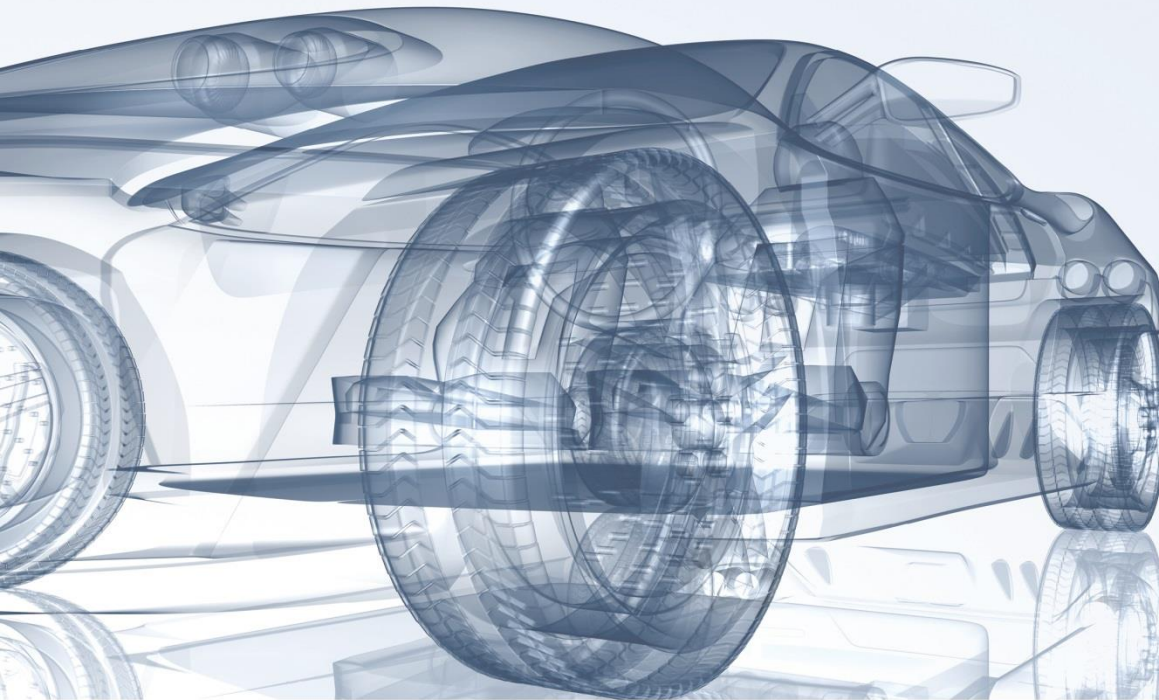


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Driving the green revolution:

Technology advancements enable new efficiencies in electric vehicles (EVs)

Karl-Heinz Steinmetz
General Manager, Powertrain Systems
Texas Instruments (TI)

Agenda

- The driving forces in the automotive market
- The roadmap toward zero-emission transportation
- In-depth: Why the industry embraces 48 Volts
- Conclusion: Technology advancements enable new efficiencies in EVs
- Q&A



The driving forces in the automotive market

1

93 million new vehicles were produced worldwide in 2016^[1]

More than 105 million will be produced by 2021

2

\$324 (USD) of semiconductor content in vehicles manufactured in 2017^[2]

Semiconductor content in vehicles will grow to \$361 by 2021



Sources:

[1] LMC Automotive, 2017

[2] Strategy Analytics, 2017

Presenter: Karl-Heinz Steinmetz, Texas Instruments



3

Advanced driver assistance systems was a \$16 billion market in 2016^[2]

It will more than double to \$37 billion by 2021

4

Global demand for electric and hybrid powertrains will increase 210 percent between 2016-2021^[2]

The roadmap toward zero-emission transportation

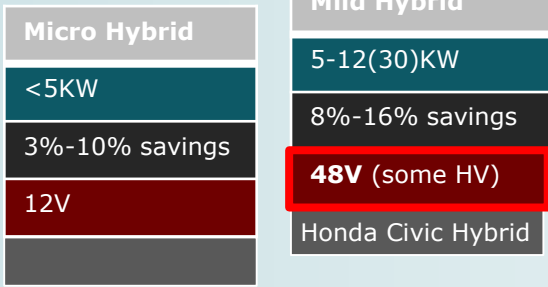


Features

- Start-Stop, most basic level of electrification
- Limited recuperation

- Downsized internal combustion engine (ICE)
- Electric torque assist
- Limited electric propulsion

