INTRODUCTION

# Prairie Rivers Network & About Me

Prairie Rivers Network:

- Located: Champaign IL, work statewide
- Conserve and protect water resources, both surface and groundwater, and the people and wildlife that depend on them.
- Ensure data center development does not upend Illinois's process towards a carbon free future.

Andrew Rehn, Climate Policy Director:

- 10+ years of policy experience at PRN
- Masters in Civil Engineering

prairie rivers network

prairierivers.org

**Many slides borrowed from the Alliance for Water Efficiency's excellent slide deck - see references**

DATA CENTER IMPACTS

# Water Sources & Discharges

## Where do data centers get their water?

- Community Water Supply / Drinking Water Supply
- Surface Water or Groundwater
- Wastewater Reuse

## Where does the water go?

- Wastewater Treatment Plant
- Discharges to Surface Waters

DATA CENTER IMPACTS

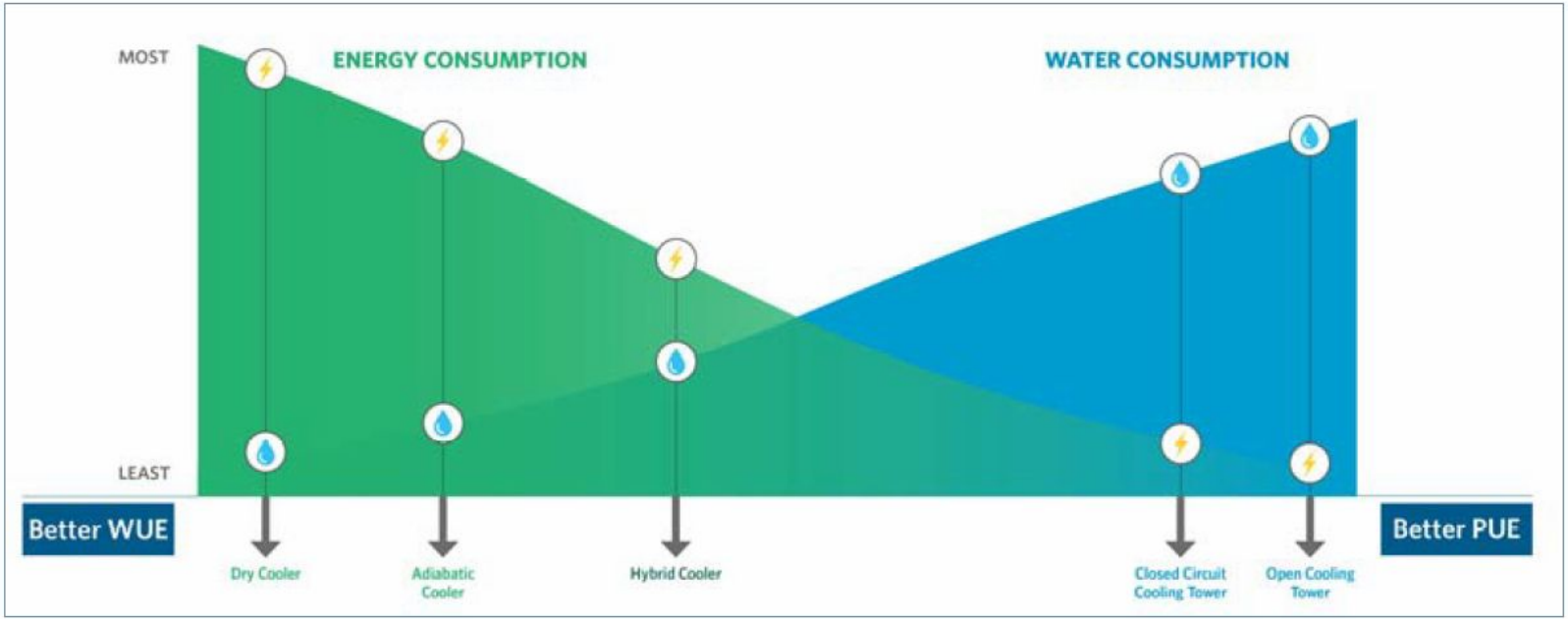
# Water Use

## Data centers can use a lot of water:

- **On-site,** particularly if they use evaporative cooling
  - Larger data centers can each “drink” up to **5 million gallons per day**, equivalent to a town of 10,000 to 50,000 people.
  - Technology dependent.
- **Off-site,** particularly if they are powered by fossil fuels or nuclear (which are water cooled).

