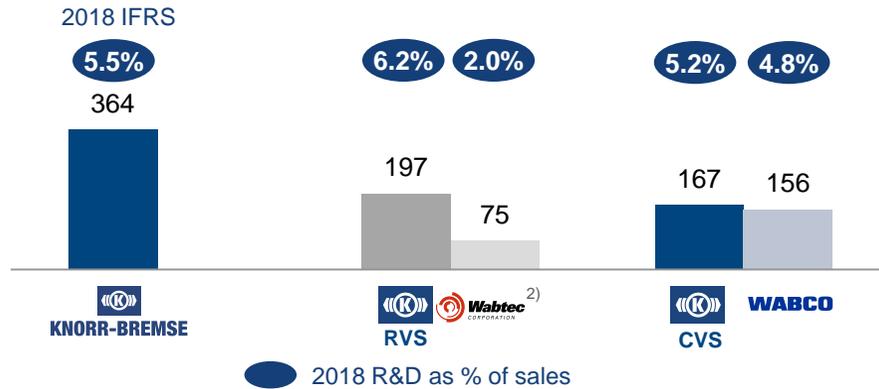


 Countries Knorr-Bremse is present

Notes: ¹⁾ VDA - Verband der Automobilindustrie (German Association of the Automotive Industry); Source: Knorr-Bremse information

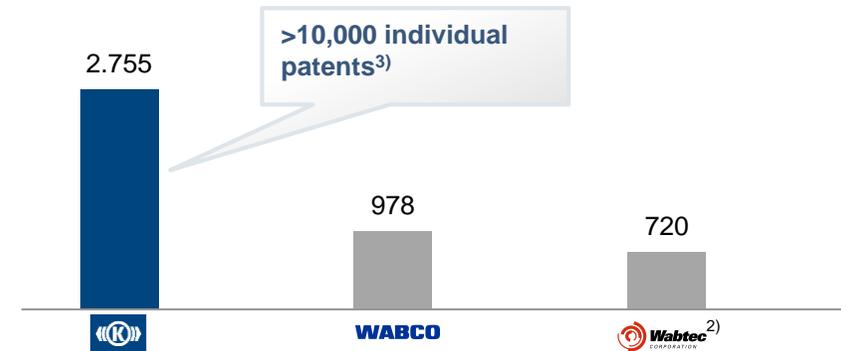
Knorr-Bremse significantly outspends competition in R&D, translating into clear technology leadership – the backbone for future growth

Knorr-Bremse invests more in R&D¹⁾

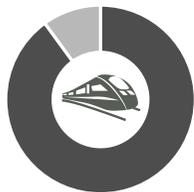


Knorr-Bremse has a larger patent portfolio than its peers

Portfolio size based on patent families (public)



Knorr-Bremse has been consistently able to translate its R&D investment into pioneering “first to market” innovations



9 out of 10 of the most industry-defining innovations⁴⁾ come from Knorr-Bremse



8 out of 10 of the most industry-defining innovations⁴⁾ come from Knorr-Bremse

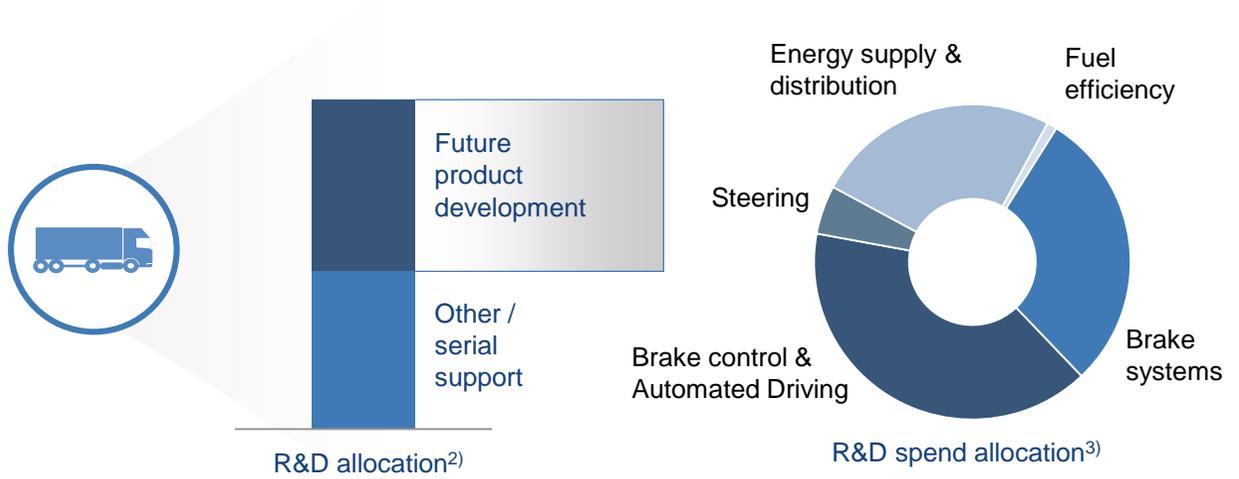
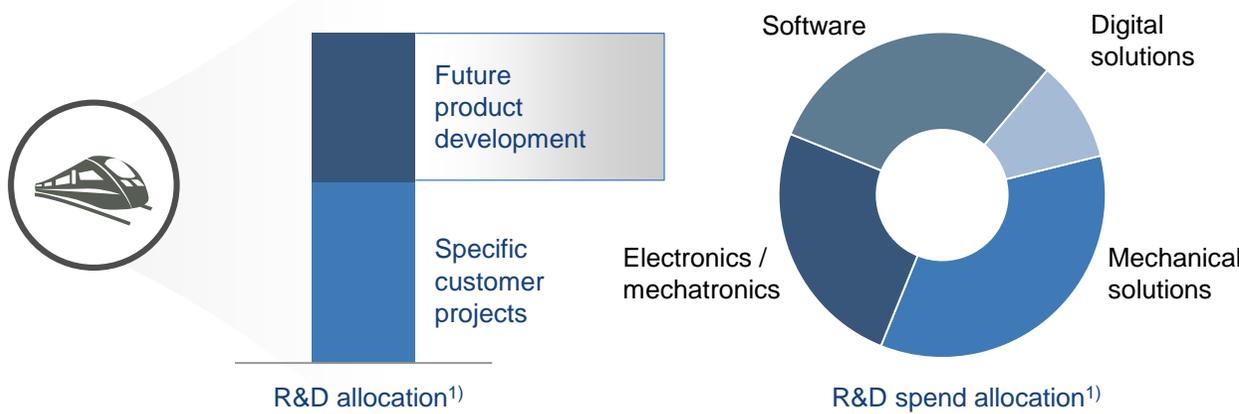
- High quality and amount of patents ensure competitive advantage
- Investment in future top line growth
- Maximum alignment to megatrends
- Excellent R&D capabilities (patents, engineers, process efficiencies)

Notes: €/USD conversion 0.83; ¹⁾ Knorr-Bremse R&D financial information based on IFRS, R&D ratio as reported in annual reports; ²⁾ PF Faiveley and excl. GE Transportation acquisition; ³⁾ Granted and applied patents; ⁴⁾ Information as per Knorr-Bremse management view, for reference see slide 28 and 56; Industry defining are considered to be the top 10 innovations in the past 30 years in the rail and commercial vehicle industry; Source: Knorr-Bremse information; 2017 annual reports of Wabtec / Faiveley and WABCO; PatentSight

Knorr-Bremse focuses resources on the most important future technologies

Knorr-Bremse's R&D spend has a balanced split between customer and proprietary innovation projects

2017 figures as example



- Success and growth in OE driven by ability to provide **customer specific solutions**
- Focus on complex high value-add projects
- Project pricing reflects **upfront R&D spending**
- Enables **customer to outsource entire systems engineering**

Our focus is on **future technologies** and on **complex customer projects** where Knorr-Bremse delivers a high value-add

- Disproportionate, higher investments in Brake Control and Automated Driving
- Targeted R&D investment focused on **key future technologies**

Notes: ¹⁾ Approximation based on Knorr-Bremse management view; ²⁾ Based on hours spent in 2017; ³⁾ Based on R&D expense in 2017 (German GAAP (HGB)); Source: Knorr-Bremse information

