Community Development
221 East Clark Street
Albert Lea, Minnesota 56007-2496
507-377-4349

PLANNING COMMISSION
ADVISORY BOARD
November 17, 2026 – 5:30 p.m.
City Center

AGENDA

A. CALL TO ORDER AND ROLL CALL

B. APPROVAL OF THE SPECIAL MEETING AGENDA

C. APPROVAL OF MINUTES

1. September 1, 2026

D. NEW BUSINESS

1. Interim Ordinance Authorizing A Study and Imposing A Moratorium on Data Centers

E. PUBLIC HEARINGS

1. Preliminary and Final Plat of Attig Subdivision

F. COMMISSIONER COMMUNICATIONS

G. STAFF COMMUNICATIONS

H. ADJOURNMENT

Disclaimer: This agenda has been prepared to provide information regarding an upcoming meeting of the Planning Commission of the City of Albert Lea. This document does not claim to be complete and is subject to change.

MINUTES OF THE ALBERT LEA PLANNING COMMISSION

Regular Meeting
September 1, 2026
5:30 pm – City Center

Vice-Chairman Dorman called the meeting to order at 5:30 p.m.

MEMBERS PRESENT
Leon Axtman
Matt Dorman, Vice Chair
Josh Enriquez
Matt Maras

MEMBERS ABSENT
Allen Hendriks
Lucas Schuster, Chair
Steve Thompson
Rachel Christensen, Ex-Officio

STAFF PRESENT
Megan Boeck, Community Development Director
Cierra Maras, Community Development Administrative Assistant

APPROVAL OF AGENDA
Motion by Axtman and second by Maras to approve the agenda as presented. Motion carried.

APPROVAL OF MINUTES
Motion by Enriquez and second by Dorman to approve the August 4, 2026 meeting minutes as presented. Motion carried.

Staff report prepared by Megan Boeck, Community Development Director, is to become part of these minutes by reference.

PUBLIC HEARINGS

1. Conditional Use Permit for a retail gas station and convenience store at 219 Garfield Avenue

Boeck reviewed the staff report and explained that Kwik Trip Inc is seeking a Conditional Use Permit for a proposed 11,000+ square foot retail gas station, car wash, and convenience store located on

the northeast corner of the Blazing Star site. She noted that two state grants have helped pay for soil cleanup on the site as well as the extension of Eberhart Street.

Dorman opened the hearing to the public at 5:31 p.m.

Maras asked if the drive off of Garfield Avenue is an entrance or an exit.

Dean George, representative for Kwik Trip, stated that the delivery trucks will enter off of Garfield and exit off of Eberhart and that would be the standard traffic flow for public traffic as well. He stated that construction is anticipated to begin in spring of 2027. He explained that the new store will be roughly two times the size of the existing store on the other side of the intersection and that there will be one fuel canopy that can accommodate 20 vehicles.

Schuster closed the hearing to the public at 5:45 p.m.

Motion by Dorman and second by Enriquez to recommend to City Council the approval of a Conditional Use Permit for Kwik Trip at 219 Garfield Avenue with the following conditions:

1. Ground and/or rooftop equipment be screened.
2. Trash enclosures be constructed with like building materials.
3. Stormwater pond maintenance agreement be adhered to.

Motion passed on a 4-0 voiced vote.

COMMISSIONER COMMUNICATION

None.

STAFF COMMUNICATION

None.

ADJOURNMENT

Motion by Maras and second by Axtman to adjourn the meeting at 5:48 p.m. Motion carried.

_____

Cierra Maras, Planning Commission Secretary

_____

Matt Dorman, Vice-Chair

Community Development
221 East Clark Street
Albert Lea, Minnesota 56007-2496
507-377-4349

TO: Planning Commission Members
FROM: Megan Boeck, Community Development Director
DATE: November 13, 2026
RE: Preliminary Plat – Attig Subdivision

Attached is a preliminary plat of Attig Subdivision which is an 8.85-acre parcel along West 9th Street and abutting Pickeral Lake. The property is currently described by metes and bounds and per City Code, it is not developable until an official plat is recorded in the office of the registrar.

The property is currently zoned R-1 Single-Family Residential of which the purpose is to encourage the establishment and preservation of residential neighborhoods characterized by single-family buildings on medium-sized lots. The property owner has submitted plans for a single-family house and accessory structure.

The Preliminary Plat of Attig Subdivision meets all the requirements of Chapter 38 – Subdivisions including lot size, street frontage and public utilities which are located in West 9th Street.

Staff recommends approval.

Megan Boeck

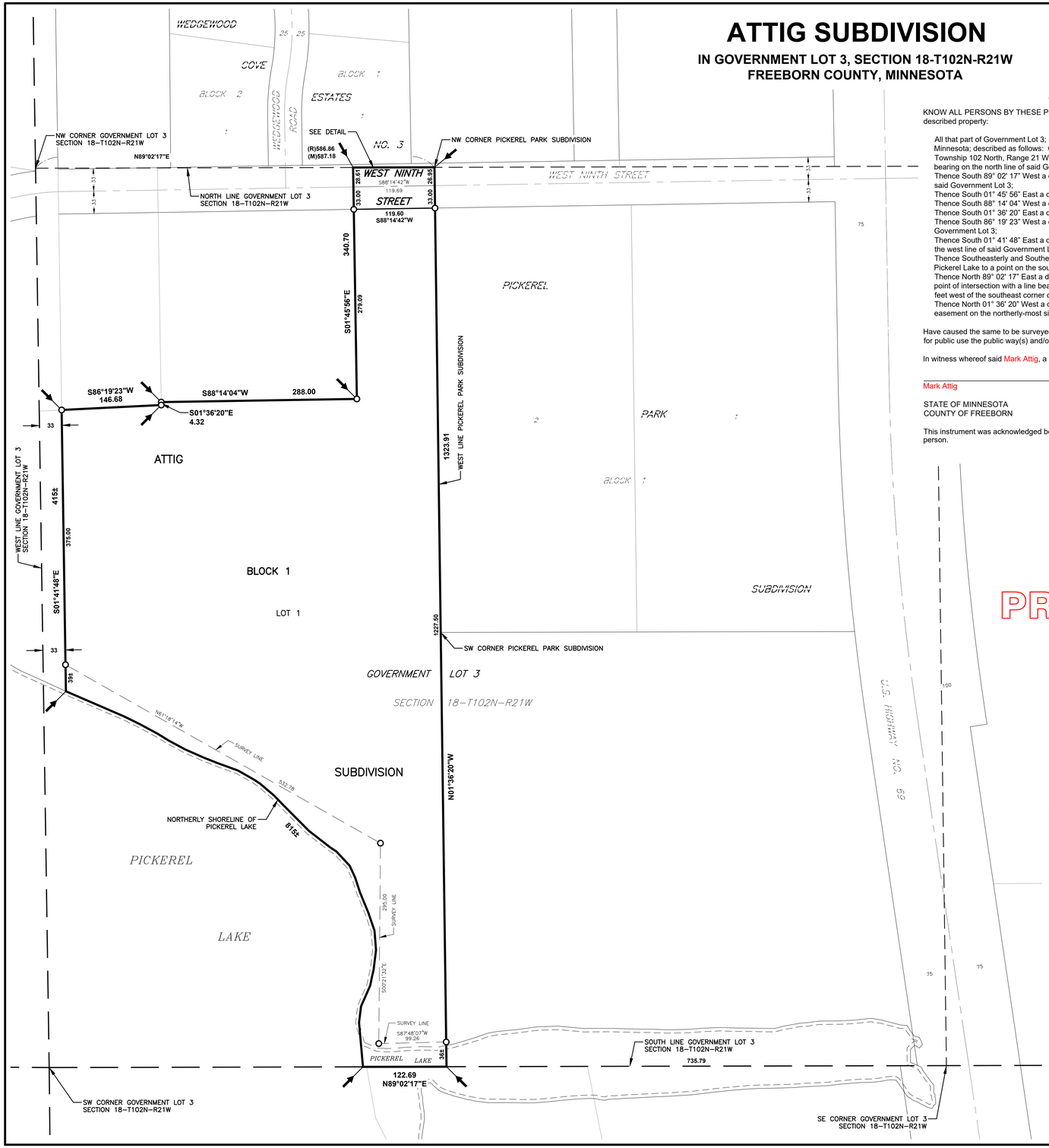
Megan Boeck, Community Development Director



OFFICIAL PLAT

ATTIG SUBDIVISION

IN GOVERNMENT LOT 3, SECTION 18-T102N-R21W
FREEBORN COUNTY, MINNESOTA



CERTIFICATE OF DEDICATION

KNOW ALL PERSONS BY THESE PRESENTS: That Mark Attig, a single person, fee owner of the following described property:

All that part of Government Lot 3; Section 18, Township 102 North, Range 21 West, Freeborn County, Minnesota; described as follows: Commencing at the northwest corner of Government Lot 3, Section 18, Township 102 North, Range 21 West; thence North 89° 02' 17" East a distance of 586.86 feet, on an assumed bearing on the north line of said Government Lot 3, to the point of beginning;
Thence South 89° 02' 17" West a distance of 119.78, on a reverse of the last described line on the north line of said Government Lot 3;
Thence South 01° 45' 56" East a distance of 340.70 feet;
Thence South 88° 14' 04" West a distance of 288.00 feet;
Thence South 01° 36' 20" East a distance of 4.32 feet;
Thence South 86° 19' 23" West a distance of 146.68 feet, to a point 33.00 feet east of the west line of said Government Lot 3;
Thence South 01° 41' 48" East a distance of 415 feet more or less on a line parallel with and 33.00 feet east of the west line of said Government Lot 3; to a point on the northerly shoreline of Pickerel Lake;
Thence Southeasterly and Southerly a distance of 815 feet more or less, along the northerly shoreline or Pickerel Lake to a point on the south line of said Government Lot 3;
Thence North 89° 02' 17" East a distance of 122.69 feet, on the south line of said Government Lot 3, to the point of intersection with a line bearing South 01° 36' 20" East from the point of beginning, which point is 735.79 feet west of the southeast corner of said Government Lot 3;
Thence North 01° 36' 20" West a distance of 1323.91 feet, to the point of beginning; subject to highway easement on the northerly-most side thereof.

Have caused the same to be surveyed and platted as ATTIG SUBDIVISION and do hereby dedicate to the public for public use the public way(s) and/or the drainage and utility easement(s) as shown on this plat.

In witness whereof said Mark Attig, a single person as hereunto set his hand this _____ day of _____, 2026.

_____
Mark Attig

STATE OF MINNESOTA
COUNTY OF FREEBORN

This instrument was acknowledged before me this _____ day of _____, 2026 by Mark Attig, a single person.

_____, Notary Public
My Commission Expires _____

PRELIMINARY

SURVEYOR'S CERTIFICATE

I, Steven J. Thompson, do hereby certify that this plat was prepared by me or under my direct supervision; that I am a duly Licensed Land Surveyor in the State of Minnesota; that this plat is a correct representation of the boundary survey; that all mathematical data and labels are correctly designed on this plat; that all monuments depicted on this plat have been, or will be correctly set within one year; that all water boundaries and wetlands, as defined in Minnesota Statutes, Section 505.01, Subd. 3, as of the date of this certificate are shown and labeled on this plat; and all public ways are shown and labeled on this plat.

Dated _____ day of _____, 2026.

_____
Licensed Land Surveyor
Minnesota Licensed No. 22705

STATE OF MINNESOTA
COUNTY OF FREEBORN
This Instrument was acknowledged before me on this _____ day of _____, 2026 by Steven J. Thompson.

_____, Notary Public
My Commission Expires _____

CITY APPROVAL

We do hereby certify that the within plat of ATTIG SUBDIVISION was duly accepted and approved by the City Council of the City of Albert Lea, on the _____ day of _____, 2026.

_____ Attest: _____
Mayor City Clerk

COUNTY SURVEYOR

I hereby certify that in accordance with Minnesota Statutes, Section 505.021, Subd. 11, this plat has been reviewed and approved this _____ day of _____, 2026.

_____
Deputy Freeborn County Surveyor

COUNTY AUDITOR & TREASURER CERTIFICATE

Pursuant to Minnesota Statutes, Section 505.021, Subd. 9, taxes payable in the year 2026 on the land hereinbefore described have been paid. Also, pursuant to Minnesota Statutes, Section 272.12, there are no delinquent taxes and transfer entered this _____ day of _____, 2026.

_____
County Auditor & Treasurer,Freeborn County, Minnesota

COUNTY RECORDER'S CERTIFICATE

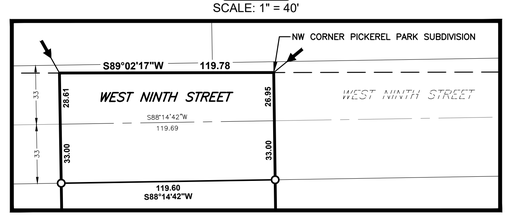
County Recorder, County of Freeborn, State of Minnesota

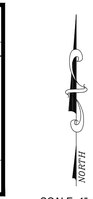
I hereby certify that this plat of ATTIG SUBDIVISION was filed in the office of the County Recorder for public record on this _____ day of _____ , 2026, at ____ o'clock ___M., and was duly filed as Document Number _____ .

_____
County Recorder, Freeborn County, Minnesota

By: _____
Deputy

DETAIL:
SCALE: 1" = 40'



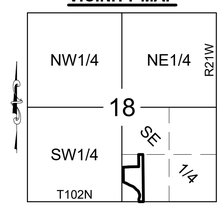


SCALE: 1" = 80'

0 80
40 160
SCALE IN FEET

AREA
9.00 ACRES± (391,036 Ft^2)

VICINITY MAP



Scale: 1"=2000'

LEGEND

- ○ = 5/8 Inch X 16 Inch iron stake monument (capped SJT 22705)-Placed
- ● = Iron stake monument - Found
- ◄— = Subdivision Plat Corner
- Ⓤ = Utility Easement
- M = Measured Dimension
- R = Recorded Dimension

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BASIS OF BEARING SYSTEM
All bearings are based upon the MnDot Freeborn County Coordinate System Nad 83 (96) Harn Adjustment Grid

JONES, HAUGH & SMITH INC.
CONSULTING ENGINEERS & LAND SURVEYORS
515 SOUTH WASHINGTON AVENUE ALBERT LEA,
MINNESOTA 56007

OCTOBER 2026

DRAWN BY ANDY MCGOWAN
26-360FP.dwg

Community Development
221 East Clark Street
Albert Lea, Minnesota 56007-2496
507-377-4349

TO:	Planning Commission Members
FROM:	Megan Boeck, Community Development Director
DATE:	November 13, 2026
RE:	Interim Ordinance Authorizing a Study and Imposing Moratorium on Data Centers

Attached is a draft ordinance authorizing a study and imposing a moratorium on large-scale data centers. Per the University of Minnesota Toolkit for Southeast Minnesota Local Governments, a large-scale data center is defined as a building or other facility used principally for storing, managing, processing and/or transmitting digital data. To qualify, the facility must house computer or network equipment, measure 150,000 square feet or larger and/or uses 50,000 gallons of water per day or more, and operates over 10MW.

The purpose of the study is to determine localized impacts, how they should be regulated, and if Albert Lea City Code needs to be amended to better address the use and operation.

This moratorium will be in effect for 12 months. It is scheduled for City Council approval on November 23, 2026. Our hope is that we can develop a process that includes public outreach, studies on noise and light pollution, as well as water usage studies.

This moratorium will not impact smaller, localized facilities that use less than 10MW. These facilities are usually built ancillary to an existing building and support a company's own computing needs.

Please let me know if you have any additional questions.

Thank you!

