

2018  
New Year's Briefing



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# European Light Vehicle Production

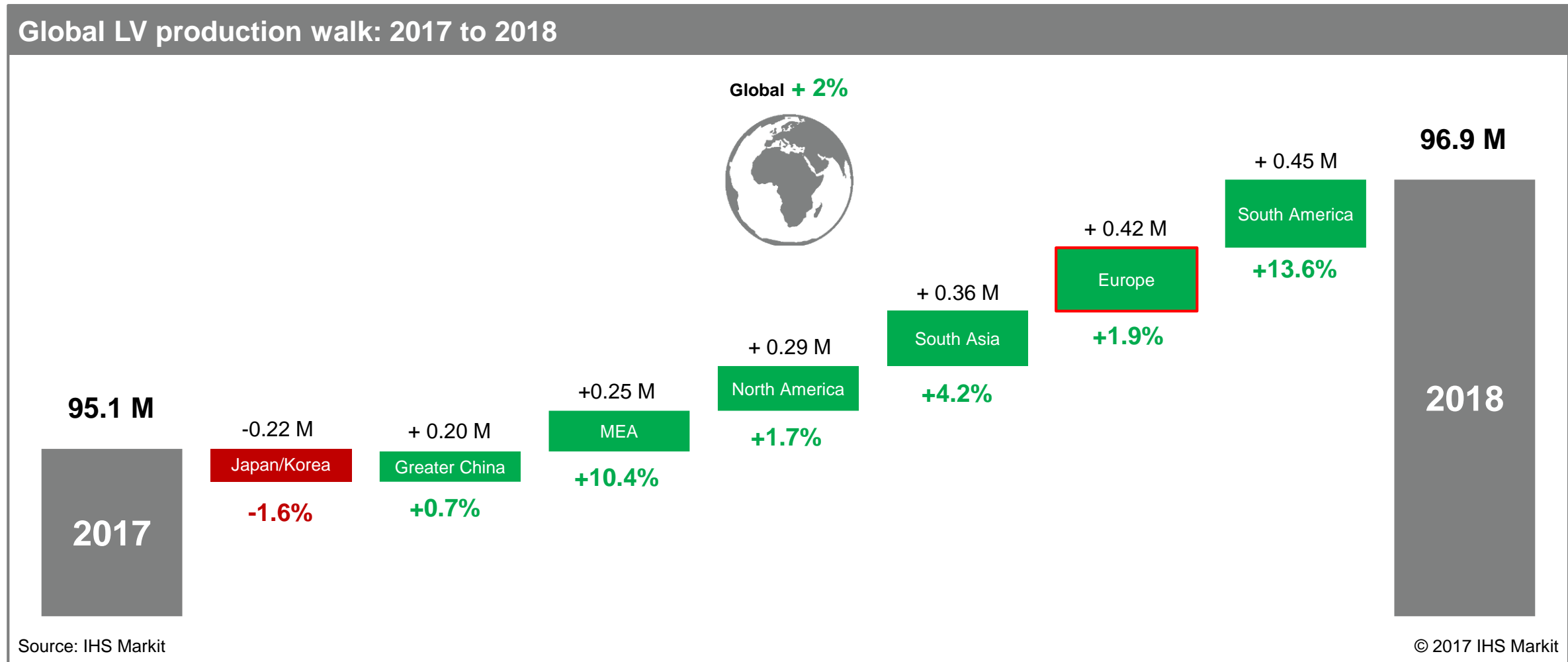
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- Premium Brands' Transition to Electrification

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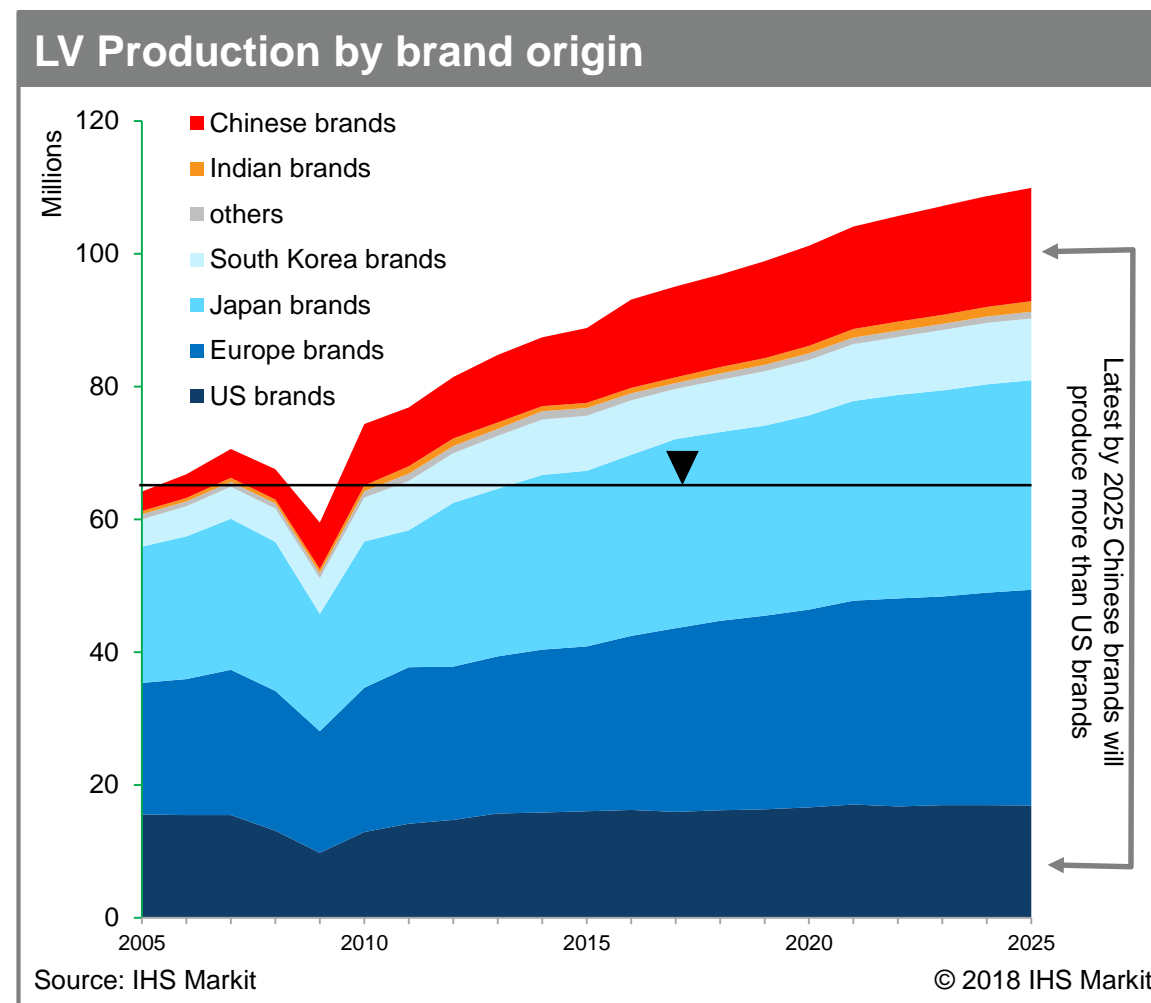
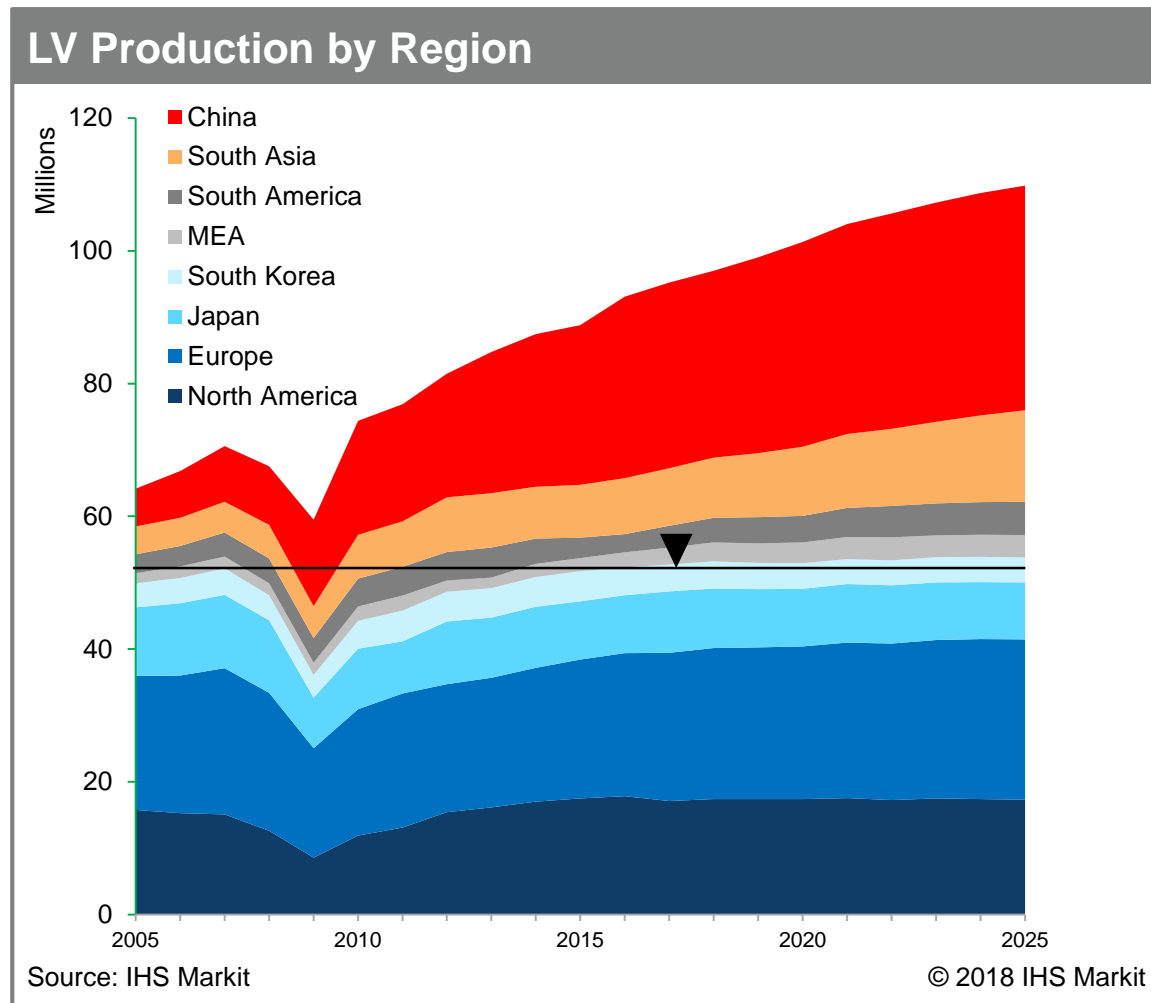
# Global Light Vehicle Production Outlook