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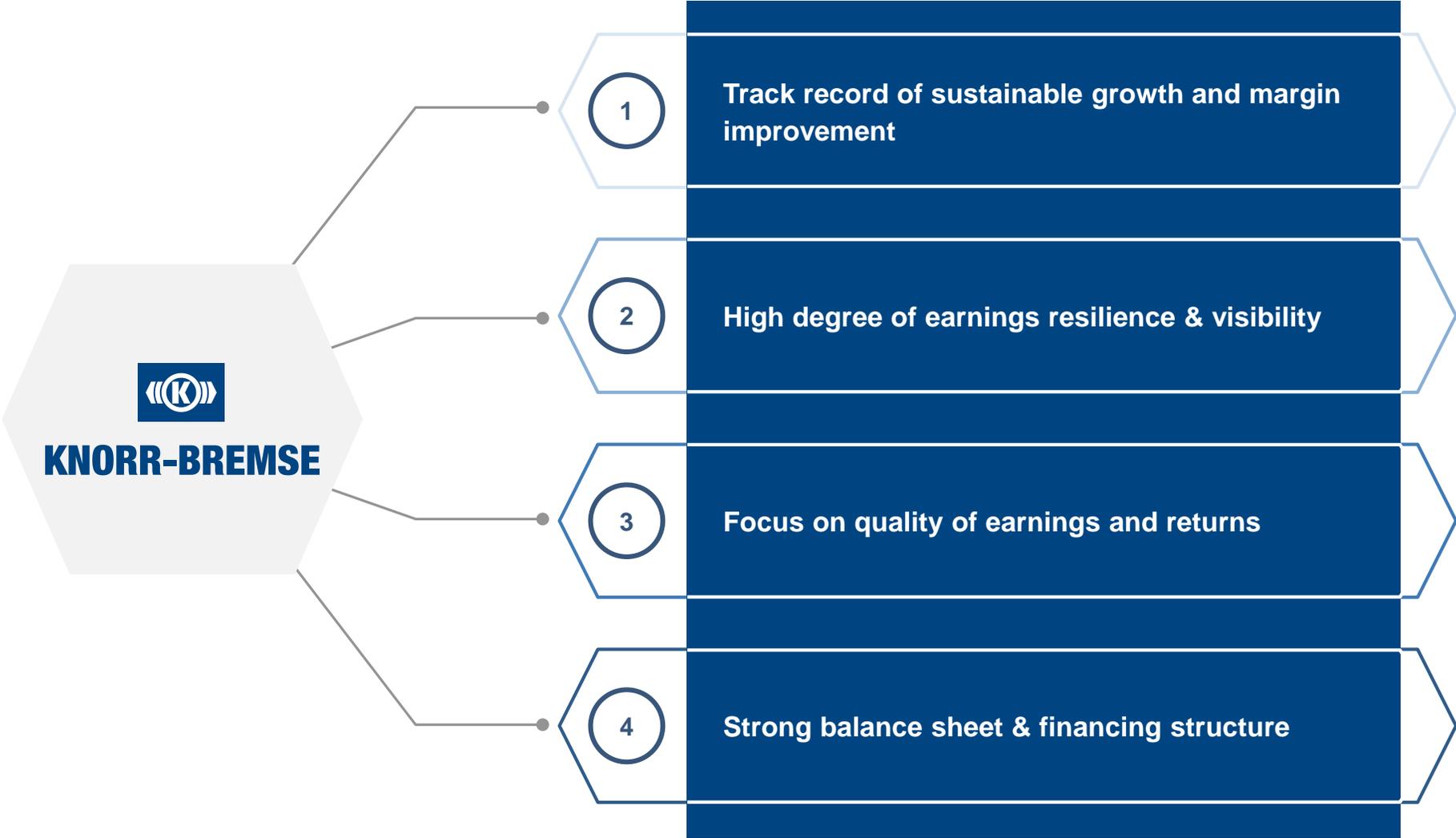
6 Financials

7 Sustainability

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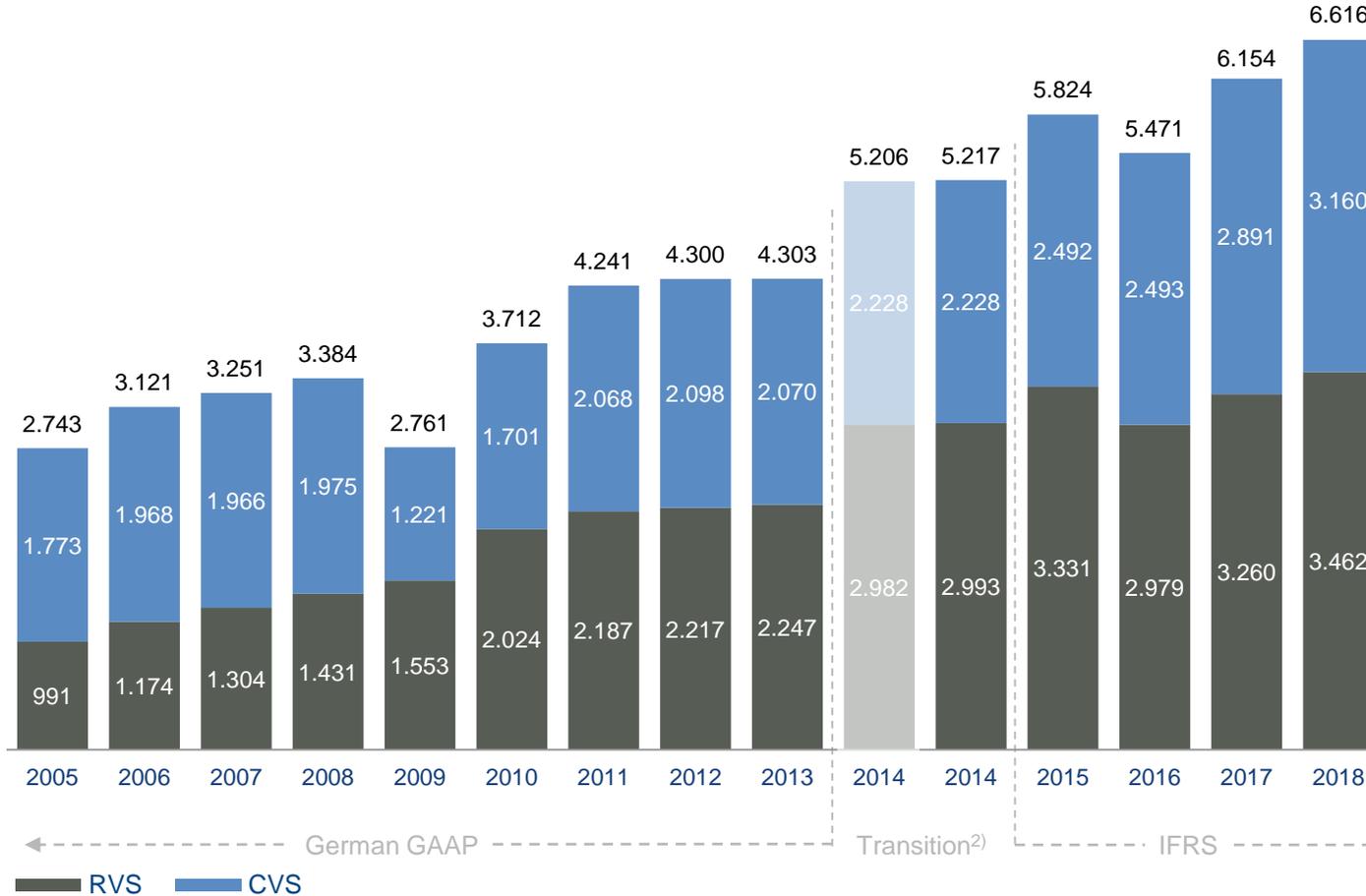
Review of Knorr-Bremse financial profile



1 Track record of strong and sustainable top-line growth ...

Historical sales¹⁾²⁾ by division

(€m)



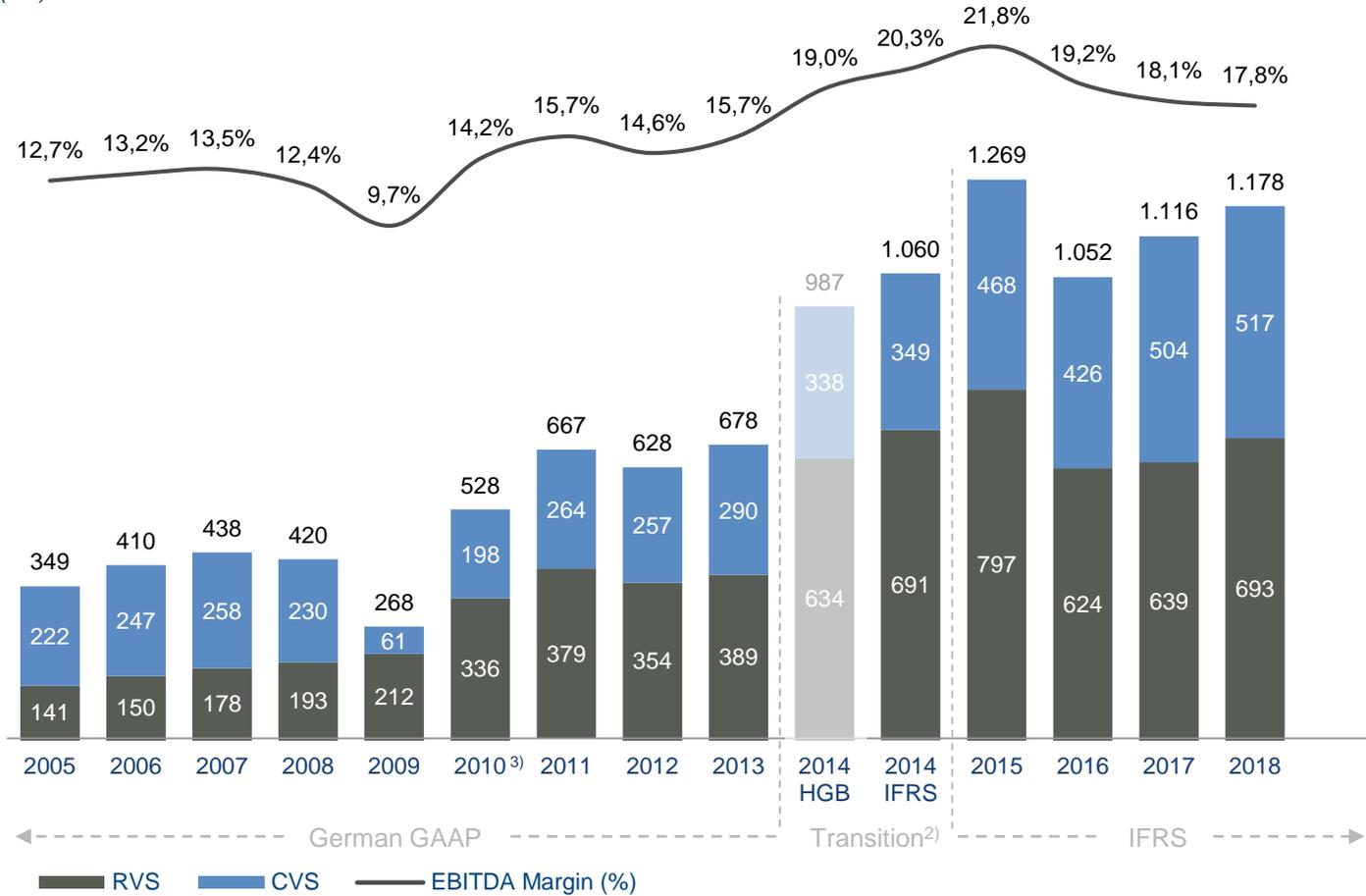
	CAGR ²⁾		
	2005-18	2010-18	2017-18
Group	7.0%	7.5%	7.5%
	4.6%	8.0%	9.3%
	10.1%	6.9%	6.2%

