

## Sky-High Prices Contribute to Rising Fiber Optic Cable Costs

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*Input costs for fiber optic cable are adding upward pressure on fiber optic cable prices at a time when demand for fiber technology is high and expected to continue growing. High fiber optic cable prices may threaten the financial feasibility of information communication technology (ICT) investments. This executive briefing on trade (EBOT) will examine the relationship between fiber optic cable input costs, specifically silica tetrachloride, helium, and energy, and the demand forces that have increased the price of fiber optic cable.*

Fiber optic cables transmit data in the form of light through thin strands of glass, approximately the diameter of a human hair. Fiber optic cable technology offers high bandwidth, low latency, and reliable connectivity, particularly in areas where radio waves may be obstructed by construction, foliage, or other barriers.<sup>1</sup> Because of these benefits, fiber optic cable plays an integral role in ICT infrastructure. However, due to global supply constraints and demand increases, fiber optic cable prices have increased significantly since 2021. These price increases threaten the viability of broadband infrastructure investments around the world, particularly in less-developed countries where high upfront costs may make ICT connectivity too expensive.

**How are fiber optic cables produced?** Fiber optic cable manufacturing begins with transforming silicon tetrachloride and oxygen into optical glass. The glass is stretched into a thin strand, which forms the core of the optical fiber. Manufacturers cool these thin strands with helium.<sup>2</sup> Because of helium's chemical properties, helium is a highly effective coolant that can rapidly cool the fragile fibers without breaking them.<sup>3</sup> After cooling, the optical glass core receives multiple layers of coating to form a single optical fiber. These fibers are bundled together to form fiber optic cables.

The costs of the key inputs to this process—silicon tetrachloride, helium, and energy—are rising. The chief executive for Corning, the world's largest fiber optic cable producer, reports that he has “never seen anything like this inflationary crunch.”<sup>4</sup>

**Why are input prices rising?** The silicon tetrachloride market is driven by high-purity silicon and silica manufacturing, which has applications in fiber optic cables, semiconductors, photovoltaic cells, and certain chemical manufacturing. Rising demand for electronics, photovoltaic cells, and fiber optic cables have pushed prices for silicon tetrachloride upward;<sup>5</sup> the CRU Group reports that prices for silicon tetrachloride have increased by over 50 percent between 2021 and 2022.

Global helium shortages have caused helium prices to rise.<sup>6</sup> Since 2005, the global helium industry has experienced significant shortages, leading to volatility in helium prices. The most recent shortage occurred in July 2021 after the shutdown of the Bureau of Land Management's (BLM's) Crude Helium Enrichment

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<sup>1</sup> Rudisail, “[5G vs. Fiber Optics](#),” June 22, 2021.

<sup>2</sup> Pease, “[Helium Recovery Systems Reduce Cost of Fiber Production](#),” September 1, 2002.

<sup>3</sup> Summit Source Funding, “[Helium Used for Internet Access \(Fiber Optics\)](#),” accessed March 13, 2023.

<sup>4</sup> Gross, “[Global Shortage of Fibre Optic Cable Threatens Digital Growth](#),” July 25, 2022.

<sup>5</sup> Expert Market Research, “[Global Silicon Tetrachloride Market Report and Forecast 2023-2028](#),” accessed January 23, 2023.

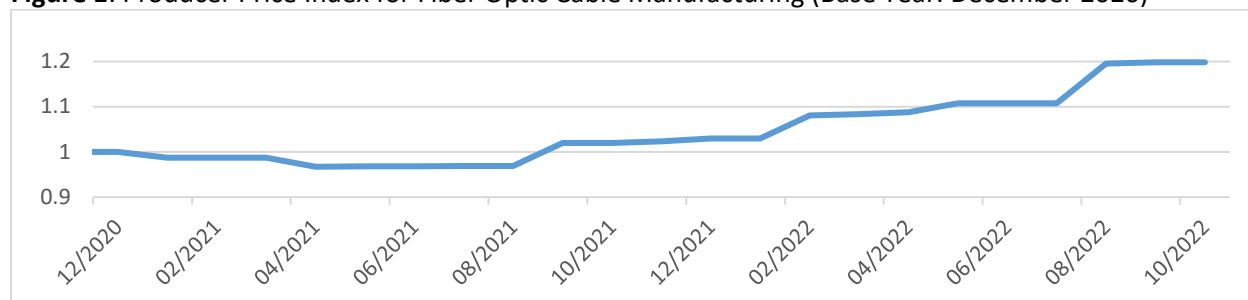
<sup>6</sup> For more information on global helium supply, see DeCarlo and Uy, “[Still Afloat? A Look at the Helium Industry](#),” December 2017, 2; DeCarlo and Goodman, “[The Impact of Conflict on the Global Helium Shortage](#),” May 2022, 2.

