

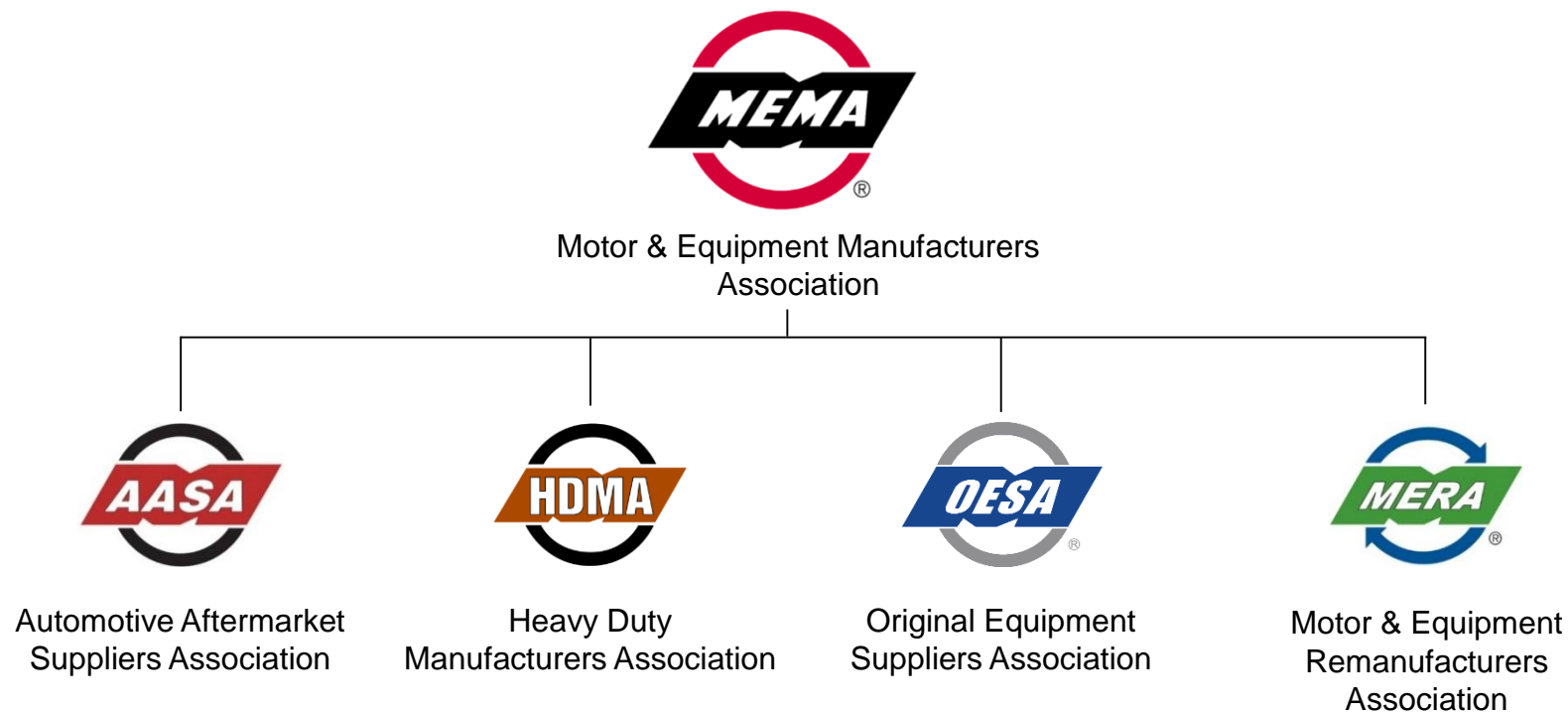
# The Impact of Technology Change on the Automotive Component Industry

2018 Global Auto Summit  
New Delhi

Brian Daugherty  
Chief Technology Officer

# Serving Vehicle Suppliers Since 1904

MEMA is the trade association for motor vehicle suppliers including parts manufacturers and remanufacturers. Our members supply both the original equipment and aftermarket segments of the light vehicle (car and truck) and commercial vehicle (on- and off-road) industries.



