SCAPE
POWERING E-MOBILITY

D8.5 – Leaflet, posters/roll-ups and presentation

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

DATE: 28 February 2023 **VERSION:** 2.1

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Project: SCAPE | www.scapepower.eu
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Dissemination level: Public
Work package: WP8

Description: Elaboration and development of the project's primary promotional materials (digital and printed) including Project leaflet, Roll-up Project Poster and a Project PowerPoint presentation.

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Executive summary

This deliverable provides an overview of SCAPE's main communication materials which will be instrumental to launch the project and aid dissemination during events. These materials capture SCAPE's objectives, methodologies and expected impacts in a highly visual and content-driven way. Their design and contents comply with the project's visual identity and communication /dissemination strategy (both outlined in D8.1). All materials will be made available in a printable format and a digital-friendly version.

This deliverable includes detailed descriptions, including images, of:

- Project leaflet;
- Project roll-up poster;
- Project PowerPoint presentation.

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Document History

Date	Person	Action	Status
26 October 2022	Valentina Malcotti (ISINNOVA)	First version	Draft (V1.0)
27 October 2022	Àlber Filbà Martínez (IREC); Gabrielle Lacube (IREC)	Content review	Draft (V1.1)
28 October 2022	Valentina Malcotti (ISINNOVA)	Final version	Final (V2.0)
28 February 2023	Valentina Malcotti (ISINNOVA)	Review from PO	Final re-submission (V2.1)

Status Legend: Draft, Final, Approved, and Submitted (to European Commission).

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1. SCAPE Leaflet

1.1. Scope

The SCAPE leaflet is a **public-facing document** meant to reach the scientific and automotive communities, making them aware of the project and establishing a first contact to inspire target groups to investigate the project further. However, the contents are kept to a non-technical level with the aim of spurring the interest of environmentally sensible players and citizens at large. The project leaflet will be one of the main ways through which partners spread the word about the project at events and workshops.

1.2. Design and contents

The leaflet offers an **eye-catching overview of the project**, detailing the needs SCAPE is addressing (challenges), SCAPE's proposed approach/actions (solutions) as well as SCAPE's expected benefits at large (impact).
The leaflet also provides basic information about the **consortium partners** and their expertise and field of action. The back cover features the project's contact information, including website, social media accounts and the EU-funding acknowledgement. Colors, design and fonts all reflect the **project's visual identity**, as do several captivating, stylized images of vehicles that express the project's specific framework of powering e-mobility.

1.3. Format

The leaflet has a **tri-fold square format** measuring 21x21 cm (closed) and 21x63 cm (open). A **printing file** of the leaflet will be made available on SCAPE's shared folder for partners to print locally on-demand to avoid massive print runs, considering the environmental costs at stake.
A **'lighter' digital version** of the leaflet will also be available in the shared folder. Contents are slightly re-arranged in this version to allow for a logical flow of the text, without the layout constraints of the printed version. This same version will also be downloadable from the SCAPE website (www.scapepower.eu), currently under construction.

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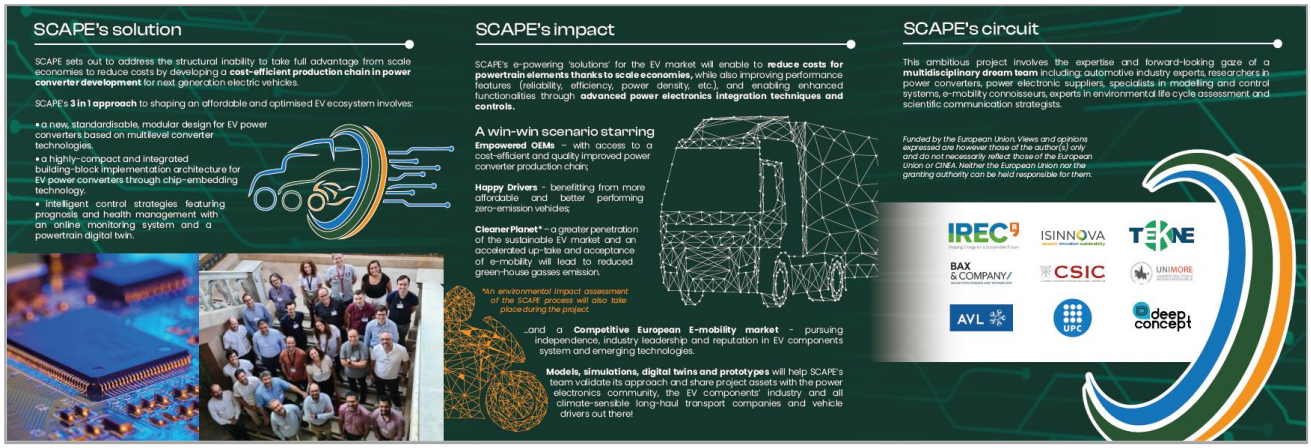

