



MACROTENDENCIAS DA MOBILIDADE

SEMINÁRIO FUTURO DA MATRIZ VEICULAR NO BRASIL – FEV/19



BOSCH

Bosch Group

A global network

 **402 166**

Bosch associates make
these solutions possible



60

Countries – 44 regional
subsidiaries



78.1

billion euros
in sales



Including sales and service
partners, Bosch's global
manufacturing and sales
network covers nearly
every country in the world.



The Bosch Group

Four business sectors



Mobility Solutions

- ▶ One of the world's largest suppliers of mobility solutions



Industrial Technology

- ▶ Leading in drive and control technology, packaging and process technology



Energy and Building Technology

- ▶ One of the leading manufacturers of security and communication technology
- ▶ Leading manufacturer of energy-efficient heating products and hot-water solutions



Consumer Goods

- ▶ Leading supplier of power tools and accessories
- ▶ Leading supplier of household appliances

Bosch Mobility Solutions is closely connected with all divisions.

Cooperation across the Bosch Group enables a valuable exchange of knowledge and synergies.

Bosch Group in a nutshell

Facts & Figures

Founded in **1886**
More than **130** years of

Expertise & Innovation



Mobility Solutions
grew 3 times faster than global
automotive production

7.8% more
sales

61% share
of total sales Bosch



Worldwide **125**
Engineering locations

62,500
R&D Associates



Sales in total

€78bn

€5.3bn

Historical high EBIT
from operations



Total headcount

402,166

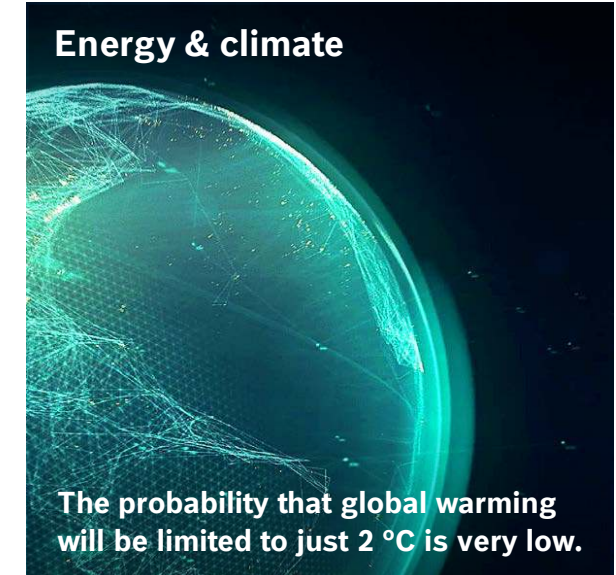
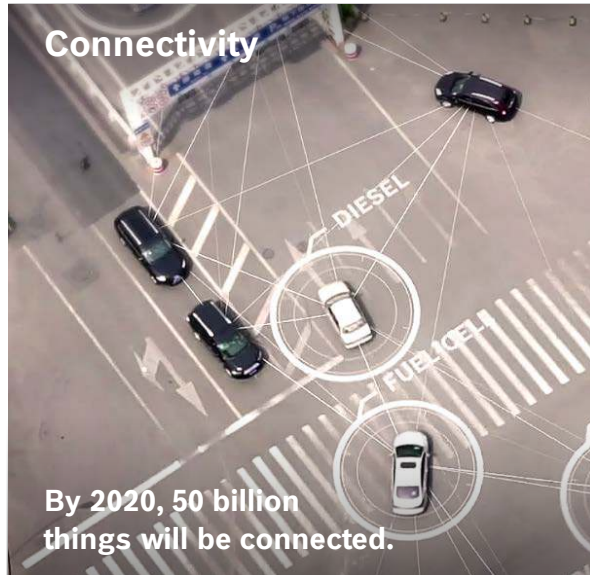
280 manufacturing
sites



