

# Data Center Developments and NPDES Permitting Considerations

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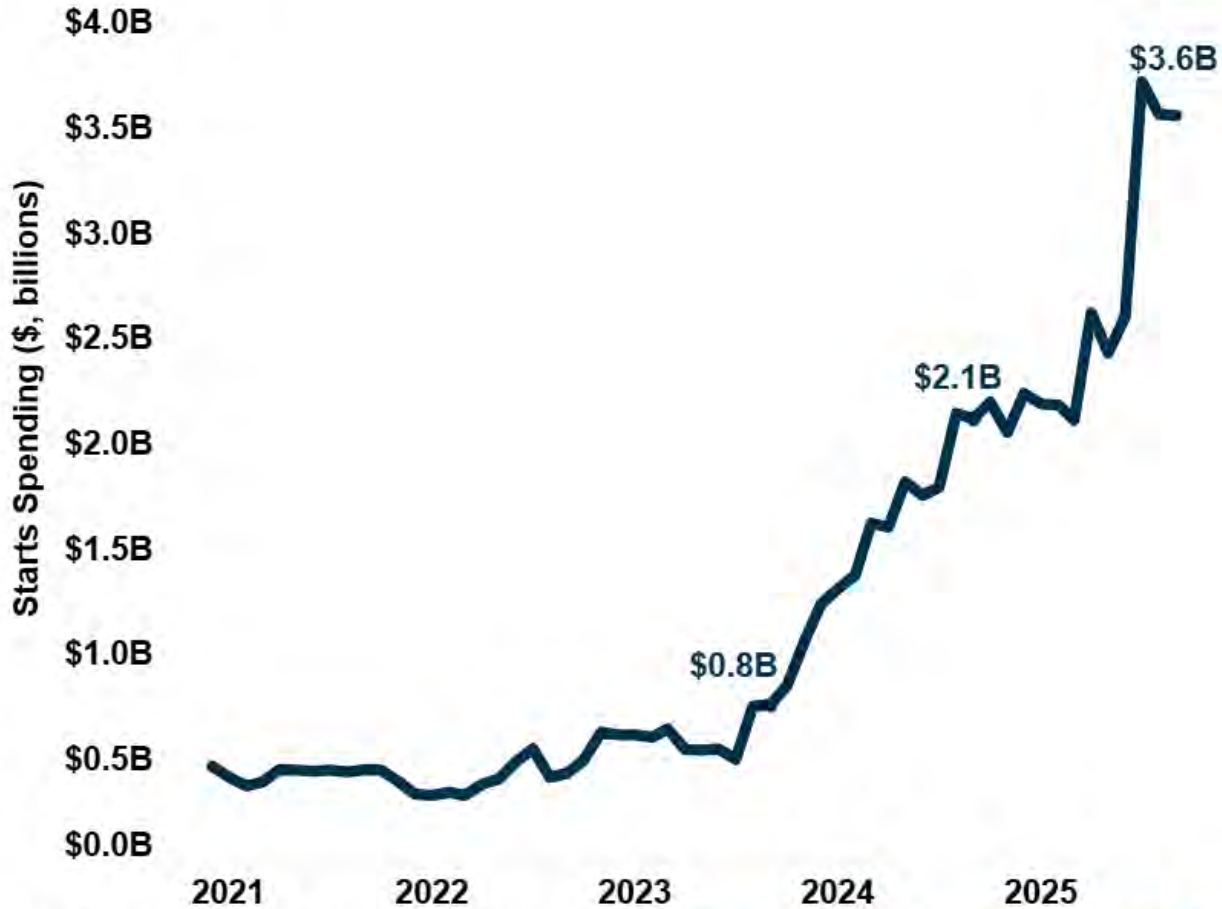
# Topics Covered

Data Centers and Wastewater  
101

NPDES Interactions

Other Considerations

## Monthly Average Data Centers Starts Spending (12-MMA in \$, Billions )



Source: ConstructConnect, spending figures represent recent years of same-month results.



