



NOVEMBER 28TH, 2018/ BERGAMO / FRANK MÜHLON

Smarter Mobility

EV charging infrastructure

ABB

Electrification of road transportation

Today

Mid-class vehicles with longer ranges hitting the markets



Electrification of public transportation



Electrification of road transportation

The near future

Pushing the limits – 350kW charging capability

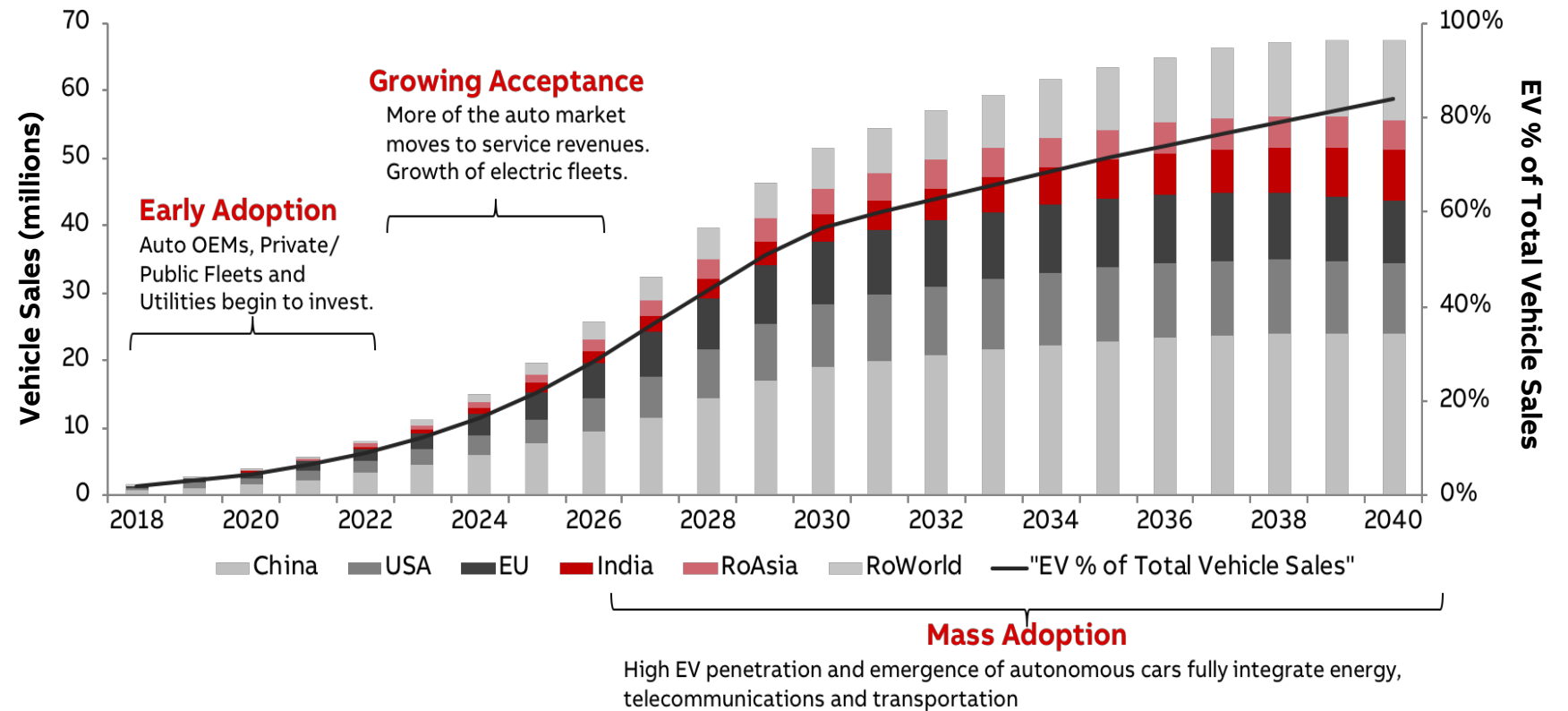
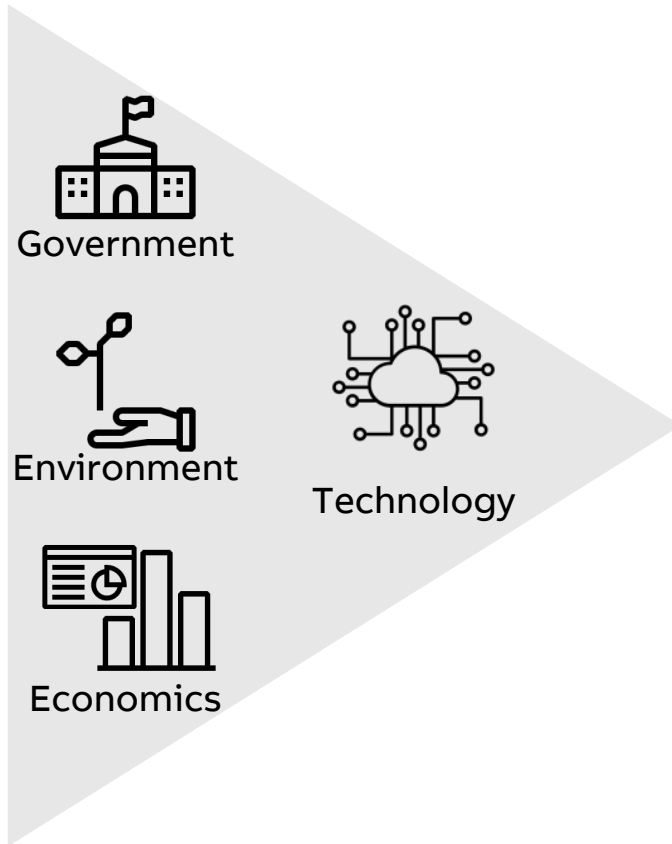


