



# The Combustion Engine Business Model in the Age of Electromobility

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# Central results at a glance (I)

- A Market scenarios:** Worldwide, all automakers face the **challenge of mastering the transition to electromobility with low growth rates** in passenger car market and **regionally varying BEV shares**.
- Global automotive market returns to pre-COVID levels in 2024 and **grows at 1.1% p.a. through 2040 to 110M vehicles sold**.
  - The **global BEV share will be 60%** in 2035 according to the current forecast, but with **large regional differences**—Europe will lead the way with > 90%, ahead of China and North America.
  - In **China and North America**, the three market scenarios **exhibit** large differences in BEV shares, in **Europe** the **differences are small**.
- B Electrification strategies:** Different electrification strategies (BEV investment and ICE plant conversion) have a **direct impact on the profit performance of manufacturer types**.
- C OEM categories:** The **future profitability of individual OEM categories differs greatly** depending depending, among other things, on their current BEV shares.
- **European premium and volume manufacturers and Traditional Chinese OEMs** already have higher BEV shares and will **continue to pursue comparatively ambitious electrification strategies** in the future.
  - **American and Asian volume manufacturers** have a lot of **catching up to do** in order not to lose touch with the global market.

## Central results at a glance (II)

- D Value creation:** All automakers benefit financially in all market scenarios from placing full focus on the transformation to e-mobility as BEV pioneers. Even with slow electromobility ramp-up, the risk of loss is relatively low.
- For European premium manufacturers, it is not worthwhile in any scenario to be a BEV laggard and thus continue to rely on ICE production in the short term. Given the current forecast market development and in the event of an accelerated BEV ramp-up, they benefit from high profits as BEV pioneers. If electromobility slows down, they must always expect losses - regardless of which strategy they pursue.
  - European volume manufacturers can secure high profits as BEV pioneers in the current market forecast as well as in the accelerated scenario. Only in the event of a slowdown in electromobility could BEV pioneers miss out on profits.
  - Asian volume manufacturers with and without a BEV focus can make additional profits particularly as BEV pioneers, which is the only way to make it in the world market.
  - Traditional Chinese OEMs are completely dependent on the local market and therefore exhibit the largest range between profit potential and loss risks in the BEV pioneer strategy. However, with the current forecast as well as accelerated electromobility, there are also financial advantages only for BEV pioneers and OEMs in the midfield.

# Your contacts



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# Current debates ...

## UN climate conference COP27



+

## EU banning ICEs in 2035



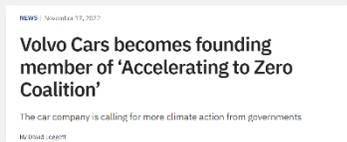
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## Immediate climate protection program in Germany



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## Transformation of the automotive industry



# ... show importance of core question

A

Considering various market scenarios, what

B

electrification strategy

C

per OEM category

D

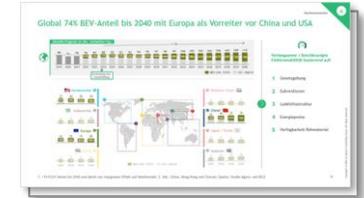
will create the most value until 2040?



# Methodology

## A Market scenarios

- Forecast global market trend in eight regions
- Develop three different scenarios with different BEV shares in new registrations (slower e-mobility, current forecast, accelerated e-mobility)



## B Electrification strategies

- Identify possible electrification strategies (BEV laggards, midfield, BEV pioneer)
- Evaluate influenced variables depending on electrification strategy



## C OEM categories

- Identify current BEV shares and strategies of established OEMs
- Cluster established OEMs into six manufacturer types