## Data Centers – Why now?



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# Currently Operating Data Centers

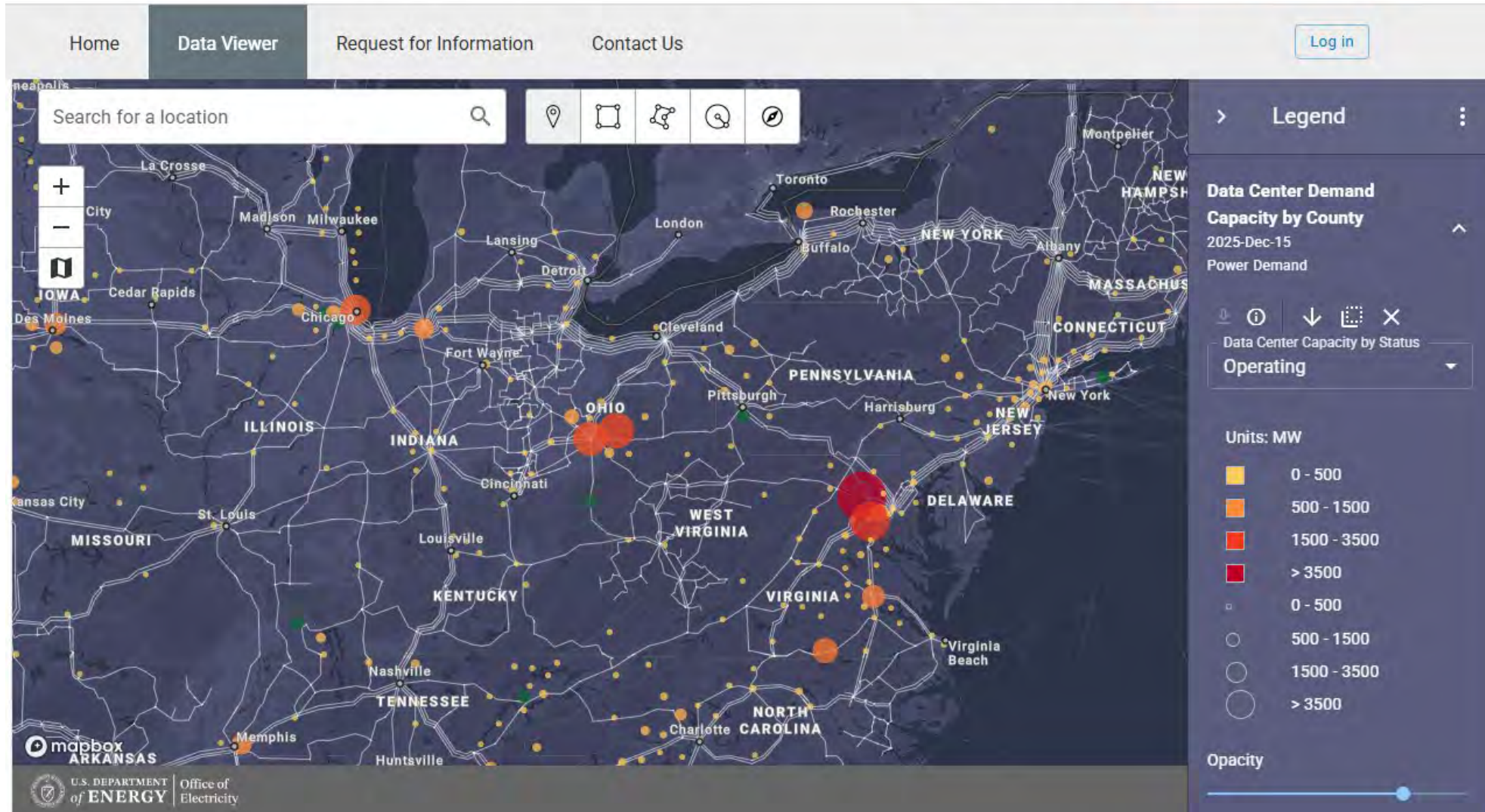


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# Planned Data Center Construction