Enabling clean „Off-Road“ applications



EVs will create huge disruption

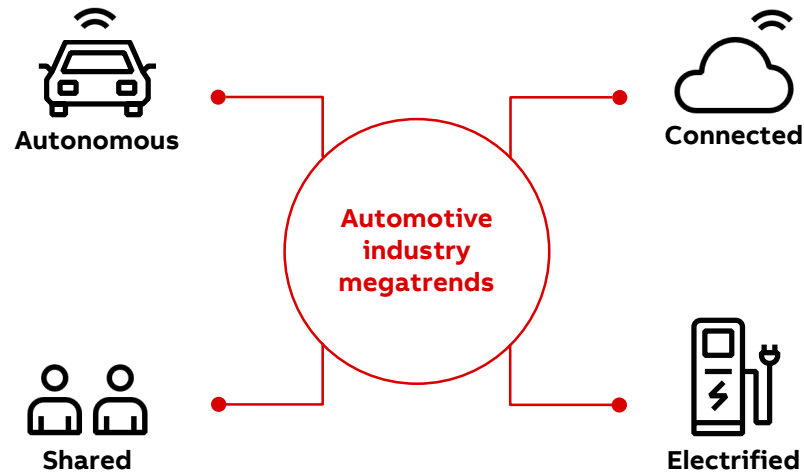
EV vehicle sales will overtake combustion and will integrate energy, and telecommunications



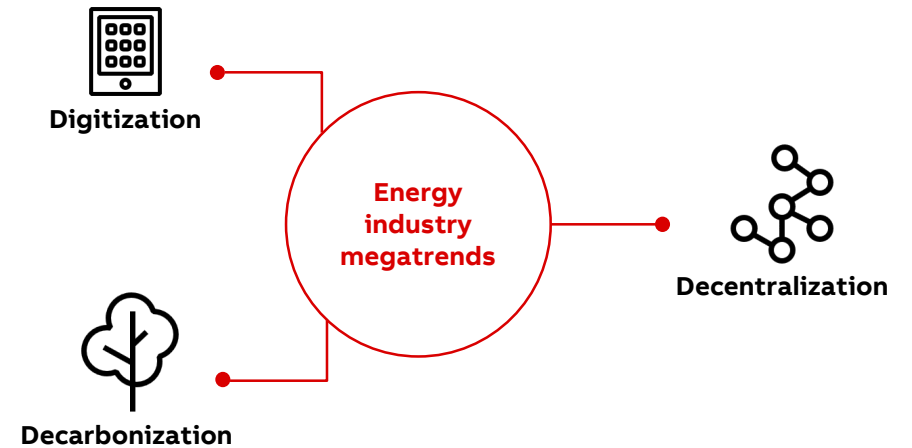
Disruptive trends are currently re-shaping the mobility and the energy sector

Overlapping trends

MOBILITY system: A-C-E-S



ENERGY system: 3D



Fundamental drivers for mobility and energy: technology developments, societal and environmental trends, and customer behavior.