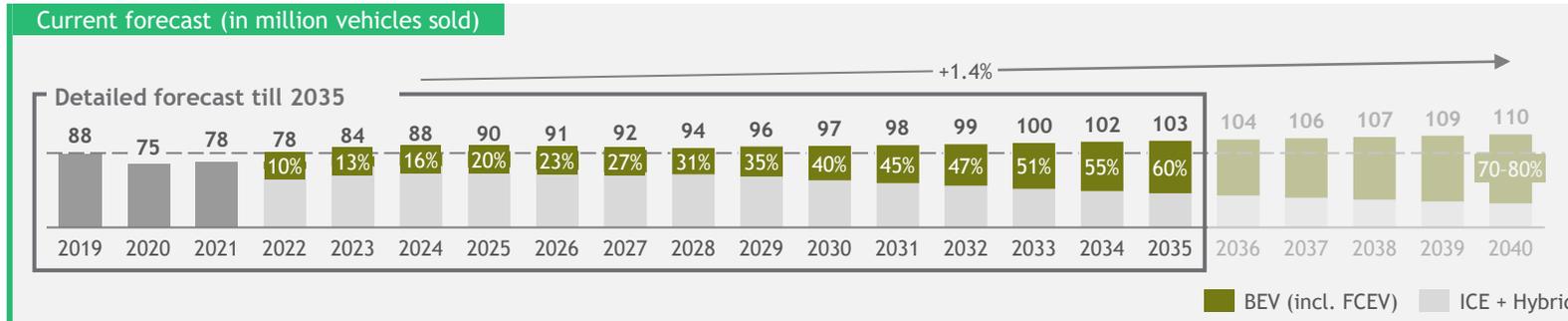


## D Value creation

- Conduct economic analysis of the different scenarios
- Compare scenarios per manufacturer type based on present value of profits

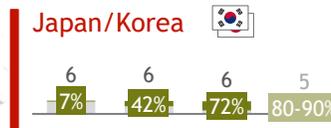
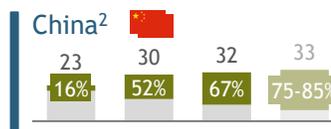
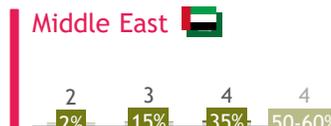
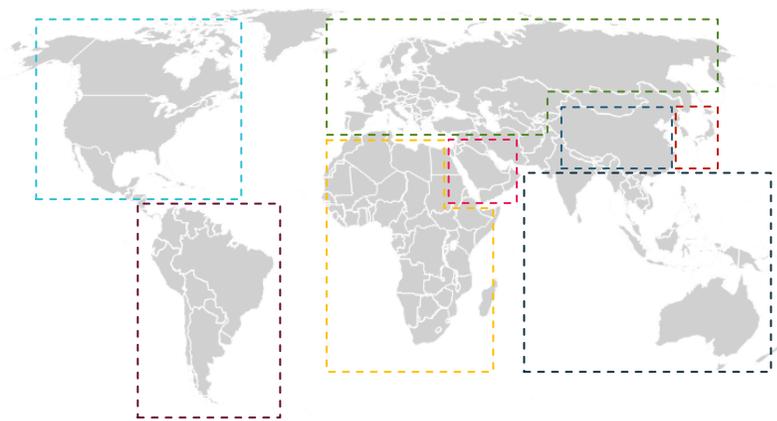
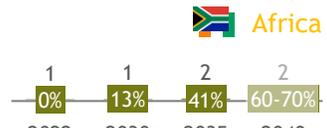
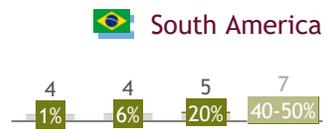


# Worldwide 60% BEV share by 2035 with large regional differences



## External factors that could slow or accelerate electromobility:

- Legislation
- Subsidies
- Expansion of charging infrastructure
- Energy prices
- Raw material availability



Legend: BEV (inkl. FCEV) (dark green), ICE + Hybrid (light grey)

1. < 1% FCEV share by 2035 and thus only marginal effect on market model 2. Incl. China, Hong Kong, and Taiwan; Source: Agora Verkehrswende and BCG