Figure 1-SCAPE Leaflet (Digital version)

2. SCAPE Roll-up Poster

2.1. Scope

The SCAPE roll-up poster is a **public-facing** material meant to be exhibited at project-related and external **events** and **conferences** to represent the project and raise awareness about SCAPE. It is intended to appeal to a wide range of audiences, both within and beyond the power electronics and electric vehicle ecosystems.

Ideally, **one roll-up poster** will be produced and stored at the project coordinator's premises. From there, the roll-up can be forwarded and shared with partners depending on their needs (e.g., conferences, participation at trade fairs or other scientific or European Union-driven events, etc.).

2.2. Design and contents

The roll-up design is based on graphical elements developed for the leaflet. The logo's **rainbow and eco-friendly portal** and **circuit-like elements** have been incorporated to make the visual dynamic, catchy and to **communicate innovation in progress**. Colours, design, and fonts used reflect the project's visual identity and match the project's other communication and dissemination materials.

Content-wise, the approach chosen has been to provide **short key messages**, rather than detailing the project in all its aspects. Priority placement, at the top of the roll-up, was given to delivering keywords of the **project's mission** and its close relation to **scientific innovation**, **potential impact on industry** and **environmental sustainability** frameworks.

The bottom part of the roll-up draws attention to the **consortium**, showcasing the logos of the partners involved. SCAPE's **main communication channels**, including details of the project's website and two social media channels (LinkedIn and Twitter) are also displayed.

Full acknowledgment of EU funding is provided.

Figure 2 - SCAPE Roll-up Poster

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2.3. Format

The SCAPE roll-up is a **classic roller banner** measuring 200x85 cm. It is single sided (printed on one side only) printed on *EcoFlat 398 gsm*, a material combining two layers of PVC and a PET core. It has a smooth surface and a grey back, preventing light from passing through and so ensuring the printed images and texts are always clearly visible.
Initially, one item will be printed (see section 2.1) and provided with a mountable structure rolled up in a handy carry bag, making it easy for the poster to travel around. The roll-up is quick to assemble and pack away.
A printable version will also be made available to all partners through the shared folder in case additional copies are needed to be printed locally, thus avoiding unnecessary (and polluting) logistics to send the roll-up around Europe.

3. SCAPE PowerPoint Presentation

3.1. Scope

The SCAPE PowerPoint presentation is designed to **support consortium partners in presenting the project** at external events.

3.2. Design and contents

Figure 3 – SCAPE Power Point Presentation

The presentation is provided in the project's **PowerPoint template,** thus fully adheres to the project's visual identity requirements.
Contents of the presentation have been inspired and adapted from those developed for the leaflet and for the DES (D8.1). The format allows for all partners to **edit and personalise contents** based on their needs (i.e. adding their own specific role and actions in SCAPE, etc.).
The first slides are devoted to providing an **overview of the project**, including basic technical information (i.e., duration, budget, etc.), the **expertise of the consortium** and the **proposed work plan** (i.e., WPs). The following sections concentrate on presenting the project's **background and challenges** (needs and inspiration behind the project), moving on to detailing, at a high-level, the project's **technical objectives and KPIs**, strategies (including approaches to **target groups**) and **potential impacts** on various levels (including expected TRL levels, exploitable results routable to market and societal benefits).

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EU funding acknowledgement is featured on each page, and all official project communication channels and management contacts are provided in the final slide.
Some **stock (license-free) images** are included to make the presentation more attractive.

3.3. Format

The PowerPoint presentation is available for all partners through the shared folder. The format allows for all types of editing to fit different purposes, although the **template structure must not be altered** (colors, fonts, etc.) as it responds to the project's unique visual identity.

