



Carbon Fiber is one in a series of reports published as part of Nexant's 2018 Technoeconomics – Energy & Chemicals (TECH) program.

Overview

Carbon fiber is a lightweight and high strength material that can withstand high loads without deformation. Its characteristics are stable over long time periods, even under severe conditions, and also include good fatigue and corrosion resistance, good electrical and thermal conductivity, chemical inertness and electromagnetic interference shielding capacity as well as low thermal expansion coefficient, making it a high-value product.

Global demand for carbon fiber is projected to increase at healthy rates over the next five years. Some of the demand drivers include, among others, the rising global wind and mill capacity as well as fuel efficient aircrafts and cars; new space and military applications that require unique material properties; and the overall increase in global communication, leading to higher demand for satellites, electronic equipment, and fiber optic cables, all of which employ carbon fiber.

This TECH report provides an overview of the commercial and developing technologies for producing carbon fiber and addresses:

- What are the major production technologies for carbon fiber and how do they differ? Is the technology available and who are the key technology owners and licensors?
- What are the key developments in carbon fiber technologies?
- What is the market, business and regulatory environment like for carbon fiber today?
- What are the key factors that impact overall economics for producing carbon fiber across different geographic regions?
- How are carbon fibers recycled? Who are the key recyclers on the market?

Commercial Technologies

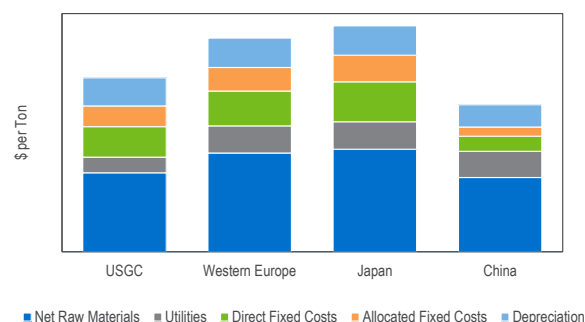
Carbon fiber properties depend principally on the precursor used, and the process conditions employed. Three precursors are commercially employed: polyacrylonitrile (PAN), which accounts for over 97 percent of the global market; pitch, accounting for less

than three percent; and rayon for around 0.1 percent of the global capacity.

Process Economics

Detailed cost of production estimates for the PAN and pitch-based carbon fibers are presented for USGC, Western Europe, Japan and China, reflecting the location of existing carbon fiber capacities.

PAN-Based Carbon Fiber Regional Cash Cost of Production



Commercial Overview

Carbon fiber global demand in 2018 is estimated at 78 150 tons and is forecast to grow by 9.5 percent per annum on average to about 123 000 tons in 2023. Carbon fiber applications are generally divided into three major segments:

- Aerospace and military (civilian aviation, military, and space)
- Consumer (sports & leisure, and other consumer goods)
- Industrial (wind turbine blades, ground transportation, pressure vessels, civil engineering, oil and gas, medical, and other industrial applications)

An overview of the supply, demand, and trade of carbon fiber on a global and regional basis (North America, Europe and Asia Pacific, Rest of the World) is provided in this TECH report.



TECH 2018S7: Carbon Fiber

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- Chemistry
- Process flow diagrams and descriptions of established/conventional, new and emerging processes
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- Overview of product applications and markets for new as well as established products
- Regional supply and demand balances for product, including capacity tables of plants in each region
- Regulatory and environmental issues where relevant

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Technology and Costs comprises the Technoeconomics – Energy & Chemicals (TECH) program (formerly known as PERP), the Biorenewable Insights program (BI), the Sector Technology Analysis, and the new Cost Curve Analysis. These programs provide comparative economics of different process routes and technologies in various geographic regions.

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