



Automotive – Focus on innovation

Horst Binnig, CEO Rheinmetall Automotive
Capital Markets Day 2018, 29 November, Berlin

MOBILITY. SECURITY. PASSION.



Look back to CMD 2017 in Bremen Last Chart 2017: Rheinmetall Automotive is still on track



MARKETS AND CUSTOMERS



Markets in better shape than anticipated, global LV production will grow by >2%

Our global production and technology footprint will follow local needs

Rheinmetall Automotive intends to continue outperforming markets in the future, too



PERFORMANCE AND GROWTH



Sales growth at Mechatronics will follow the high demand for fuel-optimization products

Hardparts will continue to optimize its global footprint, with the focus on generating cash

Aftermarket: back on track with a new strategy, now set to return to former profitability



INNOVATION AND PRODUCTS

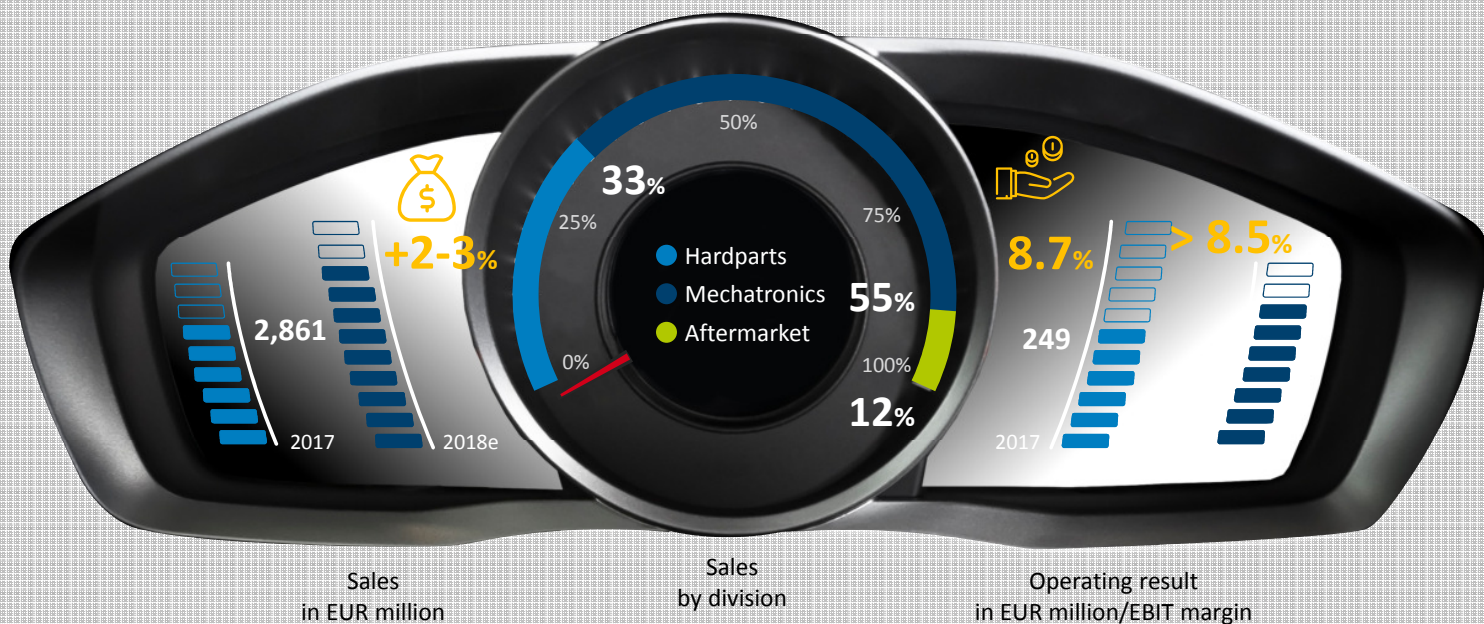


Trend toward greater efficiency and emission reduction promises higher content per car

Electrification brings additional business and sales growth

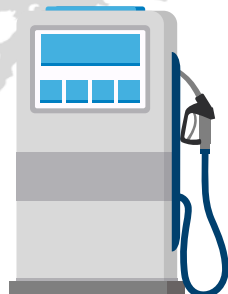
Product pipelines are still full of innovations for every type of power train

Targets 2018



2018 A "disruptive" year?

1 China



2 Diesel

3 Legislation



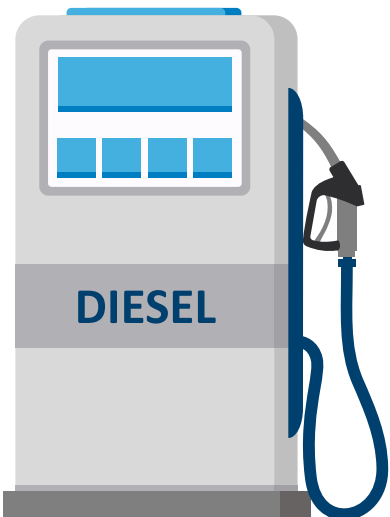
Worldwide Harmonised Light Vehicle Test Procedure




4 E-Mobility

2. Diesel


Future of the passenger car diesel engine






MARKETS AND CUSTOMERS

- Diesel market in Europe still under pressure
- WLTP-related backlog will be reduced by the end of the year
- Small diesel engines (< 1.5 l) will come under price pressure



PERFORMANCE AND GROWTH

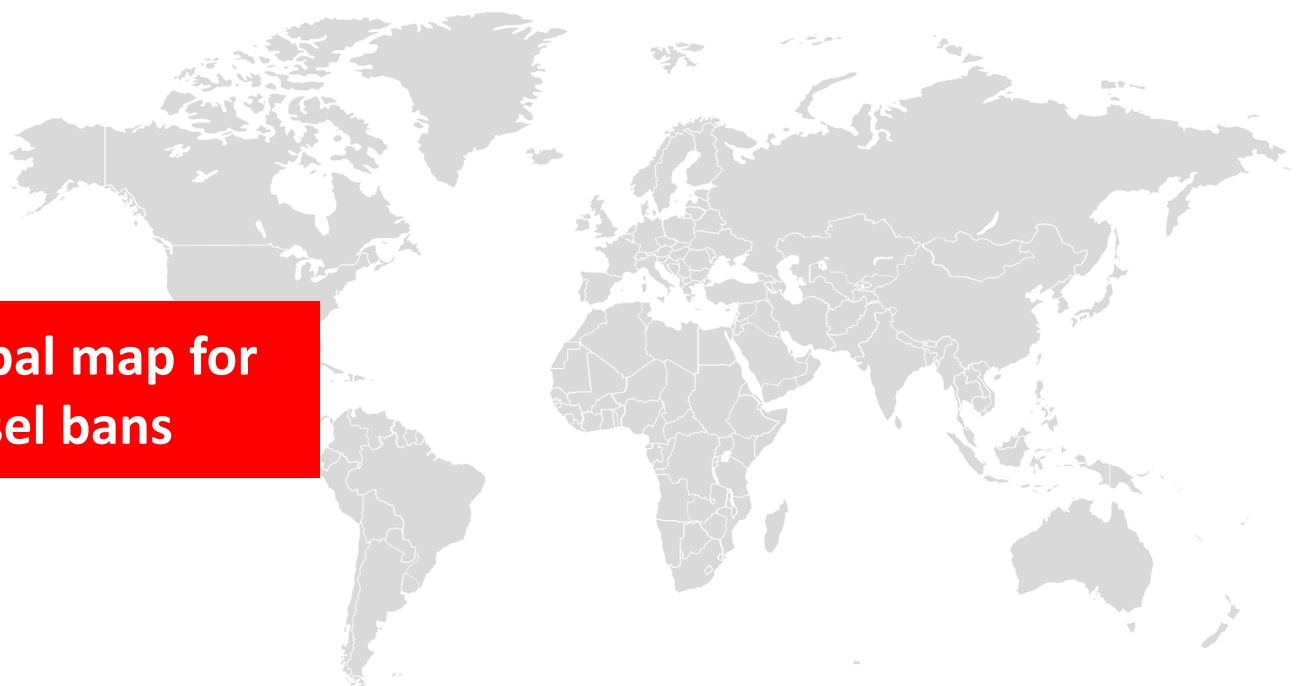
- Core diesel products are just 7% of Rheinmetall total sales
- Share of pure diesel-related products is further reduced in our plan 2019ff
- Our content per diesel engine will also grow in the future