440 Subsidiaries &
regional companies

Actively shaping global megatrends

With innovations for people, society, and the environment



Urban mobility Automated mobility Automated parking Rental vehicles

Safety on the roads Efficient powertrains Connected services

Electromobility **Infotainment in the car** Convenient mobility

Charging infrastructure **Driver assistance systems** HMI systems

Hybrid powertrain systems Reduction of emissions

Alternative fuels Internet of things **Connected mobility**

Bosch Mobility Solutions

Integrated system solutions for maximum benefit

Connected mobility



Automated mobility



Powertrain systems and electrified mobility



**fun and
fascinating**

**safe and
comfortable**

**efficient and
economical**

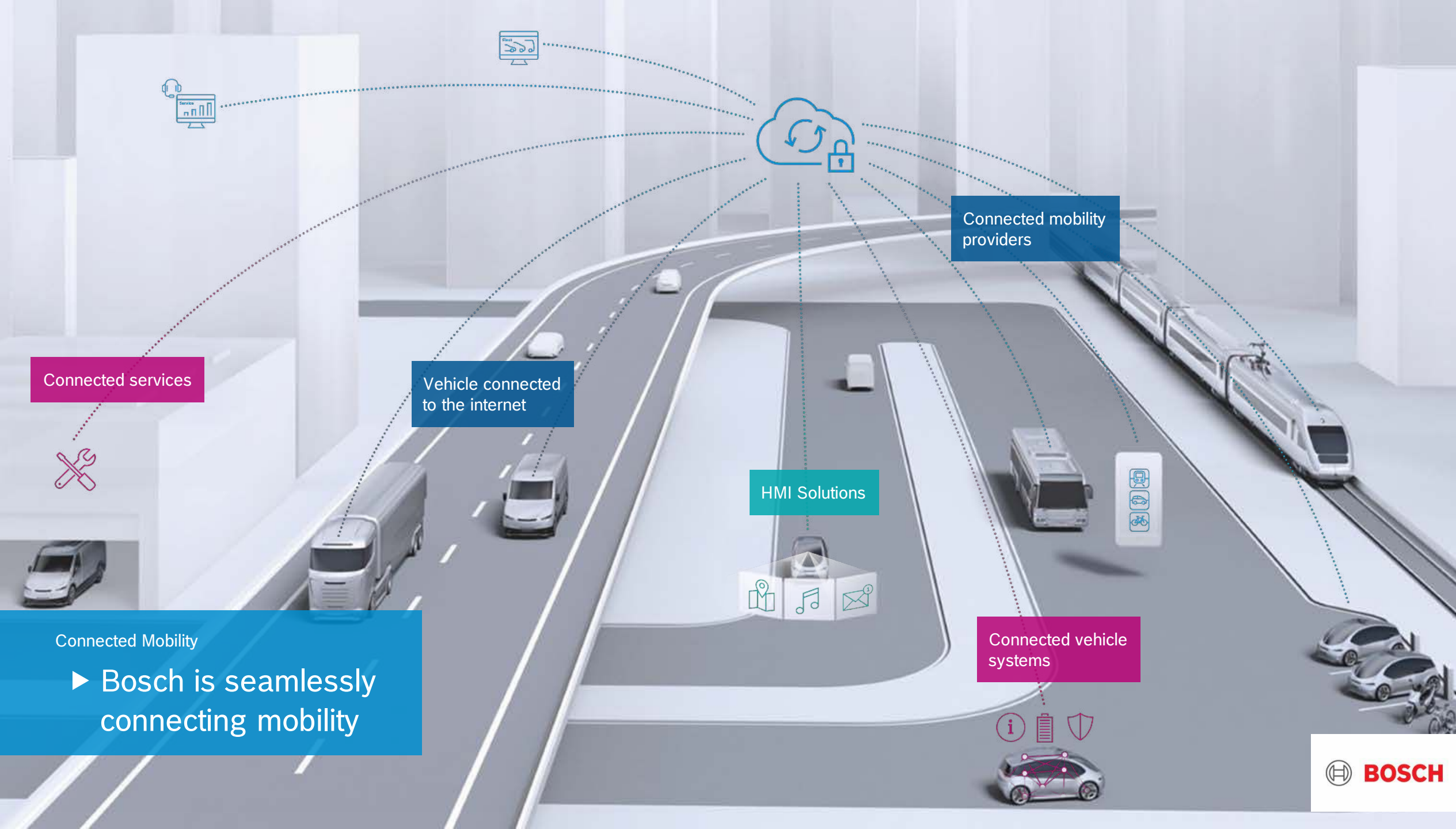


Connected Mobility

► New Offerings, Business Models
and Lifestyles will emerge

REEL
CHARGE
REAL

→ SERVICE ENTRY



Connected services

Vehicle connected
to the internet

HMI Solutions

Connected mobility
providers

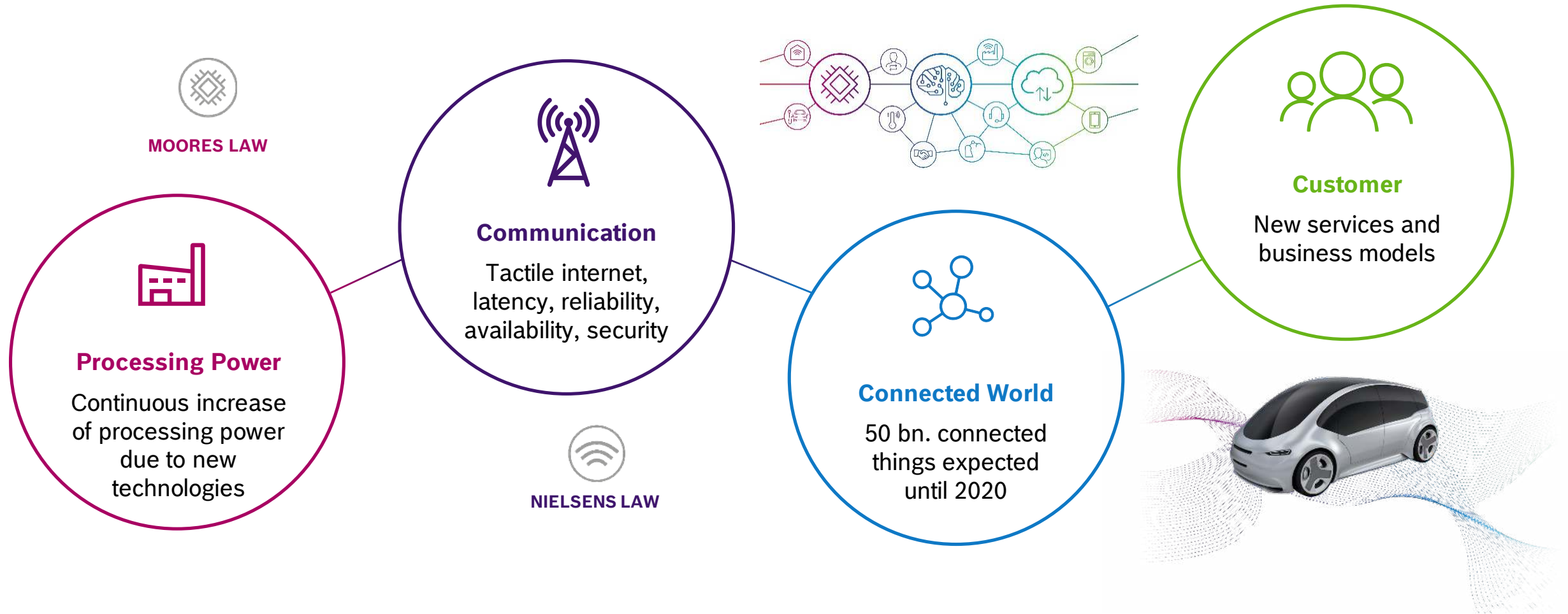
Connected vehicle
systems

Connected Mobility

► Bosch is seamlessly
connecting mobility

Connected World

Increasing use of technology & Internet of Things (IoT)



