In the year since I wrote *The Carbon Conundrum: Activated Carbon Market Update* (WC&P June 2011), several issues and items have impacted the global activated carbon market. This paper will review the major issues that have had an effect on the availability and pricing of activated carbon products.

The major activated carbon products used worldwide are mainly manufactured from coal (lignite, sub-bituminous, bituminous and anthracite), coconut-shell charcoal and wood (hard wood, soft wood and bamboo). Most carbons used in water filters are manufactured from coconut shell or coal. There are smaller niches of products made from peat, olive pits, fruit nut shells, palm shells, pecan shells and macadamia nut shells. Coal pricing fluctuates by country with prices in the US and China being the most important. China has large coal industry and capacity but remains a net importer from the US, New Zealand and Australia. The reason coconut-shell charcoal and coal have such a big impact is that the ratio of raw material to finished activated carbon product is close to 3:1.

**Stock and pricing issues**

As mentioned in the previous article, raw materials used to manufacture activated carbons (such as coal and coconut-shell charcoal) have been subject to shortages and price increases, and those issues directly relate to the global pricing for activated carbon products. The shortages of coconut-shell charcoal have been alleviated somewhat and charcoal pricing has stabilized in the past six to eight months, with no price increases since October/November 2011. Some US domestic coal carbon manufacturing had long-term coal contracts expire in the past year and some new contracts are at higher prices.

One event that had a major domino effect on activated carbon and activated carbon raw material supply was the March 2011 tsunami that hit Japan. After the initial tragedy, Japanese agencies realized they needed huge quantities of activated carbon for water treatment. The fear was that radioactive fallout would rain down and contaminate water sources that supply the reservoirs of many cities. Purchasing orders went out for thousands of metric tons of activated carbon. Coal-, coconut shell- and wood-based stocks of activated carbon in Asia were readily depleted and it took many months for stocks to build back up to normal levels. Many companies found they could not buy the quantities of carbons they normally bought from Asia, or if they could, the price had increased significantly. These companies were forced to look to other countries and sources; Japanese activated carbon demand is just now starting to fade over a year after the event.

Ocean freight costs, Chinese anti-dumping duty on steam-activated carbon imported into the US and oil prices (coconut charcoal is an alternate fuel in Asia if oil is highly priced) have had a steady impact on activated carbon prices in the US. Ocean freight costs have been relatively stable but do track oil prices. The US Commerce Department’s recently completed anti-dumping duty Preliminary Third Review portends higher duties for the April 2010 to March 2011 review period but final results will not be released until around October.

The fact that there is again uncertainty in the amount of anti-dumping duty on Chinese carbons means less carbon may be imported into US in the following year. 2012 is the final year of the five-year, anti-dumping duty; the whole policy is to undergo its sunset review soon. The duty is no small issue as it can range from zero percent to over $1 (USD)/lb. The amount of the anti-dumping duty depends upon the specific manufacturer in China and the data they did or did not submit to the Commerce Department for review. The normal tariff duty on activated carbon from China is 4.8 percent.

**Production increased**

The supply side of activated carbon has been affected by...
several issues in the past few years. Several new manufacturing plants have been constructed or have been announced, and many existing plants are being expanded or under consideration. New capacity was needed because the forecast for activated carbon demand greatly exceeded then-current production capacity. New coconut-shell activated carbon plants or major expansions have started production in India, the Philippines, Indonesia and Vietnam in the past year. Some consolidation occurred in September 2011, when a major coconut-shell carbon manufacturer based in Europe bought out a medium-sized coconut-shell manufacturer (also based in Europe), which had a new manufacturing facility in Vietnam.

A new lignite coal activated carbon joint venture (JV) plant is now in production in Canada, and a new plant is in startup mode in Hawaii to produce activated carbon from macadamia nut shells. One of the largest activated carbon manufacturers in the world is considering an IPO or sale of the company; the effect of this on production and pricing is unknown at this time. Due to an anticipated demand increase for powdered activated carbon for flue-gas mercury removal, numerous companies are reviewing the feasibility of making low-cost activated carbon from wood and agricultural wastes; however, none are currently beyond the planning stage. Additionally, a new grass-roots plant, announced in late 2011, is to be built in Pennsylvania by a new player in the activated carbon industry from Australia.

Reactivation is an important part of some industrial and municipal activated carbon markets, as the virgin carbon can be used, reactivated and then recycled in custom ways, or the reactivated carbon can be sold and used in other suitable applications. New carbon reactivation plants are being built in China and the US and the largest plant in Europe was recently expanded. A new reactivation plant in Mexico started service within the past couple of years.

**Market growth projections**

The major reason for projected activated carbon market growth in the next five years is the new market for mercury removal from flue gas at coal-fired power plants that could require 500 to 800 million pounds of powdered activated carbon annually by 2016. The US EPA’s Final Rule passed in November 2011 and coal-fired power plants have three to four years to comply with the requirement of 91-percent mercury removal efficiency. Some pending litigation that questions the validity of the mercury-removal rule and timing until implementation, and the Cross State Pollution Control Act, could reduce the amount of activated carbon required by 20 percent; however, the market seems poised to add large growth on activated carbon demand. There is also a projected 70 to 90 million pounds per year of activated carbon needed to help potable water plants in the US meet US EPA’s Disinfection ByProduct Rule commencing in January 2013. Another reason for increased activated carbon demand is the growing Chinese economy, which will have its own large demand for activated carbon products as it increases its industrial and commercial base and continues to be a major world exporter of manufactured products.

**Certification cost impact**

Activated carbon products may have third-party certifications (such as NSF, USP, EPA registration and kosher), which can be expensive to maintain. This results in additional cost and typically, a higher price than non-certified products. Activated carbon products in the US are normally specified to meet industry standards (such as AWWA and the Food Chemical Codex) and tested in compliance with ASTM D-28 Committee on Activated Carbon Standard Test Methods. Quality activated carbons are supplied with certificates of analysis (COA) that list the activated carbon specifications and test results for that specific lot of product. As a result of Proposition 65 in California, all activated carbon products used in carbon filters for POU/POE filter units are additionally tested for arsenic at the five-ppb limit, which is more stringent than federal and NSF certification limits. This extra testing entails costs that are often passed on by slightly higher prices for activated carbon.

**Market performance history**

Total activated carbon imports for 2011 was $162 million (USD), a slight increase of only 5.3 percent over 2010 imports of $154 million. The primary reason for the small increase was the dramatic drop in German imports of coal activated carbon, which was previously needed as a stopgap supply until more US production came online in 2011 for the rising flue-gas market. 2010 imports were 18-percent higher than 2009 imports and preliminary data for 2012 imports indicate a 15-percent increase for January/February over the same period in 2011. It suggests a record year for activated carbon imports into the US.

My usual advice still stands. Companies need a real relationship and partnership with activated carbon suppliers in order to maintain adequate quality supplies and have counsel concerning the correct activated carbons to use for their applications.

**About the author**

Ken Schaeffer, President of Carbon Resources, LLC, has over 30 years experience in the activated carbon industry. He holds a BA in biology and an MS in environmental science from the University of Texas at Dallas. Schaeffer is past Vice-Chairman of ASTM Committee on Activated Carbon D28 and past Vice-Chairman of the International Activated Carbon Manufacturers Association (IACMA). He is also on the Board of Directors of the Pacific Water Quality Association (PWQA). Schaeffer can be reached at ken@carbonresources.com or (760) 630-5724.