Megan Boeck

Megan Boeck, Community Development Director

Data Centers, Water, and Energy

Considerations for Local Government Decision-making in Southeast Minnesota

October 2026

University of Minnesota Hubert H. Humphrey School of Public Affairs
University of Minnesota Law School
University of Minnesota Extension Southeast Regional Sustainable Development Partnership
The Freshwater Society

UNIVERSITY OF MINNESOTA

FRESH WATER

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Project Description and Contributors

Information in this toolkit stems from a 12-month research project, starting July 2025. This was a collaboration between the University of Minnesota's Hubert H. Humphrey School of Public Affairs and Law School, University of Minnesota Extension Southeast Regional Sustainable Development Partnerships (Southeast RSDP), the Freshwater Society, and the cities of Byron, Lewiston, and Stewartville. The audience for this toolkit is officials and staff in local governments (for example, council members, county boards, and planning staff) in the Southeast region of Minnesota, but since there is limited research on data centers to-date, the toolkit may be more broadly applicable.

Acknowledgements

The project was guided by the questions and on-the-ground knowledge of three collaborating city administrators in Southeast Minnesota: Al Roder (City of Byron), Ragini Varma (City of Lewiston), and Bill Schimmel (City of Stewartville). It also included in-depth contributions from the following University of Minnesota graduate students: Amy Bendtsen, Anna Edmunds, Lulu Yang. The authors extend tremendous gratitude to them all for their time, context and contributions. We also thank Udeshi Basau, via UMN Center for Urban and Regional Affairs (CURA), and Amelia Goldwasser, via the UMN Institute on the Environment, for design assistance.

This report represents the results of research conducted by the authors and does not necessarily represent the views or policies of the University of Minnesota, University of Minnesota Extension, or the Freshwater Society.

This work was supported by a University of Minnesota Institute on the Environment Impact Goal grant, 2025-2026, titled "Data Centers, Energy, and Water: Local Government Tools for Collective Planning and Community Decision-making in SE Minnesota," under Grant No. IG 144.

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01 | Project Introduction

In December of 2024, at a monthly meeting of economic developers and city staff in Southeast Minnesota, a power company presented on the current influx of data center development inquiries in the region. Among the features of this presentation were the economic opportunities data centers could provide to cities in the region. After that meeting the city administrator of Byron, Al Roder, approached University of Minnesota Extension's executive director of the Southeast Regional Sustainable Development Partnership (Southeast RSDP) Andi Sutton. Al had questions, among them: what were the trade-offs between the economic benefits and water and energy needed to make it happen? Were resources available for city staff and decision-makers like him for how to evaluate and respond to inquiries in a more informed way?

Andi didn't have the answers then, but—thanks to her role at Southeast RSDP as a convener of community-University partnerships—knew University of Minnesota researchers could help. From this initial conversation came a year-long research collaboration between the University of Minnesota's Hubert H. Humphrey School of Public Affairs and Law School, University of Minnesota Extension's Southeast RSDP, the Freshwater Society, and the cities of Byron, Lewiston, and Stewartville. The team worked from July, 2025 - June 2026 to develop materials to meet this need. Research focused on capturing national and local insights (interviews), understanding the Minnesota and municipal policy environment (document analysis), and developing and piloting tools for deliberation (workshops). The goals?

- **Equip local government decision-makers with transparent research on what we know to date about the impacts of data centers as large-scale resource users on energy and water systems** (impacts as well as considerations for local governments)
- **Begin to foster regional discussions about data center development within the Southeast region of Minnesota** (and maintaining a focus on conversations that span a single jurisdictional boundary)

What follows is a tool that can be used by local government decision-makers. The geographic focus of much of the material is Southeast Minnesota, but a lot of the content will have wider application. The toolkit contains the following sections:

> **Introduction:** This section explains how to use the toolkit and emphasizes how quickly the landscape around data centers is changing. It also discusses the role of local governments.

Electricity Impacts and Regulation: This section details how electricity demand from large data centers affects local power systems, including electricity prices, climate goals, and backup generators. It also reviews the role of the Minnesota Public Utilities Commission.

Water Impacts and Regulation: This section reviews water use by data centers, including direct and indirect water use, and the tradeoff of lower water-using cooling systems with electricity use. It also offers context specific to Southeast Minnesota regional groundwater systems.

Guiding Questions and Checklists: This section offers guiding questions based on project interviews and participatory workshops. It includes specific questions decision-makers should ask when faced with a project inquiry to evaluate feasibility, support negotiation limits, and align review processes with local priorities.

Addressing Data Centers in Local Codes: This section provides examples of how to address data centers in changes to local codes, including zoning updates, site and building design, using moratoria, and resource use considerations.

Data Centers FAQ: This section provides answers to frequently asked questions about data centers and offers a "quick guide" way to navigate this tool kit with references to sections that provide more detailed information.

This toolkit acts as an in-depth resource to build knowledge about a rapidly evolving area. It is designed to reflect a spectrum of possible approaches, rather than prescribing one path forward.

Whether a data center developer has approached you and you would like to know how to respond, you are on a planning board and you are interested in revising local code to address data centers, or you are not facing a proposal but want to be more informed to participate in conversations within your city or regionally–or more–there is information in this document for you.

02 | Introduction

This section includes

- How to use this Tool Kit
- What is a Data Center?
- Local Governments in Data Siting in Minnesota

Introduction

This toolkit is designed for officials and staff in local governments (for example, council members, county boards, and planning staff) in the Southeast region of Minnesota seeking to understand and consider responses to energy and water use in data centers.

The focus is to provide information about key considerations for local decisionmakers who are interested in proactively addressing data center impacts on water and energy systems. Our goal with this toolkit is not to tell anyone what to think about data centers but to help provide sufficient background on key issues that help local decisionmakers consider how to think about data centers, particularly hyperscale or very large data centers, in relation to energy and water considerations. The information in this toolkit covers a range of factors central to energy and water considerations, and connects these to how local officials can approach asking questions about data centers and responding to potential data center development in local plans and codes.

Information about specific data center projects and the sector as a whole is changing quickly. Our team started asking questions and shaping the research trajectory of this project a little over a year ago (August 2025). Since then public awareness about data centers has changed locally and nationally. Public opinion polling shows that over the past year, opposition towards data centers being sited near to where someone lives is increasing across.[1] This reflects what we heard locally: hyperscale data center projects encompass a wide range of issues and are attracting strong community responses.

Additionally, debate surrounding the siting of a specific data center may reflect concerns about the societal use of artificial intelligence (AI). Data center projects are emerging as a tangible symbol in the debate about AI more broadly.[2] This is a discussion that spans beyond a single jurisdiction, but this context will inform public sentiment and the ways in which people engage with local decisionmakers.

Despite many regulatory decisions surrounding data centers occurring at state or federal levels, local officials (e.g., municipal, county, township) are being asked to understand and articulate responses to the impacts of data centers on a broad set of issues. We include a substantial amount of detail on electricity and water decisionmaking in this toolkit to build a broader

[1] Meyer, *Exclusive*.
[2] Kagan-Kans, "The Data Center Is a Symbol."

understanding of energy and water considerations for local decision-makers, even if those decisions are ultimately governed by state or federal processes.

New information and research emerge regularly about data centers – it is a quickly changing area. This toolkit represents a snapshot of information identified primarily on or before June 30, 2026. Data underpinning this toolkit stems from multiple sources: review of existing research (both academic literature and other reports or presentations), interviews with jurisdictions in Virginia, Maryland, California, and Iowa, and four project workshops. Information shared in this toolkit will need to be updated as data center projects – and the sector overall – continue to evolve. Each section includes a reference to other resources that provide more in-depth review of issues or offer differing perspectives.

This toolkit can be treated as a guide or roadmap that focuses on understanding the water and energy impacts and helps communities evaluate infrastructure needs, environmental effects, and responsibility for costs. Local governments in the region may be interested in a range of outcomes, from actively seeking data center projects to more passively considering a project should it arise, to stopping them altogether. This toolkit was designed to support local governments in Southeast Minnesota, so the context and background is tailored to that region as much as possible. But since there is limited research on data centers to-date, much of the information on impacts, questions to ask about data center projects, and local code changes is more broadly applicable.

How to Use this Toolkit

You will find five sections in this toolkit. Each section links to areas within the toolkit where you can find more information or guidance to underpin recommendations. This toolkit utilizes hyperlinks across sections such that each section will orient you to other resources within this toolkit.

01 | An overview of energy impacts and local government decisions in Southeast Minnesota

02 | An overview of water impacts and local government decisions in Southeast Minnesota

03 | Key questions local governments should ask to proactively address data center impacts

04 | A guide to addressing data centers in local codes

05 | An FAQ guide to orient you to information in this toolkit based on key questions about data centers

What is a Data Center?

A data center is a facility that houses computer and network equipment, servers and other related equipment for storage, management, processing, and transmission of digital data. Data centers vary in size and function: local governments may encounter small enterprise facilities, edge data centers, hyperscale campuses, or compute-intensive facilities such as cryptocurrency mining (see Table 1).

A data center supports digital services such as storage, computing, cloud services, artificial intelligence, and online applications. There are different types of data centers, and they can have very different local impacts. Local jurisdictions may specify different requirements based on varying sizes and functions or apply more uniform rules across data centers as a single category (see Section Defining Data Centers).

Knowing the Type of Data Center in Question is Key

Different types of data centers have varying requirements that may impact local decision-making. Local government decisions – from community engagement to local ordinances – may benefit from tailoring discussions to specific types of data centers.

Enterprise data centers are often smaller facilities that support a company's own computing needs. **Edge data centers** are located closer to end users and are used to collect, process, or transmit data with lower delay. **Hyperscale data centers** are very large facilities built to support large-scale cloud, artificial intelligence, or other high-volume digital services. **Cryptocurrency mining facilities** are specialized computing facilities used to support cryptocurrency transactions.

These categories matter because they do not have the same requirements.

A small enterprise facility may look like another commercial building with added electrical needs. A hyperscale or artificial intelligence (AI) campus may use electricity equivalent to a city, with larger land use, power, cooling, and backup-power questions. Crypto mining is different again because operators may be more willing to shut down when electricity prices are high or the grid is stressed.

Other definitions of data centers focus on ownership or use of the facility. For example, a **colocation data center** refers to situations where a company owns and operates a data center, but rents space in that data center to other users. Contracts between the owner and users in a colocation facility detail the services agreed to, including space, power, cooling, and security. The ownership and use model – and whether a local government is directly interacting with the end user – may influence development agreements and negotiations over transparency of resource use.

Table 1. Different types of data centers and their requirements

Edge	Cloud/ Enterprise	Colocation	Hyperscale	Crypto Mining
Smaller, localized facilities closer to end users	General computing, storage, and internet services	Large, multi-tenant or shared facilities that support various users	Large facilities or a campus of multiple facilities	Specialized computing for cryptocurrency transactions
1-10 MW	**1-20 MW**	**Varying sizes** (from smaller enterprise to large hyperscale)	**20-500+ MW**	**5-100 MW**
<1-40 acres	**1-10+ acres**		**50 - 500+ acres**	**2-20 acres**

Note: This table includes crypto mining which often behaves differently than other data centers in that it can ramp electricity use up or down more easily, some local jurisdictions include crypto mining along with other data centers and others explicitly differentiate.

Data Center Siting in Minnesota & Local Government Role

Local governments play a critical role in data center development, although do not have jurisdictional authority to regulate many of the impacts central to current debates about data centers. Local governments are often responsible for weighing the needs of a data center (land, water, energy) against other current and future needs (current residents, businesses, and industry; future growth or priority development areas; environment and ecosystems) and evaluating whether the expected gains justify limitations on future or other needs.[3]

Local officials with data center experience emphasize the importance of proactively putting local land-use and performance standards in place to regulate data center development. Putting these protections in place before a development can help address harms associated with poorly planned data centers.[4]

The focus of this toolkit is to help local governments evaluate proposals and establish appropriate local requirements, but this may also require working with agencies not often the focus of local government collaboration (e.g., the Minnesota Public Utilities Commission) or across local governments as impacts from large, hyperscale facilities may span jurisdictional boundaries.

Local, state, and federal levels of government have authority over different aspects of data center impacts related to energy and water (see Tables 2-4). Many of the issues highlighted in Tables 2-4 are explored in greater depth in other parts of the toolkit as indicated by links in the table. State agencies are involved in many other aspects of a data center project, Minnesota Business First Stop (MBFS) coordinates across agencies for data centers and has more detailed resources on agency oversight and permitting across a wider range of issues (see "Minnesota Data Center Regulatory Guide").

[3] Grimm et al., "Overview: Regulating Data Center Water Use in California."
[4] Turner, *Loudoun County, Virginia: Data Center Capital of the World "A Strategy for a Changing Paradigm."*

Table 2. Select environmental issues raised by data centers, decision-making authority, and local government role in Minnesota related to air pollution

Issues	Level of authority	Description	Local government role
Air Pollution	**State, Federal**	**Air Quality** Air quality is regulated by the Minnesota Pollution Control Agency (MPCA). Criteria pollutants limits are regulated by the US EPA and enforced by MPCA. See Backup Generator Use. Air pollution is not directly regulated by the Minnesota Public Utilities Commission (PUC), but the PUC is the siting agency for backup generators (a primary source of air pollution from data center facilities).	Local governments primarily have a supportive role for air quality issues, except for odor.[5]

Table 3. Select environmental issues raised by data centers, decision-making authority, and local government role in Minnesota related to water resources

Issues	Level of authority	Description	Local government role
Water Resources	**State**	**Water supply/withdrawal** Water withdrawals are regulated by the Minnesota Department of Natural Resources (DNR). Some data centers use municipal water supply, in which case the municipality is permitted by DNR. See Water Supply and Availability.	Annual withdrawals permitted by the DNR. Water use for data centers that is under a municipal permit will require monitoring by the local government. See Water Supply and Availability.
	State, Federal,	**Water discharge** Water discharge (water quality) is	Municipalities that operate wastewater treatment plants are

[5] Minnesota Pollution Control Agency, "Air Emissions."

	Regional	regulated by the MPCA and Minnesota's standards are approved by the US EPA. See Wastewater Systems and Use.	required to comply with discharge permits set by the MPCA. This requires regular testing of wastewater effluent. In some cases, regional entities (e.g., Metropolitan Council) collect and treat wastewater and plan for future demand.
	State, Local	**Stormwater** Data center projects will require a Construction Stormwater (CSW) Permit from the Minnesota Pollution Control Agency (MPCA). This will include the submission of a Stormwater Pollution Prevention Plan. Facilities may require an Industrial Stormwater Permit from the MPCA if there are above ground storage tanks.[6]	Local Watershed Districts issue permits for work within a watershed boundary which may have different requirements from the MPCA's CSW permit. Stormwater pollution prevention programs as a part of city or county MS4 permits may encourage or require specific best management practices.
	State, Local	**Wetlands** Wetlands are overseen by the Board of Water & Soil Resources (BWSR), but local governments often initiate and implement wetland regulations in the state (city, county, watershed district, watershed management organization or soil and water conservation district (SWCD)).	BWSR maintains a local government unit directory which details responsible local parties by county. Local government units, including SWDCs, are responsible for evaluating applications and enforcing requirements. Local governments or watershed districts may have wetland or wetland buffer ordinances.

[6] Minnesota Pollution Control Agency, "Does My Facility Need an Industrial Stormwater Permit?"

