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DECEMBER 7, 2021

# **Robotics & Discrete Automation**

## Capital Markets Day 2021

Sami Atiya, President of Robotics & Discrete Automation

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This presentation includes forward-looking information and statements including statements concerning the outlook for our businesses.

These statements are based on current expectations, estimates and projections about the factors that may affect our future performance, including global economic conditions, and the economic conditions of the regions and industries that are major markets for ABB Ltd.

These expectations, estimates and projections are generally identifiable by statements containing words such as “expects,” “believes,” “estimates,” “targets,” “plans,” “outlook,” “on track,” “framework” or similar expressions.

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## **The important factors that could cause such differences include, among others:**

- business risks associated with the volatile global economic environment and political conditions
- costs associated with compliance activities
- market acceptance of new products and services
- changes in governmental regulations and currency exchange rates
- general market conditions, and
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# Driving profitable growth

## RA in sustainable transport

- 1. Sustainable transport offers attractive profitable growth opportunities**
    - Growth of electric vehicle production
    - New manufacturing needs
  - 2. We are well positioned**
    - Portfolio of solutions for EV manufacturing
    - Flexible manufacturing
    - Sustainable manufacturing
  - 3. Resulting in incremental profitable growth**
- 
- 4. High growth beyond sustainable transport**



# High growth of EV sales

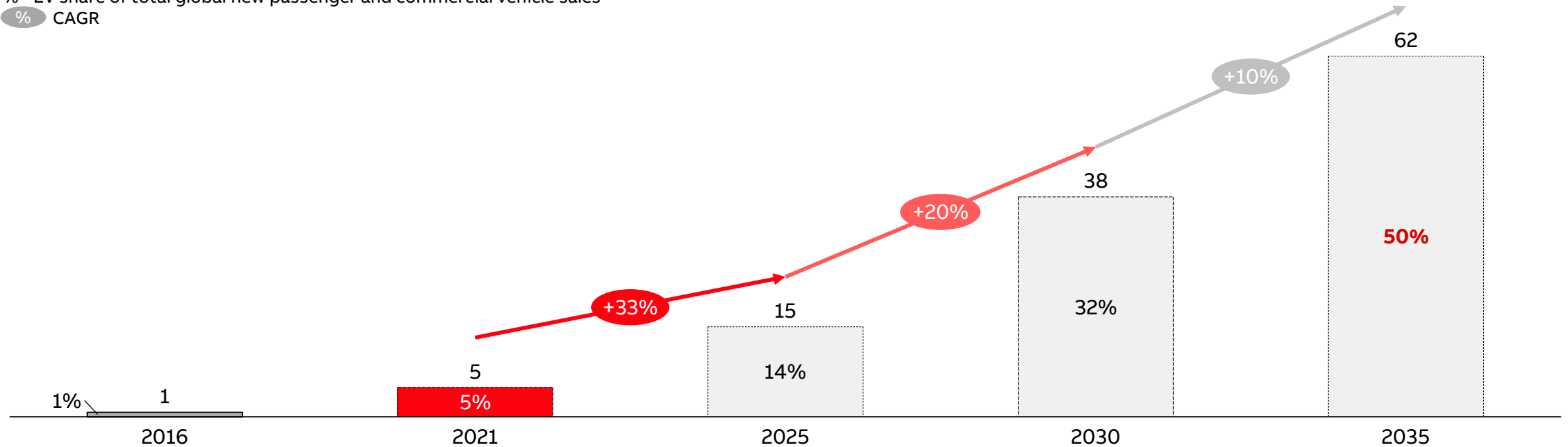
## EV sales to surpass non-EV sales by 2035

### Global xEV<sup>1</sup> vehicle sales forecast

[Million units]