*The voice for the motor vehicle supplier industry*



# Why Suppliers are Key Players



Parts suppliers manufacture more than



**Largest sector of manufacturing jobs in the country**  
**734,000 direct jobs and 3.6m total jobs**

# How Did We Get Here? Decades of Constant Change, but Below the Surface

---

- Mechanical systems became electrically-driven
- Manual switches transitioned to electronic controls
- Addition of displays, touchscreen technology, and advanced HMI
- Sensor technology enabled Advanced Driver Awareness Systems
- ADAS moves from Awareness to Assistance
- Electric actuators (originally for fuel economy) and electronic controls for throttle, steering, and braking
- Platforms are now in place for more advanced automation

# Rapid Change is Still Occurring

---

- Connectivity – Rapid change and investment for the last 10+ years and still increasing
- Fuel Economy and Electrification
  - Began many years ago; driven by government policy, not economics
  - Media attention on BEVs, but volume will primarily be in hybrids
  - Massive increase in EV investment recently (Ex: Ford, German OEMs)
- Automation
  - Significant media hype and investment (no one wants to appear complacent or behind the curve)
  - Payoff and timeframe are both still very unclear except L1 and L2
- Sharing – Lots of hype, but still a very low percentage of VMT

# Preparing for Rapid Technology Change

---

- Requires much larger investment in R&D across many areas
- There is more risk:
  - Picking the wrong technology or timelines
  - OEM volume predictions can be incorrect
  - The best example is hybrid and BEV volumes which didn't come anywhere close to projections
- Cannot fund everything, so we must try to predict which investments will have the greatest payoff in a reasonable timeframe
- Need good internal strategy processes to develop product and technology roadmaps (avoid the hype)

# Still Significant Uncertainty

---

- Fuel economy standards
- Electrification – Hybrids and BEVs
- Vehicle automation
- Artificial Intelligence
- Cybersecurity
- Mobility-on-Demand
- Vehicle and ride sharing

# One Example: US Vehicle Electrification – the Reality

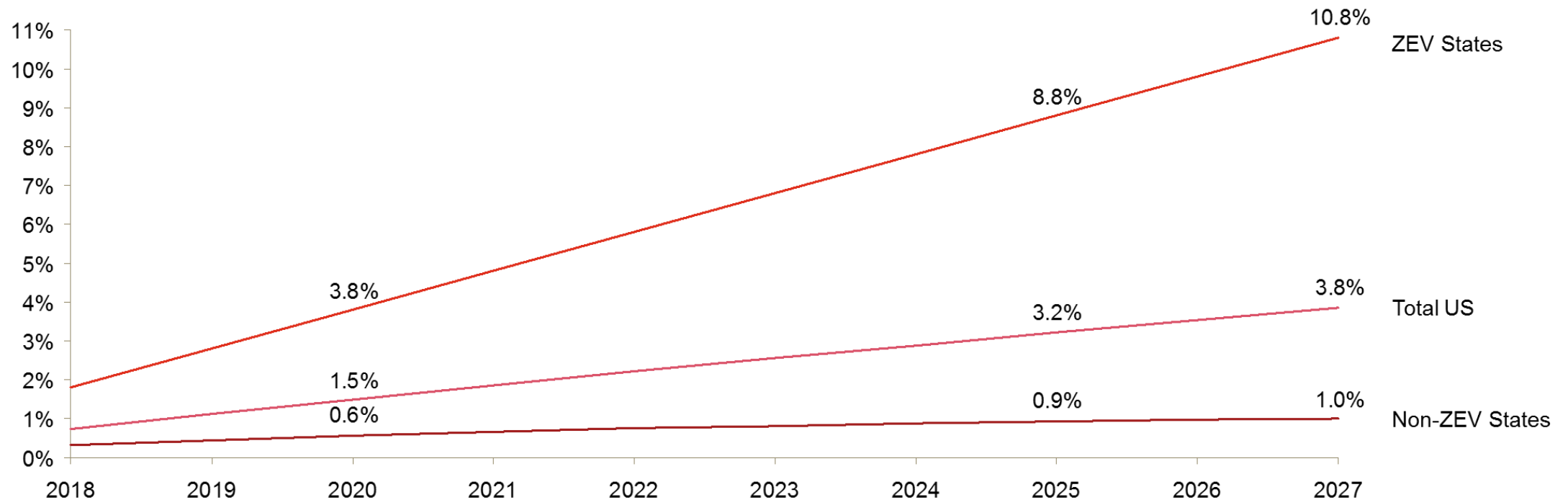
---

- Only about 3% of light vehicles sold in the US are hybrids and about 0.7% of light vehicles sold are BEVs
- Electrification is still being driven by regulation - not economics
  - Fuel economy regulation (Phase II, CAFE, CO<sub>2</sub>)
  - In the case of light vehicles – the ZEV mandate in CA
- Although significant progress has been made, batteries and fuel cells are still too expensive (fuel savings vs. system depreciation)
- Gasoline/Diesel - high energy densities & easy to transport
- Toyota and Mazda – the demise of the ICE has been exaggerated