2017 to 2018 forecast outlook by Region



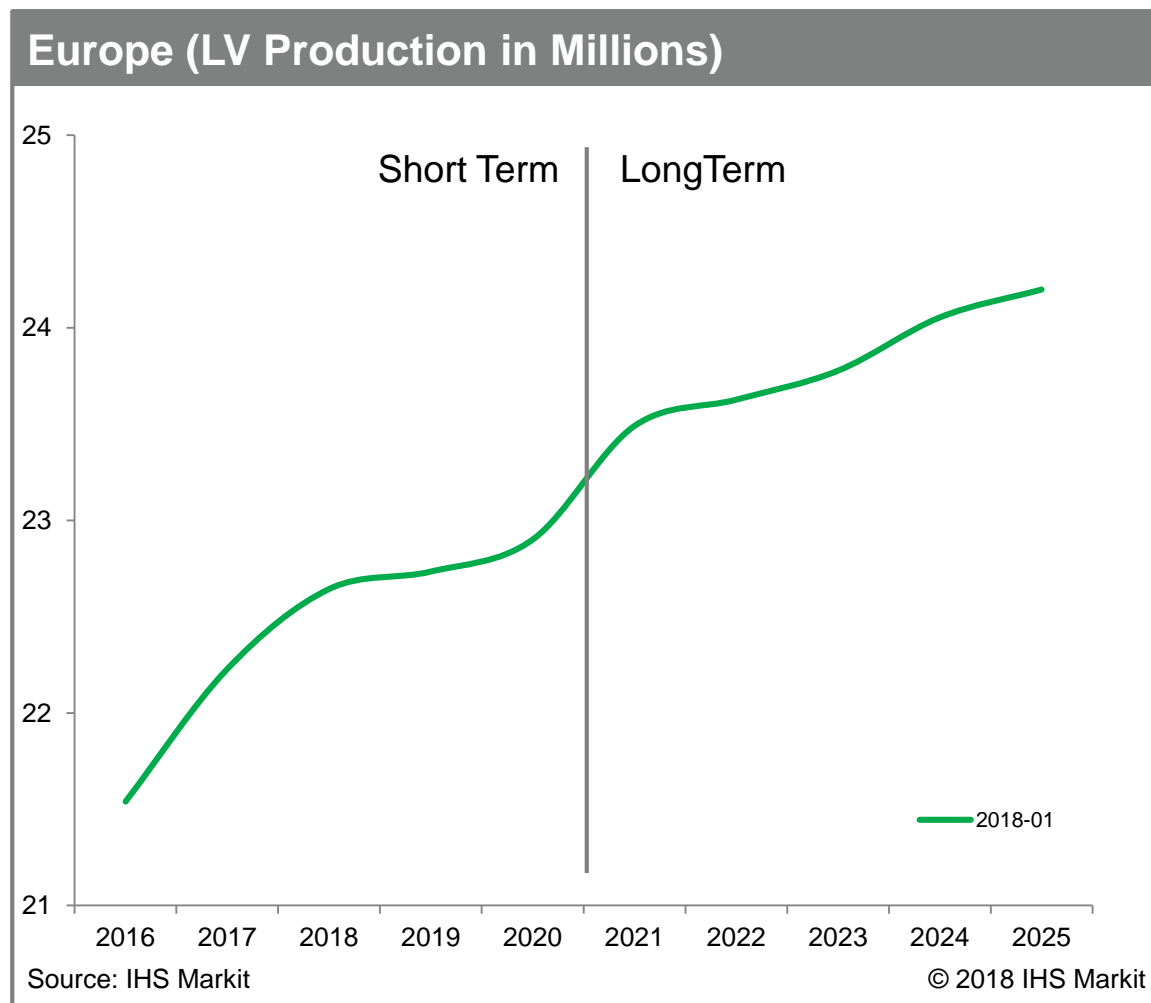
# Global Light Vehicle Production Outlook

## Advanced vs. Emerging Markets



# European Light Vehicle Production Outlook

## Short Term Growth and Long Term Risk



### Short Term 2017-2020:

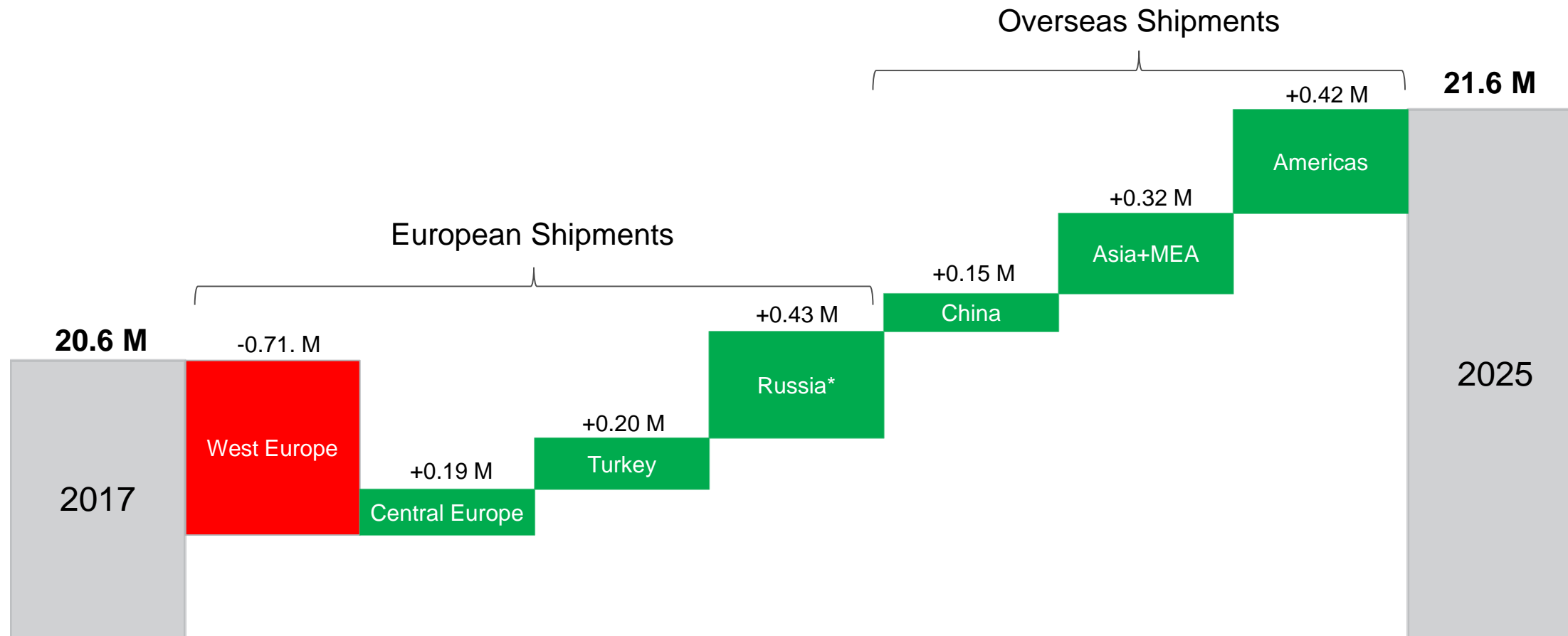
- **Better than expected** market demand in Western Europe
- **Russian market recovery** with more dynamic momentum
- The **BREXIT** slump has yet to take full effect in 2018, with other Western European markets cooling down in growth a bit

### Long Term 2021 – 2025:

- Increased visibility on OEM's zero emission vehicle strategies, showing a more **aggressive BEV launching phase** in the 2019-2021 time frame.
- Although **export ratio** is considerably lower (20%) than in Japan (ca. 50%). The Export ratio of premium brands is at 40%, the risk being **further localization**
- But without **exports to overseas markets** Europe would be as slumping as Japan and Korea