INNOVATION AND PRODUCTS

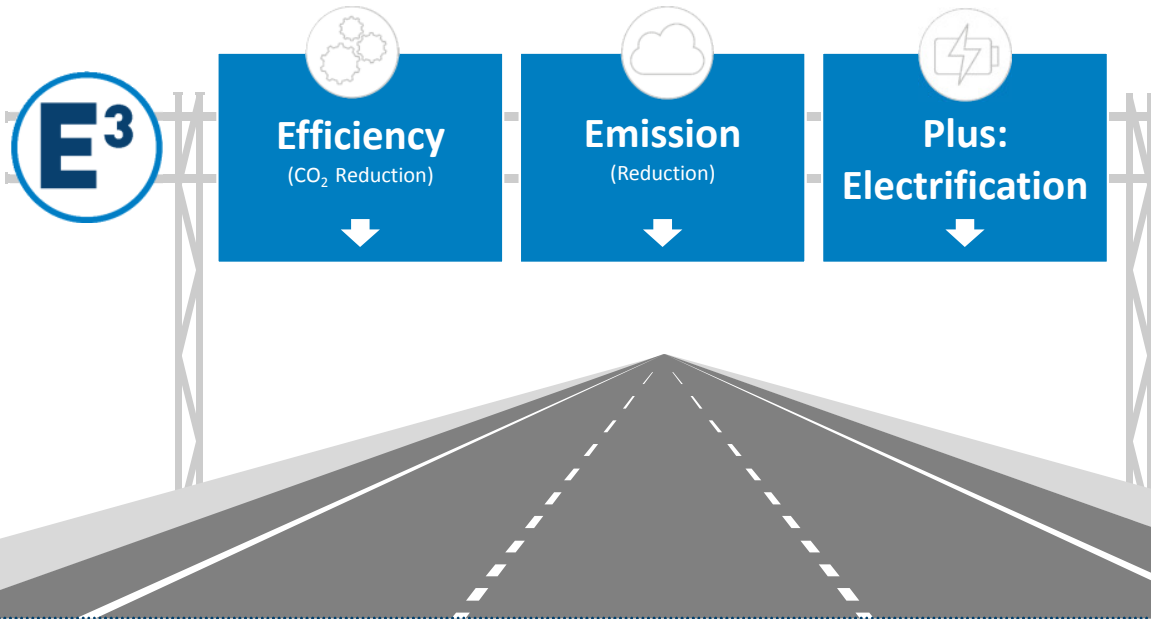
- Diesel engines are “clean” with the right technologies
- Our diesel products (EGR valves etc.) are necessary to reach this target (LV & Truck)
- New products, esp. for HD-applications, are in the pipeline

