

Improving EV Performance and Efficiency with Power Electronics

McLaren Applied

28th June 2022



Tier 1 supplier developing and manufacturing future-focussed, sustainable products

Greybull
Capital

McLaren
Group

McLaren
Applied
Technology & Products
Business

McLaren
Racing
F1 and IndyCar

McLaren
Automotive
Supercar Manufacturer



Applied's automotive journey

1993



Automotive
pinnacle
product
supply

Automotive
controllers

2000



World-class
Auto
standards
adopted

Ancillary
controller

2008



Safety
critical
application
development

FAA
accredited
controller

2013



Automotive
pinnacle
product
supply

Automotive
inverter and
motors

2015



World-
leading AV
competence

Dual-lane,
safety critical
controller

2016



Commercial
Vehicle BEV
competence

EV
supervisory
controller

2020



Automotive
pinnacle
product
supply

Automotive
powertrain



Automotive Executives support EV trends



"We are all in on electrification... the inflection point for our company, and our society, has arrived. Now the question is – are you in?"

*Mary Barra
CEO, General Motors*

"Aston Martin and Lagonda will both be EV brands. We will launch our first BEV in 2025"

*Lawrence Stroll
Executive Chairman, Aston Martin*



"We (Rimac) want to be leaders in BEV hypercars and supercars... we focused on 800V from the start"

*Mate Rimac
Founder and CEO, Rimac*

"Bentley's are ferociously quick with effortless refinement. Electrification and Bentley are the perfect partners"

*Adrian Hallmark
CEO, Bentley*



"Commercial vehicles are the foundation of Ford of Europe. By 2024 all our commercial vehicles will be zero emissions capable"

*Stuart Rowley
President, Ford of Europe*

"The pandemic accelerated the drive towards e-mobility... we are now at the tipping point for electrification"

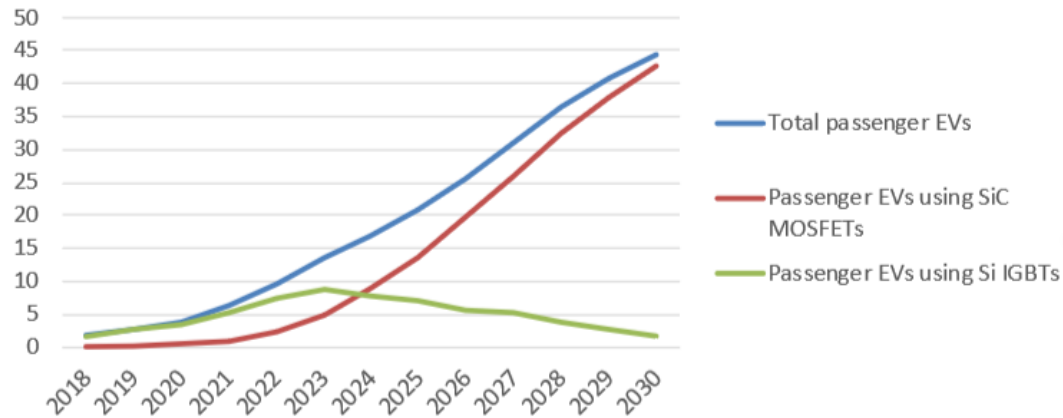
*Patrick Schaufuss
Partner, McKinsey & Company*