# European\* Exports will continue to define growth in the mid-term

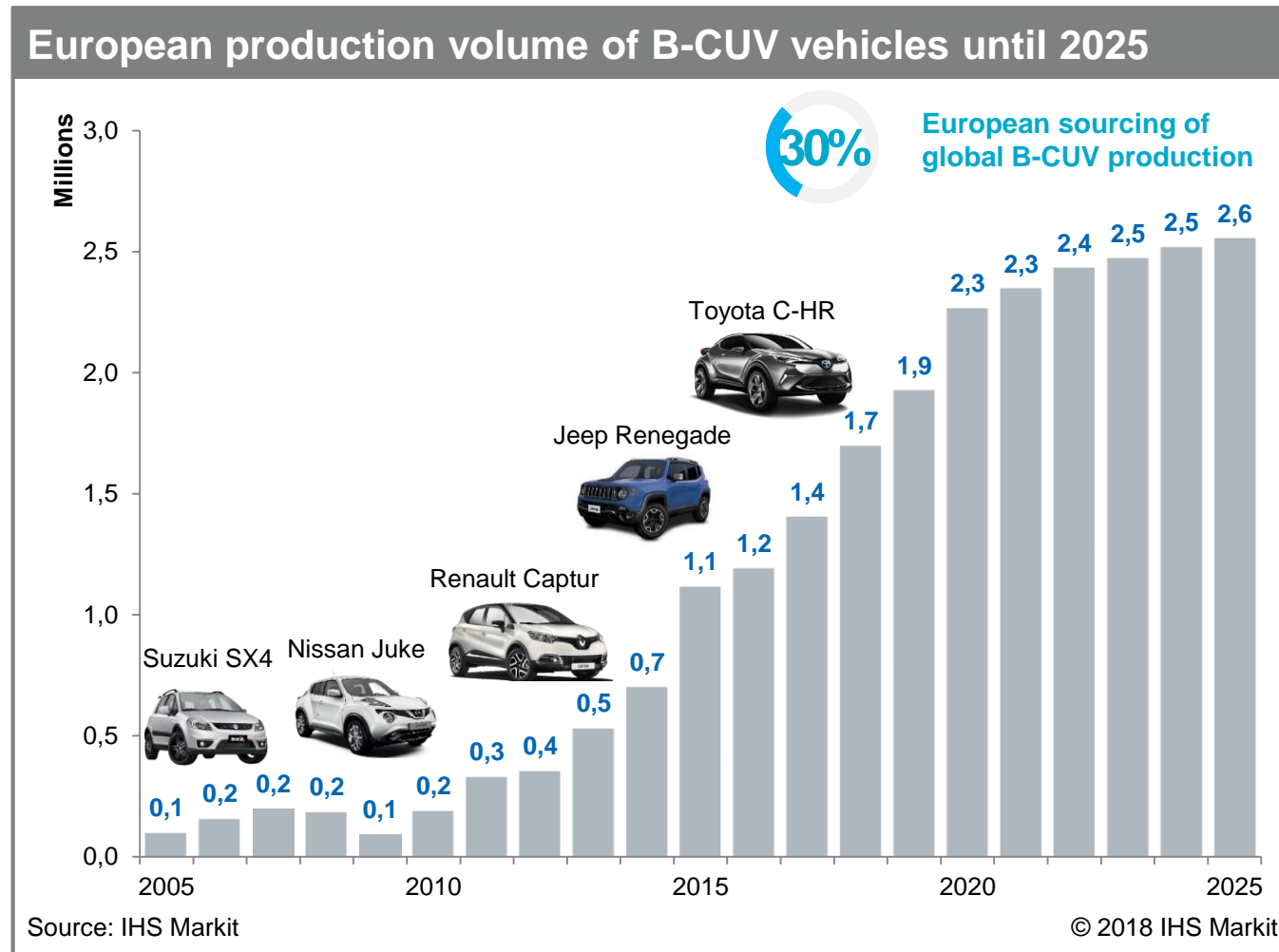
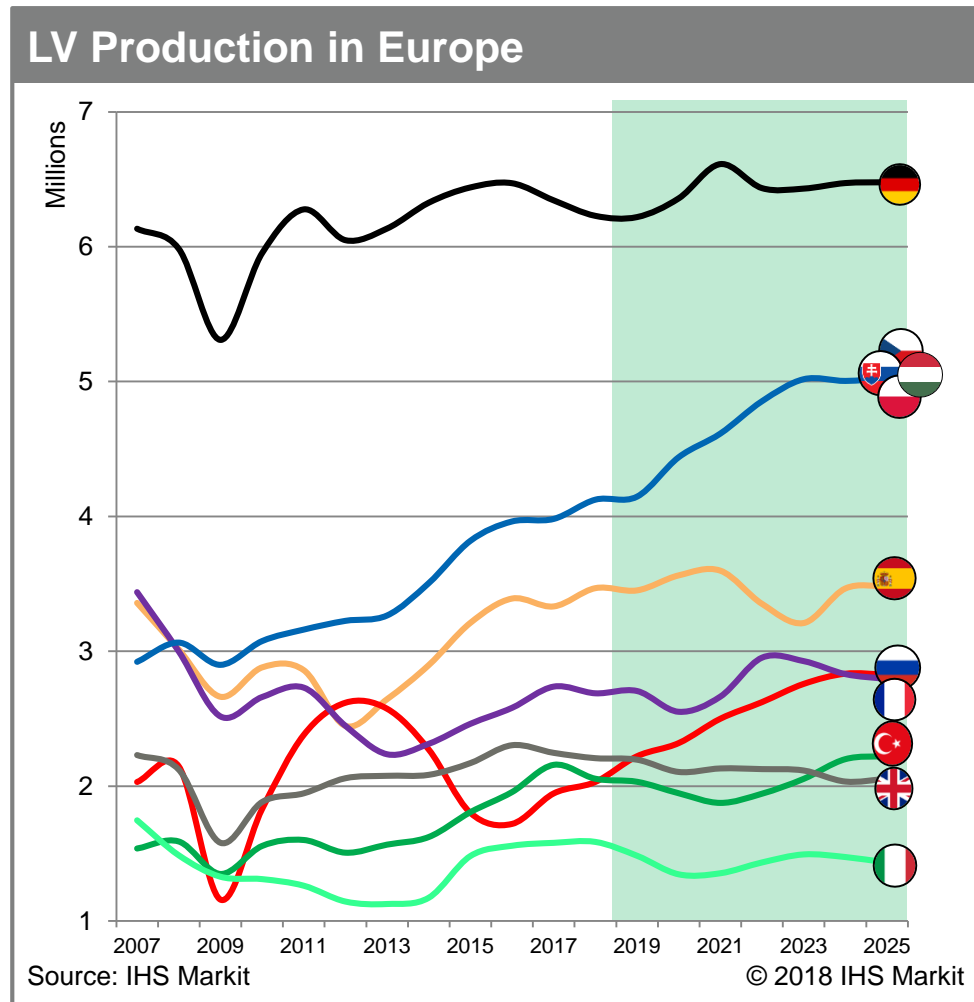
2017 to 2025 production growth by export destination



\*European production without Russian output

# European Light Vehicle Production Outlook

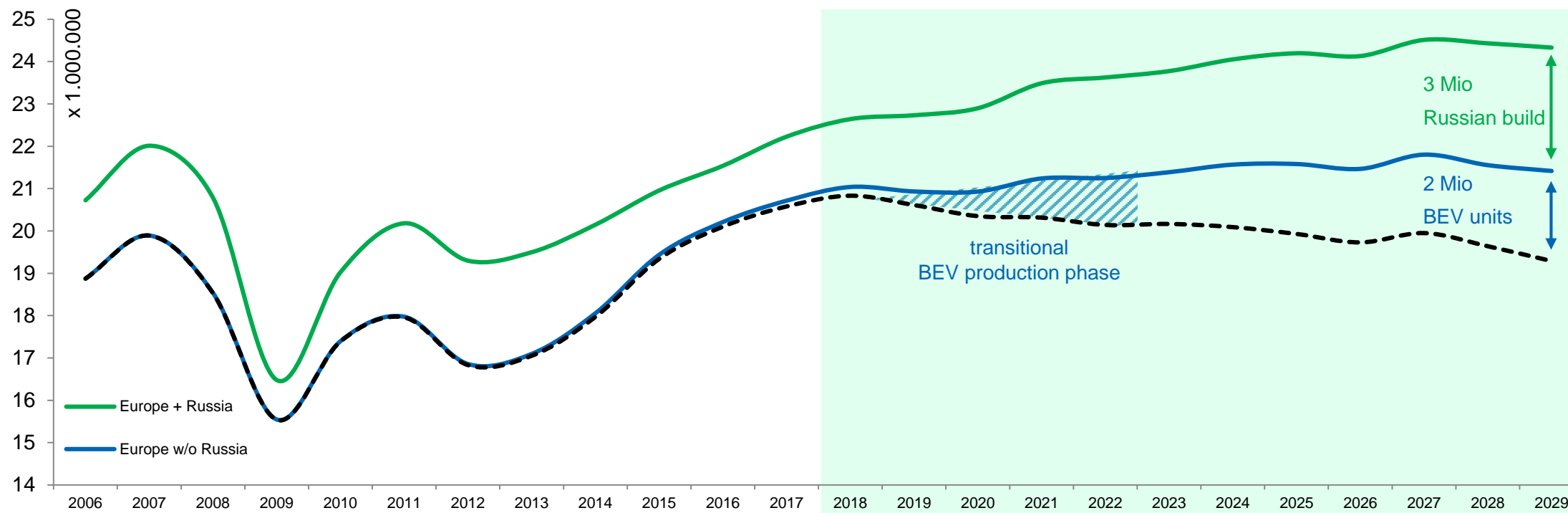
## Growth Trend for countries and Segments