Global map for Diesel bans



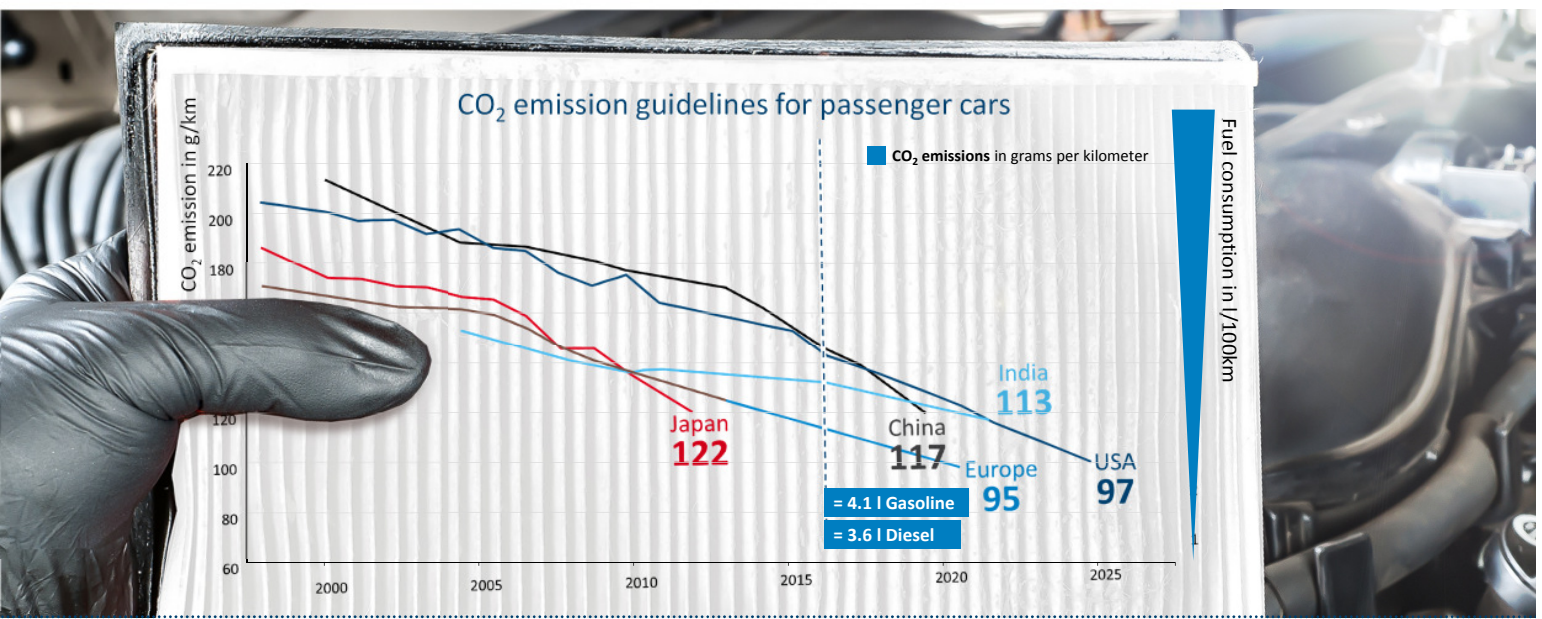
3. Legislation

The growth drivers of Rheinmetall Automotive



3.1 Legislation / Efficiency

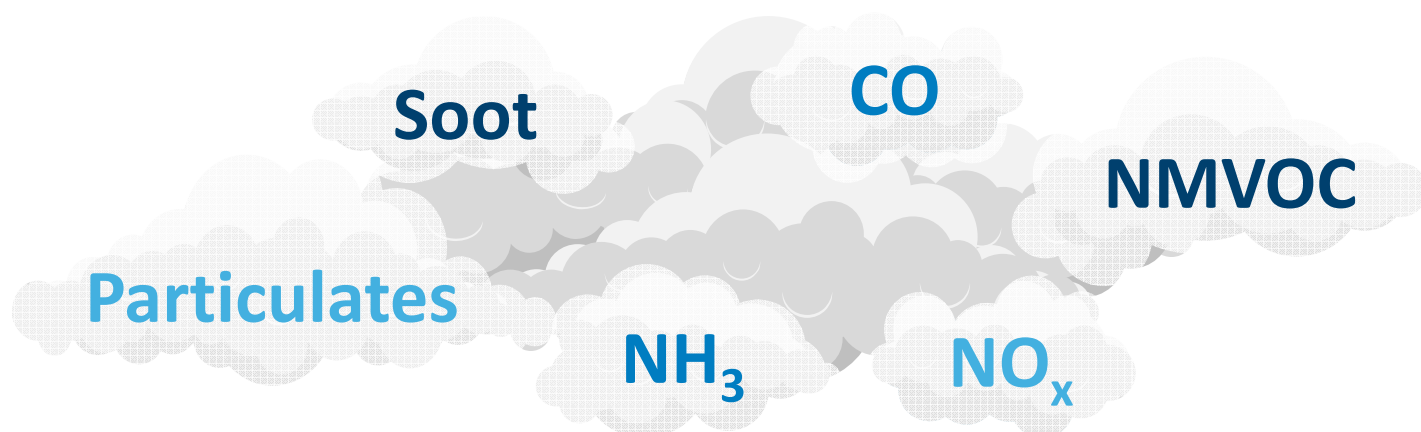
CO₂ Reduction = Reduction of consumption = Efficiency



