

Building a UK Based Supply Chain for UK Manufacturing of Power Electronics

McLaren Applied

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

Greybull
Capital

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Group

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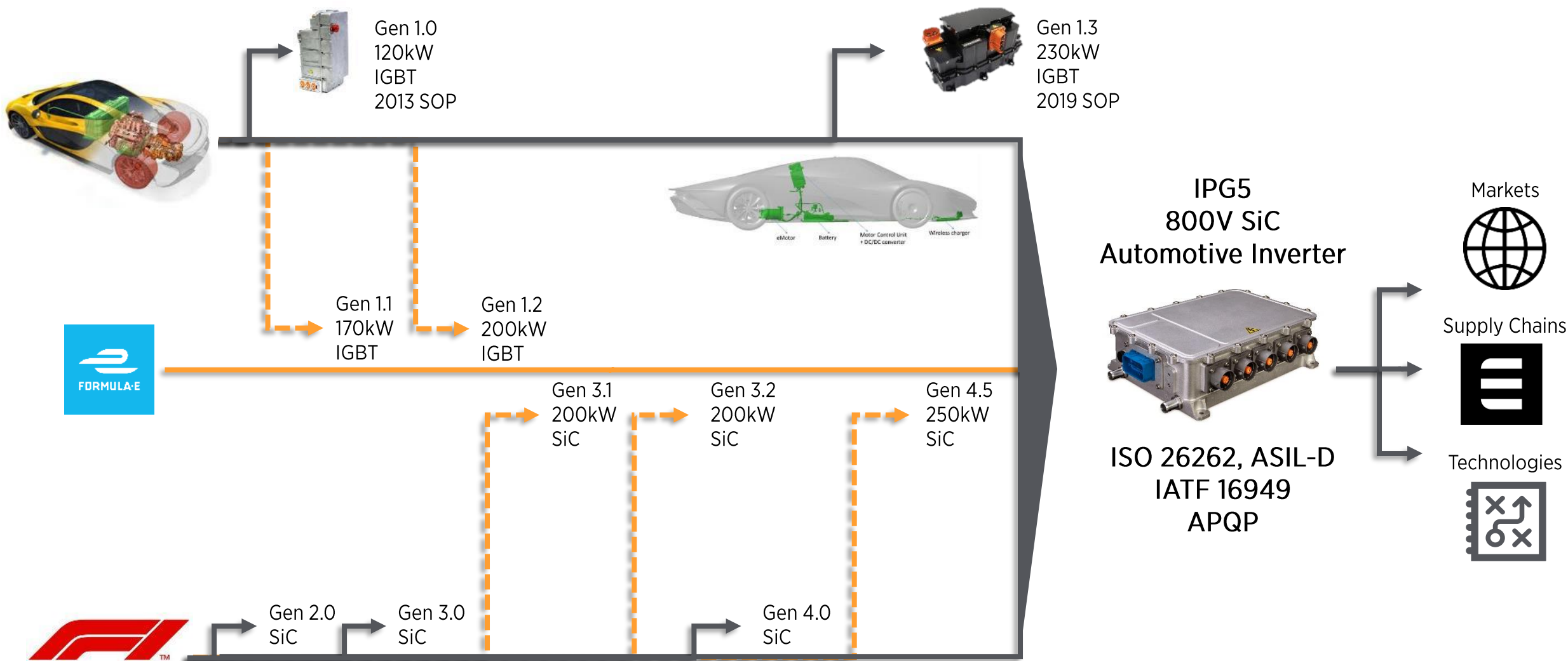
Technology & Products Business

