



DRIVING DIGITALIZATION

FACT BOOK



KNORR-BREMSE

Agenda

- **Introduction**
- Key Company Highlights
- Rail Vehicle Systems (RVS)
- Commercial Vehicle Systems (CVS)
- R&D Focus
- Financials
- Sustainability
- Capital Markets Summary
- Appendix



The Knorr-Bremse leadership team



Marc Llistosella,
Member of the Board, CEO

- 2023-present: Knorr-Bremse | CEO
- 2021-present: Vaionic Technologies GmbH | Board Member and investor
- 2019-present: Einride AB | Board Member and investor
- 2008-2018: Daimler Trucks Asia | 2015-2018 President & CEO, Mitsubishi Fuso Truck & Bus Corporation; Head of Daimler Trucks Asia | 2008-2014: Managing Director & CEO, Daimler India Commercial Vehicles
- Diploma in Bus. Administration

with Knorr-Bremse since **01/23**



Frank Weber
Member of the Board, CFO

- 2020-present: Knorr-Bremse | CFO
- 2016-2020: Daimler AG | Head of Corporate Development
- 2019-2020: Mercedes-Benz AG | Head of Transformation
- 2013-2016: Daimler Trucks Asia | CFO
- 2011-2013 Mitsubishi Fuso Trucks & Bus Corporation | CFO
- Diploma in Bus. Administration

Years with Knorr-Bremse **2**



Dr. Claudia Mayfeld
Member of the Board,
Integrity & Legal

- 2021-present: Knorr-Bremse | Head of Integrity & Legal
- 2013-2019: RWE Pensionsfond | Member of the Executive Board
- 2016-2020: Innogy SE | Senior Vice President Group Legal & Compliance, General Counsel
- 2013-2016: RWE AG | Senior Vice President Group Legal & Compliance, General Counsel
- PhD in Accounting Principles

Years with Knorr-Bremse **1**



Bernd Spies
Member of the Board, CVS

- 2022-present: Knorr-Bremse | Head of CVS
- 2014-2022: Knorr-Bremse | Member (2013-2015) and Chairman (since 2014) of the Management Board, CVS
- 2008-2013: Hella KGaA Hueck & Co | Member of the Management Board, Global Sales
- 2006-2008: Robert Bosch GmbH | Head of Commercial Vehicles product division, Starters and Alternators
- Diploma in Electrical Engineering

Years with Knorr-Bremse **8**



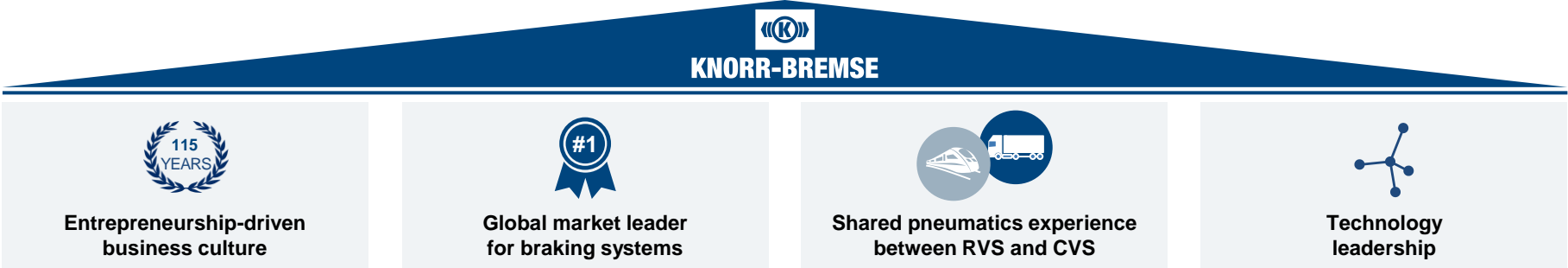
Dr. Jürgen Wilder
Member of the Board, RVS

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

Years with Knorr-Bremse **4**



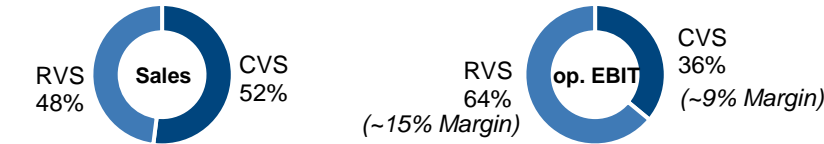
Knorr-Bremse – One of Germany’s most successful industrial companies



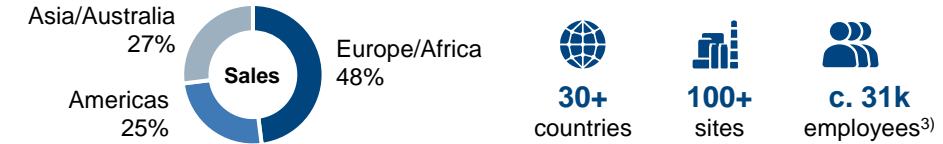
2022 Key financials



BALANCED PORTFOLIO²⁾ ...

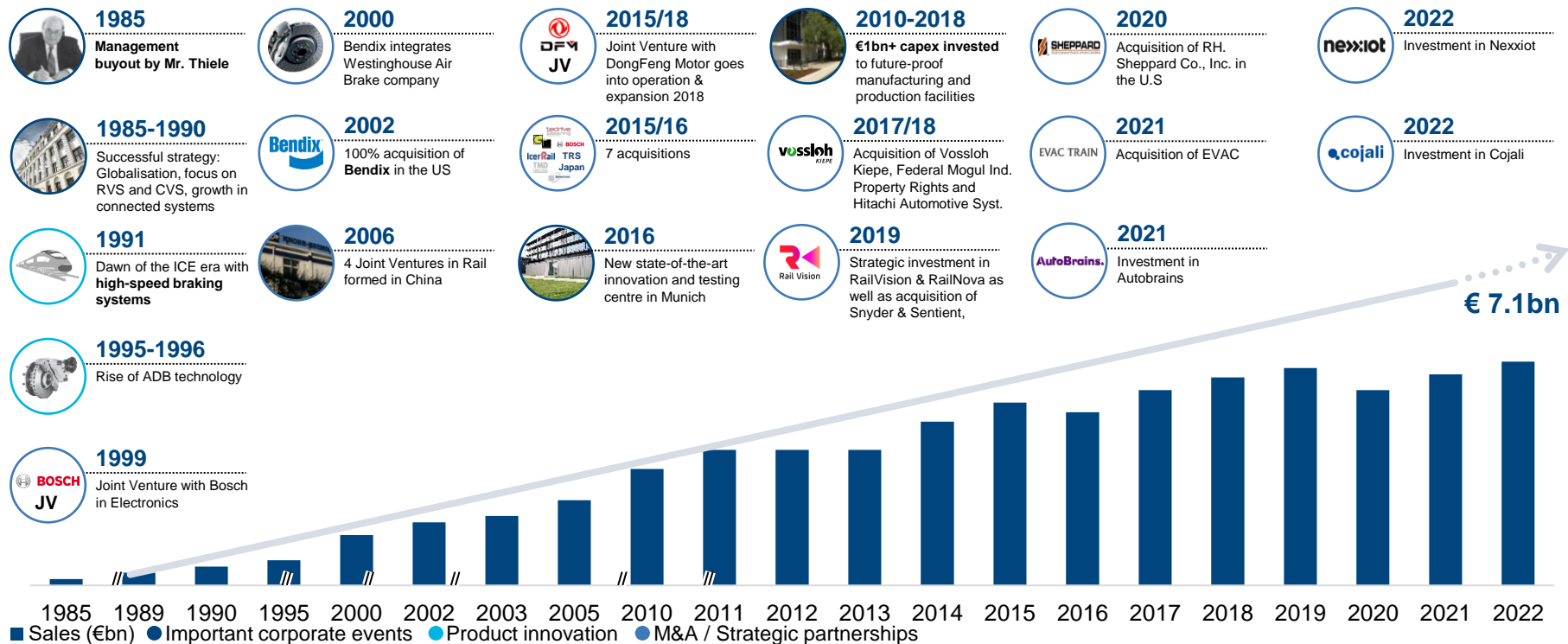


... AND DIVERSIFIED GLOBAL FOOTPRINT WITH HIGH LOCAL CONTENT



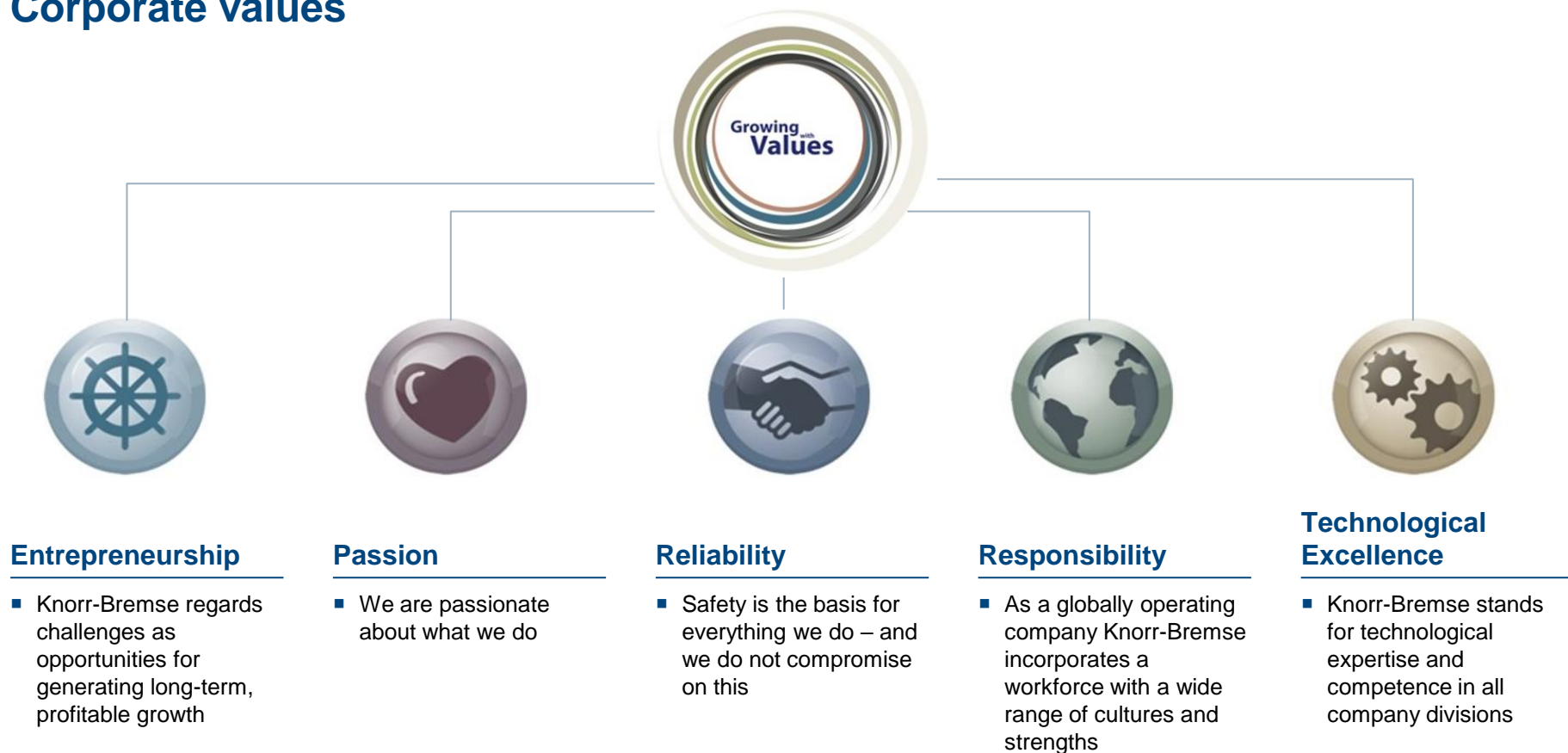
Notes: Sales, EBITDA, EBITA, and EBIT for 2020 based on annual report prepared in accordance with IFRS, other financial figures for 2020 prepared in accordance with German GAAP (HGB); Aftermarket share based on German GAAP (HGB) where BilRUG sales allocated proportionally between OE and aftermarket; RVS – Rail Vehicle Systems; CVS – Commercial Vehicle Systems; 1) CAGR 1989–2019 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: 1986-2016 based on financial statements prepared in accordance with German GAAP (HGB) and 2017-2019 based on financial statements prepared in accordance with IFRS. 1) 1989 – first year when consolidated accounts are available

Corporate values



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Global market leader in rail and truck



Market leadership

A global market leader

~50% market share¹ in RVS brakes

~23% market share¹ in CVS brakes



Market outperformance

Track record of **above industry growth: 10% historic revenue CAGR²**



Sustainability is part of our DNA

Our technologies are the **foundation for sustainable and safe transportation**



Resilience

38% aftermarket share¹

Well-balanced **portfolio**

Cost-efficient operations



Innovation edge

Shaping industry trends by focusing on **safety** and **mission critical** applications



Profitability

EBIT margin of ~11%

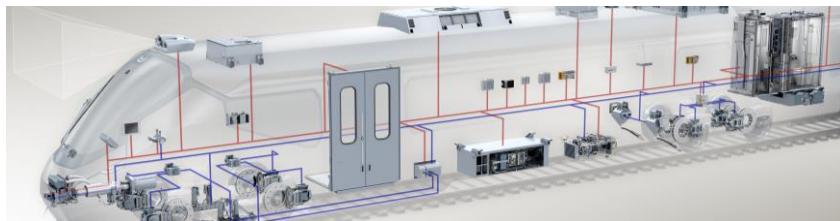
Focus on **attractive** rail and truck **end markets**

1) In 2022 2) 1989-2019

Global #1 – Leading supplier of safety-critical rail and commercial vehicle systems

RVS offering (2022: 48% of sales, 64% of EBIT)

| | | | | |
|---------------|------------------|--------------------|----------------------------------|------------------------------------|
| Brake systems | Entrance systems | HVAC ¹⁾ | Train Control Management Systems | LRV ²⁾ traction systems |
|---------------|------------------|--------------------|----------------------------------|------------------------------------|




| | | |
|---------------------------|------------------|----------------------|
| Power electronics | Sanitary systems | Signaling systems |
| Modernisation and support | | Aftermarket business |

CVS offering (2022: 52% of sales, 36% of EBIT)

| | |
|---|--|
| Fuel efficiency <ul style="list-style-type: none"> Engine components Transmission | Brake systems, steering & vehicle dynamics <ul style="list-style-type: none"> Brake control Brake systems Automated driving Steering systems |
|---|--|



| | | |
|--|--------------|-----------------|
| Energy supply & distribution | Connectivity | Electrification |
| Aftermarket services including Alltrucks network ³⁾  | | |

Our customers

Example car builders



Example operators



Notes: 2020 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

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 life-cycle 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 world-wide

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

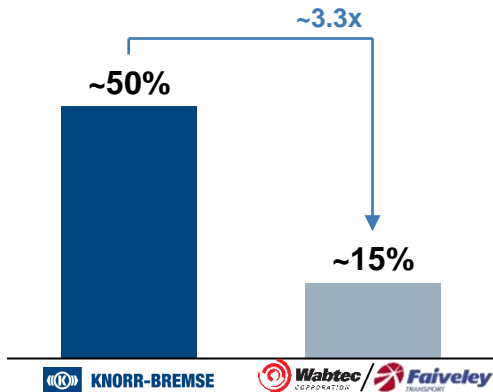
KB has maintained and expanded its market leading positions



Market positions key product groups¹

- #1 Brake systems
- #1 Entrance systems
- #1 HVAC systems²

Global brakes market shares¹



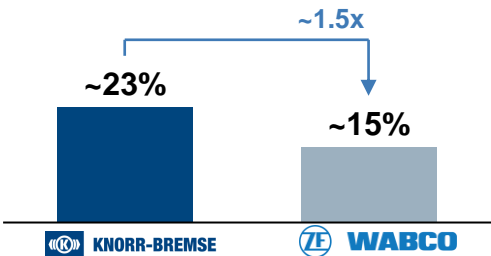
*Example global market leader
for brakes¹*



Market positions key product groups³

- #1 Brake systems & vehicle dynamics⁴
- #1 Energy supply & distribution⁵
- #1 Fuel efficiency⁶