DATA CENTER IMPACTS

# Cooling Technology Drives Onsite Water Use




"Air cooled"
"Closed loop"

"Water cooled"
"Open loop"

Water Environment Federation
the water quality people

# COOLING TECHNOLOGY TRADEOFFS

| Category | System Type | Cooling Capacity | Water Efficiency | Energy Efficiency |
|---|---|---|---|---|
| Mechanical Refrigeration (Facility-Scale) | Direct Expansion System | Lowest | Highest | Lowest |
| | Air-Cooled Chiller | Low | Highest | Lowest |
| Evaporative (Facility-Scale) | Water-Cooled Chiller (Includes Cooling Towers) | Medium | Lowest | Low |
| | Adiabatic Cooling Assistance | Medium | High | High |
| | Spray-Assisted Cooling | Medium | Medium | High |
| Free Cooling / Airside and Waterside Economization (Facility-Scale) | Dry Cooler | Medium | Highest | Medium |
| | Airside Economizer (Heat Pump) | Medium | Highest | Medium |
| | Waterside Economizer (Heat Pump) | Medium | Low | High |

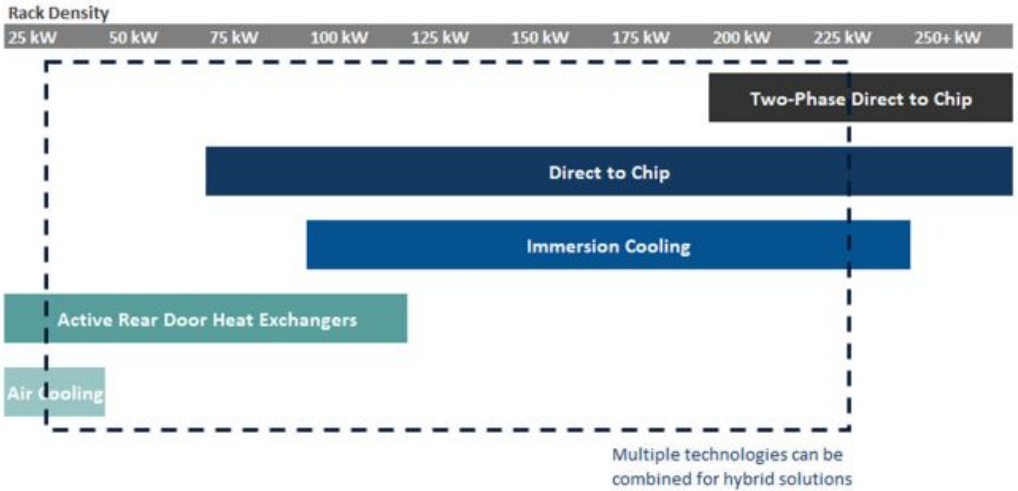
Note: Higher efficiency doesn't always result in lower usage

Facility-Scale Cooling Technologies
- Lower cooling capacities
- Higher water efficiencies
- Lower energy efficiencies

Component-Scale Cooling Technologies
- Higher cooling capacities
- Lower water efficiencies
- Higher energy efficiencies

| Category | System Type | Cooling Capacity | Water Efficiency | Energy Efficiency |
|---|---|---|---|---|
| Liquid (Component-Scale) | Liquid Cooling, Rear-Door Heat Exchangers | High | Medium | Highest |
| | Liquid Cooling, Immersion | Highest | Medium | Highest |
| | Liquid Cooling, Direct-to-Chip Cooling | Highest | High | Highest |