Connected Mobility

The future of mobility



Connected Mobility Solutions

Benefits

Enjoy smart mobility

Personalized, seamless and exciting mobility experience

Save lives

Offer the safest mobility – towards a zero death vision

Win time for family & leisure

Allow your users to focus on what is really important in their lives

Manage vehicles efficiently

Optimize the quality of your mobility services: reliable and cost-efficient



Increase user loyalty

Establish a personal relationship with every user

Increase revenue

Exploit new value offerings and increase your user touchpoints

Monetize data

Monetize your existing vehicles data with data-driven services

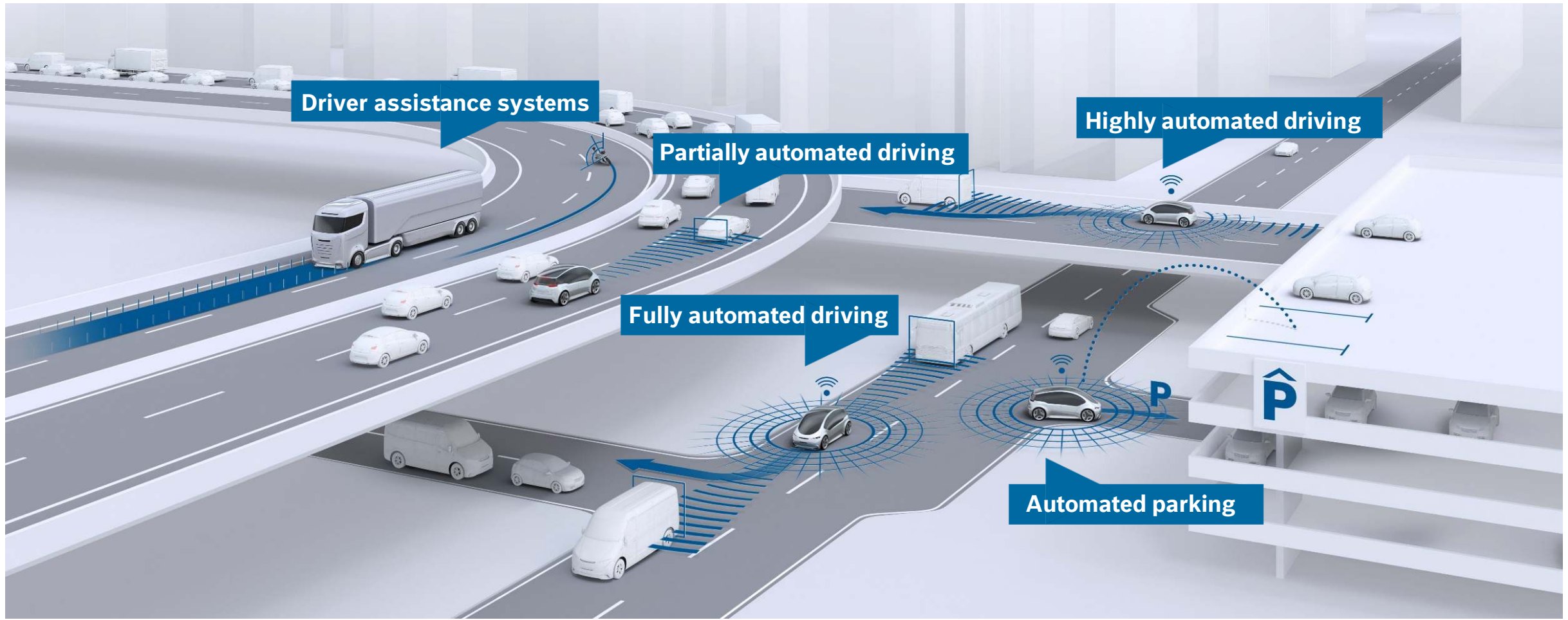
Cost reduction

Reduce development and operation costs for your vehicles and services

AUTOMATED MOBILITY