Notes: ¹⁾ Divisional historic figures do not add up to group sales excluding consolidations/other; ²⁾ 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; Source: Knorr-Bremse information

1 ... combined with disproportionate EBITDA growth

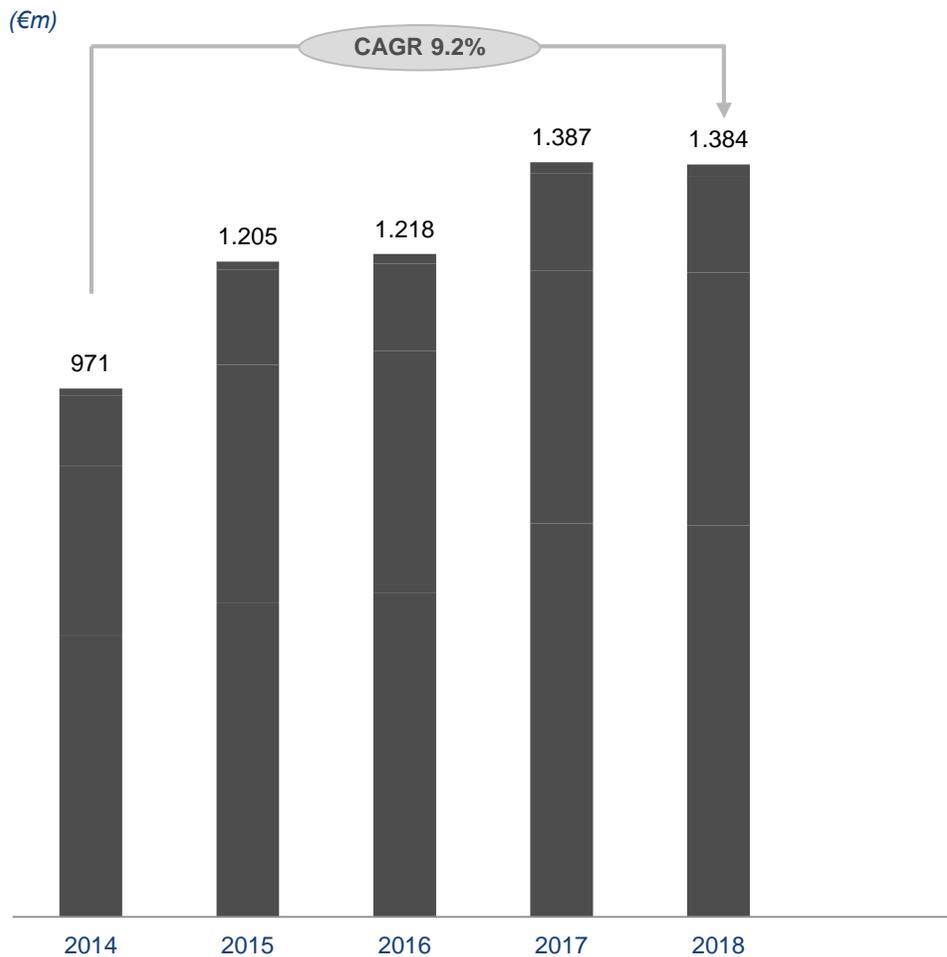
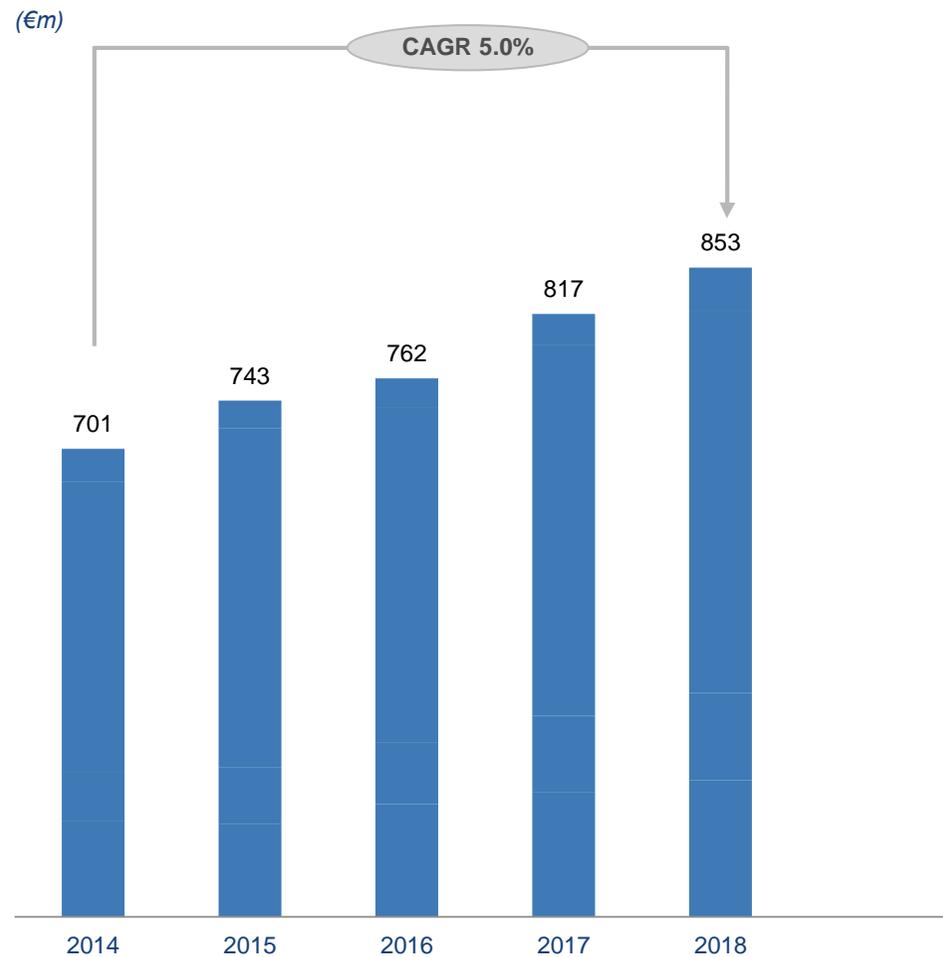
Historical EBITDA¹⁾²⁾ profitability

(€m)



	CAGR ²⁾		
	2005-18	2010-18	2017-18
Group	9.8%	10.6%	5.6%
	6.7%	8.8%	2.6%
	13.0%	9.5%	8.5%

Notes: ¹⁾ Divisional historic figures do not add up to group EBITDA excluding consolidations/other; ²⁾ 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; ³⁾ EBITDA 2010 including extraordinary expenses due to BilMOG; Source: Knorr-Bremse information