3.1 Legislation / Efficiency Innovation Roadmap Rheinmetall Automotive



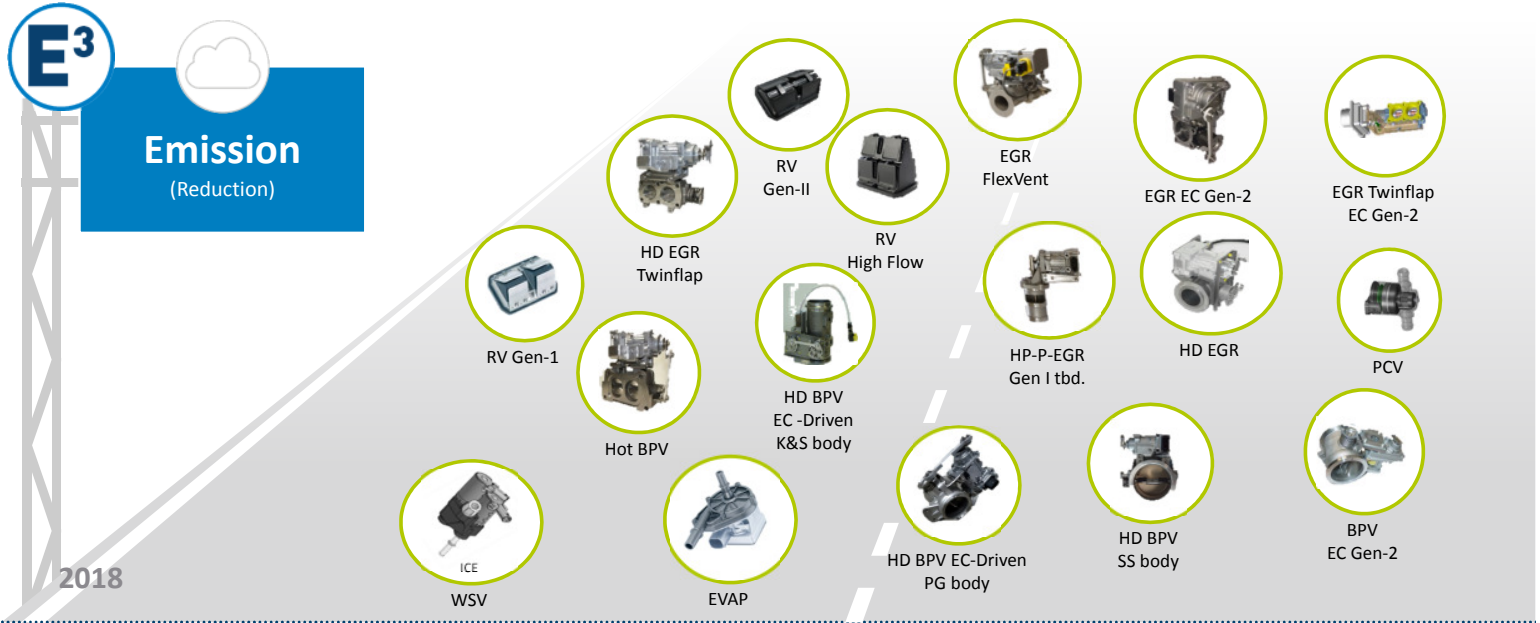
3.2 Legislation / Emission



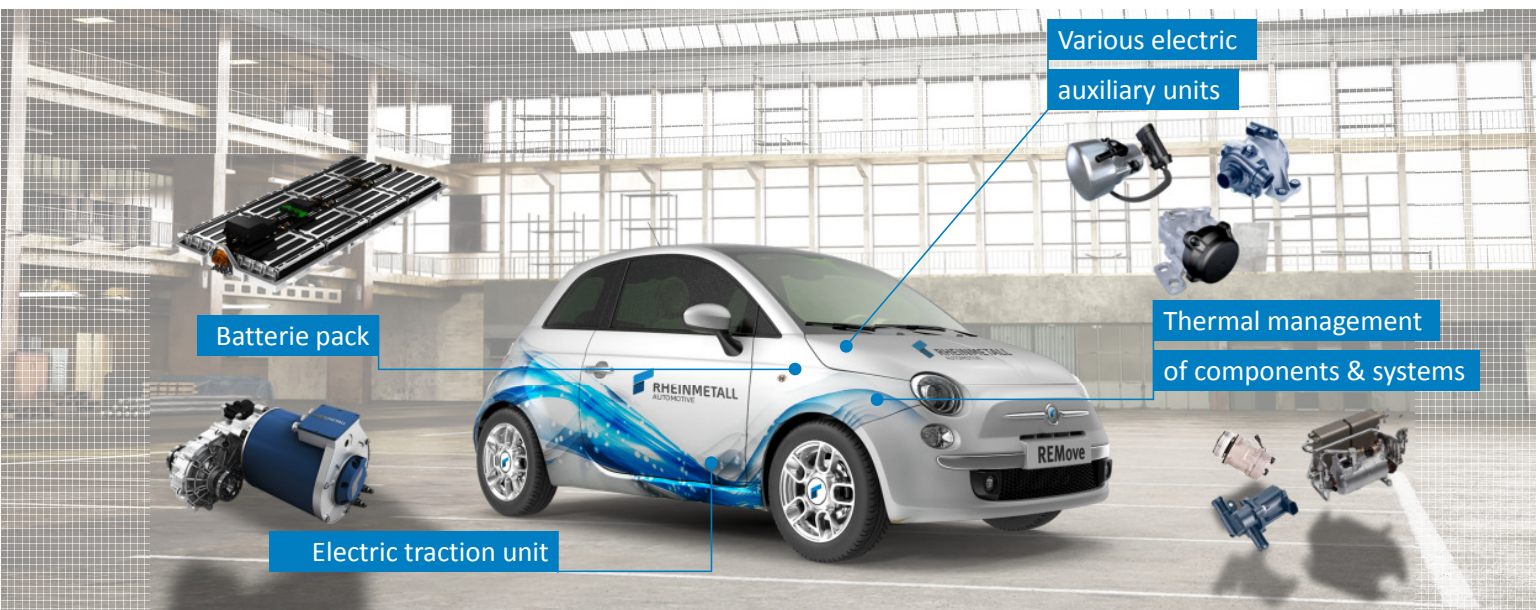
Global Trend #2: Emissions down

2021

3.2 Legislation / Emission Innovation Roadmap Rheinmetall Automotive

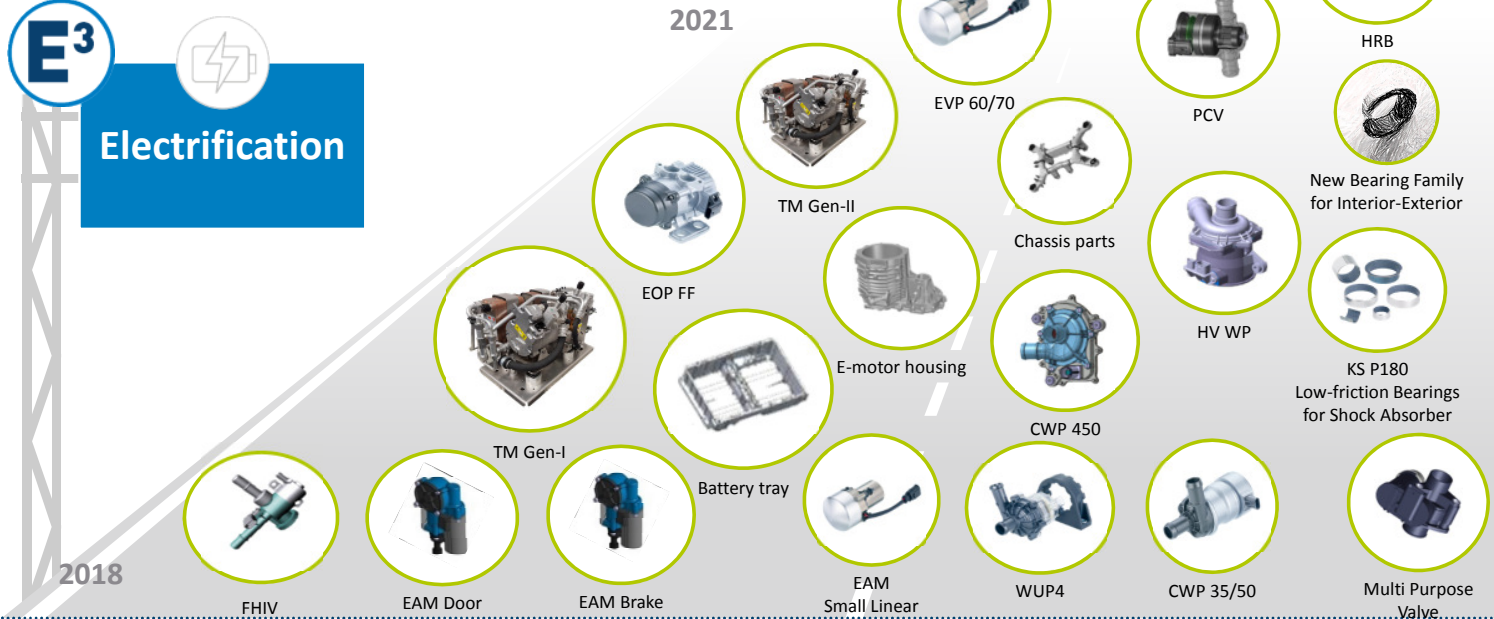