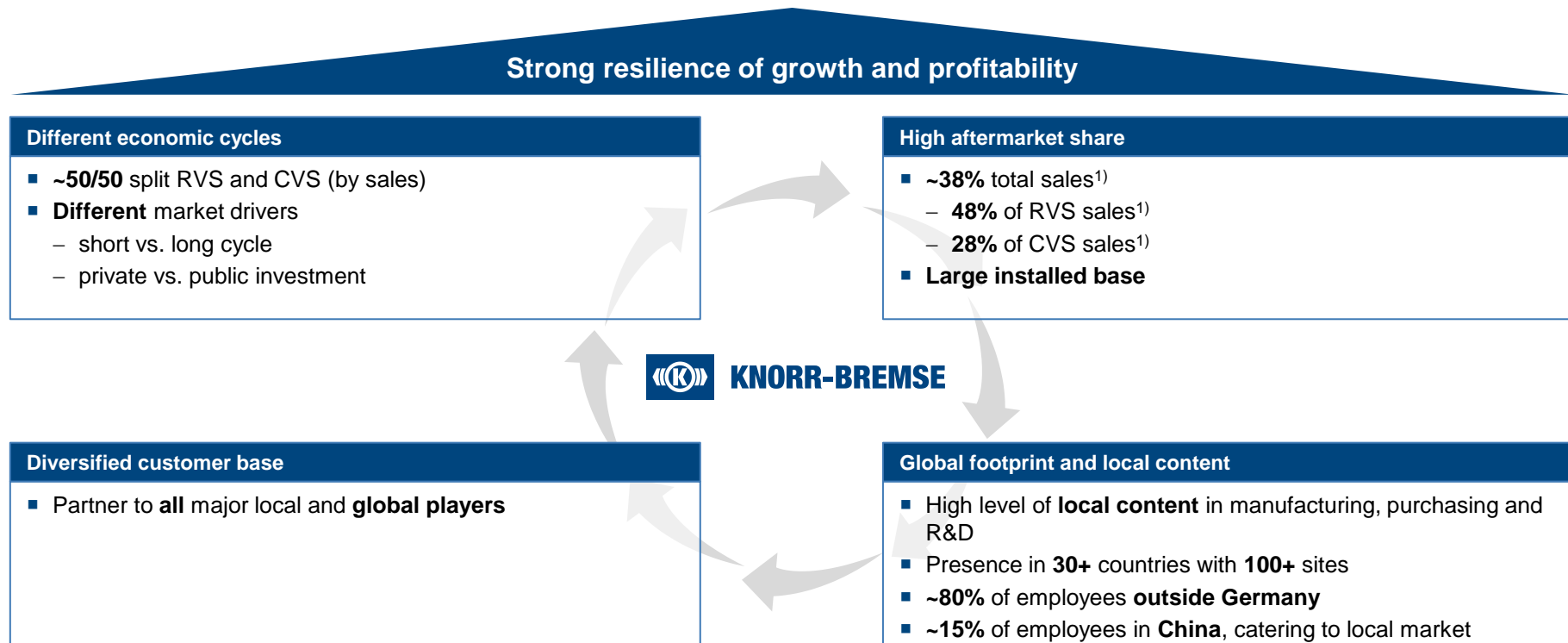
Global brakes market shares³



*Example global market leader for
brake systems & vehicle dynamics⁴*

1) 2020 estimates for OE and aftersales without labor; Wabtec includes Faiveley; For competitor, an estimate was used; Market shares rounded to the nearest multiple of 5% 2) Heating Ventilation Air Conditioning
3) For 2020 global addressable Truck, Bus and Trailer OE market, excl. aftermarket 4) Air disc brake, valves / pedal unit, actuators, foundation drum brake, steering, brake control (ABS, EBS, ESP), ADAS, ELC, others 5) Compressors, air treatment 6) Vibration dampers, engine air control, transmission – gear and clutch actuation/ control; Source: internal market research

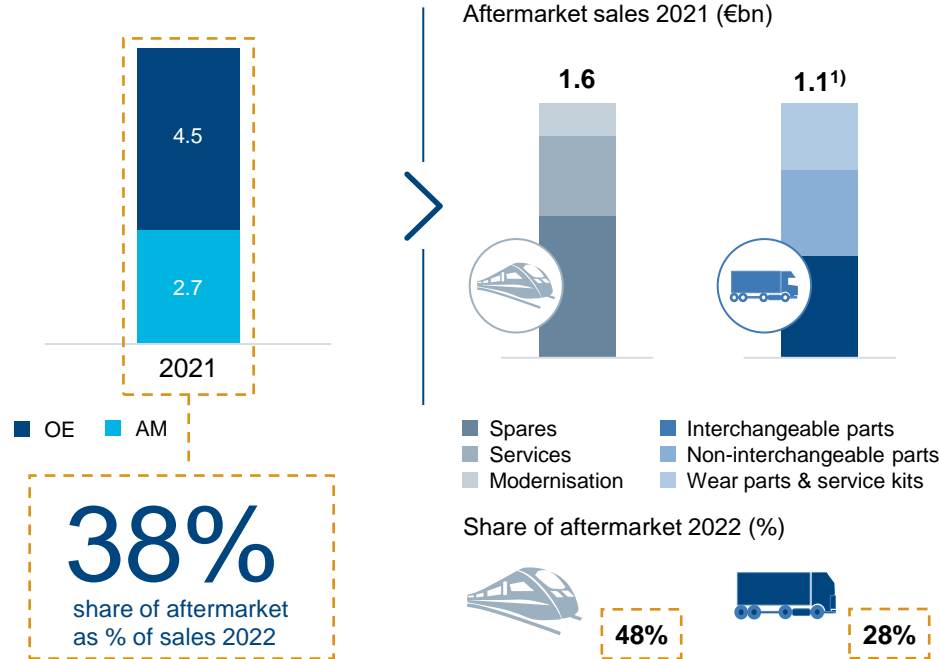
Resilience – Strong business model



Notes: 1) Based on IFRS in 2022

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

Aftermarket is the growth and resilience backbone



Key features

Annuity-like

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

Close to the customer

- RVS
 - 36 service centres²⁾
 - 20 service locations at customers' premises
- CVS
 - >1,600 certified service partners
 - >700 Alltrucks workshops

Strong customer retention (homologation)

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

Innovative business model

- New connectivity-based business models
- Preventive
- Predictive

Notes: 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

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

Interdependence of RVS and CVS

- Same core technologies
- Shared components and materials
- Co-located R&D centers
- Shared overhead functions

Future technology development

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

Differences of RVS and CVS

- Serial business (CVS) vs. project business (RVS)
- Different customer group

RVS



CVS



Electric compressors
Friction materials
Air disc brakes (ADB)

Driver assistance
Trailer control valve
Electronic air supply

Notes: 1) ADAS – Advanced driver assistance system; 2) HAD – Highly automated driving

Innovation is the basis of KB's technology leadership and long-term success



True Scale:

~3,800 R&D employees
Thereof 740 software engineers
5 global R&D centers (3 co-located)



Agile R&D methods implemented



Extensive partnership network & collaboration with tech players



In-house incubator



Pioneering innovations (examples)

RVS



Digital automatic coupler for freight (DAC)



Reproducible braking distance



LIFEDrive sliding doors

CVS



Electric power steering



Electronic parking brake



eCompressor

Long-term R&D ratio: 6 – 7 %

We confirm our successful strategy

- «1» Systematically **develop base portfolio**
- «2» **Focus on attractive segments** for future outperformance in **rail** and **truck**
- «3» Drive **innovation & digitalization**
- «4» **Clear M&A** strategy
- «5» **Operational excellence**
- «6» **ESG** and **sustainability**
- «7» **Strong financial performance**



Knorr-Bremse is ideally positioned to shape the trends of the future



Urbanization



Sustainability



Digitalization



Mobility

Industry trends: addressing industry trends with superior technological solutions

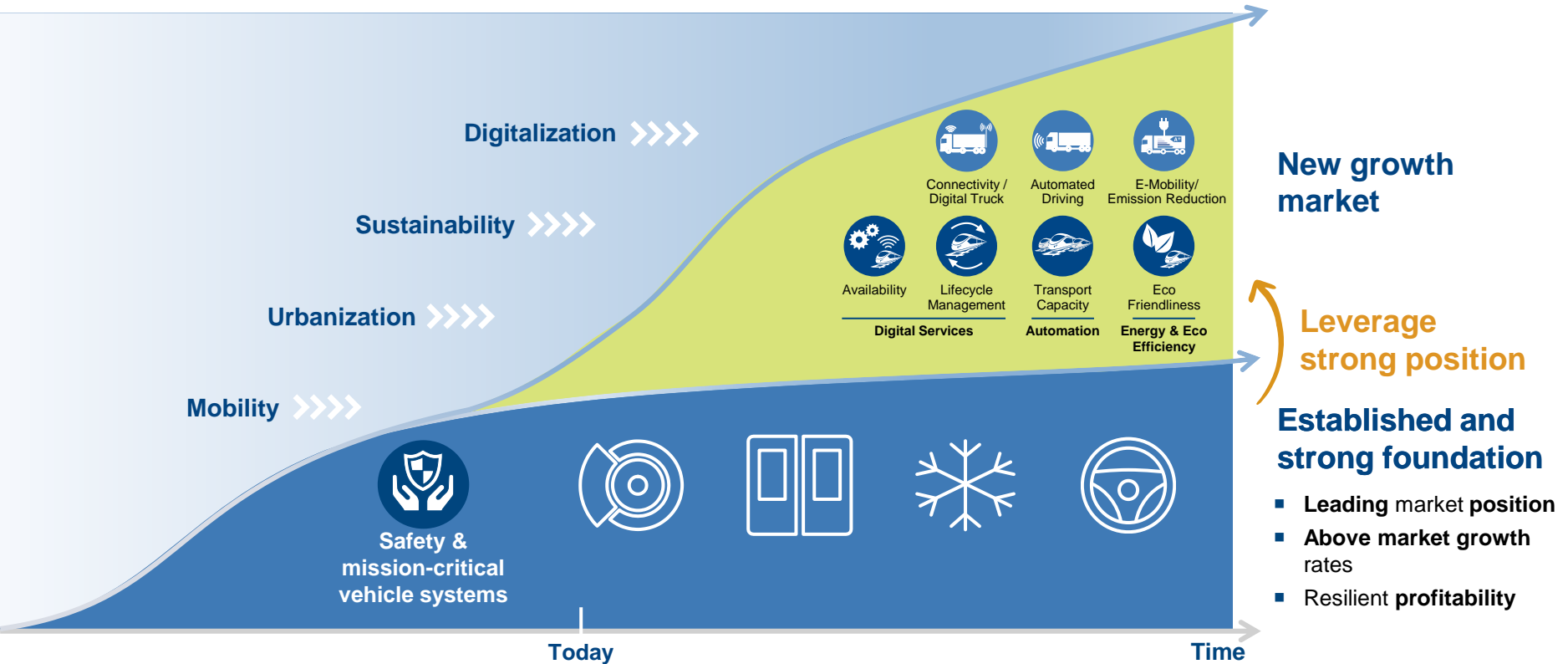


Transport Capacity
Availability
Eco Friendliness
Life Cycle Management



Traffic Safety
Emission Reduction & E-Mobility
Automated Driving
Connectivity

Knorr-Bremse will continue to grow its core business further and will also develop new levers of growth



Knorr-Bremse continues to systematically develop its portfolio of mission critical products and digital solutions

Mechanical products

Mechatronic products

Smart & digital products

— **Strong basis** —



Pneumatic
brake
system



Air disc
brake



Electronically
controlled
pneumatic
brake



ABS & EBS













Smart brake
control (Cube
Control)



GSBC &
rGSBC



Build new business in RVS

| Industry trends | Digital Services | | Automation | Energy & Eco Efficiency | |
|--------------------------|---|--|--|--|--|
| |  Availability |  Lifecycle Management |  Transport Capacity |  Eco Friendliness | |
| Applications (examples) | Condition-based/ predictive maintenance | | Aftermarket | Automation | Energy savings / metering |
| RVS solutions (examples) | European train operator use case  | HVAC monitoring & energy saving Investment into Railnova |  RAILSERVICES RailServices portfolio for optimized LCC ¹ |  Increased train density  Environment sensing |  Driver advisory system  Smart metering |

1) Lifecycle costs 2) Reproducible Braking Distance



Build new business in CVS

Digital Services

Industry trends



Connectivity/
Digital Truck

Automation



Automated Driving

Energy & Eco Efficiency



E-Mobility/
Emission Reduction

Applications (examples)

Driver safety
management

ADAS

HAD actuation
& motion control

Electrification

CVS solutions (examples)



Collecting safety
data and video
for coaching &
evaluation



ADAS offering with strong
partners



Combining
steering,
braking, and
motion control

eCUBATOR
INNOVATE OUR PRODUCTS FOR THE E-MOBILITY AGE

CVS strongly positioned to
innovate products for the
E-Mobility age (BEV and FCEV)

*Only minor part of CVS portfolio
affected by electrification*

Knorr-Bremse drives digitalization in two dimensions



Digital products and services

Solution portfolio

- From mechatronic to smart & connected products
- New capabilities (e.g., analytics) and platforms for new products and services
- Build digital business models

&



Internal digitalization

Inhouse operations

- Standardized end-to-end processes
- Digitalization

Product enhancement with digital technology

*Solution
Examples*

Condition Monitoring

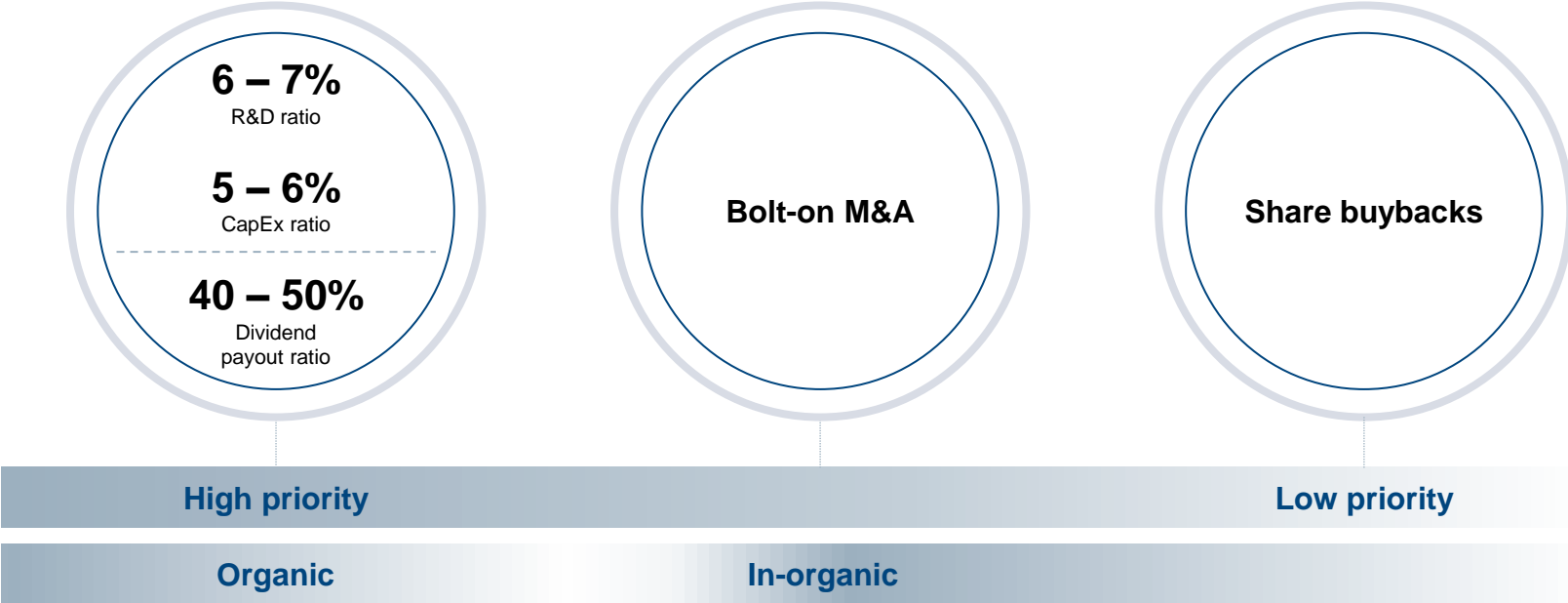
*Remotely monitor condition
of KB products*

Digital business models

Predictive Maintenance

*Optimize operations and maintenance
process together with customers*

Capital allocation priorities: clear framework with focus on organic growth and bolt-on M&A



M&A: clear strategy

Priorities



Pursue **attractive and selective segments** in **rail** and **truck** for **future outperformance**



Focus on **bolt-on** acquisitions in **rail** and **truck**, **no focus** on **third pillar**



Strengthen our core business **with new capabilities**



Continue active **portfolio management** along stringent strategic and financial criteria



Strategic Principles

Markets & Segments

- Highly **attractive growth segments** with strong **entry barriers**
- **Technological differentiation**

Business Model

- **Leading** market position and/or leading technology
- **Sustainable** competitive advantage
- **Resilient** business model

Synergies

- **Best owner** principle
- Tangible and realistic **synergies**
- Easy to integrate with high **cultural fit**

M&A: clear financial guardrails

Priorities



Attractive segments



Bolt-on acquisitions



Strengthen **core business**



Active **portfolio management**

Financial principles for larger transactions

Value accretive for KB

Strong **cash generation**

High **profitability (ROS + ROCE)**

High **aftermarket** revenue base

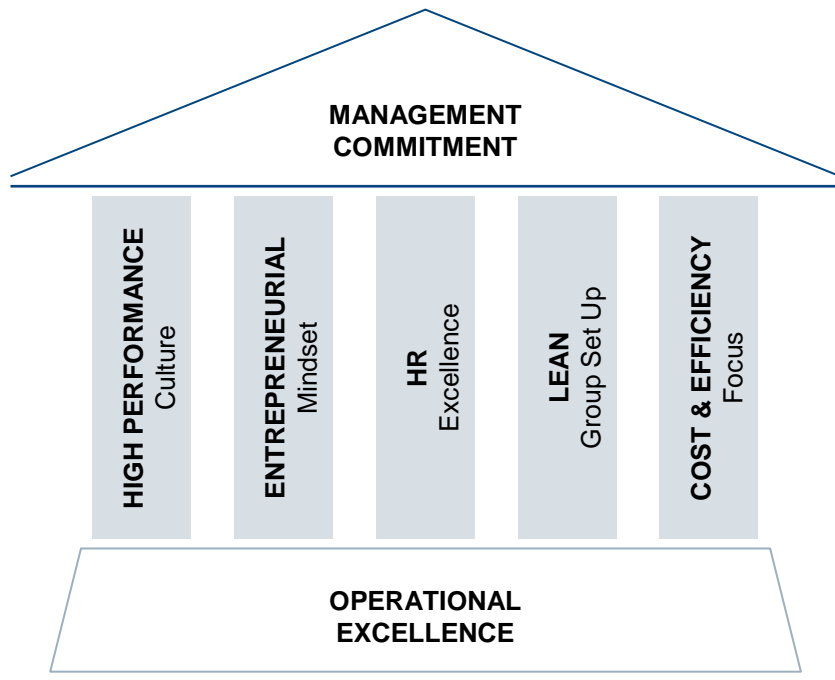
Asset-light business model

Portfolio management, if needed

Start-ups with **clear plan for strong financial profile /**
accretive **cooperation potential**

