

# COOLING DATA CENTERS

## OPEN LOOP VS. CLOSED LOOP

### “Similar to an A/C System”

- Circulates air through open space
- Effective for cooling large areas, but wastes energy in places that do not need cooling (ie. aisles between server racks)

### “Similar to a Giant Radiator”

- Controlled use of water, recirculating the same water through a closed loop.
- Continuously moving through the system, water undergoes cooling & heating before being reused.

### ***So Closed Loop Systems Are Clean, RIGHT?!?***

***NO! The liquid in the closed system doesn't last forever. When it's time to change the "coolant," it cannot go down the drain because it's toxic waste. It gets burned.***

**What that means for the environment:** in high-tech "Thermal Oxidation" units at over 2,000°F, the toxic waste is burned up. *If it works perfectly*, it's one of the cleanest ways to destroy hazardous waste. Glycol-based coolants will break down into simple water vapor and CO2 which protects our groundwater – as long as the leftovers don't leak. Whatever doesn't burn must be bagged & buried at a toxic waste site.

**Liquid isn't the only thing in the pipes:** Over time, the coolant picks up “hitchhikers” like copper, lead, & tin from the equipment. If filters aren't top notch, these heavy metals can make air pollution & toxic ash.

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## information continued...

**Pesticides vs. PFAS getting in the soil:** While agricultural pesticides are harmful, most break down over months or years. PFAS (also known as Forever Chemicals) in data center coolants do not break down naturally. Because of those chemical additives (nitrites, molybdates, or glycols), the remaining liquid is often classified as hazardous waste. *It's rarely just pure water.* They use specialized fluids designed to move heat efficiently and protect the expensive equipment.

**Chemical Additives:** "Inhibitors" are added to stop algae from growing, which prevents corrosion in the metal pipes. They use heavy-duty magnetic and mesh filters to catch any tiny metal flakes or "**sludge**" that might build up over time so they don't have to replace the whole batch.

**Sludge Disposal:** If the liquid can't be recycled, is incinerated at a chemical treatment plant OR in an incineration facility. When these fluids (or the filters that touched them) are burned, they release TFA (Trifluoroacetic acid) into the atmosphere, which eventually falls back as rain.

### The Numbers

January 2026: Over 270 data centers in the states bordering Lake Michigan (Wisconsin, Illinois, Indiana, and Michigan)

The total direct withdrawal from Lake MI was estimated 30 - 45 BILLION gallons per year.

Over the next 5 years, (in the same 4 states) roughly 150 billion gallons of water is projected to be withdrawn! That does not include the water used in creating all the electricity to run the plants!

Water lost to steam has no guarantee of being returned anywhere close to the data center.

Main Source: <https://uwm.edu/freshwater/data-centers-consuming-water-the-conversati/>