# European Light Vehicle Production Outlook

European\* Light Vehicle Production is facing a critical transition

## European Light Vehicle Production Forecast



Source: IHS Markit

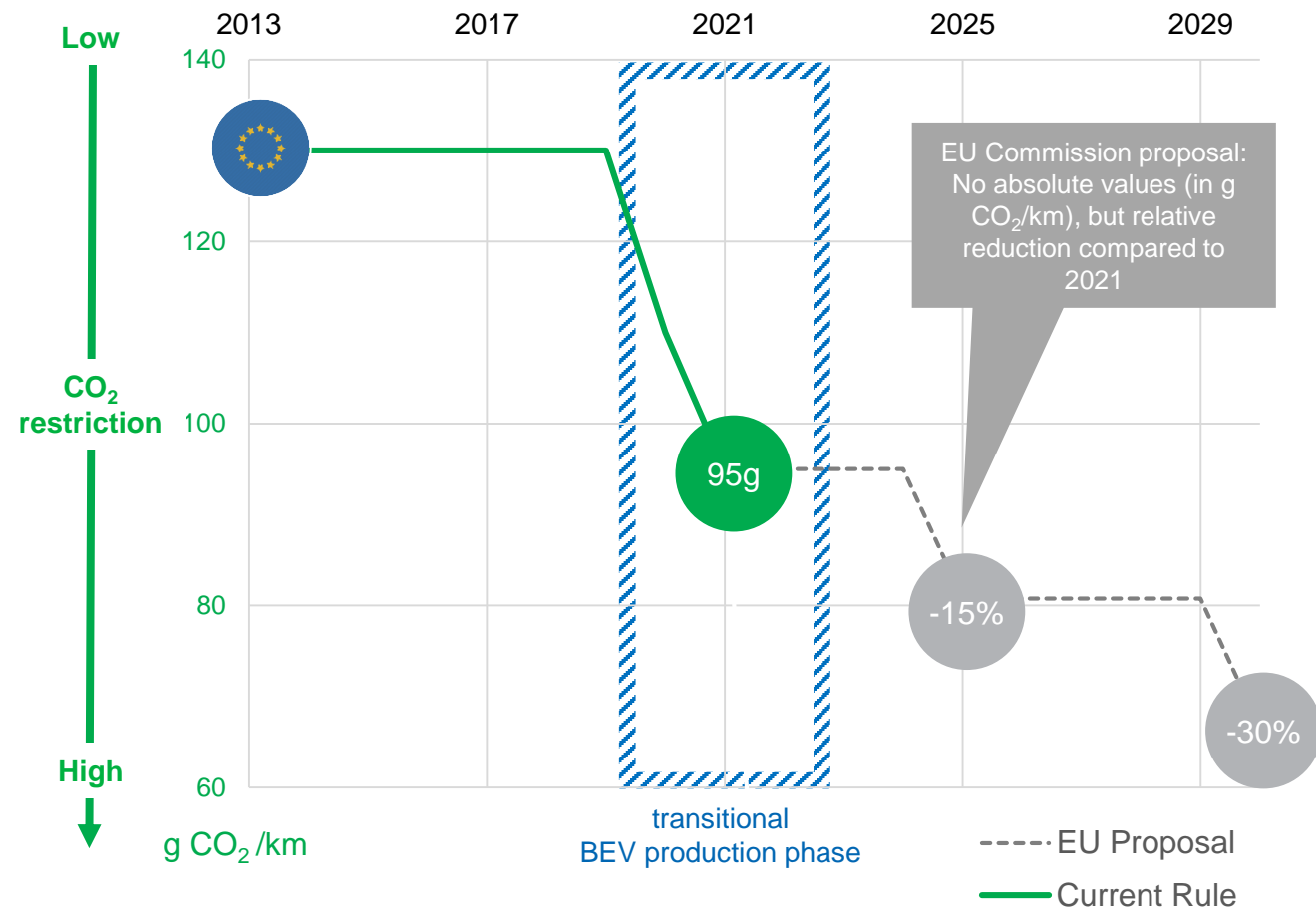
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- **2019-2022: critical transitional phase for BEV production** in Europe, triggered by VW Group's first electrification wave and its MEB platform.
- 2030: BEVs with a more dynamic outlook → 2016-2029 CAGR : 24.5% vs overall market 0.5%. (Production w/o BEVs = -0.3%)



# Legislation & Regulation are a driving force for EVs

Europe: New targets are designed to spur investment in electrification



The EU has a current target of **130 g Co2/km**.

- By **2021**, the target is significantly reduced to **95 g Co2/km**
- In November 2017, the EU Commission has made a proposal to reduce CO2 emissions for cars:
  - **-15% by 2025**
  - **-30% by 2030**

### Outside of Europe:



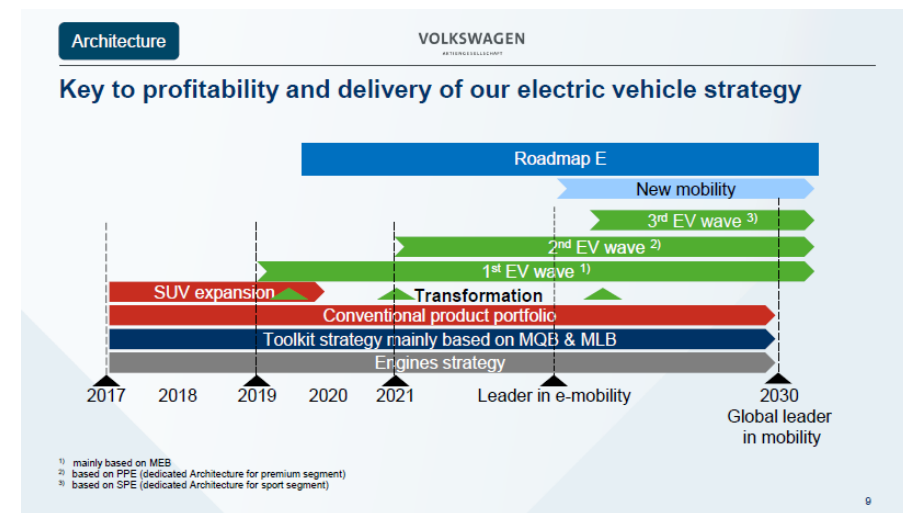
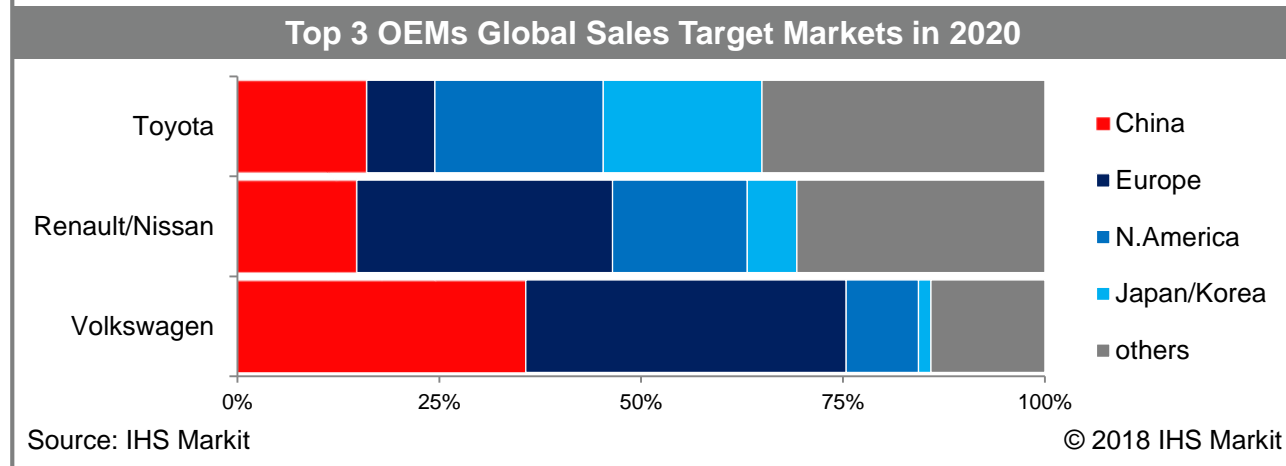
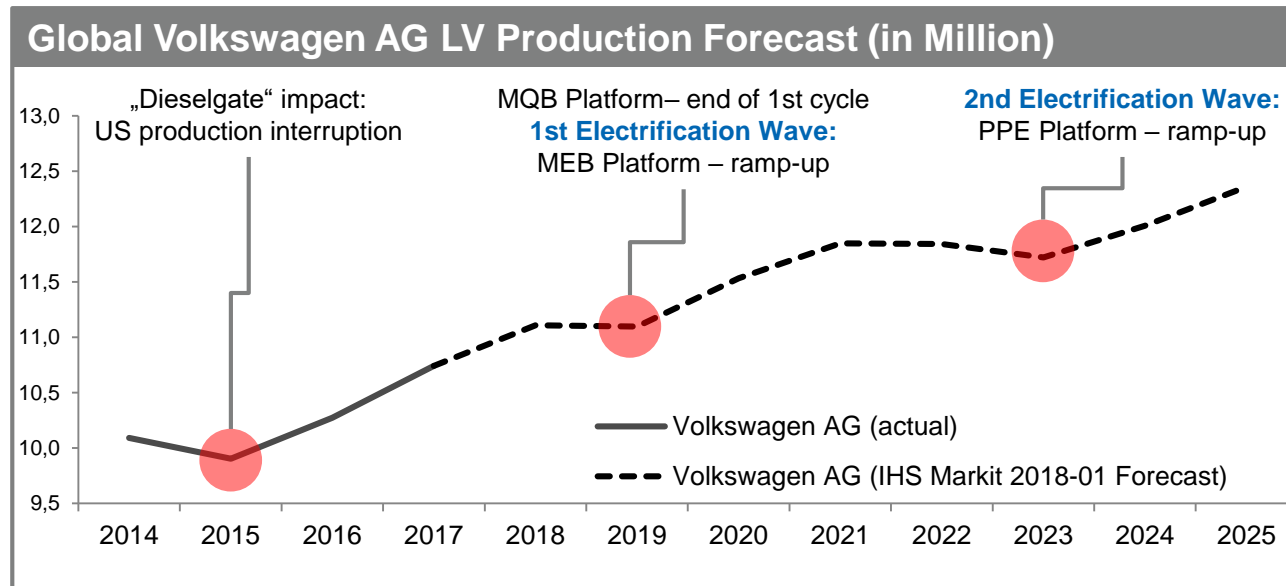
USA: **ZEV Mandate** in California and Northeastern US (Section 177 States)