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Project Leaflet

SCAPE

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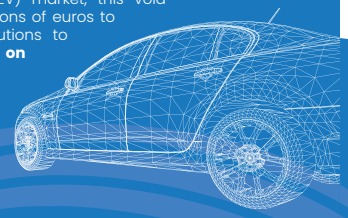
SWITCHING-CELL-ARRAY-BASED
POWER ELECTRONICS CONVERSION
FOR FUTURE ELECTRIC VEHICLES

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.**



Connect with SCAPE

www.scapepower.eu

@SCAPEpower

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Contact the
project coordinator:
afilba@irec.cat

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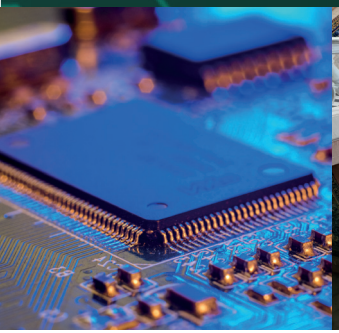
SCAPE's solution

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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ISINNOVA research innovation sustainability
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BAX & COMPANY VALUE FROM SCIENCE AND TECHNOLOGY
CSIC
UNIMORE
AVL
UPC
deep concept

Project Roll-Up Poster

SCAPE

POWERING E-MOBILITY

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

A new promising player in e-powering sustainable mobility and promoting zero-emission transport is on the road!

9 innovation-driven partners in a 4-year EU-funded endeavour to revolutionise the design and implementation of power converters for next generation electric vehicles.

On a shared mission to develop a novel, standardisable, and modular architecture for the EVs' powertrain coupled with an integration of advanced control systems to counter the lack of standardization on the EV power conversion system designs across different vehicles' market.

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Project coordinator

IREC · ISINNOVA · TEKNE · BAX & COMPANY · CSIC · UNIMORE · AVL · UPC · deep concept

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Project Presentation

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SCAPE

A new European player in e-powering sustainable mobility

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SCAPE's Overview

- Project acronym: **SCAPE**
  SWITCHING-**C**ELL-**A**RRAY-BASED **P**OWER **E**LECTRONICS CONVERSION FOR FUTURE ELECTRIC VEHICLES
- Type of action
  RIA (Research & Innovation Action)
- Call & Topic
  HORIZON-CL5-2021-D5-01-02
  Nextgen EV components: Integration of advanced power electronics and associated controls (2ZERO)
- Project Duration
  48 months (01.07.2022 - 30.06.2026)
- Budget
  5.999.750,00 €
- Project Coordination
  Dr. Àlber Filbà (Catalonia Institute for Energy Research – **IREC**)
- Project Officer
  Joao Duarte Carrilho Miranda
- Project contacts
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SCAPE's Team

The SCAPE Consortium: the power of multidisciplinarity

9 partners based in France, Italy, Spain, Turkey and Germany

- ✓ automotive industry experts
- ✓ researchers in power converters
- ✓ power electronic suppliers
- ✓ specialists in modelling and control systems
- ✓ e-mobility connoisseurs
- ✓ experts in environmental lifecycle assessment
- ✓ scientific communication strategists

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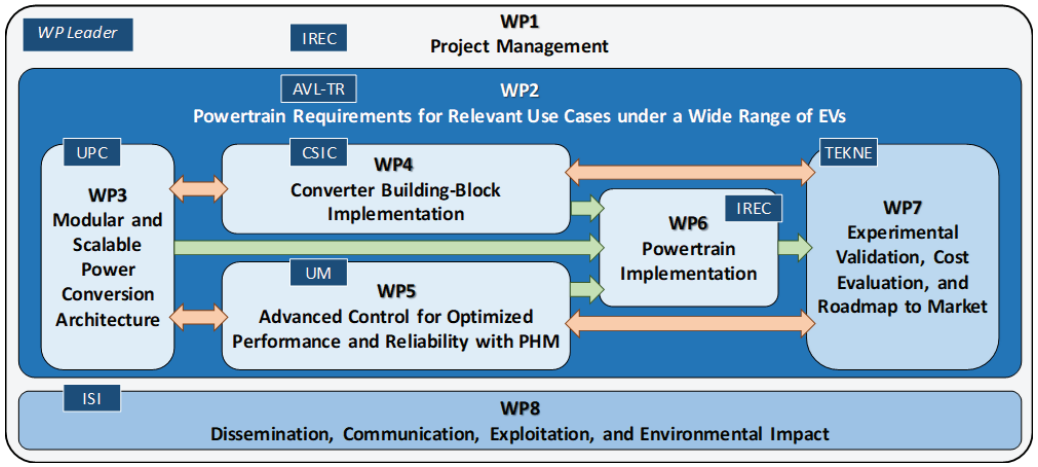
SCAPE's Work Plan