EV Industry has reached an inflection point

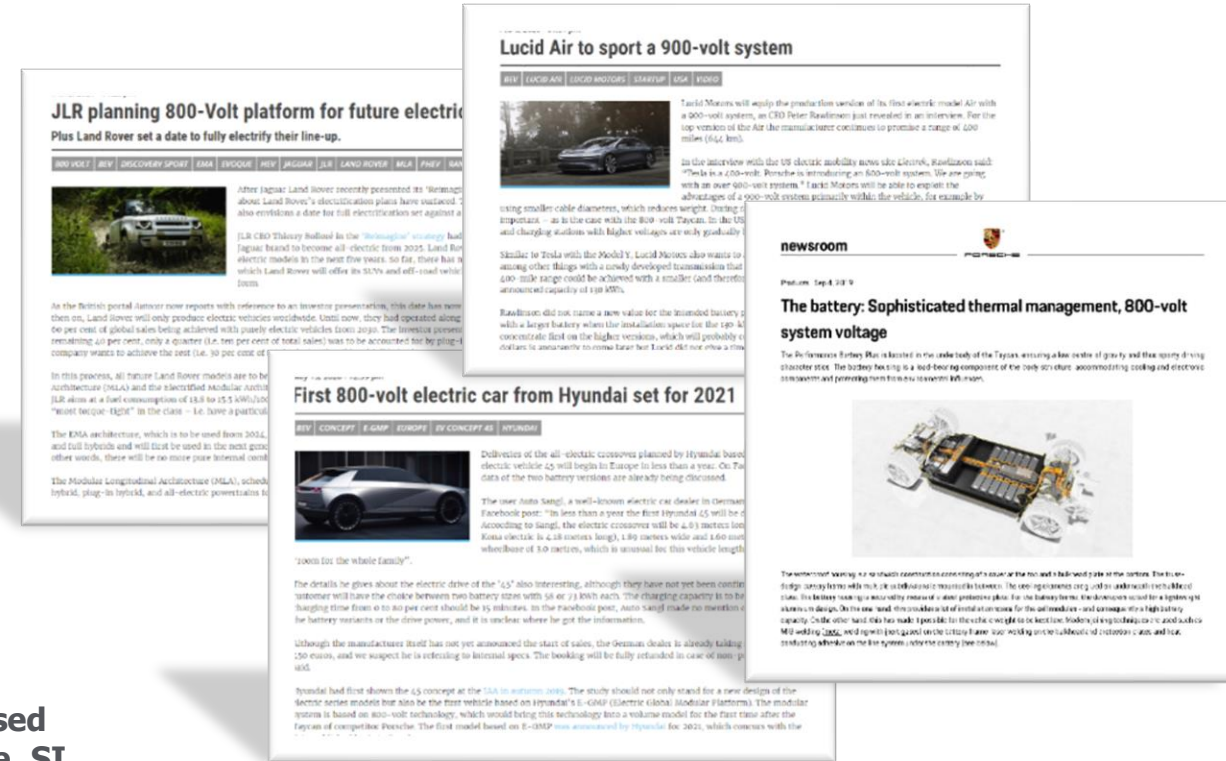
Global passenger EV sales (millions)



Source: Exawatt

Exawatt forecasts that in **2024 sales of passenger EVs that incorporate SiC-based transistors (i.e. SiC MOSFETs) will surpass those based on Si transistors (i.e. Si IGBTs)**

By 2030 Exawatt expects over 95% of passenger BEVs will use SiC MOSFETs in their powertrains. Exawatt expect BEVs will account for more than 50% of annual passenger vehicle sales by 2030.



**Headwinds are well known...
800V and SiC adoption is the future**



Key trends and issues for EV development for OEM's



EV product volumes are rapidly accelerating



Improving powertrain efficiency is key to competitiveness



EV Infrastructure is changing and improving, however...



...**charge** and **range anxiety** and **cost** remain the common concern for consumers



Cost



Weight



Packaging



Range



Thermal Mgt.