Stringent post merger integration to ensure deliverables

Focus on operational excellence



Global platforms



Process digitalization and standardization



Footprint optimization

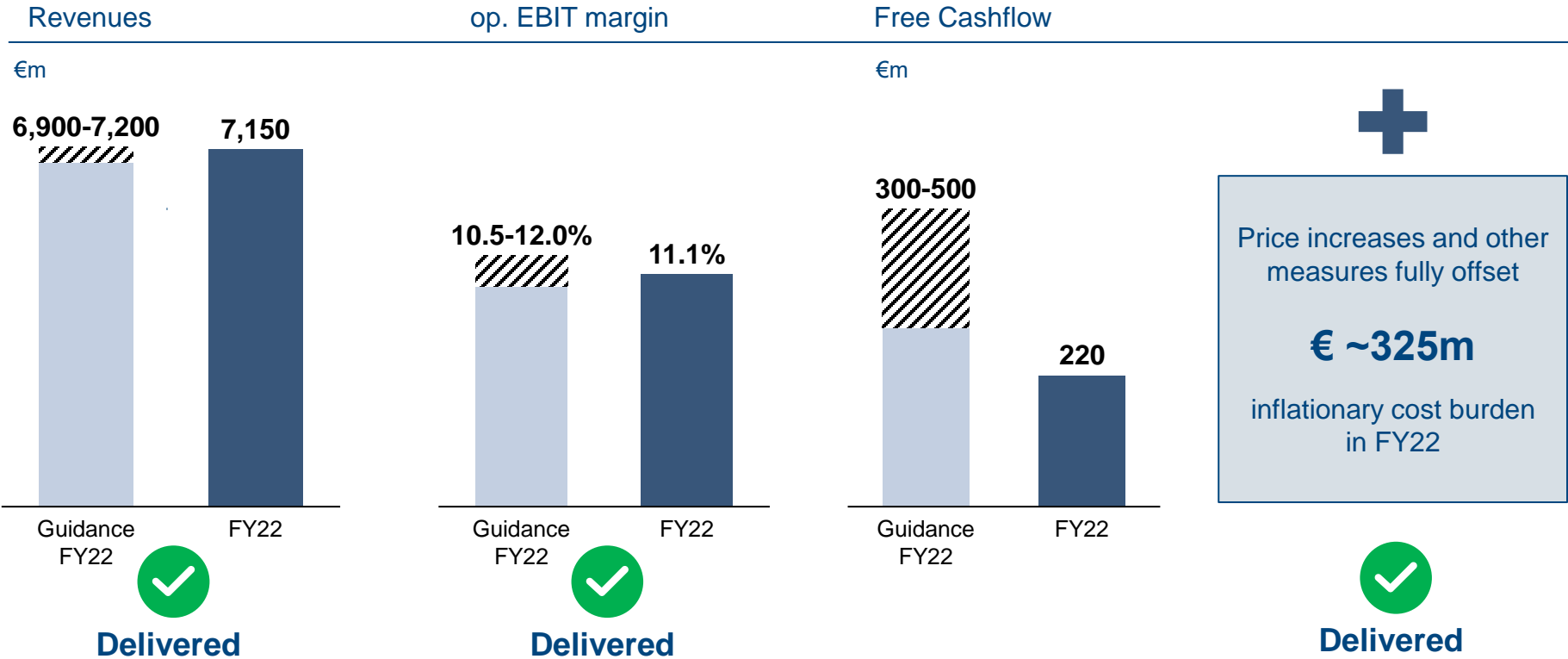


Continued “local for local” set-up and value chain

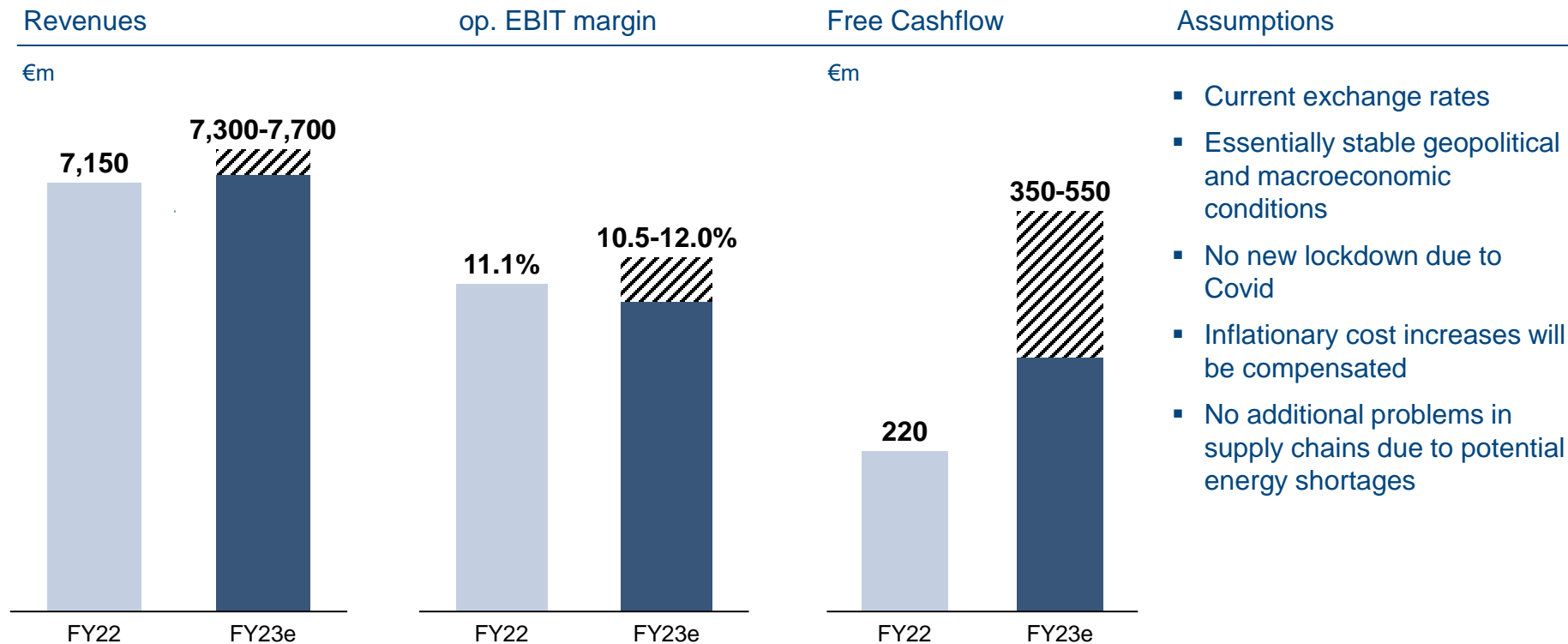


Cost improvements

Guidance FY22 for revenues and op. EBIT margin achieved

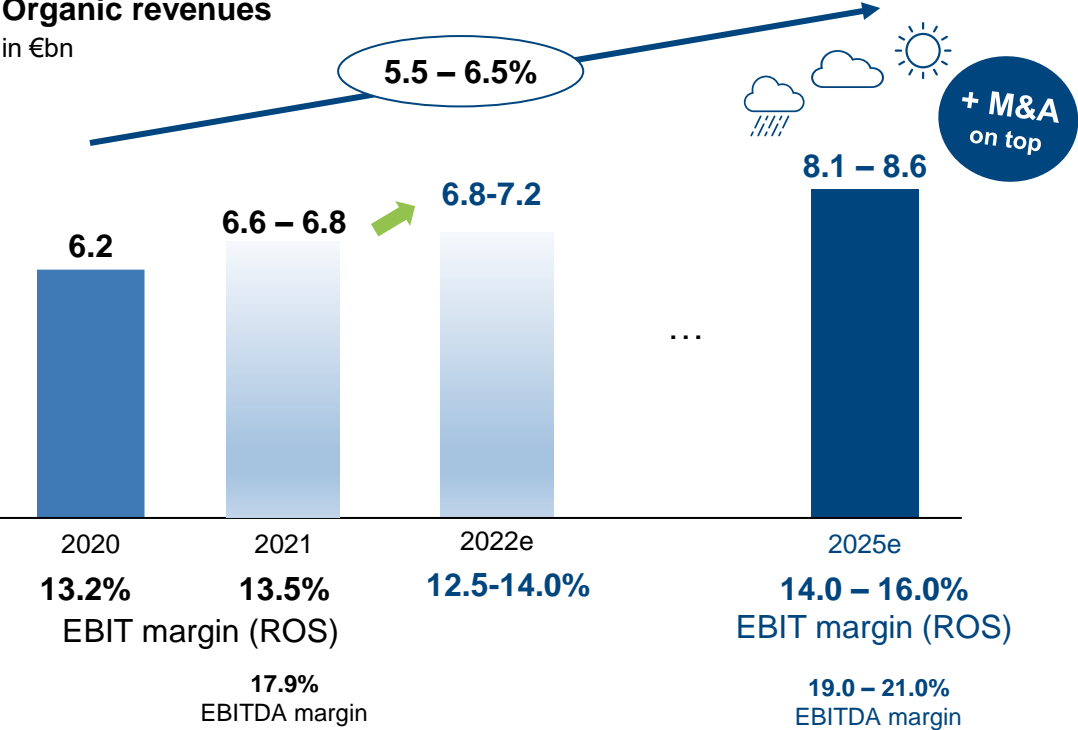


Group guidance FY23



Mid-term outlook: continued profitable growth of Knorr-Bremse towards 2025

Organic revenues
in €bn



| | Revenue CAGR | EBIT margin (ROS) |
|-------|--------------|----------------------------|
| RVS | 5 – 6% | 18.0 – 19.5% |
| CVS | 7 – 8% | 12.0 – 13.5% |
| Group | ROCE ≥30% | CCR over cycle 80 – 90% |

Note: Operating margins shown 2021 and 2025; based on market expectations mirrored in other CMD presentation parts

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RVS: outperformance and resilience



Market leadership

Global #1 market leader across products and regions (e.g. ~50% market share in brake systems)



Strong growth profile

RVS with **long track record of outperforming underlying markets**



Technology innovation

- **Strong technology innovator** shaping industry standards
- Continuation of **R&D investments**



High barriers to entry

- **Safety-critical products** with significant homologation barriers
- RVS only supplier certified for all standards and norms globally



Resilience

- **Expansion of business** through customer-region-product mix
- **Strong aftermarket** (~48% revenue share)



Profitability

Outstanding profit margins with track record of margin expansion and disciplined cost management (EBIT margin ~15%)

RVS: the leading safety critical systems supplier for rail with a track record of market outperformance



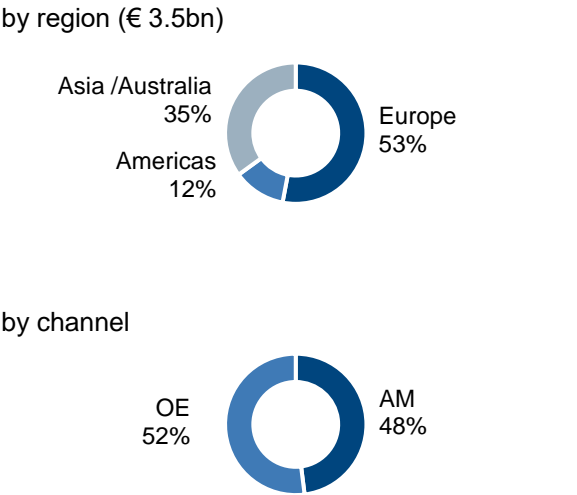
Highlights

- 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

2022 key financials

| |
|-------------------------------------|
| € 3.4bn sales |
| ~5% CAGR 2010-2022 ³⁾ |
| € 638m op. EBITDA (18.8% margin) |
| € 507m op. EBIT (14.9% margin) |
| 48% aftermarket share ⁴⁾ |

2022 sales split

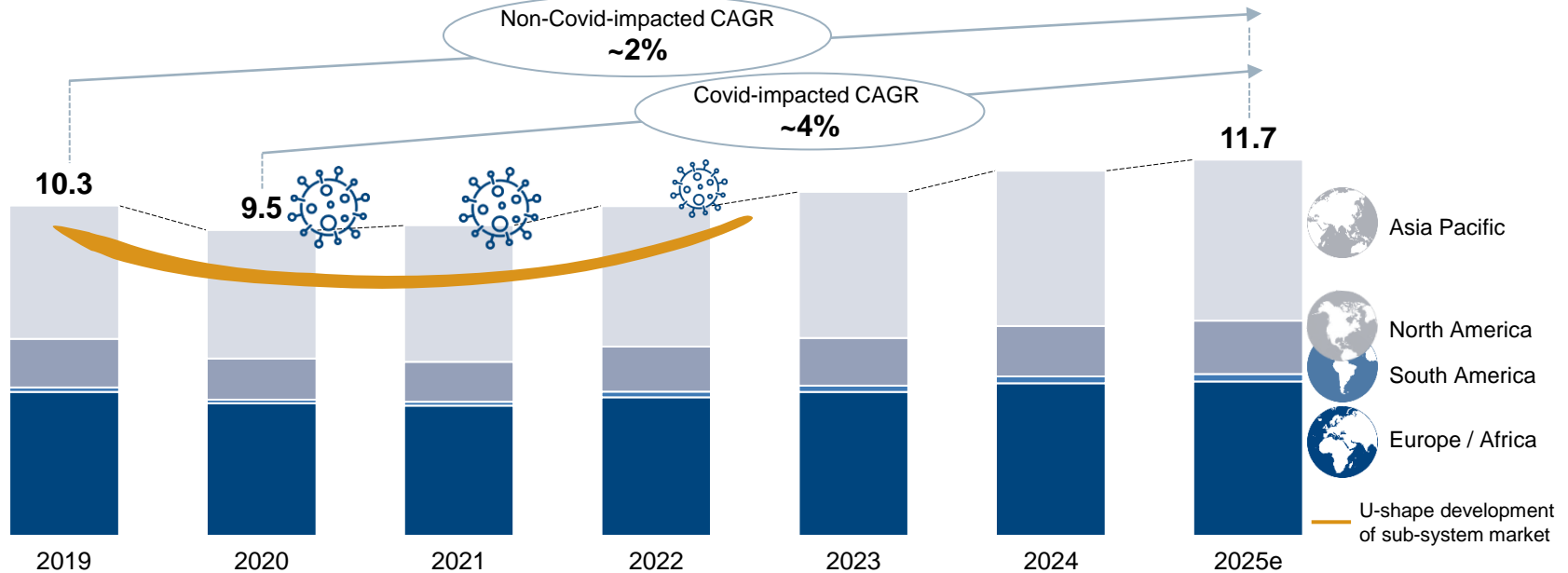


Notes: BilRUG sales allocated proportionally between OE and aftermarket; 1) RVS market share estimates for OE and aftersales without labour; 2) All active rail vehicles without freight cars with a minimum of one Knorr-Bremse system related to brakes, entrance systems and HVAC installed; 3) Total reported RVS sales growth including OE and aftermarket based on German GAAP (HGB) 2010-2016; from 2016 IFRS 4) BilRUG sales allocated proportionally between OE and aftermarket

Long-term growth in global rail will continue, despite Covid U-shape



Development of relevant sub-systems market volume¹ (OE + RS in €bn)



1) Big Five - Brakes, Doors, HVAC, Power Electronics, TCMS; Source: Knorr-Bremse information and internal market research

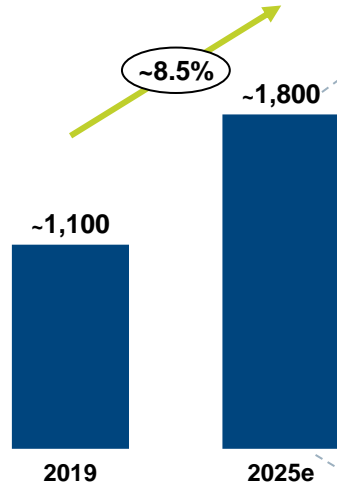
Future growth will come from markets in Europe, Asia and North America














