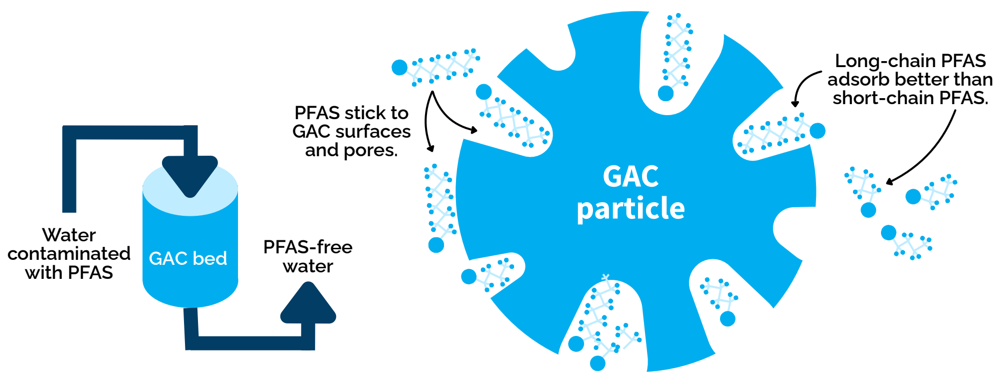
Removing PFAS from drinking water

PFAS-REACH
PFAS Research, Education, and Action for Community Health

Learn about different technologies used by water systems to keep PFAS out of drinking water

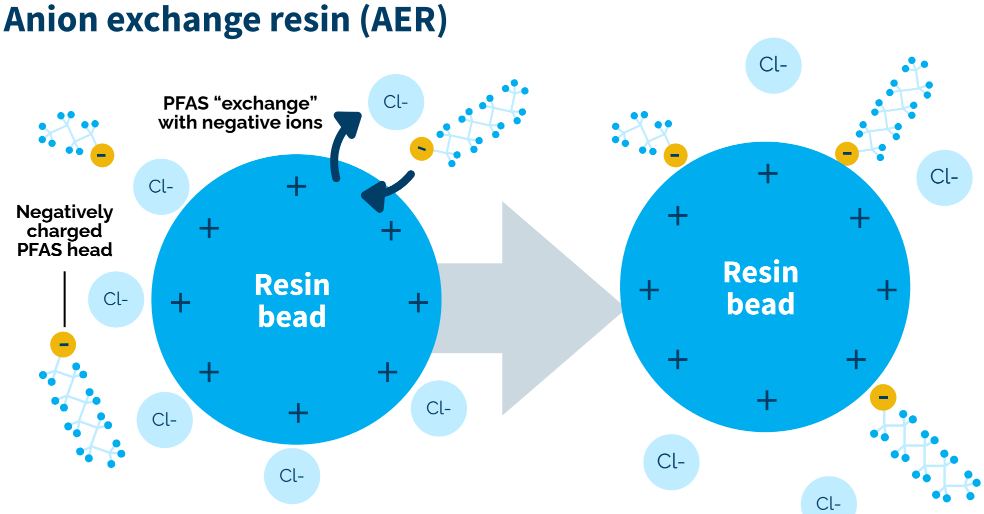
With the 2024 announcement of the first federal drinking water standards for PFAS, public water systems are now required to monitor for these chemicals and take steps to meet the new limits. Many systems across the U.S. have already begun installing treatment technologies to remove PFAS. Because each option has its own strengths and limitations, understanding how they work—and what to consider—is key to choosing the right approach.