Reliability



The McLaren Applied's 800V SiC Inverter addresses these issues



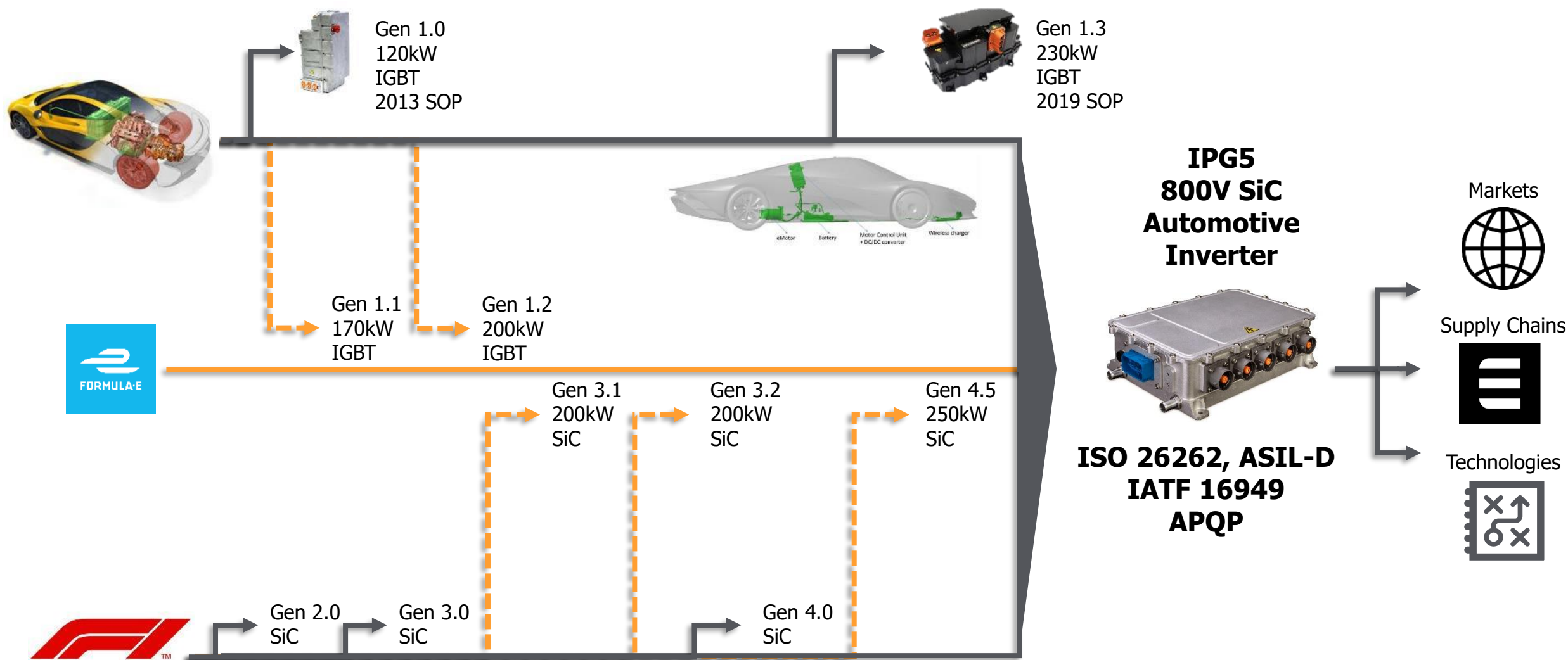