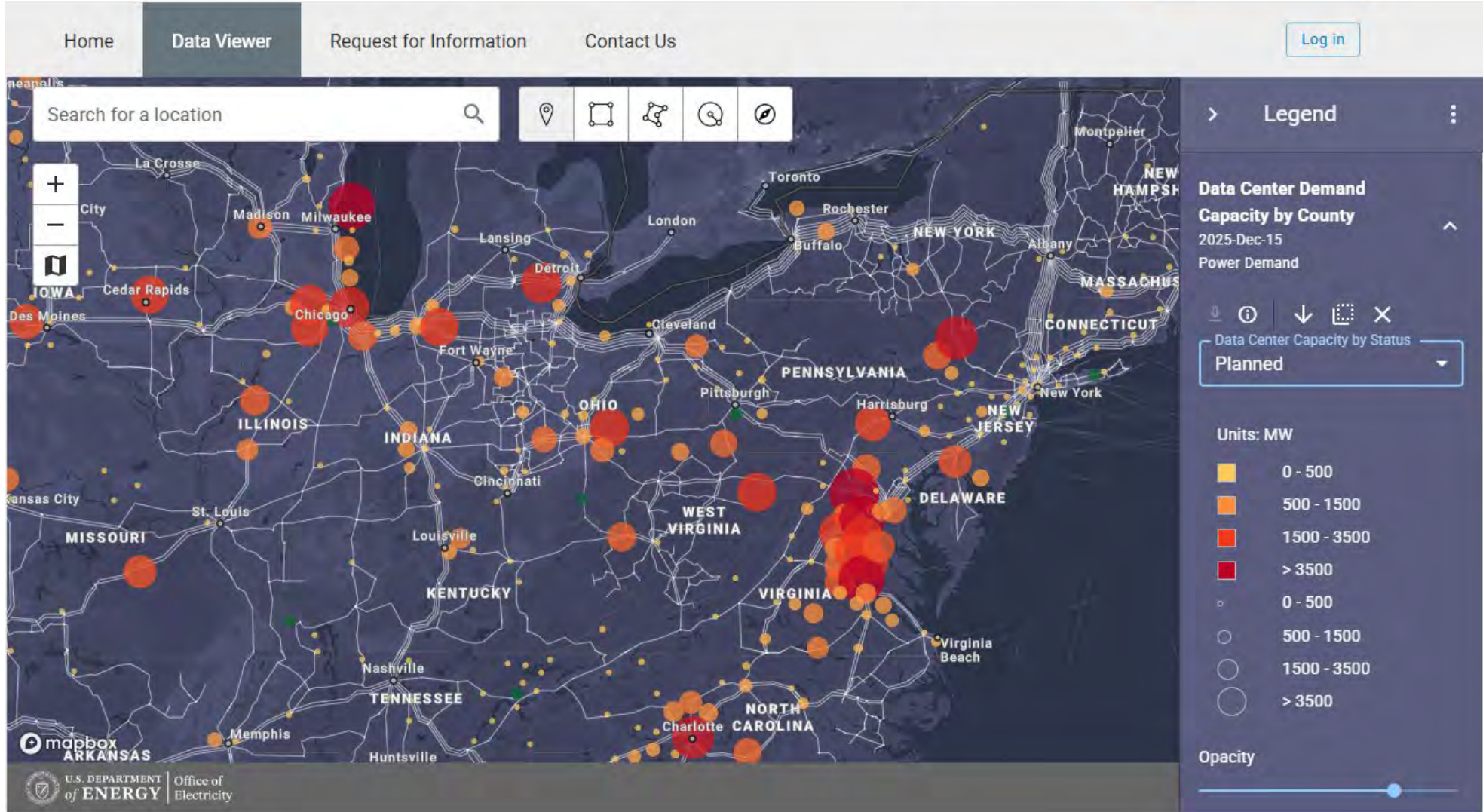


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# Data Center Map

[Map](#) [Database](#) [Pricing](#) [About](#)  [Sign In](#)

## Ohio Data Centers

We currently have 195 data centers listed, from 17 markets in Ohio. Click on a market below, to explore its data center locations.