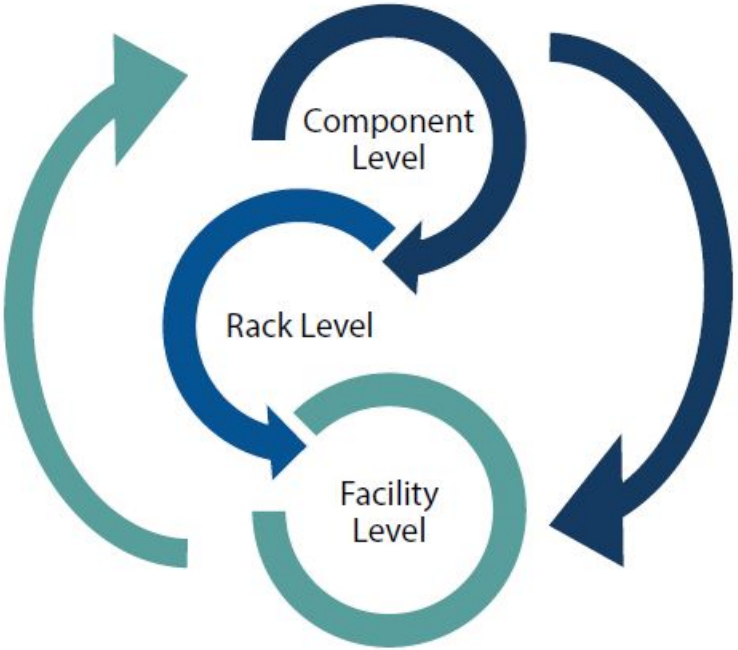
# CLIMATE AND COMPUTING CAPACITY: KEY DRIVERS OF COOLING NEEDS




- Higher rack density requires more cooling capacity
- Liquid cooling technologies have higher cooling capacity

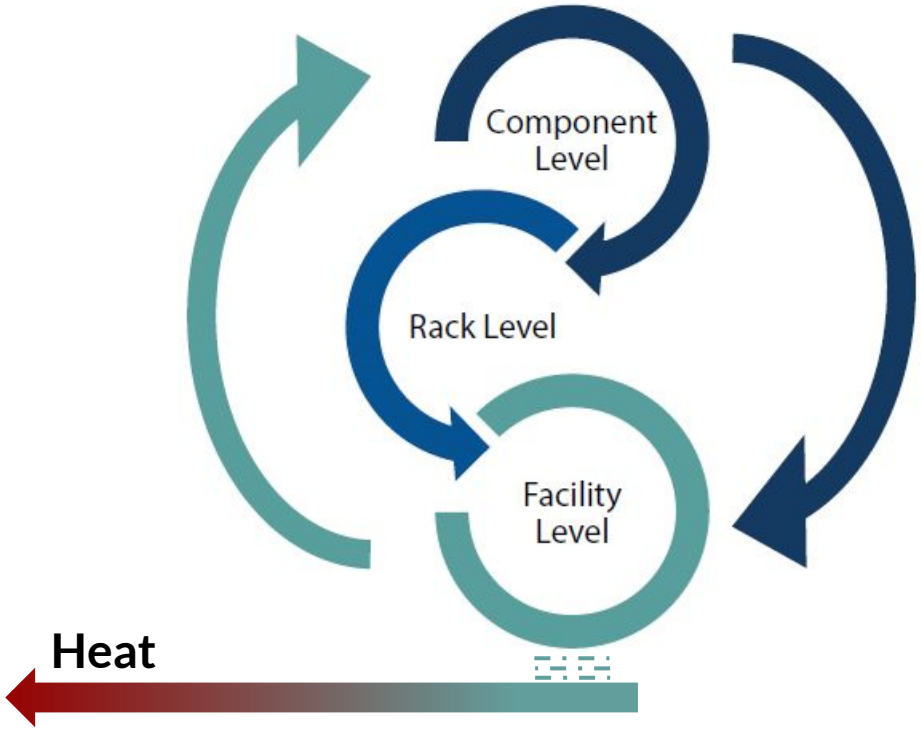
Sources: 2025 JLL Data Center Outlook Report, 2025; Devin Pellicone, "AI Rack Cooling: Applying Directed Energy Thermal Strategies to High-Density Data Centers (50 KW - 1 MW+)," Advanced Cooling Technologies, 2026, https://www.1-act.com/resources/blog/ai-rack-cooling-data-centers/?srsltid=AfmBOoole-w1xtc6DS0vM7bL5vsNMc89TW55Y2qxndcxR0-fs4xCfhRb.