% - EV share of total global new passenger and commercial vehicle sales

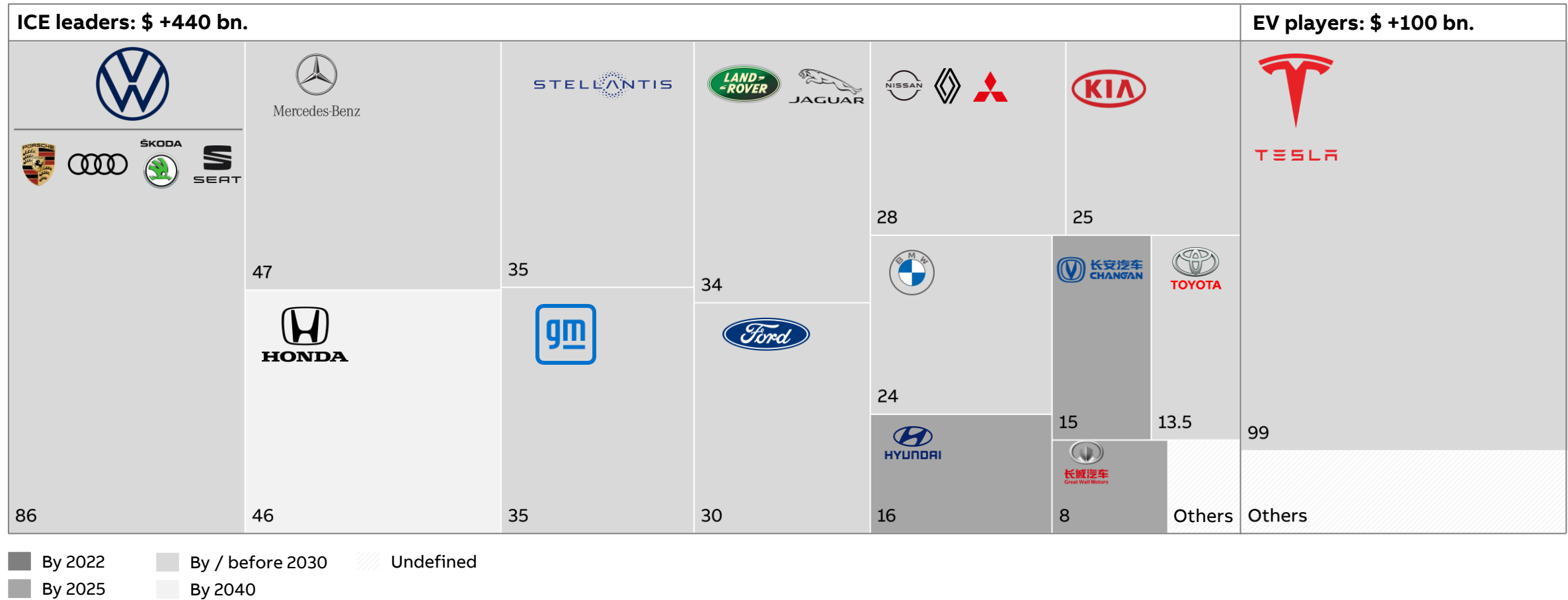
% CAGR





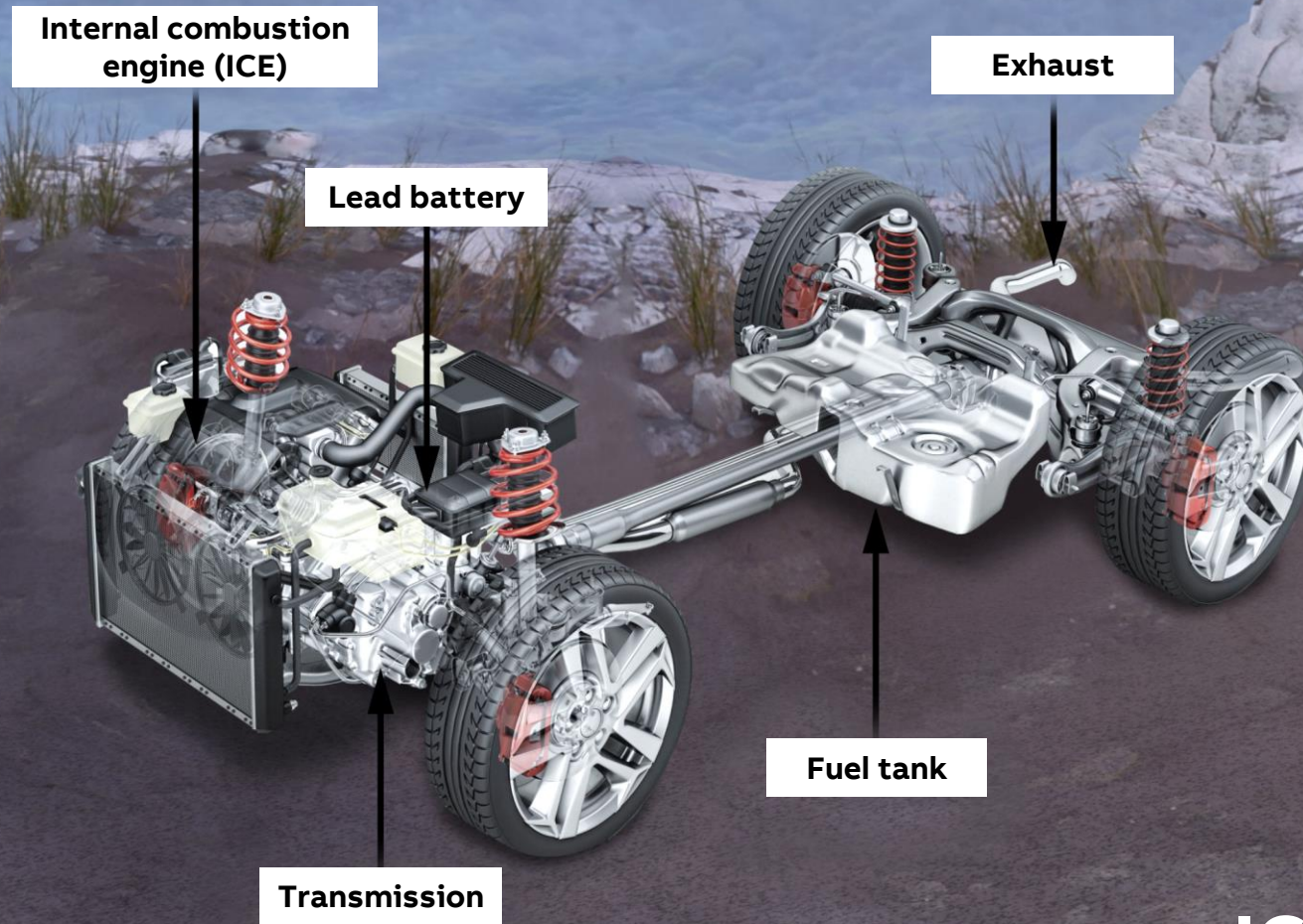
# >\$500 bn. announced investments by OEMs until 2040