Save the trouble of contacting the providers yourself, check out our [Quote Service](#).

[Filter Markets](#)

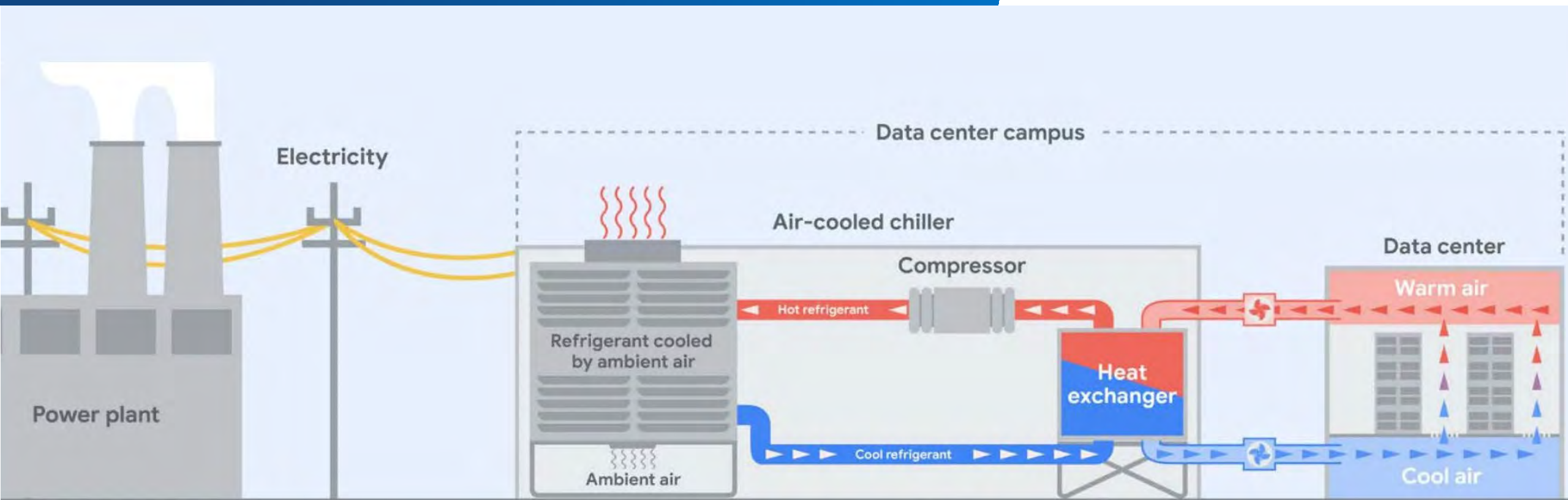
The best day to enable your AI infrastructure deployment is yesterday. Let's Get Started!

Market	Data Centers
Akron	6
Cincinnati	21
Columbus	113
Cleveland	23
Dayton	10
Canton	4
Lima OH	2
Toledo	3
Springfield	1
Warren	2
Lebanon	2