McLaren
Racing
F1 and IndyCar

McLaren
Automotive
Supercar Manufacturer



Applied's inverter journey: past, present and future

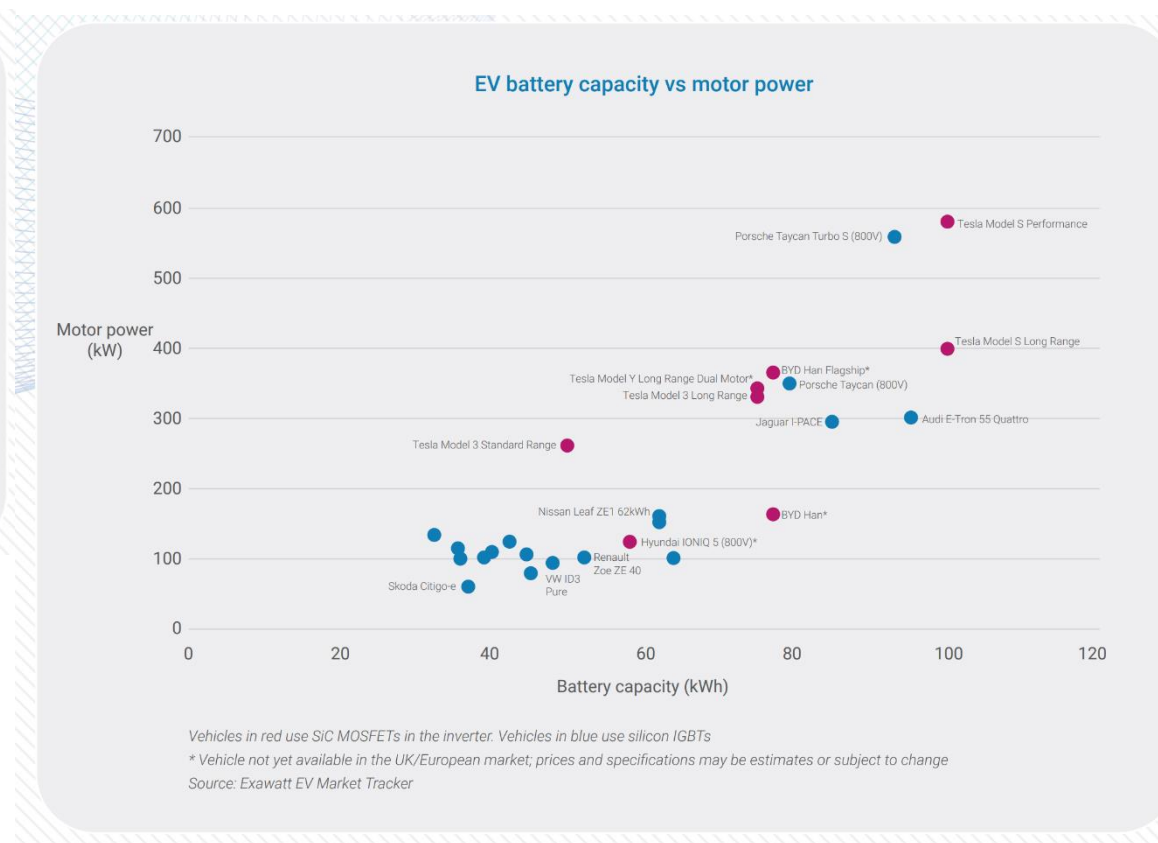
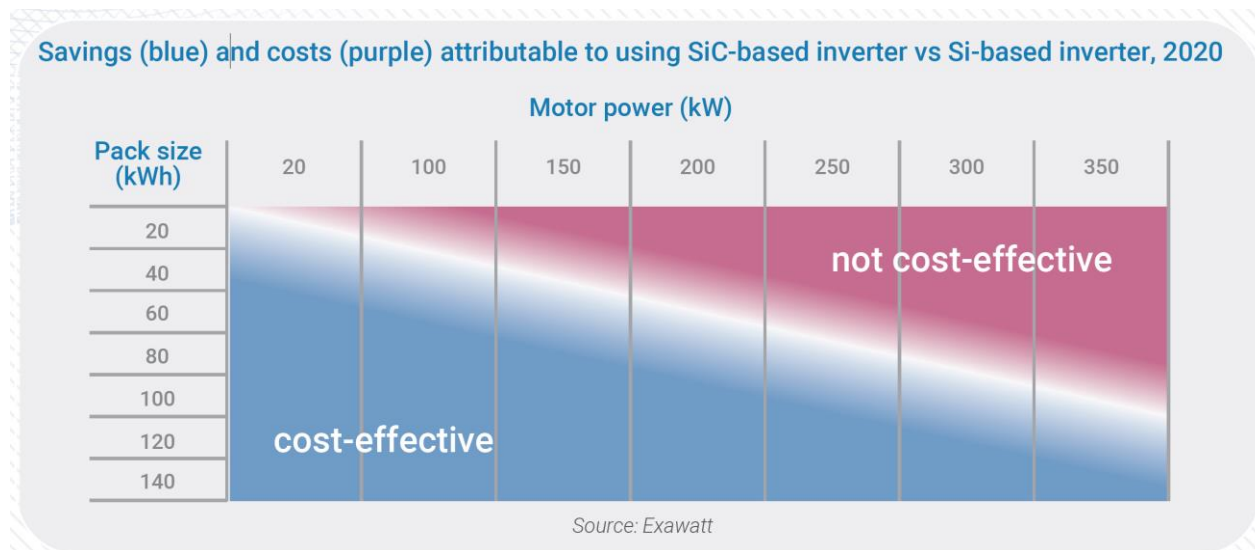




Why Silicon Carbide?