Table 4. Select environmental issues raised by data centers, decision-making authority, and local government role in Minnesota related to energy resources

Issues	Level of authority	Description	Local government role
Energy Resources	**State*** *for investor-owned utilities or voluntarily regulated cooperatives	**Electricity prices** Electricity prices for investor-owned utilities (such as Xcel in the Southeast region, or Minnesota Power and Ottertail power in other regions) are set by the Minnesota Public Utilities Commission (PUC). For those served by electric cooperatives, rates are set by the cooperative board of directors. See Cost of Service Regulation.	In cases where prices are set by the PUC or cooperative boards, local governments are not involved in setting electricity prices. For municipal electric utilities, rates are regulated by city council or appointed commissioners. See Different Processes by Electric Utility Types.
	State	**Siting of on-site generation** Given the scale of electricity requirements for data centers, the Minnesota Public Utilities Commission (PUC) will be responsible for most siting of on-site generation systems . The PUC issues site permits for solar generation and power plants of 50 MW or greater and wind generation 5 MW or greater. The PUC also issues permits for energy storage projects 10 MW or larger and high-voltage transmission lines greater than 100 kV and 1,500 feet.	Local governments have permitting authority over smaller projects under the PUC thresholds. Local zoning or ordinances are superseded and preempted by PUC site or route approvals for large projects that fall under PUC authority.

		Backup generators over 50 MW require a certificate of need and a site permit from the Minnesota Public Utilities Commission (PUC).	
	State, local	**On-site fuel storage** Storage tank standards and permitting for above and underground storage tanks are regulated by the Minnesota Pollution Control Agency.	Local governments can regulate the location of fuel storage through zoning and site design standards. Some cities in the state require storage tank permits.

03 | Electricity Impacts, Regulation, and Local Government Participation

This section includes

- OVERVIEW: Electricity Impacts, Regulation and Local Government Participation
- DEEPER DIVE: Electricity Impacts, Regulation and Local Government Participation

Overview

Electricity Impacts, Regulation and Local Government Participation

Why does this matter to local governments in Southeast Minnesota?

Most local governments may not have direct experience with regulating electricity, other than those with municipal electricity utilities. The boom in data center development means that many governmental staff and elected officials need to learn more about the electricity sector to better understand possible impacts to the electricity system, including ways to mitigate those impacts. Local governments (staff and elected officials) may get questions that cover specific proposed projects in Southeast Minnesota or that are about how a data center might be connected to other projects that are sited or being proposed in the region, such as transmission lines.

Hyperscale data center development, in particular, is raising questions about whether and how data centers may impact electricity rates, influence localized air pollution, and impact goals to reduce greenhouse gas emissions from the electricity sector. Local officials do not have authority to address all of these areas, but may be interested in knowing more about electricity regulation to ask their own questions or provide information to interested residents.

This section provides a baseline of information to support discussions with state agencies, electric utilities, and any project developer, as well as information to support addressing data centers in ordinances. Details about the electricity sector may also facilitate more robust conversations across city departments that are often large users of electricity and with interested community members concerned about impacts on issues they care about.

What will you find in this section?

This section provides details how rates are regulated in the electricity sector – with a focus on utilities that are regulated by the Public Utilities Commission (in the Southeast region, this is Xcel Energy), how impacts on the electricity grid may be mitigated through rate structures or incorporating flexibility and efficiency, and impacts on climate goals.

1. An overview of data center electricity use. Data center electricity use is expected to increase in the United States, and researchers are estimating by how much and at what pace. But these estimates should be used to inform discussion and policy, rather than be used as predictive.

2. A review of how the Minnesota Public Utilities Commission regulates rates, concerns about cost shifting to residential customers, information on Minnesota's Very-Large Customer Class requirement that was passed in June 2025, and how our local electricity grid is a part of a larger system of transmission operations and planning.

3. Considerations that may continue to influence how data centers impact the electricity sector and related rates, including flexibility, ways to encourage energy efficiency in data centers or other sectors to provide capacity for data centers, and waste heat re-use.

4. Standards for backup generators commonly used at large data centers, and how the US EPA and Minnesota Pollution Control Agency regulate air pollution from generators. Many local jurisdictions and residents are concerned about the health impacts due to air quality impacts, this is a new but growing area of research.

5. Considerations related to reducing greenhouse gas emissions, including increases in emissions in other parts of the US, a growing number of new natural gas power plants, and Minnesota's Carbon Free Electricity Standard.

Deeper Dive

Electricity Impacts, Regulation and Local Government Participation

In 2024, data centers were estimated to represent about 4.7% of total electricity consumption in the United States. Data centers are expected to represent between 9.5-15.3% of total electricity consumption in the United States by 2030. This translates to about one-third of total load growth from 2024-2030 – a steep increase in data center electricity use. Current and expected future growth in electricity demand represents a shift from a period of flat electricity use. The majority of this growth is in the commercial and industrial sectors, including data centers (see Figure 1).

Projections about load growth can be used to inform decision-making and discussions around data centers, but past forecasts have also overestimated growth which can result in excess costs from building unnecessary infrastructure.[7]

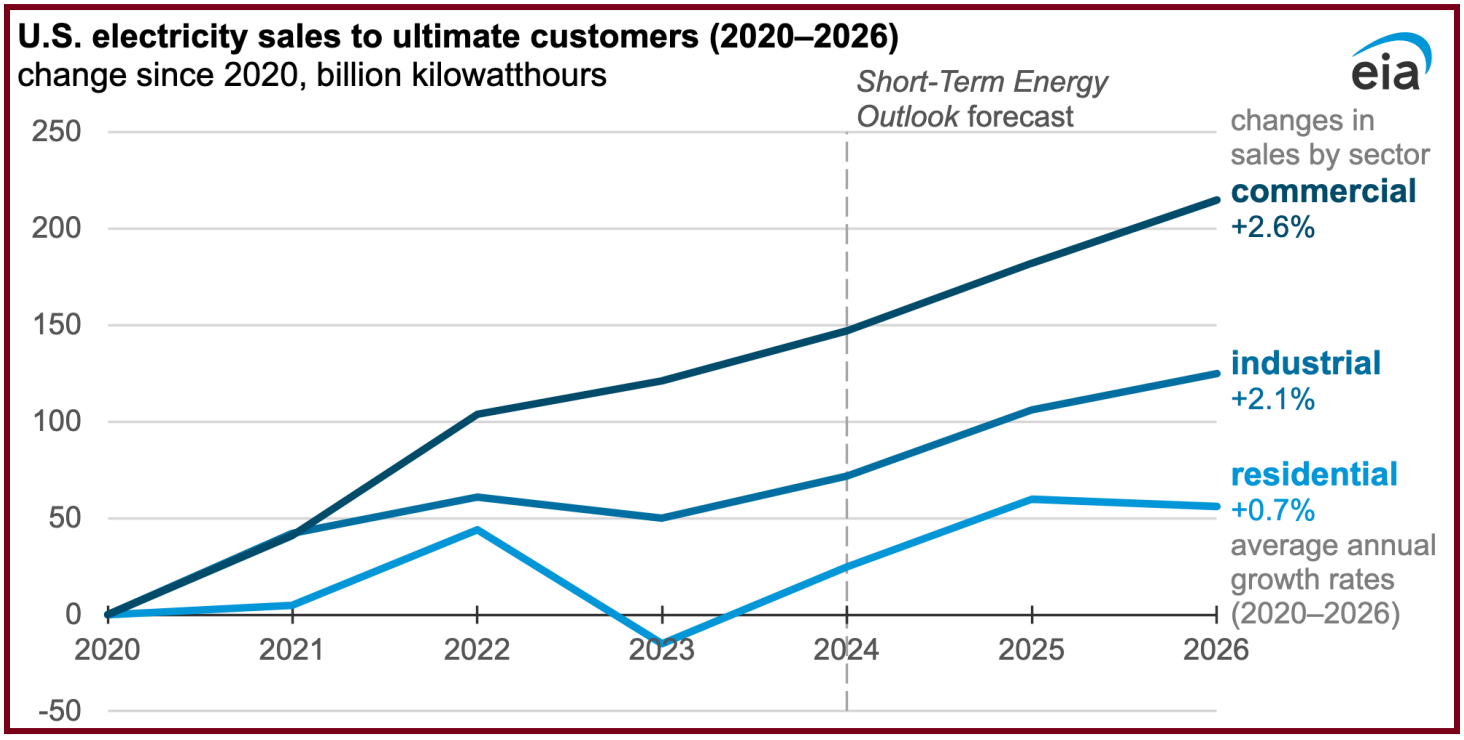


Figure 1. U.S. Energy Information Administration, *Short-Term Energy Outlook*, May 2025

[7] Dyson and Shwisberg, "Reality Check."

Minnesota's electricity use has largely followed the national pattern of flat, or even slightly declining, electricity demand.[8] As of 2025, Minnesota had 63 megawatts (MW) of installed power capacity for computing equipment, which is dwarfed by the amount of computing capacity under construction (202 MW), committed (196 MW), or in early stages (1,529 MW).[9] (Megawatts measure how much power a facility draws at a particular time.) Ongoing tracking estimates much higher electricity demand for projects across stages in Minnesota, as much as 5 gigawatts (GW; a gigawatt is 1000 megawatts).[10]

This increase illustrates the difference between the electricity demand of historical enterprise or cloud data centers, and the requirements of hyperscale data centers. The Meta data center in Rosemount – Minnesota's only under-construction hyperscale data center – has two buildings that combined total over 300 MW, surpassing the combined electricity demand of earlier generations of data centers in the state.[11] The proposed data center in Pine Island may eventually use 1 GW or more of capacity, equivalent to 11% of Xcel's Upper Midwest load.[12] Designed (also called nameplate) power capacity and estimated operational power capacity are often not publicly available, even to local governments unless otherwise required in the development process.

Data Center Electricity Use

Data center electricity use is driven by data processing and storage, and then by cooling systems. Data center demand has historically been driven by services associated with the internet, including substantial demands for cloud-based services.[13] Today, the demand for AI-related data centers is growing. As of 2025, traditional data centers in the U.S. used more total electricity than AI data centers, but this is expected to flip in the near future.[14] Electricity use is generally split across electricity used for servers, storage, network, cooling, and other infrastructure. The breakdown of electricity use across those areas varies by data center type, but in general hyperscale data centers devote more electricity use to servers.[15]

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[8] U.S. Energy Information Administration (EIA), "Minnesota."
[9] Clean Energy Economy MN and The Business Council for Sustainable Energy, *2026 Minnesota Energy Factsheet*.
[10] "Data Center Watch Mni Sóta Makoce."
[11] Cleanview, "Data Centers in Minnesota — Project List & Locations"; "Data Center Watch Mni Sóta Makoce."
[12] Masters et al., "Xcel Energy CEO Speaks on Energy Security."
[13] Masanet and Lei, "How Much Energy Do Data Centers Really Use?"
[14] Stansbury et al., "Can US Infrastructure Keep up with the AI Economy?"
[15] IEA, "Share of Electricity Consumption by Data Centre and Equipment Type, 2024 – Charts – Data & Statistics."

For AI data centers, different tasks require substantially different amounts of electricity, for example agentic workflows – utilizing autonomous agents to execute complex multistep tasks – are estimated to use orders of magnitude more electricity than text classification (like using AI to review email).[16] So, as AI continues to develop, so too will the related electricity needs.

How do Data Center Developers Measure Energy Use?

The efficiency of a data center's systems is often measured using a Power Usage Effectiveness (PUE) ratio. PUE is the ratio of all the power used at a data center to the power used by the information technology (IT) equipment, such as servers, storage, and network systems. For a data center that splits power consumption evenly between IT systems and other power needs (such as cooling, power distribution, or other supporting systems), the PUE would be 2. The closer PUE is to 1, the more power is being used for computing needs rather than overhead.[17]

PUE does not measure performance of the IT systems or total energy use, it only measures the relative efficiency of power used to support the core function of a data center compared to other facility energy use.[18] Nor does PUE address the total energy demands of a system; it is a ratio.

Examples: Meta reported an average PUE of 1.08 in 2024, Google reported an average PUE of 1.09, Microsoft reported an average PUE of 1.17 for FY25.[19]

Data Center Impacts on Electricity Prices

Even though local governments – unless you have a municipal electric utility – are not in charge of setting electricity rates, local residents are likely to ask staff and elected officials about impacts on electricity rates. How a new data center's electricity use may impact electricity prices, in particular for residential customers, is a common and complicated question.

[16] Bistline, Estimating GHG Emissions from AI Use: Framework for Corporate-Level Measurement.
[17] Microsoft, 2026 Environmental Sustainability Report: Data Fact Sheet; Google, Environmental Report (2025); Meta, Environmental Data Index; Offutt et al., Data Centers and Their Energy Consumption: Frequently Asked Questions; Sarte et al., Data Centers in Virginia.
[18] Benitez, "Is PUE Dead?"
[19] Google, Environmental Report (2025); Meta, Environmental Data Index; Microsoft, 2026 Environmental Sustainability Report: Data Fact Sheet.

Electricity rates are rising around the country and likely to continue doing so given higher interest rates, higher commodity and equipment prices, and necessary investments in other grid priorities. There are some factors that can affect electricity prices nationwide, such as inflation and equipment pricing, while others are region or state-specific, such as distribution and transmission investments and reactive and proactive responses to natural disasters.[20] Given the range of factors influencing electricity rates, in this section we explore the considerations that highlight the ways in which data centers may impact (by raising, stabilizing, or lowering) rates compared to impacts on rates that are related to other factors.

Local climate and energy plans often reference or seek to address high energy burden – those spending a disproportionately high amount (over 6%) of their income on energy costs.[21] Planners may need to address how changes to electricity prices may exacerbate or ease disproportionate impacts on high-energy burden or low-income households.

Different Processes by Electric Utility Types

Whether or how a data center will impact the electricity system is determined largely by the agreement between a developer and the electric service provider. There are three types of electric service providers: investor-owned utilities, rural electric cooperatives, and municipal electric utilities.

Utility Types

1. **Investor-owned Utilities:** For an investor-owned electric utility, the Minnesota Public Utilities Commission (MN PUC) regulates its rates and terms of service. In Southeast Minnesota, Xcel Energy is the only investor-owned electric utility operating in the region. The other investor-owned electric utilities in the state include Minnesota Power and Ottertail Power. The MN PUC also regulates natural gas providers (CenterPoint Energy, Minnesota Energy Resources (MERC), Great Plains Natural Gas, Greater Minnesota Gas, Xcel Energy). [22]

2. **Electric Cooperatives:** Most electric cooperatives set retail rates and approve major service arrangements through their member-elected boards.

[20] Wiser et al., "Retail Electricity Price Trends and Drivers: Data Update–2026 Edition."
[21] Finis and Wyatt, "Climate and Sustainability Data and Metric Tracking Tools for Communities."
[22] Minnesota Public Utilities Commission, "What The MN PUC Regulates."

3. **Municipal Electric Utilities:** Municipal electric utilities are governed by the city council or a local utility commission which is often appointed by city council.[23]

Most cooperatives and municipal electric utilities procure power from a generation and transmission (G&T) cooperative or a joint action agency. In Southeastern Minnesota, two G&T cooperatives provide electricity to local distribution cooperatives and some municipal electric utilities (Great River Energy (GRE) and Dairyland Power Cooperative) and the Southern Minnesota Municipal Power Agency is the primary joint action agency providing electricity to municipal utilities in the region. Given the power demands of data centers, developers often first go to these larger utilities responsible for generation and transmission to understand power availability prior to discussions with a distribution utility or a local government.

The remainder of this section will discuss what we know about the impacts of data centers on the electricity system and rates, including what has already been put in place in Minnesota to mitigate these impacts, but importantly these measures may vary by utility in the state.

Curious About the Different Electric Utilities in the State?

The Minnesota Public Utilities Commission has a map of all the electric utilities operating at the distribution-level in the state, available here.