# Air Cooled Data Center



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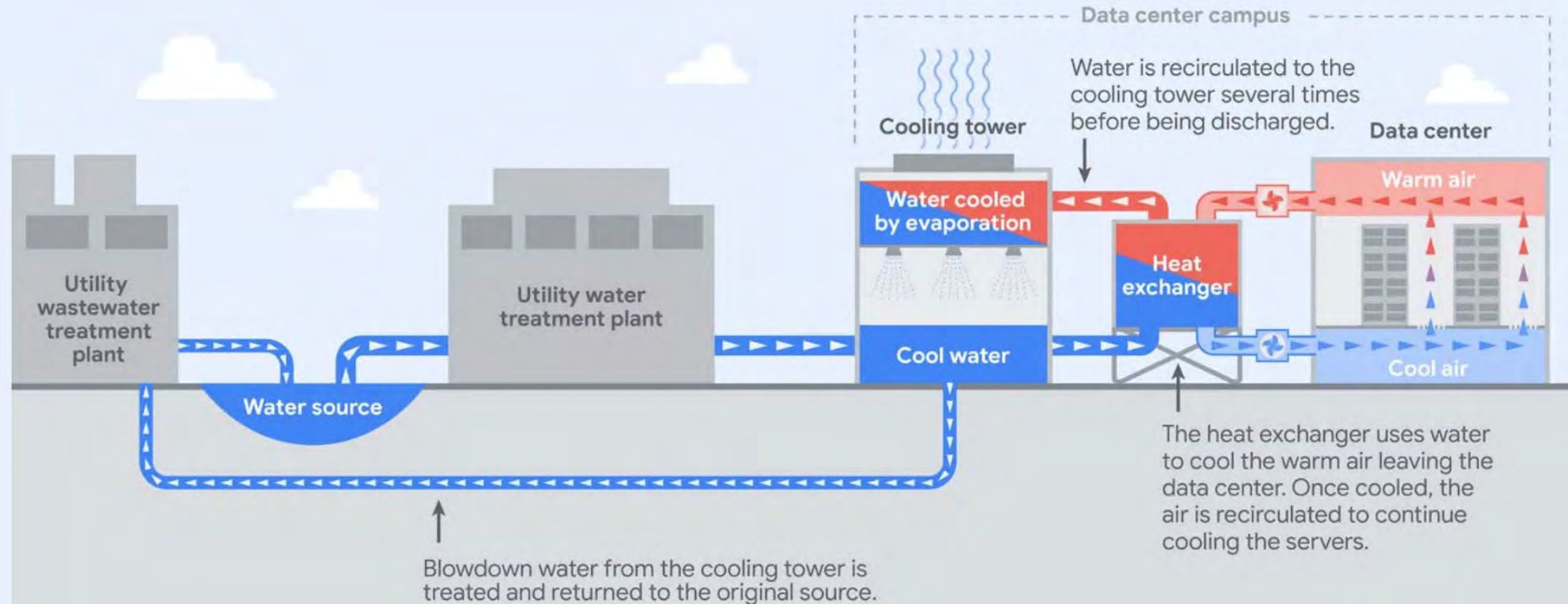


↑  
The air-cooled chiller uses more energy but does not require water for cooling, similar to air conditioning for a home.

# Water Cooled Data Center



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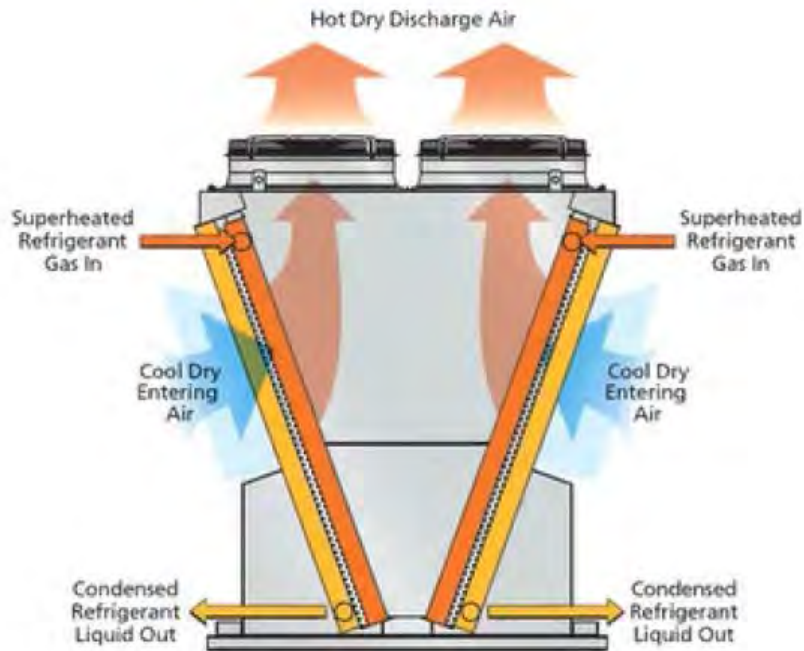