Market development OE

in €m, CAGR in %¹

Selected biggest growth markets



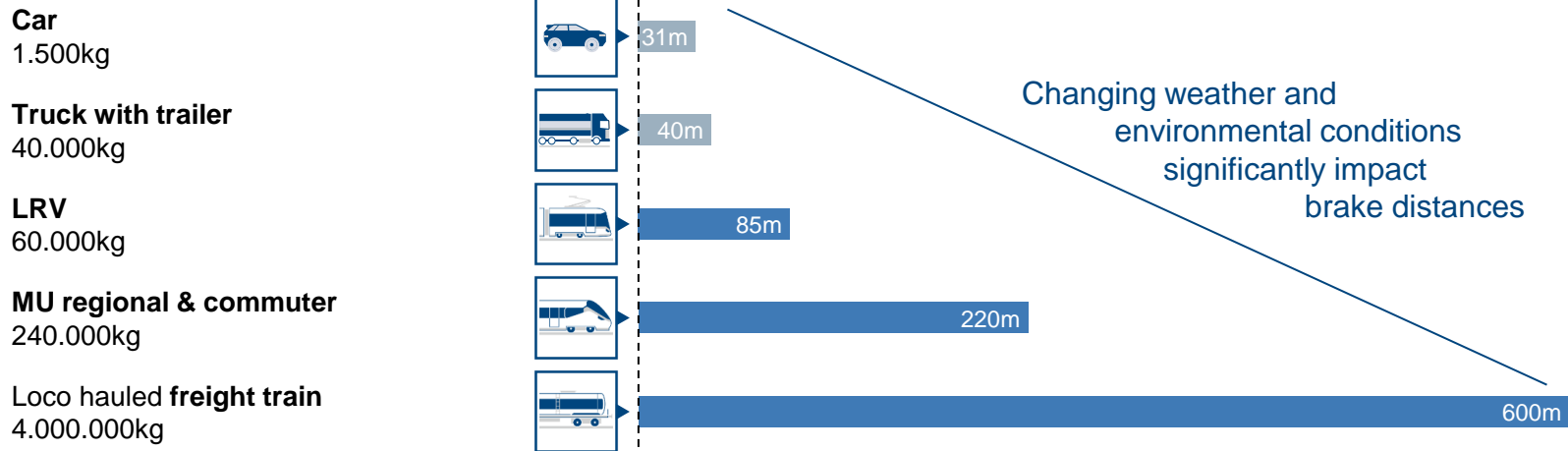
| | CAGR '19-'25 | Market position  |
|---------------------------------|-----------------|--|
| North America & Mexico MT | ~11% |  |
| Austria | ~27% |  |
| France | ~6% |  |
| Russia & CIS (High Grade) | ~4% |  |
| Scandinavia | ~10% |  |
| Spain & Portugal | ~26% |  |
| India (High Grade) | ~5% |  |
| South East Asia, HK, TW | ~14% |  |
| Selected biggest growth markets | ~9% |  |
| RoW ² | ~3% |  |

1) Brakes, Doors, HVAC, rounded to the nearest 50 2) Rest of World w/o selected biggest growth markets & w/o China

Source: KB internal market research; Values recognize FX rates

The enormous brake distances in Rail require outstanding braking performance

Different braking distances at 80km/h



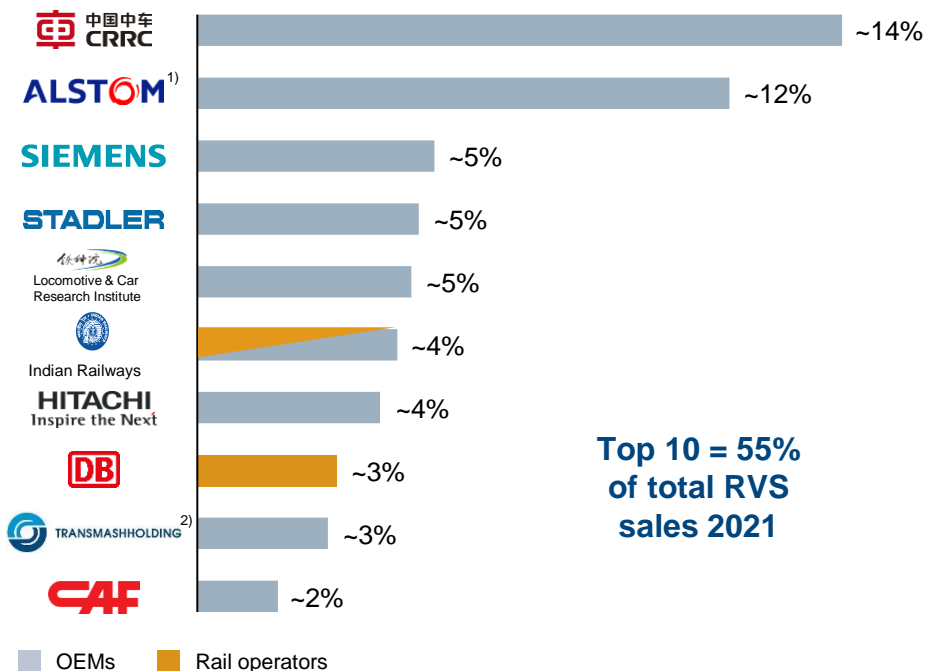
Different braking distances at 330km/h



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



Top 10 customers 2021 (% of sales)



**Top 10 = 55%
of total RVS
sales 2021**

Other major Knorr-Bremse customers

>300 relevant rail operator customers

Europe / Africa



Americas



Asia / Australia



>50 relevant OEM customers

Asia / Australia

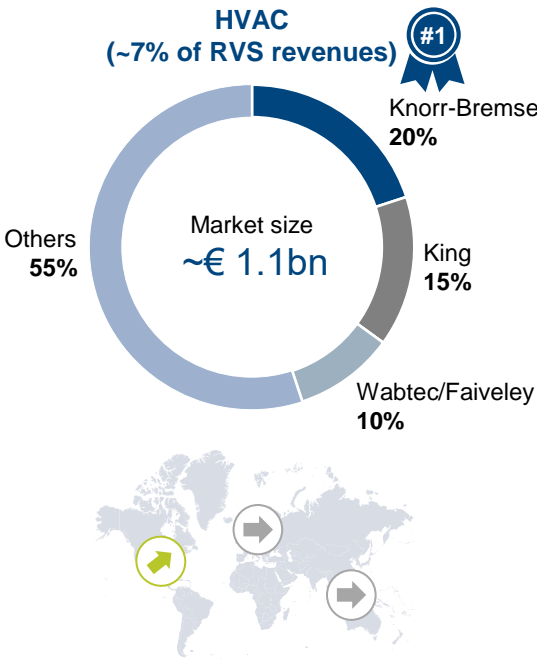
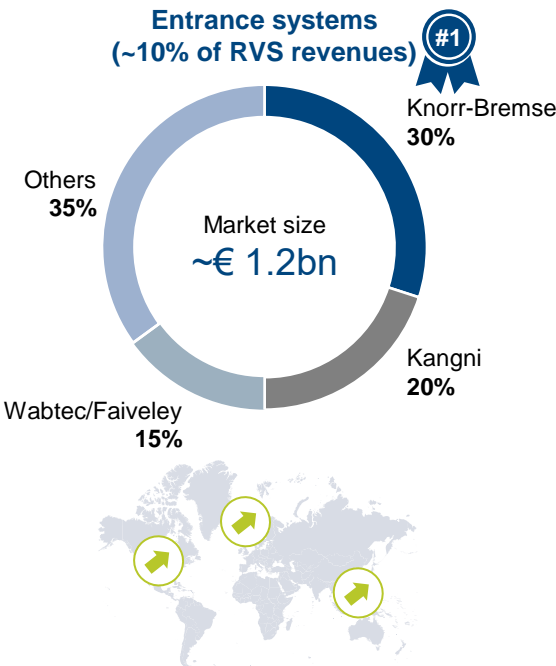
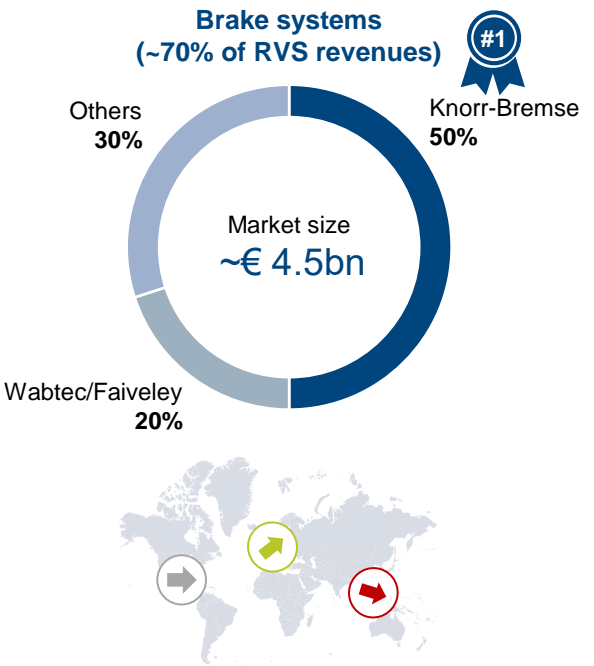


Notes: 2021 sales and customer data based on 31.12.2021; Share of top 10 customers as % RVS sales 2021 may not add up due to rounding; ¹⁾ incl. ex-Bombardier, excl. JV ²⁾ incl. beneficiary companies

RVS holds global #1 position across key product categories



Global market share 2021¹ (% of revenues)



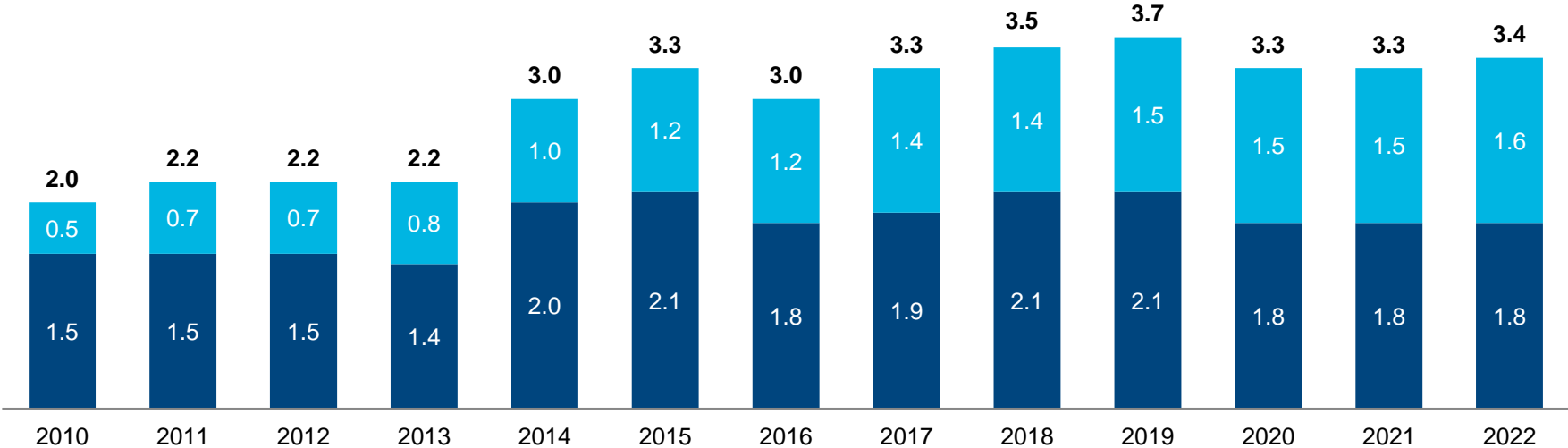
Notes: Based on German GAAP (HGB); Market share estimates are rounded to the nearest multiple of 5%; For competitors, a price estimate was used;
 1) Market share based on deliveries, estimates for OE and AM without labor. Source: Knorr-Bremse information and internal market research

Historic development of OE and AM business



Strong growth both in OE and AM

RVS sales by type (until 2017 German Gaap/HGB, 2018-2020 IFRS, €bn, 2010-2022) ¹⁾

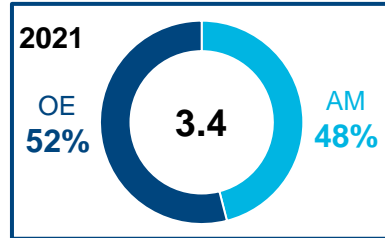
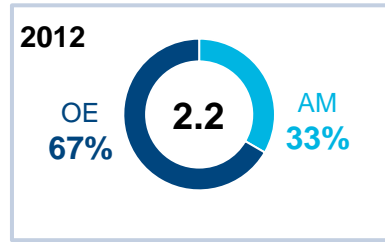


Note: some figures may not add up due to rounding; 1) BilRUG sales allocated proportionally between OE and aftermarket

RVS grew within each business unit, despite Covid impact, AM outperformed



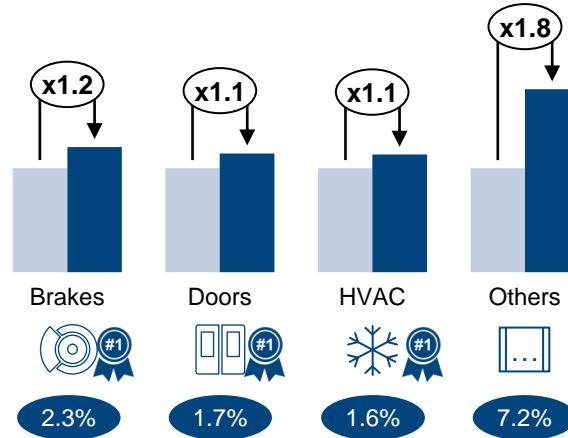
Revenue development in €bn



[Index 100 = 2012]

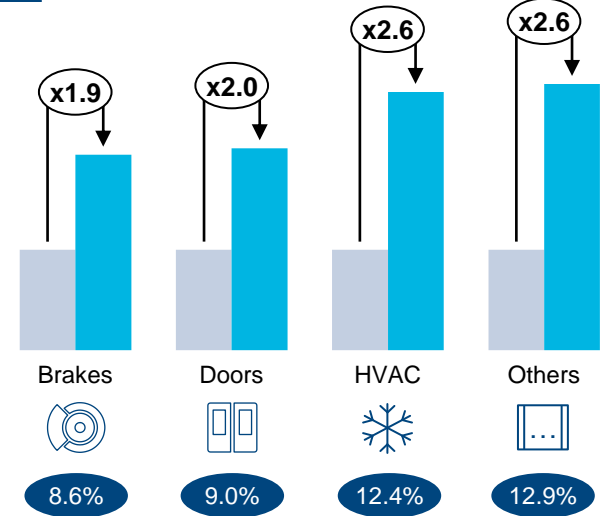
2012 2020 CAGR 2012-2020

KNORR-BREMSE (OE)



Constant increase in the installed base...

RAILSERVICES (AM)

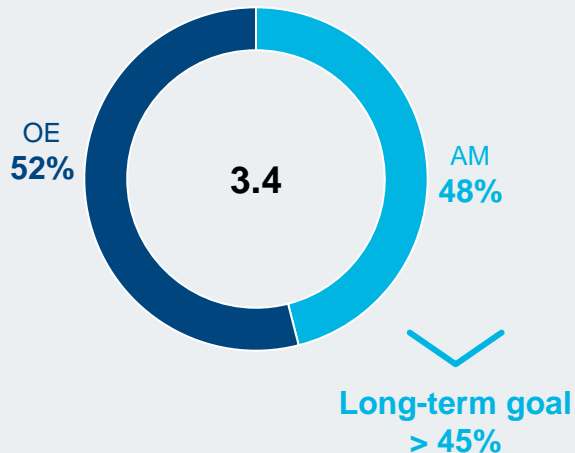


... drives the profitable Aftermarket

Aftermarket business will continue to be an important growth engine



Revenue split
2022 in €bn



+ Opportunities



Use installed fleet



Modernization



New service models & digital solutions

- Challenges

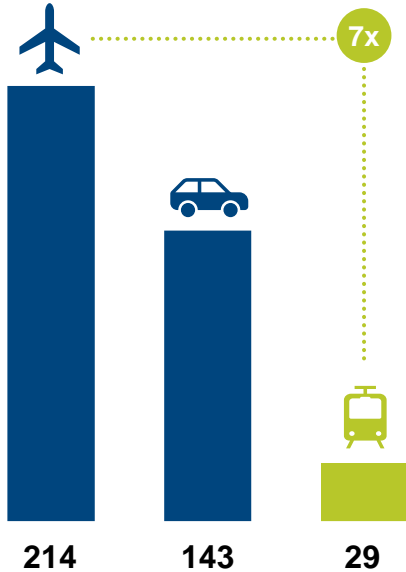
- Competition by OEMs, focussing more on service
- Insourcing and lifecycle costs optimization, incl. stretching overhaul cycles

CO₂ emission targets not achievable in transportation without rail

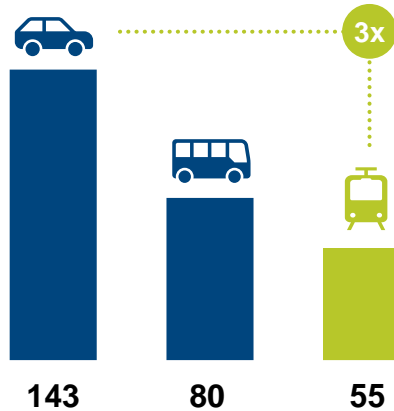


Greenhouse gas emissions from transport¹

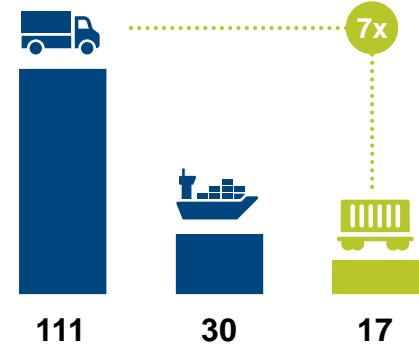
Passenger transport – long distance [in g/pkm]



