



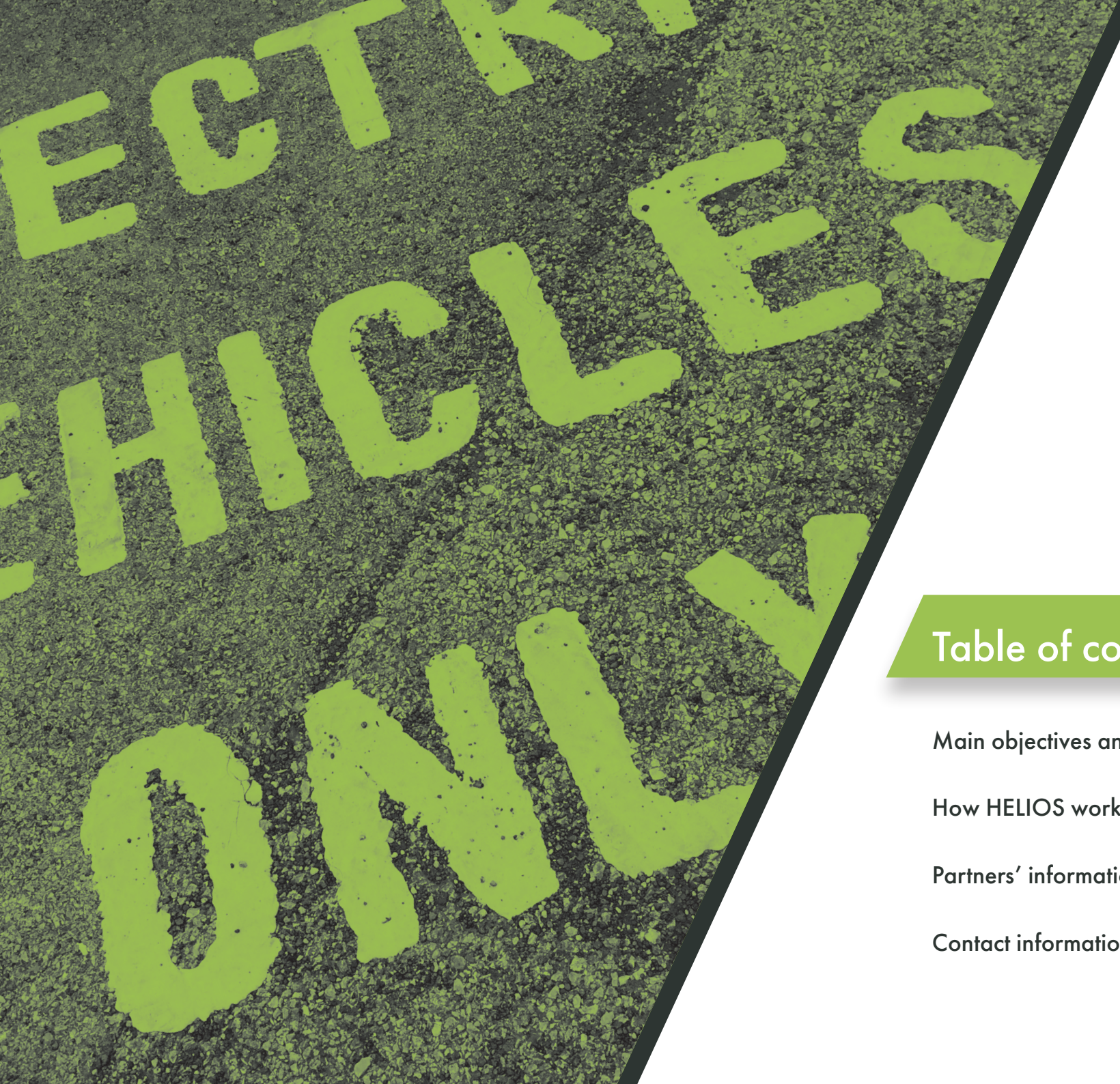
High-performance modular battery packs  
for sustainable urban electromobility services

## The HELIOS Project

The Helios project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 963646







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## Main objectives and expected impact

The HELIOS project brings together the expertise of industry and academia to work on a new concept of modular, lighter and eco-friendly Li-Ion battery pack for electric vehicles used in urban electromobility services. Experimenting on innovative materials, designs, technologies and processes, the HELIOS consortium sets new standards for performance, safety, scalability, lifetime durability, charging capabilities, energy density and preservation capacity in electric batteries for a wide range of applications, from mid-size vehicles to city busses.