Challenges for the industry

Challenges

Acceptance level of EV's for Drivers / Fleets

- Range anxiety
- Charging times
- Charging convenience & accessibility

For Operators

- Up-Times
- Serviceability
- Utility / Grid-codes / permits

For OEM

- Disruptive shift
- Technical (standards; EMC; insulation;....)
- New business models

ABB as a partner

Global Player, native in over 100 countries

Front-runners in High-Power Charging, over 600 patents in power-conversion and charging

Leading development of key components for HPC with industry suppliers

Field experience from installed base and thousand of service engineers; since 2015 only more than 100 GWh charged in ~ 15 Mio charge sessions

Highly interoperable with all EV models and with more than 50 different backends

Seamless grid integration from single 50kW to multiple output 350kW charging parks

The charging infrastructure



Driver: The EV range roadmap

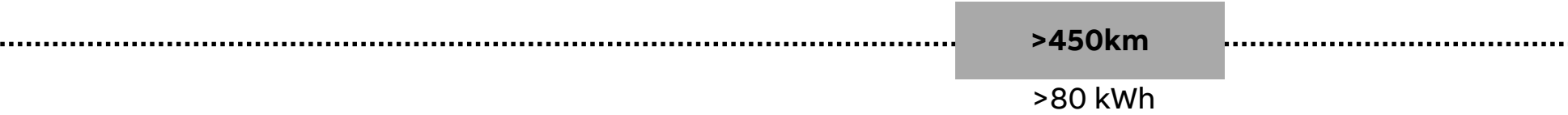
Batteries get bigger, range gets longer

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021

Mass market EVs



Premium EVs



Small cars:
50 - <150 kW



Mid/ high segment:
120 - 150 kW



Top segment:
~300/350 kW



Charging infrastructure key for mass-adoption of EVs

EV charging market can be split in 4 segment applications

AC destination private/commercial

Power: 3 – 22 kW

Charging time: 4 – 16 h



DC destination (semi-)public (slow)

20 – 25 kW

1 – 3 h



DC fast (fuel stations)

≥ 50 kW

20 – 90 min



DC high power & bus charging

150 – 350kW+

10 – 20 min



Public and commercial car charging – use cases

Charging service should match charging application and demand

Public and commercial EV charging			
AC destination	DC destination	DC Fast	DC High Power
3 – 22 kW	20 – 25 kW	≥ 50 kW	150 – 350kW+
4 – 16 h	1 – 3 h	20 – 90 min	10 – 20 min



ABB's way of building a high-power charger

Full dual galvanic isolation, 50 kW PM's, de-centralized cooling, up to 500A, scalable, cloud connected