Cost of Service Regulation

In Minnesota, the PUC regulates rates and terms of service for Xcel Energy, Minnesota Power, Ottertail Power, and Dakota Electric. In exchange for providing all customers in their territories with safe and reliable electricity, regulated utilities are allowed by the PUC to collect enough money from its customers to cover the reasonable cost of providing service, including a regulated return on major capital investments.

Different utilities may be motivated to invest in new infrastructure to serve data centers for different reasons. Investor-owned utilities earn a profit based on capital expenses and allocate electricity rates to classes of customers (residential, commercial, and industrial consumers)

[23] Minnesota Municipal Utilities Association, "Municipal Utilities - Local Control."

based on the cost to serve those customers and as such large loads may shift costs across customer classes.[24] Municipal utilities and electric cooperatives typically conduct cost-of-service studies that help these utilities allocate costs across customer classes, in a similar manner to investor-owned utilities (but without investor-owned utilities' shareholder-return structure). This complicates the supply and demand relationship between a new use of electricity (like a large new data center load) and electricity prices.

When a new electricity user is added to the grid, utilities typically ask it to pay for some but not all of the additional investments that the utility will need to serve it. At the same time, the new electricity user will help share the burden of common infrastructure that serves all customers. In recent years, states with increasing electricity demand have on average had slower increases in prices than states with stagnant or falling demand.[25] That does not mean every new large customer lowers rates; the result depends on the costs the particular customer causes and the revenues it contributes. The net effect of a new electricity user on other customers is thus usually determined by the balance between any investments it requires that it does not pay for and the extent to which it helps other users to pay for shared infrastructure. Or to put it more simply: a new data center may increase or decrease costs for other customers depending on how much it pays to the utility. If it pays the utility substantially more than the additional cost of serving it, that may lower prices for other customers. If it pays the utility substantially less than the marginal cost of serving it, that may increase prices for other customers—effectively shifting costs from the data center to other consumers.

So when a local government considering a data center project wants to know if the project will raise electricity rates for its residents, businesses, or other industries, it should mostly be asking whether the utility is assured enough money from the data center that other consumers will be held harmless or ideally even benefit from lower rates. For a Commission-regulated utility, the utility and the Minnesota Public Utilities Commission should both be working to achieve this goal. For a member-regulated cooperative or municipal utility, local decisionmakers should ask which board approves the agreement and what protections that board is requiring.

Mitigating Cost Shifting from Industry to Other Users

Electricity costs are divided into customer classes: residential, small to medium commercial customers, and large commercial or industrial customers.

[24] Martin and Peskoe, *Extracting Profits from the Public: How Utility Ratepayers Are Paying for Big Tech's Power*.
[25] Wiser et al., "Retail Electricity Price Trends and Drivers: Data Update–2026 Edition."

The worst danger for other consumers is that a utility could make large investments to serve an expanded grid for new data centers but that **the new data center projects would fail to materialize** so the utility would seek cost recovery for its new but now unnecessary investments from existing users.

This kind of extreme cost shift—where investments are made to serve a promised project that is never built, is often called a "stranded cost." The same problem can arise if a data center opens but uses much less electricity than promised or closes before the utility has recovered the cost of facilities built to serve it. There is also a concern that costs may be stranded for a different reason, that the contract, or Energy Service Agreement (ESA), between the utility and the developer may not last long enough to fully recover the costs of the investments made.[26] Of course, utilities themselves prefer guarantees from new data center customers to ensure they will buy large quantities of electricity in coming years but there is a danger that utilities might be insufficiently rigorous in seeking guarantees if they believe they have a backstop option of charging existing customers if the data centers they are anticipating fail to appear.

Minnesota's Very-Large Customer Class

The Minnesota legislature, like many legislatures across the country, is aware of the risks of cost shifting or stranded costs. Minnesota Statutes § 216B.1622, passed in June 2025, directs the Minnesota Public Utilities Commission to assign costs attributable to very large customers to protect other customers from cost shifting or stranded-cost risk. These protections may include promises to buy a certain quantity of energy for a certain period of time, for example, along with financial assurances to support payment if the customer cannot meet its obligations. Xcel Energy's recently approved terms illustrate how these protections can work.[27] A very large customer generally must sign a 15-year contract, pay for at least 80 percent of its contracted capacity even if it uses less, provide 24 months' notice before leaving, and directly fund the transmission and distribution upgrades required to serve it.

The Commission has begun applying utility-specific definitions. Xcel Energy's very-large-customer category includes new loads of 100 MW or more and certain loads from 20 MW to below 100 MW that require substantial system modifications or pre-service

[26] Earthjustice, *The AI Data Centers Bill Moving through Congress Lacks Ambition and Impact*.
[27] Minnesota Public Utilities Commission, "Minnesota Public Utilities Commission Strengthens Consumer Protections as State Prepares for New Very Large Electricity Customers."

expenditures.[28] Under Xcel's proposed 15-year agreement for Google's Pine Island data center, Google would pay the estimated construction costs of its grid connection before electricity service begins. If Google leaves early, it would owe an exit fee equal to 75 percent of the charges for reserving its contracted power capacity during peak periods for the remaining contract term, capped at eight years, plus outstanding obligations to fund specified clean-energy projects.[29] The Attorney General has argued that the proposed agreement's 75 percent threshold and eight-year limit are inconsistent with the Commission's requirements and has asked Xcel to clarify which terms would govern.[30]

Other Minnesota utilities have separate proceedings, proposed thresholds, or governance structures. Local decisionmakers that are concerned that their utility is not providing enough protection against cost-shifting or stranded assets may want to seek more details from their utility on the measures they are taking and read the arguments in Commission proceedings over their utilities policies for such large loads. If they believe that their utility is providing insufficient protection to other customers, they could seek to comment on the Commission proceedings.

Electricity Transmission System in Southeast Minnesota

Local governments likely have had little interaction with the electricity transmission system and transmission-level system operations. Cases where local governments have interacted more with the electricity system have often focused on interactions with distribution-level utilities on issues of resource mix, energy efficiency programs, energy data or service reliability.[31] Given the power demands of data centers, connections and/or assessments are occurring more frequently at a transmission-level. The transmission system in the region is operated by Midcontinent Independent System Operator (MISO), which operates transmission and the wholesale electricity market from Manitoba, Canada down to Louisiana.[32]

Electric service providers and MISO plan the wider system of electric transmission, while the Minnesota Public Utilities Commission reviews the need for and route of certain large

[28] Minnesota Public Utilities Commission, "Minnesota Public Utilities Commission Strengthens Consumer Protections as State Prepares for New Very Large Electricity Customers."
[29] Northern States Power Company d/b/a Xcel Energy, "In the Matter of the Petition of Northern States Power Company for Approval of Contracts for Provision of Electric Service to a New Large Customer Project."
[30] Office of the Minnesota Attorney General—Residential Utilities Division, *Initial Comments*, 48–49, "In the Matter of the Petition for Approval of an Electric Service Agreement between Google and Northern States Power Co. d/b/a Xcel Energy, Docket No. E-002/M-26-170."
[31] ACEEE, "Overview"; Bonugli et al., *UTILIZING CITY-UTILITY PARTNERSHIP AGREEMENTS TO ACHIEVE CLIMATE AND ENERGY GOALS*.
[32] MISO, "Fact Sheet."

high-voltage power lines. Major transmission lines take many years to plan and build, so a line near a proposed data center may have been planned before the data center and for broader purposes such as serving other growth in electricity demand, replacing aging equipment, or connecting renewables and other new sources of generation. With that said, transmission build-out and emerging hyperscale data center load are connected – a recent draft report from the US Department of Energy on national transmission needs documents the bottleneck that transmission plays in data center projects and proposed new transmission projects associated with data centers elsewhere in the US.[33]

Current long-term transmission capacity planning looks at a range of scenarios to inform transmission capacity needs over the next 20 years based on decarbonization, load growth, and generation retirements across MISO's region. Data centers are one source of expected load growth, alongside electric vehicle adoption, building electrification, and domestic manufacturing.[34] Many proposed hyperscale data center projects in Minnesota are in proximity to higher voltage transmission lines, and it is possible as more transmission is built that data centers may be some of the loads served (a "build-it-and-they-will-come" situation).

In Southeast Minnesota, and across the region more generally, transmission upgrades are already underway and continue to be proposed. For example, the Mankato-Mississippi River Transmission Project was identified by MISO in 2022 as a necessary route for regional transmission planning, largely to support renewable energy needs. Examples of these projects in the region include the Mankato-Mississippi River Transmission Project which has been approved to run from Kellogg to Mankato and the Gopher to Badger Link which includes two projects that run from the North Rochester Substation (near Pine Island) to Marion and then from Marion to the Mississippi (MariBell segment).[35]

Planning and permitting for grid upgrades across generation and transmission systems can take far longer than the timeline for a data center. For example, some projects approved in 2022 by MISO's planning process are not anticipated to be operational until 2030.[36]A recent report on data center impacts in the Great Lakes region highlighted that "[a] significant planning challenge arises from the temporal mismatch between the pace of data center development and the speed of utility infrastructure expansion."[37]

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[33] US Department of Energy, *National Transmission Needs Study - Draft for Consultation and Public Comment July 2026*.
[34] MISO, *MISO Futures Report: Series 2*.
[35] Xcel Energy et al., "Mankato-Mississippi River Transmission Project"; Gopher to Badger Link, "Gopher to Badger Link: Project Area."
[36] MISO, "Long Range Transmission Planning."
[37] Ferreira et al., *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*, 40.

The required electricity infrastructure for data centers, including transmission lines and substations, is requiring local governments to not only address issues surrounding data center siting but also siting of this related infrastructure. In places with higher densities of data centers, local governments have initiated electrical infrastructure-specific planning processes. For example, Loudoun County, Virginia has initiated a two-phase amendment to their comprehensive plan to address electrical infrastructure, including maximizing and efficiency using existing transmission corridors and minimizing negative impacts.[38] Local governments are beginning to request information about transmission system requirements or impacts (see Section Studies or Plans Specific to Climate and Environmental Impacts).

Data Center Electricity Behaviors: Flexibility and Conservation

Some of the biggest challenges that utilities serving data centers face is not only the scale of the electricity demand, but how a large load contributes to peak demand – the times during the year in which electricity providers must provide the highest amount of electrical power to users. Utilities plan and build to serve this peak, even if those generation assets are costly and used infrequently.[39] Many sectors – including industrial sectors – participate in demand response programs that reduce consumption during these peak times. The industrial sector has historically been the largest contributor to reducing use during those peak times.[40] One of the key considerations for large loads from data centers is how they contribute to these more stressful, peak times. Information on how much of the designed for electricity consumption data centers actually use is limited, but estimated to be less than the nameplate or designed capacity.[41] This continues to be an evolving area of research and change within the data center industry.

Flexibility

Data center flexibility can reduce demand at times, support voltage stability, and grid reliability to be beneficial to the broader electricity grid. Increasing data center flexibility may support developing data center projects to support economic and security goals, while mitigating

[38] Loudoun County, VA, "Electrical Infrastructure Comprehensive Plan Amendment."
[39] Vanatta et al., "The Past, Present, and Future of Peaking Thermal Power Plants in the United States."
[40] U.S. Energy Information Administration (EIA), *Demand Response Saves Electricity during Times of High Demand*.
[41] Norris and Vijaykar, "Data Center and Large Load Flexibility to Meet Energy Demand Growth."

impacts on electricity affordability and reliability.[42] Data centers have historically been treated as inflexible loads (facilities that have to operate 24/7 without disruption), but efforts to increase flexibility are gaining traction. Flexibility for data centers includes shifting non-critical compute tasks to other locations or other times of day, and integration with other industries to promote energy efficiency.[43]

To recognize the impact of a flexible large load (data center or another large electricity load) on the grid, state regulators may benefit from establishing a formal, enforceable definition of flexible large load that can support long-term planning and inform the assumptions used in interconnection studies and electric service agreements.[44] Decisions about issues related to flexibility are occurring at state and federal levels, but staff and officials in local units of government receiving questions about impacts on electricity rates may want to in turn ask for more information about flexibility or demand response from the Minnesota PUC or local electric utility.

Reducing Electricity Use

There are considerations that may help reduce on-site electricity use for data centers, or support energy efficiency measures that may reduce data center consumption or consumption in other sectors to free capacity on the grid that could be used by data centers.

Energy Efficiency and Conservation

Data centers can both manage their energy use through efficient building design and operation. As noted in Section Data Center Electricity Use, PUE, the common metric used to assess data center energy efficiency performance, focuses on reducing waste electricity use or electricity not being used directly for computing. Minnesota requires qualifying data centers to receive certification from an approved sustainable building standard (Minnesota Statutes § 297A.68.42 (2024)), which include measures to use energy more efficiently among other sustainability practices.

Other initiatives support transparency and education about energy consumption and relative performance, including some data centers. Under Minnesota Statutes § 216C.331, Minnesota requires buildings that meet certain criteria to participate in a Large Building Energy

[42] Walsh et al., *Leveraging Large Load Flexibility to Facilitate Access to Power While Protecting Customers: Considerations for State Regulators*.
[43] Kirchstetter et al., *DOE Data Center Load Flexibility Workshop Summary*.
[44] Walsh et al., *Leveraging Large Load Flexibility to Facilitate Access to Power While Protecting Customers: Considerations for State Regulators*.

Benchmarking program to help understand energy consumption patterns and compare performance across similar buildings.[45] The Minnesota Department of Commerce provides a public map with information on energy use for required buildings, which includes some data centers. Local jurisdictions also have their own benchmarking and disclosure requirements for certain buildings to foster transparency and energy conservation.

There is a growing discussion about data centers playing a role in encouraging energy efficiency in other sectors that would free up existing capacity to meet data center loads. Targeted energy-efficiency investments can help accommodate new electricity demand from data centers, but this also depends on when and where these investments reduce demand and which infrastructure constraints they relieve.

New Jersey was the first state in the US to approve a program that specifically incentivizes residential investments to provide capacity for data center load.[46] Minnesota requires qualified large data centers to contribute to energy conservation to serve low-income energy conservation, weatherization, and efficient fuel-switching programs that benefit income-eligible households, including renters (managed by the Department of Commerce). Local governments may want to be aware of energy efficiency options in conversations with developers and their electric utility to support residential reductions in energy use that may be beneficial to their residents.

Waste Heat Recovery & Reuse

Some electricity use and the majority of the direct water use (see Section Direct Water Use) is used for cooling in data centers, one way to reduce electricity and water consumption is to use heat generated for other purposes. This is a growing area of discussion in the US, with examples in Colorado and Washington,[47] and a proposed project in California.[48] But waste heat re-use is a more widespread practice in European countries like Sweden and Germany, for example, Germany requires effective use of waste heat from data centers on-site or in district energy systems.[49] Given the concentration of data centers in Northern Virginia, the topic of waste heat recovery has been championed by the Northern Virginia Regional Planning Commission (NVRC), which has hosted learning sessions across local planners in the Washington DC Metropolitan area and project leaders in Germany to learn how to adapt data center waste heat recovery and re-use to the US and Northern Virginia context. For local governments, waste heat recovery from

[45] Minnesota Department of Commerce, "Large Building Energy Benchmarking."
[46] Takemura, "New Jersey Law Will Let Data Centers Pay for Home Energy Upgrades."
[47] Spencer, "PAS Quicknotes: Data Center Waste Heat Recovery."
[48] Pacific Gas and Electric Company, "PG&E Begins Energy Infrastructure Upgrades to Bring San Jose's Net Zero Community to Life."
[49] Weiß, "From EU Framework to National Action."

data centers may be enabled by local or regional area-based heat and energy planning aligned with comprehensive planning and zoning to enable coordinated decisions that promote co-location of data centers for waste heat re-use.[50] Although, systematic heat and energy planning is relatively rare in the US.[51]

Incorporating waste heat recovery in data center projects has the potential to reduce fuel use or electricity consumption in nearby buildings, reduce on-site electricity demand by reducing cooling needs, and reduce greenhouse gas emissions. Examples of zoning or permitting requirements that could promote waste heat re-use include: heat recovery opportunities in zoning, study requirements for waste heat recovery, or design requirements for easy connection to district energy systems that utilize waste heat.[52]

Backup Generator Use

Generators are used at data centers to provide backup power if the electricity supply from the grid is interrupted. Most data centers use diesel generators, as they are accessible, easy to operate, have low capital costs, and can run using fuel stored on site rather than relying on pipelines.[53] Emissions from on-site generators include fine particulate matter (PM2.5), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2), which are associated with a range of health impacts including asthma, premature mortality, and cardiovascular disease. One national modeling study attributed annual health damages equivalent to about $4 per U.S. household from backup generators and $44 per household from a mix of electricity generation assumed to supply the facilities. .[54]

Emissions from on-site generators and electricity generation (off-site) contribute to air pollution-related health impacts, but are regulated differently.