## xEV investment announced by major global OEMs





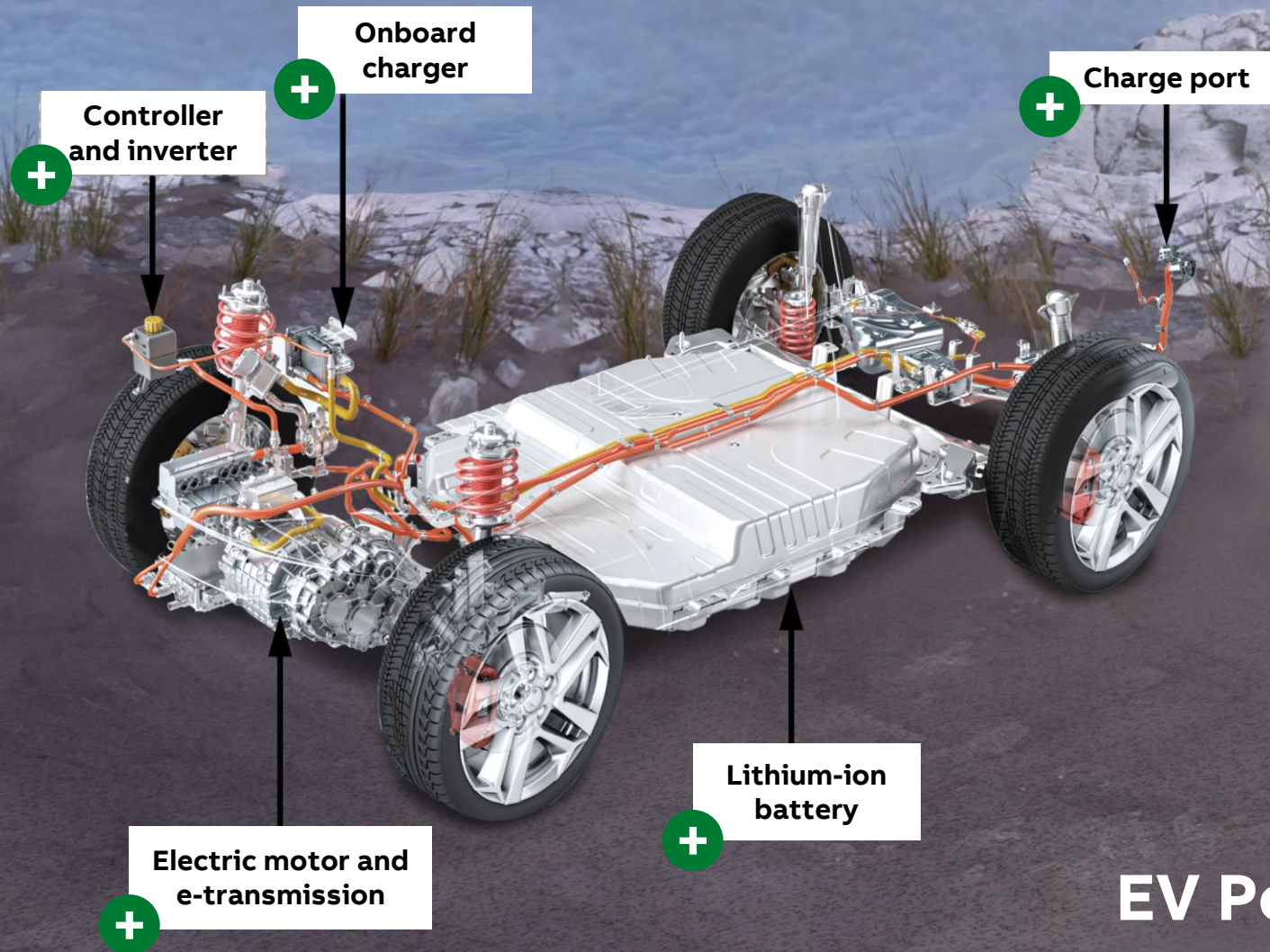
# Vehicle anatomy: difference between ICE and EV