Passenger transport – local transport [in g/pkm]



Freight transport [in g/tkm]



1) 2019, reference for Germany, Sources: <https://www.allianz-pro-schiene.de/themen/umwelt/daten-fakten/> (accessed on September 8, 2021), based on Umweltbundesamt

RVS is the only supplier world-wide certified for all local standards and norms



Market protected by unique level of complexity ...

| | | |
|--|---|----------|
| | Major global standards | 4 |
| | Unique configurations for vehicle types | 7 |
| | Brake subsystems | 3 |
| | Safety-critical components | >100 |
| | Country- and customer-specific variants | Multiple |
| | 100k active brakes articles to homologate | |

... 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

1) GOST based on 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

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- Introduction
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- **Commercial Vehicle Systems (CVS)**
- R&D Focus
- Financials
- Sustainability
- Capital Markets Summary
- Appendix



CVS with high-quality business model: outperformance and resilience



Market leadership

A global market leader
increasing market share (~25% for brake systems & vehicle dynamics)



Strong growth profile

Continuously **outperforming markets with rising content per vehicle** (5% sales CAGR vs. ~2% TPR growth between 2012-2021)



Technology innovation

Technology leader with continuous significant **investment in innovation and R&D**



High safety requirements

Global key supplier with **system know-how** and **vehicle dynamics capabilities**



Resilience

Strong aftermarket share (~28% revenue share), **cost efficiency**, regional **diversification** as well as track record in **strong cost management execution**



Profitability

Technology differentiation, superior products, systems approach, scale advantage and consequent **cost management** (op. EBIT margin ~9%)

CVS: one of two global leaders with an outstanding position in braking and safety-relevant systems



Highlights

Global market position¹⁾

Technology leader

Global market share

c.14k Employees

2022 key financials

€3.7bn sales

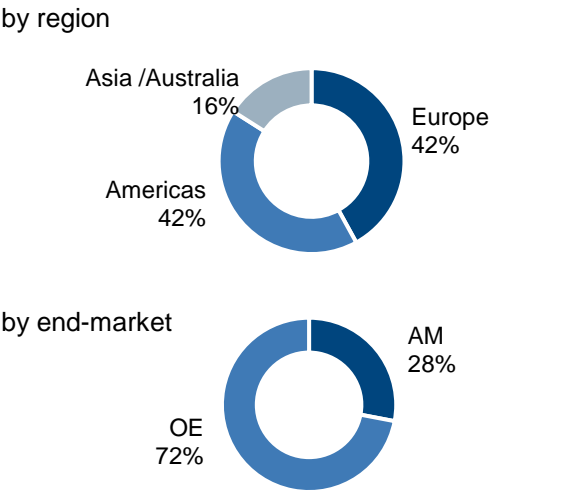
~8% CAGR 2010-2022²⁾

€486m op. EBITDA (13.0% margin)

€339m op. EBIT (9.0% margin)

28% aftermarket share

2022 sales split³⁾



Notes: Sales, EBITDA, EBIT and respective margins based on IFRS; other figures based on German GAAP (HGB) 1) 2020 global addressable Truck, Bus and Trailer OE market,; 2) Total reported CVS sales growth including OE and AM 3) Sales split by region based on IFRS; Other splits based on German GAAP (HGB)

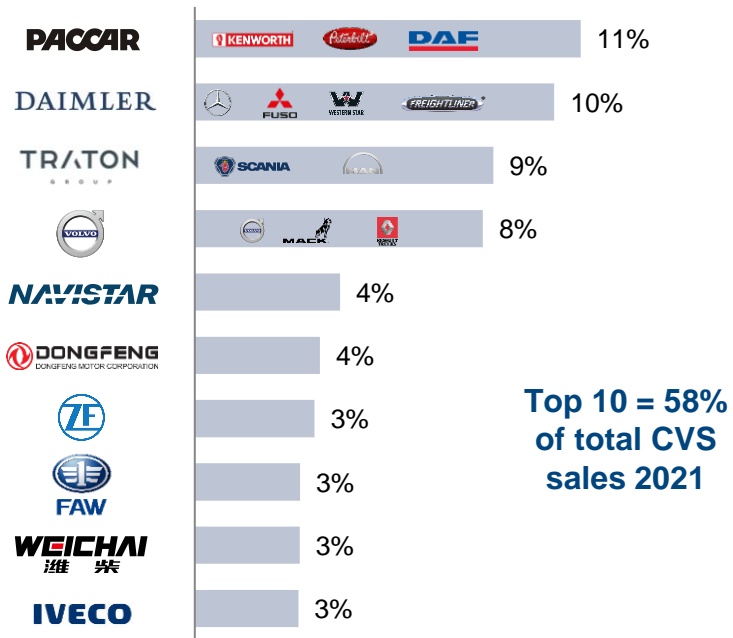
Knorr-Bremse is the partner of choice for global OEMs with long-standing relationships



Top 10 customers 2021 (% of sales)

Years of relationship

Other major Knorr-Bremse customers



>30

>90

>90

>30

>20

>5

>30

>5

>5

>90



CATERPILLAR



ISUZU

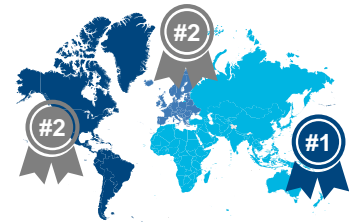
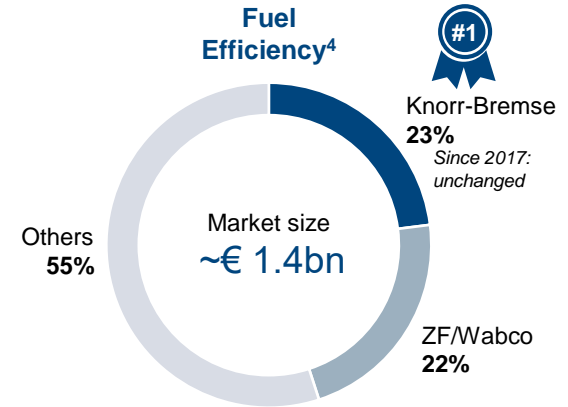
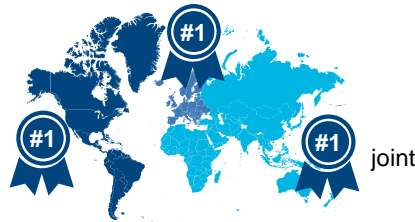
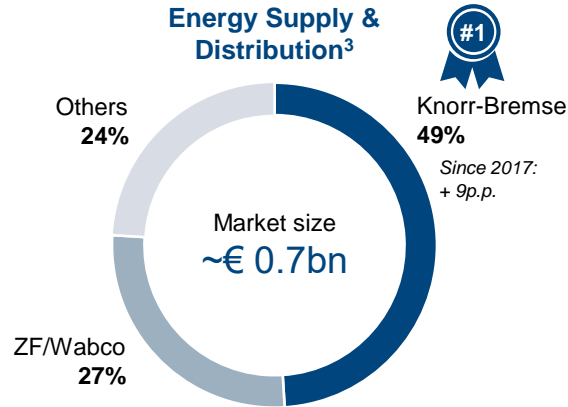
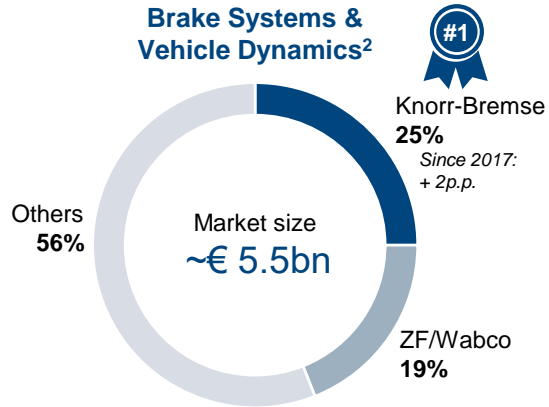


Note: Share of top 10 customers as % CVS sales 2021 may not add up due to rounding.

CVS is market leader in all major product fields



Global market share 2021¹ (% of revenues)



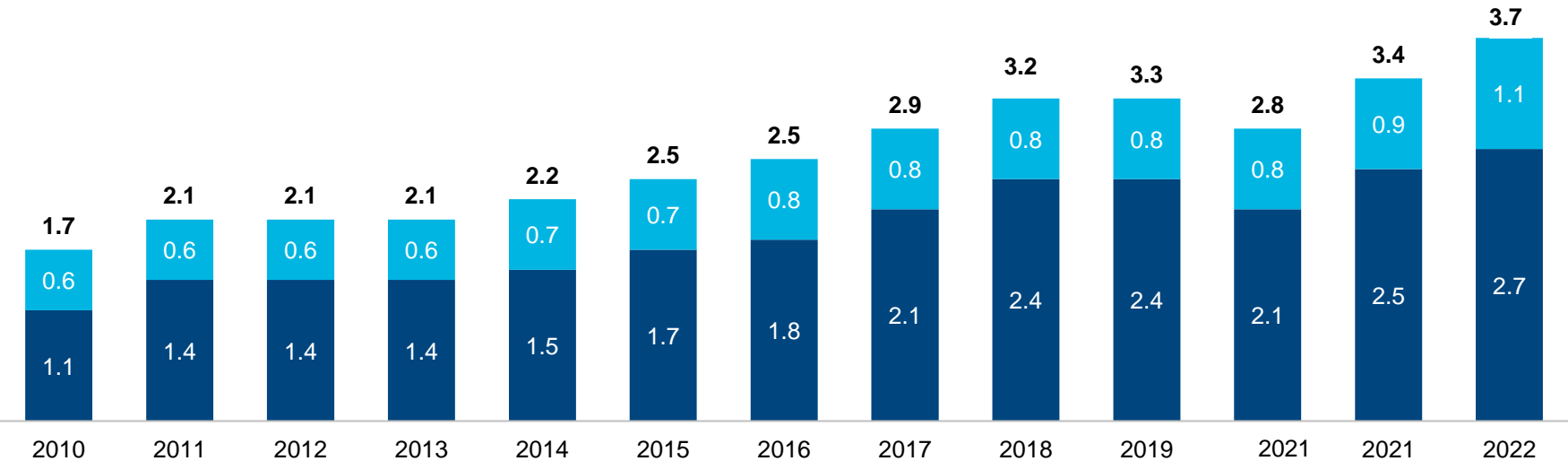
1) 2021 estimated addressable Truck, Bus and Trailer OE market, incl. "Brake Systems & Vehicle Dynamics (incl. Automated Driving)", "Energy Supply & Distribution" and "Fuel Efficiency"; excl. aftermarket; Knorr-Bremse data 2) Air Disc Brake, Valves / Pedal Unit, Actuators, Foundation Drum Brake, Steering, ABS, EBS, ESP, DAS, ELC; incl. segment Others 3) Compressors, Air Treatment 4) Vibration Dampers, Engine Air Control, Transmission – Gear and clutch actuation

Historic development of OE and AM business



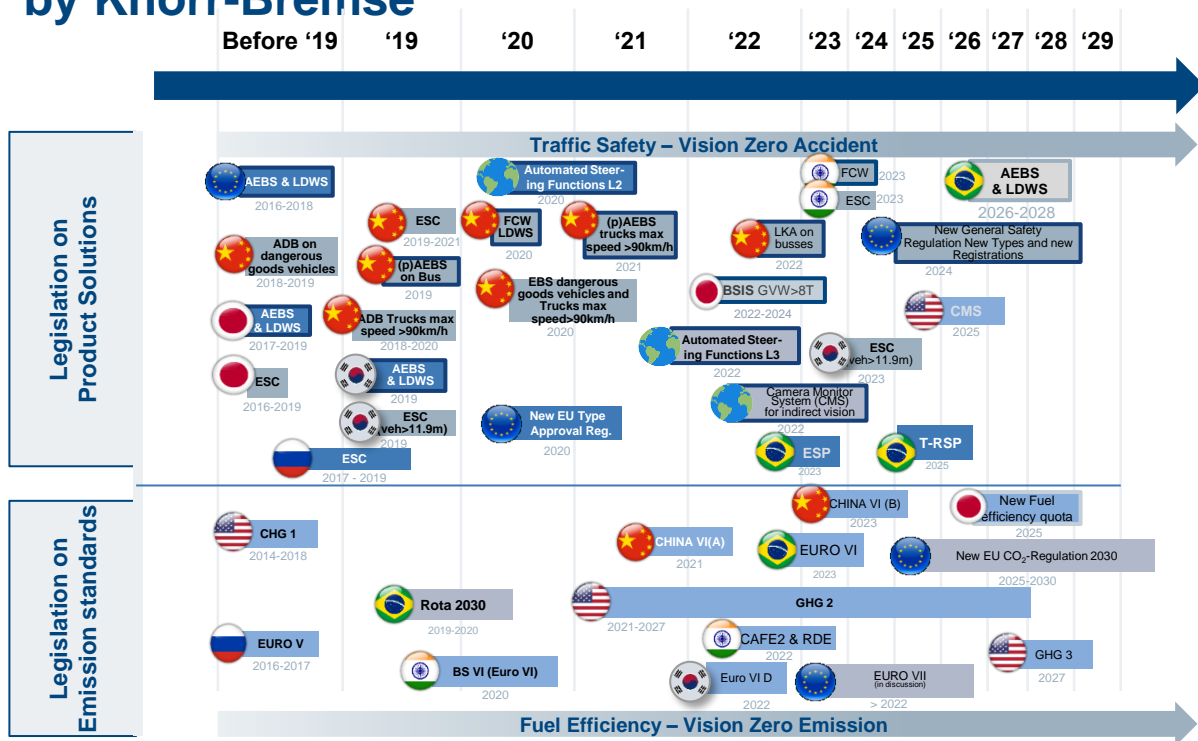
Strong growth both in OE and AM

CVS sales by type (HGB, €bn, 2010-2017)1) 2018-21 IFRS



Notes: Some sales split may not add up due to rounding 1) 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



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)

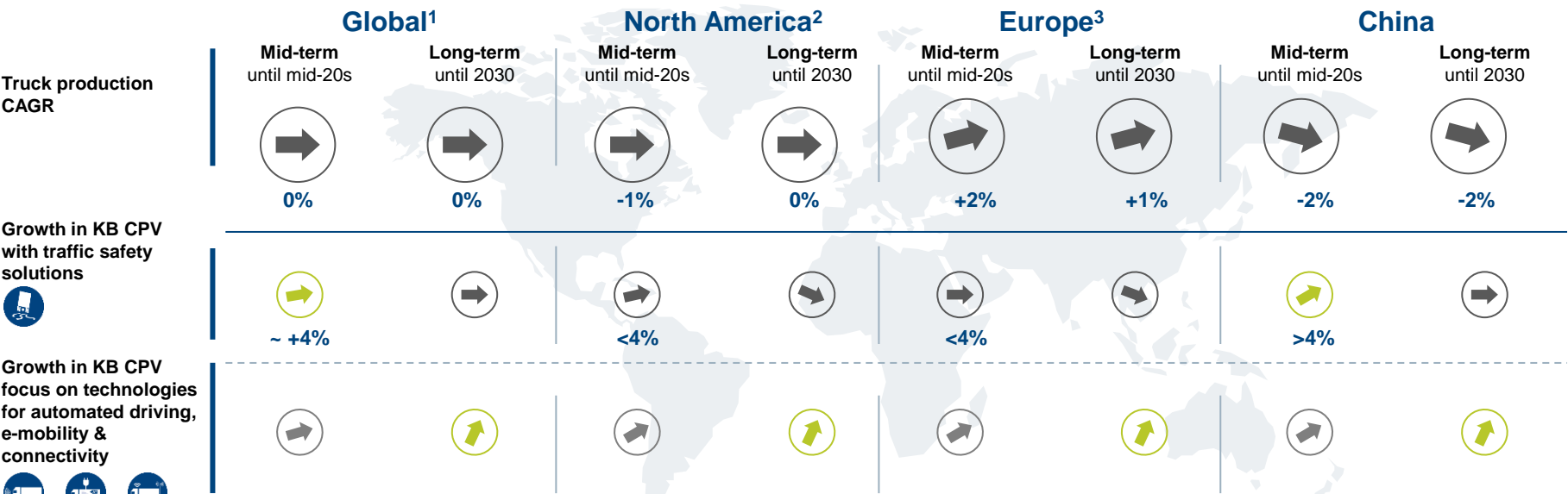
CVS growth opportunities driven by higher CPV despite limited volume growth



Truck production is flat and does not contribute to growth

Growth driver will be the current content per vehicle (CPV) with **traffic safety technologies** until mid 2020s

In the long run, CPV must be driven by technologies for **new trends automated driving, e-mobility and connectivity**