# Three possible market scenarios with different BEV shares per region

## Regional adjustments to base scenario<sup>1</sup>



### Accelerated electromobility

- Individual countries accelerate BEV market ramp-up from 2030
- BEV early with TCO advantage as of 2030
- Bottlenecks for raw materials and BEV vehicles
- Expansion of charging infrastructure slower than planned

### Slower electromobility

- Chinese government implementing ICE bans as of 2035
- Strong expansion of charging infrastructure by 2030
- Energy prices and BEV TCO rising above average
- Bottlenecks for raw materials and BEV vehicles



- Regional ICE bans in parts (e.g., California, New York) starting in 2035
- Expansion of charging infrastructure more strongly promoted
- Energy prices and BEV TCO rising above average
- Expansion of charging infrastructure slower than planned

## BEV shares in three scenarios

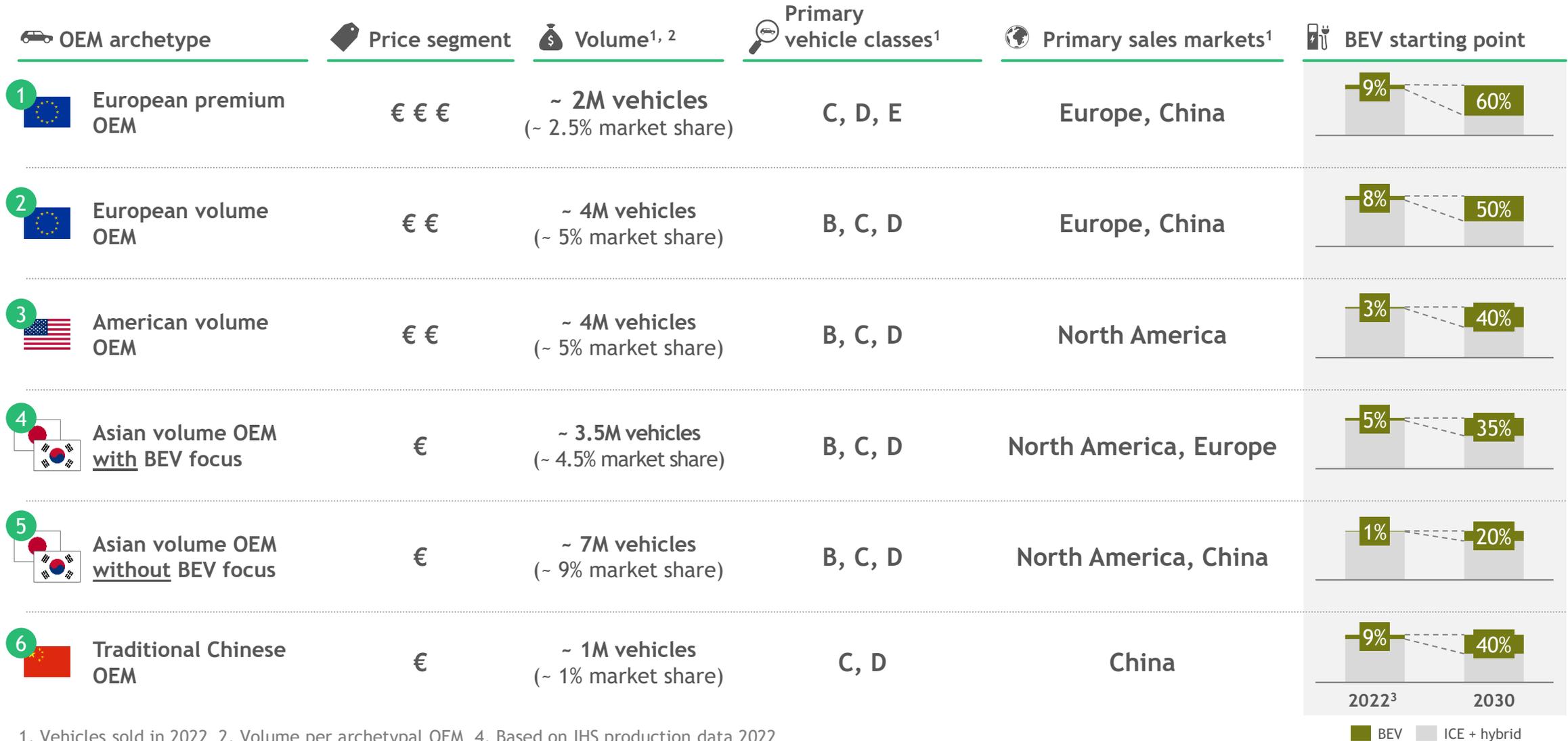


BEV-share new registrations: — Verlangsamte Elektromobilität — Beschleunigte Elektromobilität - - - Aktuelle Prognose (Basisszenario)  
 1. Representation of selected regions—model includes adjustment of assumptions for all regions; Source: Agora Verkehrswende; BCG

# OEMs can choose between three electrification strategies

Electrification strategy	 <b>BEV laggards</b>	 <b>Midfield</b>	 <b>BEV pioneers</b>