**ICE Powertrain**

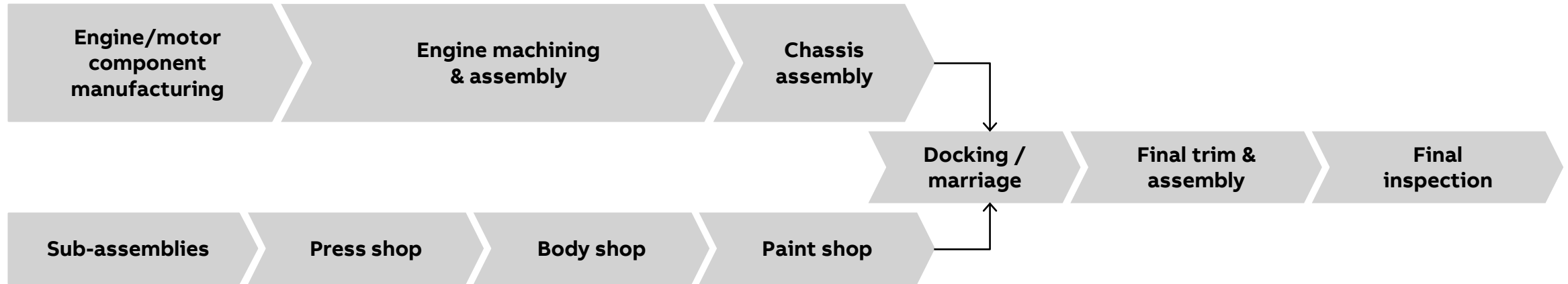


# Vehicle anatomy: difference between ICE and EV



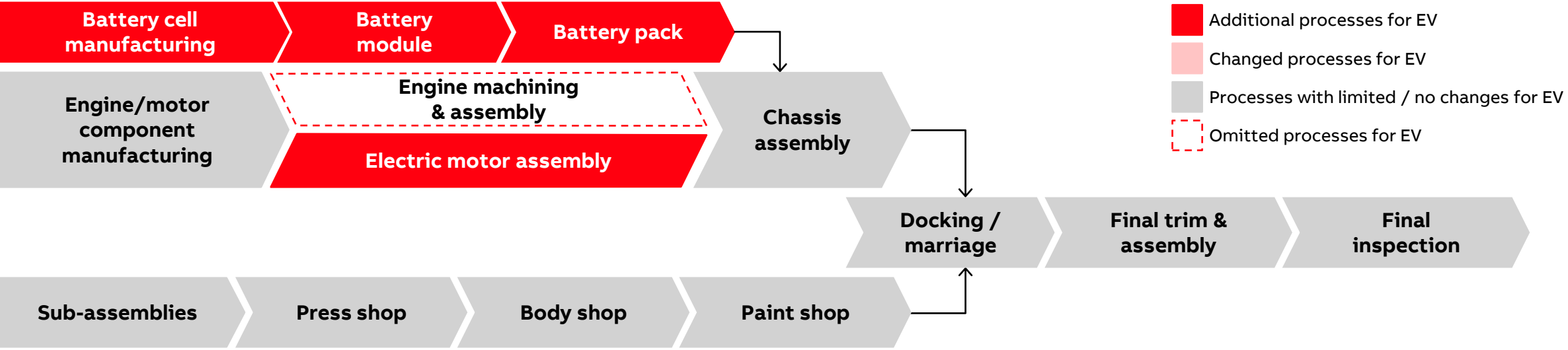
**EV Powertrain**

# ICE vehicle manufacturing

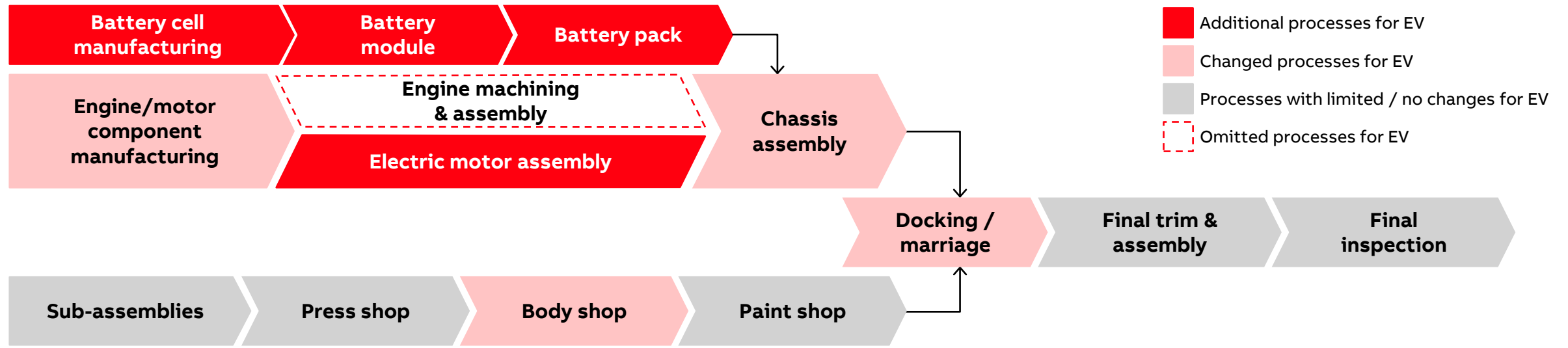




# EV manufacturing



# EV manufacturing



Engine / motor  
component  
manufacturing



Chassis assembly



Body Shop



Docking / marriage





# Sustainable transport as part of our business

Orders of ~\$600 million, ~20% of RA order intake<sup>1</sup>

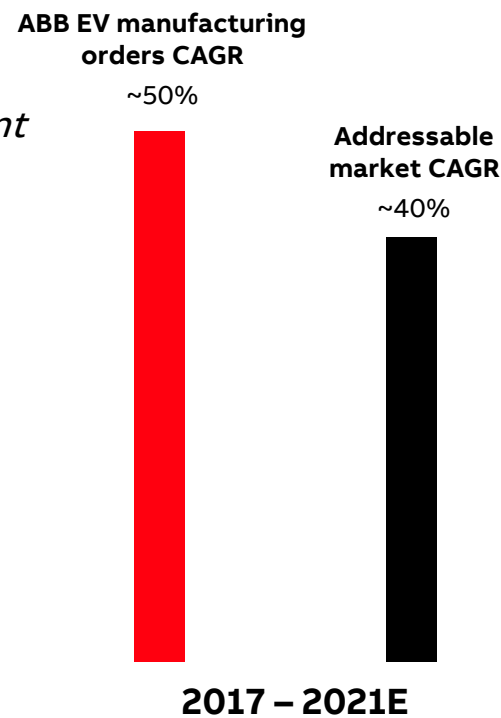
## Sustainable transport market growth drivers