Backup generators for data centers are considered a stationary source with pollution levels regulated by the US EPA and permitted in Minnesota by the Minnesota Pollution Control Agency.[55] The US EPA regulates diesel generators based on a set of tiers (2-4) that are associated with different emissions standards. Tier 4 generators are the current and most strict standards for new generators and first took effect in 2008. Generators that serve as the primary source of

[50] MacDonald et al., *Data Heat: Sector Coupling of Data Centers & District Heating*.
[51] International District Energy Association (IDEA) et al., *Synthesis Report: Data Centers & District Energy Northern Virginia Workshop*.
[52] MacDonald et al., *Data Heat: Sector Coupling of Data Centers & District Heating*.
[53] Casomar and Bangsund, *Diesel Generators at Data Centers: Status, Impacts, and Protective Practices*.
[54] Han et al., "Health-Informed Computing."
[55] Minnesota Pollution Control Agency, "Stationary Engines or Generators."

electricity generation are required to comply with Tier 4 standards, but backup generators include Tiers 2-4. Issues associated with noise – including that of backup generators - and examples of addressing Tier 4 generators in local ordinances are discussed in Section Mitigating Noise Pollution: Standards and Studies.

The difference in pollution from Tier 2 to Tier 4 is substantial: 88% reduction in NOx, 85% reduction in PM, and 79% reduction in VOC. Natural gas generators may further reduce emissions compared to Tier 4 diesel generators: 94-98% reduction in CO, 55-95% reduction in NOx, 0-70% reduction in PM, and 0-58% reduction in VOC.[56]

Studies on the health impacts associated with backup generators are increasing in prevalence, but still relatively rare. Lackawanna County, PA recently contracted a study on the cumulative impacts of multiple data centers, power plants, and supporting infrastructure on air quality and health given multiple proposed projects in the county.[57] Local governments are addressing the pollution associated with backup generators by requiring Tier 4 generators and specifying that on-site generators can only be used for emergency purposes and testing (see Section Performance Requirements: Climate, Energy, and Water).

Climate Goals and Renewable Energy Use

The demand for electricity from data centers can increase carbon dioxide emissions or make emissions reductions harder by increasing fossil fuel generation. Data center investment can also help finance new zero carbon electricity generation and storage. The net impact of a data center on local and global carbon emissions depends on how the project changes operation of existing power plants and investments in new power plants, as well as alters electricity demand where data centers would otherwise be built.

[56] Casomar and Bangsund, *Diesel Generators at Data Centers: Status, Impacts, and Protective Practices*.
[57] County of Lackawanna, "Meeting Minutes Board of Commissioners."

Research highlights the connection between data center build-out and increasing carbon emissions. One study estimates that the growth of data centers used for AI may add 24-44 Mt CO_2 equivalent annually from 2024-2030, depending on the scale of growth.[58] Impacts on carbon emissions will depend on the scale of growth and balance of fossil fuel and carbon free energy sources catalyzed by data center electricity demand.

Data center growth can make local greenhouse gas reduction targets harder to meet. For example, in 2023 data center emissions were estimated to be 45% of Loudoun County, Virginia's greenhouse gas emissions and 10% of Prince William County's greenhouse gas emissions.[59] This data, while limited, suggests that data center growth may substantially impact local climate goals. Of course, it does not establish how approving or rejecting a specific project will change global emissions, which depend on electricity investments and whether and where data centers would otherwise be sited.

Many local governments, states, and utilities developed decarbonization goals before data centers introduced additional pressure on electricity supply. Local planners need to assess how the pressures facing the electricity sector will impact decarbonization timelines and how to effectively respond to those expected impacts.[60]

Across the United States, new natural gas power plants are being proposed to provide access to fast, reliable electricity. Long-term planning documents from utilities serving Minnesota indicate anticipated or potential new natural gas generation to serve increased load from data centers, electrification, and electric vehicles.[61]

Electric utilities in Minnesota are required to comply with the state's 100% Clean Electricity Standard, which requires 100% carbon-free electricity by 2040.[62] In 2025, the Minnesota Legislature updated Minnesota Statutes § 216B.1622 to require that agreements between covered utilities and "very large customers" demonstrate compliance with the benchmarks in the clean electricity standard and that serving such customers cannot be a reason for delayed or non-compliance.

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[58] Xiao et al., "Environmental Impact and Net-Zero Pathways for Sustainable Artificial Intelligence Servers in the USA."
[59] Davis and Boggs, "Mid-Course Review - Draft Greenhouse Gas Inventories."
[60] Ferreira et al., *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*.
[61] ORDER APPROVING SETTLEMENT AGREEMENT WITH MODIFICATIONS; Minnesota Power, *2025-2039 Integrated Resource Plan*; Great River Energy, "2026-2040 Integrated Resource Plan."
[62] MN Department of Commerce, "Minnesota's Clean Electricity by 2040 Law."

The PUC is responsible for implementing the Clean Electricity Standard and in September 2025 clarified some of the rules regarding what and how to count clean electricity. One of the issues debated during that process was whether utilities would need to match their use of carbon free electricity on an hourly basis or annual basis, the former being stricter and more ambitious for climate goals (for every hour of the year utilities would need to demonstrate compliance with the standard) and the latter more flexible (demonstrating annual compliance with the standard, meaning at different times of the day and year electricity provided have a greater or lesser percentage of carbon free sources). The Commission did not require hourly matching. This may result in annual patterns of more carbon-intensive electricity used during peak demand periods. For example, data center peak demand in Virginia tends to be higher during the summer and winter months.[63] Minnesota may differ some from this due to different climatic conditions.[64]

Some data center companies are voluntarily aiming to power their operations – including data centers – with hourly matched (24/7) clean electricity to achieve corporate goals. For example, Google has a goal for 24/7 carbon-free energy by 2030 and has capacity to shift non-urgent compute tasks to times when the grid is powered by more renewable energy sources, aiming to reduce electricity use at times of peak carbon intensity.[65] The proposed Google project in Pine Island, MN includes proposed contractual requirements for new renewable energy, battery energy storage, and contributions to Xcel's existing program to support battery storage in Minnesota.[66]

Working with Electric Utilities

Conversations with jurisdictions in different regions of the country identified varying approaches to engaging directly with electric utilities regarding data center projects. A spectrum of approaches ranged from completely hands-off relying on the developer and utility to determine needs and adequate power availability to a structured implementation agreement between a utility and city to achieve data center project goals.[67] Developers may have discussed power availability with the utility before approaching local officials.

Questions around electricity use may spur local government officials or staff to engage more directly with an electric utility to understand the possible impacts and safeguards in place,

[63] Ferreira et al., *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*.
[64] U.S. Energy Information Administration (EIA), *Hourly Electricity Consumption Varies throughout the Day and across Seasons*.
[65] World Resources Institute, "24/7 Carbon-Free Energy and Hourly Matching Cities Cohort Kickoff."
[66] Xcel Energy, "PETITION NEW LARGE CUSTOMER PROJECT DOCKET NO. E002/M-26-170."
[67] City of San Jose, "NEWS RELEASE."

questions surrounding siting and infrastructure routes, and to also understand how the utility is evaluating the project. For example, electric utilities conduct their own assessments of risk and incorporate these into their contracts, local governments may be able to include further risk mitigation requirements in development agreements based on a utility's assessment. Some local ordinances are requiring more transparency about agreements by requesting interconnection studies and energy service agreements (see Studies or Plans Specific to Climate and Environmental Impacts).

Hyperscale data center projects may require local governments to work more closely with and understand how their electric utility makes decisions, but this same level of coordination may also be required in places where a large number of smaller data centers aggregates to a substantial impact on the electricity system.

Participating in Electricity Decisions

1. **For a Commission-regulated utility:** Filings can be found through the Commission's electronic docket system (eDockets). A local government or resident may submit a public comment without hiring a lawyer through the Commission's online comment form, by emailing consumer.puc@state.mn.us and identifying the docket number, or directly filing through eDockets. The PUC offers guidance on how to submit comments. Comments are most useful when they identify a specific proposed protection, explain why it may be inadequate, and request a concrete change
2. **For a member-regulated cooperative**: The relevant documents and opportunities for participation may instead be before the cooperative board. Local officials should ask whether the proposed service agreement will receive a public board vote, whether members may review or comment on it, and whether the cooperative's wholesale power supplier must also approve it.
3. **For a proposed high-voltage transmission line:** If serving the data center requires a new transmission line subject to Minnesota Public Utilities Commission approval, the line will generally have a separate proceeding addressing whether it is needed and where it should be located. Local governments and residents may review the application, attend public hearings, ask questions, and submit comments on the need for the line, possible routes, and local impacts.

Want to Go Deeper? Suggested Resources

Table 5: Suggested others resources on electricity impacts of data centers

If I am looking for	Organization & Title
A summary of what influences rates	Levinson, Michelle, and Ian Goldsmith. *What's Really Driving Up US Electricity Prices? We Unpack the Numbers*. December 15, 2025.
An overview of regional energy consumption and forecasted data center demand	Ferreira, João-Pedro, William Shobe, Terance Rephann, and Matthew Scheffel. *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*. Report prepared for the Joyce Foundation. University of Virginia, Weldon Cooper Center, Center for Economic & Policy Studies, 2026.

04 | Water Impacts, Regulation, and Local Government Participation

This section includes

- OVERVIEW: Water Impacts, Regulation and Local Government Participation
- DEEPER DIVE: Water Impacts, Regulation and Local Government Participation

Overview

Water Impacts, Regulation and Local Government Participation

Why does this matter to local governments in Southeast Minnesota?

The impact of data centers – or any other large water user – on water systems is of interest to local governments as (often) providers of drinking water and wastewater services and due to concerns about impacts on water availability, ecological systems, and the capacity of water and wastewater infrastructure to handle the volumes. Large water users may challenge local government staff and officials to consider new dimensions of water governance, including the sustainability and circularity of water and regional management of water systems given reliance on common aquifers, primarily the Prairie du Chien-Jordan Aquifer which has already been identified by the Department of Natural Resources as potentially facing limits to water withdrawals.

Hyperscale data centers are raising questions about a more holistic approach to water use, including on-site water consumption and off-site water use required to provide electricity and other services (e.g., wastewater) to industrial sites. The combined demands of the data center sector on water and electricity are beginning to spur considerations about integrated assessments and planning across water and energy systems for more detailed assessment of impacts and water use, discharge, and the potential for resource recovery.

This section provides a baseline of information to support discussions with state agencies, departments or external water utilities, project developers, planning efforts that span watersheds, or other regional bodies, as well as information to support addressing water use in ordinances.

What will you find in this section?

This section provides details how water is used in data centers, including on-site or direct water use and indirect water use. As many cities may be providing water to industrial users along with others, this section includes information on water supply to data centers and requirements in statute such as water-use priorities and legislative changes from 2025 that give the Department of Natural Resources the authority to request more information about data center water use.

1. An overview of direct and indirect water use, including a comparison of water use to example municipal water allocations and information on cooling systems.
2. A discussion of regional considerations applicable to all large water users, but being emphasized in conversations about data centers. This section includes an example of stressors already present in Southeast Minnesota with the Prairie du Chien-Jordan Aquifer and an example modeling study to provide an example of the kind of studies local governments can conduct or work with DNR to conduct across the region.
3. A review of wastewater considerations related to chemical and thermal pollution in wastewater discharge. In comparison to discussions about water use, there has been relatively little research on wastewater associated with data centers. Finally, this section includes a brief discussion of recycled water use for data centers.

Deeper Dive

Water Impacts, Regulation and Local Government Participation

Water impacts for data centers include both water use and wastewater treatment. Water use is generally categorized as indirect water use and direct water use. Together, these comprise the water footprint of a data center, which is driven by a combination of cooling technologies and characteristics of the electricity that may serve a data center, including fuel mix and cooling technologies used for power plants.[68] Estimates find substantial variation in data center water consumption driven by a range of determinants, including server efficiency, water used in electricity production, server utilization, and cooling systems, among others.[69]

Direct water use is the water that a data center uses on site, primarily for cooling. Local governments have the most control over direct use by requiring specific design standards.

Indirect water use is attributed to the water used to generate electricity used by a data center and the water used in wastewater processes associated with a data center. Addressing indirect water use may require regional collaboration to understand the broader impacts and may also be particularly important for local governments that manage both water and a municipal electric utility.

Assessing the total water use of data centers remains challenging due to insufficient data: researchers and decision-makers lack substantial facility-level data on water use. This lack of data may inhibit local governments and regional water utilities from planning for changes in water demand, infrastructure investments, and related issues of water scarcity and system resilience.[70] Seasonality of use may further

[68] Lei et al., "Geospatial Assessment of Water Footprints for Hyperscale Data Centers in the United States"; Lee et al., "Regional Water Consumption for Hydro and Thermal Electricity Generation in the United States."
[69] Lei et al., "The Water Use of Data Center Workloads."
[70] Privette et al., "Data Centers Water Footprint."

impact these issues as municipalities use more water in the summer months and will need to plan for seasonal stress points with any new large water user.

Direct Water Use

Direct water use varies substantially by facility, but is largely driven by cooling technologies.[71] Data centers exhibit a wide range of annual water withdrawals (Figure 2). Comparing example municipal water allocations in the region to combined annual data center water withdrawals by location in the United States from Google and Meta, some single data center facilities use more than the annual allocation a city may have from the Minnesota Department of Natural Resources (DNR), but many data centers are using far less water on site. The average water withdrawal (mean) is 227 MGY, but this is influenced by a few very large water users (on the lefthand side of Figure 2). The median (or middle number) water withdrawal is 82 MGY.