China: Government set **NEV quota** + local government set city **entry restrictions**

# Volkswagen AG Forecast

## Managing the transition to an electrified global OEM



Source. Volkswagen AG presentation: 5-Year Planning Round: Groundwork to Deliver Strategy 2025

- It is not a coincidence that VW Group's EV Strategy is in line with tightening regulations in VW's core markets
- VW is most dependent on highly regulative markets like China and Europe
- Renault/Nissan and Toyota have a much more globally diversified sales footprint, and therefore not under immediate compulsion to meet regulations

# Volkswagen AG's model portfolio (r)evolution

## SUVs and BEVs are surging

|                  |                         | SUV Expansion  |                   |                     |                          |                      |                        |              | 2023 | ID Aero Wagon    |  |
|------------------|-------------------------|----------------|-------------------|---------------------|--------------------------|----------------------|------------------------|--------------|------|------------------|--|
|                  |                         |                |                   |                     |                          |                      |                        |              | 2022 | ID Buzz          |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2021 | ID Lounge        |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2021 | ID Aero          |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2020 | Mission E Wagon  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2020 | Vision E Coupe   |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2020 | Vision E         |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2020 | C-CUV e-tron     |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2020 | ID Crozz         |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2020 | Seat C-Hatch EV  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2019 | e-tron Sportback |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2019 | ID               |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2019 | Mission E        |  |
|                  |                         |                |                   |                     |                          |                      |                        |              | 2018 | e-tron           |  |
| segment          | low-cost brand          | A              | B                 | C                   | D                        | E                    | BEV                    |              |      |                  |  |
| + Models added + | 2020  C-Sedan*          |                | 2019  Skoda B-CUV | 2017  T-Roc         | 2018  Kodiaq GT          | 2019  Cayenne Coupe  | 2019  e-tron Sportback |              |      |                  |  |
|                  | 2019  C-CUV*            |                | 2018  T-Cross     | 2017  Karoq         | 2018  Atlas/Teramont Cp. | 2018  Q8             | 2019  ID               |              |      |                  |  |
|                  | 2019  C-Hatch*          |                | 2017  Virtus*     | 2016  C-Trek*       | 2018  Seat D-CUV         | 2017  Panamera Wagon | 2019  Mission E        |              |      |                  |  |
|                  |                         |                | 2017  Arona       | 2016  Q2            | 2016  Atlas/Teramont*    | 2017  Panamera Wagon | 2019  Mission E        |              |      |                  |  |
|                  |                         |                | 2016  Ameo*       | 2016  Ateca         | 2016  Ateca              | 2016  Kodiaq         | 2016  Phideon          | 2018  e-tron |      |                  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
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|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
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|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
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|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   |                     |                          |                      |                        |              |      |                  |  |
|                  | - Models discontinued - | 2019  Fox*     | 2019  Fox*        | 2015  Praktik       | 2015  Altea              | 2022  Alhambra       | 2016  VW Phaeton       |              |      |                  |  |
| 2019  Mii 3D     |                         | 2019  Mii 3D   | 2015  Roomster    | 2015  Eos           | 2022  Sharan             |                      |                        |              |      |                  |  |
| 2019  Mii 5D     |                         | 2019  Mii 5D   | 2016  Ibiza Wagon | 2016  Golf Cabrio   |                          |                      |                        |              |      |                  |  |
| TBD  Citigo 3D   |                         | TBD  Citigo 3D | 2016  Polo 3D     | 2016  Scirocco      |                          |                      |                        |              |      |                  |  |
| TBD  up! 3D      |                         | TBD  up! 3D    | 2016  Polo 3D     | 2017  Yeti          |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2017  Gol 3D*     | 2018  Yeti          |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2017  Ibiza 3D    | 2019  Beetle        |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2018  A1 3D       | 2019  Beetle Cabrio |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2020  Spacefox*   | 2019  A3 3D         |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2020  Gol 5D*     | 2019  A3 3D         |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2020  Voyage*     | 2019  Rapid         |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   | 2020  Leon 3D       |                          |                      |                        |              |      |                  |  |
|                  |                         |                |                   | 2020  Toledo        |                          |                      |                        |              |      |                  |  |
|                  |                         |                | 2023  A3 Cabrio   |                     |                          |                      |                        |              |      |                  |  |
|                  |                         |                | TBD  Golf 3D      |                     |                          |                      |                        |              |      |                  |  |

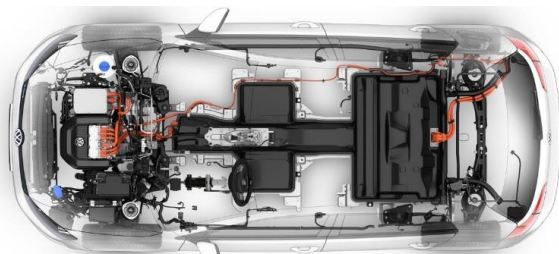
EV Wave

# Platforms for Battery Electric Vehicles

Electrification will be supported in man

## Conventional platform

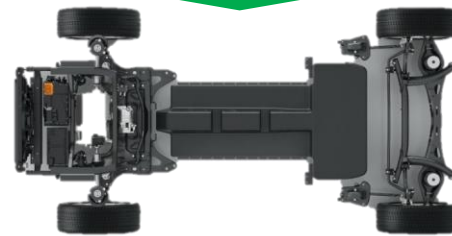
Some conventional platforms can implement batteries, but cannot change the overall architecture to form a battery-driven vehicle assembly.



PSA: CMP Platform

## Multi-energy platform

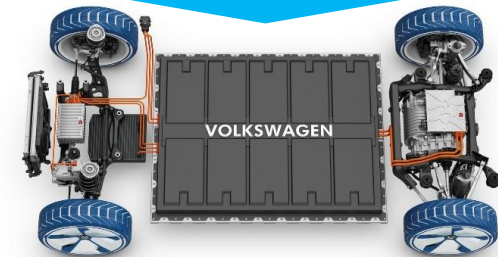
Initially designed to cater to both battery electric and conventional powertrain vehicles. Structure is not skateboard style but is more flexible than a conventional platform



Volvo: CMA Platform

## Battery electric vehicle (BEV) platform

Platform is designed from scratch and only for pure BEV applications. Skateboard-style architecture, allows for more battery capacity and more interior space with the same vehicle size.



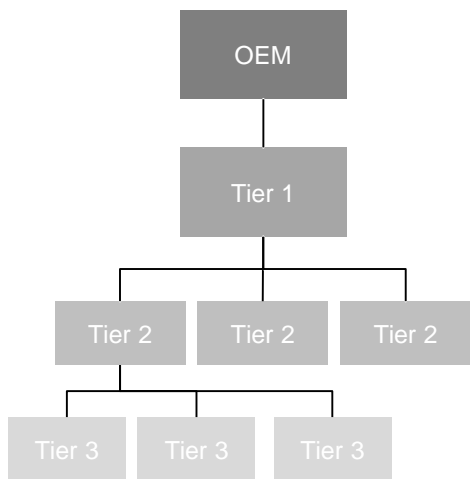
Volkswagen: MEB Platform

# “Electric Mobility will change the conventional supply chain”\*

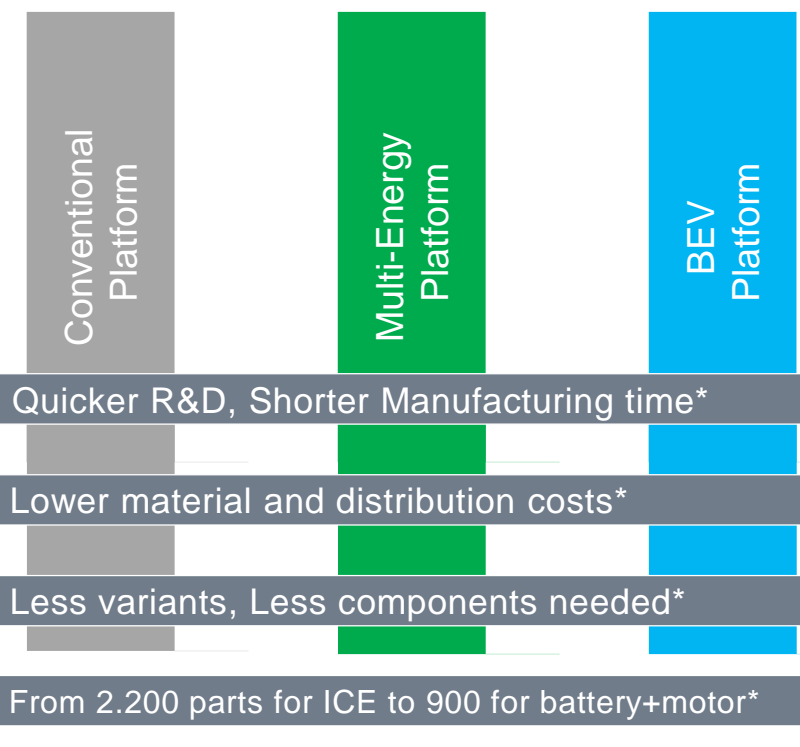
Implication for future BEV platform concepts

“Electric mobility will change the conventional supply chain!  
It offers the chance to reengage in the client-supplier relationship”  
Frank Welsch, Head VW brand R&D, Volkswagen AG

