MAGNIFY MSCA-DN

MAGNIFY newsletter

September 2026 Issue : 1



Welcome to MAGNIFY!

We are delighted to welcome you to the first edition of the **MAGNIFY** newsletter. Over the next four years, this newsletter will keep you up to date with the progress of the **MAGNIFY Marie Skłodowska-Curie Doctoral Network**, sharing our latest research developments, training activities, events, project milestones, and the people behind our success. As we embark on this exciting journey, this inaugural issue introduces the vision of MAGNIFY, our consortium, and the ambitious research programme that will help shape the future of sustainable power electronics.

Why MAGNIFY?

The global transition towards clean and sustainable energy depends on increasingly efficient power electronic systems. From renewable energy and electric mobility to energy storage, data centres and industrial automation, power electronics play a fundamental role in converting and managing electrical energy. As electrification accelerates, the demand for compact, reliable and high-efficiency energy conversion technologies continues to grow.

At the heart of these systems are magnetic components—such as inductors and transformers—which largely determine the efficiency, power density and reliability of power electronic converters. Despite their critical role, their design remains a major challenge due to the complex interactions between magnetic materials, electromagnetic behaviour, thermal effects and manufacturing constraints.

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About the Project

MAGNIFY is a **Marie Skłodowska-Curie Doctoral Network** funded by the European Union. The project brings together **9 beneficiaries and 6 associated partners from 9 European countries**, combining complementary expertise from academia, research organisations and industry. The network will train **15 Doctoral Candidates**, each working on an individual research project while contributing to a common scientific vision: enabling more sustainable, efficient and high-performance power electronics through advances in magnetic materials, multiphysics modelling and converter design.