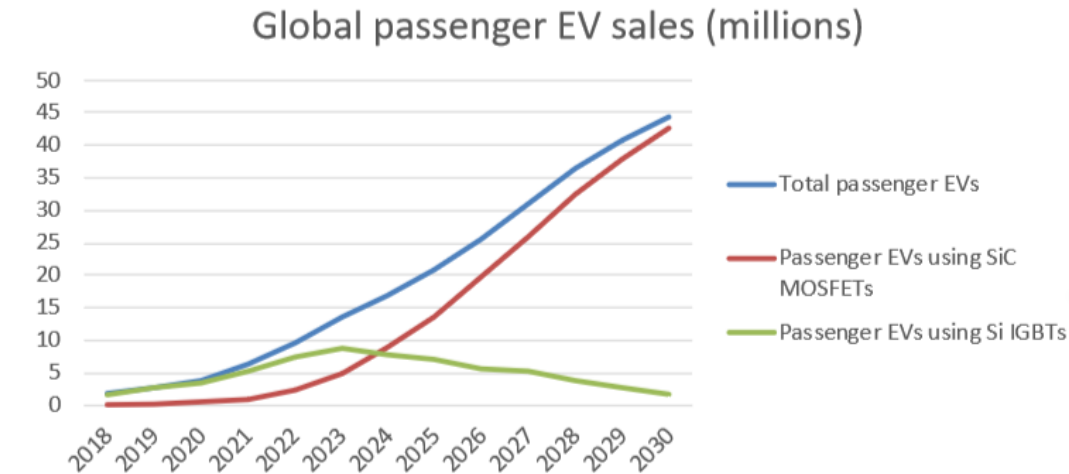


Why Silicon Carbide?





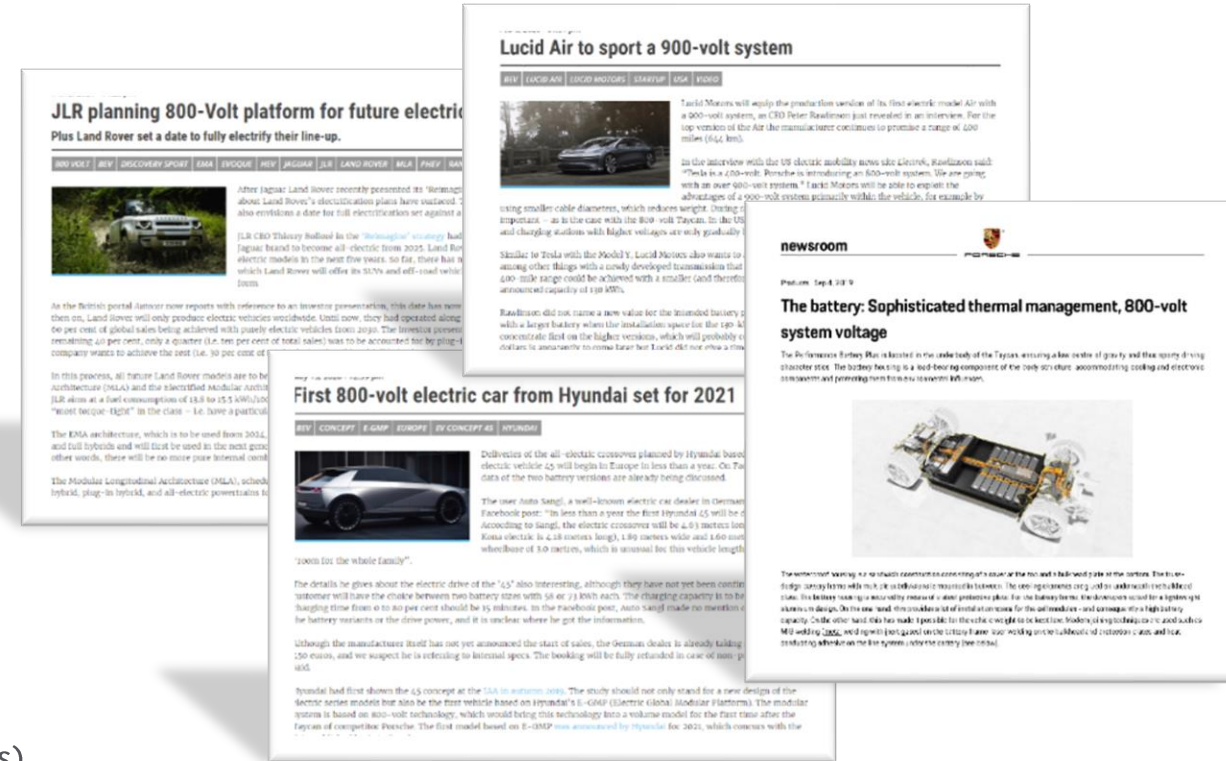
EV Industry has reached an inflection point