# US State Government Mandates Are Driving BEV Sales

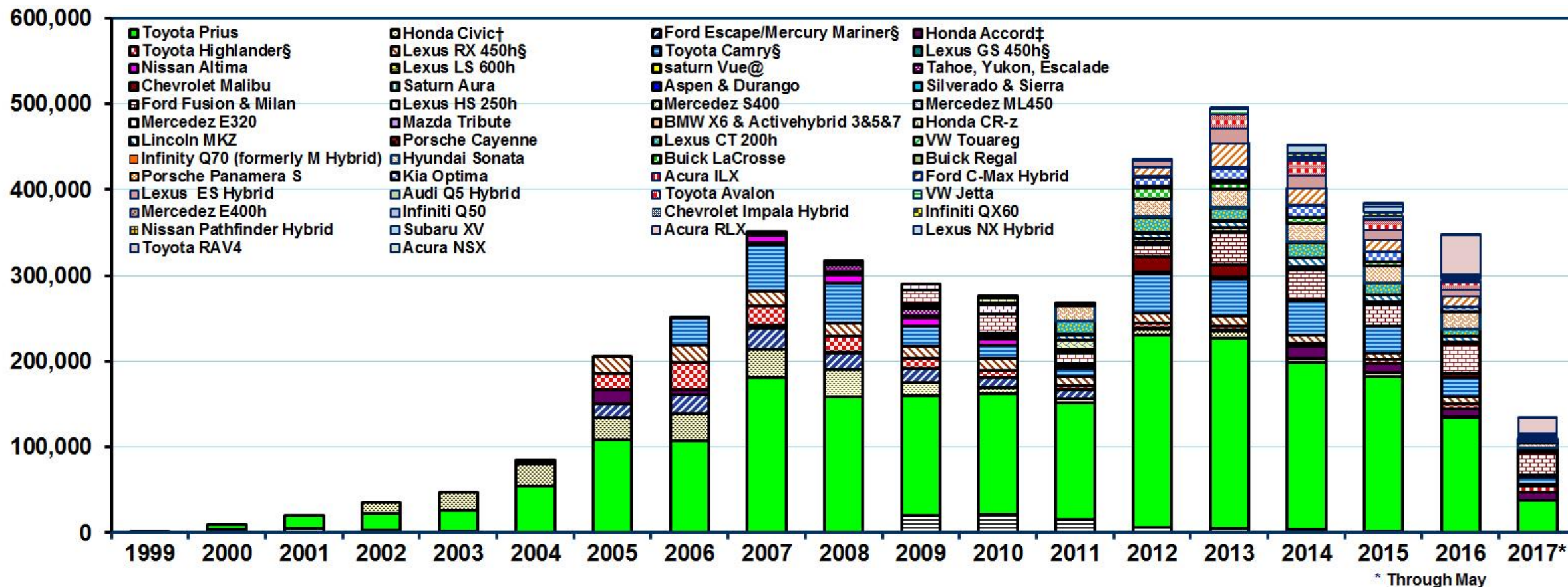
US Light Duty Electric Vehicle New Vehicle Sales (%)  
2018-2027



Note: ZEV (CARB) estimates based on credits produced by 200-mile BEVs  
Source: Bloomberg, EIA, CARB, IHS, Electric Vehicle Transportation Center, Strategy& analysis