Ruth V. Sabariego KU Leuven– MAGNIFY Project Lead

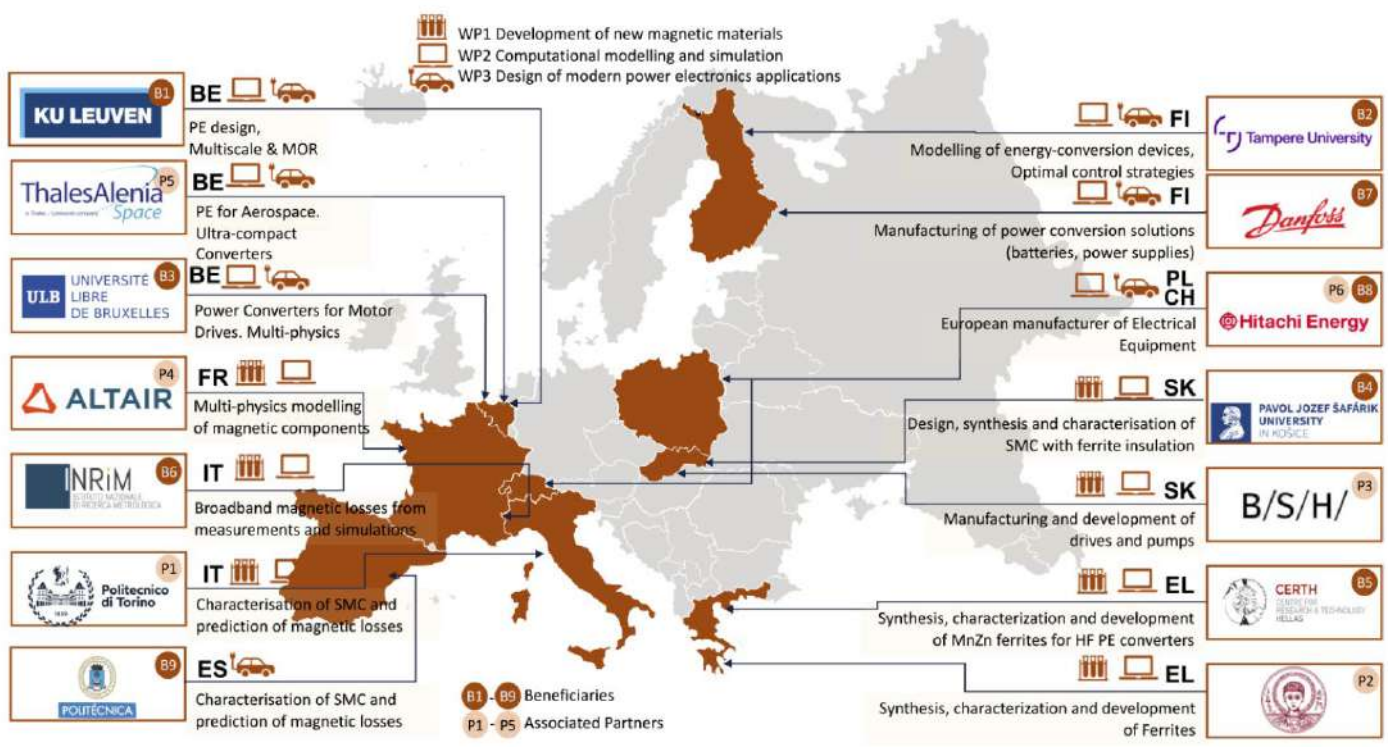
Meet the MAGNIFY Consortium

MAGNIFY is a **Marie Skłodowska-Curie Doctoral Network**, funded by the European Union, that fosters a collaborative and interdisciplinary research environment by bringing together complementary expertise from academia, research organisations and industry.

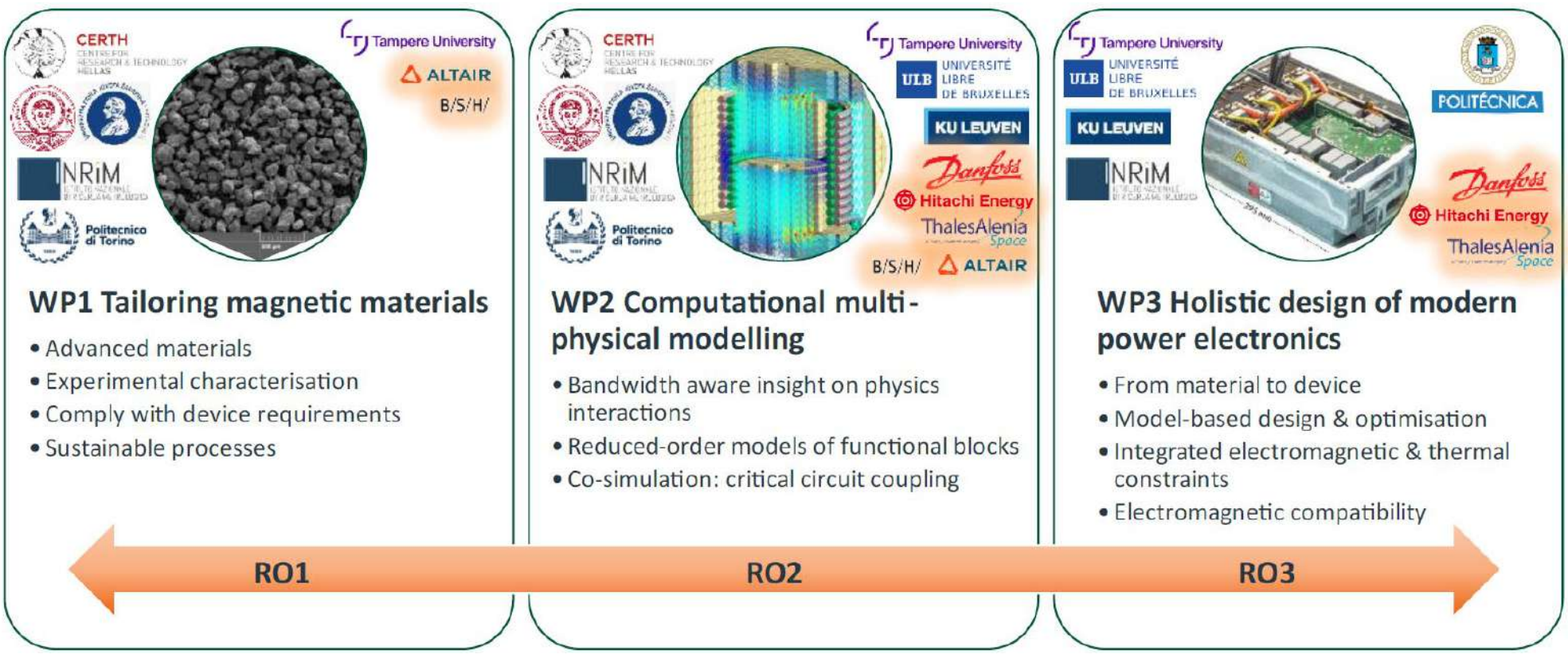
Our consortium comprises leading universities and research centers (KU Leuven, ULB, UPM, INRiM, Politecnico di Torino, Tampere University, Pavol Jozef University, CERTH, AUTh) and industrial partners (Danfoss, Hitachi, B/S/Hm Altair, Thales Alenia) with expertise spanning magnetic materials, electromagnetics, computational modelling, power electronics and advanced manufacturing. This broad knowledge base enables MAGNIFY to address the complete innovation chain, from material development and characterisation to multiphysics modelling, magnetic component design and system-level validation.