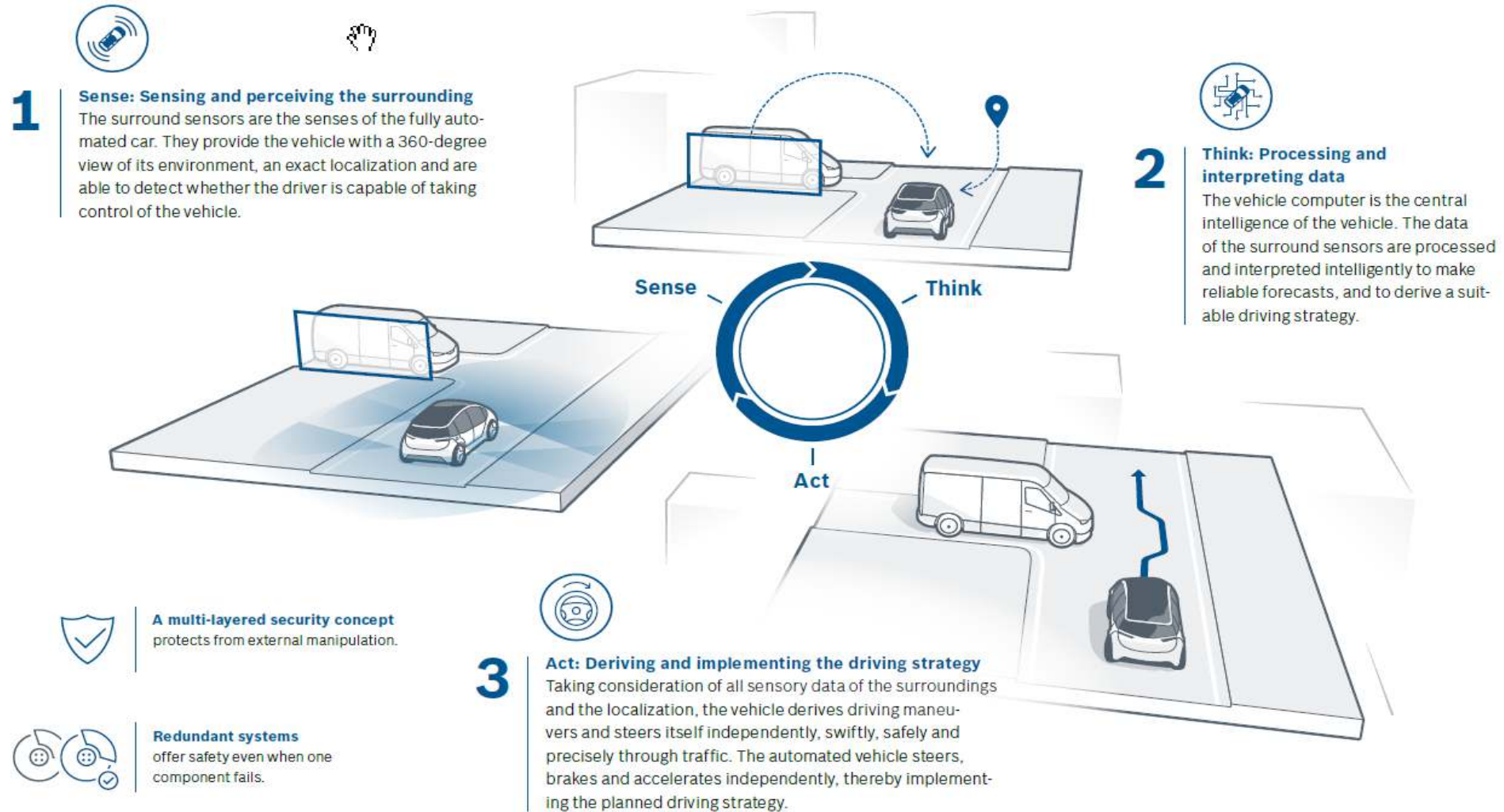
Automated mobility

Bosch is teaching the vehicle how to drive



Automated mobility

Sense, Think, Act: Paving the way for automated driving



Multi-camera system

All-around vision makes parking and maneuvering easier



Fascinating real-time view of one's own vehicle



safe
maneuvering

through better orientation and visibility
of the vehicle's entire surroundings

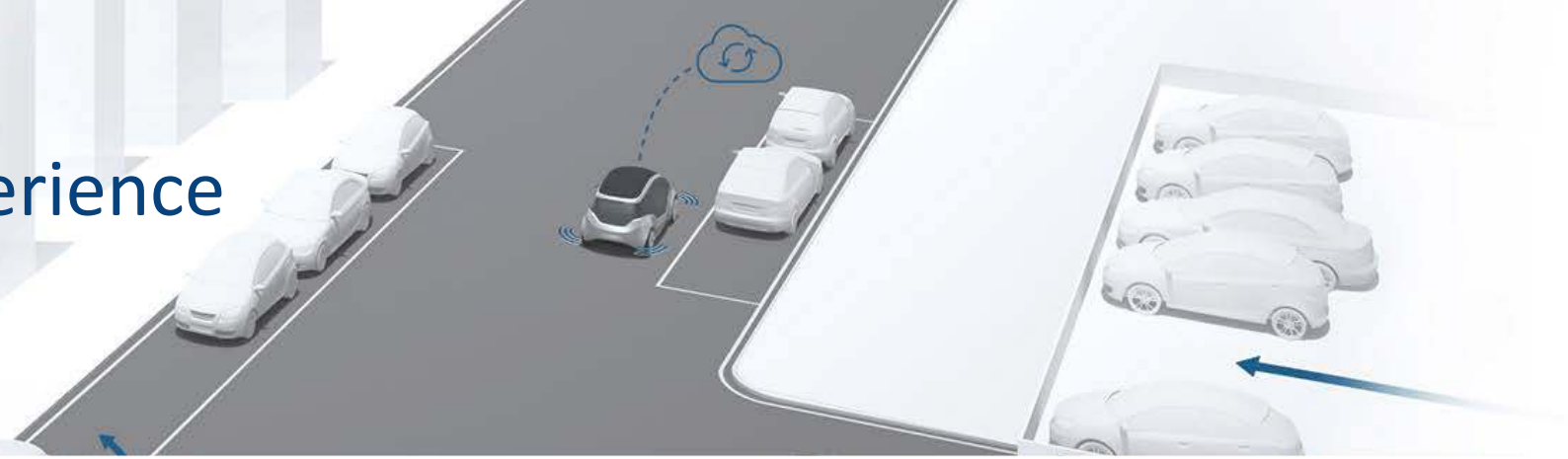
convenient
parking

switch back and forth among different perspectives to
line up precisely with lines, curbs, and walls

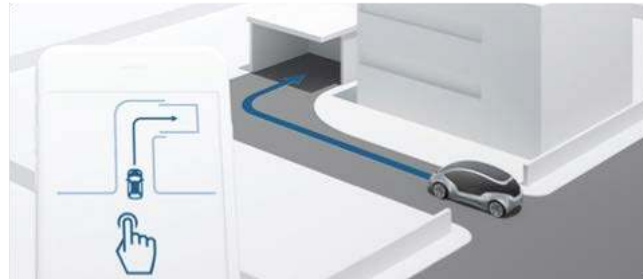
- ▶ Four near-range cameras capture the vehicle's entire surroundings
- ▶ An ECU combines the camera images with distance information from ultrasonic sensors
- ▶ Different perspectives and modes are available for selection
- ▶ Linking live images to an animated 3D model of the vehicle creates a highly realistic representation
- ▶ Even small obstacles are easy to see

A new parking experience

with automated and connected parking solutions



For the future of parking, Bosch combines connected and automated technology to form a complete, convenient service that lets vehicles park in parking garages fully automatically.



+60 hours

of free time: reduced parking search times can save each driver over 60 hours per year

- ▶ Parking made easy: support when looking for a parking space and when entering and exiting it
- ▶ Bosch parking solutions improve convenience, safety, and efficiency when parking
- ▶ Parking space information from the cloud means that drivers always know where there's an empty space
- ▶ Automated park assists make parking space entry/exit easier