4. Electrification E-Mobility@Rheinmetall Automotive

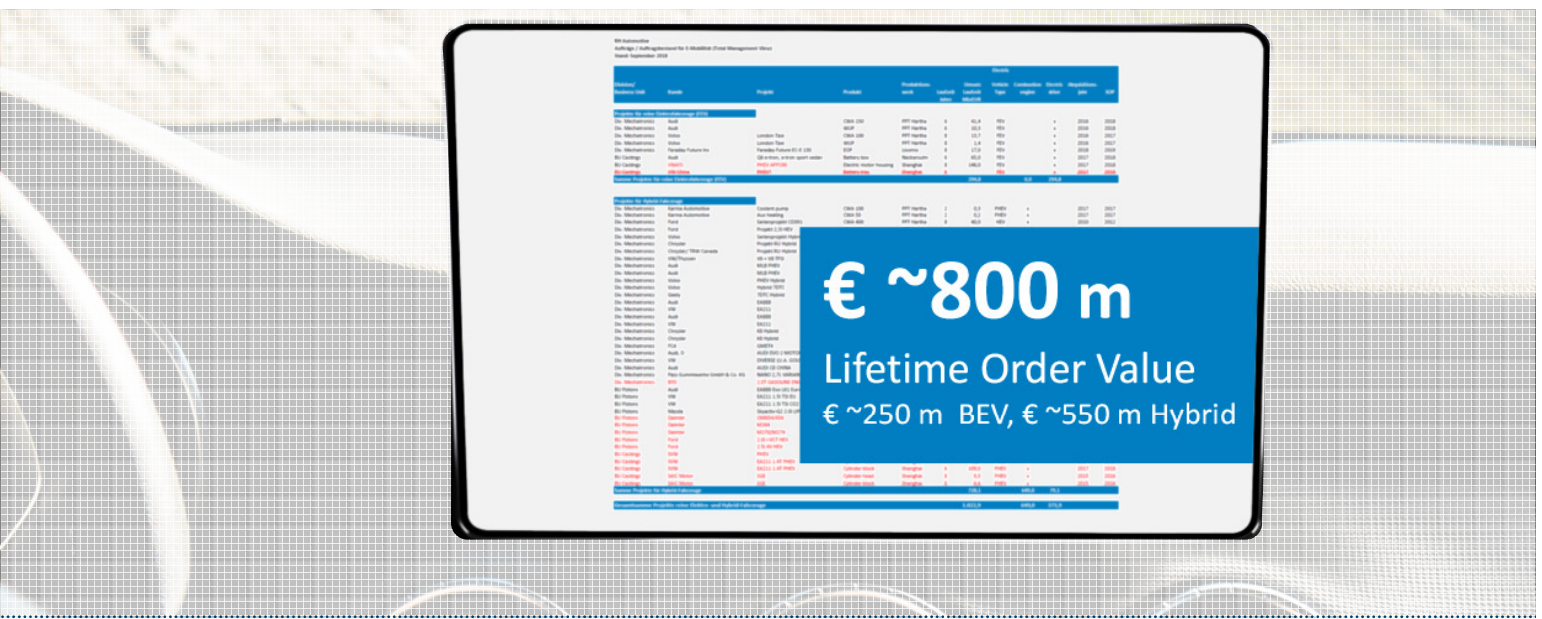


4. Electrification Innovation Roadmap Rheinmetall Automotive

E³
Electrification

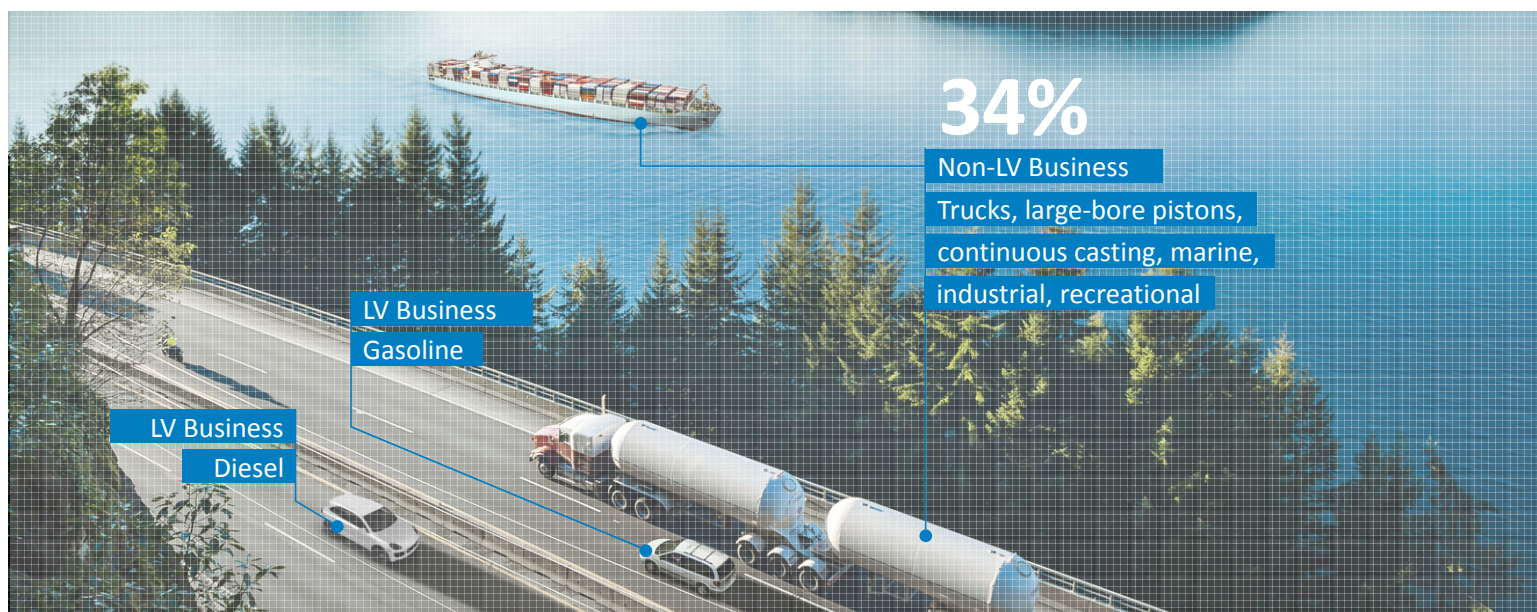


4. Electrification Share of BEV sales increased again in 2018



And now to something additional...