- Project Management (WP1)
  Keeps SCAPE going and on track with its **budget and timing**.
- Technical actions (WP2 – WP6)
  The **heart of SCAPE's multi-purpouse endeavour** involving multfunctional architectures, chip-embedding technologies and advanced control strategies.



- Tech transfer (WP7)
  Makes sure SCAPE's **innovations** are **routed to market.**
- Communication, Dissemination, Explotation and Environmental Impact (WP8)
  Gives SCAPE its **identity and voice** to tell SCAPE's story to all **target gruoups** involved (and beyond) making the project's **echo far-reaching** and **long lasting**.

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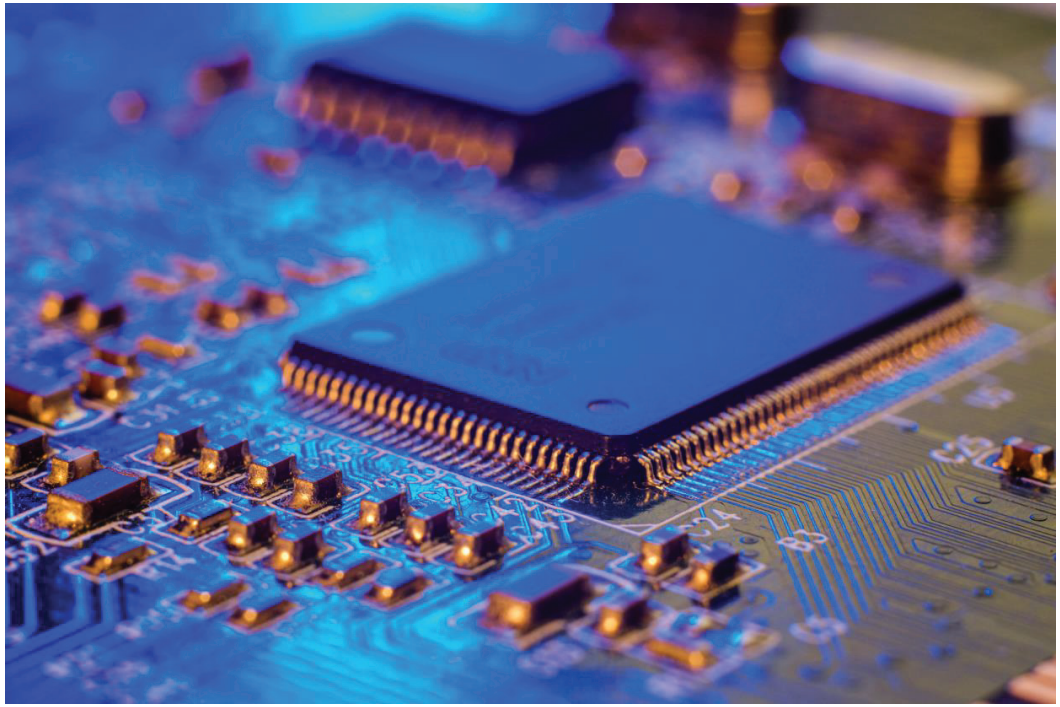
SCAPE's Challenges

1. Face the lack of standardisation on EV power conversion system design across different vehicles .
2. Tackle the dispersion in power devices and circuits.
3. Increase the performance of power electronics for Next gen electric vehicles.
4. Counter the over dependance on non-EU sources for EV components.