Granular activated carbon (GAC)



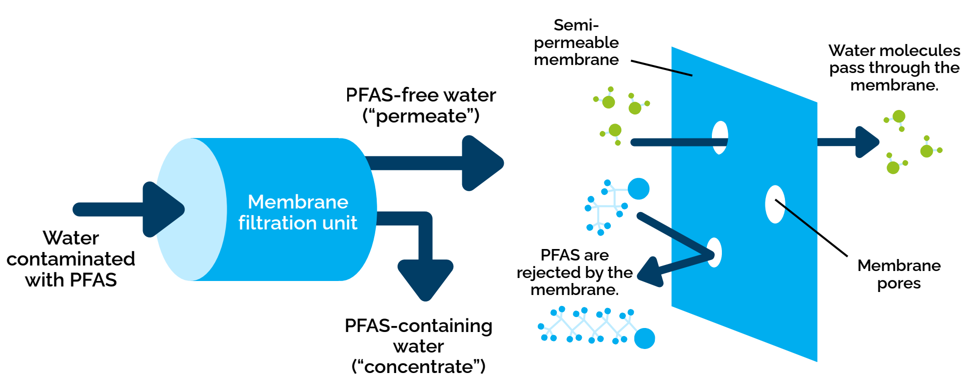
A GAC tank is filled with carbon particles that have tiny pores on their surfaces. When water contaminated with PFAS passes through the tank, PFAS stick to the surface of GAC particles, a process called adsorption. Two tanks are usually used in series: a "lead" tank that removes PFAS from water first, and a "lag" tank that acts as a backup in case any PFAS pass through the lead tank.

Anion exchange resin (AER)



AERs are a type of ion exchange resin. They are made up of positively-charged polymer beads with negatively-charged ions (anions) covering the surface of the beads. When PFAS-containing water moves through an AER bed, negatively-charged PFAS will "exchange" with those ions and stick to the beads.

Reverse osmosis (RO) / Nanofiltration (NF)



RO and NF both send pressurized water through a membrane. The membrane's pores are small enough to block PFAS while allowing water to pass through. In general, RO filters have smaller pores than NF and require a higher water pressure.

Comparing technologies

Each of the technologies above—GAC, AER, and RO/NF—have distinct advantages and disadvantages. All are widely used by public water systems to remove PFAS from water. Specific technologies may work best depending on cost, water chemistry, and the types of PFAS present.

	Long-chain PFAS	Short-chain PFAS	Also removes	Waste	Costs
GAC	Great removal efficiency	Fair removal efficiency	Many co-contaminants	High volume of spent GAC	Less expensive media
AER	Great removal efficiency	Good removal efficiency	Other ionic contaminants	Small volume of spent resin; incinerated	More expensive media
RO/NF	Great removal efficiency	Great removal efficiency	Co-contaminants with similar sizes	Large amounts of wastewater	High energy expenses

GAC case study: Hyannis, MA

Primary PFAS sources: Discharges from a fire training facility and airport to groundwater
Levels: PFOS up to 430 ng/L, PFHxS up to 270 ng/L
Cost: $58 million
Capacity: up to 10.8 million gallons per day
Why GAC? Replenishing tanks with new carbon media cost less than half the price of other media

AER case study: Yorba Linda, CA

Primary PFAS source: Suspected wastewater discharges to Santa Ana River
Levels: PFOS up to 23 ng/L, PFOA up to 16 ng/L
Cost: $27 million
Capacity: up to 19 million gallons per day
Why AER? Selected based on performance and pricing during a pilot study

RO/NF case study: Decatur, AL

Primary PFAS source: Chemical manufacturing plant discharges to groundwater and Tennesee River
Levels: PFOS up to 120 ng/L, PFOA up to 34 ng/L
Cost: $30 million
Capacity: up to 16 million gallons per day
Why RO? Better at removing short-chain PFAS, compared to other filter types

To check our sources and learn more, visit
pfas-exchange.org/resources/removing-pfas-from-drinking-water

PFAS-REACH was launched in 2018 with funding from the National Institute of Environmental Health Sciences (NIEHS).

PFAS-REACH is led by Silent Spring Institute in collaboration with Northeastern University and Michigan State University. Community partners include Testing for Pease, Massachusetts Breast Cancer Coalition, and Slingshot.