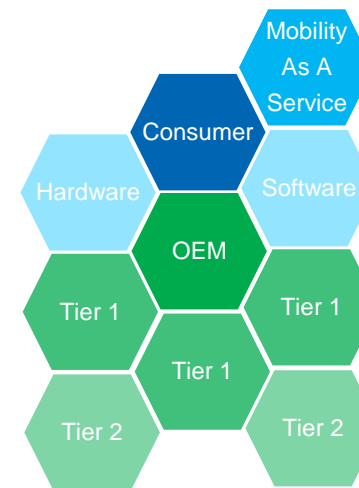
## Traditional Automotive Supply Chain



## Vehicle Platform Design



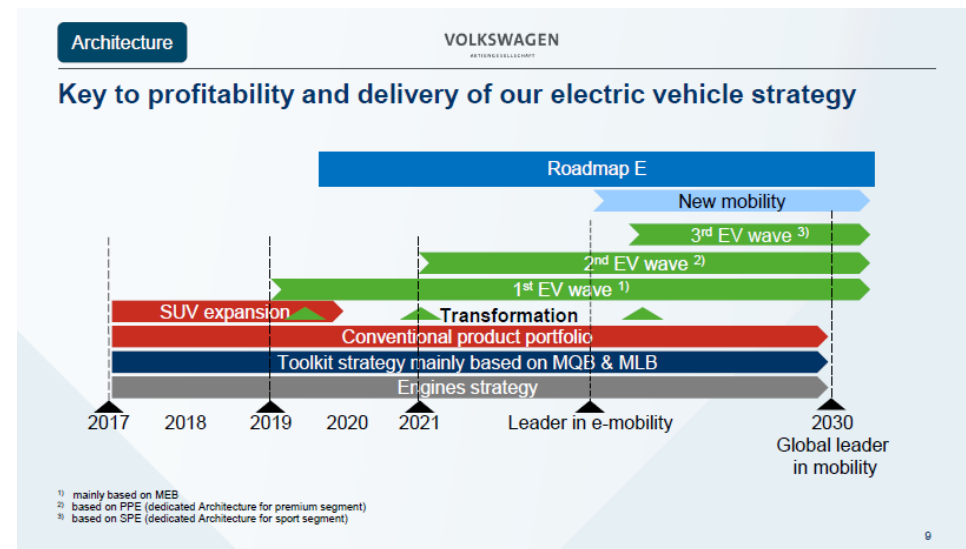
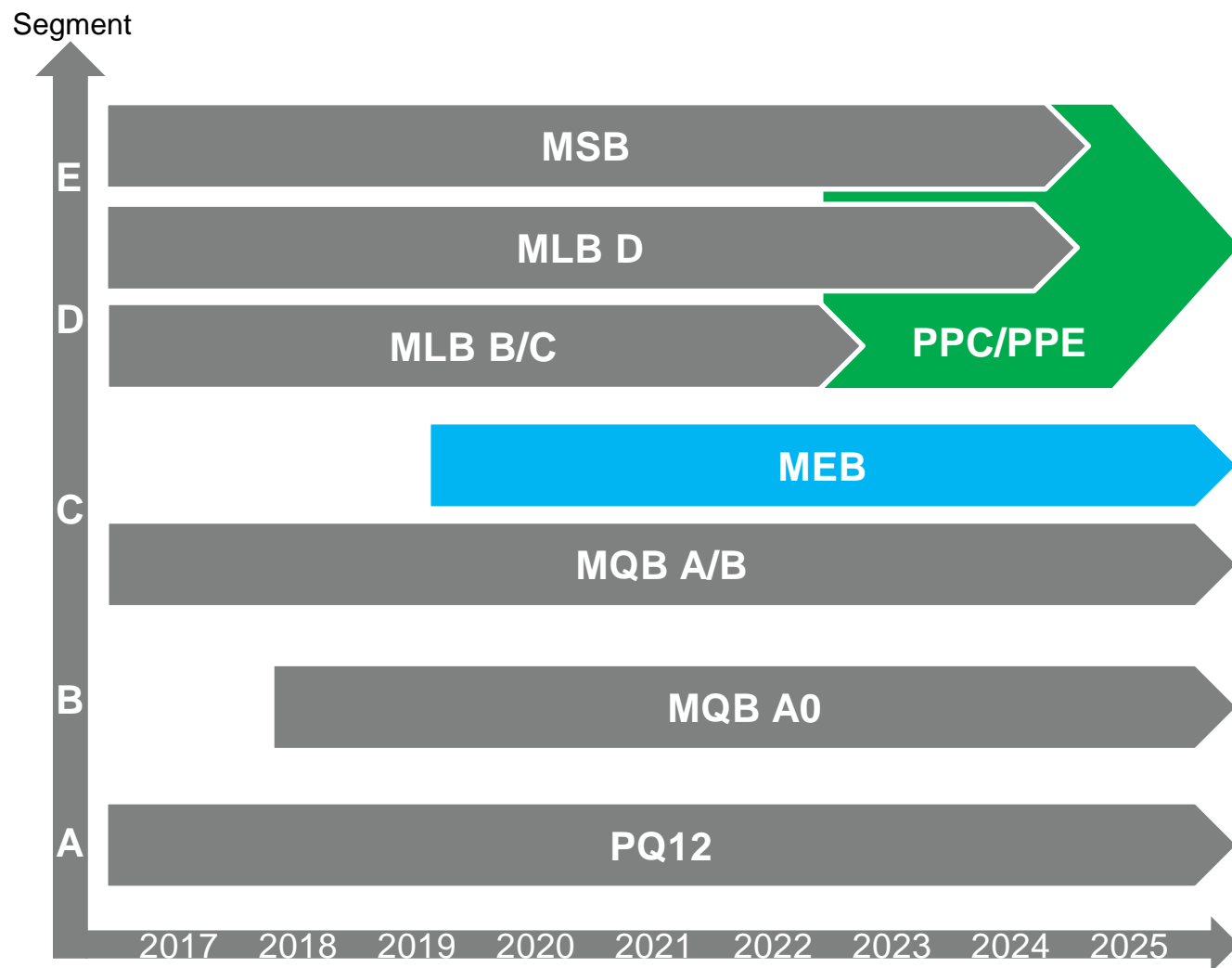
## Future BEV Automotive Supply Chain (?)



\* official VW AG Strategy 2025 announcements

# Future Platform Strategies

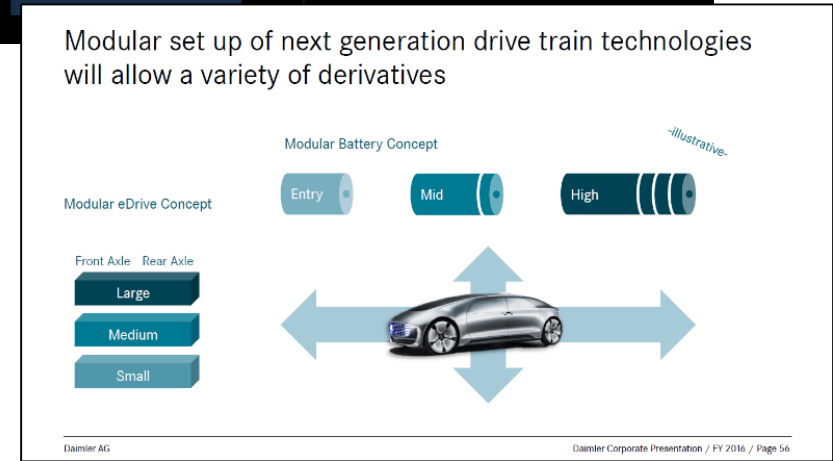
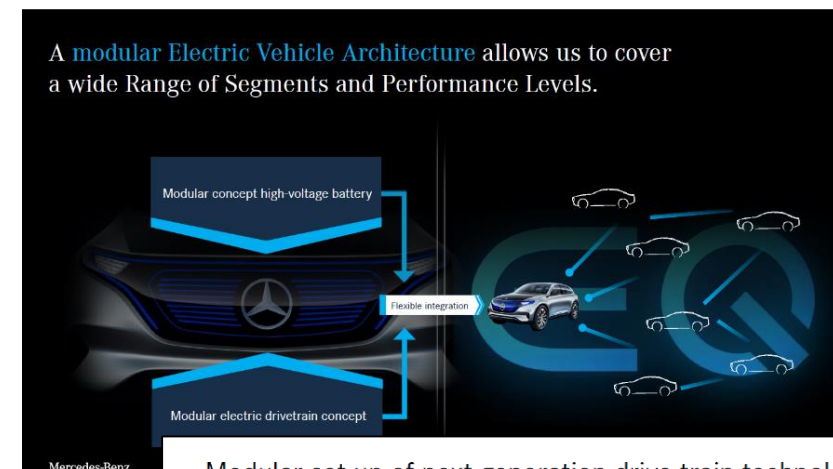
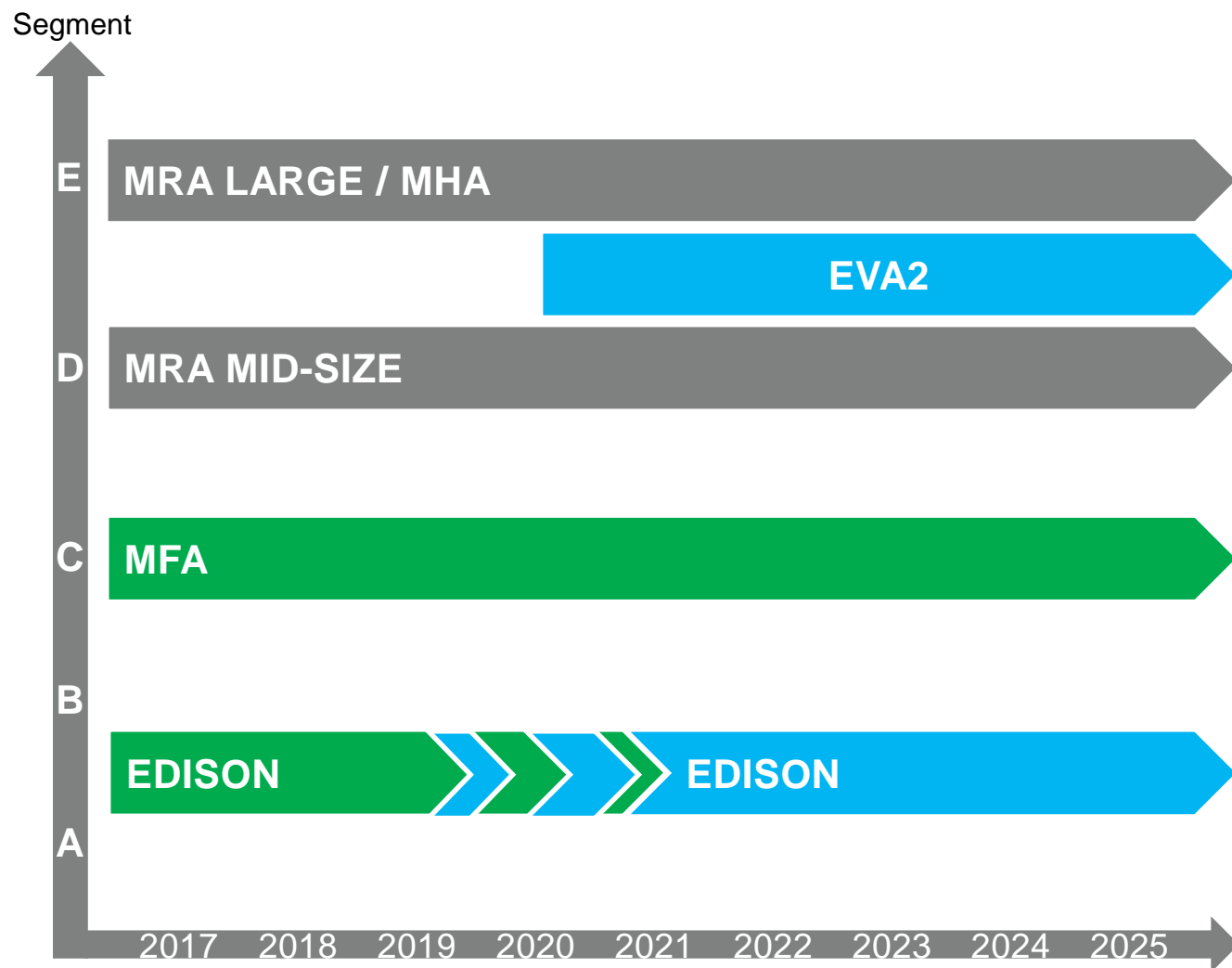
Volkswagen AG – electrification through platform diversification