<b>Comment</b>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>Short-term focus on ICE production and siphoning off increased profits</li> </ul> <p><b>BEV investments</b></p> <ul style="list-style-type: none"> <li>Long-term increase in BEV investment (esp. in R&amp;D)</li> </ul> <p><b>Manufacturing focus</b></p> <ul style="list-style-type: none"> <li>Long-term conversion of manufacturing to pure electric plants, short-term mixed plants</li> </ul>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>Medium-term decrease in ICE technology and establishment of BEV capacities</li> </ul> <p><b>BEV investments</b></p> <ul style="list-style-type: none"> <li>Steady buildup of BEV capacities and capabilities</li> </ul> <p><b>Manufacturing focus</b></p> <ul style="list-style-type: none"> <li>Medium-term use of mixed plants and steady conversion to BEV manufacturing</li> </ul>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>Full focus on BEV transformation for technology leadership in the short term</li> </ul> <p><b>BEV investments</b></p> <ul style="list-style-type: none"> <li>High short-term investment in BEV technology</li> </ul> <p><b>Manufacturing focus</b></p> <ul style="list-style-type: none"> <li>Short-term conversion of ICE to BEV plants including final assembly and potential battery production</li> </ul>
<b>Focus on BEV manufacturing</b>	 From ~ 2035	 From ~ 2030	 From ~ 2025