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plant, which supplies over 40 percent of helium consumed in the U.S.<sup>7</sup> In January 2022, a Russian helium plant also had fires,<sup>8</sup> further exacerbating the global supply shortage such that global helium prices increased 135 percent. The increase in helium prices alone is estimated to increase the direct cost of optical fiber by 0.1 to 0.3 USD per fiber kilometer.

Higher energy prices have also had an inflationary effect for cable producers, particularly in Europe, where energy prices were five times higher at the end of 2022 than at the beginning of the same year.<sup>9</sup> Due to the combined effect of these inflationary factors, the U.S. producer price index for fiber optic cable manufacturing has risen nearly 20 percent since December 2020 (see Figure 1).

**Figure 1:** Producer Price Index for Fiber Optic Cable Manufacturing (Base Year: December 2020)



Source: U.S. Bureau of Labor Statistics, FRED.

**Fiber Optic Cable Demand is on the Rise.** ICT infrastructure projects and residential investment have also put upward pressure on prices. According to the CRU Group, fiber optic cable use has grown 8.1 percent during the first half of 2022 and the industry expects an over 10 percent compound annual growth rate between 2020 and 2027 as wireless carriers meet consumer demand for high-speed internet.<sup>10</sup> Broadband expansion, data center construction, and 5G investments are the primary demand drivers. Currently, China consumes 46 percent of fiber optic cables produced globally, but the United States is the largest importer of cable, responsible for 21 percent of global imports. Analysts predict the most market growth in the Asia-Pacific and in North America as both regions invest in ICT infrastructure.

**Fiber Optic Cable and the Future of Broadband.** With surging demand and rising input costs, fiber optic cable prices have skyrocketed. For example, in Europe, cable prices doubled between January 2021 and July 2022.<sup>11</sup> Globally, fiber optic cable prices have risen up to 70 percent between March 2021 and July 2022. Limited cable supply has caused manufacturers to prioritize their largest cable customers, stretching lead times for smaller customers to nearly a year. This raises questions about whether governments can meet their targets for building infrastructure, and whether large ICT infrastructure projects will become infeasible.

Sources: Freudenrich and Pollette, "[How Fiber Optics Work](#)," July 29, 2022; Giraud, "[Helium Recovery Systems for Producers of Optical Fiber](#)," January 10, 2023; Kunert, "[Price, Lead Times and Scarcity of Fiber Optics May Derail Projects](#)," July 25, 2022.

<sup>7</sup> This shutdown was due to Occupational Safety and Health Administration violations. The BLM Crude Helium Enrichment Plant has since reopened in May/June, 2022.

<sup>8</sup> Since the removal of Russia from SWIFT, companies do not expect that Russia will be able to supply helium to U.S. and EU buyers. RFI, "[Sanctions On Russia Add to Troubles Facing Global Helium Industry](#)," March 3, 2022.

<sup>9</sup> Finch, "[Bare Fibre Prices: Recent Trends and CRU's Outlook](#)," October 4, 2022.

<sup>10</sup> GlobeNewswire, "[With 10.3% CAGR, Fiber Optics Market Worth USD 9.73 Billion by 2027](#)," September 7, 2022.

<sup>11</sup> Ashenden, "[Fiber-Optic Cable Shortage Threatening Global Digital Connectivity](#)," July 29, 2022.

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