CO2 Reduction



Electrification

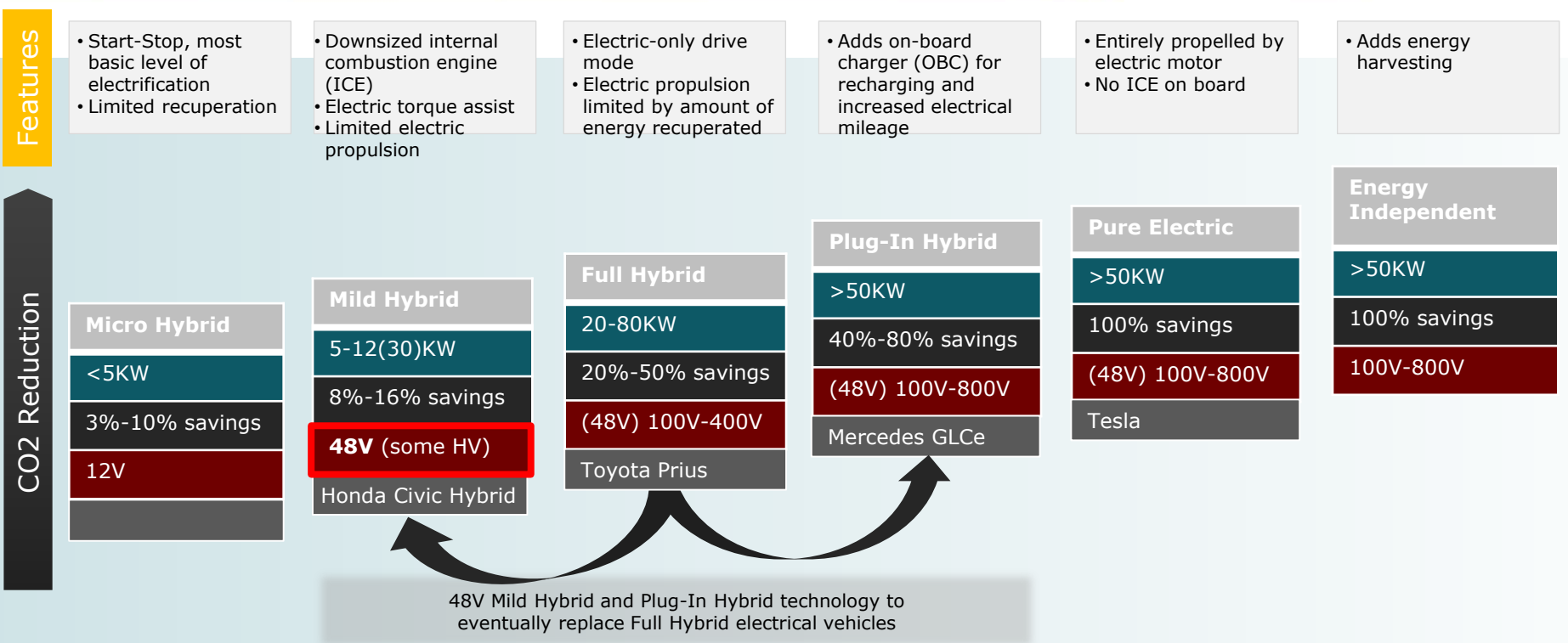
Why the industry embraces smart 48-Volt hybridization



- Lowers fuel consumption and lower vehicle emissions
- Extremely high torque from zero RPM
- Additional electrical propulsion; up to 20kW (27PS) continuously
- Local emission-free (pure electric) driving up to ~35km/h
- Enables “sailing” above 70km/h
- Ability for individual torque vectoring per wheel



The roadmap toward zero-emission transportation



Electrification

Conclusion: Technology advancements enable new efficiencies in EVs



- Worldwide emission standards are currently driving electrification – and semiconductors will play a critical role
- 48V technology offers the best compromise of cost vs. performance to meet both short- and mid-term goals
- Pure EVs require high-voltage technology – which creates new challenges during system design, vehicle assembly and regular maintenance
- Beyond full electrification, why alternative energy (eFuel) may have potential in the future:
 - Reuse existing infrastructure
 - Store renewable energy
 - Enable hybrid cars with CO₂ neutral combustion and local emission-free electric propulsion

Thank you