Sales by segment (2017) Non-LV Business



Focus on our Truck Business

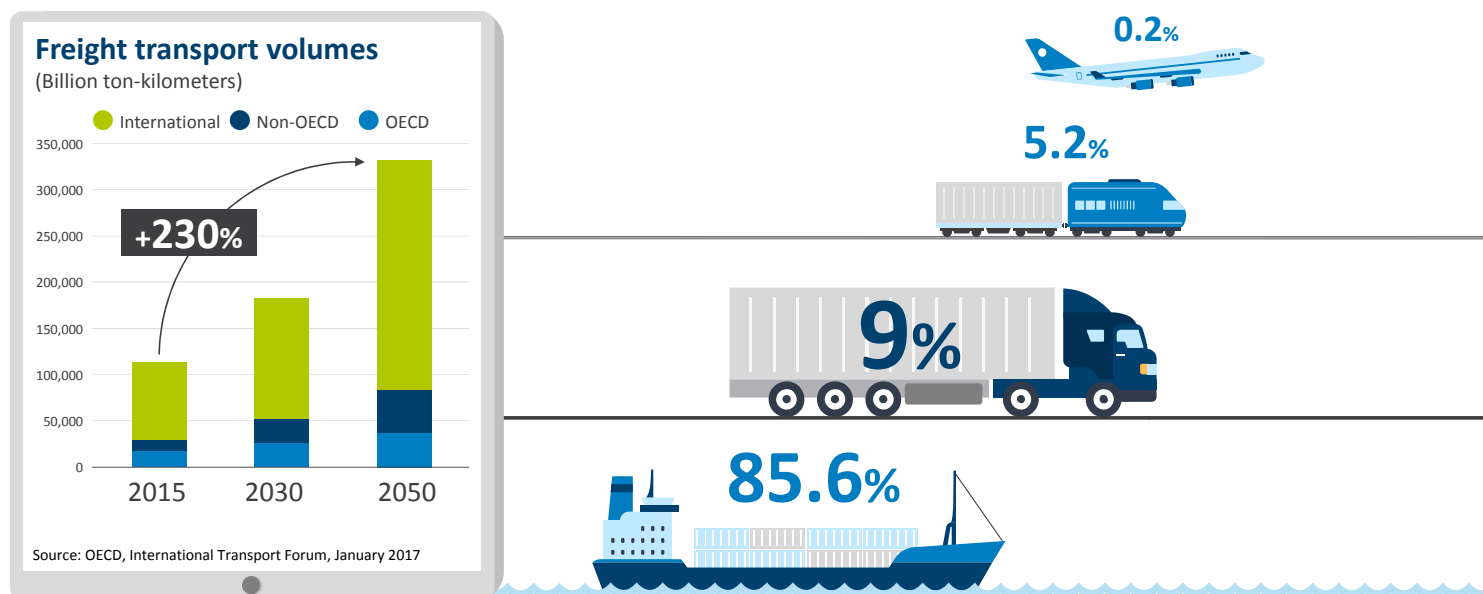


Truck Our current product portfolio



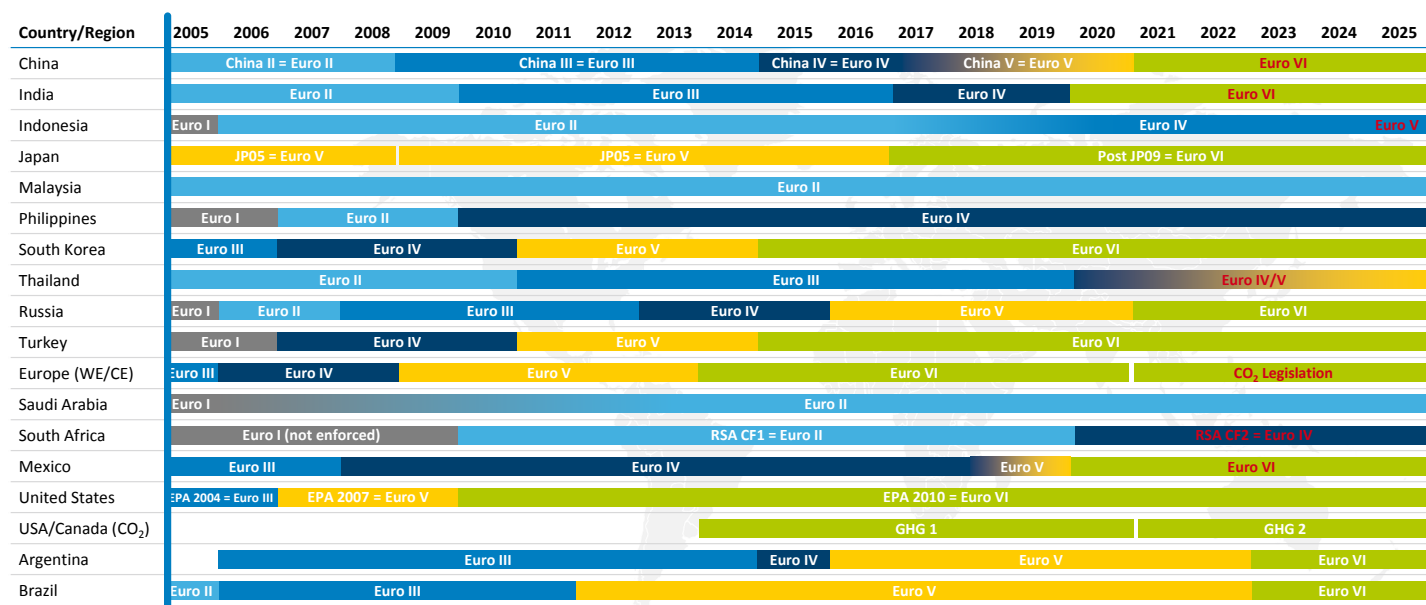
First driver for growth and performance

Global transport volume will continue to expand, tripling by 2050.



Second driver for growth and performance

Legislation for emissions





North America

has already introduced **EURO VI** emission limits and is introducing new CO₂ targets in 2020 (GHG2).



Europe

Already applies **EURO VI** and is heading for the next stage in 2019 plus additional CO₂ targets (planned)



China and India

are going to introduce **EURO VI** by 2020

Third driver for growth and performance Legislation for consumption (CO₂)

First came the Emissions Law, now additional new fuel consumption guidelines for trucks (CO₂)!

Dieselvebrauch per Gesetz senken
Brüssel will Dieselvebrauch bei Lkw senken

Von Markus Grabitz 03. Mai 2018 - 13:26 Uhr

Hinter den Kulissen tobt eine Lobby-schlacht um ein geplantes Gesetz der EU-Kommission. Die Senkung von Verbrauchswerten von minus 15 Prozent bis 2025 und mehr sind im Gespräch. Viele wollen auf die Prozentzahlen Einfluss nehmen.

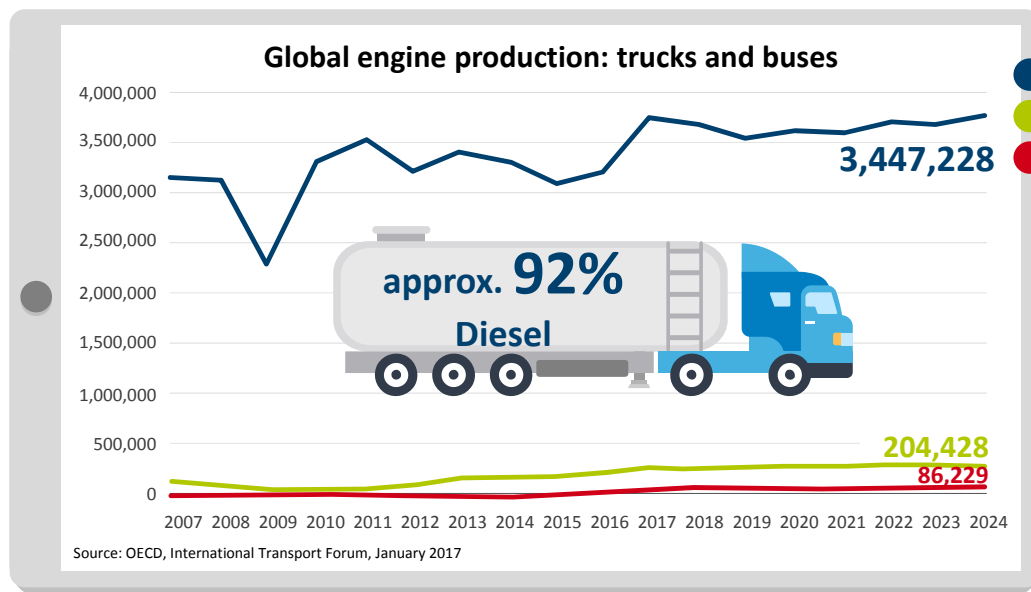
Brüssel - Die EU-Kommission will den Dieselvebrauch von Nutzfahrzeugen per Gesetz senken. Wie zu hören ist, will die EU-Kommission Mitte Mai vorschlagen, dass neu zugelassene Lastwagen über 3,5 Tonnen den CO₂-Ausstoß bis zum Jahr 2025 um zehn bis 15 Prozent senken müssen. Noch ist offen, ob die Kommission dem Transportsektor jetzt ein Ziel für die weiteren Einsparungen bis zum Jahr 2030 vorgibt oder ob sie damit bis 2022 wartet.

Mit der geplanten Regulierung des CO₂-Ausstoßes für Lastwagen betritt die EU nun Neuland.
 Foto: dpa-Zentralbild

Jahr	Reduzierung (%)	CO ₂ -Ausstoß (g/kWh)
2018	100%	~301
2025	90 - 85%	~251
2030	70%	~201