This multidisciplinary and intersectoral approach not only accelerates scientific innovation but also provides an outstanding training environment for the 15 Doctoral Candidates, that will become future leaders in sustainable power electronics and energy conversion.

MAGNIFY MSCA-DN



MAGNIFY Objectives



The first step towards more efficient power electronics begins with better magnetic materials. We will develop and characterise innovative soft magnetic composites and ferrite materials specifically designed for high-frequency applications. The project aims to create more sustainable materials with enhanced performance, enabling smaller, more efficient and more reliable magnetic components for future energy conversion systems..

WP2 focuses on developing advanced computational tools for accurate and efficient design of high-frequency magnetic components and power electronic systems. By combining electromagnetic, thermal and mechanical models across multiple scales, from magnetic materials and components to circuits and complete converters, the project will create fast and reliable multiphysics simulation tools. These next-generation models will allow engineers to optimise power electronic systems more efficiently and with greater confidence

WP3 transforms the innovations developed in the previous work packages into practical engineering solutions. By combining advanced magnetic materials with state-of-the-art computational models, researchers will design, optimise and prototype high-performance inductors, transformers and electromagnetic filters for high-frequency power electronic applications. The resulting prototypes will be validated in industrially relevant applications, paving the way for more sustainable and higher-performance power electronic systems.

MAGNIFY Project

The scientific programme of MAGNIFY is built around **15 doctoral research projects**, each tackling a specific challenge in the development of next-generation magnetic components for high-frequency power electronics. Together, the projects cover the entire innovation chain, from advanced magnetic materials and multiphysics modelling to the design and validation of innovative power electronic systems. In future editions of this newsletter, we will introduce our Doctoral Candidates and their research, highlighting their scientific progress, key achievements and contributions to the future of sustainable power electronics.

1.	Advanced soft magnetic composites with ferrite insulation	Responsible: Jan Füzer	PhD Student: Ioannis Tsoukalas
2.	MnZn ferrites for HF power converters & dimensional dependencies of their magnetic properties	Responsibles: Vasilios Zaspalis, Vasiliki Tsakaloudi	PhD Student: Anagha Anil
3.	Magnetic losses in cores for power electronics: characterisation and physical modelling	Responsibles: Vittorio Basso, Carlo Stefano Ragusa	PhD Student: Sayeedurrahman
4.	High-frequency reduced-order models of passive components with novel magnetic materials	Responsible: Ruth V. Sabariego	PhD Student: Guillaume Rault
5.	Design of inductors using time-domain loss models, including dynamic hysteresis models	Responsible: Paavo Rasilo	PhD Student: Marko Filip Horvat
6.	Capacitive effects on windings in magnetic components	Responsible: Ruth V. Sabariego	PhD Student: Shamroze Fayyaz
7.	Harmonic-balance multi-physical FE and circuit simulator for PE converters	Responsible: Johan Gyselinck	PhD Student: Hesamodin Allahyari
8.	Optimal 3-D modelling of magnetic components in resonant power converters for accurate leakage inductance estimation	Responsible: Wilmar Martinez	PhD Student: Brian Lopez
9.	Harnessing time-domain loss models in model-based control	Responsible: Petros Karamanakos	PhD Student: Angelos Fragkos
10.	Development of novel integrated filter designs for next-gen multi-MW electrification applications	Responsibles: Prasad Jayathurathnage, Petros Karamanakos	PhD Student: Sachira Liyanage
11.	Exploring advanced manufacturing techniques for next-generation compact inductive components	Responsibles: Prasad Jayathurathnage, Johan Gyselinck	PhD Student: Uzmah Javed
12.	Integrated magnetic and thermal design of high-frequency magnetics with interfaces to optimise power electronic systems	Responsibles: Adam Ruszczyk, Miroslav Vasić	PhD Student: Qudus Ayinde Aromose
13.	Modelling and design of EMC magnetics for high-frequency, wide-bandgap power converters	Responsibles: Marcin Kącki, Miroslav Vasić	PhD Student: Divya Nadikoppula
14.	Optimal combination of insulation and thermal management for magnetic components	Responsibles: Adam Ruszczyk, Wilmar Martinez	PhD Student: Marcin Gawędzki
15.	Modelling & Optimization of Active Cooling Solutions for HF High Power Density Magnetics	Responsible: Miroslav Vasić	PhD Student: Julia Walczyk