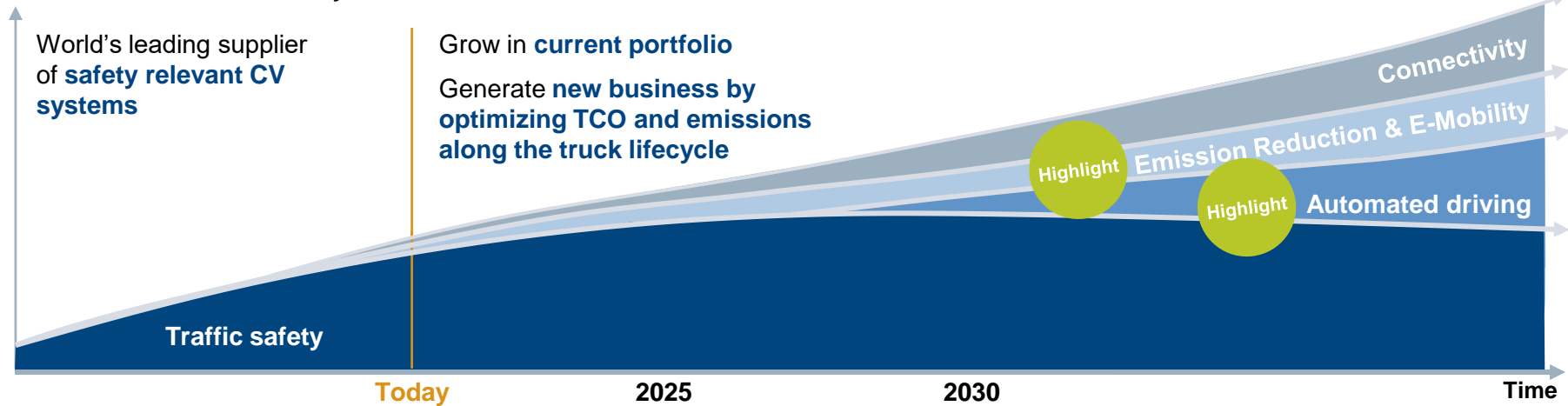
1) Incl. Turkey & Korea 2) Class 6 – 8 3) West & East Europe

New growth areas for CVS



Illustrative growth potential

Growth contribution of industry trends



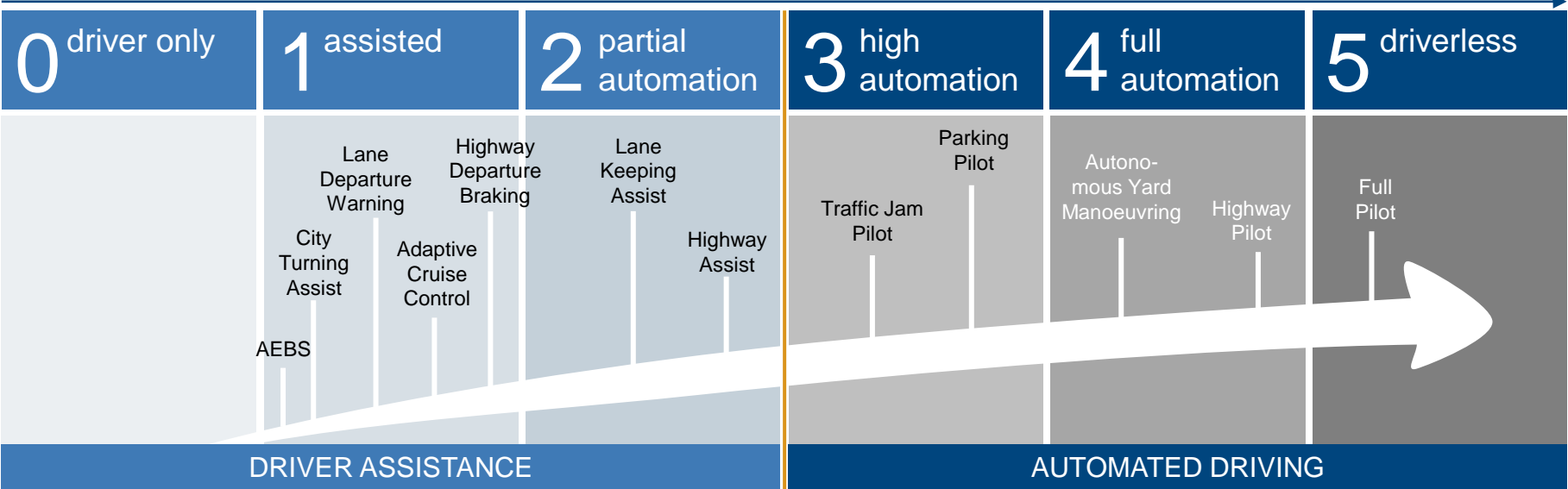
Current CVS portfolio with focus on traffic safety perfectly fits market demands

In the future however, CVS will gain more content per vehicle growth with solutions for Automated Driving, Emission Reduction & E-Mobility and Connectivity

CVS offers both driver assistance and automated driving solutions



degree of automation →



CVS as a system supplier

- Braking
- Steering
- Sensors
- Level 1 and 2 functions

Air Disc Brake

Steering

Brake Control

CVS as vehicle dynamics supplier in consortium/partnership approach

- Braking
- Steering
- Vehicle dynamics
- Related redundancy

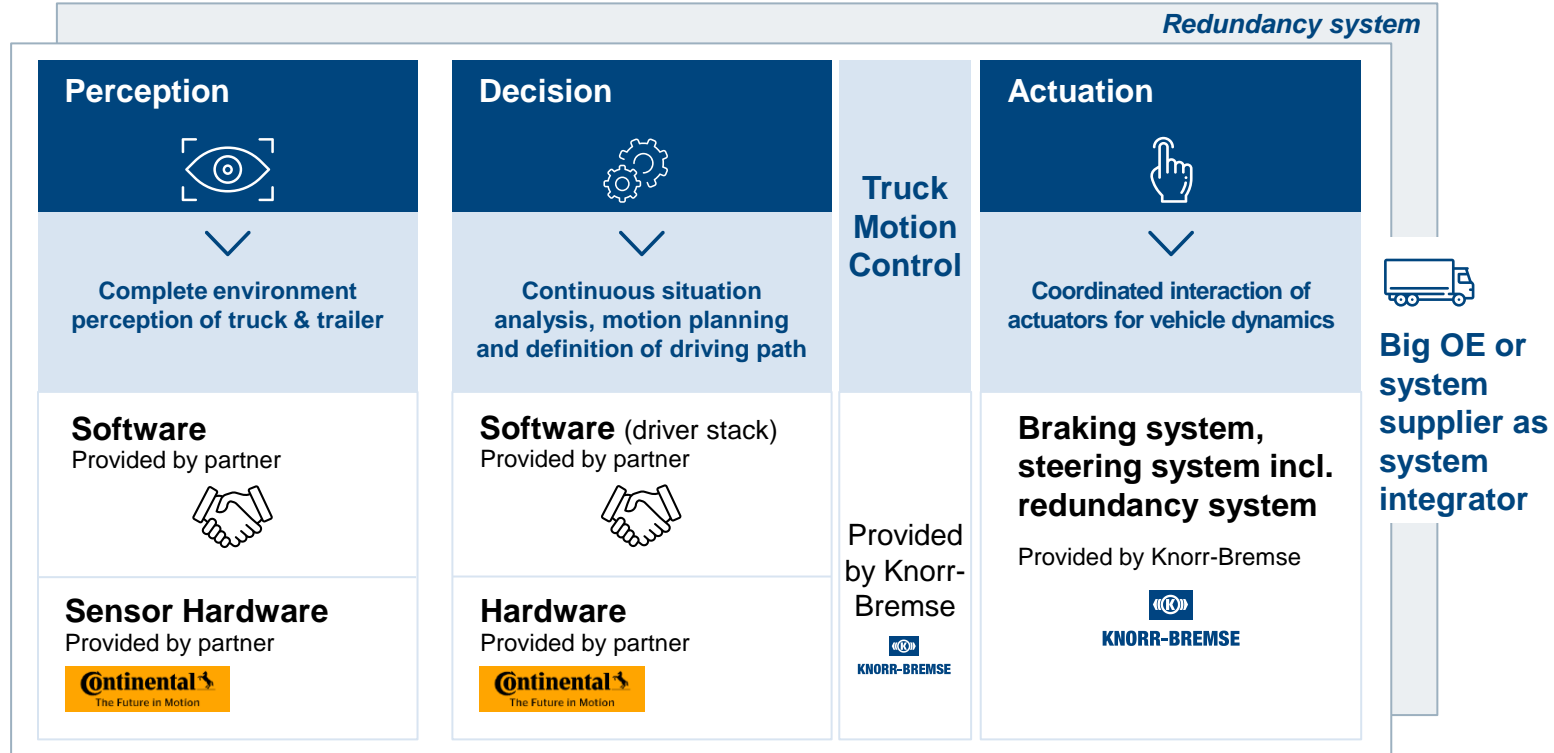
CV system competence

Brake control

Steering

Vehicle dynamics / Truck Motion Control

CVS offers automated driving solutions in a partnership approach - Actuation, Truck Motion Control and Redundancy are CVS' core competencies



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

Perception

Decision

Actuation



Redundancy

System integration 

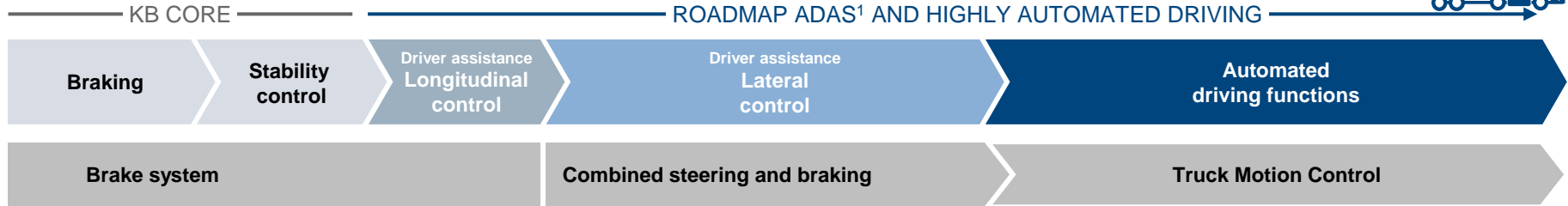
Consumer Benefits

- 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

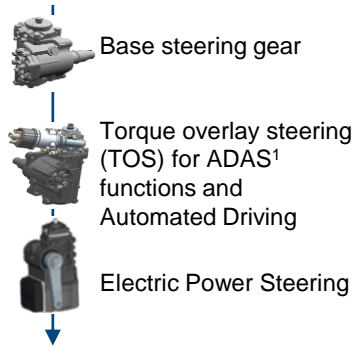
Truck Motion Control combines braking, steering and vehicle dynamics



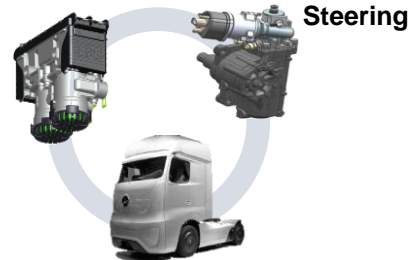
- Successful M&A strategy
- KB global #2 steering supplier



KB driving steering innovation and vehicle content growth



Brake control

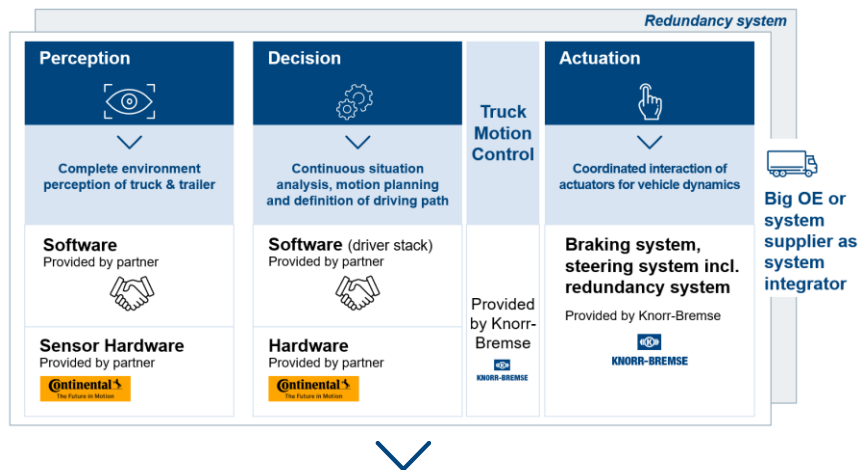


CV system competence

Combined competencies enable Truck Motion Control for safe vehicle control under all conditions

1) ADAS = Advanced Driver Assistance Systems

Different offerings for automated driving in a partnership approach



Stand-alone KB offering:

- Actuation, Truck Motion Control and Redundancy supplied by CVS

In partnership as a consortium:

- System with actuation, TMC, perception & hardware for the decision layer together with Continental as sensors and hardware partner
- Complete system including driver stack in collaboration with an AI partner in addition to the sensors and hardware partner

CVS fosters system competency and future content per vehicle increase potential

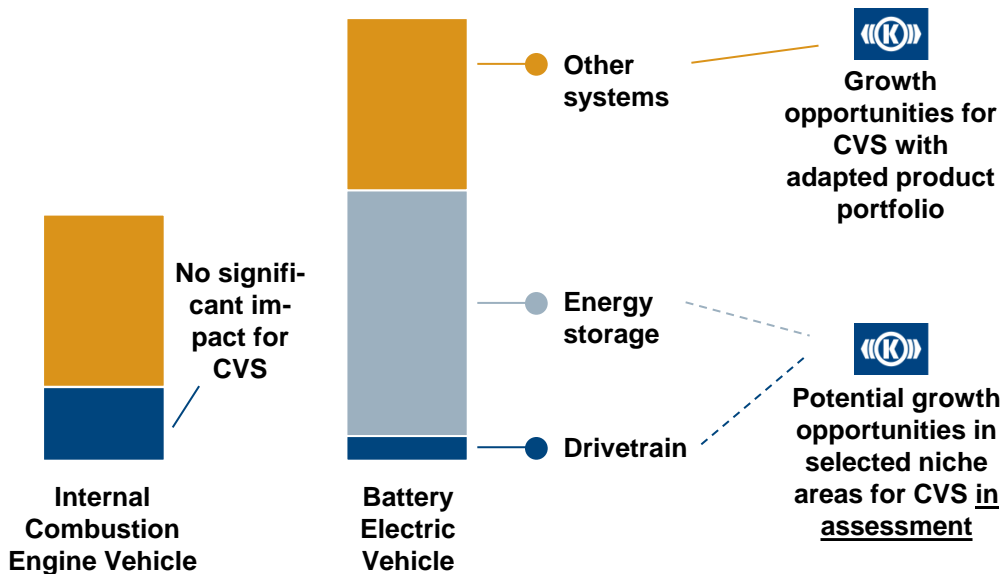
- General requirement for redundant Electric/Electronics architecture **increases content per vehicle** → redundancy ensures the safe vehicle movement even in case of the failure of a system relevant component
- The addition of **torque overlay steering** to CVS' portfolio adds content to the vehicle, more advanced steering solutions at higher price further increase content per vehicle

CVS will benefit from transition of integrated combustion engine trucks towards electrified trucks



Value structure of a truck

Illustrative



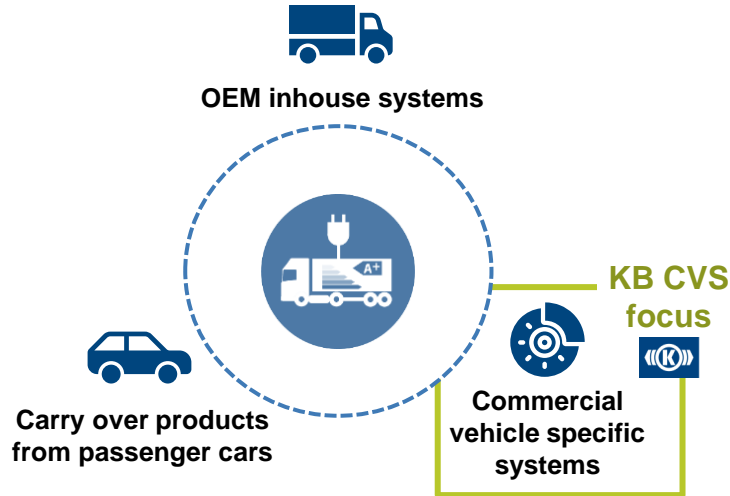
Impact for CVS

- Shift from ICE to EV vehicles offers **first mover advantage**
- More complex Electrics/Electronics architecture in electric vehicles **increases content per vehicle**
- KB products in „other systems“ and in energy storage offer **growth potential for CVS**
- Value reduction in drivetrain **does not affect CVS significantly**
- Potential content per vehicle increase via **electric vehicle adapted products** and **completely new product fields**

CVS founded an internal incubation unit for e-mobility solutions



Defining our role in the environment of the e-mobility ecosystem for commercial vehicles



Internal incubation unit set up for solutions for e-mobility



- Adaptation of existing product portfolio towards EV
- Definition of new product fields
- First product concepts already transferred to CVS business units
- 52 patents applications have been generated out of the CVS e-Cubator until today

CVS is offering a broad product portfolio for electric trucks



SELECTED
EXAMPLES

EV adapted portfolio

SELECTED
EXAMPLES

eCompressor

- Electric screw compressor
- Mid air demand eCompressor (rotary vane)
- Low air demand compressor for future EV requirements



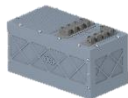
EV brake control & vehicle dynamics

optimized and scalable holistic EV motion control, including energy recuperation



New EV product fields

Redundant power management system



EV brake resistor



Opportunities in fuel cell electric vehicles in assessment



✓ on the market

✓ market launch soon

in development

in assessment

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



- Bendix acquisition as enabler for footprint expansion
- Sheppard acquisition to strengthen position as global system supplier of integrated steering and braking systems
- Capitalisation of technological expertise and brand
- Increased content per vehicle (technology as driver)
- Continuous cost structure improvements