**01** New powertrain architecture  
→ *E-motor, battery manufacturing investment*

**02** More variants  
→ *Higher flexibility*

**03** Lower powertrain complexity  
→ *Increasing robotization level*

**04** New players  
→ *Additional green field investment*

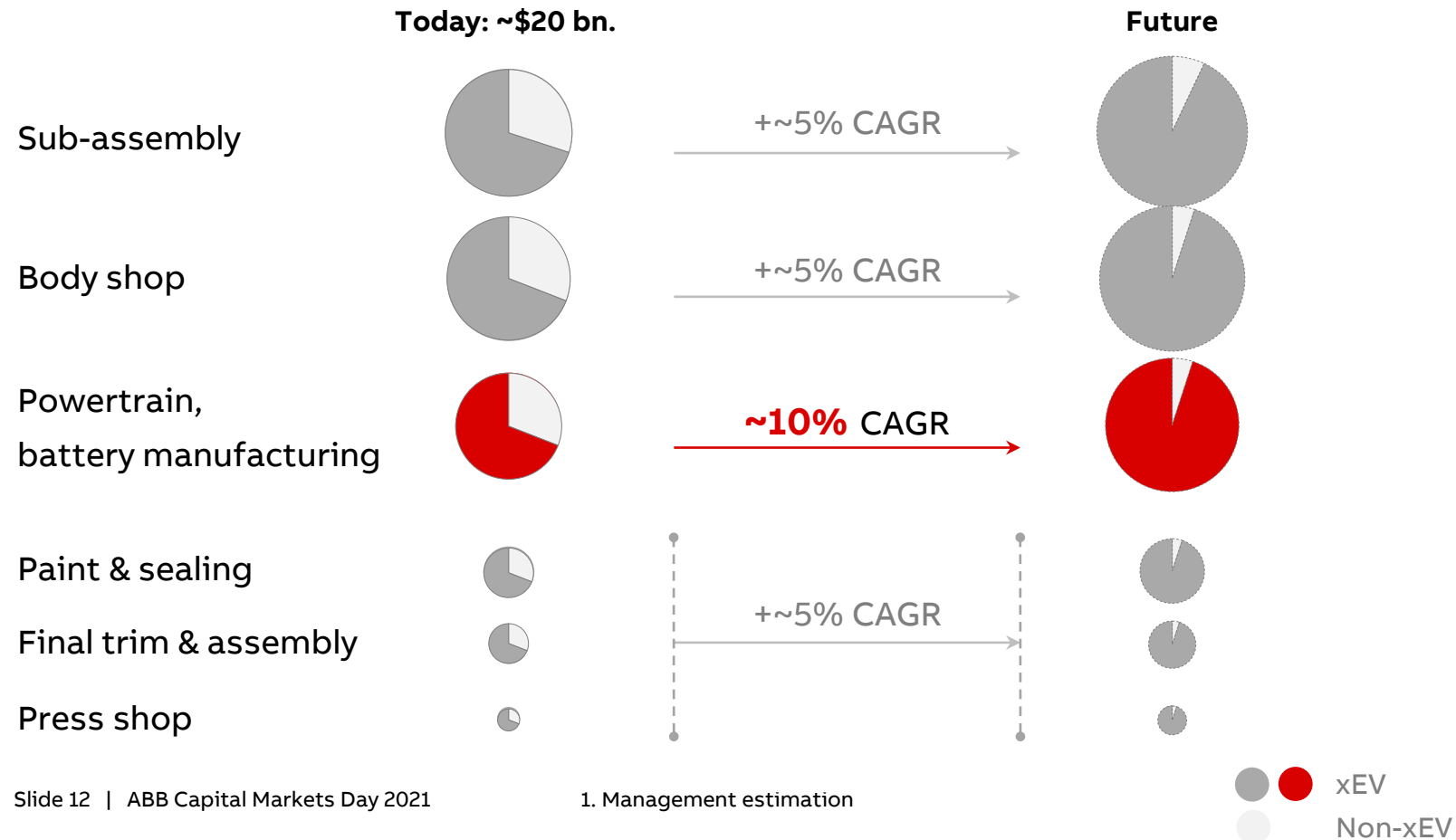


Mid-teen market CAGR in the coming years

**ABB: innovative solutions to outgrow the market**

# Changes will increase market for robotization

## Total automotive robotics market size by major manufacturing steps<sup>1</sup>



## Major growth drivers

New powertrain solutions

- Batteries
- Electric motors

Increasing flexibility

- New EV variants
- Higher uncertainty of EV adoption speed

New players

- Greenfield investments



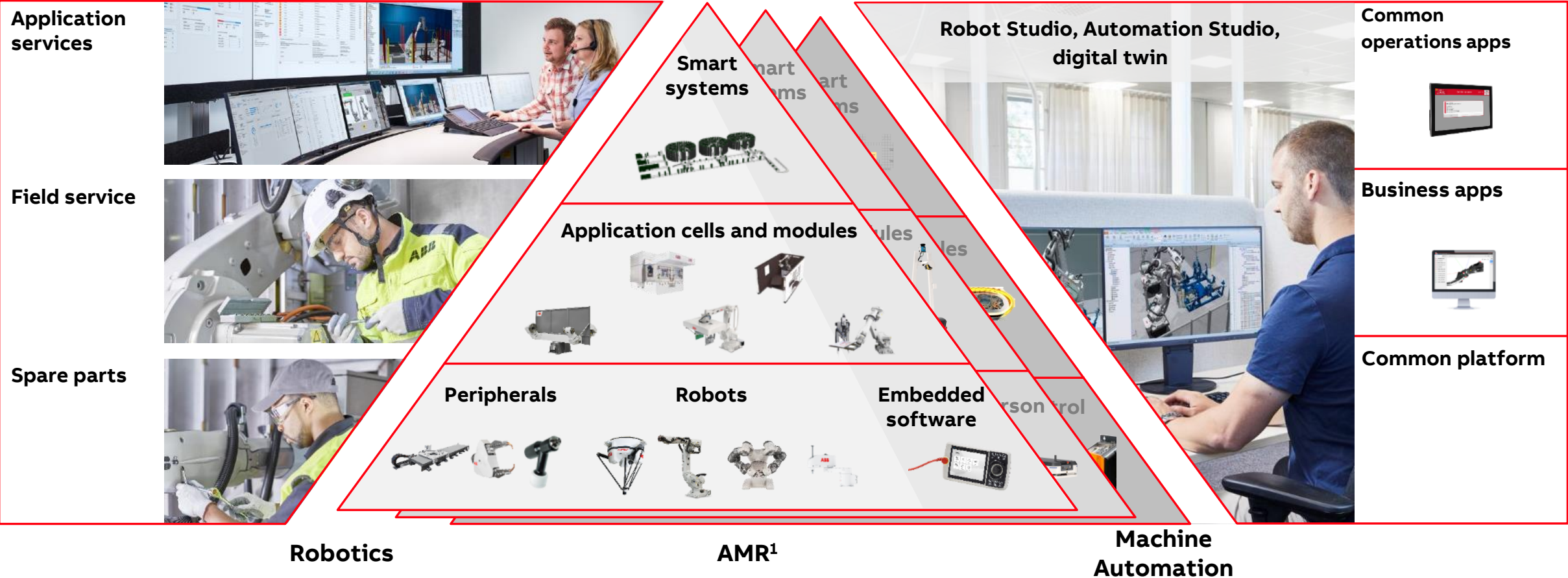
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# Complete portfolio for flexible automation