# Industrial Cooling Technologies

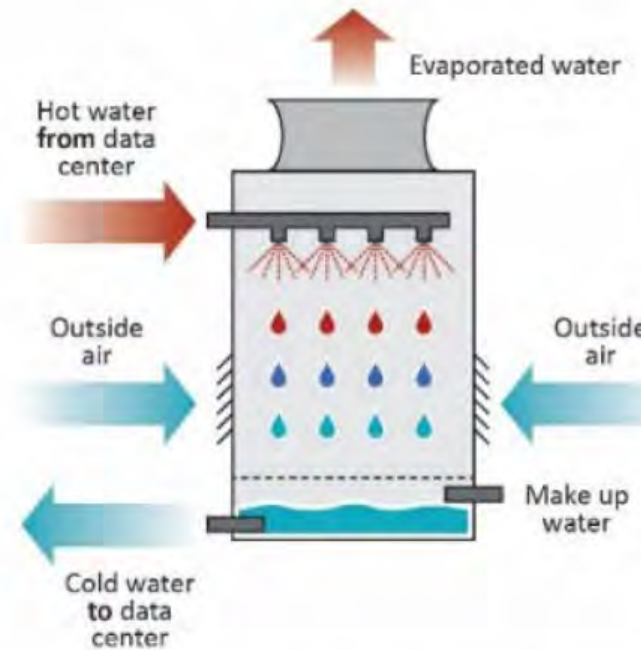


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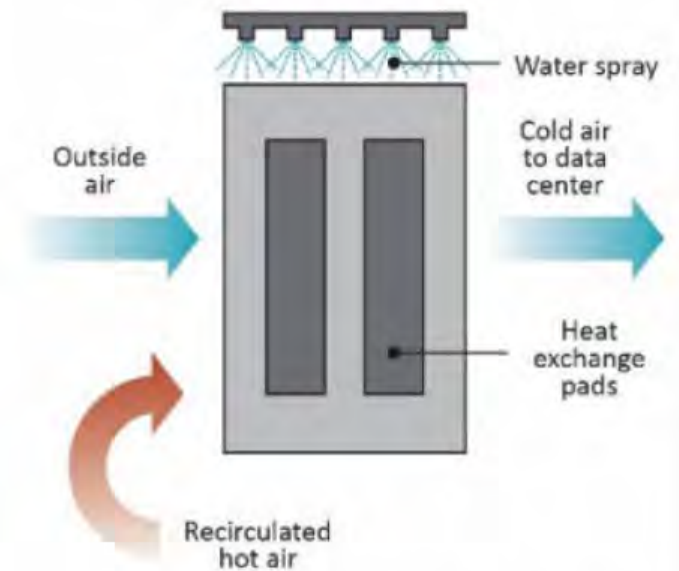
## Dry Cooling/ Non-Evaporative



