# Towards a green and responsible electronics industry

**Aligning with the circular economy objectives of the European Union and paving the way for new technological solutions, the DESIRE4EU project represents a significant step towards a sustainable electronics industry. We have discussed this with Alba PCB Group, an industrial partner of the consortium.**

by Laura Reggiani

**The DESIRE4EU project is an ambitious and innovative European initiative aimed at revolutionizing the electronics industry through the development of circular and bio-based printed circuit boards**

Officially launched on September 19, 2024 in Grenoble, France, this project aims to redefine the production, use, and recycling of electronic boards, focusing on sustainable and environmentally friendly solutions. The Consortium partners met to kick off the project, discussing work methodologies and presenting their respective research groups. During the meeting, the next challenges were also identified, thus starting an active collaboration between the various teams.

The project is led by a Consortium of eight partners, both academic and private, from five European countries, with the following main objectives: the production and assembly of completely bio-based multilayer PCBs, fully compliant with

technological standards; the development of specific efficient and sustainable bio-extraction processes to recover precious metals such as copper; the adoption of a "circular by design" approach, defining guidelines to promote the future use of these technologies. The **DESIRE4EU Consortium** aims to significantly reduce the environmental impact of the electronics industry, lowering greenhouse gas emissions, reducing toxicity, and limiting the use of non-renewable resources. The project has a holistic nature and combines expertise in materials science, green chemistry, electronics, and environmental microbiology. This interdisciplinary approach ensures that DESIRE4EU not only addresses immediate environmental challenges but also sets new standards for the electronics value chain.

## An international partnership

The project involves leading international partners, such as the **Grenoble Institute of Technology**, which coordinates the initiative through Professor **Pascal Xavier**, and various academic and research institutions, including the **Catholic University of Louvain**, the **SiNano Institute** (a European academic and scientific association for nanoelectronics), and the **Budapest University of Technology and Economics**. The industrial partners are **Arduino** (known for its open-source hardware platform), **Meshining Engineering** (a company with extensive experience in the development of bio-composites), **ABchimie** (a French company specializing in chemicals), and **Alba PCB Group**, a manufacturer of printed circuit boards and embedded solutions with plants and research centers in Italy, Germany, Poland, and China. Headquartered in Mogliano Veneto (Italy), the company has always been committed to developing innovative solutions for the production of printed circuit boards, and to learn more about the project, its objectives, and its impact on the electronics industry, we met with **Antonello Pramaggiore**, Director of Marketing and Business Development at Alba PCB Group.

**What initiatives has the European Union undertaken to reduce the environmental impact of the electronics industry? How does the DESIRE4EU project fit into this context?**
Climate change and high greenhouse gas emissions are among the major issues at the heart of the European Union's agenda. To address the environmental emergency, a series of legislative proposals have been adopted, starting with the Green Deal, which aims to achieve climate neutrality by 2050, with an intermediate target of reducing emissions by at least 55% by 2030. The global supply chain of the electronics industry is among the top eight sectors accounting for over 50% of the global carbon footprint. According to recent data, in 2022, 62 million tons of e-waste were generated, an 82% increase compared to 2010. Unfortunately, only 22% of this waste was properly recycled; the rest was disposed of in landfills or incinerated, causing significant negative effects on pollution. In this context, the DESIRE-4EU project, approved by the European Union's Innovation Council, aims to develop *"sustainable and circular"* printed circuit boards, manufactured entirely in Europe with materials of biological and biodegradable origin. The new generation of PCBs will not only meet the high technological and quality standards required by the market but will also be fully recyclable through an eco-compatible bioleaching process.

**Antonello Pramaggiore**, Director of Marketing and Business Development at **Alba PCB Group**.

**What role does Alba PCB play within the Consortium? What are your tasks?**
Alba PCB plays several key roles within the project, making a significant contribution to the development of innovative technologies necessary for the production of new "green" electronic boards. Our main activities include:

- **Collaboration with BME University and Meshining Engineering |** We will support the development of new bio-based materials, focusing on their compatibility with existing production processes in the PCB industry. This synergy aims to ensure a smooth transition to sustainable solutions without compromising operational efficiency.
- **Definition of design guidelines |** We will actively participate with Arduino and BME in defining the *"design rules"* for new electronic circuits. This collaboration will promote the integration of eco-friendly technologies into future electronic projects.
- **Production and validation of multilayer PCBs |** The Alba Elettronica plant in Mogliano Veneto will manufacture several thousand multilayer PCBs, adapting the processes and production parameters to the new bio-compatible substrates. At the end of production, an extensive validation session is planned in collaboration with research centers, applying IPC standards to guarantee the quality and technical reliability of the products.
- **Coordination of Exploitation - IP protection activities |** Alba PCB Group is responsible for designing the technology transfer strategy, ensuring that innovations developed within the project are effectively implemented in the electronics industry. We will also manage intellectual property issues with Consortium partners regarding new materials, manufacturing technologies, and bioleaching processes.