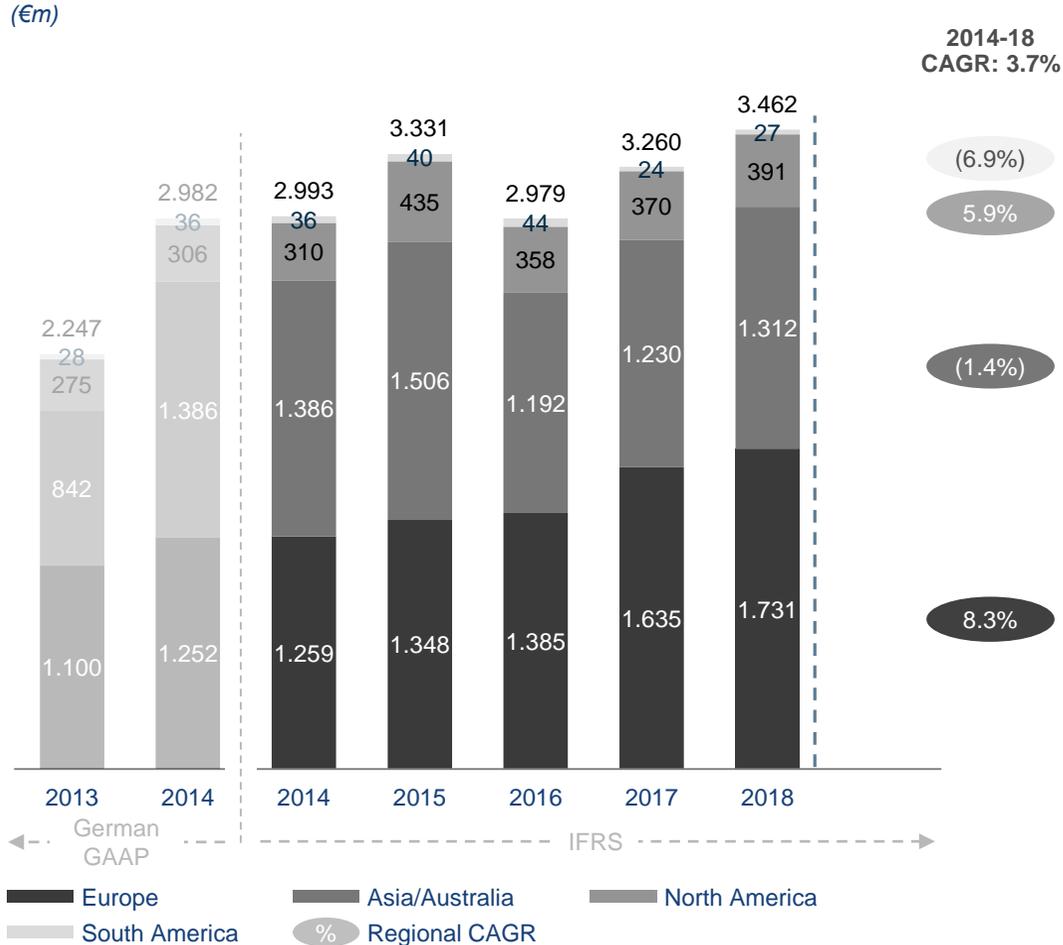
RVS – Aftermarket sales (2014-2018)¹⁾CVS – Aftermarket sales (2014-2018)¹⁾

Notes: ¹⁾ Based on IFRS; BiRUG sales allocated proportionally between OE and aftermarket; Source: Knorr-Bremse information

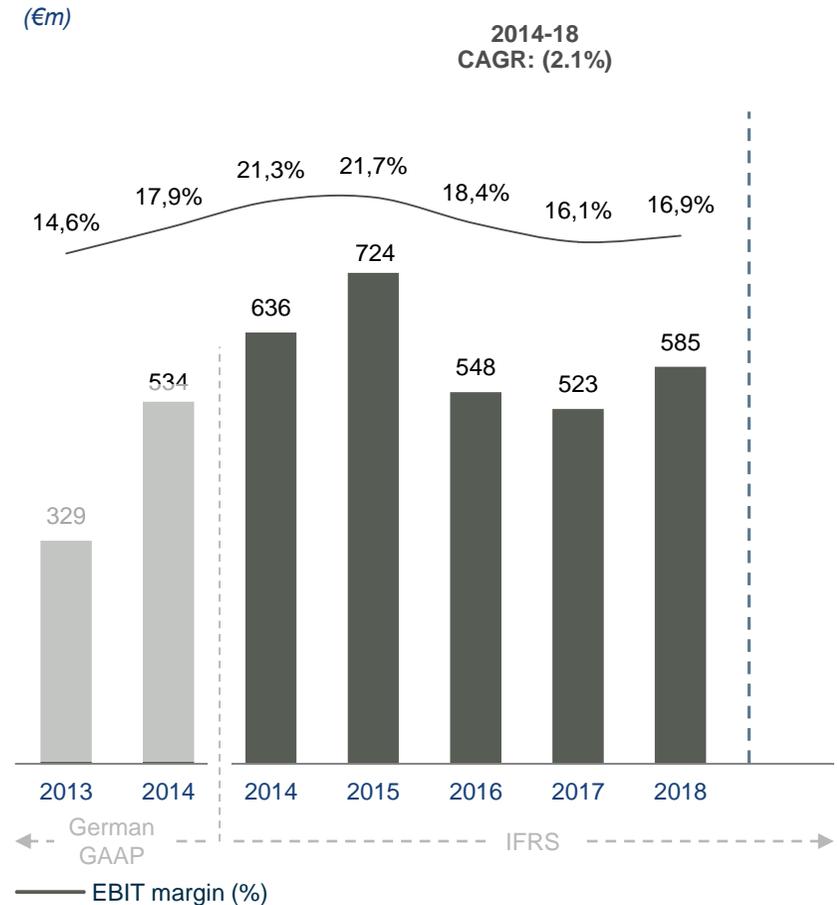
1 RVS – Sales development driven primarily by Europe and China with profitability reflecting regional margin mix dynamics



Regional sales development¹⁾²⁾



EBIT²⁾

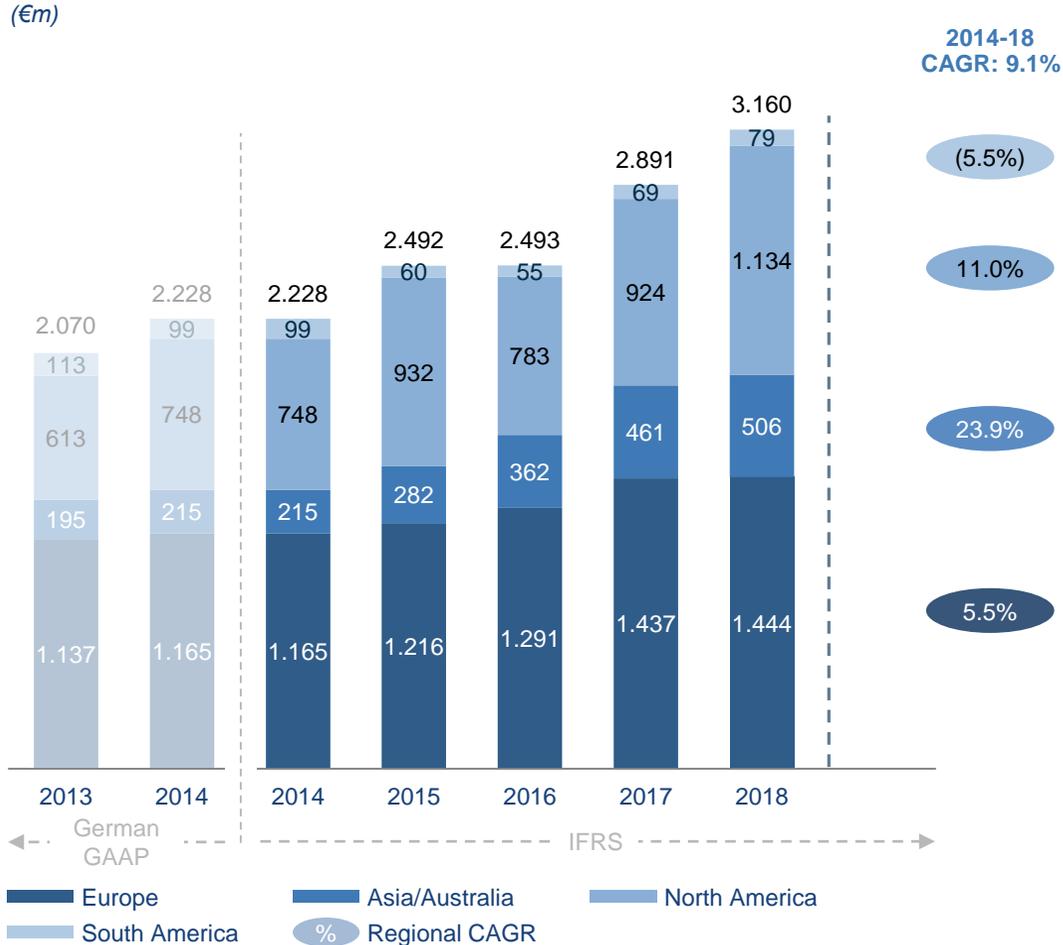


Notes: ¹⁾ 3rd party historic regional sales figures do not add up to divisional sales excluding IC sales; ²⁾ 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; Source: Knorr-Bremse information