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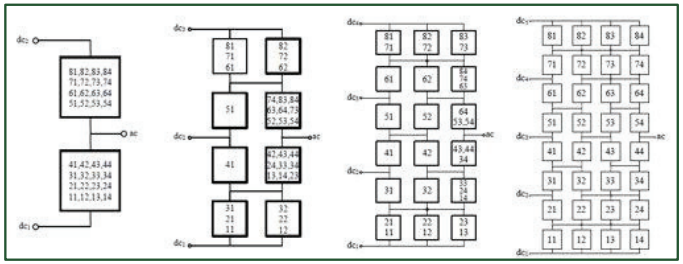
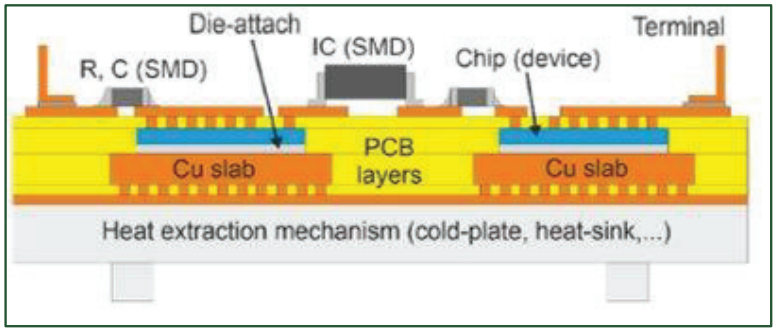
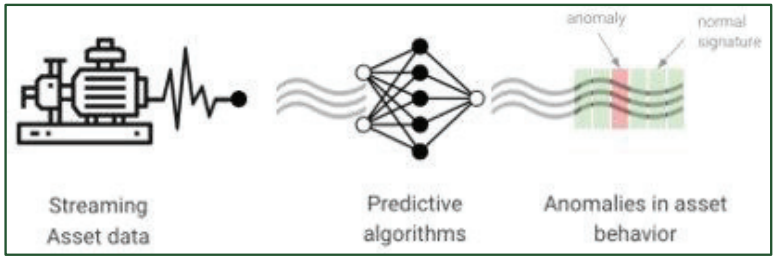
SCAPE's Solutions

Revolutionise the design, architecture, integration and control systems of power converters for electric vehicles through a 3 in 1 approach involving:







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.

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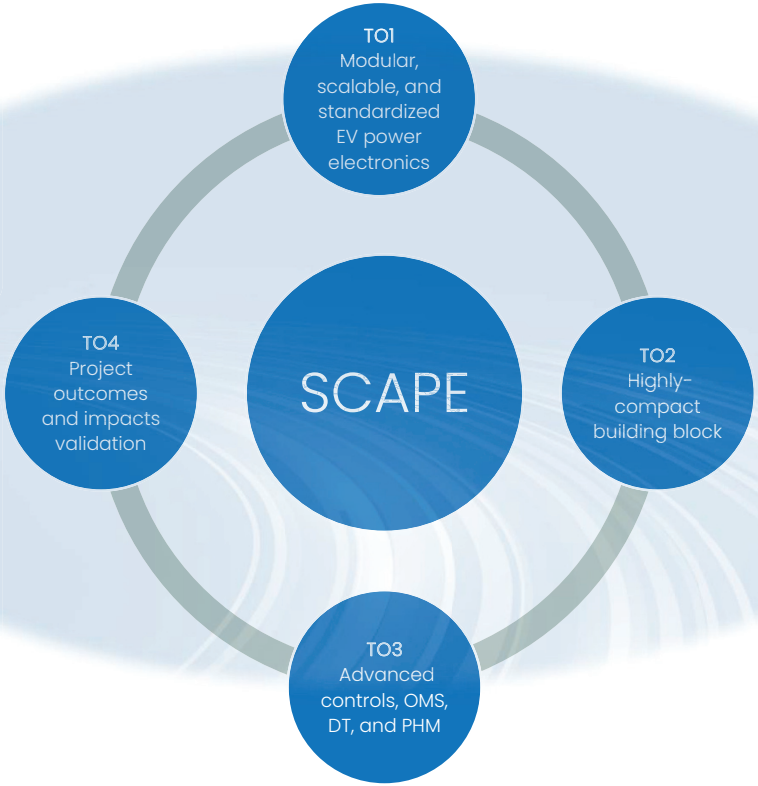
SCAPE's Technical Objectives

- Solutions from two-wheelers to heavy-duty vehicles.
- Take full advantage of scale economies.
- Define multifunctional architectures [converter integrating the powertrain inverter and the on-board charger (OBC)].