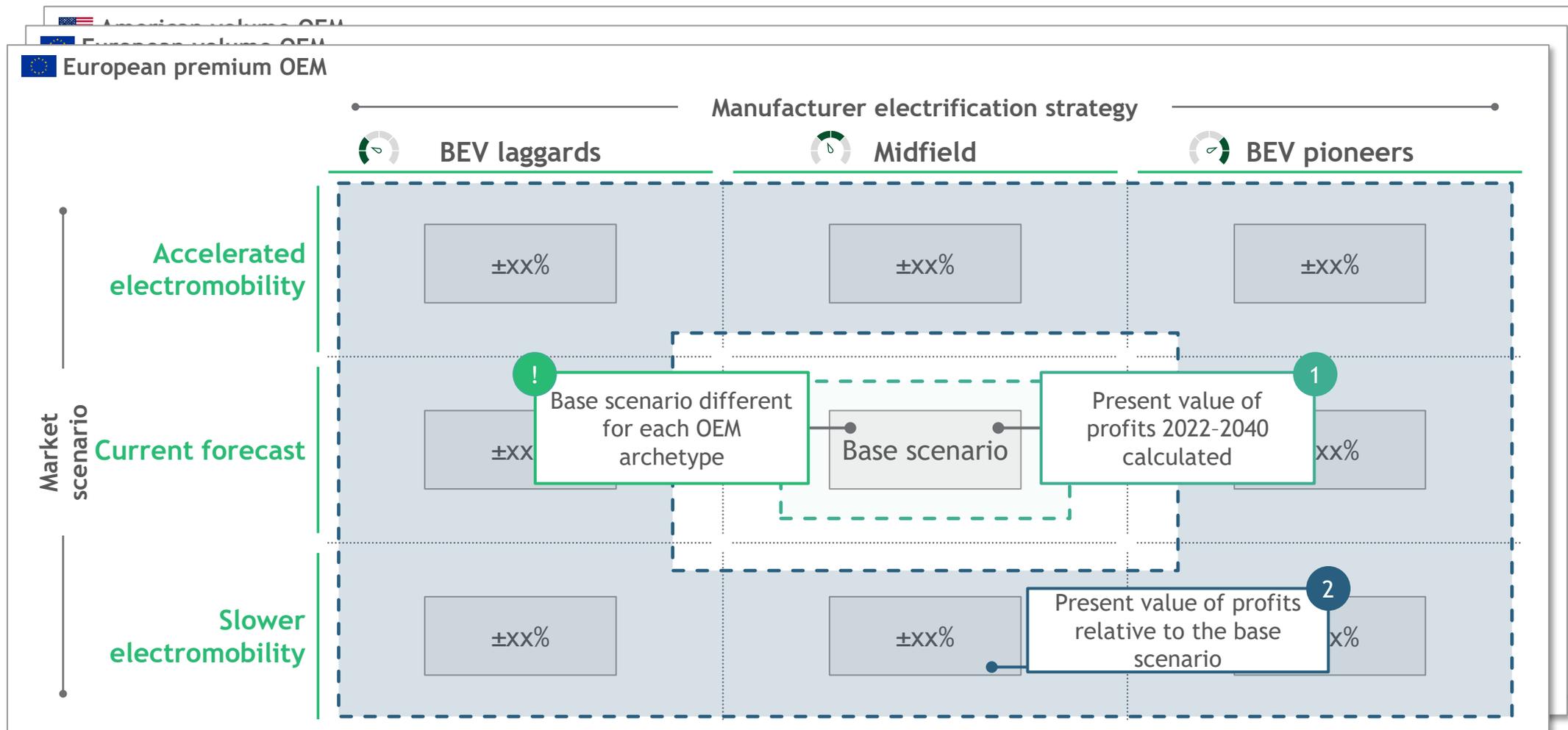
# Six different OEM archetypes with different BEV starting points