1. Autonomous mobile robots



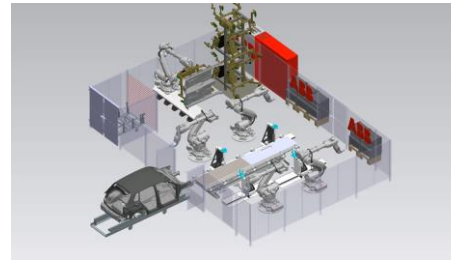
# Creating value

Strong portfolio of products, software and domain expertise

Technologically leading product portfolio



Software and digital twin for engineering and simulation



Industry and process expertise



## EV manufacturing solutions

Of total EV manufacturing order intake<sup>1</sup>:



Sub-assemblies  
~25%



Body shop  
~20%



EV powertrain, battery mfg.  
~20%



Others  
~35%



# Nondestructive spotwelding quality inspection for EVs

Ultrasonic, nondestructive

Integrated, ready-to-use solution

AI based welding spots screening, higher efficiency

For EV by major OEM 





# High speed battery manufacturing

Robotics combined with flexible transport technology by B&R

High throughput: 45 million units / year<sup>1</sup>

High precision: +/- 10 micrometer

Installed in:  





# Scalable battery assembly cell

Scalable, standard solution

Reduced delivery time

Integrated vision module

Installed in:   







# Flexible automotive manufacturing with Asti AMR

## Outdoor logistics

First commercial SLAM<sup>1</sup> navigation  
outdoor AMR

Optimized high volume outdoor  
logistics flows

Private and reliable network<sup>2</sup>





# Enabling sustainable manufacturing

## Example: PixelPaint

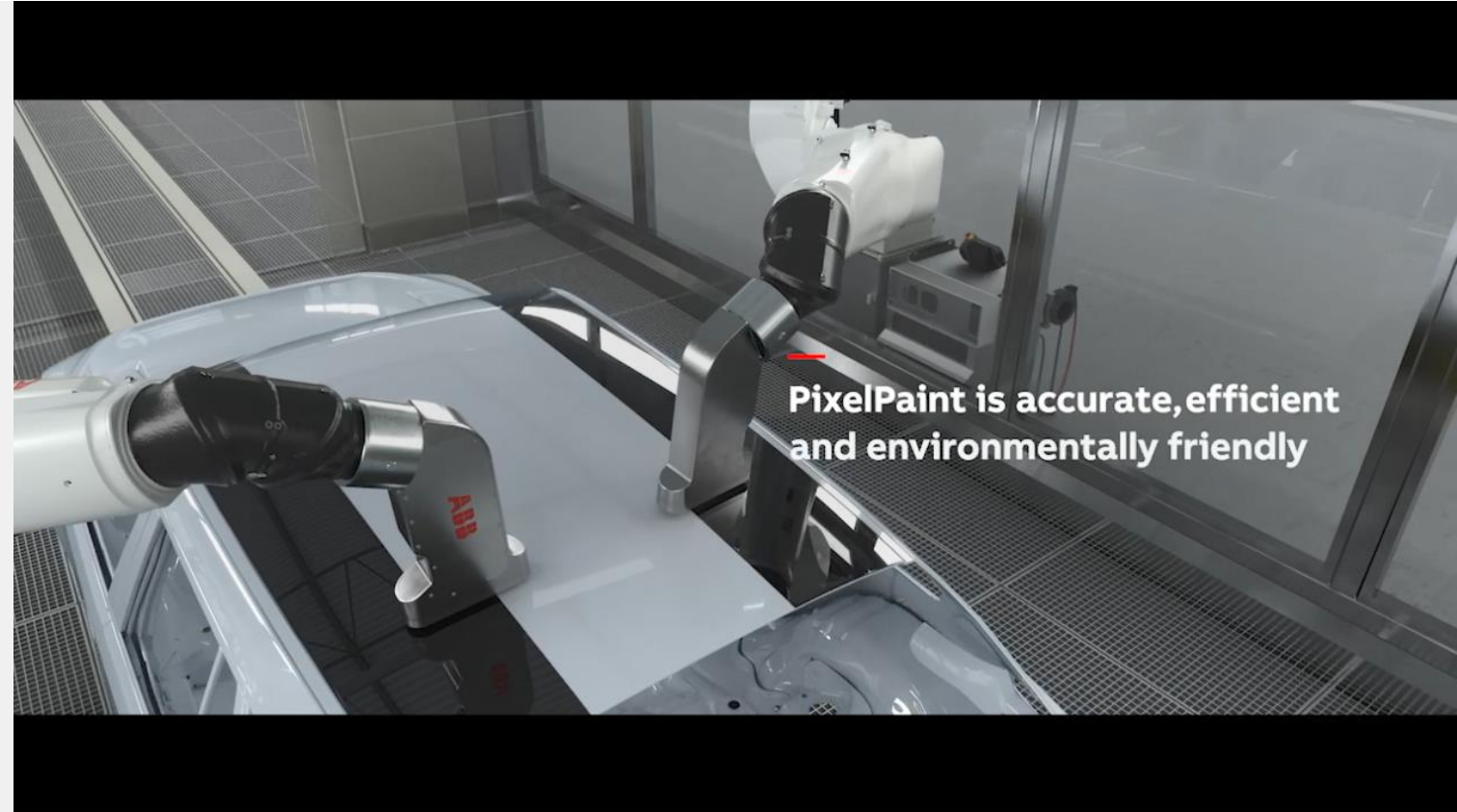
- **1/3 electricity use** vs. spray applications