- Intensive localisation with key local players
- Capitalise on strong position in OE channel
- Increased content per vehicle (technology as driver)
- 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; Source: Knorr-Bremse information



KNORR-BREMSE

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

With over **12,000** patents¹⁾

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

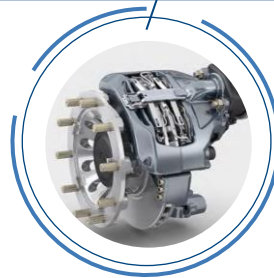
5 state-of-the-art R&D centres globally complemented by 23 local engineering entities with customer proximity

Focused & 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

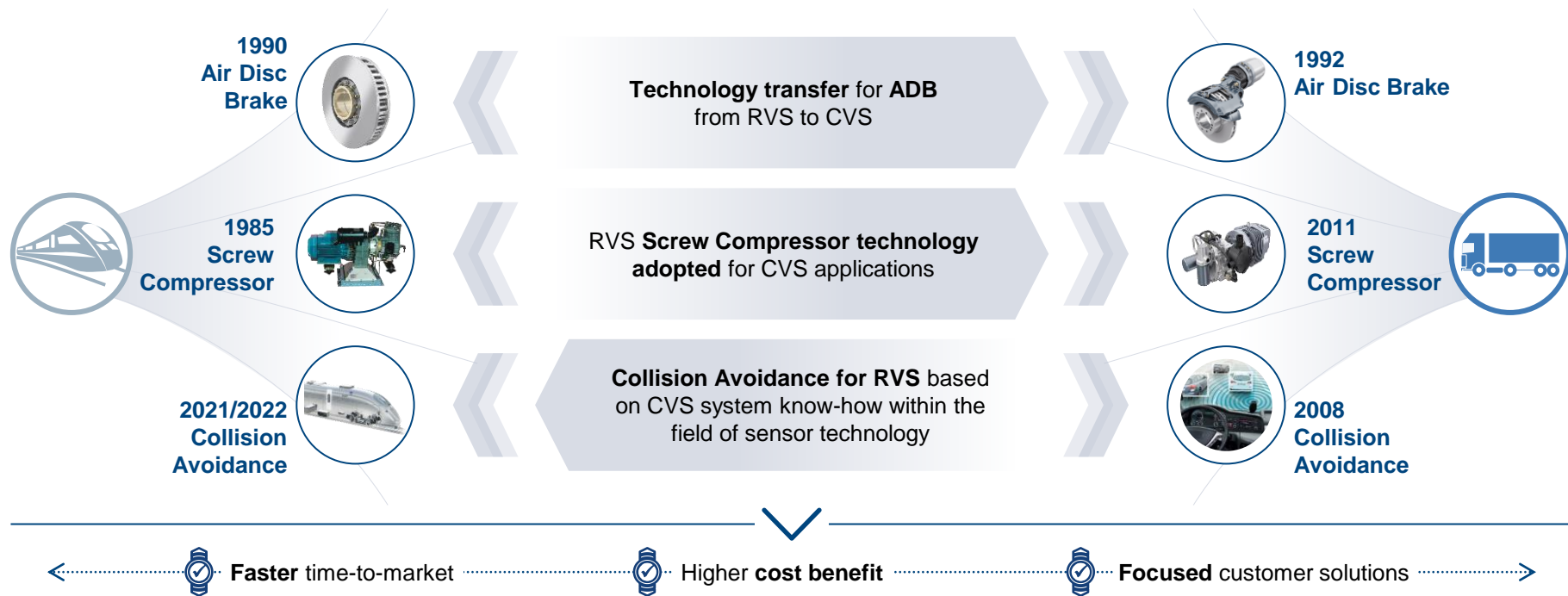


Long-term targeted R&D ratio: **6-7%** of revenues³⁾

Notes: 1) Granted and applied patents; 2) Based on published number of patent families (granted and applied); 3) Knorr-Bremse 2020 R&D financial information based on IFRS;

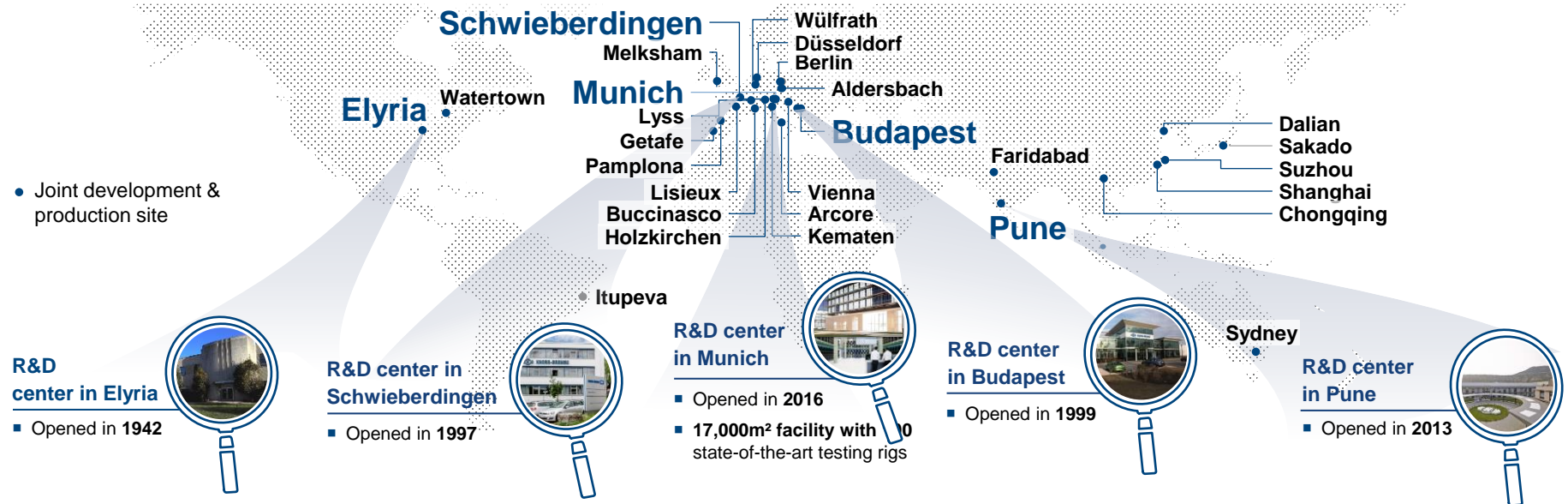
...resulting in synergies and cross-proliferation

Cross-divisional R&D examples



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

Globally Σ ~3.600 FTE¹⁾

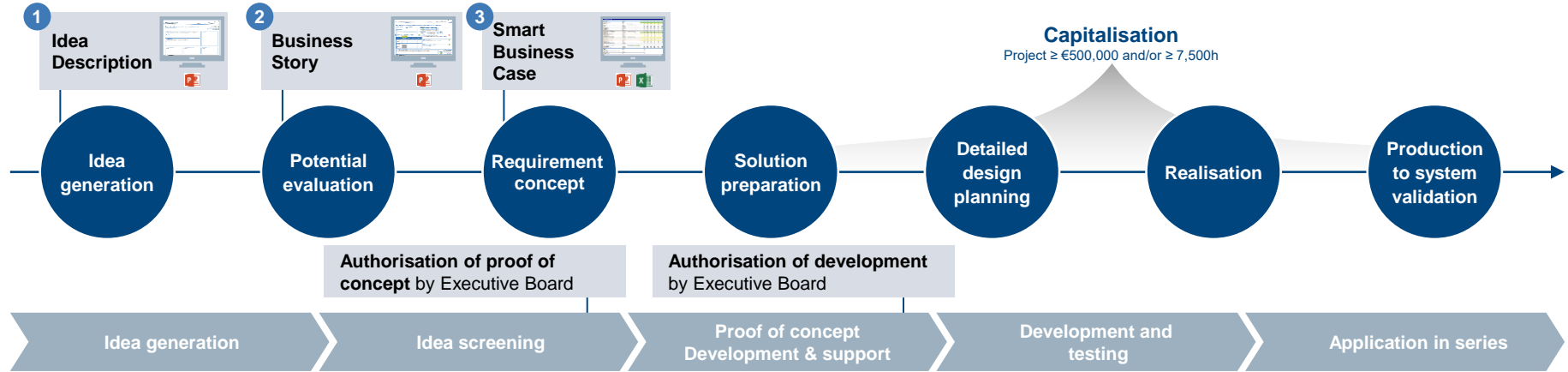


Knorr-Bremse's innovations are supported by a **network of specialized development centres** with joint production and R&D

Notes: 1) FTE refers to number of employees in R&D function (includes engineers, technicians, merchants) EOP 2019, TCI allocated to Asia

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

Close co-operation 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



Partnerships with Universities

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



Acceleration of
PRODUCT INNOVATION
in digital age requires
DIVERSE PARTNERSHIPS
to outperform competitors

VC partnerships with Start-ups

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



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

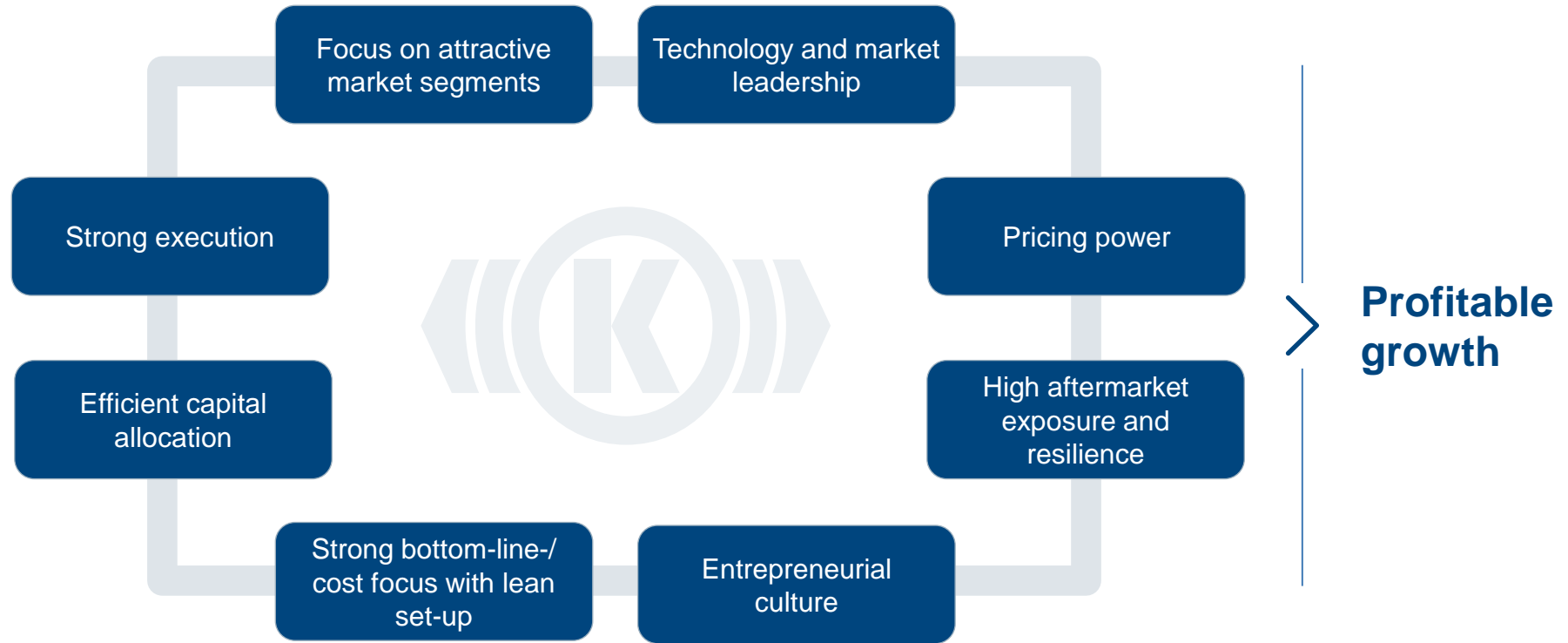
Notes: 1) VDA - Verband der Automobilindustrie (German Association of the Automotive Industry)

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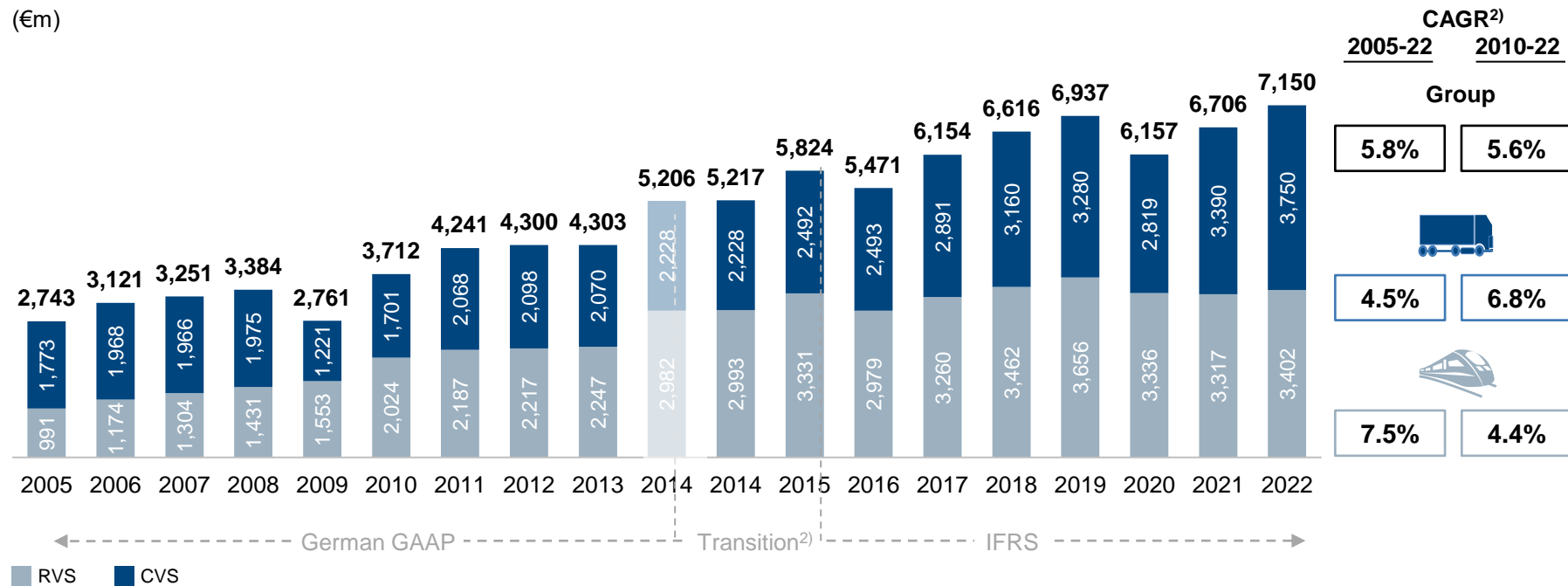
Financial excellence foundation: success factors for future profitable growth fully intact



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

Historical sales¹⁾²⁾ by division

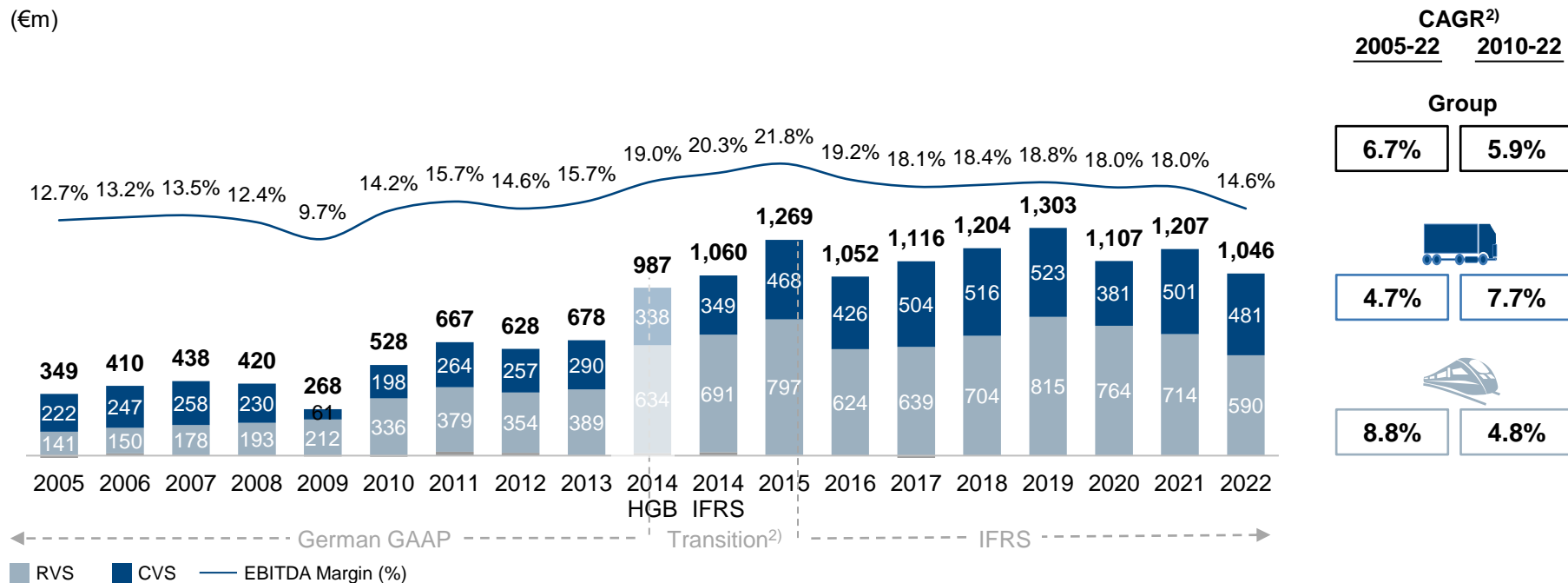
(€m)