Source: Volkswagen AG presentation: 5-Year Planning Round: Groundwork to Deliver Strategy 2025

# Future Platform Strategies

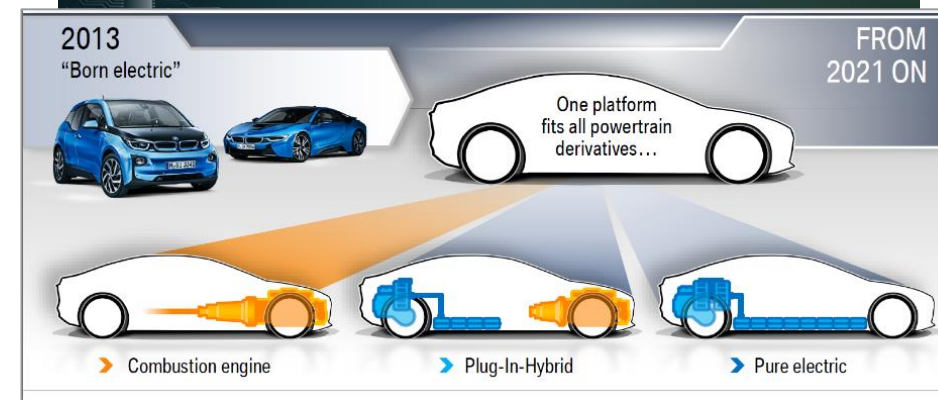
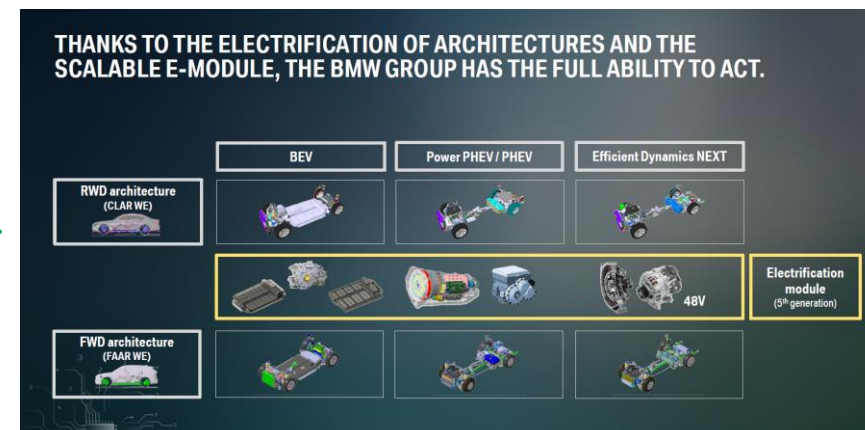
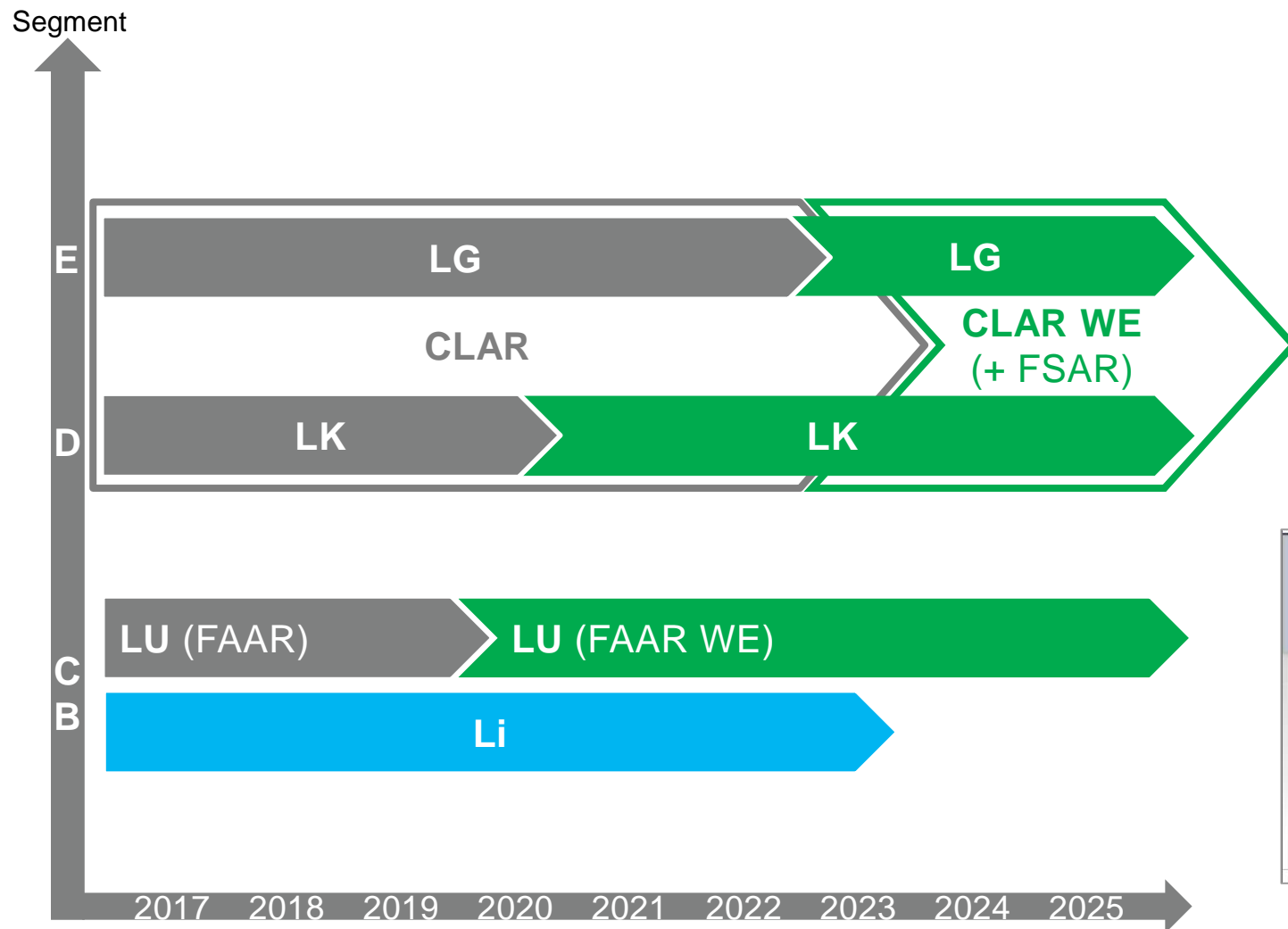
## Daimler— A bet on full battery electric platforms



