Horizon
The EU Research & Innovation Magazine

European Commission

Europe tackles e-waste with eco-friendly innovation that helps reuse and repair

Researchers are developing reusable and environmentally friendly electronics for the healthcare, consumer and manufacturing sectors, replacing scarce materials with circular alternatives to build a sustainable future.

13 November 2025 - By MICHAEL ALLEN

Europe's appetite for electronics keeps growing, but so does the waste. From smartphones and laptops to medical sensors, more devices mean mounting piles of discarded hardware.

According to Eurostat, around 5 million tonnes of electronic waste is collected for recycling in the EU each year. That is more than 11 kilograms per household, enough to cover around 2 000 football pitches stacked a metre high.

These 5 million tonnes represent less than 40% of the total mass of electronics put on the European market annually. The rest often ends up in landfills because mixed materials make recycling difficult.

Smarter design

To tackle this challenge, the EU-funded SUSTRONICS initiative is rethinking how electronics are made, from the materials used to the way products are assembled and repaired. Led by Dutch technology company Philips, it brings together 46 partners from 11 countries.

The three-year initiative runs until May 2026, supported by the Chips Joint Undertaking, an EU public–private partnership promoting sustainable semiconductor and electronics manufacturing in Europe.

"The SUSTRONICS researchers focus mainly on fundamental research into new solutions," explained Ramon Caanen, who leads a sustainability consulting team at Philips.

This includes the use of bio-based, paper-based and more widely available materials, the sustainable manufacturing of electronic components as well as designs that enable better recycling.

The researchers' goal is to embed sustainability into design, production and functionality, so that products can be better reused and more easily recycled.

That focus has gained urgency since the EU introduced new regulations on eco-design and the right to repair in 2024. They are meant to extend product lifespans, improve energy efficiency and make repairs simpler. They also aim to reduce environmental impact and promote a more circular economy with less waste.

Healthcare pilots

Healthcare is one of SUSTRONICS's main proving grounds. While connected medical devices can improve patient care, their single-use electronic parts add to the e-waste problem. Three pilot studies are developing sustainable electronics for healthcare.

At Swedish hygiene company Essity Hygiene and Health, a partner in the global research, principal scientist Shabira Abbas is working on a smart incontinence pad designed to make life easier for both patients and staff.

The device is known as a change indicator and alerts staff when a pad needs replacing. A small clip-on reader sits outside the pad, is cleaned between patients, and is reused with each new pad.

"It is designed to improve both skin health and dignity," said Abbas.

A removable electronic strip inside the pad measures temperature, humidity and enzymes. It can be recycled separately where facilities allow. The team uses paper substrates and 3D-printed metal-oxide sensors to reduce the use of material.

The pad also requires a small reader, which sits outside the pad, to transmit data to staff. This clip-on reader can be reused with each new pad.

"In between patients, you have to clean the reader, but otherwise they are reusable," said Abbas. Her team's challenge is making the connector foolproof and easy for staff to attach and remove.

They are also working on energy efficiency, adapting software to use minimal power while processing pad data. This is vital for medical devices that must run continuously, since the combined energy demand of many units greatly increases their overall carbon footprint.

The other two pilot devices include a skin patch for tracking glucose metabolism and a smart dressing for wounds, which signals when it needs replacing. In today's medical practice, both are still single-use, so sustainability is a key challenge.

Better materials

The SUSTRONICS team is also exploring ways to improve production efficiency and use recyclable or environmentally friendly materials whenever possible. Part of the solution is moving to more common resources from those that are scarce and environmentally harmful, such as silver.

"Silver has a high upstream footprint. Replacing silver with more common materials such as copper or carbon can lower impact significantly. But the key challenge is to make these substitutes perform well in their intended electronics application," said Caanen.

Beyond medical devices, pilots also target repairability in shavers and lighting, easier dismantling for recycling, and lower energy use.

Looking ahead

Their work ties in with wider EU goals. A new Circular Economy Act, expected in 2026, will create a stronger market for recycled materials, boosting both supply and demand across Europe. It supports the EU's ambition to lead the world in circular economy practices by 2030.

Today, only about 12% of Europe's materials are reused or recycled. The target is to double this to 24% by 2030 under the EU's Clean Industrial Deal.

Caanen hopes that SUSTRONICS will become a flagship project for sustainable electronics, by demonstrating how the European electronics industry can benefit from sustainable, alternative materials for electronic components, while maintaining competitiveness.

For hospital patients, innovations like the smart pad could mean greater comfort, dignity and quality of care, while also contributing to a more sustainable, circular economy.

By combining practical healthcare solutions with ambitious environmental goals, the SUSTRONICS team demonstrates how technological innovation can improve everyday lives and support Europe's drive for sustainability.

In the long term, such efforts could transform both the electronics industry and healthcare, showing that small devices can have a big impact.

Research in this article was funded by the EU's Horizon Programme. The views of the interviewees don't necessarily reflect those of the European Commission. If you liked this article, please consider sharing it on social media.

Circular Economy Act

Due for adoption in 2026, the **Circular Economy Act** aims to establish a Single Market for secondary raw materials, increase the supply of high-quality recycled materials and stimulate demand for these materials within the EU. It will contribute to the ambition laid out in the Competitiveness Compass to make the EU the world leader in the circular economy by 2030.

The **circularity rate** is one way to measure how circular our economy is. This number shows how many of the materials we use are recycled or reused instead of being thrown away. Right now, Europe's circularity rate is about 12%, but the goal is to **double it to 24% by 2030**. This target is part of the EU's Clean Industrial Deal.

More info

- SUSTRONICS (CORDIS)
- SUSTRONICS project website
- Ecodesign for sustainable products regulation
- Chips Joint Undertaking
- EU Green Deal Industrial Plan
- EU Clean Industrial Deal
- EU Circular Economy