... combined with disproportionate EBITDA growth

Historical EBITDA¹⁾²⁾ profitability

(€m)

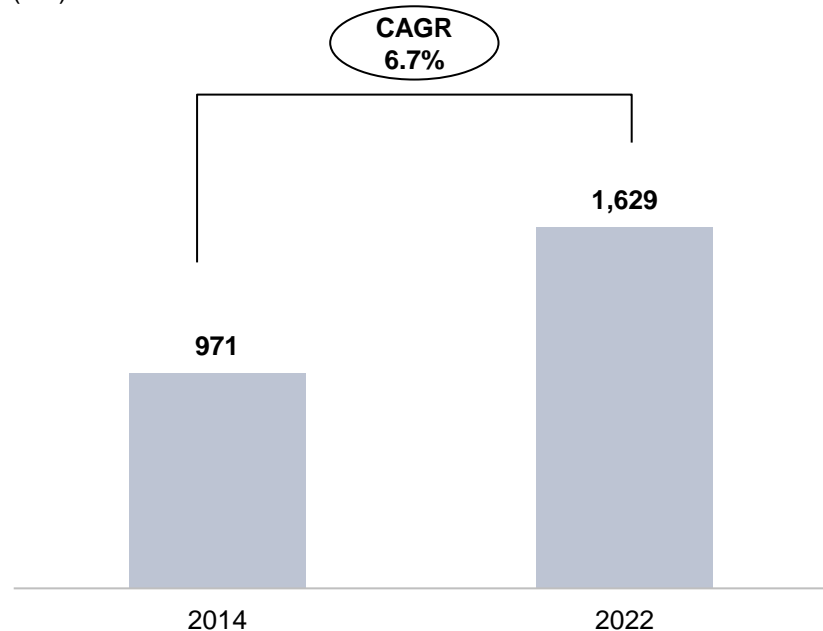


... all supported by solid aftermarket sales growth

RVS – Aftermarket sales¹⁾



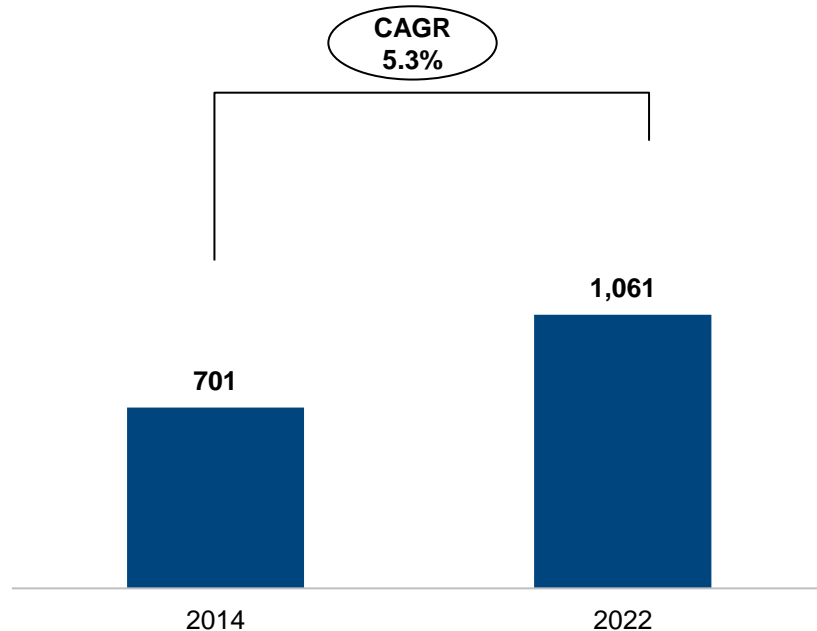
(€m)



CVS – Aftermarket sales¹⁾



(€m)

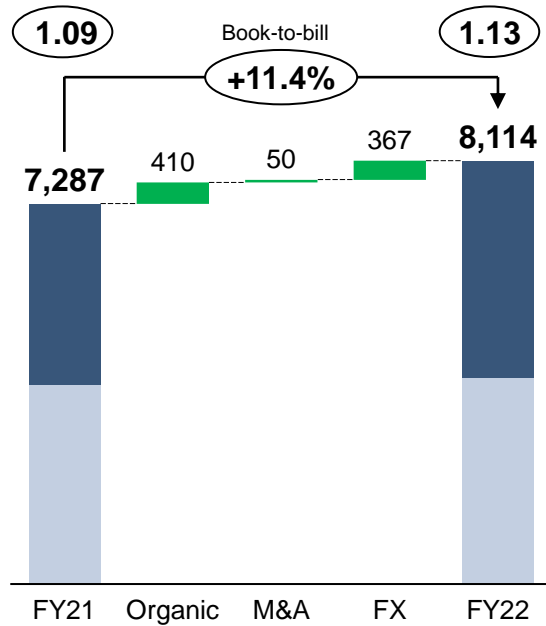


Notes: 1) Based on IFRS; BilRUG sales allocated proportionally between OE and aftermarket

FY22: order Intake for Group, RVS & CVS

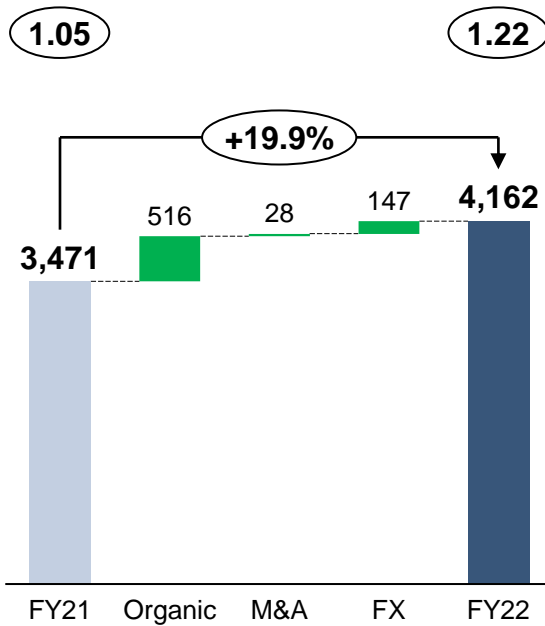
Group

(€m)



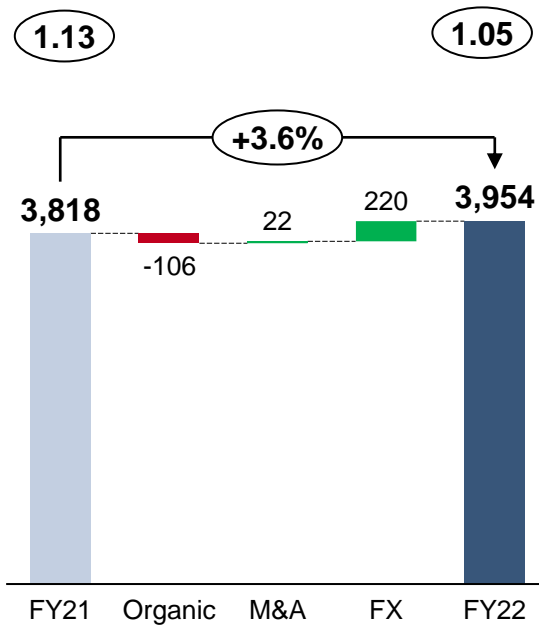
RVS

(€m)



CVS

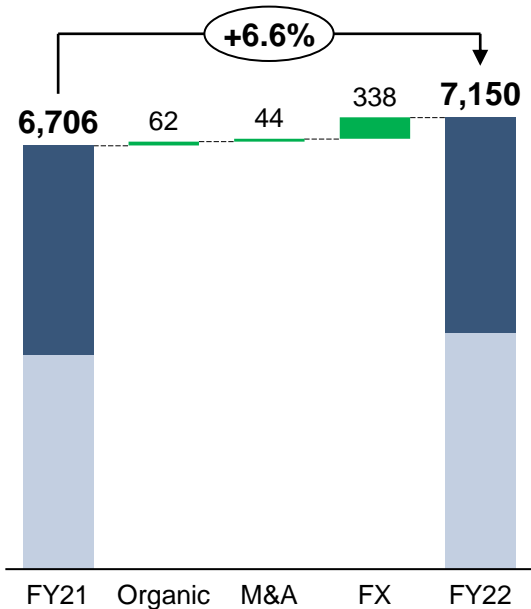
(€m)



FY22: revenue for Group, RVS & CVS

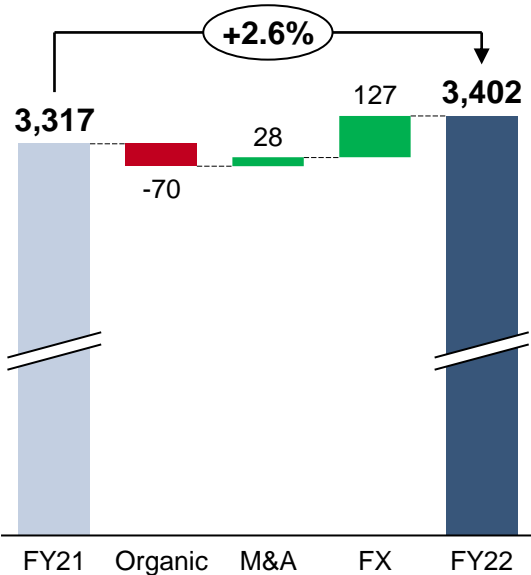
Group

(€m)



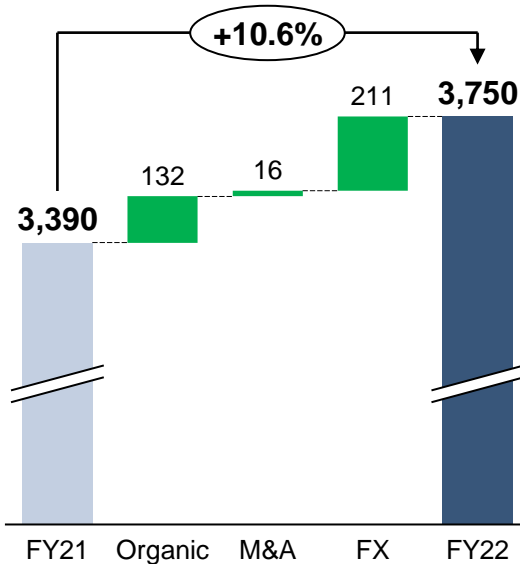
RVS

(€m)



CVS

(€m)



FY22: op. EBIT for Group, RVS & CVS

Group

(€m)

13.5%

11.1%

-12.5%

908

795

Reported:
916
(13.7%)

Reported:
721
(10.1%)

-141

1

27

FY21 Organic M&A FX FY22

RVS

(€m)

17.9%

14.9%

-14.8%

595

507

-98

-5

15

FY21 Organic M&A FX FY22

CVS

(€m)

10.7%

9.0%

-6.2%

361

339

-41

5

13

FY21 Organic M&A FX FY22

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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 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** (Healthy, 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**.

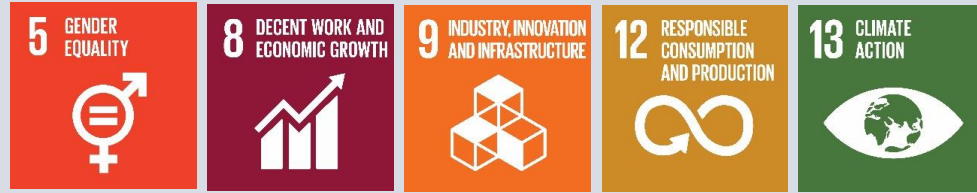
Communication and co-operation



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.

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



Carbon neutrality from YE2021

Carbon neutrality from 2021

- Climate strategy with ambitious targets
 - 50% CO₂ emission reduction by 2030
 - Carbon-neutrality at KB sites since YE21
- Additionally: Increasing purchase of renewable energy and carbon offsetting
- Starting point of CO₂ emissions in 2018 at 143,000 tons

Contribution by our products

- Rail is a cornerstone of eco-friendly transport solutions
- Truck products support lower fuel consumption
- ~9% of KB's revenues are driven by remanufactured and recycled products
- Circular economy supported by remanufactured and overhauled products

Focus on 5 SDGs

- In 2018 ~150 top managers of KB committed to 5 core United Nations Sustainability Development Goals
- Sponsorship of Executive Board Members to drive initiatives around the KB world



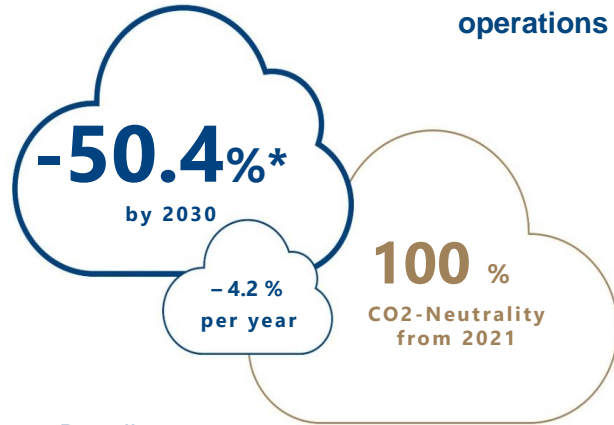
Knorr-Bremse AG is part of the new **DAX 50 ESG index**



Knorr-Bremse's climate strategy 2030

Knorr-Bremse Climate Strategy 2030...

Emissions from own operations (Scope 1+2)



*vs. 2018 Baseline

Reduction pathway based on ambition as set out by the SBTi

Source: Knorr-Bremse AG Sustainability Report 2021

... with its ambitious goals

- **Goal to halve our CO₂ emissions by 2030:** Average reduction of (gross) Scope 1 and Scope 2 emissions by 4.2% per annum in relation to the 2018 baseline
- **Goal CO₂-neutrality for own operations:** Increasing the proportion of renewable energy and offsetting any remaining emissions with high quality voluntary carbon certificates that we source through a long-term partnership and dedicated long-term projects

Knorr-Bremse's three levers to achieve a reduction



Energy efficiency: Energy efficiency measures and the use of low-carbon fuels in heating systems and in the fleet



Renewables generation: Investments in measures to increase the proportion of our own renewable energy produced at Knorr-Bremse sites



Renewables purchase: Increase in the proportion of renewable energy purchased via long-term power purchase agreements, green electricity products and energy attribute certificates (EACs)

ESG as integral part of KB's strategy further accelerated

E nvironment

- Further roll-out of energy efficiency activities and own green power production
 - 2030 goal of **-50% CO₂ (Scope 1+2)** intact (>-65% in FY22)¹
- **Scope 3 strategy accelerated with internal commitment to join SBTi**, target announcement in Q2-Q3/23
- Target revenue share of **remanufactured products >10%** achieved

S ocial

- **Global Gender-Diversity targets introduced** - share of women at Management Level 20%, at entire workforce 25% (until Q3/27)
- **Employee safety** further improved (>-10% in TCIR² on Group level)
- **Ukraine donations** and **humanitarian** support at KB

G overnance

- **Sustainability included in three corporate financing** activities
- High participation rate in **employee share program**
- ESG management **bonus target (STI)** reached



1) Preliminary assessment and before last tranche of green power certificates 2) Total Case Incident Rate 3) Short-term incentive

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

United Nations Global Compact (participation since 2010)



APTA - American Public Transportation Association, USA



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



AAR - Association of American Railroads, USA



Verband der Automobilindustrie

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



AIAG - Automotive Industry Action Group, USA



RAILSPONSIBLE – founding member (sustainable rail supply chain initiative)



MEMA - Motor & Equipment Manufacturers Association, USA



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



New York and New Jersey Minority Supplier Development Council, USA



APRA - Automotive Parts Remanufacturers Association - Chairman Europe

Our 9 material (non-financial) corporate responsibility areas

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

| | | |
|--------------------------------------|---|--|
| Anti-corruption and fair competition | Product and system safety | Ecological product design |
| Energy and CO ₂ emissions | Personnel development | Sustainability standards in the supply chain |
| Employment conditions | Occupational safety and health protection | Diversity and equality |

Agenda

- Introduction
- Key Company Highlights
- Rail Vehicle Systems (RVS)
- Commercial Vehicle Systems (CVS)
- R&D Focus
- Financials
- Sustainability
- **Capital Markets Summary**
- Appendix

Share data

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 |

Bond Data

Corporate Bond of Knorr-Bremse AG

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

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

Bond Data

Sustainability-Linked Corporate Bond of Knorr-Bremse AG

| | |
|--|---|
| Security Identification Number | A30VPQ |
| International Securities Identification Number | XS2534891978 |
| Issuer | Knorr-Bremse AG |
| Issuer ratings | A2/outlook stable (Moody's), A/outlook negative (Standard & Poor's) |
| Volume | EUR 700 million |
| Term | 5 years |
| Settlement | September 21, 2022 |
| Maturity | September 21, 2027 |
| Coupon | 3.250% p. a. |
| Reoffer spread | 3.331% p. a. |
| Listing | Regulated Market of the Luxembourg Stock Exchange |
| Denomination | EUR 100,000 |
| Applicable law | German law |

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

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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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