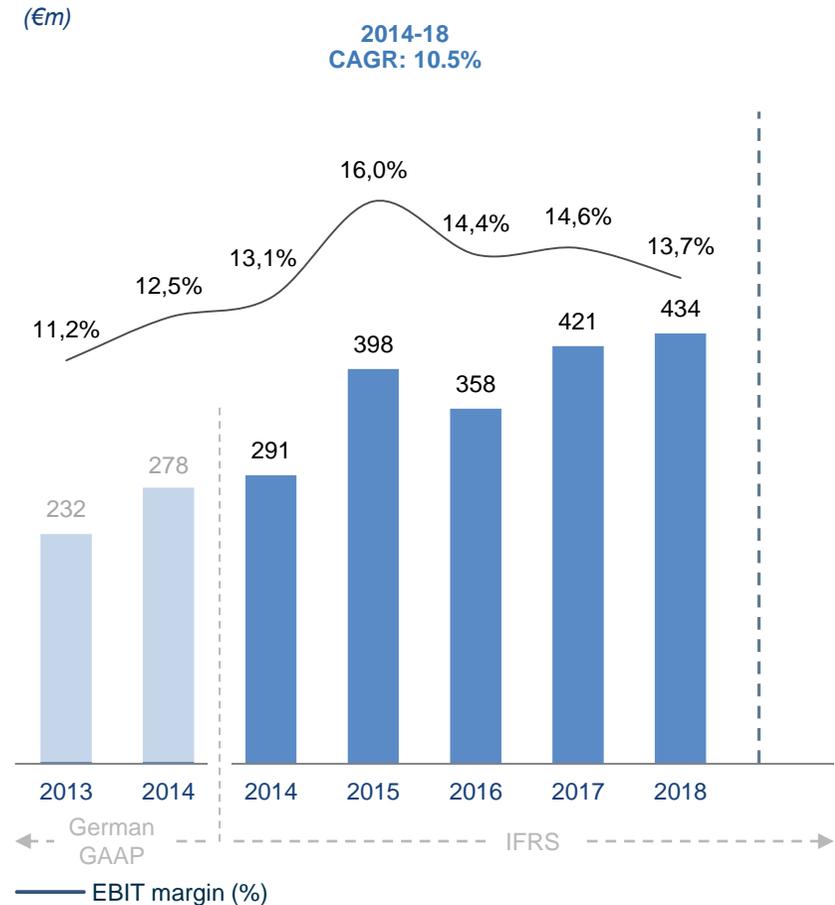
1 CVS – Sales growth driven by strong momentum across key regions coupled with significant margin expansion



Regional sales development¹⁾²⁾



EBIT²⁾



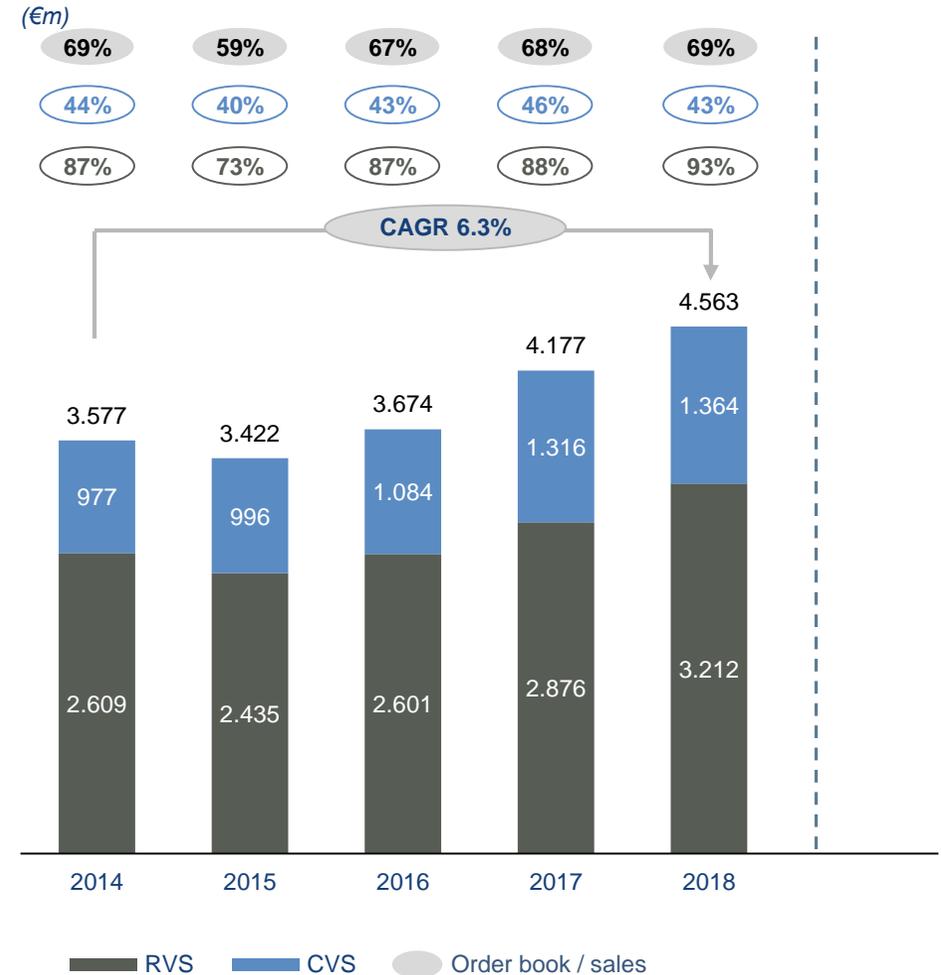
Notes: ¹⁾ 3rd party historic regional sales figures do not add up to divisional sales excluding IC sales; ²⁾ 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; Source: Knorr-Bremse information

2 Top-line visibility supported by high order intake and order book

Order intake 2014-18¹⁾²⁾



Order book 2014-18²⁾³⁾



Notes: ¹⁾ Non-GAAP metric; ²⁾ Group figures include consolidations/other; ³⁾ Calculated based on financial statements prepared in accordance with IFRS; Source: Knorr-Bremse information

3 Focus on quality of earnings – a closer look at key P&L items

Key items

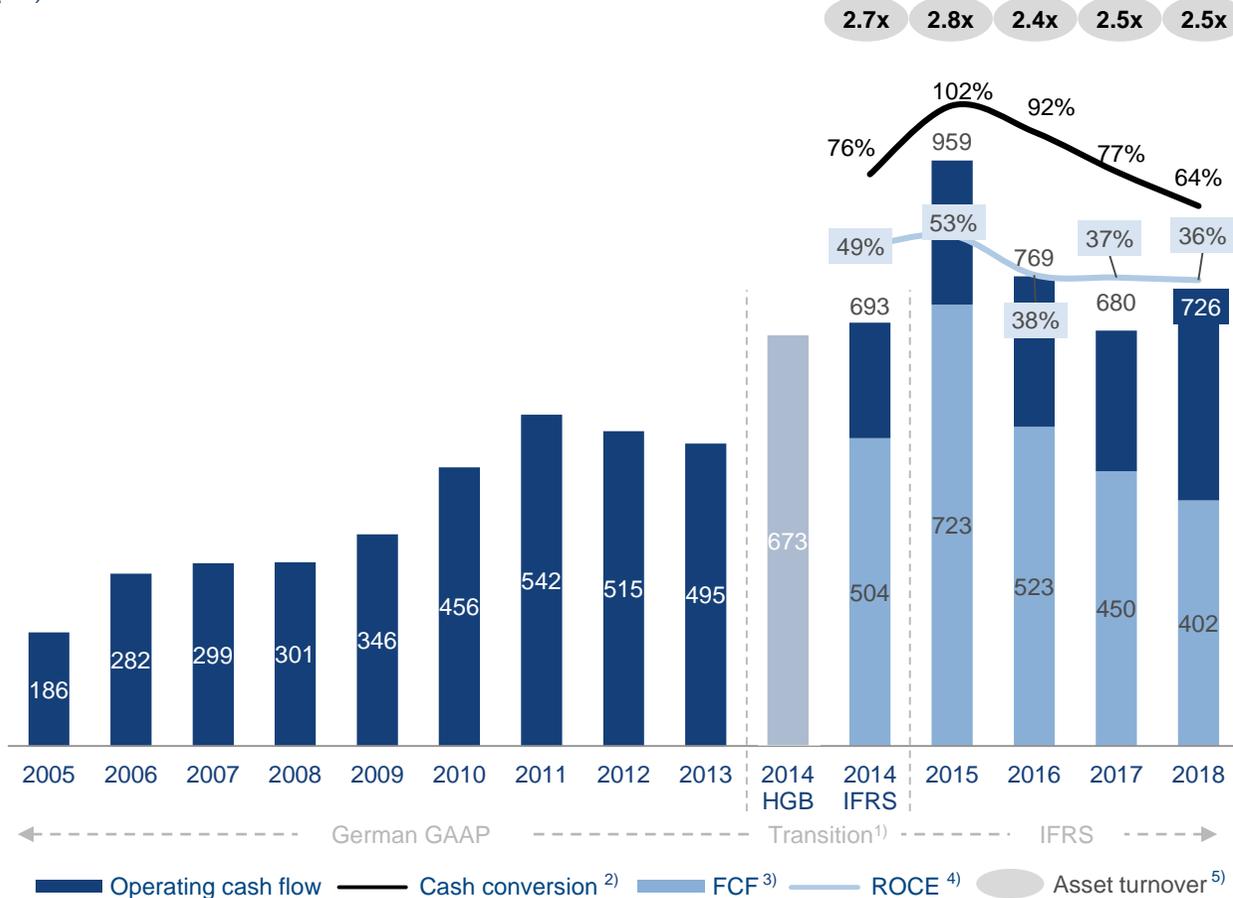
€m	2015	2016	2017	2018
Net sales	5,824	5,471	6,154	6,616
<i>% growth</i>	11.6%	(6.0%)	12.5%	7.5%
Changes in inventory of finished and unfinished goods	(7)	(11)	39	34
Own work capitalised	19	21	32	48
Total operating performance	5,836	5,481	6,224	6,698
Other operating income	89	83	81	66
Material expenses	(2,747)	(2,571)	(3,010)	(3,318)
Personnel costs ¹⁾	(1,272)	(1,272)	(1,439)	(1,497)
Other operating expenses	(636)	(669)	(741)	(771)
EBITDA	1,269	1,052	1,116	1,178
<i>Margin, %</i>	21.8%	19.2%	18.1%	17.8%
Depreciation / Amortisation	(170)	(166)	(211)	(206)
EBIT	1,099	886	904	972
<i>Margin, %</i>	18.9%	16.2%	14.7%	14.7%
Financial result	(51)	(45)	(52)	(98)
EBT	1,048	841	852	876
<i>Margin, %</i>	18.0%	15.4%	13.9%	13.2%
Income tax	(337)	(274)	(265)	(246)
<i>Effective tax rate</i>	32.2%	32.6%	31.1%	28.1%
Net income	711	567	587	629