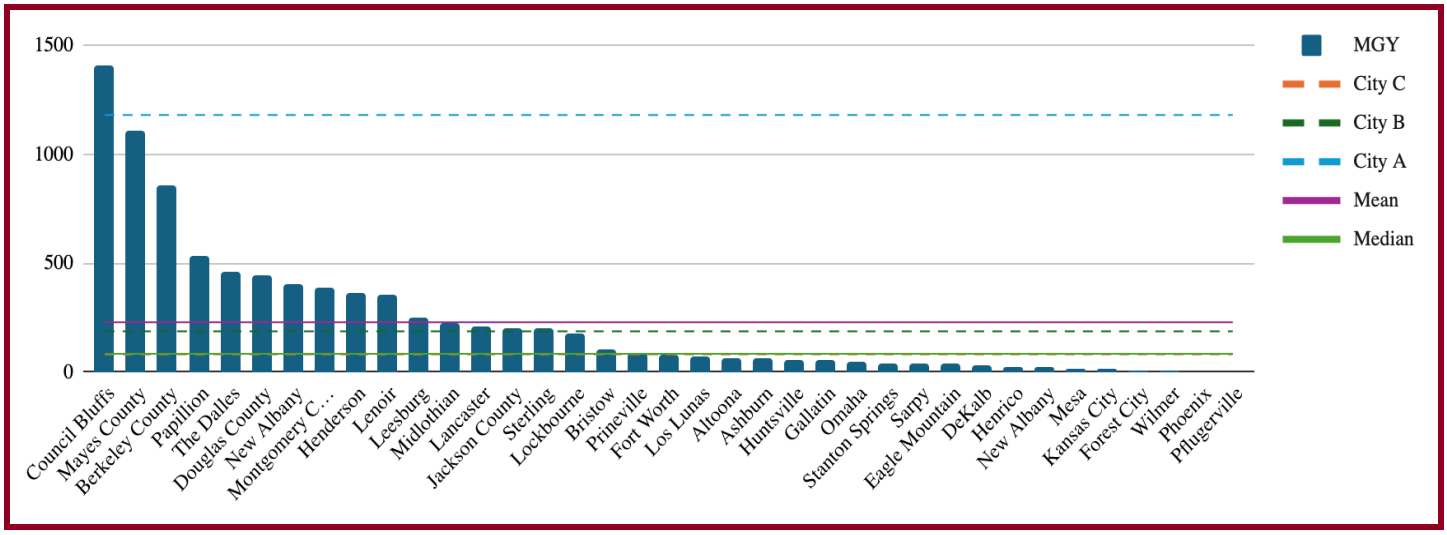


Figure 2. Reported annual amount of water withdrawn by Google and Meta in 2024 from U.S. data center locations with example annual Southeast Minnesota city water allocations for comparison. City A represents a city of about 30,000, City B represents a population of about 7,000 and City C a population of about 1,500. Mean water withdrawal = 227 MGY; Median water withdrawal = 82 MGY. Data on data center water withdrawals from annual sustainability reporting from Google and Meta[72] and municipal water allocations based on interviews. Not included: combined water withdrawals from leased facilities and sites outside of the United States.

Cooling design is often driven by climate and computing capacity and rack density. Data centers often use a combination of cooling technologies, including those that cool at the facility or building-level and those that cool at the component-level, such as servers.[73] Data centers can use air-cooled or liquid-cooled

[71] Mytton, "Data Centre Water Consumption."
[72] Google, *Environmental Report* (2025); Meta, *Environmental Data Index*.
[73] Alliance for Water Efficiency, *A Data Center Primer for Water Service Providers*.

systems. Heat generated at the server level is transferred to systems at the facility level to remove that heat from the building, this can occur through air cooling or water cooling (evaporative cooling). Generally, air-cooled systems use less water onsite but more electricity, while water-cooled systems use less electricity but more water onsite for cooling purposes.

Open-Loop and Closed-Loop Cooling Systems

Closed-loop cooling systems directly cool components, such as chips or racks, rather than the ambient air in a data center. There are a range of technologies that can be used for closed-loop systems, such as rear door heat exchangers which remove heat from equipment at the server rack, immersion cooling, and direct-to-chip cooling. All rely on using liquid to absorb heat, removing the heat from that liquid, and recirculating that liquid.[74] Closed-loop systems may reduce direct water use by cycling liquid through the system multiple times. A single data center may use a combination of open and closed-loop systems, for example, a closed loop system may remove heat from equipment while relying on evaporative cooling to remove heat from the overall building. Cooling system design varies by data center.

How Do Data Center Developers Measure Water Use?

Water usage effectiveness (WUE) is one way companies measure the environmental impact of data centers. WUE is the ratio of the annual data center water use (for cooling and humidification) to energy use, measured in liters per kilowatt-hour (L/kWh). The lower the WUE, the better. WUE values closer to zero indicate more efficient use of water for cooling in a data center. WUE may be helpful in any discussions with developers to align local requirements with indicators companies are already tracking annually for sustainability goals.
WUE does not convey the total volume of water used, it is simply a ratio.

Examples: Meta reported a WUE of 0.19 L/kWh in 2024, Microsoft reported a 0.27 L/kWh WUE for FY25 with a continued goal of 40% reduction by 2030.[75]

[74] Microsoft Datacenters in Your Community, *How Closed-Loop Cooling Works in Microsoft's Datacenters*; Alliance for Water Efficiency, *A Data Center Primer for Water Service Providers*.
[75] Meta, *Environmental Data Index*; Microsoft, *2026 Environmental Sustainability Report: Data Fact Sheet*.

Indirect Water Use: Water-Energy Nexus

Direct water use may be the area where local governments have the most direct impact, but indirect water use can represent up to 71-75% of data center water use.[76] Cooling technologies that reduce the direct water use often increase indirect water use because of increased electricity use.

In Minnesota, power generation already uses the largest portion of water in the state, which relies heavily on surface water that is primarily non-consumptive (returned back to its original source).[77] The use of water for power generation decreased by 48% from 2005 to 2024 primarily due to converting power plants from coal to natural gas and the increase in renewable energy.[78]

Nationally, similar trends hold: thermoelectric power generation is also the largest source of water withdrawals (followed by irrigation), with an estimated 18% decrease since 2010 due to plant closures, less coal use, and more water-efficient generation and cooling technologies.[79]

Electricity is also required for both potable water and wastewater. Electricity used for municipal drinking water and wastewater systems accounts for about 1.8% of national electricity consumption and can account for up to 40% of drinking water system operational costs and 40-60% of municipal electricity bills.[80]

Assessing Direct and Indirect Use Together

Given this trade-off between direct, on-site water use and indirect, off-site water use in electricity generation and water supply and treatment, it is important to track and understand both water and electricity metrics to understand the environmental impact of a data center and identify strategies to reduce environmental harm. Direct water use may more directly stress local water resources, while indirect use may have more dispersed impacts across a larger area.[81] Lack of facility-level data on equipment, seasonable use, and interactions with local watersheds currently inhibits regional planning activities across energy and water use.[82] Local, regional, and state governments may be interested in

[76] Siddik et al., "The Environmental Footprint of Data Centers in the United States"; Xiao et al., "Environmental Impact and Net-Zero Pathways for Sustainable Artificial Intelligence Servers in the USA."
[77] Minnesota Department of Natural Resources, "Minnesota Water Use Data."
[78] Minnesota Department of Natural Resources, *Water Availability and Assessment Report 2025*.
[79] Dieter et al., "Estimated Use of Water in the United States in 2015."
[80] Elliott, *Roadmap to Energy in the Water and Wastewater Industry*; Pabi et al., *Electricity Use and Management in the Municipal Water Supply and Wastewater Industries*; US EPA, "Energy Efficiency for Water Utilities"; Siddik et al., "The Environmental Footprint of Data Centers in the United States."
[81] Privette et al., "Data Centers Water Footprint."
[82] Ferreira et al., *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*.

considering direct and indirect water use across large water users (including but not limited to data centers) to have a more comprehensive understanding of water use and potential impacts.

Even with the substantial amount of indirect water consumption associated with data centers, the localized impacts of direct groundwater use may be more salient to municipal decision-making. Power generation often relies on surface water, while many municipalities in Southeast Minnesota rely on groundwater. Groundwater is harder to replace as groundwater is not directly replaced (it is discharged to surface water bodies), while surface water use is often returned to the same source it was drawn from. Reductions in groundwater may more directly affect municipal water supply for those reliant on groundwater sources. Local governments may want to consider approaches to water circularity which may encourage reuse opportunities (see Section Recycled Water Use) or on-site requirements for managed aquifer recharge, which goes beyond more standard requirements to manage stormwater to promote subsurface storage and recharge through injection, infiltration, and recovery processes.[83]

Water Supply and Availability

Water used by data centers is often provided by municipal water providers. For example, data from Meta indicates that over 99% of the water they withdraw is from a third-party system, such as a municipal water supply.[84] If data centers in Minnesota follow this trend, this suggests that a data center's water use would be permitted under a municipality's existing water use or allocation permit from the Department of Natural Resources (DNR). Some data centers may use amounts equivalent to this full allocation, while others use less, depending on the size of the municipality and the design of the data center (see Figure 2). As municipalities approach their water appropriations, due to new industrial users like data centers or other large water users and increases in residential demand, close coordination with the DNR will be necessary as a part of the water use permitting process.

Under Minnesota Statutes § 103G.265 any "data center, as defined in section 216B.02, subdivision 11, whose proposed consumptive use exceeds 100,000,000 gallons per year and which requires a permit amendment or a new individual permit" may be subject to a DNR preapplication evaluation. DNR has discretion to determine the need for an evaluation and the information required, but may include a description, estimated use rates and volumes, anticipated water source, water quality or temperature requirements, or other additional information as necessary.

Minnesota Statutes § 103G.261 defines water allocation priorities within the state, with the first priority being domestic water supply and power generation that meets specific contingency planning requirements, notably this excludes industrial and commercial use of municipal water. This is followed by: (2) users consuming less than 10,000 gallons of water per day, (3) agricultural irrigation and processing in

[83] Jennings, *New Mapping Tools for Groundwater Replenishment*.
[84] Meta, *Environmental Data Index*.

excess of 10,000 gallons per day, (4) power production that does not meet the first priority criteria, (5) other uses involving consumption in excess of 10,000 gallons per day, and (6) nonessential uses. This places data centers in priority category five. In the last legislative session (2025-2026) there was substantial discussion about whether data centers that are using municipal allocations are being treated like a first priority use, rather than the priority use intended by statute which would circumvent the intent of the statute (see HF 3793/ SF 3852). Water allocation priorities apply during times of limited supply even if a data center is served by municipal water supply.[85]

For local governments in Minnesota, the water allocation priorities and a municipality's permitted water allocation may influence considerations about the water use required by data centers. For some, the water requirements may exceed a city's total water allocation making this kind of project infeasible, while for others close consideration of the water requirements given a city's permitted water allocation may help you establish what is feasible (see Section Evaluate Feasibility: Power Supply, Water Availability, and Wastewater Capacity). Additionally, some localities may consider including in local code requirements for water allocation agreements (see Section Studies or Plans Specific to Climate and Environmental Impacts). Regardless of permitted water allocation, it will be beneficial to consider how transparency is possible about water use requirements for any data center, as citizen comments highlight concerns about the priority use of data centers (or other large water users) when permitted under municipal water allocations and the lack of public comment or engagement in these permitting decisions.[86]

Regional Water Impacts

Municipalities rely on the Minnesota Department of Natural Resources (DNR) to help manage collective water use. They typically monitor their own water usage and annual water allocation, but in the absence of a regional planning entity, it is DNR processes that are likely to drive discussions of regional use impacts. Most municipalities in Southeast Minnesota get their water from the Prairie du Chien–Jordan aquifer (see Figure 3), and the City of Rochester is in the process of a Water System Master Plan and Groundwater Study with neighboring municipalities to understand the impact of drilling new wells in the Jordan aquifer in the region. Currently, Rochester is not allowed to drill new wells in the Jordan aquifer unless the Rochester Public Utilities can demonstrate that alternatives are not available and that future withdrawals will not result in unacceptable environmental impacts, as the DNR is concerned about reaching the yield limit of the Jordan aquifer.[87] This example illustrates why discussions of water use – and in particular uses that require new wells – may require close coordination with nearby jurisdictions.

[85] Miller, "Water Law Changes Affect Data Centers."
[86] "Compiled Written Comments for HF 3793."
[87] City of Rochester, MN, *City Council Study Session 7/27/2026*; Rochester Public Utilities, "Water System Master Plan and Groundwater Study."

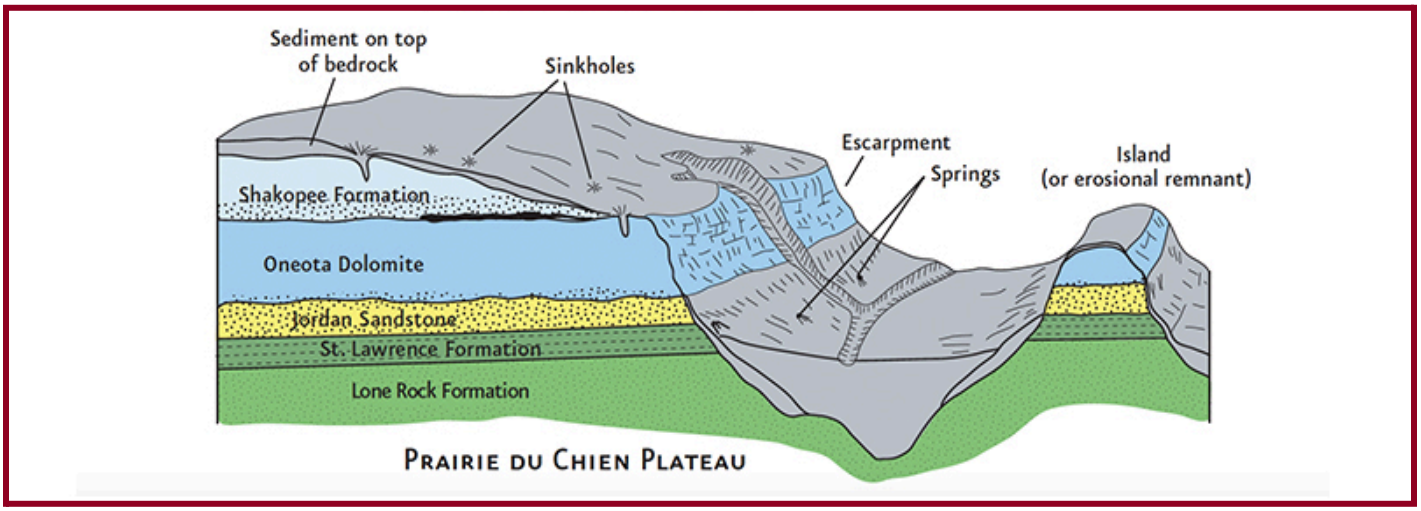


Figure 3. Layered sedimentary rocks form the major aquifers in Southeast Minnesota. The Shakopee Formation, Oneota Dolomite and Jordan Sandstone together comprise the Prairie du Chien-Jordan Aquifer[88]

Over the past five years, water use from surface water has declined due to reductions from power generation and industrial processing, but in recent years statewide groundwater use has increased. In other sectors, like agriculture, that have seen increased groundwater use there has been more well interference. A well interference is when a nearby well is no longer able to draw water from the aquifer due to drawdown of the water level from a high-volume well.[89]

We did not identify an example of well interference due to data center development to date in Minnesota. No water utility in the Southeast region we spoke with for this toolkit reported an issue with well interference and municipal water allocation, as interviewees reported that often private wells are shallower than municipal wells and further away in radius to prevent interference. As of writing, there are no operational hyperscale data centers in Minnesota, so this issue will require continued monitoring.