-CO₂

thanks to reduced parking search traffic with Bosch parking solutions

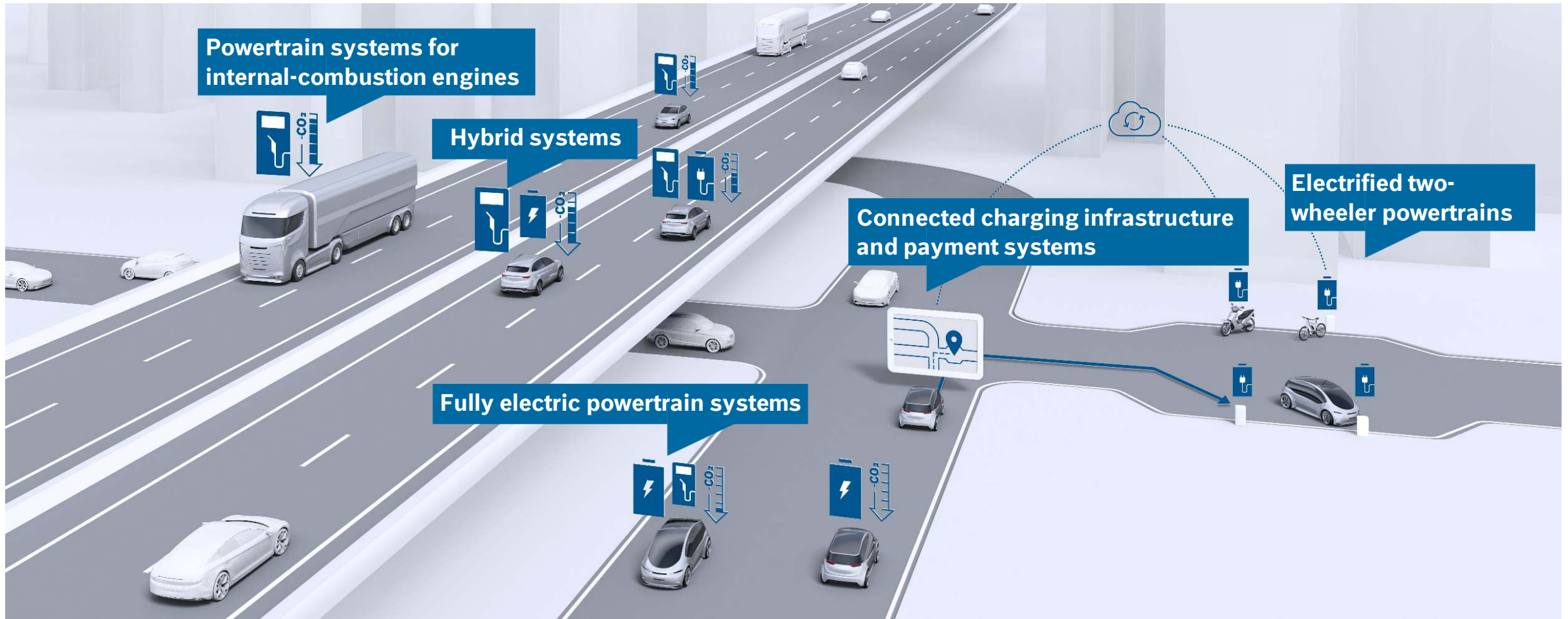


Electrification

► New Technology for eMobility

Powertrain systems and electrified mobility

Bosch is energizing the powertrain



Electrification

Legislation and urban growth are changing mobility



emission reduction

electromobility

smart last mile solutions

charging-infrastructure

automated driving

hybrid-drives

micro mobility

space scarcity

connected mobility

sharing services

fleet targets

traffic volume

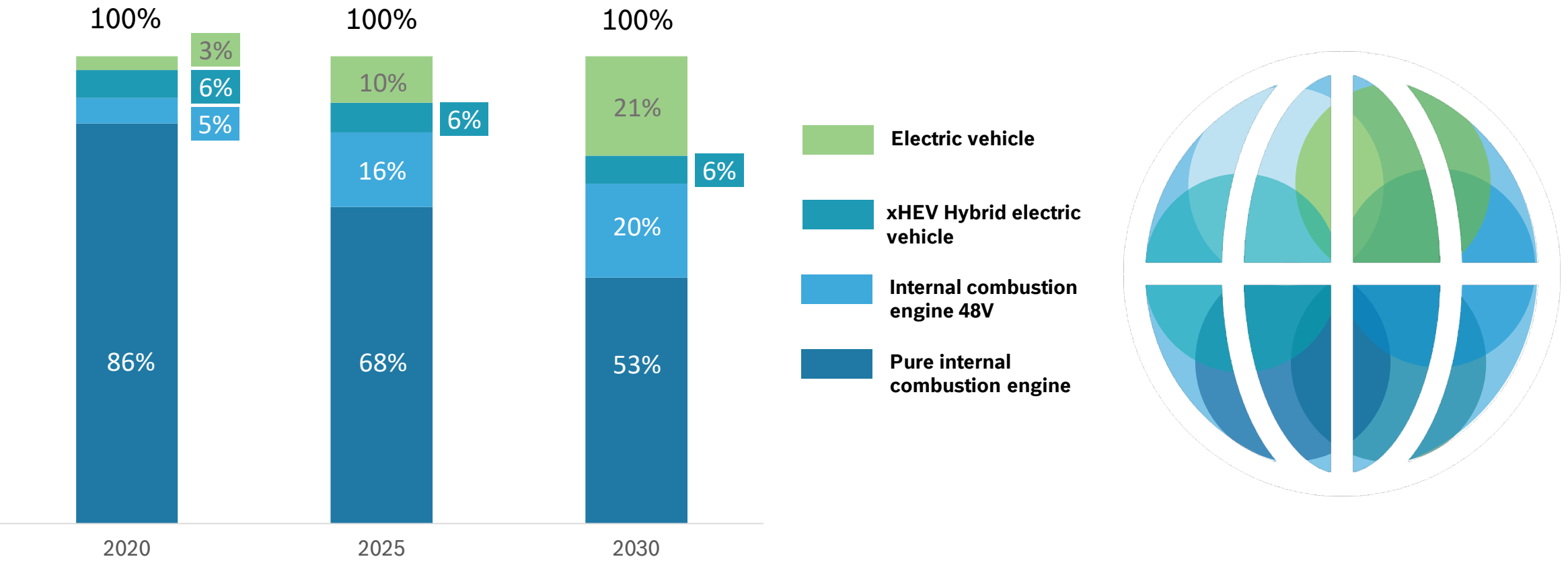
city bans

light e-mobility

Electrification

//By 2030 every 5th new vehicle is a pure electric vehicle

New vehicle sales passenger cars incl. light commercial vehicles < 6t [m vehicles] worldwide



Bosch Electrified Powertrain

Europe: Trends and impact



Trends

City restrictions ongoing

Clean air initiatives ongoing

End customers preferences changing

Electric Car Sharing in cities growing



Impact on market

Push on electrification

Last mile electrification

Diversification @ electric vehicles between city and long distance electric vehicles

Cities set up e-mobility environment step by step



Impact on Bosch

Portfolio extension

Light commercial vehicles e-mobility activities intensified

Broad range of e-mobility systems (48V, strong hybrids, hybrids, plug-in hybrids, electric vehicles)

Bosch Electrified Powertrain

China: Trends and impact



Trends

Subsidy and incentive policies, CAFC* and NEV** credit management

Infrastructure development pushed

Chinese OEM ambitions to become electrification leader

Reduction of market restrictions



Impact on market

Push on electrification in all vehicle segments

Competitive and **volatile market**

Focus on **full powertrain**

Focus on **time to market**