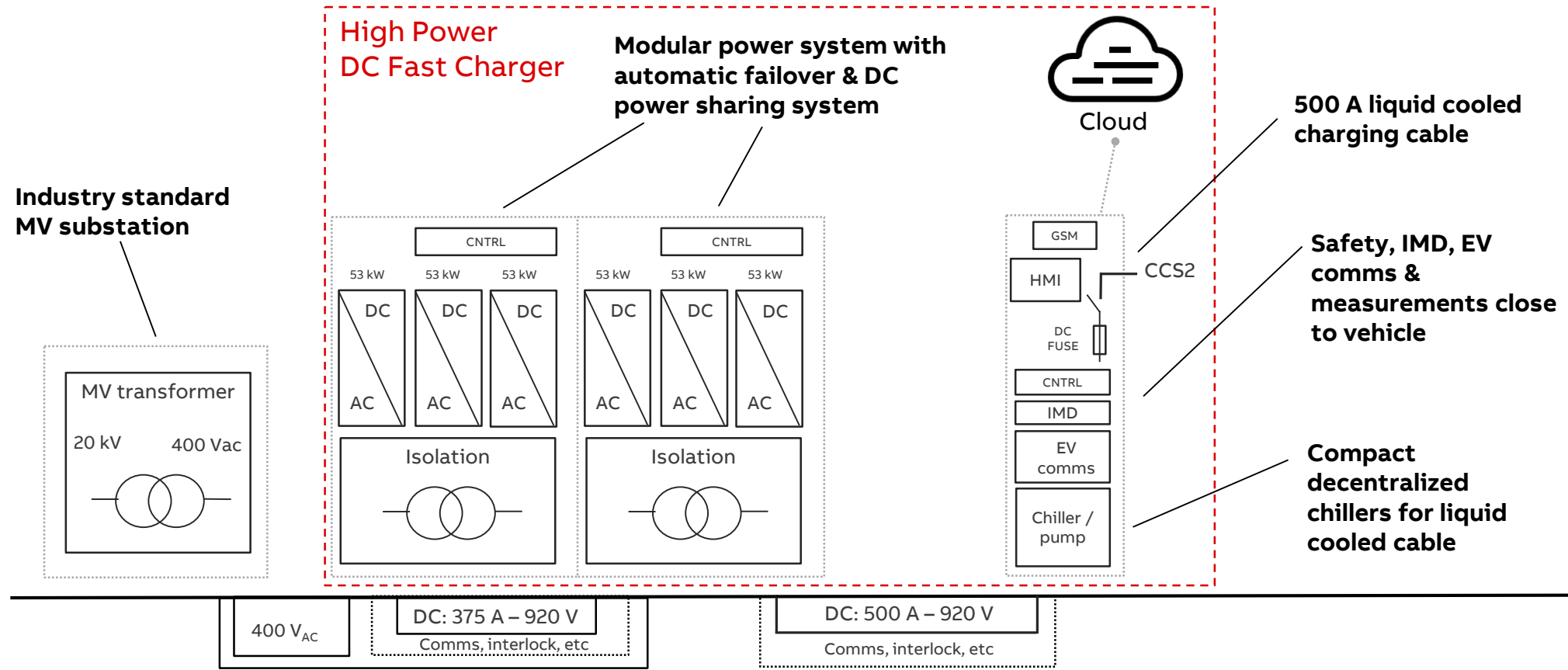
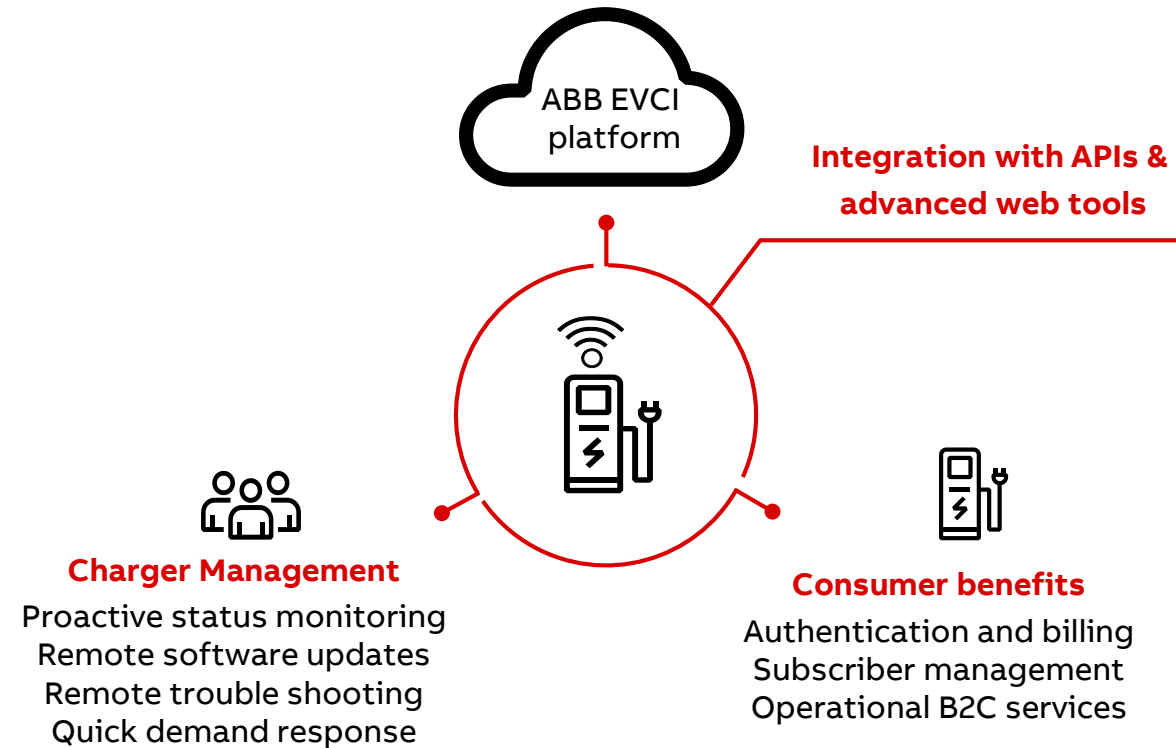