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)

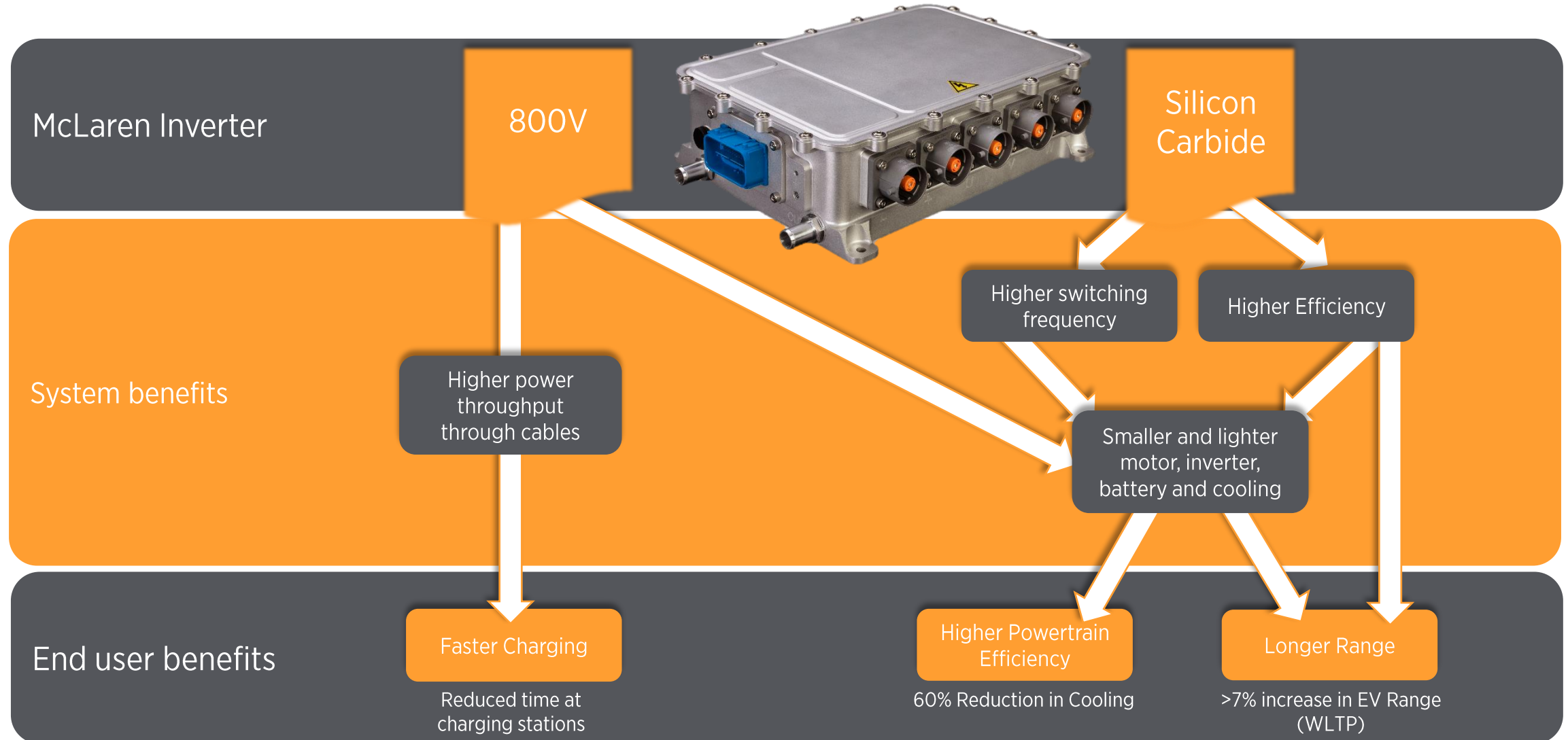
By 2030 Exawatt expects over 95% of passenger BEVs will use SiC MOSFETs in their powertrains. Exawatt expect BEVs will account for more than 50% of annual passenger vehicle sales by 2030.