# COOLING TECHNOLOGIES WORK TOGETHER




Alliance for Water Efficiency

# COOLING TECHNOLOGIES WORK TOGETHER



OFFSITE WATER USE

# Immense Energy Use Drives Offsite Water Use

**Joliet residents rise up again against proposed data center**

Timeline not yet set for data center votes

December 20, 2025 at 8:10 am CST

**1800 MW**

**Approved.**

Chicago uses:

**~3500 MW***

***Residential + Industrial, estimate***

**1 Data Center > 50% of Chicago Energy Usage**

**TABLE 3** Water consumption by power generation type.

| GENERATION TYPE | U.S. CAPACITY SHARE (2024)[10] | MEDIAN[b] WATER CONSUMPTION, (EWIF, L/kWh)[8,9] | MEDIAN[b] WATER WITHDRAWAL (L/kWh)[8] |
|---|---|---|---|
| Natural Gas | 45% | 1.1 | 25.9 |
| Coal | 15% | 1.8 | 39.8 |
| Nuclear | 20% | 2.0 | 66.2 |
| Hydro | 5% | 0[a] | Unavailable |
| Solar (PV) | 5% | 0.1 | Unavailable |
| Wind | 10% | 0 | Unavailable |

Data Centers and the Water-Energy Nexus
https://images.magnetmail.net/images/clients/ASHRAE/attach/30-34_Data Centers_Davidson_June26.pdf

# Considerations for Data Centers Water Use

**Protections**

- Transparent Water Usage Planning & Reporting & Enforcement
- Water Use Efficiency
  - Technology Minimums or Efficiency Metrics (WUE or DCRE)
- Evaluation of Impact on Water Resources
- Reducing Offsite Water Use by Requiring Renewable Energy
- Scarcity Planning & Peak Water Demand
- Protecting ratepayers/consumers from infrastructure costs
  - Drinking Water & Wastewater Treatment
- Pollution
  - Runoff, concentration effects, flushing, discharging to waters vs wastewater treatment

**Opportunities**

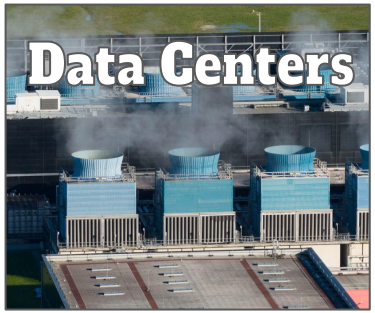
- Waste Heat Reuse via Thermal Energy Networks
- Wastewater Reuse

Statewide Approach - The POWER Act

# Water

## Water Impact Permit (new) at Illinois EPA

- **Yes or No:** No permit for Data Centers that impact our water
- Cooling as **water efficient** as closed loop
- **Data centers pay** for infrastructure costs




**Requires:**

- Basic planning and report for water use.
- Public Website

ILLINOIS STATE WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

## Water Impact Report

- Model & report on impacts of each data center.

# Resources

- Alliance for Water Efficiency:
  - Data Center Primer
    - https://allianceforwaterefficiency.org/data-center-primer-for-water-service-providers/
  - Slides
    - https://allianceforwaterefficiency.org/wp-content/uploads/2026/06/AWE-Data-Center-Presentation_June-2026.pdf
- Data Centers and the Water-Energy Nexus

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  - https://images.magnetmail.net/images/clients/ASHRAE/attach/30-34_DataCenters_Davidson_June26.pdf
- Aurora Data Center Ordinance
- The POWER Act HB5513/SB4016