Overall project budget: € 11.476.356,25  
EU contribution: € 9.993.975,25

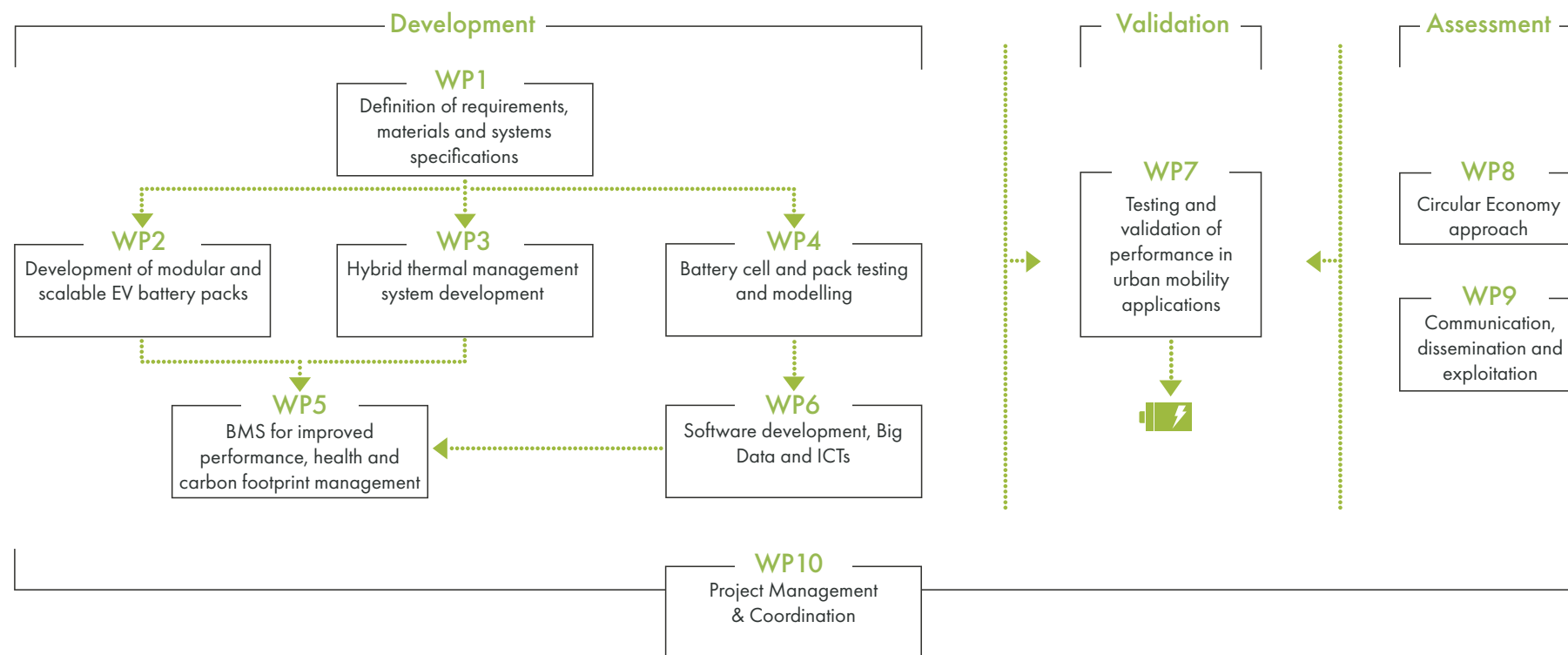
Start date: 1 January 2021  
End date: 31 December 2024  
Total months: 48