Notes: Based on financial statements prepared in accordance with IFRS; ¹⁾ Including leased personnel; Source: Knorr-Bremse information

3 Knorr-Bremse is a high return and cash generative business

Strong cash generation abilities

(€m)



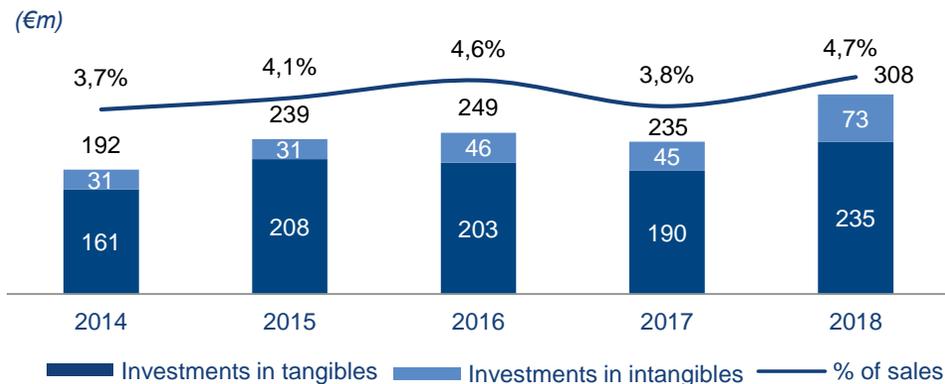
Key drivers and factors

I EBIT margins	<ul style="list-style-type: none"> ROCE normalisation along with EBIT in 2016 largely driven by China RVS HS Additional margin upside from historical acquisitions of low margin businesses with future turnaround potential
II Asset turnover	<ul style="list-style-type: none"> Strong asset turnover above c.2.0x Consistent historical sales growth Moderate decrease due to capex and working capital growth
III FCF generation	<ul style="list-style-type: none"> Recent normalisation mainly due capex program and changes in net working capital resulting from China pre-payments Cash flow mirrors EBITDA development in combination with low WC levels (pre-payments) 2018 impacted by increasing investment activities (Federal Mogul) and extraordinary costs (IPO, IFRS, Blueprint)

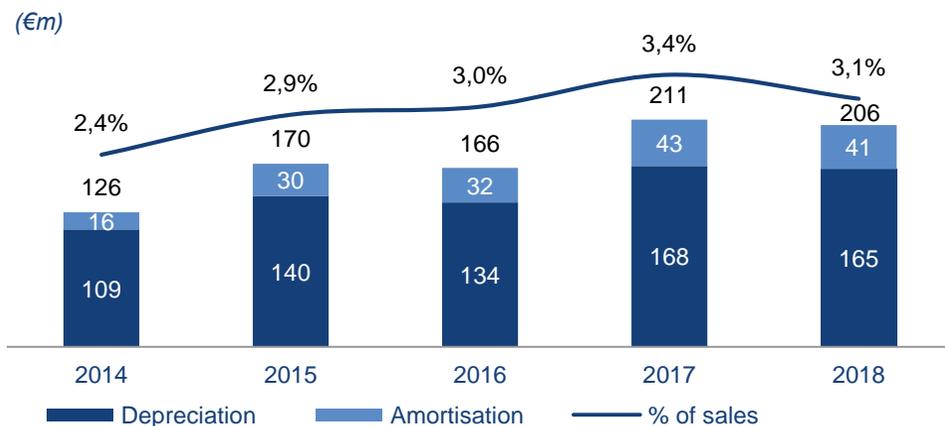
Notes: ¹⁾ 2014 represents the first year that Knorr-Bremse prepared its financial statements in accordance with IFRS. Prior to 2014, financial statements were only prepared in accordance with German GAAP (HGB). IFRS differs in certain aspects from German GAAP (HGB), and accordingly data presented in accordance with German GAAP (HGB) may not be comparable to data prepared in accordance with IFRS; ²⁾ Cash conversion defined as: (OCF - investments in fixed assets - investments in intangible assets) / net income; ³⁾ FCF (Free Cash Flow) defined as cash flow from operations minus cash-relevant capex; ⁴⁾ ROCE defined as EBIT divided by capital employed (Fixed assets + Intangible assets + Net working capital); ⁵⁾ Asset turnover defined as sales divided by capital employed; Source: Knorr-Bremse information

3 Fully invested asset base driving low capex requirements

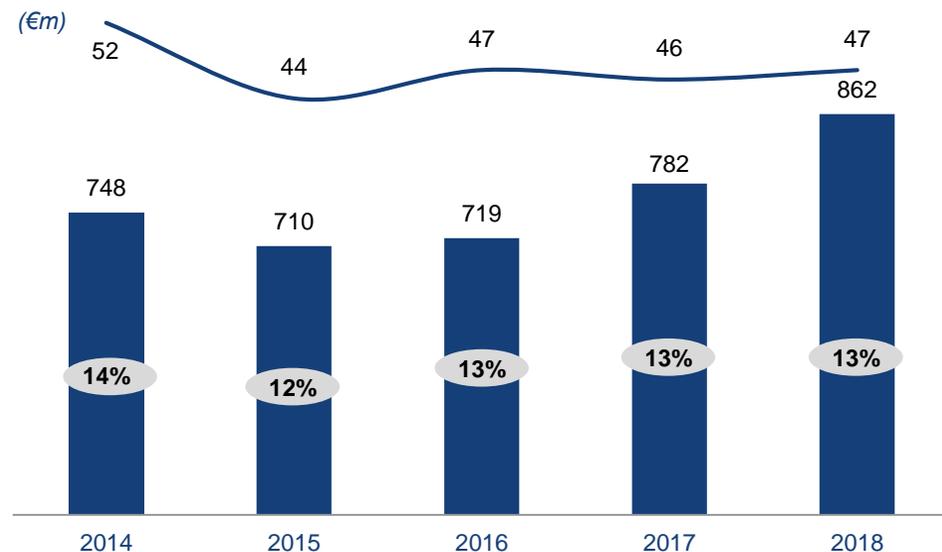
Capex¹⁾



D&A



Net working capital²⁾



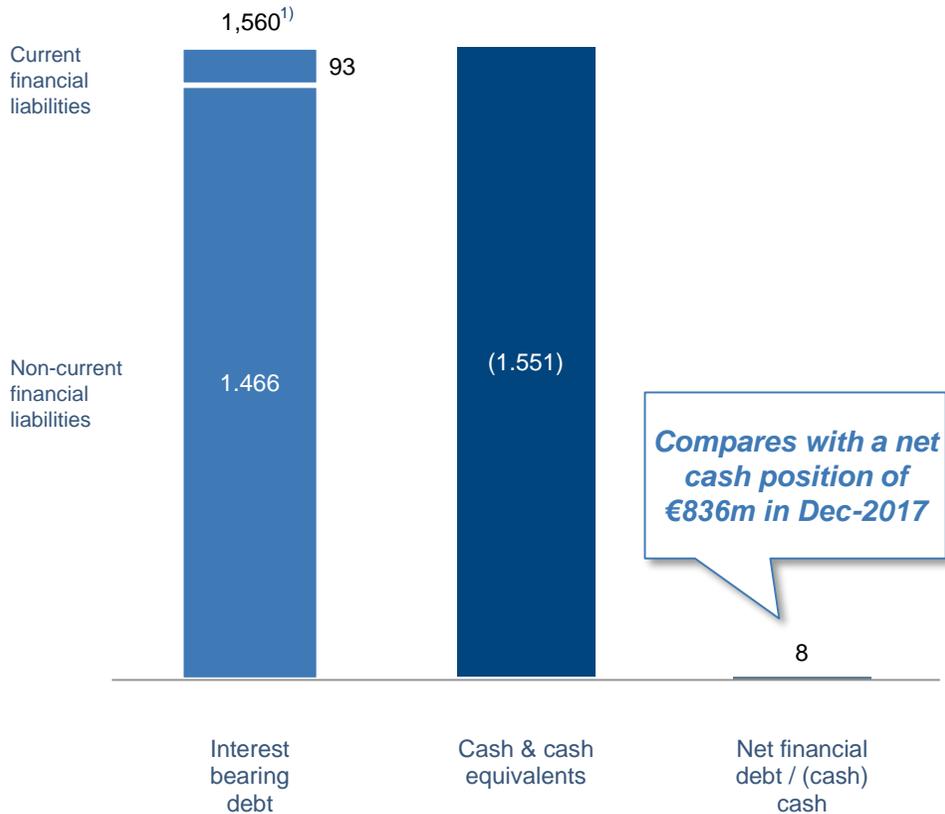
- Increase in D&A in 2017 mainly due to the difference in fair value and the proceeds from sale of assets held for sale resulting in additional €25m impairment
- Effect from step-ups³⁾ included in amortisation are €9m in 2017, €8m in 2016 & 2015 and €1m in 2014