Impact on Bosch

Portfolio extension

Focus on **time to market**

More integrated and **system solutions**

Flexible manufacturing concepts

*CAFC: Corporate average fuel consumption

**NEV: new energy vehicle

Bosch Electrified Powertrain

NAFTA: Trends and impact





| Trends | → Impact on market | → Impact on Bosch |
|---|---|--|
| Gov Policy / Regulations – CARB* – ZEV** mandate | Mix and volume of drivetrain topologies | Alternative technologies (fuel cell, 48V, high voltage components) |
| Growing competition due to investment growth from China | New alliances, stronger competition | Portfolio extension |
| Customer acceptance and knowledge of electric vehicle/ hybrid electric vehicle | Push on electrification in all vehicle segments | |

* CARB = California Air Resource Board
** ZEV = Zero energy vehicle

26 Powertrain Solutions | PS/CA-LA3-Uc | 2019-02-20
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Bosch Powertrain Electrification – future mobility

Types of electrification

| | Mild Hybrid | Strong Hybrid | Plug-In Hybrid | EV w/REX | Electric Vehicle |
|---|---------------------------------------|--------------------------------|--|---|---|
| Electric Power* | 5 – 20 kW | 30 – 100 kW | 40 – 140 kW | 60 – 160 kW | 60 – >300 kW <small>(with 2 machines up to 600 kW)</small> |
|  | No possibility of pure electric drive | Limited electric driving range | Entry into electric driving without restrictions | Enhanced electric driving with “Range Extender” (REX) | Efficient and resource-saving with high potential for CO ₂ -reduction |
| Potential for CO ₂ reduction increasing | | | | |  |

Types of electrification differ concerning cost/CO₂-benefit and will penetrate regions differently.

* mainstream assumption, deviations possible

THANK YOU



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