Photonics21 Press Release

European scientists turn to light to halt internet energy crisis

European scientists are turning to light to avert a looming energy crisis threatening the future of AI, streaming, and digital services.

As demand for artificial intelligence, cloud computing, and data-intensive applications accelerates, power systems are under increasing pressure. Data centres and digital networks could soon require the output of entire power stations simply to move information from place to place.

But, a new European research initiative aims to break this trend by replacing traditional electronic data processing with ultra-efficient photonic technology – using light instead of electricity to transmit and compute data.

The approach could dramatically cut energy use across AI systems, mobile networks and everyday digital services.

Experts warn that data centres already consume around 1.5% of global electricity, and demand is projected to more than double by 2030, driven largely by AI and the rapid growth of digital services. As systems get faster, electrical signals generate more heat, waste more power, and push energy infrastructure to its limits.

A System Under Strain

Every time a user streams a video, queries an AI model, or checks a map, data is sent to vast data centres (sometimes hundreds or thousands of miles away) before a response is returned.

With billions of connected devices coming online and AI workloads exploding, the energy required to move this data is rising sharply.

The HiCONNECTS project (or "Heterogeneous Integration for Connectivity and Sustainability") is tackling the fundamental bottleneck: the inefficiency of electrical signals.

Project experts warn that the current digital infrastructure may struggle to support future demand, as increasing data volumes drive up energy consumption.

By integrating photonics with advanced electronics, the project aims to reduce heat, cut power consumption and enable far higher data speeds.

Unlike electrical signals, light can carry far more information faster and with significantly lower energy loss, making it a key technology for future computing systems.

Rethinking The Internet

One of the project's most transformative goals is to redesign how and where data is processed.

Instead of sending everything to distant data centres, HiCONNECTS technology enables more data to be handled locally: on devices, within cities, and across nearby networks.

This "localised internet" reduces the distance data must travel, cuts response times, and dramatically lowers energy use.

In effect, the approach shifts the internet from a model that constantly transports data over long distances to one in which more decisions can be made closer to where data is generated.

For users, this could mean faster, more efficient AI services, more reliable 5G and future 6G networks, improved healthcare diagnostics, and real-time smart city systems, all without a surge in energy consumption.

Building A Sustainable Future

While the technologies developed in HiCONNECTS promise a faster and more responsive internet, the long-term implications are even more significant.

The challenge is no longer simply increasing performance, but ensuring that digital infrastructure can scale without overwhelming energy systems.

By reducing the energy required to move and process data, photonics-based systems could play a critical role in supporting sustainable growth in AI, communications and digital services.

HiCONNECTS is a large-scale European research initiative that brings together 64 partners across 15 countries, including major semiconductor companies, equipment manufacturers, research institutes, and universities.

The project aims to develop the next generation of energy-efficient computing infrastructure while strengthening Europe's position in critical technologies such as photonics, semiconductors and artificial intelligence.

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