## Evaporative Cooling



Evaporative cooling tower



Direct evaporative cooling

# Emerging Data Center Cooling

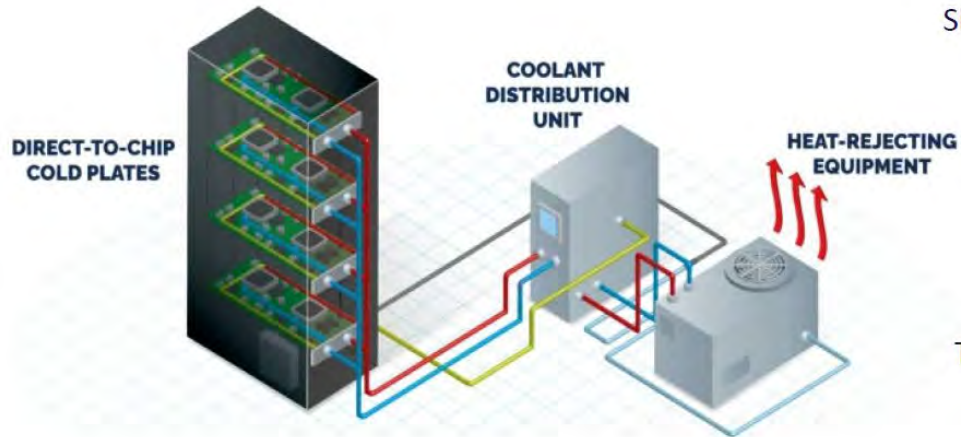


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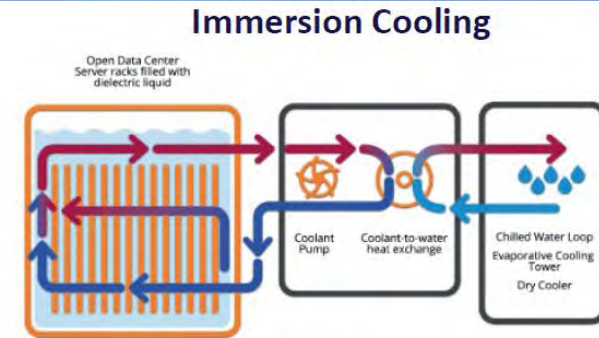


## Cooling technologies for AI and advanced computing

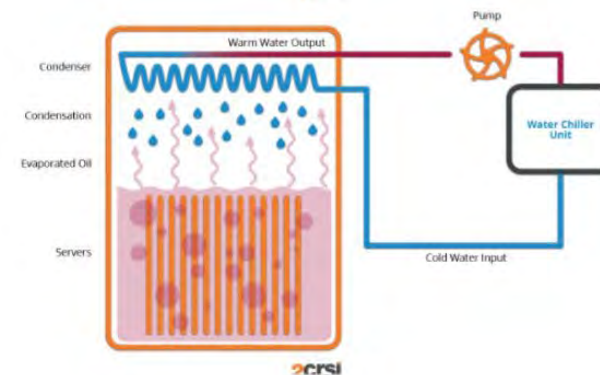
### DIRECT-TO-CHIP COOLING



Single Phase



Two-Phase



Sources: Park Place Technologies, 2crsi

# NPDES Interactions



- Cooling water discharge is a process wastewater
  - Temperature, TDS, additives, biocides
- Water conditioning rejects
  - Ion exchange, RO, sediments
- Blowdowns and condensates
- Intake structures



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# Cooling Water - Temperature

- Ohio has water quality standards for temperature
  - Can adversely impact aquatic species reproduction and survival
  - Different values for Lake Erie and Ohio River direct discharges and tributary streams
  - Values range from 44 to 89 °F
  - Rules allow for mixing zones



# Cooling Water – Total Dissolved Solids

- Recirculating cooling systems can “concentrate” or “upcycle” salts and minerals
- Ohio has a water quality standard for TDS: 1,500 mg/L
- Compliance with standard can limit the number of times water can be cycled
- TDS can also contribute to whole effluent toxicity at levels greater than 2,300 mg/L
- Rules allow for mixing zones



# Cooling Water – Additives and Biocides

- Additives maintain water chemistry to prevent scale
  - Can contribute to toxicity
    - Must be preapproved by Ohio EPA
  - May include phosphorus
    - May prevent approval and necessitate alternatives or additional testing
- Biocides prevent biological growth within system piping
  - Often use chlorine or bromine derivatives
    - Requires limits for total residual oxidants



# Water Conditioning Rejects

- Ion exchange water softeners
  - Can contribute to TDS when regenerating media
- Reverse osmosis
  - Reject water often contains high TDS
  - Often include additives to protect membranes from fouling
  - May also include membrane cleanings





# Blowdowns and Condensates

- Boilers and heat exchangers
- Air compressors





# Intake Structures

All intakes must be evaluated for aquatic organism impingement and entrainment

- If above 2 MGD volume must include a 316b demonstration



# Other Considerations

- Construction stormwater
- Industrial stormwater
- Pretreatment Program requirements for indirect discharge
- Behind the fence power generation



# Thank You

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