McLaren

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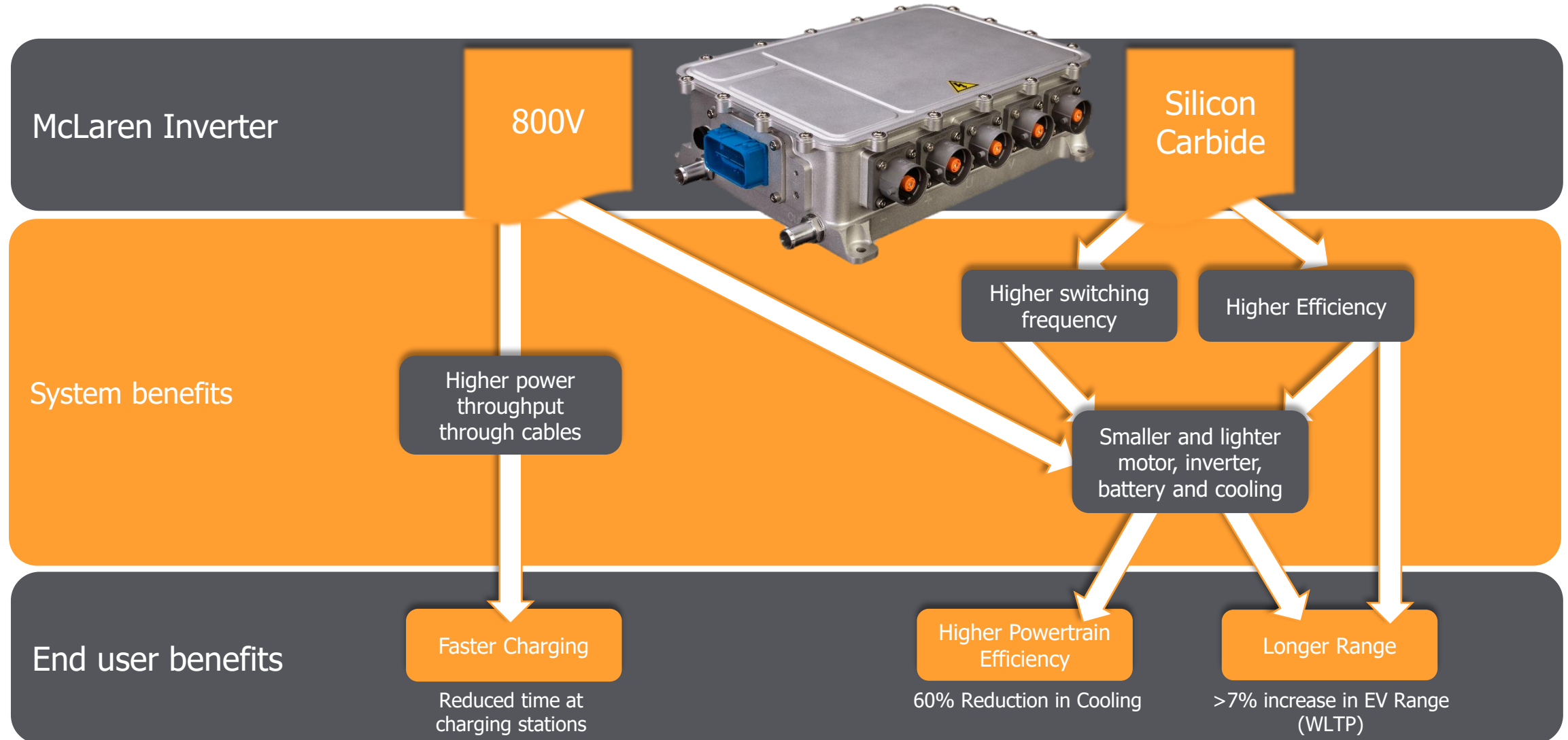


