

POWERING E-MOBILITY

SWITCHING-CELL-ARRAY-BASED POWER ELECTRONICS CONVERSION FOR FUTURE ELECTRIC VEHICLES

Meet SCAPE

As a promising player in e-powering sustainable mobility and promoting zero-emission transport, SCAPE brings together nine expert and inspired partners in an EU-funded endeveour. A 4-year journey towards the standardization, cost reduction, and increased performance of power electronics for next generation electric vehicles. The ambitious project sets out to revolutionise the design of power converters for electric vehicles. Moving away from traditional approaches in powering e-mobility, SCAPE aims to build and validate a novel, standardisable, and modular design and architecture for the EVs' powertrain coupled with an integration of advanced control systems.

SCAPE's challenge

In power electronics, the traditional design approach of power converters involves a range of power semiconductor devices with different ratings, optimized to operate at different conditions and with several requirements for ancillary circuitry and power circuit topologies. This dispersion in power devices and circuits leads to significant engineering efforts to ensure production and, thus, little resources left to improve performance at this level. In the electric vehicle (EV) market, this void translates into EV OEMs investing billions of euros to develop their own e-powering solutions to counter the lack of standardization on the EV power conversion system designs across the different models and types of vehicles.

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www.scapepower.eu



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SCAPE's solution

SCAPE sets out to address the structural inability to take full advantage from scale economies to reduce costs by developing a cost-efficient production chain in power converter development for next generation electric vehicles.

SCAPE's **3 in 1 approach** to shaping an affordable and optimised EV ecosystem involves:

• a new, standardisable, modular design for EV power converters based on multilevel converter technologies.

• a highly-compact and integrated building-block implementation architecture for EV power converters through chip-embedding technology.

 intelligent control strategies featuring prognosis and health management with an online monitoring system and a powertrain digital twin.



SCAPE's impact

SCAPE's e-powering 'solutions' for the EV market will enable to reduce costs for powertrain elements thanks to scale economies, while also improving performance features (reliability, efficiency, power density, etc.), and enabling enhanced functionalities through advanced power electronics integration techniques and controls.

A win-win scenario starring

Empowered OEMs - with access to a cost-efficient and quality improved power converter production chain;

Happy Drivers - benefitting from more affordable and better performing zero-emission vehicles;

Cleaner Planet* - a greater penetration of the sustainable EV market and an accelerated up-take and acceptance of e-mobility will lead to reduced green-house gasses emission.

*An environmental impact assessment of the SCAPE process will also take place during the project.

> ..and a Competitive European E-mobility market - pursuing independence, industry leadership and reputation in EV components system and emerging technologies.

Models, simulations, digital twins and prototypes will help SCAPE's team validate its approach and share project assets with the power electronics community, the EV components' industry and all climate-sensible long-haul transport companies and vehicle drivers out there!

SCAPE's circuit



This ambitious project involves the expertise and forward-looking gaze of a multidisciplinary dream team including: automotive industry experts, researchers in power converters, power electronic suppliers, specialists in modelling and control systems, e-mobility connoisseurs, experts in environmental life cycle assessment and scientific communication strategists.

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