**Eliminates the 30% paint waste** that occurs from spray paint applications

**46 tons CO<sub>2</sub> saved per PixelPaint robot** (IRB 5500) due to paint savings<sup>1</sup>







Additional environmental and cost savings thanks to no masking

Water-borne paint, hence zero VOC emissions



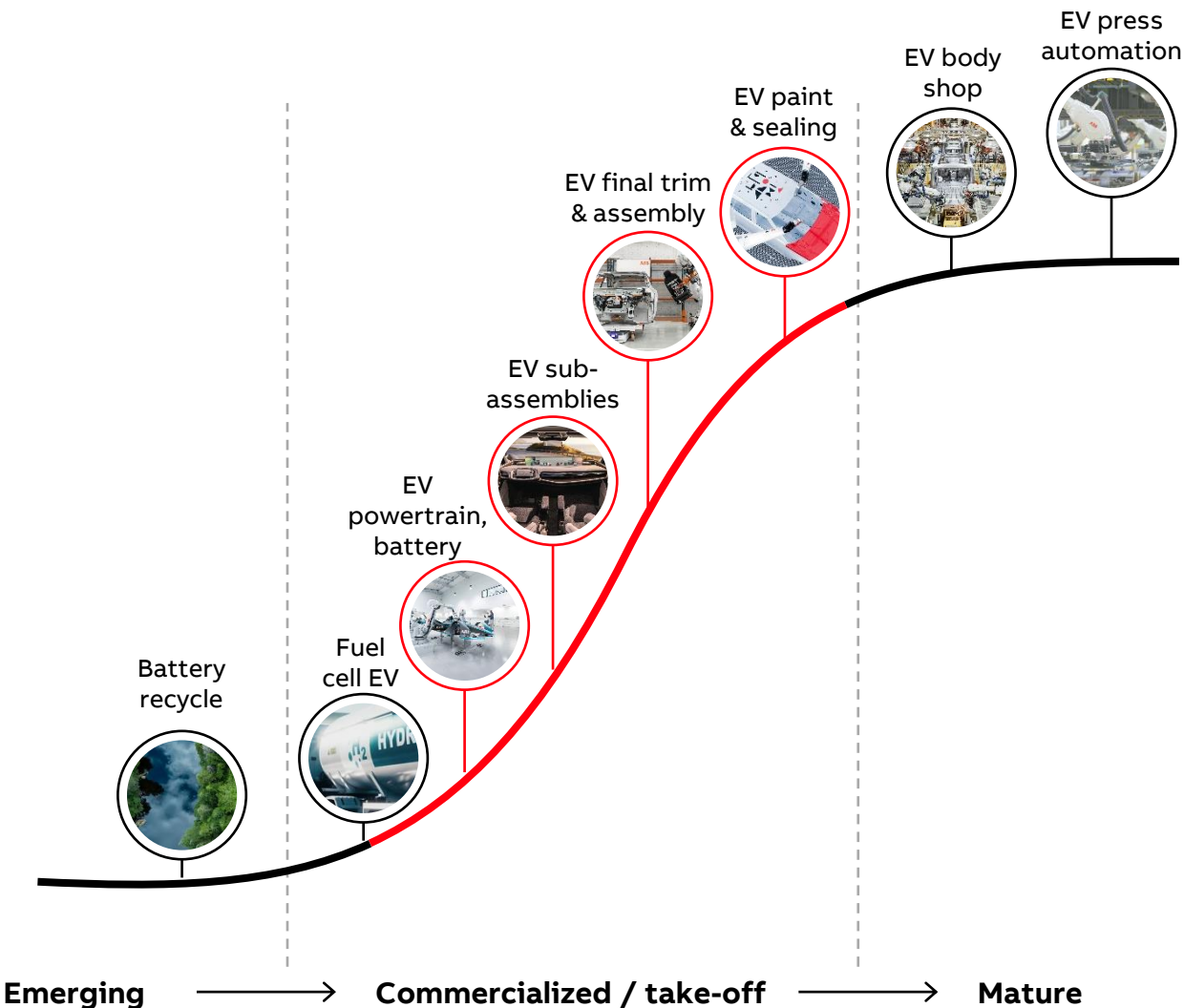
**PixelPaint is accurate, efficient and environmentally friendly**

# Leading through technology

-  **EV Sub-assemblies**  
~\$5.5 bn
-  **EV body shop**  
~\$5 bn
-  **EV powertrain, battery manuf.**  
~\$2.5 bn
-  **EV paint & sealing**  
~\$1 bn
-  **EV final trim & assembly**  
~\$0.5 bn
-  **EV press automation**  
~\$0.2 bn