Source: Daimler Capital Market Day 2017

# Future Platform Strategies

## BMW Group– Learning from past experiences



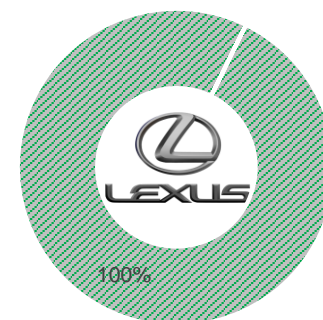
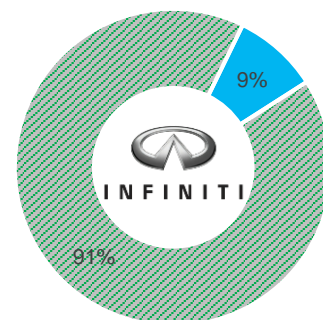
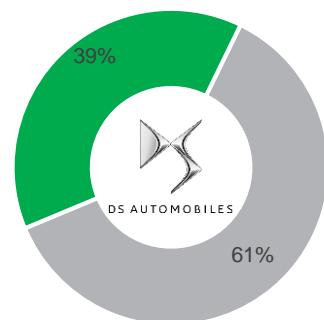
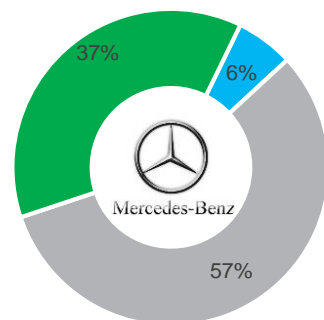
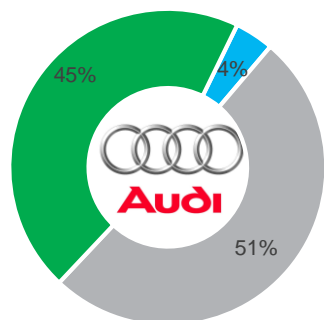
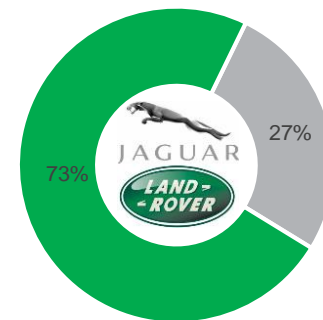
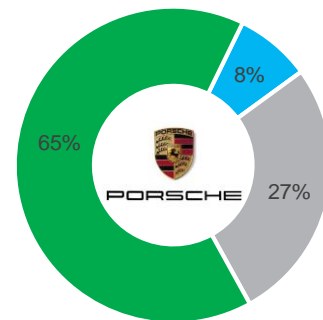
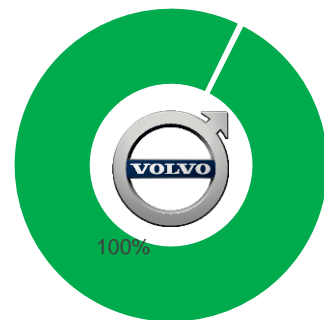
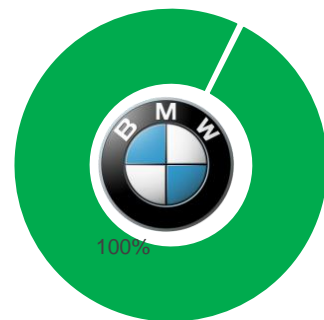
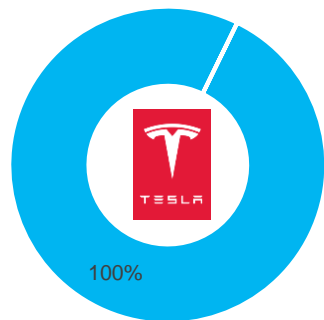
Source: BMW Technology Workshop Dec. 2017



# Future Platform Strategies

Where are the Premium brands heading?

Major platform types in use by 2025 for premium brand passenger cars

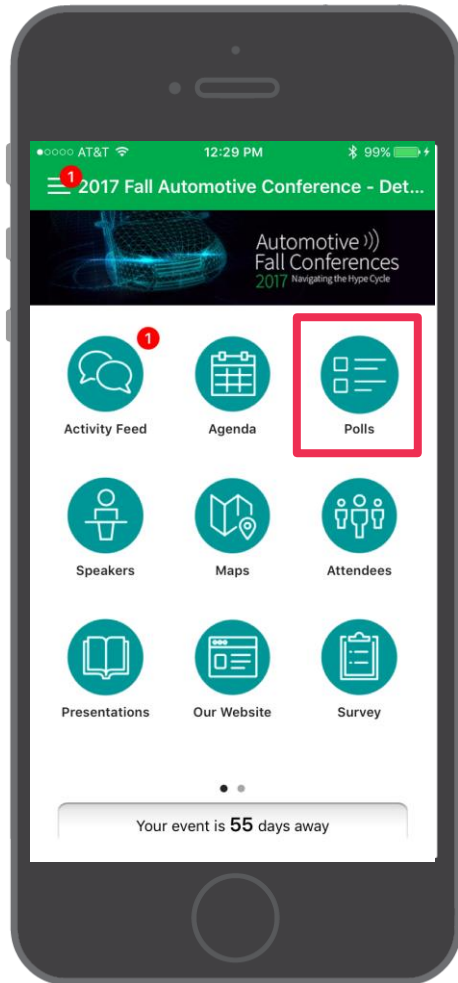


# Pro and Con of Platform types

## Region by Region outlook

|         |   | Conventional platform | Multi-energy platform | BEV platform |
|---------|---|-----------------------|-----------------------|--------------|
| R&D     | Initial Platform cost                               | Yellow                | Red                   | Green        |
|         | BEV launch planning                                 | Red                   | Yellow                | Green        |
|         | Parts purchasing                                    | Green                 | Green                 | Yellow       |
|         | Supplier base choice                                | Green                 | Yellow                | Red          |
| Market  | Market flexibility (ICE vs. BEV)                    | Yellow                | Green                 | Red          |
|         | Volume planning                                     | Red                   | Green                 | Red          |
|         | BEV „experience“ (driveability, range and interior) | Red                   | Yellow                | Green        |
| Pricing | BEV Profitability @ a). Low volumes                 | Green                 | Yellow                | Red          |
|         | b). High volumes                                    | Red                   | Green                 | Green        |

# POLL QUESTION!



Looking at future platform strategies, which of the following European premium brands is best prepared for the market environment in 2025? (either EV boom or EV slump)

- Audi
- BMW
- Mercedes-Benz
- Porsche
- Volvo

Access this poll on the event app!

# BEV Transition on plant level

How to? The story of VW's Mosel facility becoming a pure BEV, MEB platform plant

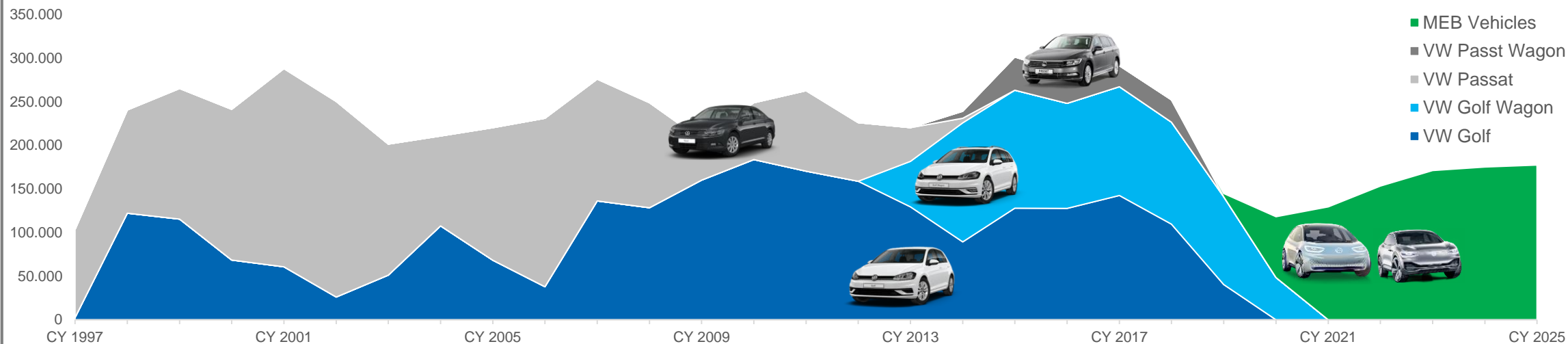
## VW Mosel Plant

**Plant Foundation:** 1990  
**Capacity:** 1350 vehicles per day  
**Employees:** 7.700  
**Brands produced:** Volkswagen

## VW Mosel „MEB plant“:

**Transformation date:** 2019 until 2021  
**Capacity:** increase to 1.600 vehicles per day  
**Employees:** -1000 employees less (retirement)  
 +400 new employees (trainees)  
**Brands produced:** VW, Audi and SEAT  
**Investment:** Euro 1 Billion (!)

## VW Mosel assembly plant production by model



Source: IHS Markit

© 2017 IHS Markit

## Executive Summary

1. **European production growth is highly dependent on external factors**
  - Local market demand is decreasing, only Russian will be a dynamic force (but has to be viewed independently)
  - Europe is becoming an export hub which is facing a transitional phase to electrification in the 2020s
  
2. **Market Electrification is forced by legislative framework**
  - Europe and China are driving the legislative restrictions, US in selected states
  - European OEMs are more dependent on China and Europe than others...
  
3. **OEMs have three major possibilities to adapt their platform strategies to an electrified future**
  - Conventional
  - Multi-energy
  - BEV

**The Challenge for the OEMs and suppliers is to leverage the investment made in electrification by understanding the potential magnitude of electrification. A difficult task, given the dynamic and emotional nature of that topic**

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