Applied's inverter journey: past, present and future



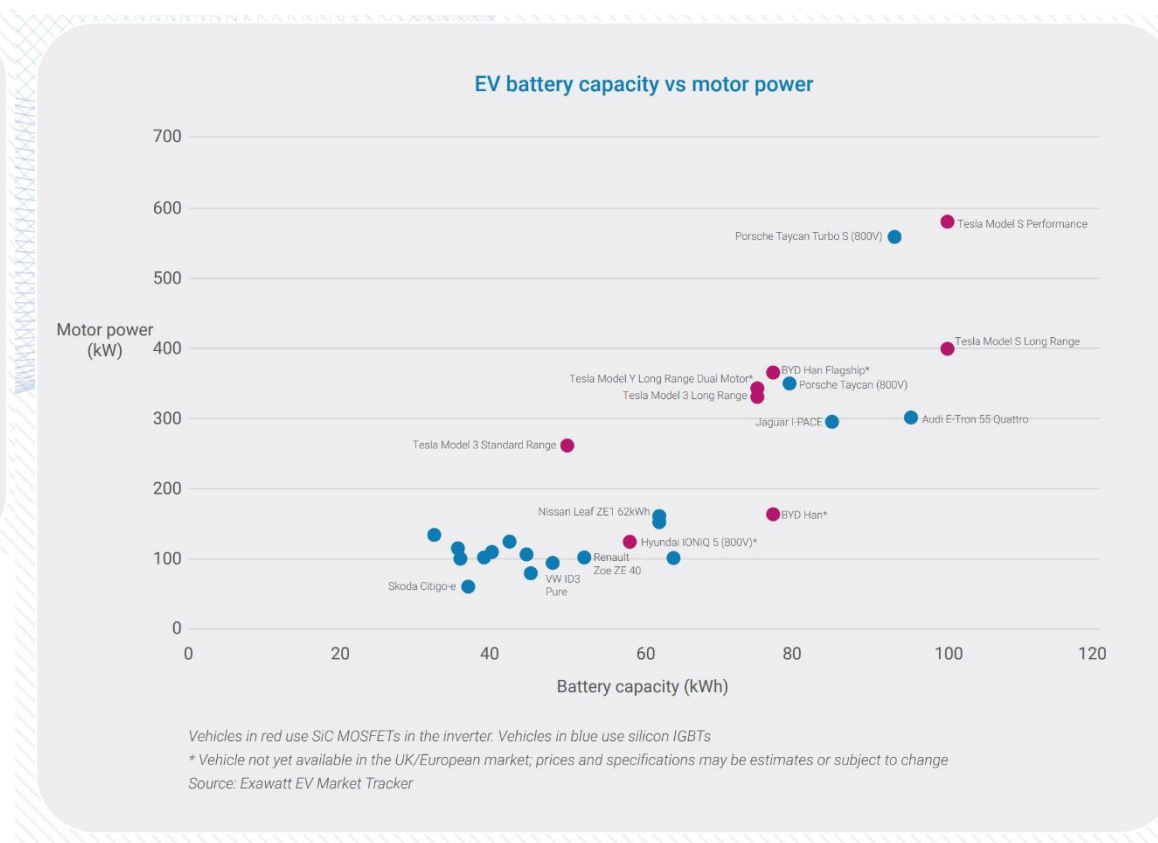
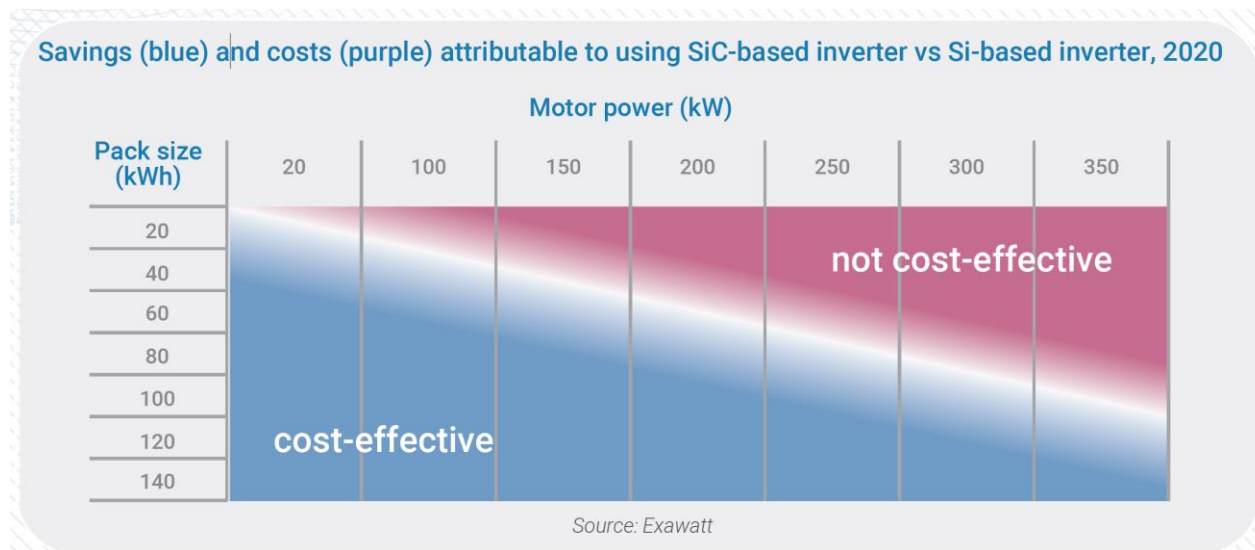


Faster Charging, Longer Range with Powertrain Efficiency





Is Silicon Carbide Cost Effective?





IPG5 800V Silicon Carbide Inverter

Specifications:

- <900V HV Input
- 5.5kg (>80kVA/kg)
- 3.79L (>115 kVA/L)
- 480A_{rms} Peak
- 320A_{rms} Continuous
- 70°C Max Coolant
- Efficiency 97% typical, 99% peak

Interfaces:

- 3 x CAN (2X CAN FD)
- 1 x Ethernet

Safety features:

- ISO26262 to ASIL D
- Integrated HVIL
- Active Short Circuit
- IEC60664, ISO6469 etc
- AUTOSAR 4.3 Compliant



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Contact us to find out how we can help you

Stephen Lambert
Head of Electrification
steve.lambert@mclaren.com
+44 (0)7950 644 655

McLaren Applied Ltd.
McLaren Victoria Gate
Chobham Road
Woking
Surrey
GU21 6JD

Tel: +44(0)1483 261400