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Green Speed: Unlocking a Sustainable Future with Fiber Broadband

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The digital revolution isn't just transforming how we connect. It's reshaping our lives and redefining our relationship with the planet. While the telecommunications industry fuels this revolution, it also faces a critical challenge: sustainability.

Telecom networks, data centers, and the ever-present hum of digital activity require power that generates greenhouse gas emissions, contributing to climate change. In total, the ICT industry is estimated to be responsible for 2 percent of the world's carbon footprint—roughly on a par with the aviation industry.

But there's a considerable flip side: the emissions avoided through the use of ICT are already nearly ten times greater than those generated by deploying it, from video conferencing replacing transatlantic flights, to smart thermostat optimizing home energy use, or the online shopping boom reducing car journeys.

Multiply that impact across industries, homes, and individuals, and the digital world's potential for environmental good becomes evident. According to the Global e-Sustainability Initiative (GeSI), ICT has the potential to slash global greenhouse gas (GHG) emissions 20 percent by 2030 by helping companies and consumers save energy

Fiber: Green Champion of Broadband

The technology driving the communication advancements at the heart of the ICT industry is fiber broadband, and it holds the key to unlocking a greener future. Fiber is the greenest broadband

technology available; faster, more performant, and more energy efficient than anything we've seen before.

In fact, a study by Omdia recently found that 50 percent of communication service providers who have deployed fiber PONs said it plays a significant role in helping their organizations meet energy-saving and sustainability goals.

How does fiber consume less energy? The answer basically comes down to fiber being a better and more efficient technology. Let's compare fiber to copper broadband.

Fiber is what is known as a passive technology. Light traveling down a fiber can go very fast for very long distances without needing to be boosted or amplified. Copper, on the other hand, provides more resistance: you need more energy to push data through and then amplify it at regular intervals.

Fiber also consumes much less energy than fixed wireless access (FWA). That's because fiber confines the pulses of light inside the core of the fiber optic cable, whereas in FWA the data travels in all directions and requires more energy. A study launched in 2017 by Europacable found that for a broadband network delivering 50 Mbps services, fiber consumes 3,156 MWh per year, which is more than three times lower than FWA.

The energy consumption of other fixed access technologies is significantly higher: 4,987 MWh per year for copper (xDSL), and 3,465 MWh per year for cable (DOCSIS). In terms of carbon emissions, that's the equivalent of 1.7 tons for fiber compared to 2.7 tons for DOCSIS.

Cutting Carbon Emissions and More

Fiber has enabled us to decouple increases in bandwidth from increases in energy consumption. In fact, broadband carbon emissions have actually decreased since operators began upgrading older copper networks to deep fiber or full fiber-to-the-home networks. Each new generation of fiber broadband, from GPON, to XGS-PON, and now 25G PON, delivers even more efficiency. Overall, since 2007, broadband power consumption has been reduced by 35 percent while speeds have increased by a factor of 64 (See Figure 1, next page).

As more homes and businesses are connected around the world, the energy consumed per bit delivered continues to fall. Even mobile networks benefit from fiber FTTH broadband, because FTTH fiber enables the most power efficient backhauling of mobile traffic from cell sites to the network core: 40 percent less power than any other backhauling technology.

Fiber's Ripple Effect: Transforming Industries and Lives

The benefits of fiber broadband extend far beyond its own green footprint. Transport accounts for 21 percent of global emissions, with 73 percent coming from short journeys. With Zoom meetings replacing business trips, online shopping replacing car journeys, and working from home eliminating countless commutes, fuel and carbon

emissions are significantly cut. A study in Maine found that vehicle travel, which normally produces 54 percent of Maine's greenhouse gas emissions, fell by a third during the early part of the Covid pandemic when people switched to working from home. Likewise, smart buildings connected by fiber use energy management systems, and connected appliances optimize energy use, creating eco-friendly homes and workplaces. Fiber is also making businesses and enterprises more sustainable by replacing traditional copper local area networks (LAN). Optical LANs are far more power efficient, with an energy cost reduction of fiber-based local infrastructure in the region of 70-80 percent.

In agriculture, high-speed fiber broadband enables precision agriculture and smart farming. GPS, drones, and sensors help farmers use real-time data to make better decisions on irrigation or fertilizer use, reducing energy, waste, and increasing yields.

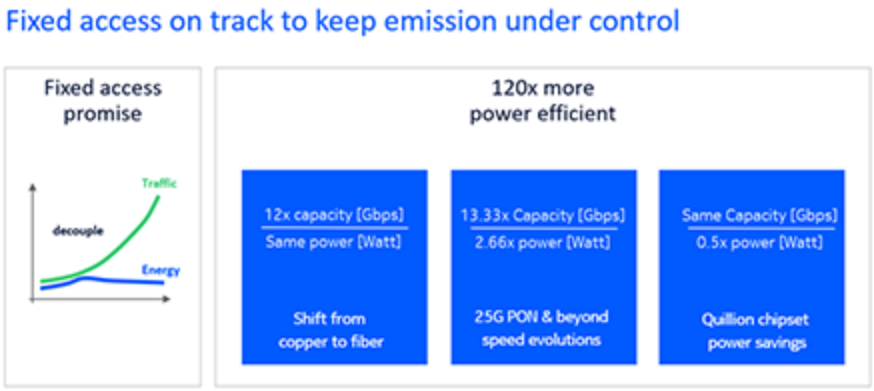

Figure 1. As connections between homes and business grow, energy consumed per bit delivered falls. Fiber is the most efficient access technology – at 8x less power than other technologies.

A cherry farm in New Zealand is using high-definition cameras to scan their produce, analyze those images in the cloud, and then sort their cherries for quality and route them automatically, all with high-speed fiber broadband. Increased productivity saves energy, reduces waste and hence reduces the overall environmental impact.

This type of Industry 4.0 application is making warehouses, factories, and other industrial complexes around the world far more productive, efficient, and sustainable.

A Fiber Future Means Sustainable Connectivity

While fiber's current impact is impressive, the industry is committed to further optimizing the entire fiber lifecycle, from manufacturing to end-of-life. This means selecting low-carbon materials and ensuring equipment is designed for longevity and efficient recycling.

Today, fiber is the fastest growing broadband technology, so it has huge potential to help save energy in homes, businesses, farms, etc. By 2025, it is expected that 1 billion residential and business will be connected over fiber, and fiber will be at the reach of 50 percent of the population. Over this same time, more networks will also upgrade from GPON to XGS-PON, halving the energy required per port.

25G PON brings an even greater efficiency gain, delivering a 12.5-fold capacity boost over GPON for only a 2.5-fold power increase. With 0.25 watts per gigabit power consumption, 25G PON is the most energy efficient broadband access technology available today. Moreover, each of these upgrades can be made simply by changing optics in fiber nodes: none of the existing fiber infrastructure needs to be dug up or replaced, thus avoiding additional environmental impact.

Fiber broadband isn't just about lightning-fast speeds and seamless connectivity; it's about building a greener future. As we invest in fiber, we connect people, empower industries, and pave the way for a more sustainable world. And as we make more fiber connections, we ensure every byte transmitted carries the weight of positive environmental change.