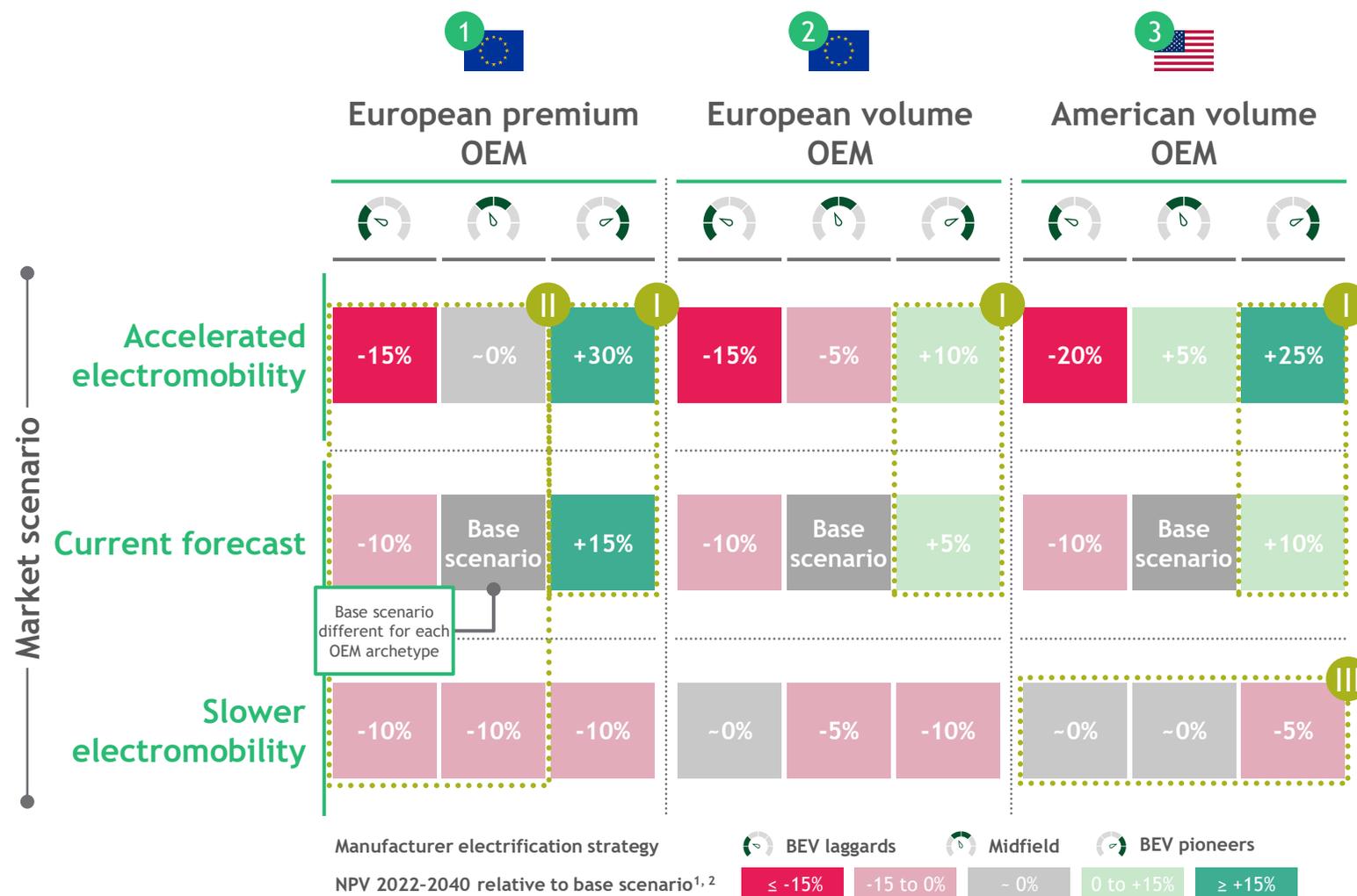
1. Vehicles sold in 2022 2. Volume per archetypal OEM 4. Based on IHS production data 2022  
 €: Low price segment, €€: Medium price segment, €€€: Premium price segment Source: Agora Verkehrswende and BCG