Notes: Based on financial statements prepared in accordance with IFRS; ¹⁾ As per asset register, defined as investments in fixed and intangible assets incl. finance leasing; ²⁾ Net working capital defined as Inventory + Accounts receivables + Construction contracts with positive balances - Accounts payables - Construction contracts with negative balances - Prepayments received; ³⁾ Step-ups from key PPA's (Selectron, Powertech, GT & Kiepe Electric); ⁴⁾ Including €25m from impairment of assets held for sale; Source: Knorr-Bremse information

4 Healthy capital structure with low leverage

Capital structure as of June-30, 2018

(€m)



Minorities

- Total profit share 2017: €51.4m
- Bosch minorities recognised as liabilities of €379m (no P&L impact)

Low pensions liabilities as of June-30, 2018

- Share of total assets: 5.5%
- Plan assets: €27m
- Provision for DBO: €310m
- Provision for other employee benefits: €49m

Notes: Based on financial statements prepared in accordance with IFRS; ¹⁾ Liabilities to bank, bonds & leasing liabilities; Source: Knorr-Bremse information

Knorr-Bremse medium term targets and dividend policy

		Medium term targets
P&L	Sales	<ul style="list-style-type: none"> Group organic CAGR of c. 4.5%-5.5% <ul style="list-style-type: none"> RVS c. 5-6% CVS c. 4-5% Assuming constant currencies
	EBITDA Margin	<ul style="list-style-type: none"> Margin expansion c. 150 bps compared to 2017 <ul style="list-style-type: none"> Driven by both divisions RVS division slightly ahead vis-à-vis CVS division
Cash flow	Capex	<ul style="list-style-type: none"> Capex ratio in line with 2014-2017 average <ul style="list-style-type: none"> RVS: c. 4% of sales CVS: c. 4% of sales
	Working capital	<ul style="list-style-type: none"> DWC requirements expected to be in line with 2014-2017 average
Capital structure	Leverage	<ul style="list-style-type: none"> Maintain solid investment grade Target leverage <1x Net debt/EBITDA, incl. post financing of acquisitions
	Dividend	<ul style="list-style-type: none"> Target payout ratio of 40-50% of IFRS net income
Other	Tax rate	<ul style="list-style-type: none"> IFRS tax rate @ ~30%

Source: Knorr-Bremse information



Knorr-Bremse ticks all the boxes of a best-in-class industrials company

Track record of organic growth market outperformance

6.5% organic sales CAGR (2010–2017)¹⁾ plus selective, value-added M&A



Strong profitability & cash flow vs. peers

Sustainable EBITDA margin range of ~18–20% (2014–2017)²⁾



Sustainable cash conversion range of ~80–90% (2014–2017)²⁾



Consistent high return on capital

ROCE range of ~40–50 % (2014–2017)²⁾



Proven resilience through the cycle

Aftermarket exposure of ~30–35% of sales (2014–2017)



Well-balanced regional and divisional sales mix



Notes: ¹⁾ Based on financial statements prepared in accordance with German GAAP (HGB); Group net sales including BilRUG without acquisitions for RVS and CVS; ²⁾ Based on financial statements prepared in accordance with IFRS; Source: Knorr-Bremse information

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Knorr-Bremse takes active part in corporate memberships throughout the world



United Nations Global Compact (participation since 2010)



APTA - American Public Transportation Association, USA



AAR - Association of American Railroads, USA



AIAG - Automotive Industry Action Group, USA



MEMA - Motor & Equipment Manufacturers Association, USA



New York and New Jersey Minority Supplier Development Council, USA

UNIFE - Sustainable Transport Committee of the Union des Industries Ferroviaires Européennes, BEL



VDA - Verband der Automobilindustrie e. V., GER Working Groups: Sustainable supply chain & products



Railsponsible – founding member (sustainable rail supply chain initiative)



VDB - Fachgruppe Umwelt im Verband der Bahnindustrie e. V., GER



APRA - Automotive Parts Remanufacturers Association - Chairman Europe



Achieved CSR ratings and awards

CSR Ratings



C+



Silver



95%



D

Awards



Top employer
5th time in a row



Supplier
Sustainability
Award 2014



Industrial
Sustainability
Supplier 2015



Special Price:
"Green Award"
2018

Our CR policy and focus areas



Strategy and management

We aim for **sustainable value creation**. By this we understand achieving long-term economic success while at the same time acting responsibly towards our employees and business partners as well as the environment and society.

We are committed to **sustainable corporate governance** that includes environmental and social aspects in strategic planning, management and corporate processes.

We act and work according to **legal and ethical principles** laid down in our Group-wide Code of Conduct.



Products and partners

We consistently work on developing **innovative products** and solutions that combine a high degree of customer value with a contribution to sustainable development. Safety is always our overriding goal.

We **work closely with our customers and suppliers** to jointly ensure continuous improvement of product quality and minimal undesirable impact on the environment and society.

We take into account and support the activities of our **business partners aimed at improving their environmental and social compatibility**.



Commitment and society

We are involved, as a member of society, in **social issues** and are engaged world-wide as a **good corporate citizen**. We supplement the activities of the charitable organization Knorr-Bremse Global Care e.V. with social projects implemented directly at our production sites (Local Care).

We encourage and support **social involvement on the part of our employees**.

We see ourselves as **partners for the regions** in which we live and work, and we support their long-term development.



Employees and governance

We create an attractive working environment in which the principles of **mutual trust, team-work, diversity and equality of opportunity** as well as fair and respectful treatment of each other are recognized and practiced.

We offer a **safe and healthy working environment** and enable our employees to develop their **own individual potential**.

We conduct an ongoing **dialogue with our managers** on the subject of value-oriented, sustainable corporate governance.



Environment and climate

We accept our **responsibility for ensuring a clean environment and protecting the climate** and operate in compliance with our **HSE Policy** (Health, Safety and Environment).

We have set ourselves the goal of handling **resources in a responsible manner**, consistently reducing **CO₂ emissions, minimizing** and where possible **avoiding undesirable impact** on nature and the environment and actively using opportunities to **protect the environment**.

We are concerned to optimize the **environmental compatibility** of our products across their **entire life-cycle**.



Communication and co-operation

We seek constructive **dialogue with our stakeholders** and provide them with regular and transparent updates on our sustainability activities.

We support social, educational and environmental projects and enter into **partnerships with organizations** that contribute towards sustainable development.

The basis of our responsibility

Our values

Growing with Values.



- Entrepreneurship
- Technological Excellence
- Reliability
- Passion
- Responsibility

UN Global Compact



Commitment to ten basic principles:

- Human rights
- Labor standards
- Environmental protection
- Anti-corruption

CR Policy



- Comprises our understanding of Corporate Responsibility
- Sets down guidelines for our CR focus areas
- Points out the main focus of our efforts to realize social and environmental responsibility

Our Code of Conduct gives us guidance on how to behave responsibly towards colleagues, business partners and authorities.

Code of Conduct

KNORR-BREMSE 

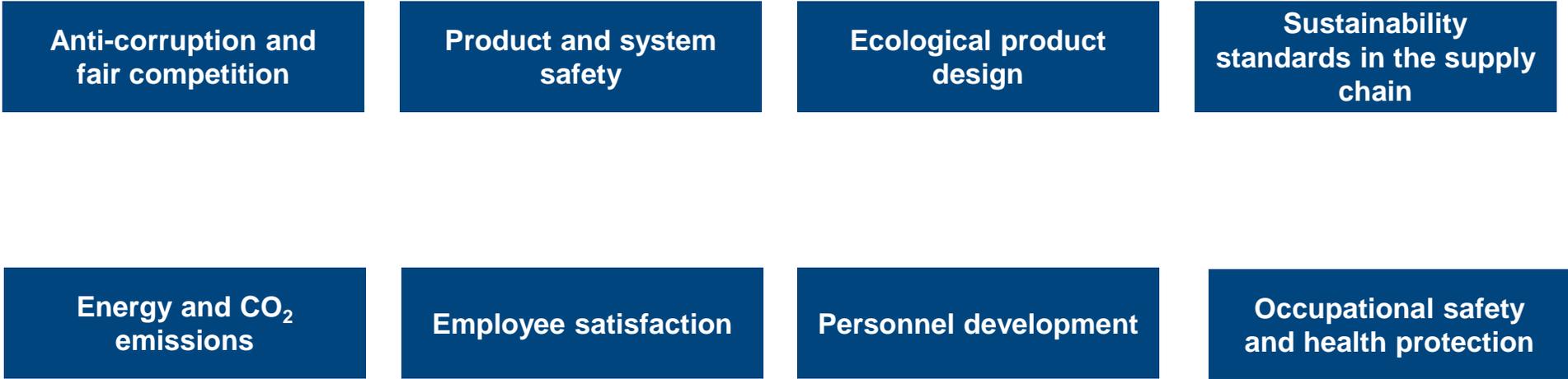
1. Based on our corporate values and the UN Global Compact principles
2. Issued by the Board of Directors of Knorr-Bremse AG
3. Applicable worldwide for all employees
4. Regular eLearnings for the employees, available in 10 different languages, including a video statement by our CEO Klaus Deller
5. Supplemented by guidelines on specific areas, e.g. Anti-Corruption, Fair Competition, etc.
6. Additional Supplier Code of Conduct in place regarding conduct with business partners