- Highly-compact converters with CE 3D board-integration technology.
- Take full advantage of WBG devices.
- Improved thermal behavior.
- Minimized stray inductance and EMIs.
- Increased power density.
- Reduced manufacturing cost.

- Validate performance targets with TRL-6 powertrain converter prototypes in relevant environment.
- Use Life-Cycle Assessment (LCA) tools and economic & social studies to validate cost reduction, end-user adoption, and environmental impact.
- Virtually validate integrated converter + motor and converter + battery designs through multiphysics system models.

- Leverage on the converters degrees of freedom to:
- Distribute power losses among power devices.
- Improve conversion efficiency and EMIs.
- Improve converters and motor reliability and lifetime.
- Provide fault tolerance and predictive maintenance.

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SCAPE's Technical KPIs

Objectives' measurability (KPIs)	Reference commercial product metrics[1]	Targeted metrics[2]
Efficiency	70	> 97,5% (loss reduction > 35%)
Driving range	1 pu	> 1,05 pu
Power density	20 kW/litre (OBC: 3,5 kW/litre)	> 100 kW/litre
Specific power	15 kW/kg (OBC: 3 kW/kg)	> 30 kW/kg
Cost	4 €/kW (OBC: 40 €/kW)	< 2,5 €/kW
Thermal resistance from junction to heat sink	1 pu	< 0,75 pu
Power device & gate driver parasitic inductances	1 pu	< 0,6 pu
Switching frequency	< 10 kHz	Up to 50 kHz
Mean time to failure	1 pu	3 pu
Life expectancy	8.000 h, 300.000 km	> 16.000 h, 600.000 km

[1] for a 100 kW best current-generation inverter and 100.000 units

[2] for a 100 kW inverter/OBC charger and 100.000 units

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SCAPE's Target Groups

Possible project stakeholders include both technical/research audiences, actual industry/automotive suppliers and final EV vehicles drivers/users.

Up-taking target groups	Benefited target groups
• Nextgen EV components market players • OEMs and suppliers in the EV industry (Tier 1 and Tier 2) • Automotive stakeholders • Scientific community (in the field of Power Electronics) • Relevant automotive-related associations (EARPA, EUCAR, CLEPA, AUTOSAR, ERTRAC, etc.) • Other transport sectors beyond automotive, such as vessels and aircrafts	• EV vehicle drivers • EV fleet drivers • Long distance road transport companies • Transport advisory councils • City municipalities • **Planet!**

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SCAPE's Impact

Where power electronics meets EV innovation

Cost-efficient **production chain in power converter development** for EVs

Improved **e-powering preformance** (reliability, efficiency, power density, etc.),

Enhanced functionalities through **advanced power electronics integration techniques and controls.**

Validation and sharing of project assets (with the power electronics community, the EV components' industry and all climate-sensible EV transport companies and drivers) through **models, simulations, digital twins and prototypes.**

Empowered OEMs – with access to a cost-efficient and quality improved 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 lead to reduced green-house gasses emission.

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

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SCAPE's TRLs

Concept	Starting TRL	TRL expected at the end of SCAPE
Building blocks as highly-integrated SCs	**TRL 3**: prototypes evaluated in laboratory conditions.	**TRL 6**: devices developed and evaluated in a full powertrain configuration in an EV test bench.
Modular and scalable powertrain topology	**TRL 4**: Small prototypes tested in controlled conditions.	**TRL 6**: 800 V, **50 kW integrated inverter/OBC** and **1 kW auxiliary dc-dc converter** will be tested with a traction battery, a service battery, and a motor, all components in an EV powertrain configuration. These demonstrators will allow validating the target KPIs.
Physics-based digital twin model	**TRL 3**: Existing models of similar components with preliminary physical characteristics.	**TRL 5**: Complete model of EV powertrain is developed considering electrical, mechanical and thermal behaviour.
Optimized Health and performance controller	**TRL 4**: Control algorithms that analyse individual components are tested.	**TRL 6**: Full control system linked to digital twin model evaluates health and performance and corrects control signals on EV test bench validation.
Improved reliability system	**TRL 3**: technology evaluated in laboratory conditions at small scale.	**TRL 6**: Monitoring system and fault-tolerant capabilities are implemented and the features are tested in full powertrain architecture.
Improved cooling system	**TRL 4**: Small prototypes tested in controlled conditions.	**TRL 6**: Advanced unified cooling system .

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