TCO

Total Cost of Ownership

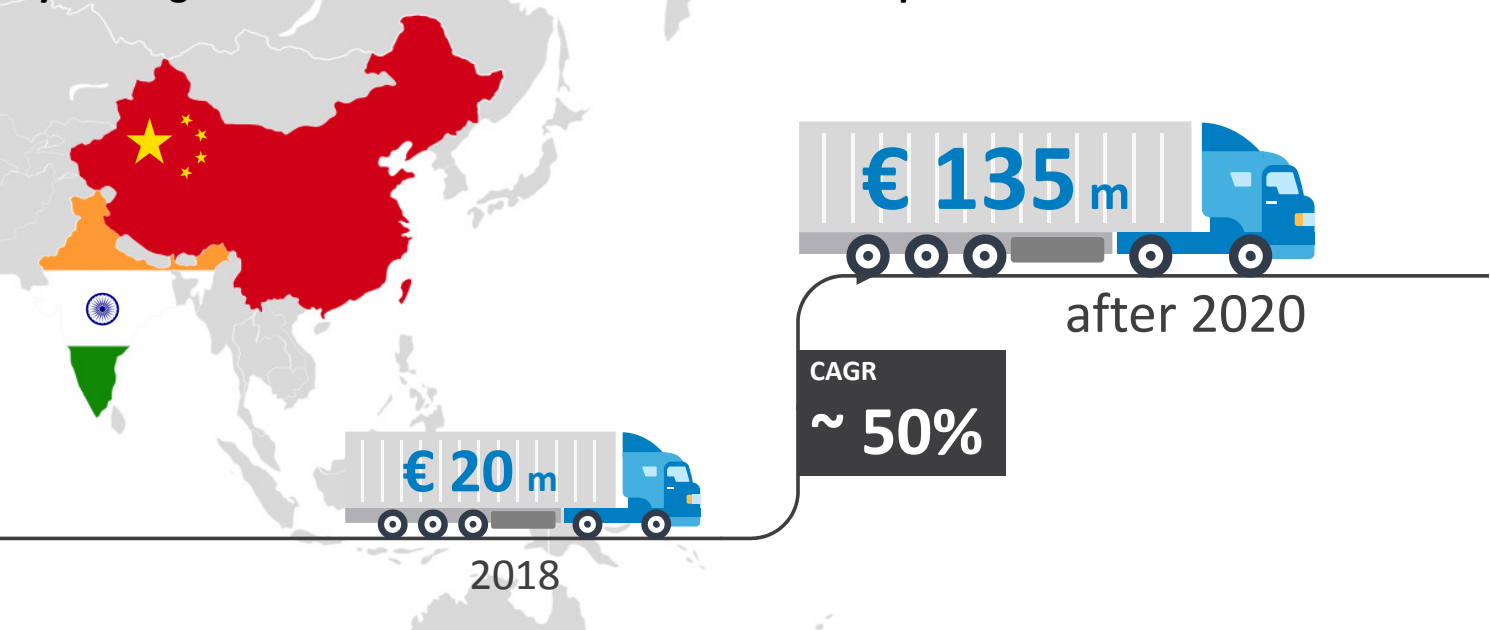


For the foreseeable future, the diesel engine will remain the dominant drive technology for commercial vehicles!

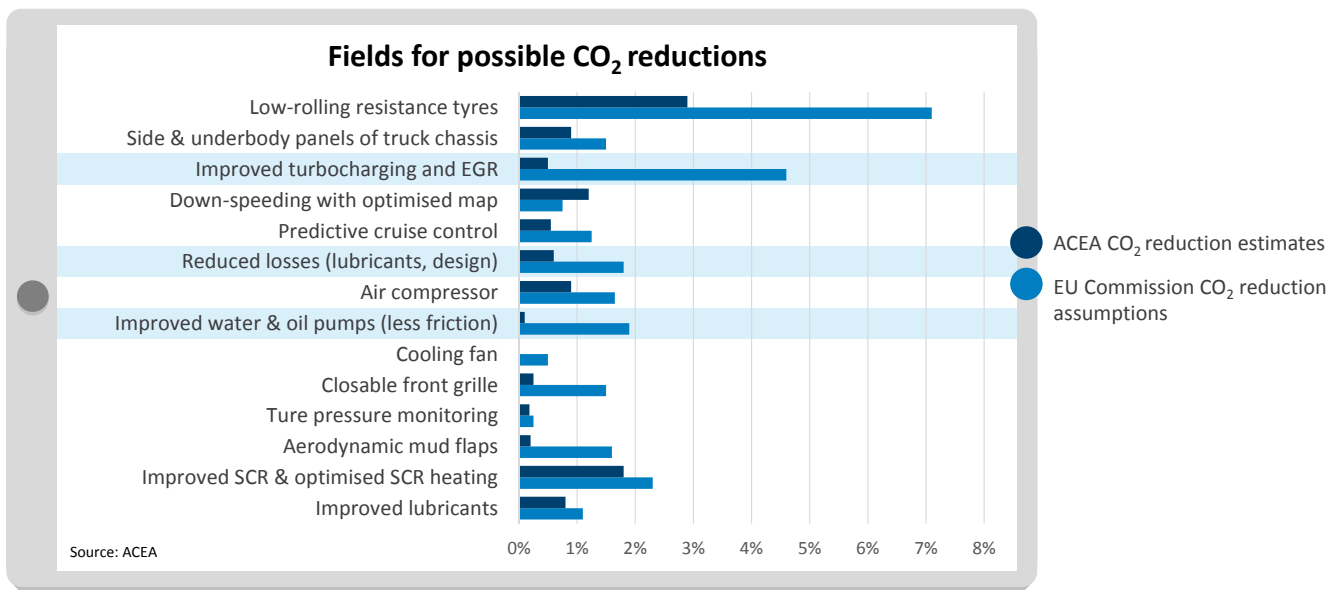
Legislation will boost content per truck around the globe.

Focus China & India

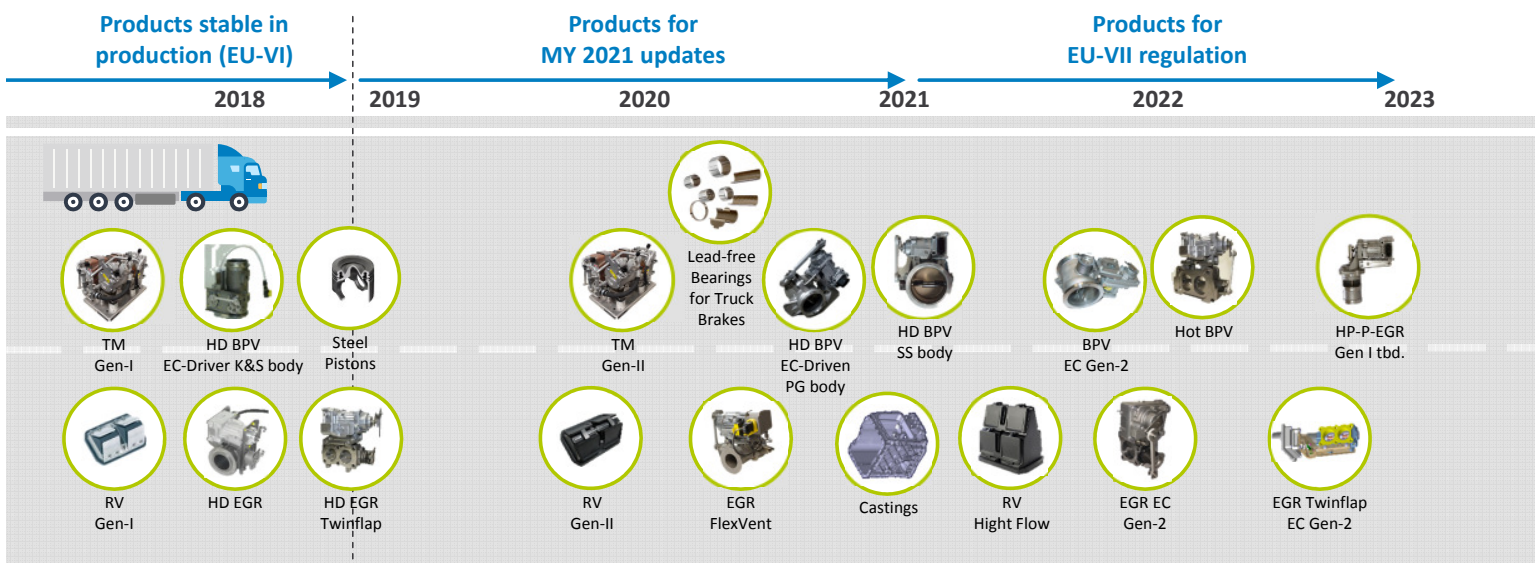
Dynamic growth in Asian markets for our truck components