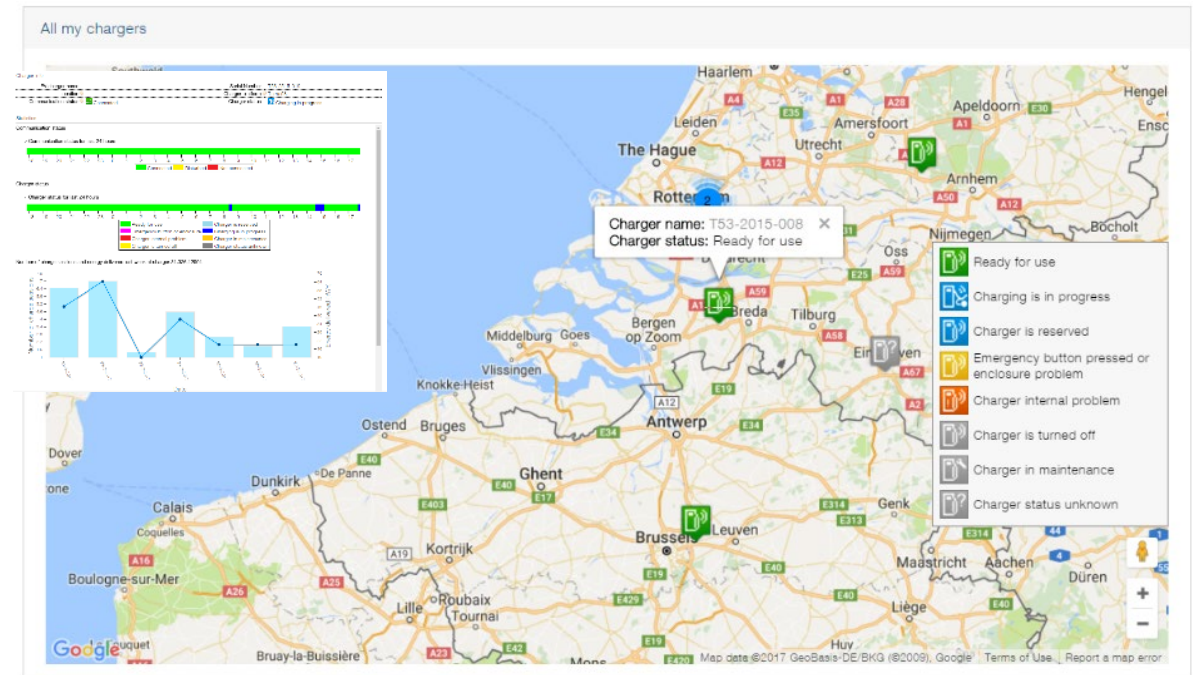