# US Hybrid Electric Sales by Model

New HEV Sales



The voice for the motor vehicle supplier industry



Source: Argonne Nat. Labs

# Additional Thoughts on BEVs

---

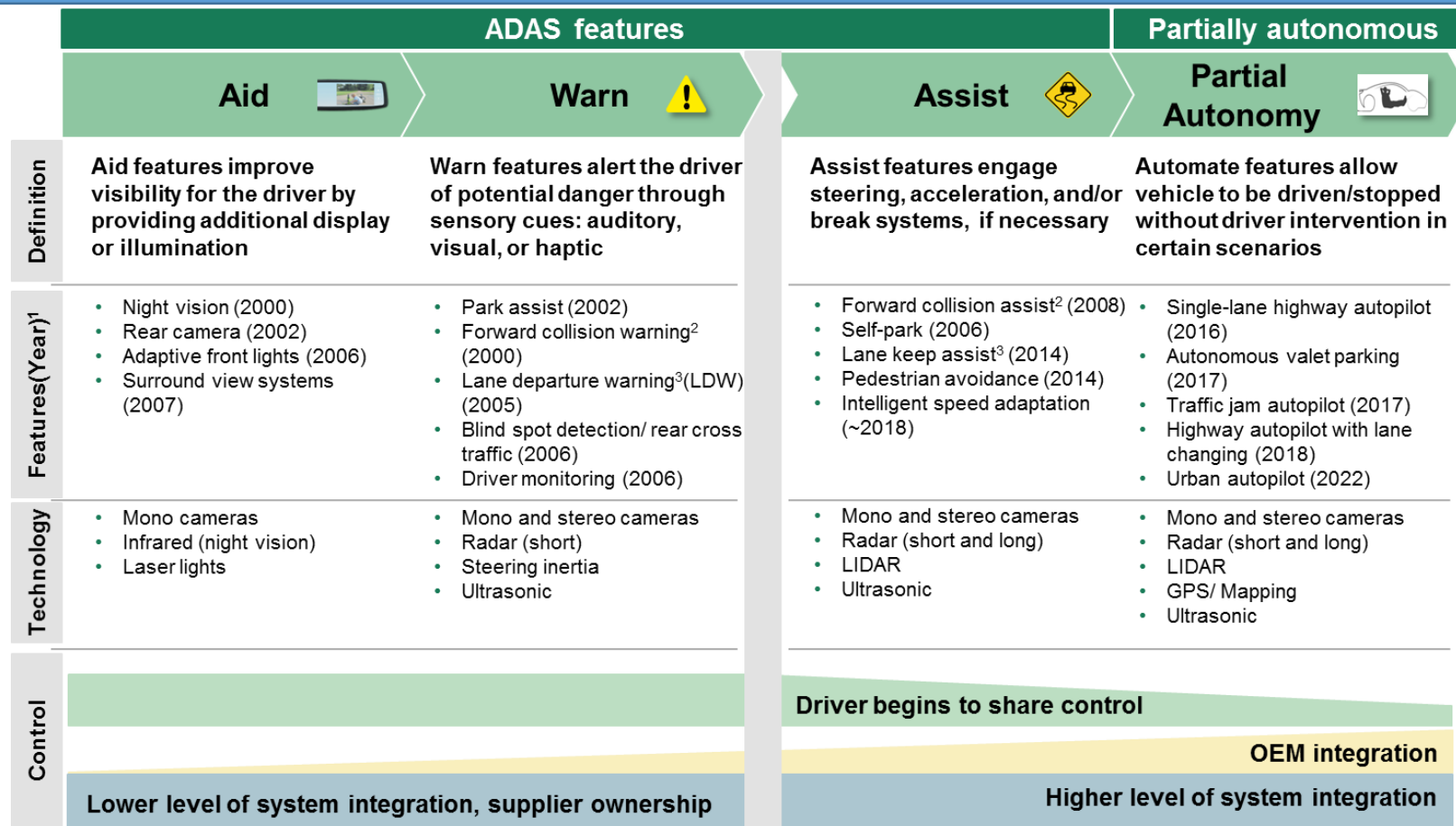
- If 100% of vehicles sold per year in the US were BEVs (~17M), it would require the construction of approximately ten additional full size 1000MW power plants every year. Restated: for every 10% of US vehicle sales that are BEVs, another 1000MW power plant will be required per year.
- Morgan Stanley estimates that if all US vehicles were BEVs, it would require 1/3 of the entire US generating capacity to power them
- Although many forecasts show the rapid “S” curve adoption of BEVs, it is unlikely to happen due to the massive infrastructure required
- Slow steady growth driven by government mandates is more likely

