# Municipal Capabilities

CalgonCarbon
A Kuraray Company

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## Activated Carbon Manufacturing

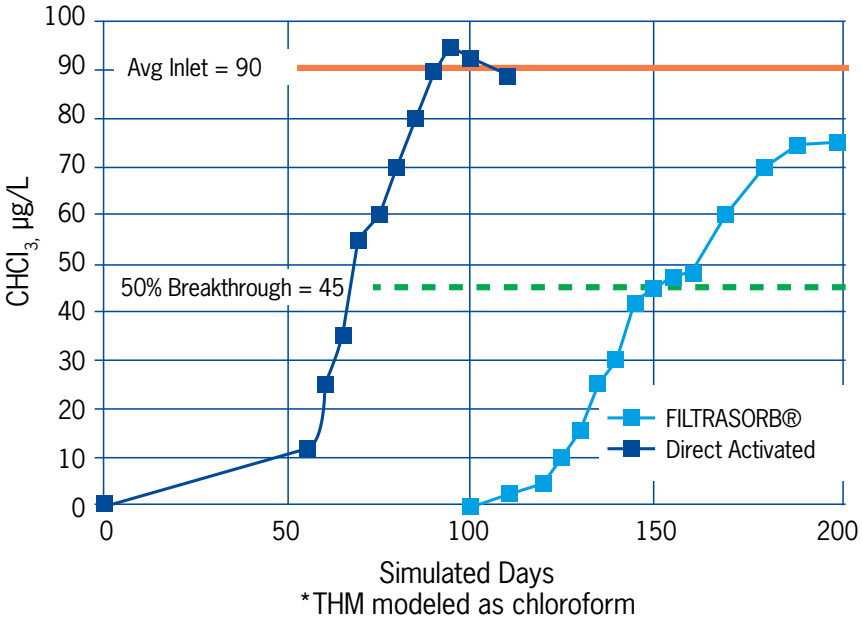
Calgon Carbon is the largest manufacturer of granular activated carbon (GAC) in the United States. As a manufacturer of activated carbon, we have a distinct advantage with respect to both flexibility and expertise in manufacturing a broad product mix as well as significant depth and breadth of GAC application knowledge. Resellers and distributors cannot claim this level of capability.

Our company produces over 100MM lb/year of virgin GAC on its four production lines at two virgin GAC manufacturing facilities–one in Catlettsburg, KY and one in Pearlington, MS. Calgon Carbon can offer surety of supply to our customers.

Calgon Carbon's FILTRASORB® line of products, developed for the drinking water market, is NSF/ANSI Standard 61 certified.

We also use domestic metallurgical grade bituminous coal to produce a **reagglomerated** GAC. Our reagglomerated products have shown superior adsorption performance versus direct activated granular carbons.

**THM* Removal from Drinking Water**




## Activated Carbon Adsorption: The Solution for **Simultaneous Removal** of Multiple Organic Contaminants in Water and Wastewater

GAC is a contaminant removal technology that does not require the addition of chemicals.

GAC is a well-known and proven effective treatment for removing total organic compounds (TOC), disinfection by-products (DBP) and disinfection by-product precursors, VOCs, perfluorinated compounds (PFAS), algal toxins, pesticides, endocrine disrupting compounds and pharmaceutical and personal care products.

When GAC is installed to adsorb a specific compound (like TOC/DBP/PFAS), it can also protect the drinking water supply from other compounds and act as a defense barrier against chemical spills in the source water.


## Equipment Fabrication

Calgon Carbon has more than 40 years of experience supplying both adsorption systems and GAC to treat drinking water.

Calgon Carbon has an equipment fabrication facility in Pittsburgh, PA, with capabilities to fabricate, line, and paint a broad range of NSF certified equipment per applicable ASME code in a single facility.

Our internal cone underdrain design provides uniform distribution of the influent water to ensure even flow distribution and media contact, which is extremely important as treatment objectives and detection limits get smaller, some now in the low parts per trillion range. This design also facilitates media exchange without confined space entry and allows the replacement of septa without removing external piping. This underdrain has proven its value at hundreds of sites over the past 30 years, as Calgon Carbon has provided more than 1,000 vessels incorporating this design.

Calgon Carbon's GAC/IX equipment is the most passive contaminant removal technology, requiring very little operator involvement.

Customers and potential customers are welcome to tour our facilities and observe their vessels being fabricated.

| System | Vessel Diameter | Height | Width | Length | Operating Weight (lbs) | Total GAC Weight (lbs) | Total Resin Volume (CF) | Pressure Ratings (psig) |
|---|---|---|---|---|---|---|---|---|
| Model 8 | 8' | 16'4" | 9'6" | 22' | 92,000 | 20,000 | 424 | 125 |
| Model 10 | 10' | 21'9" | 11'1" | 26'1" | 215,000 | 40,000 | 706 | 125 |
| Model 12 | 12' | 16' | 13'5" | 31'4" | 265,000 | 40,000 | 848 | 125 |
| Model 12-40 | 12' | 26'9 | 13'5" | 31'4" | 385,000 | 80,000* | – | 125 |
| Model 14 | 14' | 26'11" | 14'8" | 15'4.5" | 281,000 | 60,000 | – | 125 |

*Note: This data is representative of two vessel systems. Each model is also available as single or multiple vessel systems.*