Market position<sup>1</sup>

#2



Business opportunities have various levels of market maturity

# Driving profitable growth

## RA in sustainable transport

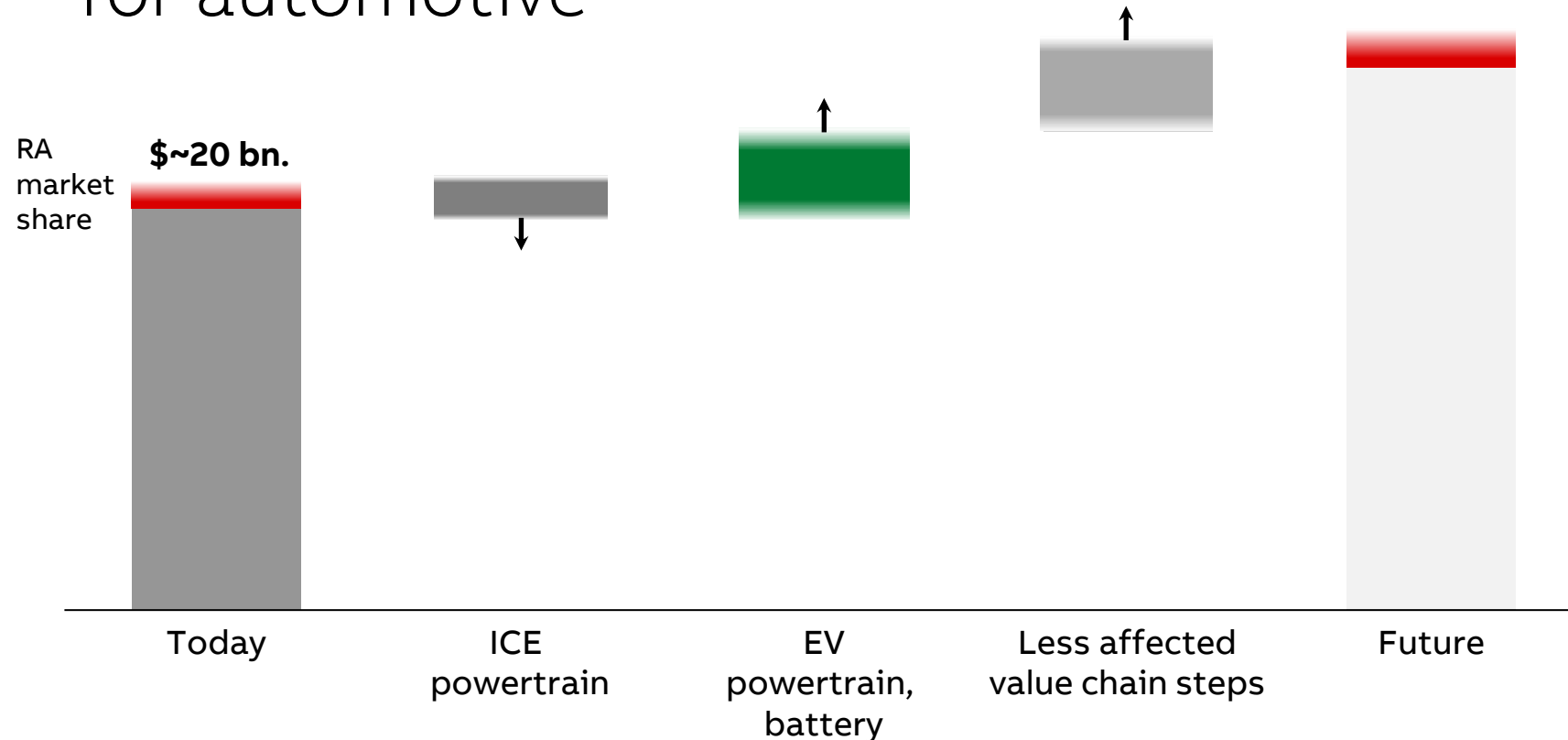
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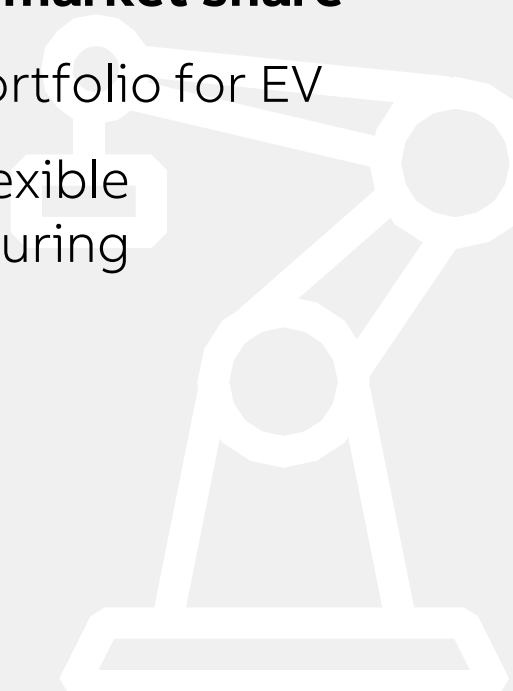
# RA is well positioned for the transition from ICE to xEV

Total addressable robotics market for automotive<sup>1</sup>



## Increasing market share

- Strong portfolio for EV
- Lead in flexible manufacturing



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# Strong portfolio, domain expertise for high growth automation

Technologically leading product portfolio



Software and digital twin for engineering and simulation



Industry and process expertise



Automation solutions for flexible manufacturing and smart machines



Of total revenue<sup>1</sup>:



Automotive



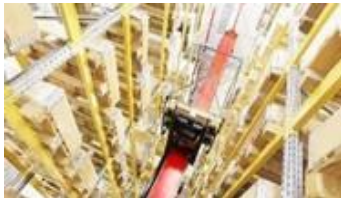
Electronics



General industry



Consumer Segments & Service Robotics



Machine builders





# Scalable high growth Robotics & Automation solutions

**Food & beverage**



**Aerospace**



**Logistics**



**Retail**



**Wood & furniture**



**Construction**



**Ag. & earth moving mach.**



**Lab automation**



**Household appliance**



**Foundry**



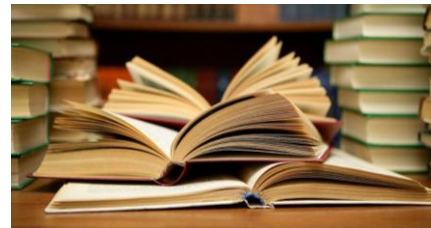
**Consumer packaged goods**



**Metal fabrication**



**Education**



**SMEs & tier 1s, 2s, 3s**



**EV**



**ABB**