# How HELIOS works

HELIOS's project work plan is organised in 10 linked work packages (WPs). The "Development" phase starts with the definition of the main requirements and specifications and continues with the development of the battery packs (WP2) and the hybrid thermal management system (WP3) prototypes for a medium-size car and an electric bus. While models of cells and battery packs are tested (WP4), the Battery Management System (WP5) and internal software solutions

(WP6) are set up. In the "Validation" phase, the integration and verification of performance and mechanical properties (WP7) takes place. The "Assessment" phase includes cross-checking on the application of a Circular Economy Approach (WP8) and the implementation of project communication, dissemination and results' exploitation. All along, WP10 on Project Management and Coordination ensures successful project execution.





# Partners' information



University



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A University counting over 39,000 students, 900 post-doctoral scholars and over 11,500 employees, Aarhus has so far successfully participated in over 330 Horizon2020 projects, 10% of which as coordinator. Its Electrical and Computer Engineering Department (ECE) runs one of Northern Europe's largest advanced research facility focusing on the integration of future energy systems: the Renewable Energy System Integration & Control under Electric Engineering Laboratory (RESCuE Lab).

ROLE IN THE PROJECT



As Project Coordinator, AU leads work packages 1 and 10, and contributes to all the other work packages.



University



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Karlsruhe Institute of Technology (KIT), one of the largest research and education institutions in Germany, hosts the Institute for Applied Materials – Applied Materials Physics (IAM-AWP), which has over 12 years of experience in research and industrial cooperation on lithium-ion batteries. Since 2011, the IAM-AWP runs Europe's largest Battery Calorimeter Laboratory, and leads international research aimed at improving thermal stability for inherently safe li-Ion cells and battery packs.

ROLE IN THE PROJECT



Involved in cells selection and in the definition of testing scenarios, KIT leads work package 4 on battery testing and modelling.



# Partners' information



University



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IZTECH, the only institute of technology in Turkey, brings to Helios the expertise of a research team specialised in numerical modelling of thermo-electrical battery behaviour for design optimisation.

ROLE IN THE PROJECT



Besides leading work package 3 on thermal management system development, IZTECH contributes to all work packages.



Aalto University

University



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AALTO University is a community of bold thinkers where science and art meet technology and business. AALTO is committed to identifying and solving grand societal challenges for an innovative future. In particular, the School of Chemical Engineering (CHEM) and its Department of Chemical and Metallurgical Engineering (CMET) focus on sustainable technologies, circular economy, and functional materials for, among others, energy storage. HELIOS' dedicated research group specialises in Hydrometallurgy and Corrosion (Hydromet).

ROLE IN THE PROJECT



AALTO focuses mostly on work package 8, for process design and optimisation in relation to a Circular Economy approach. Analysing HELIOS' project impacts, it also advises on recycling and re-use issues (work packages 1 and 2).



# Partners' information



Research  
organisation



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Aiming at becoming an international benchmark in the energy sector, since 2009 IREC carries out research whose results directly transfer to the industrial sector. Both IREC's Power Systems and Energy Systems Analytics Research Groups are involved in the HELIOS' project. In particular, the Power Systems Group experimentally validates project results within IREC's Energy Smart Lab, a unique emulation and testing facility for electrical engineering based in Barcelona (Spain).

## ROLE IN THE PROJECT



IREC leads work package 8 on process design and optimisation to apply a Circular Economy approach and analyses the HELIOS project impact. It also supports the design and modelling of converter prototypes as well as control and communication technologies for electric vehicles fleets.



Private  
company



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A French SME specialised in innovative systems and technologies in different sectors, ranging from energy and healthcare to transport and robotics, RDIUP develops web-based data analytics solutions and implements deep machine-learning technologies to elaborate useful knowledge for smart systems.

## ROLE IN THE PROJECT



In charge of developing smart Application Programming Interfaces for optimised fleet management, RDIUP mainly works on the software back-end platform and cybersecurity module within work package 6.