## Custom Reactivation

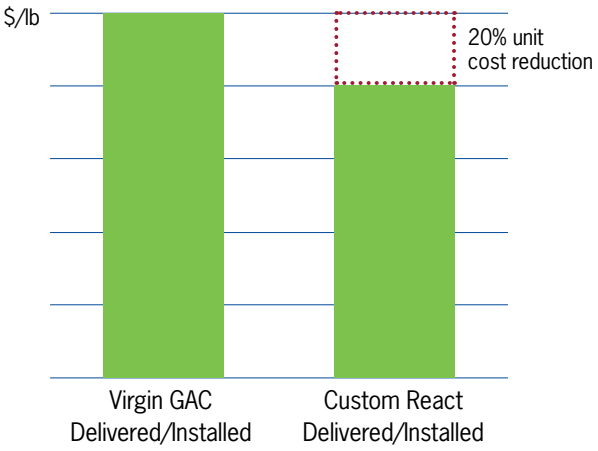
Reactivation is a high temperature process that allows GAC to be recycled and reused. Adsorbed compounds are volatilized in the reactivation process, eliminating liability for the adsorbed chemicals. Custom Municipal Reactivation (CMR) allows municipalities to recycle and reuse its own GAC.

CMR can reduce GAC-related operating costs by up to 20% compared to virgin GAC with little to no sacrifice in performance. With reactivation, the cost of GAC for treating drinking water is about $0.23/1000 gallons or $2/month/family of four. This is insignificant compared to the cost of bottled water.

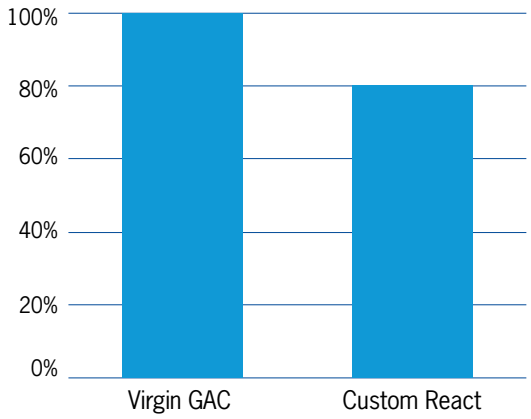
Calgon Carbon has three dedicated potable reactivation facilities in the United States. These operations are NSF/ANSI Standard 61 certified and we process only spent carbon from potable or food grade applications at these plants.

CMR has significantly lower $CO_2$ emissions compared to virgin GAC manufacturing. Reactivation is a sustainable process: it limits the use of non-renewable resources, minimizes waste, and eliminates landfilling of spent carbon.

**Comparison of Typical Costs for Virgin and Custom Reactivated Granular Activated Carbon on a Per Pound Basis**




**Comparison of Relative $CO_2$ Emissions Related to the Use of Virgin and Custom Reactivated Granular Activated Carbon**




## Ion Exchange and Ultraviolet Light Technologies

Calgon Carbon offers ion exchange resin for the removal of compounds such as perchlorate, nitrate, PFAS, arsenic, and hexavalent chromium from water and wastewater streams. We also offer both fixed bed and continuous regenerable systems for a variety of applications, which provide more efficient resin utilization, chemical consumption, and lower effluent waste volumes. The continuous regenerable systems also have the capability for the simultaneous removal of multiple contaminants as new regulations are passed.

Calgon Carbon is a world leader in the use of UV technology for disinfection and oxidation to treat drinking water, wastewater, groundwater, process water, and ballast water. Compared to chemical treatment, UV technology is low-cost and environmentally friendly—eliminating the need to transport, store, or handle toxic chemicals, and avoiding the formation of DBPs.

## Field Services

Calgon Carbon has nine Field Service teams nationwide. We have provided onsite services for our customers for more than 40 years.

Our Field Service team can perform turnkey carbon exchanges, as well as equipment installation, start-up, training, and troubleshooting services.

We employ skilled full-time Field Service representatives nationwide, and many have developed strong relationships with our customers over the years.

## Logistics

Calgon Carbon's logistics team ensures that we have the right products in the right place at the right time.

Calgon Carbon owns a fleet of dedicated bulk hopper trailers to deliver fresh GAC and remove spent GAC. This fleet of food grade trucks only carries spent carbon from municipal or potable applications. We also own a fleet of customized dump trucks with a tailgate that significantly reduces loss of water and carbon during exchanges.

From its manufacturing facilities, Calgon Carbon distributes its products to strategically located warehouses throughout the U.S. to reduce customer lead-time and total logistics costs.

## Research and Innovation Capabilities

Calgon Carbon has a world class Innovation Center and we are committed to helping our customers meet their toughest purification problems. Our technical organization includes both Research & Development and Business Innovation teams to balance the need for exploratory and applied work.

Calgon Carbon performs various bench-scale tests, including isotherms, accelerated column tests, and customized experiments, to simulate GAC performance in customers' applications. We can examine and compare the effectiveness of several types of GAC for the removal of compounds such as TTHMs, HAA5s, PFAS, 1,2,3-TCP, DCE, TCE, PCE, H2S, and other related VOCs.

We offer quarterly monitoring and analysis services to our customers. This not only helps determine the remaining life of the GAC, it also helps our customers budget and plan for future exchanges.

Our Innovation Center has the capability to perform customized laboratory reactivation to determine suitability for custom reactivation.

## Financing Capabilities

Calgon Carbon offers a Potable Water Service Program, which allows municipalities to take advantage of monthly payments for turnkey carbon exchanges.

We also offer options to purchase, rent, and rent-to-own equipment.

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