# ADAS and Automated Vehicle Technology

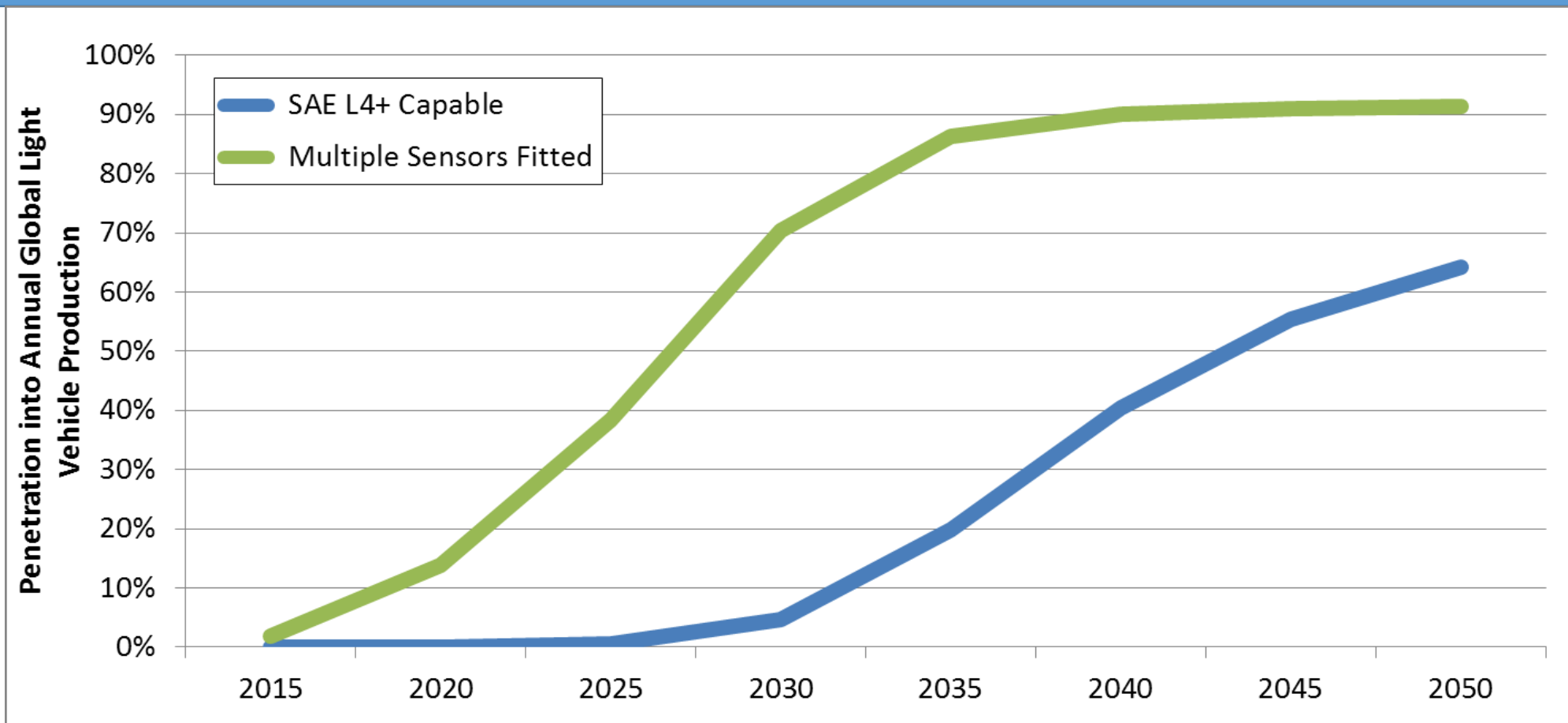
---



# ADAS Features Can Be Grouped into 4 Categories



# One prediction of a Global AV timeline



# How Realistic is This?

---

- Automated vehicle systems are available now (Level 1 and 2)
- Both Waymo (Google) and Apple (Project Titan) appear to be backing off from their initial aggressive approaches
- The media hype versus reality
  - The driving world is full of complex and random events including weather that can confuse and overwhelm automated systems
  - Humans have proven to be amazingly good at handling very complicated and unusual situations (~1 fatality per 90M miles)
  - Very non-linear increase in problem difficulty at higher automation levels
- Fully autonomous L5 vehicles are far in the future, however, we will see limited geofenced trials of early L4 systems in controlled environments starting very soon

# What Will Happen in the Future?

---

- Fuel economy standards will impact the entire supply base:
  - More technology at every level
  - Lightweighting of all components
- Advanced Driver Assistance Systems (ADAS) and lower level automated vehicle technologies are available today and will continue to improve the safety and efficiency of transportation
- Fully autonomous vehicles (Level 5) will take much longer to develop than is commonly believed
- We will see Level 4 vehicles operating in very controlled environments quite soon (Ex: Waymo in Chandler, AZ)



# Key Takeaways

---

- Rapid technology change requires significantly more R&D investment
- Develop good internal technology strategy teams and processes
- Don't let the hype surrounding fully autonomous vehicles distract us from the path to increased ADAS and low-level vehicle automation
- We should not reduce investment in more near-term safety and connected safety technologies including: ADAS and V2V
- Cybersecurity risks and threats will lead to significant changes in vehicle architectures
- Be prepared for significant changes as a wave of advanced vehicle technologies comes into the market

# Thank You

---

**Brian Daugherty**  
Chief Technology Officer  
Motor & Equipment Manufacturers  
Association  
(248) 430 - 5966  
[bdaugherty@mema.org](mailto:bdaugherty@mema.org)