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



Faster Charging, Longer Range with Powertrain Efficiency





IPG5 800V Silicon Carbide Inverter

Specifications:

- <900V HV Input
- 5.5kg (83kVA/kg)
- 3.79L (120 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



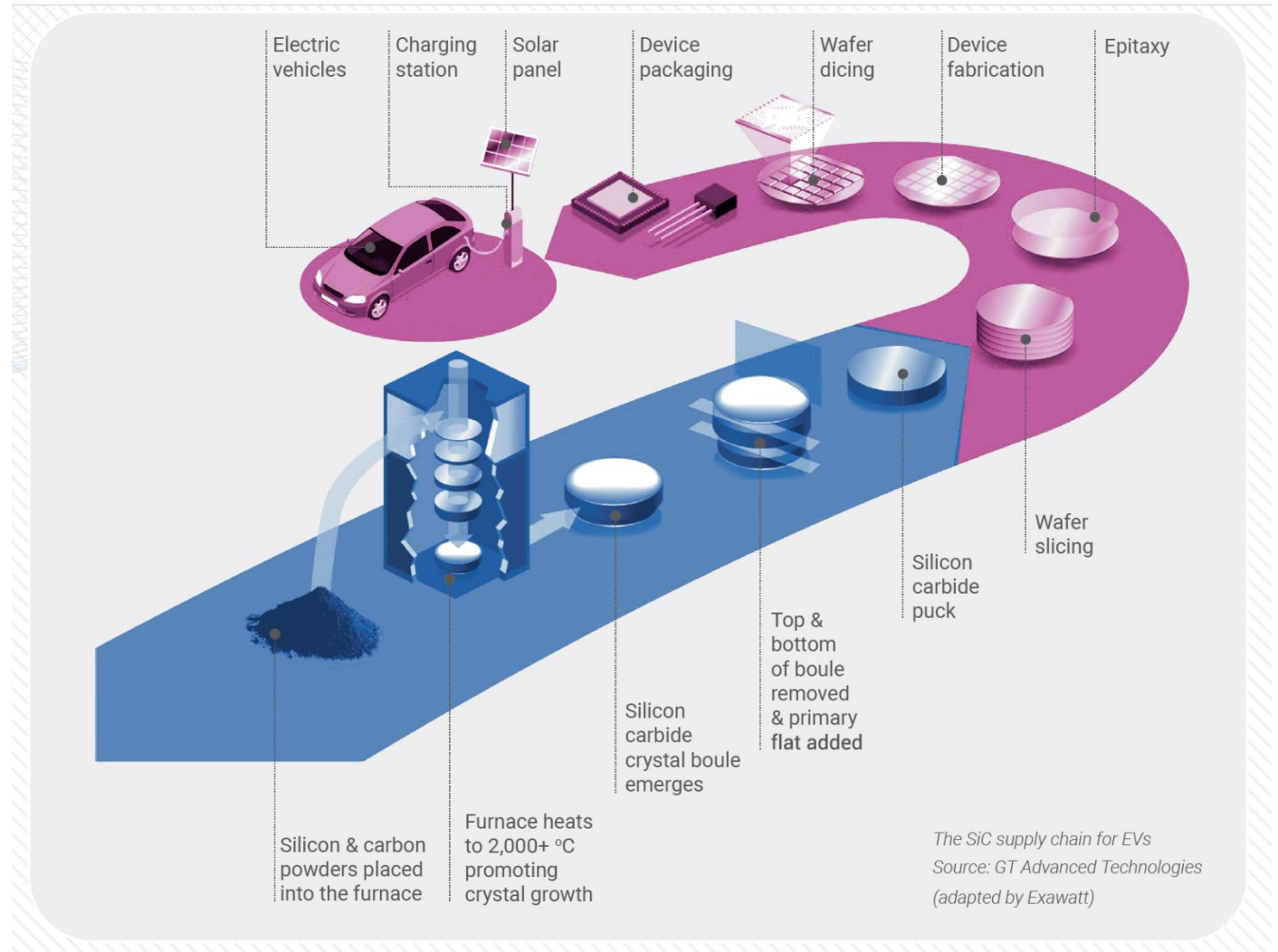


The Silicon Carbide Supply Chain

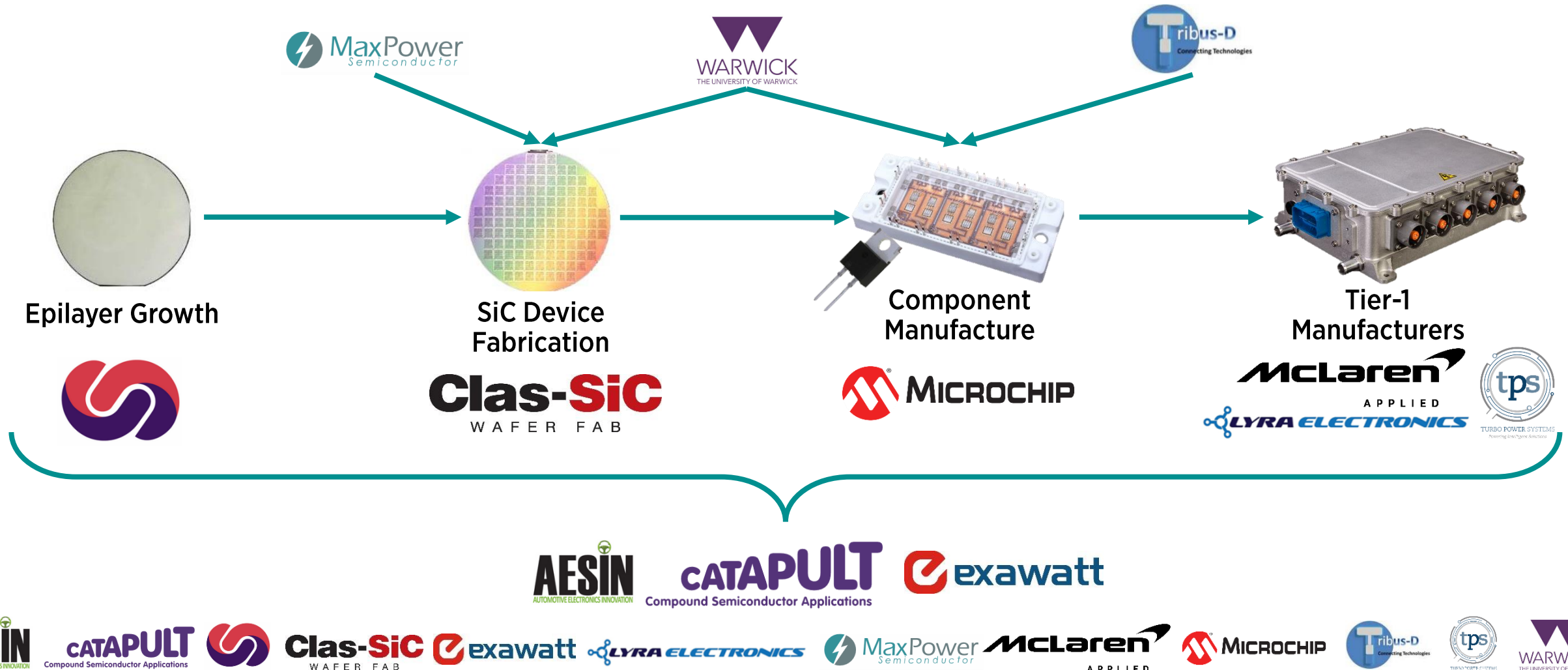


Where does the UK have a role in the SiC Supply Chain?

SiC Supply Chain



End-to-end Supply Chain development for Automotive Power Electronics





Supply Chain Innovation Engineering for Net Zero - SCIENZE

- Driving the Electric Revolution (UKRI) funded
 - Focus on advanced and automated power module and end product manufacturing
- Very limited capability in the UK to do this at present
 - Aim to make the UK competitive in manufacturing this technology
- Building on the technology base that is already present
 - Including technology developed in ESCAPE
- Partners include



Conclusions

- Electric Vehicles are moving towards high efficiency technology
 - The “Third Wave” of Electrification
- 800V and Silicon Carbide technology will be a key technology
 - Enabling innovation and differentiation
- The UK will have a key role to play in this technology
 - The supply chain needs to be in place
- We have presented two projects where this supply chain is being developed
 - More is needed – the opportunity is there – competition is good



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