2022<sup>3</sup> 2030  
 ■ BEV ■ ICE + hybrid

# Value added per scenario and strategy based on present value of projected profits



# Archetypes 1-3 | High profit potential as forerunners in forecasted and accelerated scenario

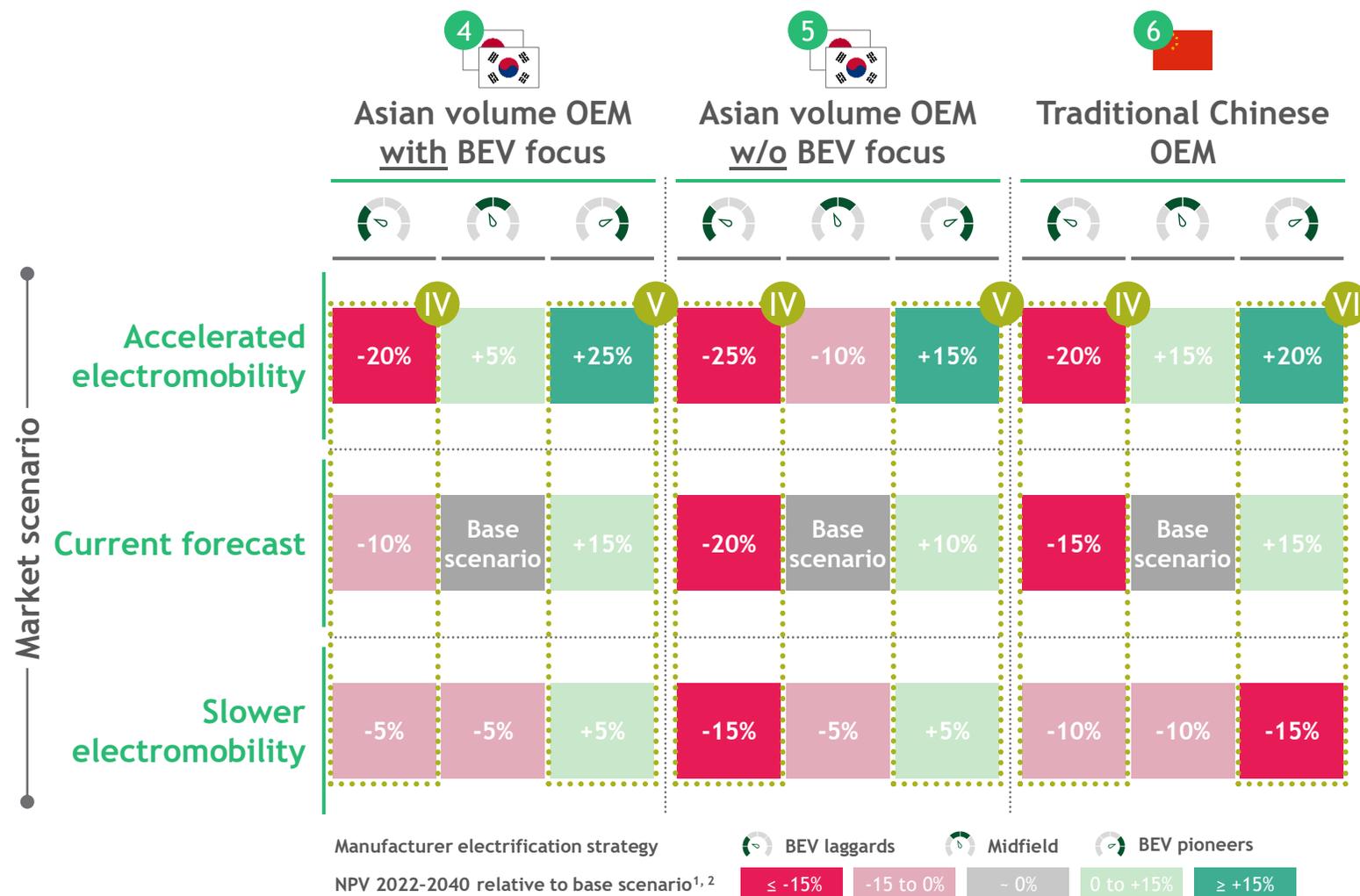


1. "Current forecast" as base 2. NPV change takes into account singular factor of e-mobility  
Source: Agora Verkehrswende and BCG

## Key results

- I **European and American premium and volume manufacturers** can achieve the highest profits in the forecast and accelerated market scenario as **BEV pioneers**, profit losses threaten BEV pioneers exclusively in the case of slower electric mobility
- II **For European premium manufacturers**, a BEV laggard strategy is not worthwhile, even with slower electric mobility they do not get beyond the profits of a midfield strategy
- III **American volume manufacturers** have invested less in BEVs to date and therefore have the **least risk of loss** if electromobility slows down

## Archetypes 4-6 | Asian and Chinese BEV stragglers face significant profit losses



1. "Current forecast" as base 2. NPV change takes into account singular factor of e-mobility  
Source: Agora Verkehrswende and BCG

## Key results

- IV Asian volume manufacturers and traditional Chinese manufacturers face significant profit losses if they rely on the BEV laggard strategy
- V Asian volume manufacturers with and without BEV focus can make profits and catch up with world market especially as BEV pioneers
- VI Traditional Chinese OEMs exhibit the largest range between profit potential and loss risk in the BEV pioneer strategy, as they are completely dependent on the local market

# Public relations



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