Truck Potentials for CO₂ reduction



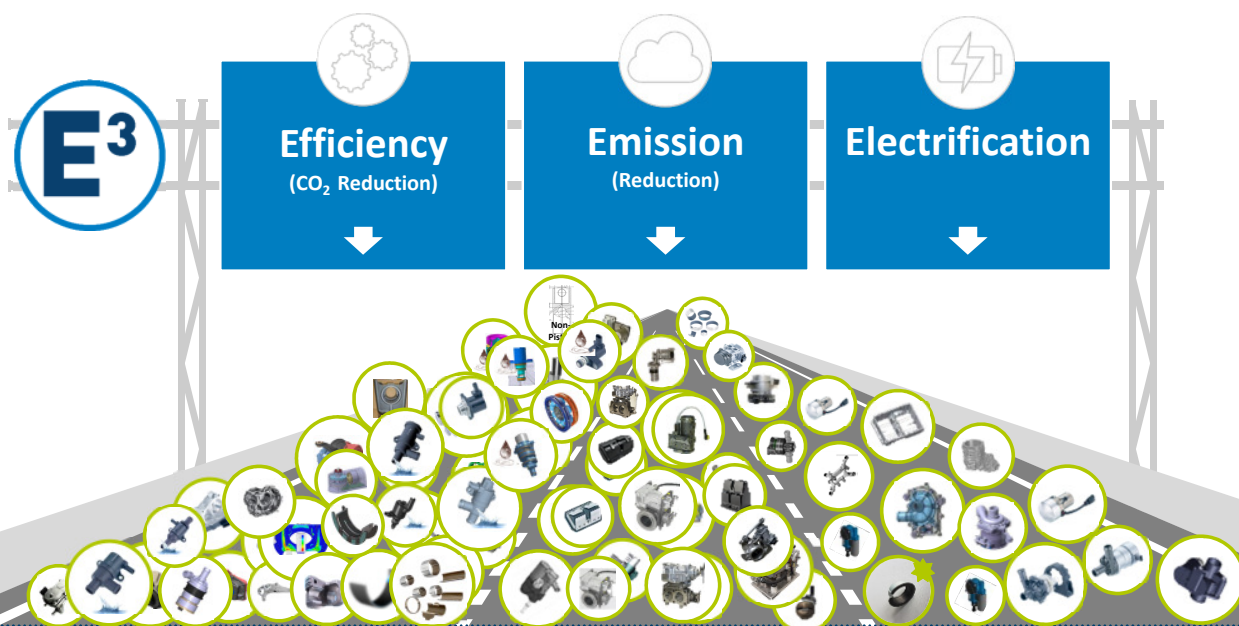
Innovation Roadmap Truck & Offroad



Innovation:

Our Business Driver

Rheinmetall Automotive Innovation Roadmap is fully packed



CMD 2018 Summary



MARKETS AND CUSTOMERS

Markets are becoming more uncertain, **BUT**

1. Our portfolio includes customers in high-growth regions of the world
2. We have new customers for industrial applications



PERFORMANCE AND GROWTH

Our global presence in LV plus our NonLV business gives us the chance to grow faster than the market for LVs

- Legislation is enforcing the use of our products and solutions
 - Content per car is increasing to meet high-tech requirements
 - Higher margin products due to innovative designs



INNOVATION AND PRODUCTS



Rheinmetall Automotive's Innovation Roadmap is full of products geared to current megatrends:

- Emission & CO₂ reduction and E-mobility
- Extended product portfolio for hybrids

E-mobility and hybrid are undergoing massive expansion; our current order volume is approx. € 800 million and continues to rise (+ € 300 million just in 2018).

MOBILITY. SECURITY. PASSION.

Appendix

Abkürzung	Deutsch	Englisch
ETC	Elektrische Drosselklappe	Electric Throttle Control
EOP	Elektrische Ölpumpe	Electric Oil Pump
E-CAM Phaser	Elektrischer Nockenwellenversteller	Electric Cam Phaser
EGR Flex Vent	Abgasrückführungsventil „Flex Vent“	Exhaust Gas Recirculation Valve „Flex Vent“
ShockTower	Stoßdämpferaufnahme	ShockTower
Chassis Parts	Fahrwerksteile – wie z.B. Hinterachsfahrschemel	Chassis Parts
E-Motor Housing	Elektromotorgehäuse	E-Motor Housing
Battery Tray	Batteriegehäuse	Battery Tray
VOP	Variable Ölpumpe (mechanisch)	Variable Oil Pump (mechanical driven)
EAM	Elektrisches Antriebsmodul (Aktuator)	Electric drive module (actuator)
RV	Membranventil	Reed Valve
EVP	Elektrische Vakuumpumpe	Electric vacuum pump
Gearbox Housing	Getriebegehäuse	Gearbox Housing
CSV	Kühlmittelumschaltventil	Coolant switching valve
EGR Module	Abgasrückführungsmodul	Exhaust gas recirculation module
HD EGR TWINFLAP	Hochdruck Abgasrückführungs-Doppelklappen-Ventil	High Pressure Exhaust gas recirculation Twin-flap valve
OSV	Öl-/Hydraulik Umschaltventil	Oil switching Valve
Exhaust Flap	Abgasklappe	Exhaust gas Flap
VVT	Variabler Ventiltrieb	Variable Valve Train
EVAP	Elektrische Kraftstoffdampf-Absaugpumpe	Electric Vapor Pump
CWP 35	Elektrische Kühlmittelpumpe/Wasserpumpe mit 35W (Nebenkreisläufe)	Electric coolant pump / electric water pump with 35W (auxiliary circuits)
WUP	Wasser Umwälz Pumpe	Water circulation pump
CWA 950	Elektrische Kühlmittelpumpe / Wasserpumpe mit 950 W (Hauptkühlkreisläufe)	Electric coolant pump / electric water pump with 950W (main cooling circuits)

Appendix

Abkürzung	Deutsch	Englisch
BPV	Rückschlagventil / Abgasklappe	Back pressure Valve
Exhaust flap	Abgasklappe	Back pressure valve
TM	Thermomodul	Thermal module
Swirl flap	Drallklappe	Swirl flap
Delta pressure valve	Differenzdruck ventil	Delta pressure valve
Inline csv	Reihen Ventil – Kühlmittel Umschaltventil	Inline coolant switching valve
HD VOP	Heavy Duty Variable Ölpumpe mechanisch	Heavy Duty variable Oil Pump (mechanical)
OSV Piston Cooling	Öl Umschaltventil für abschaltbare Kolbenkühlung	Oil switching valve for piston cooling
ORV	Öl Regelventil	Oil regulating valve
CRVi	Intelligentes Kühlmittelregelventil	Intelligent coolant regulating valve
SUV	Schubumluftventil	Turbo Recirculating valve / electrical bypass valve
VWP	Variable Wasserpumpe / Kühlmittelpumpe (mechanisch)	Variable waterpump/coolant pump (mechanical driven)
KS R55Q	Kolbenschmidt Hauptlager 3-Schichtlager (Stahl Alu Polymer) R=Radiallager, 55=Werkstoffkennung, Q = Polymer Schicht	Kolbenschmidt Main bearing (3 layer, R=radialbearing, 55=layer material, Q= polymer layer)
LiteKS 4	Aluminium Ottomotor Kolben der 4. Generation LiteKS	Aluminum Gasoline piston of the 4th generation LiteKS
Roller tappet	Rollenstößel	Roller tappet
PRV	Druckregelventil (pneumatisch)	Pressure regulating valve (air)
FTIV	Kraftstofftank Isolierventil	Fuel Tank Isolation valve
HRB	Wasserstoffrezirkulationsgebläse	Hydrogen recirculation blower

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