ABB e-mobility portfolio

Smarter mobility - cloud based reliable and cost-effective fast charging services with ABB Ability



Web tool - real time monitoring and configuration



Fleet electrification already in action

eBus Operation (Norway)



eTaxi (Munich)

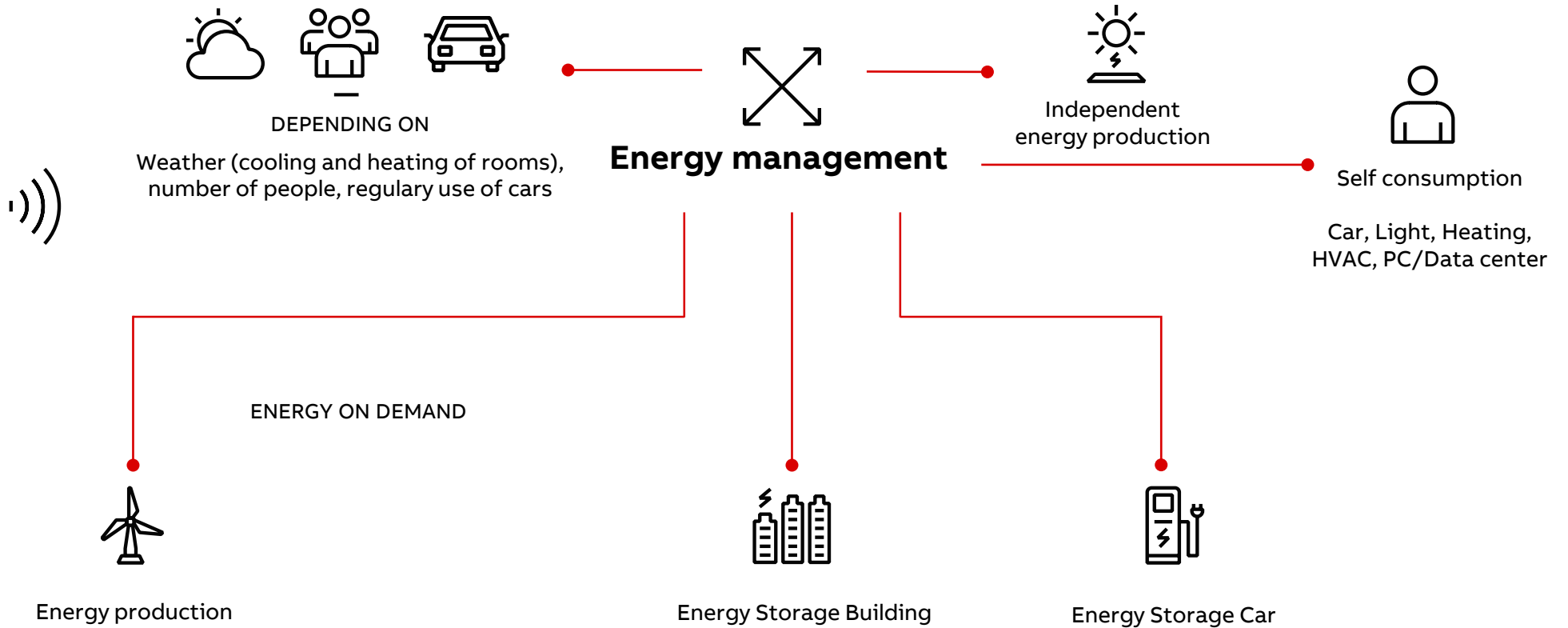


Energy- and load management

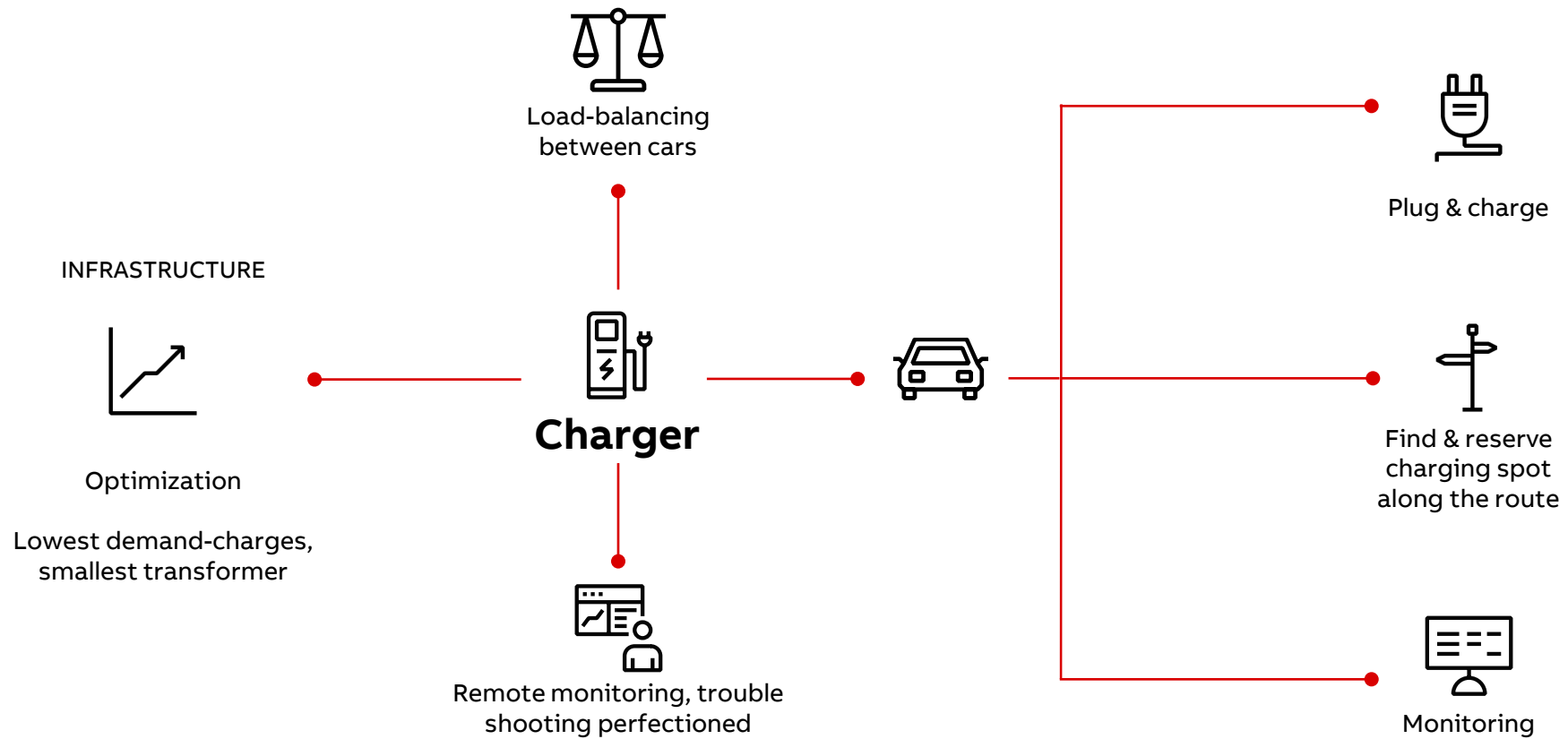
Energy management and integration of renewables