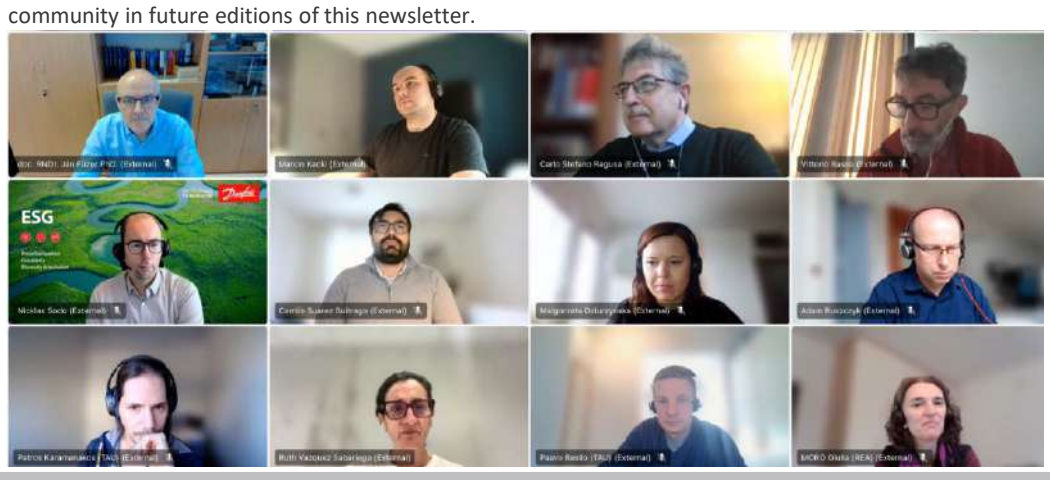
MAGNIFY Events

October 2025 — Magnify Kick-off

On **20 October 2025**, the MAGNIFY consortium officially launched the project with its Kick-off Meeting, bringing together representatives from all beneficiaries and associated partners. The meeting marked the start of a four-year collaboration dedicated to advancing sustainable magnetic materials, multiphysics modelling and innovative magnetic component design for next-generation power electronics.

The consortium reviewed the scientific vision and implementation plan of MAGNIFY, defining the roadmap for achieving the project's ambitious research objectives. Discussions focused on the coordination of the three scientific work packages, the recruitment of the 15 Doctoral Candidates, the training programme, communication and dissemination activities, and the collaboration between academic and industrial partners.

With the project now underway, the consortium is preparing to welcome the Doctoral Candidates and launch the research activities that will drive MAGNIFY over the coming years. We look forward to sharing the project's milestones, scientific achievements and upcoming events with the MAGNIFY community in future editions of this newsletter.



July 2026 — Network-wide Workshop #1: Magnify Launch Event Leuven, Belgium

From **30 June to 3 July**, the MAGNIFY consortium held its first **Network-Wide Workshop** at **KU Leuven** in Genk, Belgium. Under the theme *"Setting the Path toward Research on Magnetics"*, the event brought together the network's Doctoral Candidates, supervisors, consortium members, associated partners and invited speakers for four days of scientific exchange, training and collaboration.

The workshop combined technical sessions with transferable skills training, providing participants with an overview of the MAGNIFY research programme, its work packages and collaborative activities. Dedicated sessions on research integrity, open science and the responsible use of generative AI complemented presentations from academic and industrial experts, fostering discussions on the future of magnetic materials and power electronics research.

A key highlight was the industrial visit to **Thales Alenia Space**, where participants explored the application of advanced magnetic technologies in the space sector. The workshop concluded with presentations by the Doctoral Candidates, who introduced their research projects and received valuable feedback from supervisors and industry representatives.



Next Events

October 2026

Network-wide Workshop #2 : Workshop Košice, Slovakia
Magnetic Materials: The Key is how to characterize them properly!

May 2027

Network-wide Workshop #3 : Online Workshop
Title: How to model your components correctly when designing power supplies?

Thank You for Reading!

Thank you for reading the first edition of the MAGNIFY newsletter. We look forward to sharing our journey as the project progresses, from exciting research breakthroughs and training activities to collaborative events and the achievements of our Doctoral Candidates.
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