In recent years, there has been some effort to reassess permitting practices at DNR to identify negative impact thresholds and sustainable diversion limits. Both assessments of permitting processes and changes to permit allocations occur at the state-level, but local governments are encouraged to incorporate sustainable water use into planning processes by assessing "the extent to which new water-intensive uses should be encouraged or allowed under zoning and other local regulatory controls."[90] Local governments can incorporate a range of assessments and planning practices to address water impacts, including assessments for well interference, pumping impacts on water quality, impacts to surface water features (especially those protected by law, fens and trout streams), incorporating assessments for sustainable yield for groundwater or surface water withdrawal into planning practices,

[88] Kallok, "Mapping Subterranean Waters."
[89] Minnesota Department of Natural Resources, *Water Availability and Assessment Report 2025*.
[90] Minnesota Department of Natural Resources, *Report to the Minnesota State Legislature: Definitions and Thresholds for Negative Impacts to Surface Waters*, 34.

and considering how to minimize the impacts on water resources through site and facility design, as well as colocation with other uses that may facilitate reclaimed water reuse.[91]

Learning from an Example Drawdown Analysis

To understand potential regional implications of water use in the region, we did a simple groundwater modeling and drawdown analysis for Bryon, Stewartville, and Lewiston. We offer details on this analysis for local governments interested in conducting their own water analyses.
Cost: $15,000 or more*
Timeline: 6 months or longer*

Purpose: This analysis used annual average pumping rates corresponding to existing permitted annual totals to assess potential effects of increased pumping on groundwater and surface water resources assuming uniform groundwater movement. This kind of analysis may help local governments consider regional and localized impacts of groundwater use within existing allocations. The estimated extent of drawdown enabled conversations about potential impacts on nearby jurisdictions.

Limitations: Our analysis did not consider impacts beyond existing allocations and local governments may want to use more specific calculations based on local pump tests when given any request from a large water user. This evaluation used average annual pumping rates and assumed steady-state conditions.

Considerations: Regional studies may not be within the capacity of a single city government and require coordination and resources from the Department of Natural Resources. Or when considering a specific project, study requirements may need to be included in the environmental review and permitting process to ensure costs are covered by the applicant and not placed on small city governments (see Section Studies or Plans Specific to Climate and Environmental Impacts).

*Both cost and timeline vary based on the specific request.

[91] Freshwater Society, *Water Planning Is Critical for Data Centers and Other Large Development Projects*.

Wastewater Systems and Use

Compared to direct water use and even indirect water use estimates, there has been relatively little written to date about wastewater impacts from data centers. The two primary concerns related to water pollution include chemical discharge and thermal pollution.[92]

Chemical Discharge

Data centers rely heavily on local wastewater systems to manage on site wastewater. For example, data from Meta indicates they discharge all of their wastewater to third-party systems, like municipal sewer systems.[93] So, wastewater discharge from data centers will often be covered under existing discharge permits for municipal wastewater treatment plants. In Minnesota, the Minnesota Pollution Control Agency (MPCA) is responsible for issuing wastewater permits under the federal National Pollutant Discharge Elimination System (NPDES) program and State Disposal System (SDS) (NPDES/SDS permit).

Local public works departments or other wastewater system operators are already familiar with the MPCA NPDES/SDS permitting process. If a data center is permitted under a jurisdiction's existing wastewater permit, this would be incorporated into the existing permit and standing process.

Local governments are enacting different requirements based on their existing wastewater treatment system and the uncertainty surrounding chemical pollutants from emerging cooling technologies. We spoke with local staff that operate their municipal wastewater plant like an industrial wastewater treatment facility, and in this case do not require pre-treatment. Another jurisdiction required the project include a drainage pit to hold wastewater for testing before release into the wastewater system in an effort to plan for a worst-case scenario and mitigate harmful or unknown releases into the system. This is becoming an increasingly common strategy given the unknown pollutants in new cooling systems. Specific testing requirements are included in a jurisdiction's NPDES/SDS permit, testing is conducted either in-house or by a certified lab, and collected by the MPCA in monthly discharge monitoring reports.

Wastewater discharge of data centers has not been closely studied, but wastewater discharge is garnering much closer scrutiny in recent months.

[92] Simons, "Data Centers & Water: Understanding the Impact."
[93] Meta, *Environmental Data Index*.

Evaporative Cooling and Wastewater

Historically, data centers primarily generated what is known as "blowdown water" – water used in evaporative cooling. Blowdown water may include large concentrations of salts, other dissolved solids, and chemical additives, often from biocides, anti-corrosion agents, and scale inhibitors.[94]

Closed-loop Systems and Wastewater

Cooling technologies, in particular the chemicals used in closed-loop systems, are being examined for potential introduction of other chemical pollutants to wastewater systems. For example, the utility in Cheyenne, Wyoming traced a rare bacterium that contaminated the system to a data center. In this case, the issue stemmed from flushing a closed-loop system prior to operations, although there is no evidence that the bacterium was intentionally added. The developer disputes the utility's conclusion that the bacterium was from its project. This example illustrates the evolving questions about wastewater that will need continued evaluation.[95]

Other pollutants wastewater systems may face include high levels of metals and nutrients. Pollutants from closed-loop cooling systems – including both pre-operation activities and ongoing operation – are newer to wastewater treatment operators and require careful evaluation for compliance with existing permit requirements.[96] Closed-loop systems are commonly filled with ethylene or propylene glycol, which are often "food grade" and can be discharged to a wastewater treatment system, but their decomposition creates a high biological oxygen demand that can deplete the water.

In addition to more traditionally regulated areas, like nutrients, chemicals from closed-loop cooling systems may also include chemicals that are more difficult to regulate and remove, such as PFAS. Much like other chemicals used in closed-loop systems, PFAS from data center cooling systems is a relatively new area of research and regulatory activity. For example, recently environmental groups raised

[94] Sarte et al., *Data Centers in Virginia*; Willson, "Data Centers Face a New Environmental Concern"; Simons, "Data Centers & Water: Understanding the Impact."
[95] Willson, "Data Centers Face a New Environmental Concern."
[96] Willson, "Data Centers Face a New Environmental Concern."

concerns about the current review of a PFAS chemical for closed-loop cooling systems.[97] At a federal level, the Environmental Protection Agency (EPA) is prioritizing review of chemicals that are intended for use in data centers.[98] Local governments in Minnesota will need to work closely with MPCA to assess and manage more traditional pollutants and emerging concerns, such as PFAS.

Thermal Pollution

Thermal pollution from data centers occurs when water used for cooling is discharged back into natural systems at a hotter temperature than nearby water bodies, often called thermal discharge. As data centers are a newer industry there is limited research on the impacts of data center-specific thermal pollution, but there is longstanding research on thermal discharge from other industrial sources and increasing research on the impacts of lake warming due to climate change on ecological systems, including fish.[99]

NPDES/SDS permits issued by MPCA regulate thermal discharges similarly to other pollutants, based on water classifications in Minnesota Rules Chapter 7050. Temperature is considered by the US EPA to be a "master" variable for aquatic ecosystems, meaning it affects organisms, biological and chemical processes, and the physical environment of the water.[100]

Closed loop cooling systems may mitigate thermal pollution, but this depends on the cooling system used at a data center to remove heat from the overall facility, not solely the system used to remove heat from components.[101] An additional consideration may be groundwater temperature increase over time if a closed-loop geothermal cooling system lacks sufficient groundwater flow to remove built-up heat, potentially reducing system efficiency but also impacting cold-water ecosystems supplied by the groundwater.[102] Warmer temperatures may also change the dissolved constituents in groundwater.[103]

Understanding the Challenges Facing Wastewater Systems

Surplus wastewater treatment capacity is limited throughout the United States, in comparison to the water demands of data centers that utilize a large quantity of water. The EPA has not updated national estimates

[97] Perkins, "US Environmental Groups Urge EPA to Reject New Pfas to Cool Datacenters."
[98] US EPA, "EPA Prioritizes Review of New Chemicals Used in Data Center Projects, Supporting American Manufacturing and Technological Advancement."
[99] US EPA, "Temperature"; St. Anthony Falls Laboratory, "Will Lake Warming in Minnesota Drive Cold-Water Fish to Extinction?"
[100] US EPA, *Thermal Discharges in NPDES Permits, Overview of Resources and Tools*.
[101] Simons, "Data Centers & Water: Understanding the Impact."
[102] Liu and Dahi Taleghani, "Closed-Loop Geothermal Systems."
[103] Hoyer and Sterling, *Results of the Third Long-Term Cycle at the University of Minnesota Aquifer Thermal Energy Storage (ATES) Field Test Facility*.

of surplus capacity since 2006, but stated need for infrastructure funding and incremental capacity expansion suggest that this limited capacity continues to persist today.[104] Figures for example data center projects illustrate that even demands from data centers as low as 0.1 MGD (million gallons per day) result in substantial water infrastructure upgrades.[105]

Thus, understanding the impacts of data centers on local water systems includes both water withdrawal, wastewater treatment capacity, and conveyance capacity. Assessing these impacts on the local water system requires understanding average daily demand, average annual demand, and estimated peak demand. Knowing both average demand and peak enables estimation of peaking factors – the ratio between average daily water demand and maximum daily water demand – which is an indicator of volatility.[106] Research estimates that data centers have a higher consumptive ratio (less water returned to the watershed) and higher peaking factors than other large water users. Data centers often request more water than actual demand to hedge against uncertainty from future growth or extreme temperatures.[107]

The total wastewater capacity required for a data center requires knowing both average and peak demand to enable a more accurate estimate of the impact on local water infrastructure. This also enables assessment of needed upgrades to accommodate estimated water demand from a data center, including required land, corridors for trunk water mains, or other conveyance updates in addition to the supply availability and overall treatment capacity. Estimated water requirements for a data center should also be assessed in tandem with other expected future water needs from residential, commercial, or other industrial uses.

Recycled Water Use

In the most general terms, reclaimed or recycled water uses water more than once before returning to the water cycle. Reclaimed water often refers to treated wastewater that can be recycled or reused for a new purpose.[108] Recycling water for cooling purposes in data centers is garnering more attention, including using reclaimed water within a single data center facility or using reclaimed water from another source.[109] For example, Loudoun Water in Northern Virginia reports that for 2025, 2.0 MGD of water used by data centers on an average day is from reclaimed sources, while 2.6 MGD is from potable water.[110] This is facilitated by a reclaimed water loop, which was started in 2010 and now serves 40 data centers with 20

[104] Han et al., "Small Bottle, Big Pipe."
[105] Han et al., "Small Bottle, Big Pipe."
[106] Snider, "Water Is the New Constraint for AI Data Centers."
[107] Han et al., "Small Bottle, Big Pipe."
[108] WateReuse Association, "Glossary."
[109] Alliance for Water Efficiency, *A Data Center Primer for Water Service Providers*.
[110] Loudoun Water, "Data Centers and Impacts of Water Supply."

miles of pipes.[111] Recycling water or using other non-potable water sources may only be possible if included in early site planning to maximize water efficiency.[112]

Using recycled water in data centers represents a relatively small amount of used water based on available data. For 2025, Google reported using a total of ~11 billion gallons of potable water, ~1.7 billion gallons of non-potable water, and 918 million gallons of reclaimed wastewater.[113] Meta's 2024 data reports even less, at about 135 million gallons.[114] Furthermore, using reclaimed water may not necessarily lessen a data center's impact on overall water resources and related natural systems, as depending on the design of a data center that water may not be returned to replenish groundwater or to the baseflow of surface waters or be of the same temperature or chemistry.[115] So even with recycled water, it is important to understand both use and how much is returned to the local hydrological system.

[111] Loudoun Water, "Reclaimed Water Program"; Loudoun Water, "Data Centers and Impacts of Water Supply."
[112] Alliance for Water Efficiency, *A Data Center Primer for Water Service Providers*.
[113] Google, *Environmental Report* (2026).
[114] Meta, *Environmental Data Index*.
[115] Wroth, "Data Drain."

Want to Go Even Deeper? Suggested Other Resources.

Table 6: Suggested others resources on electricity impacts of data centers

If I am looking for	Organization & Title
A deeper dive on cooling technologies	Alliance for Water Efficiency. *A Data Center Primer for Water Service Providers.* 2026. (requires registration)
An overview for water utilities	American Water Works Association. *Cooling the Cloud: Water Utilities in a Data-Driven World*. 2025.
A better understanding of regional impacts and planning considerations	Joyce Foundation. *Groundwater Governance in EPA Region 5*. 2024. Alliance for the Great Lakes. *A Regional Playbook for Managing Data Center Impacts in the Great Lakes*. 2026.

05 | Guiding Questions for Local Governments

This section includes

- Guiding Questions for Local Governments
- Recommendations for Community Engagement
- Strategies and Checklist Questions

Guiding Questions for Local Governments

Given the scale of emerging data center projects, particularly hyper-scale data centers, answering a set of tailored questions will enable local governments and their constituents better understand alignment with local plans and priorities, potential impacts, and system capacity. Some questions can be asked and answered prior to any data center project and some questions may be asked specific to an inquiry or proposed project.

Questions for Proactive Planning

- Does a data center align with what is important to our community?
- Is any data center feasible given water, power, and wastewater needs? If yes, what scale?
- Does our current zoning allow for such a use and does it need to be updated?
- How can I address different data center types or categories?
- How can I address uncertainty about water and electricity use and impacts?
- What options can help align development (if any) with identified community priorities?

This section helps local officials consider additional questions and strategies to further explore these areas, including detailed questions to ask of developers regarding the impacts of data centers.

One recommendation we heard from an interviewee was to **"[a]sk a lot of questions up front. Do not just run headlong into being so excited about a development opportunity that you have blinders on, and get stuck in a crunch."**

Our research in this project - including interviews, workshops, and surveys - has reinforced that there are widely differing perspectives from community members, as well as city, agency and other sector staff about what constitutes a project benefit and cost. **Since what is considered a benefit and what a cost of a data center project may vary based on the perspective of an individual and their underlying**

values, we adopt language in this section that looks generally at impacts across a range of issues rather than benefits and costs.

A Resolution from Tribal Nations

Tribal consortia that share geographies with Minnesota are passing inter-tribal resolutions that address data centers. For example, the National Congress of American Indians, the Midwest Alliance of Sovereign Tribes, and the Minnesota Indian Affairs Council all passed resolutions calling for a moratorium on hyperscale data centers to allow for a full and transparent assessment of environmental, cultural, and economic impacts. These resolutions also emphasize upholding the government-to-government partnership with Tribal Nations, transparency, and the inclusion of Tribal Nations in permitting processes.

Community Engagement

Staff in locations with higher concentrations of data centers emphasize that a critical first step is to identify what is important to your community and whether or how data centers fit into that picture. Data centers are polarizing and facing a substantial backlash across the US, which points to engagement early and often. In some jurisdictions, data center developers have agreed to provide additional funds or other resources that align with identified community priorities, but leveraging these resources requires knowing priority areas and alignment with resident values or visions for your community.

Key Questions:

- How does your community understand the impacts of data centers (e.g., environmental, social, economic, or other)? How does your community prioritize these different impacts?
- Are there other values your community members hold? How do data centers align or conflict with those values?
- How does a data center align (or not) with your comprehensive plan? What about other plans (sustainability, climate, transportation, other)? How reflective are these of your current constituents?

- What resources do you have or need to answer these questions?

Community Benefits Agreements

A substantial amount of work has been done on community benefits agreements for renewable energy projects and some of this can be applied to data center projects. These agreements often focus on transparency, affordability programs, and sustainability and may provide other mechanisms for addressing adverse impacts beyond what may be required in local code.[116] Different kinds of agreements may include different requirements.[117] The World Resources Institute developed a Database of Community Benefits Frameworks Across the US across many sectors and types of benefits arrangements, including discussion of enforcement where possible. Enforcement of benefits agreements garnering more attention and legal enforceability may not always determine whether benefits are received.[118]

Strategies & Checklist Questions

Many local jurisdictions already have a development checklist that maps out the accepted local process for development decisions. Here we offer a set of questions that can be added to existing development checklists to help evaluate data center proposals or potential projects. Questions align with pre-planning activities that could be acted upon prior to any inquiry or proposed project, pre-development or inquiry questions, project specific planning activities, construction considerations, operational questions, and site redevelopment or restoration.