ABB Ability™

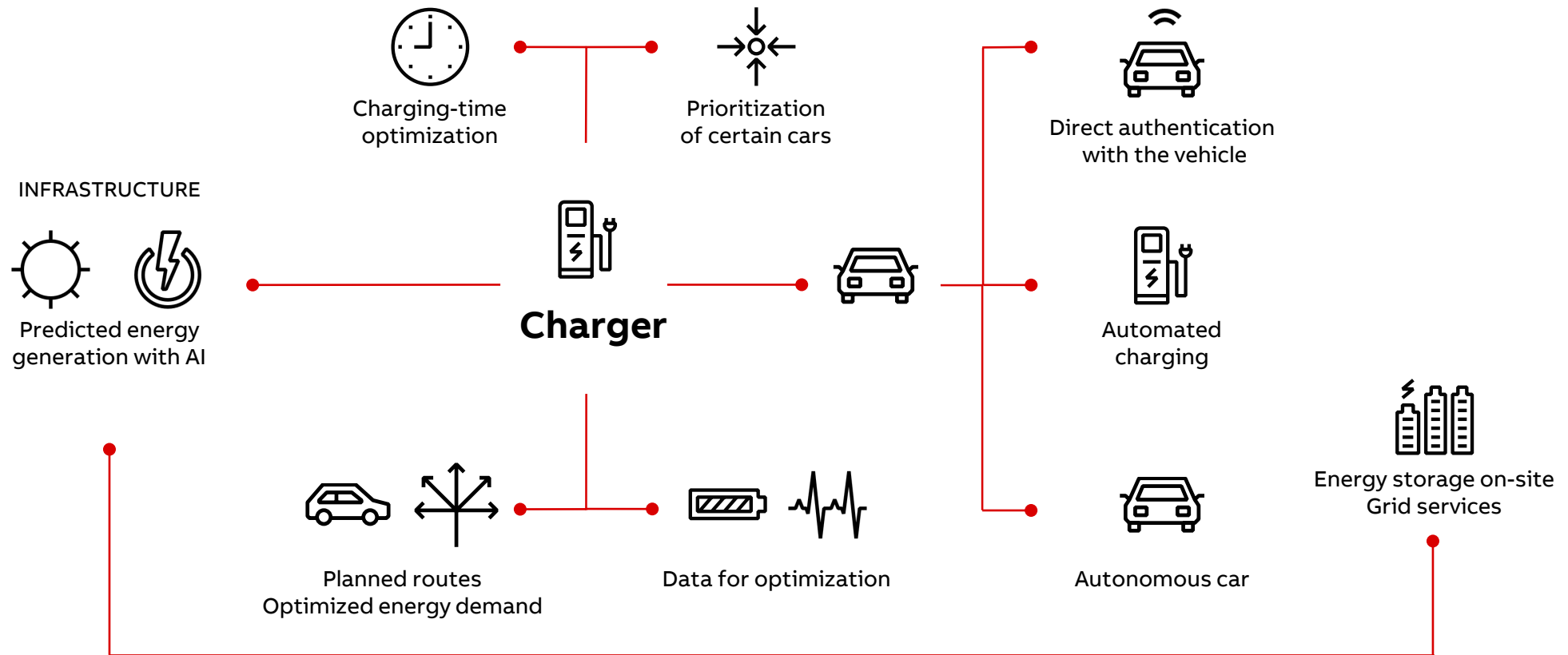
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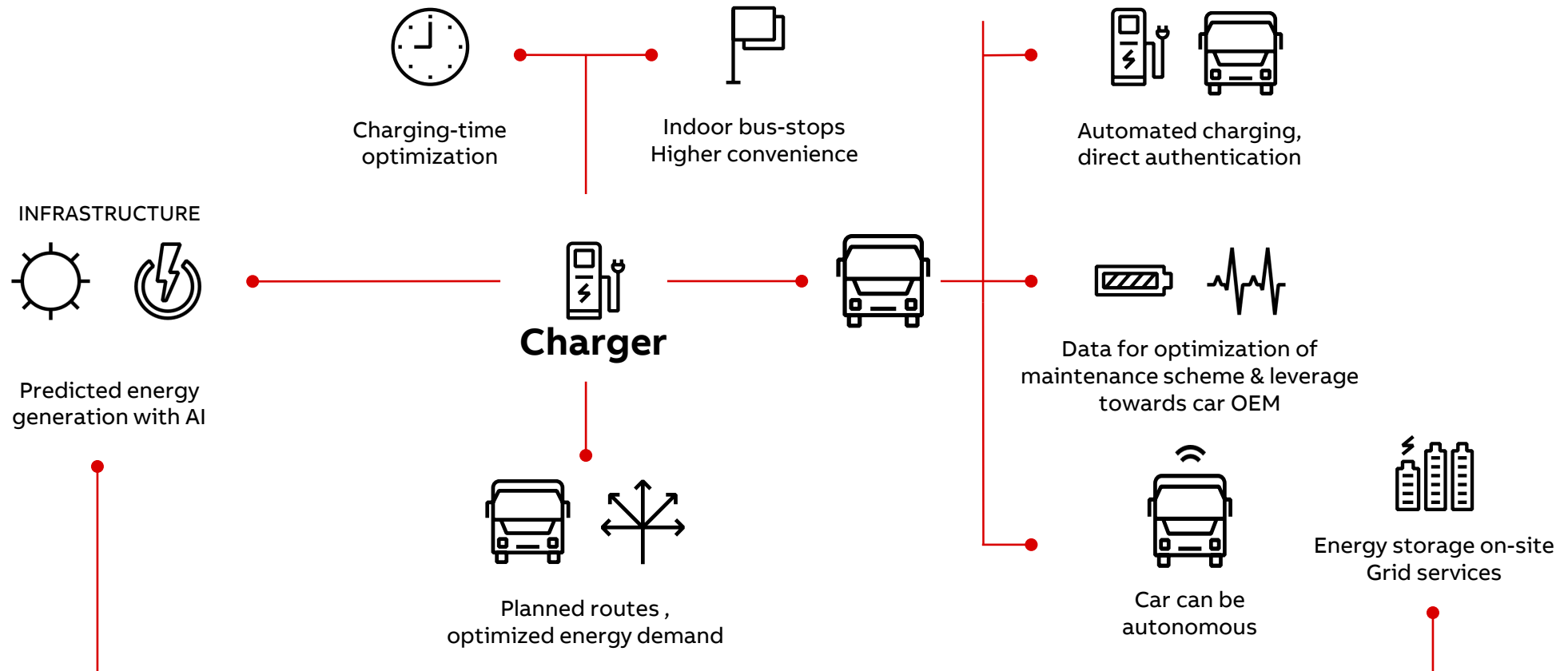
Future use case “charging on highway”



Future use case “charging of a fleet”



Future use case “charging of a bus fleet”





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