Are data centers contributing to droughts in Texas and California?

Data centers are generally **not considered a primary cause of droughts** in Texas or California. Droughts there are driven mainly by:

- Climate variability
- Long-term warming trends
- Reduced snowpack
- Heat waves
- Agricultural water demand
- Population growth

However, large data centers can absolutely contribute to **local water stress**, especially in already water-constrained regions. The concern is less "causing drought" and more:

- Competing for limited water resources
- Increasing demand during drought conditions
- Concentrating industrial water use in fast-growing areas

Scale matters

A single hyperscale or AI-focused data center may use:

- Hundreds of thousands to several million gallons per day

That is significant locally, but small compared with statewide agricultural use.

For context:

- Agriculture dominates water consumption in both Texas and California
- Irrigation uses vastly more water than data centers overall

Still, local impacts can be meaningful because data centers often cluster in rapidly growing metro areas already facing infrastructure strain.

Why data centers are under scrutiny now

1. AI increases cooling demand

AI infrastructure dramatically increases:

- Rack density

- Power consumption
- Cooling requirements

That can increase:

- Cooling tower evaporation
- Power generation water demand

especially during hot weather — exactly when water systems are already stressed.

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2. Data centers often locate in hot regions

Many campuses are built in:

- Texas
- Arizona
- Inland California

because of:

- Cheap land
- Tax incentives
- Grid access
- Fiber connectivity

But those same regions often face:

- Drought risk
- Aquifer depletion
- Extreme heat

which makes evaporative cooling more controversial.

Texas-specific concerns

In Texas, concerns focus on:

- Rapid hyperscale growth
- AI campus expansion
- Water use during heat waves
- Grid strain

Texas already experiences:

- Severe drought cycles
- High evaporation rates
- Rapid population growth

A large evaporatively cooled AI campus can increase local municipal or groundwater demand considerably.

In some smaller communities, one hyperscale facility may represent a noticeable share of local industrial water consumption.

California-specific concerns

California's concerns are even more politically sensitive because of:

- Chronic drought
- Groundwater depletion
- Agricultural competition
- Environmental regulation

Data center scrutiny is especially strong in inland regions where:

- Water supplies are constrained
- Summer temperatures are high
- Aquifers are stressed

California regulators increasingly push for:

- Recycled water use
- Water accounting transparency
- Reduced evaporative cooling
- Sustainability disclosures

The indirect water issue: electricity generation

There's another layer people often overlook.

Even if a data center uses little on-site water, its electricity may come from:

- Natural gas plants
- Nuclear plants
- Thermal generation

which themselves may consume large amounts of cooling water.

So the total water footprint includes:

1. Data center cooling
2. Upstream electricity production

AI growth amplifies both simultaneously.

Are data centers a major statewide water user?

Usually no — not compared with:

- Agriculture
- Municipal consumption
- Industrial manufacturing

But they can become important:

- Regionally
- During drought emergencies
- In rapidly growing utility districts

Especially when many campuses cluster together.

Why communities are reacting more strongly now

Historically, data centers were viewed as relatively low-impact.

But modern AI campuses are changing that perception because they combine:

- Huge electricity demand
- Large land footprints
- Significant cooling requirements
- Rapid construction growth

Some proposed AI campuses are now comparable to major industrial facilities in infrastructure impact.

Industry responses

Many operators are trying to reduce backlash through:

- Closed-loop liquid cooling
- Dry cooling systems
- Hybrid cooling
- Reclaimed wastewater use
- Water-positive goals
- Heat reuse projects

Companies like Google and Microsoft have publicly emphasized water-reduction initiatives.

The key nuance

A more accurate statement is:

Data centers do not cause droughts, but they can worsen local water stress in drought-prone regions.

As AI infrastructure scales upward, that issue is becoming more important in:

- Water policy
- Utility planning
- Zoning debates
- Environmental permitting
- Community opposition to hyperscale campuses

Data centers get cooling water from several possible sources, depending on local infrastructure, climate, regulations, and the cooling technology being used.

The main sources are:

1. Municipal drinking water systems

This is the most common source for many data centers.

The facility connects to the local city or county water utility, just like:

- Homes
- Offices
- Factories

The water is typically treated potable water.

Used for:

- Cooling towers
- Humidification systems
- Backup cooling
- Domestic facility use

Why this is controversial

AI campuses can consume very large volumes of high-quality drinking water, especially in drought-prone regions.