In 2018 Knorr Bremse selected its Core Sustainable Development Goals (SDGs)



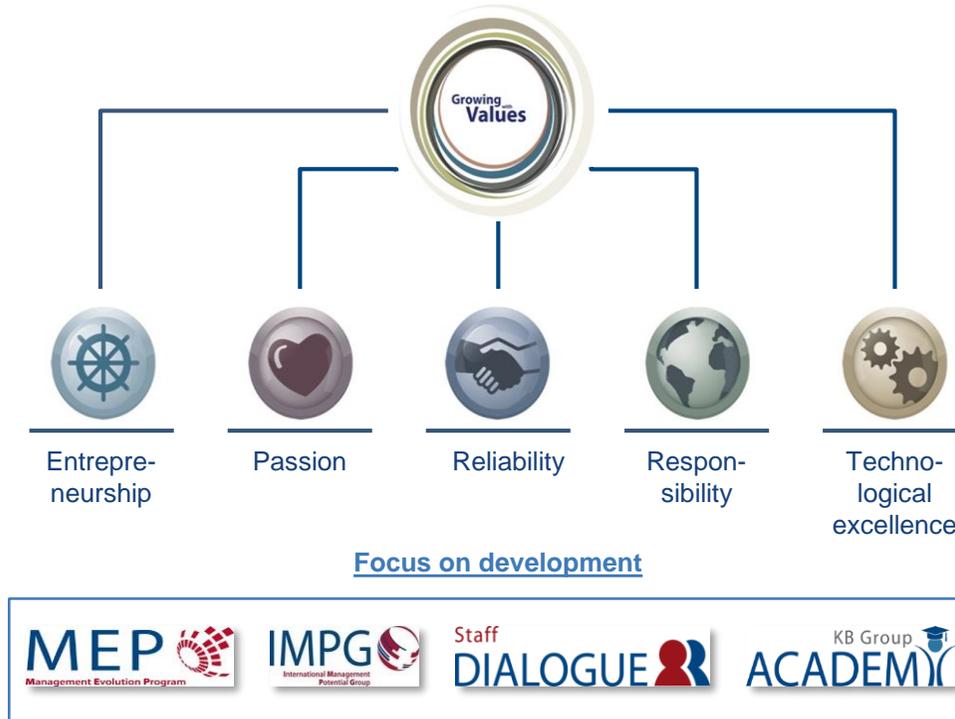
Our 8 material (non-financial) corporate responsibility areas

Evaluation of non-financial facts was carried out in the workshop on the basis of qualitative considerations regarding the extent of business relevance and its impact (2018)



Knorr-Bremse's success is built on its culture and dedicated people

Knorr-Bremse has a distinct culture and core values



Reliable and potent workforce

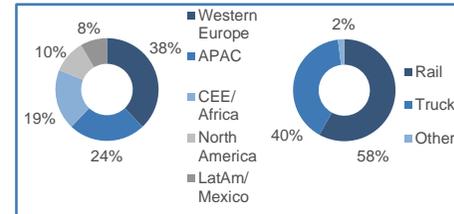
- <3% absenteeism rate¹
- Trustful relationships with employees

Strong employer branding



Diverse Workforce

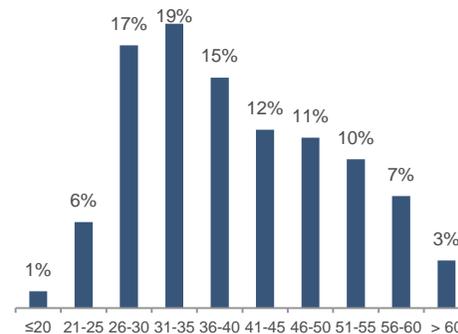
Breakdown of workforce



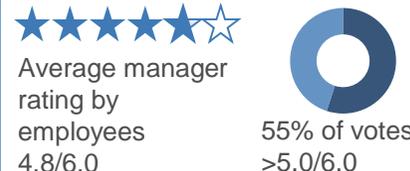
Flexibility to match demand

- Company-wide flexibility ratio of ~14% leasing employees
- Target ratio range is 10-15%

Attractive age² and functional distribution



Employee satisfaction



Female representation

- ~20% more female employees than industry average

Note: All figures based on EOB 2017; ¹ Sickness rate = Sickness days / Total working days; based on top 20 companies according to FTEs and weighted by number of employees; ² Based on SAP data where available due to personal data and privacy regulations (~60% of the workforce)

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Share data

Type of share	Bearer shares with no-par value
Bloomberg ticker	KBX
Reuters ticker	KBX.DE
German security identification number (WKN)	KBX100
ISIN	DE000KBX1006
Shares outstanding as at December 31, 2018	161.200.000

The Corporate Bonds of Knorr-Bremse AG

Security Identification Number	A2LQP5	Security Identification Number	A2DARP
International Securities Identification Number	XS1837288494	International Securities Identification Number	XS1531060025
Issuer	Knorr-Bremse AG	Issuer	Knorr-Bremse AG
Issuer ratings	A2/outlook stable (Moody's), A/outlook stable (Standard & Poor's)	Issuer ratings	A2/outlook stable (Moody's), A/outlook stable (Standard & Poor's)
Volume	EUR 750 million	Volume	EUR 500 million
Term	7 years	Term	5 years
Settlement	June 14, 2018	Settlement	December 6, 2016
Maturity	June 13, 2025	Maturity	December 8, 2021
Coupon	1.125% p. a.	Coupon	0.5% p. a.
Reoffer spread	1.188% p. a.	Reoffer spread	0.571% p. a.
Listing	EURO MTF Luxembourg	Listing	EURO MTF Luxembourg
Denomination	EUR 1,000	Denomination	EUR 1,000
Applicable law	German law	Applicable law	German law

Strong current rating: S&P (A) and Moody's (A2)

Source: [.]

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Glossary (1/2)

%	Percentage	CF	Cash flow	ELC	Electronic leveling control
ABS	Anti-lock brake system	CFO	Chief Financial Officer	EOP	End of period
ACC	Adaptive Cruise Control	CKR	Czech Koruna	ESP	Electronic stability program
AD	Automated Driving	CNY	Chinese Yuan	EU	Europe, European Union
ADAS	Advanced driver-assistance systems	CVS	Commercial Vehicle Systems	EUR	Euro
ADB	Air Disk Brake	D&A	Depreciation & Amortization	FTE	Full-time equivalent
AEBS	Advanced Emergency Braking System	DE	Germany	GAAP	Generally Accepted Accounting Principles
AG	Aktiengesellschaft (German: Stock Corporation)	DoI	Date of Implementation	GBP	British Pound
AM	Aftermarket	e	Expected	GDP	Gross domestic product
BDM	Brake Distance Management	EAC	Electronic Air Control	GSBC	Global Scalable Brake Control
bn	billion	EBIT	Earnings before Interest, Tax	HQ	Headquarters
CAGR	Compound Annual Growth Rate	EBITDA	Earnings before Interest, Tax, Depreciation, Amortization	HSR	High-speed rail
CAPEX	Capital expense	EBS	Electronic brake system	HU	Hungary
CEO	Chief Executive Officer	EGR	Exhaust Gas Reduction	HUF	Hungarian Forint

Glossary (2/2)

HVAC	Heating, ventilation & air conditioning	LDW	Lane Departure Warning	TCO	Total cost of ownership
IAA	International Automobil-Ausstellung (German: International Motor Show)	m	million	TPR	Truck Production Rate
IAM	Independent Aftermarket	M&A	Merger & acquisitions	UIC	International union of railways
iCOM	Intelligent Condition-Oriented Maintenance	OEM, OE	Original equipment manufacturer	US	United States
IFRS	International Financial Reporting Standards	OES	Original equipment service	USD	US Dollars
IN	India	OPEX	Operating expense	WC	Working Capital
IoT	Internet of Things	p.a.	per annum		
IPO	Initial Public Offering	PWM	Private Wealth Management		
JV	Joint venture	R&D	Research & Development		
KB	Knorr-Bremse	ROE	Return on Equity		
KB2020	Knorr-Bremse 2020	ROS	Return on Sales		
KPI	Key Performance Indicator	RVS	Rail Vehicle Systems		
LCC	Life-cycle cost	TCMS	Train Control Management System		

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