## Partners' information



Private  
company



Igualada, Spain

N VISION SYSTEMS AND TECHNOLOGIES SL



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NVISION is a technology-based company specialized in the development of Internet of Things (IoT) innovative solutions and services in different sectors, such as Energy and Health. NVision counts on a multicultural team with vast experience in cloud computing, sensors, big data, communications and artificial intelligence. Within the R&D department, NVision develops new functionalities for its end-to-end IoT platform (datASSISTTM) for those applications that require both data collection and processing from physical devices.

### ROLE IN THE PROJECT



Leading work package 6 on software development and ICTs, NVISION will use a cloud-based IoT platform to provide upgraded functionalities for battery pack energy and health management.



Private  
company



Manisa, Turkey

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VESTEL is a world leading Original Design Manufacturer and provider in consumer electronics. It is also one of the three largest producers of home TV sets and among the top five white goods manufacturers in Europe. Since 2014, VESTEL develops charging solutions for electric vehicles, for which it received several awards (i.e. from Red Dot, IF, Plus X, and the IDA award for its AC and DC charging stations).

### ROLE IN THE PROJECT



Within the HELIOS project, VESTEL develops the off-board charging interface and provides charging equipment to test the battery packs on both the e-car and e-bus prototypes. VESTEL's assigned research team provides technical insight to work packages 1, 5 and 7.



# Partners' information



Private  
company



## VITESCO TECHNOLOGIES



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Vitesco Technologies is a leading international developer and manufacturer of state-of-the-art powertrain technologies for sustainable mobility. With smart system solutions and components for electric, hybrid and internal combustion drivetrains, Vitesco Technologies makes mobility clean, efficient, and affordable. The product range includes electrified drivetrain systems, electronic control units, sensors and actuators, and exhaust-gas aftertreatment solutions. Vitesco Technologies has more than 40,000 employees at about 50 locations worldwide.

### ROLE IN THE PROJECT



Work package leader for the Eco(circular) design of a modular battery pack (WP 2), Vitesco Technologies equips the project with parts for battery management, battery sensors and thermal management.



Private  
company



## IDNEO TECHNOLOGIES SAU



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As a product development engineering company specialising in the design, development and manufacturing of high added value products, IDNEO SAU develops electromedicine and medical devices, automotive components, consumer electronics, industrial and Internet of Things solutions. With over 340 employees, INDNEO SAU has extensive experience in designing and prototyping battery management systems, converters and charging stations for electric vehicles.

### ROLE IN THE PROJECT



Within the HELIOS project, IDNEO SAU is involved in defining specifications, conducting functional safety analysis, developing prototypes for power electronics and testing.

## Partners' information



Private  
company



Ankara, Turkey

BOZANKAYA OTOMOTİV MAKİNE İMALAT İTHALAT VE İHRACAT ANONİM ŞİRKETİ



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Founded in 1989 in Germany, Bozankaya landed on Turkish soil in 2003 and since then has become a powerful domestic brand for vehicles. In its Ankara's facility, Bozankaya produces metro, trams, trains, as well as electric trams and busses.

### ROLE IN THE PROJECT



Acting Leader for work package 7 on systems integration, testing and validation of pilot prototypes, Bozankaya also participates as task leader in identifying requirements for product scalability, housing and installation.



University



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UNIVERSITAT POLITÈCNICA DE CATALUNYA



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With over 28,000 students, 3,100 professors and lecturers and 2,000 employees, UPC is the top technical university in Spain. Through its Power Electronics Research Group (GREP) and the Motion Control and Industrial Application Center for Innovation in Electronics (MCIA), UPC offers extended expertise both in research projects and scientific publications, as well as in the development of new technologies, products and services to be transferred to industrial application. MCIA/GREP are both involved in the implementation of national and EU projects focusing on electric vehicles.

### ROLE IN THE PROJECT



Leading work package 5 on the development of battery management systems for improved performance, health and carbon footprint management of urban electromobility fleets, the UPC research team's know-how is key in many other work packages.