Communities sometimes object because potable water is being evaporated for industrial cooling.

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2. Reclaimed or recycled wastewater

Increasingly common for hyperscale facilities.

This uses treated wastewater from:

- Sewage treatment plants
- Municipal reclaimed water systems
- Industrial recycling systems

The water is usually non-potable.

Advantages

- Reduces pressure on drinking water supplies

- Often cheaper
- Politically easier to approve

Challenges

- Requires extra treatment
- Corrosion and scaling management
- Additional piping infrastructure

Many newer campuses are designed specifically around reclaimed water use.

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3. Groundwater wells and aquifers

Some facilities pump groundwater directly from:

- Wells
- Aquifers

This is more common where municipal systems are limited.

Risks

Heavy groundwater withdrawal can contribute to:

- Aquifer depletion
- Lower water tables
- Land subsidence
- Competition with agriculture and residents

This becomes especially sensitive in arid regions.

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4. Surface water

Some large facilities or utility plants draw from:

- Rivers
- Lakes
- Reservoirs

Usually through industrial water permits.

More common for:

- Large power plants
- Older industrial cooling systems
- Utility-scale infrastructure

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5. Seawater (rare but possible)

Coastal facilities may use seawater cooling.

Common in:

- Some international facilities
- Certain industrial plants
- Marine-adjacent infrastructure

Advantages

- Avoids freshwater demand

Challenges

- Corrosion
- Environmental discharge regulation
- Marine ecosystem impacts

How the water is actually used

The biggest water consumer is usually:

Cooling towers

Warm water from the data center is sprayed or circulated while air passes through it.

Some water evaporates, carrying heat away.

That evaporated water must constantly be replaced with “makeup water.”

Closed-loop misconception

People often hear:

“The system is closed-loop.”

That usually means:

- The coolant inside the facility recirculates

But the cooling towers may still evaporate large amounts of replacement water externally.

So even “closed-loop” data centers may need continuous water supply.

Typical cooling water path

A common arrangement looks like:

1. Utility or reclaimed water enters site
2. Makeup water feeds cooling towers
3. Towers evaporate part of the water
4. Remaining water recirculates
5. Minerals concentrate
6. Some water is discharged as blowdown
7. Fresh water replenishes losses

Why climate matters

Hot, dry climates increase evaporation dramatically.

For example:

- Arizona
- Texas
- Inland California

can require much more cooling water than cooler regions.

Why AI changes the equation

AI infrastructure increases:

- Rack power density
- Total heat generation
- Continuous utilization

That increases cooling demand and potentially water demand.

A traditional enterprise data center might use relatively modest cooling.

A modern AI campus may require:

- Massive liquid cooling systems
- Large cooling plants
- Industrial-scale heat rejection

How operators reduce freshwater use

Reclaimed wastewater

One of the biggest trends.

Dry cooling

Uses air instead of evaporation.

Hybrid cooling

Uses water only during hot conditions.

Warm-water liquid cooling

Allows less dependence on chillers and towers.

Water recycling on-site

Some campuses reclaim portions of their own process water.

The hidden water issue: power generation

Even if the data center itself uses little water, the electricity powering it may come from:

- Natural gas plants
- Nuclear plants
- Thermal generation

which can themselves consume substantial cooling water.

So the total water footprint includes:

1. Direct cooling water
2. Upstream energy production water

The emerging policy debate

Communities increasingly ask:

- Should potable water be used for AI infrastructure?
- Should reclaimed water be mandatory?
- Should water-intensive cooling be restricted in drought zones?
- Should AI campuses pay higher industrial water rates?

As AI expansion accelerates, cooling-water sourcing is becoming a major infrastructure and political issue in many regions.

Cooling tower blowdown can contribute to waterway pollution if it is not properly treated or managed. As data centers scale up — especially large AI campuses using evaporative cooling — blowdown disposal is getting more environmental scrutiny.

What "blowdown" is

In a cooling tower, water continuously evaporates.

But minerals and contaminants do **not** evaporate with the water.

As evaporation continues:

- Salts concentrate
- Minerals build up
- Chemicals accumulate

If concentrations become too high, the system develops:

- Scaling
- Corrosion
- Biological growth

So operators intentionally drain part of the circulating water and replace it with fresh "makeup water."