Members of the **DESIRE4EU Consortium**

**What are the main technological and operational challenges you will encounter in the development of the new "green" PCBs?**
The development of PCBs made with bio-based materials and a *"circular"* approach represents a complex and strategically relevant challenge for the electronics industry. One of the main problems concerns the compatibility of the new materials with existing production processes, originally designed for the use of conventional laminates, in particular those based on epoxy resins reinforced with glass fibers. To address these foreseeable challenges, the Alba Elettronica plant in Mogliano Veneto has long initiated an important research and development program aimed at identifying the most suitable solutions for optimizing the processing of bio-composites. The improvement of production technologies will require a technical adaptation of specific processes and a review of the operating parameters of the entire production cycle, accompanied by detailed checks to ensure industrial scalability, without compromising the high efficiency and quality standards required by the electronics industry. Finally, the validation of PCBs will be carried out according to the strict sector standards, through a series of in-depth tests to evaluate the performance of the circuits under critical operating conditions. These tests will include thermal and mechanical stability, electrical properties, moisture resistance, and overall durability. The tests will not be limited to the laboratory environment, but will also be extended to climate chambers along with other advanced instrumental tests, with the aim of certifying reliability in real-use scenarios. On the market acceptance front, it will be fundamental to demonstrate the qualities of the new bio-based PCBs through an

articulate *"proof of concept"* phase that involves thousands of students, professionals, and companies, supported by large-scale studies that will demonstrate concrete results in terms of reliability and operational performance. Addressing these ambitious challenges will require a systemic and synergistic approach that combines technological excellence, operational efficiency, and a long-term sustainable vision. Innovation in this area will stem from intense research and development work carried out in close cooperation between the academic/scientific and industrial worlds. Alba PCB Group's strategic partnerships with universities, research centers, and companies within the DESIRE4EU Consortium are crucial for accelerating the adoption of sustainable and innovative solutions, fostering a true transition towards a more eco-friendly industry.

**How will the DESIRE4EU project impact the European electronics industry in the long term, and how can companies be encouraged to adopt these new sustainable technologies?**

The European Green Deal is set to transform the electronics industry, introducing increasingly stringent standards in terms of sustainability, efficient resource management, and emissions reduction. In the coming years, companies in the sector will have to thoroughly review the sustainability of their supply chains, selecting suppliers who adopt responsible practices to reduce dependence on non-renewable resources. Electronics manufacturers must anticipate new regulations and gradually adapt their design strategies, paying particular attention to materials and production processes. Life Cycle Assessment is becoming an essential tool for an objective and transparent assessment of the energy and environmental impact of products throughout their entire life cycle, from raw material extraction to disposal. Integrating new technologies into the electronics industry represents a complex and articulated challenge that will require a coordinated effort. The DESIRE4EU Consortium has already defined specific strategies to facilitate the adoption of these innovations, and at the end of the development phase, it is expected that at least 10 major companies in the sector will be directly involved in the use of *"ecological"* PCBs in part of their production. In this scenario, the Alba group, in addition to manufacturing the new generation of bio-based circuits, will provide advanced guidelines to support companies in the design of electronic devices with a circular, low-environmental impact approach. While this transition requires a significant commitment, it represents a strategic opportunity for the European electronics industry to innovate, increase efficiency, and improve competitiveness in an increasingly globally-oriented market towards eco-friendly solutions. Companies that are able to quickly adapt to these changes will not only significantly contribute to reducing environmental impact, but will also gain a competitive advantage by accessing new business opportunities and consolidating their market position. The considerable interest shown by many of our clients after the announcement of the DESIRE4EU project highlights how crucial these issues are for the future of the electronics industry and its evolution towards more sustainable and responsible models.

The development of "green" PCBs represents a complex challenge for the electronics industry