# Partners' information



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TECHNOLOGICAL  
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One of the largest technological service providers in Denmark and northern Europe, DTI is a self-owned and non-profit organisation which provides testing, certification, information, training and consulting to industry and small and medium enterprises. Having participated in over 100 EU projects, DTI successfully bridges the gap between research and market implementation, ensuring the swift conversion of new knowledge and technology into value for its customers.

ROLE IN THE PROJECT



Making use of dedicated battery test laboratories and of the Danish Development Centre for Future Flexible Energy System, DTI provides substantial input to work packages 2, 3, 4, 5 and 7.



University

   
Sofia, Bulgaria

TECHNICAL UNIVERSITY OF SOFIA



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TUS is the largest higher technical education and research complex in Bulgaria. It collaborates in the HELIOS project through the "CAD/CAM/CAE in Industry Laboratory" (3CLab), an R&D lab of the Faculty of Industrial Technologies, and the Safety and Environmental Engineering Laboratory (SE&EL), which belongs to the Electrical Power Department. The 3CLab participated in over 150 projects within new product development, virtual and physical engineering and prototyping, energy storage and recuperation, mechanics, vibrations and testing. The SE&EL completed over 60 national and European projects involving the energy and industry sectors.

ROLE IN THE PROJECT



TUS provides substantial contribution within all work packages, with special attention to WP 2 and 7.

# Partners' information



Research  
organisation



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The Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) is a non-profit foundation aiming at conducting and promoting research in renewable energies, energy efficiency, and energy conversion and storage, with a particular focus on solar energy and hydrogen technology. ZSW collaborates with universities, research centres and industries, building a bridge between academia and industrial implementation. The electrochemistry branch of ZSW takes part in the HELIOS project.

ROLE IN THE PROJECT



ZSW participates in work packages 3 and 4, especially within the mechanical, thermal and electrical testing of cells, modules and battery packs.



Research  
organisation



TÜRKİYE BİLİMSEL VE TEKNOLOJİK ARAŞTIRMA KURUMU, RAYLI ULAŞIM  
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The Battery Technologies Group within the Railway Transport Technologies Institute (RUTE) of the Scientific and Technological Research Council of Turkey (TUBITAK) is currently involved in R&D activities on lithium-ion and sodium-ion technologies, lithium-ion battery packs for EVs, renewable energy storage systems, portable devices and satellites. The group has expertise in mechanical and battery electronics design, production and testing, and has laboratory facilities for cell manufacturing and battery pack prototyping, in addition to battery and cell testing. Within the HELIOS project, the group collaborates with other groups under RUTE.

ROLE IN THE PROJECT



Focusing on hybridization architecture, TUBITAK RUTE participates in work packages 1, 2, 3, 4, and 5.





# Partners' information



**European  
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Copper Alliance

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As the European branch of the International Copper Association Ltd. (ICA), ECI is a non-profit organisation representing mining companies and custom smelters. Gathering worldwide expertise on copper as a material, its markets, technology applications and its extraction, manufacturing and recycling opportunities, ECI brings together the copper industry and its partners to positively contribute to the United Nations Sustainable Development Goals.

### ROLE IN THE PROJECT



As leader of work package 9 on Communications, Dissemination & Exploitation, ECI offers broad experience in dealing with questions related to the application and use of copper materials, including regulatory aspects, engineering service and support to the supply chain across WP 1, 2, 3 and 8.



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company

   
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## KNEIA SL



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KNEIA is an SME specialised in assessment services on communication, innovation management, dissemination and knowledge transfer strategies to government agencies, companies, investors, university and research institutions. With consolidated experience in organising partners' consortium, writing proposals for and implementing the communication and dissemination portion of EU projects in the area of Research, Innovation and Development, KNEIA's team offers expertise in a variety of project management, communications and partnership-building roles.


### ROLE IN THE PROJECT



With overall responsibility for communication and dissemination activities within work package 9, KNEIA supports the project's business strategy and works to maximize exploitation opportunities for the project's results and achievements.




 Project page in Cordis  
<https://cordis.europa.eu/project/id/963646>

 Project web  
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