That drained water is called **blowdown**.

Why blowdown can pollute waterways

Blowdown water often contains elevated concentrations of:

Dissolved solids

Such as:

- Calcium
- Magnesium
- Chlorides
- Sulfates

High salinity can damage freshwater ecosystems.

Water treatment chemicals

Cooling systems commonly use chemicals to control:

- Corrosion
- Algae
- Bacteria
- Mineral deposits

Examples include:

- Biocides
- Corrosion inhibitors
- Anti-scalants

Some chemicals can be toxic to aquatic organisms if discharged improperly.

Heavy metals

Corrosion inside pipes and equipment may introduce:

- Copper
- Zinc
- Nickel
- Iron

These can accumulate in sediments and aquatic food chains.

Thermal pollution

Blowdown may also be warm.

Warmer discharge water can:

- Reduce oxygen levels
- Stress fish
- Alter aquatic ecosystems

especially in smaller waterways during summer.

Why AI data centers increase concern

AI campuses:

- Generate more heat
- Use more cooling capacity
- May evaporate more water
- Produce larger blowdown volumes

At 100 MW+ scales, cooling systems begin to resemble industrial utility infrastructure.

That increases:

- Blowdown volume
- Chemical treatment needs
- Regulatory oversight

How blowdown is usually handled

1. Municipal sewer discharge

Many data centers send blowdown into wastewater treatment systems.

Advantages:

- Easier monitoring
- Existing treatment infrastructure

Challenges:

- Municipal plants may not be designed for high salinity industrial discharge
- Large volumes can strain systems

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2. On-site treatment

Some campuses treat blowdown before discharge.

Methods may include:

- Filtration
- Reverse osmosis
- Chemical neutralization
- Settling systems

More advanced systems can recycle portions of blowdown.

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3. Surface-water discharge

Some facilities discharge under environmental permits into:

- Rivers
- Lakes
- Coastal waters

These discharges are regulated and monitored.

Potential issues include:

- Salt loading
- Thermal loading
- Chemical toxicity

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4. Zero Liquid Discharge (ZLD)

Advanced systems try to eliminate wastewater discharge entirely.

They recover water and leave behind concentrated solids.

Advantages

- Minimal waterway pollution
- Reduced freshwater demand

Downsides

- Very expensive

- Energy intensive
- Operationally complex

ZLD is still relatively uncommon because of cost.

Ecological risks

Improperly managed blowdown can contribute to:

Elevated salinity

Freshwater organisms are often sensitive to dissolved salts.

Algal disruption

Biocides can affect aquatic microbial balance.

Fish stress and mortality

Especially during:

- Low streamflow
- High temperatures
- Drought conditions

Sediment contamination

Metals may accumulate in river or lake sediments.

Why drought makes this worse

During drought:

- Rivers run lower
- Dilution decreases
- Water temperatures rise

That means the same discharge concentration can have much larger ecological impacts.

This is one reason cooling-water permits become more controversial in drought-prone states.

Regulatory oversight

In the U.S., blowdown discharge may fall under:

- Clean Water Act permits
- State environmental agencies
- Industrial pretreatment programs

Operators may face limits on:

- Temperature
- Salinity
- pH
- Chemical concentrations
- Flow volume

Industry trends to reduce blowdown pollution

Higher-cycle cooling

Operators try to reuse water longer before blowdown.

This reduces wastewater volume.

Alternative chemistry

Less toxic treatment chemicals.

Reclaimed wastewater use

Using non-potable water reduces potable demand, though it may increase treatment complexity.

Dry cooling

Eliminates most blowdown because little or no evaporation occurs.

AI-optimized water chemistry

Sensors and machine learning increasingly optimize:

- Chemical dosing
- Scaling control
- Water reuse efficiency

Important nuance

Compared with heavy industries like:

- Mining
- Petrochemicals
- Pulp and paper

data center blowdown is usually less chemically hazardous.

But hyperscale AI campuses are large enough that:

- cumulative impacts matter
- local watershed effects can become significant
- public scrutiny is increasing rapidly

especially in regions already stressed by:

- drought
- rapid growth

- limited wastewater infrastructure.

Data center cooling-tower blowdown is monitored through a layered system of **environmental regulators, water utilities, and internal operator controls**. No single group “owns” the whole process—oversight is split depending on how and where the wastewater is discharged.

Here’s how it actually works.