Pre-Planning & Negotiation Limits

Pre-planning questions should be asked prior to any data center project to help a local government gather the required information to understand preliminary limits and feasibility.

[116] Lee and West, "Why Community Benefit Agreements Are Necessary for Data Centers."
[117] Weinstein, "Finding the Balance."
[118] Chun et al., "From Promise to Practice"; Kreider et al., *A Shared Understanding and Paths Forward for Community Benefit Mechanisms*.

Economic Considerations

Other sections in this toolkit offer information on electricity and water impacts, which are often considered alongside localized economic impacts. Given the size of a data center project and the potential for impacts to tax revenue, some jurisdictions may be interested in courting a developer. Consider in advance how not to give away too much, as some staff in locations with experience with data centers cautioned that enthusiasm for securing a project could lead communities to agree to less favorable terms than they might otherwise obtain.

Like any development project, local governments are making decisions based on evaluating expected increases in revenue or other sources of funding (such as other agreed upon contributions) alongside potential impacts on infrastructure, costs, and local ecological systems. This toolkit is focused on providing information about some of these areas (infrastructure, costs, and local ecological systems from a water/energy perspective). However, knowing something about the impacts to revenue or jobs locally is also important. That information may help decisionmakers identify priorities during negotiation that meet local realities or support needs in a way that aligns with community priorities.

Economic impacts from data centers are primarily associated with property tax revenue as these facilities typically create fewer long-term jobs, although regions that have experienced continued data center construction have seen more durable benefits to construction jobs. An assessment in the Great Lakes region emphasizes that estimating economic impacts is complex and assumptions need to be tailored to the specifics of the data center industry. Jobs can be categorized as direct effects (from construction and operation), indirect effects (from engineering firms, electrical contractors, equipment suppliers), and induced effects (spending from workers' income). [119]

Places with concentrated data center development have experienced large impacts on revenue from data centers. For example, Loudoun County, Virginia has over 230 data centers which generate over ⅓ of the county's budget; this has supported lowering the real property tax rate in the county.[120] Both Loudoun County and neighboring Prince William County receive a majority of their tax revenue from taxing the equipment in data centers.[121] Those we interviewed noted that the Loudoun County model is based on specific assumptions around what can be taxed, so other local jurisdictions should model revenue projections based on their own circumstances rather than assume the same level of revenue will be generated. Minnesota currently exempts computers and servers from state sales tax.[122] The Department of Revenue can coordinate with local governments to understand impacts on a local revenue stream.

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[119] Ferreira et al., *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*.
[120] Loudoun County, VA, "Data Centers: The Loudoun Story"; Loudoun County, VA, "Data Centers: Tax Revenues & County Budget."
[121] Prince William County, VA, *Data Center Industry Tax Revenue Report*.
[122] Minnesota Department of Revenue, "Qualified Data Centers."

Considering what may be feasible in advance can help foster public conversation, inter-departmental coordination, and support more robust conversations with a range of stakeholders (constituents, neighboring cities, developers, etc.).

Key Questions

- What are your negotiation limits? When would you walk away from a project? What information do you need in advance to determine that?
- Do you want to provide any incentives for development?
    - If yes, within applicable limits[123]:
        - What is the maximum term (years) you would consider?
        - What is the maximum dollar amount you would consider? What is the total dollar amount of anticipated tax revenue compared to the dollar amount requested in incentives?
- Who covers the initial cost of infrastructure? Who covers ongoing costs of infrastructure?
- Who covers the cost of any environmental impact study or groundwater model deemed necessary?

Evaluate Feasibility: Power Supply, Water Availability, and Wastewater Capacity

Data centers require large amounts of electricity, access to some water, and wastewater treatment. In particular, without sufficient electricity a data center project is not likely feasible. Our conversations with local governments in Minnesota and elsewhere suggest knowing answers to these questions to support proactively addressing data centers in planning and updates to local code.

[123] Minnesota law generally limits property-tax abatements to 15 years and a local government's total annual abatements to the greater of $200,000 or 10 percent of its net tax capacity. See Minn. Stat. § 469.1813, subds. 6–8.

Key Questions

- How close have you been to your DNR allocation? What factors have influenced any use over your permitted amount or scenarios where you have come close to this amount? Are you already requiring conservation by residents at certain times of the year?
- What other water needs do you anticipate in the future (including residential growth, other industrial or commercial activities) and how much water should be saved for those anticipated uses?
- What will your strategy be to maintain transparency about water use even if a data center is using municipal water supply?
- Do you have wastewater treatment capacity at both the treatment plant and conveyance system? What would be required to update this system for a new large user?
- Is increasing your municipal well pumping likely to impact a number of private well owners, either by lowering the water table locally or mobilizing geologic constituents like manganese, iron, arsenic?
- Is additional pumping likely to affect an area of contaminated groundwater by redirecting it towards the pumping center?
- Are you near a high-voltage transmission line? Does your local electric utility have power available and on what timeframe? *Often, data center developers are having conversations with electric utilities even before approaching a local government with an inquiry.*

Proactive Ordinances

Many local jurisdictions do not have data centers defined in code or addressed specifically in any ordinance. Local jurisdictions may be unprepared to consider a data center proposal if not sufficiently addressed in local code. Sections in this toolkit offer considerations to help proactively address data centers in code, before a proposal, including:

- defining data centers (see Defining Data Centers),
- assessing localized impacts in advance to inform future decisions (see Data Center Moratoria),

- zoning (see Zoning Classification and Mechanisms),
- site design (see Site Design & Performance Standards and Mitigating Noise Pollution: Standards and Studies),
- building design and performance standards (see Building Design & Performance Standards), and
- addressing resource and environmental impacts (see Performance Requirements: Climate, Energy, and Water).

Much of the development process may be tied to challenges around information access and accurately assessing the impacts of data centers. Across moratoria and updates to local codes, jurisdictions are beginning to use a range of studies to assess the impacts of data centers (see Sections What kind of actions are moratoria requiring?, Noise Studies, Studies or Plans Specific to Climate and Environmental Impacts). Some utilities or local jurisdictions are requiring that developers cover the costs of required preliminary or baseline studies, on power, water, and noise. This ensures that the developer is seriously considering the project and does not place these evaluation costs on others.

Pre-Development or Initial Inquiry

The following are recommendations for how to approach a pre-development conversation or an initial inquiry to ensure you have robust information ahead of time as well as the right people in the room. Initial inquiries represent the first meetings that may occur with a developer. The questions listed to support this stage help compare an inquiry to pre-planning and negotiation limits (previous stage). p

- Include your electric utility in your pre-application meeting. Often pre-development meetings are with city staff and the developer, having your electric utility there will help answer early questions and support transparency across parties.
- As you should already have established your water and wastewater limits, request water consumption and treatment estimates early. Ask for site water metrics, including withdrawal, consumption, and discharge. These may serve as a "no-go" trigger for a project, depending on the project design. This information will also be requested in the Department of Natural Resource's preapplication evaluation for applicable data center projects (Minn. Stat. 103G.265).
- Review the Minnesota Environmental Quality Board's (EQB) Data centers FAQ and reach out to EQB for support if needed (Env.Review@state.mn.us). More in-depth questions relevant for environmental review are in the following section.

- Contact the Department of Employment and Economic Development (DEED)'s Minnesota Business First Stop (firststop@state.mn.us) for assistance navigating state regulatory and permitting processes.

Key Questions: Water

- What are the estimated water use rates and volumes for the maximum day, maximum month, and average year?
- What are the estimated wastewater discharge rates and volumes for the maximum day, maximum month, and average year?

Key Questions: Electricity

- What is the planned maximum potential total load (nameplate capacity)? What is the expected annual electricity use and peak system load?

Key Questions: Land Requirements

- How much land will the project require (including equipment or infrastructure beyond the building(s), such as substations or other electrical infrastructure)?

Key Questions: Phasing

- What is the timeframe for full build out and operations of the site?
- What ability do you have to build out the infrastructure for the full site? Do you have capacity to meet initial needs while the rest is underdevelopment?

Key Questions: Cross-Cutting

- Do we have capacity to meet project needs?

Project Planning, Review, and Development Agreement

The following questions highlight data center considerations throughout the due diligence process, some of these questions relate to the negotiated development agreement with a developer while others may

need to be addressed in environmental reviews, contracts, and in coordination with state agencies. This is the stage when the majority of the questions associated with impacts detailed earlier in this toolkit will be addressed (Sections Electricity Impacts, Regulation, and Local Government Participation and Water Impacts, Regulation, and Local Government Participation). Project design and specifications, such as cooling systems, may change based on the review process.

Key Questions: Agreements

- How will agreements related to different impacts be enforced? How will they be monitored over time? Who will be responsible? Who will mediate the agreement? Will there be a community advisory committee?
- What incentives is the developer seeking? What is the timeframe? Are they practical given the scale of the project?

Key Questions: Water

- What is the anticipated source of water?
- What are the water quality or temperature requirements?
- What is the anticipated cooling system?
- Will the facility use potable or reclaimed water?
- What are the water quality inputs and outputs? Can discharge sampling be provided before setting a discharge permit?
- Will you include a drainage pit to hold wastewater for testing before release into the wastewater system?
- What are the scenarios for water use in the event of cooling malfunction, fire response, peak water demand?
- What effects could this use have on others in the area (private well owners, other large users), and how would adverse effects be addressed? Are additional studies needed?

- What ecological effects are expected, and how would adverse effects be addressed? Are additional studies needed?
- Does the developer have corporate water goals (Net Zero, replenishment, etc.)? How will those result in local impacts?
- Are WAC/SAC fees estimated to cover ongoing system maintenance or needed improvements?
- Will the developer provide annual reports on site peak water metrics, including withdrawal, consumption, and discharge to support assessment of operational water impacts on public water systems?

Key Questions: Electricity

- What kind of information will be shared about electricity consumption? Who will share this and in what intervals?
- What new substations, transmission lines, local power lines, generation, or power purchases are needed to serve this facility, which of those investments would have been made anyway, and who will pay for them?
- What studies have already been completed, or are planned or underway? Can copies be shared?
- What must the data center continue paying if it is delayed, uses less electricity than expected, or leaves early?
- Has the responsible regulator or utility board publicly estimated the net effect of this project on other customers' bills?
- What backup power will the facility use, how many backup generators are proposed, where will they be located, how often will they be tested or operated, and what measures will limit noise and air pollution?
- Does the developer have corporate climate goals (renewable energy, sequestration)? How do they count these goals? Will they be evident in this project?

Key Questions: Localized Impacts

- How will site emissions be monitored and reported? Who will collect baseline and ongoing measurements?
- What levels of noise pollution are expected from generators, cooling systems, and HVAC equipment? How will noise be mitigated? Does this align with prior studies conducted for the project? How will compliance with local requirements be ensured?
- What level of light pollution is expected from the site? What is the plan to mitigate impacts on nearby areas and ecological systems?

Key Questions: Cross-Cutting

- What kind of water resource planning has occurred? Are there strategies that can leverage water to alleviate grid stresses while minimizing impacts on local water resources? Are there strategies to use power to reduce the burden on public water systems without overloading the grid? How might this vary seasonally?
- Who is responsible if unexpected impacts occur?
- What kind of plan do you have in place with emergency services? Does this sufficiently address a worst-case scenario?

Construction & Operations

The following questions highlight questions about construction and operations that may be addressed earlier in the development timeline, but are relevant for construction and ongoing operations.

Key Questions: Localized Impacts

- What roads will be used for construction? Are those roads rated for heavy construction traffic compared to much lighter traffic during operations?

- Will the developer pay for road upgrades?
- Are there any anticipated conflicts about road use (e.g., roads owned by other jurisdictions)?

Key Questions: Site Impacts

- If readers are not automatic for utilities: what kind of access will be available to access utility meters on the site? Can meters be placed outside of secure areas that will not be easily accessible by utility personnel?

Key Questions: Enforcement

- How will the developer and/or local government respond to complaints about noise or other enforcement challenges? How will any requirements in local code be enforced?

Site Remediation and Decommissioning

Given the scale of data center projects, officials and community members are raising questions about what will happen with these sites in the future.

Key Questions

- What is the plan for reuse, redevelopment, or decommissioning if the facility is no longer used?
- Who will be responsible for the costs of equipment and infrastructure removal?
- How will costs associated with the removal of the equipment be paid for and what type of financial assurance will be provided?
- In what type of fund will this financial assurance be located?
- What condition is the site expected to be in if decommissioned?

- If the building is able to be repurposed for a different use, how will the equipment be decommissioned?
- In cases where the facility is reused or redeveloped, who will be responsible for any remediation costs?

Want to Go Even Deeper? Suggested Other Resources.

Table 7: Suggested others resources that offer questions for local government officials

If I am looking for	Organization & Title
A perspective from a Loudoun County, Virginia official	Turner, Mike. *15 Best Practices for Communities Considering Data Centers.* 2026.
Looking for a set of cross-cutting questions related to water or energy	Alliance for the Great Lakes. A Community Checklist of Evaluating Data Center Impacts. Great Plains Institute. *Aligning Data Centers with Sustainability Goals: Local Government Playbook*. 2026.
An review of a community benefits ordinance with lessons learned	World Resources Institute. *Detroit's Community Benefits Ordinance: Lessons Learned About the Community Engagement Process and Its Outcomes*. 2024.

06 | Addressing Data Centers in Local Code

This section includes

- Defining Data Centers
- Data Center Moratoria
- Zoning
- Noise Pollution
- Site Design
- Building Design
- Managing Climate and Environmental Impacts

About this Section

This section includes examples that illustrate approaches on a variety of topics for ways to address data centers in local code. The examples included here have been adopted or proposed in jurisdictions across the United States. However, **they are not recommendations for every Minnesota community or model language.** Their suitability depends on local goals, legal authority, expected benefits, and implementation costs. We provide them as a range of options to help local jurisdictions consider a range of ways to address data centers in local code.

Note: Example language in this section is included in yellow boxes or tables with links directly to available ordinances. New ordinance language is emerging in Minnesota and elsewhere, examples in this section are primarily from June 2026 or earlier.

Defining Data Centers

Defining a data center increasingly extends beyond a simple definition but includes considerations of size or scale of resource use, aggregation across a data center campus, and accessory uses.

Basic Definitions

Many local jurisdictions may not have a preexisting definition of a data center, but defining a data center in local code will allow for specific requirements to apply to data centers. The most common and general definition of a data center describes what a data center does and the equipment housed within the facility with varying levels of detail.

Example Ordinance Language: Defining Data Centers

Salt Lake City, Utah | DATA CENTER: An establishment that centralizes information technology operations and equipment for the purposes of storing, processing, and disseminating data and applications

Loudoun County, Virginia | Data Center: An establishment engaging in the storage, management, processing, and/or transmission of digital data, and housing computer and/or network equipment, systems, servers, appliances, and other associated components related to digital data operations.

Linn County, Iowa | Data center means a facility consisting of one or more buildings (whether constructed simultaneously or in separate phases) used primarily for the storage, management, processing, and transmission of digital data, which houses computer or network equipment, systems, servers, appliances, and other associated components related to digital data storage and operations. Data center includes commercial cryptocurrency mining operations and processing.

Size-Based Definitions

Recent examples also illustrate a growing trend towards defining categories of data centers to enable different requirements to apply to specific categories of data centers. Examples identified include Linn County, Iowa and DeKalb County, Georgia. Both Linn and DeKalb counties offer a general definition of data centers in addition to size-based category definitions. Linn County's amendment was passed in February 2026 and DeKalb County's amendment was denied in June 2026.

Table 8. Summary of three approaches to defining data centers based on size

Example	Size Categories	Criteria
Linn County, Iowa	Small-scale	Electrical design capacity of 20 megawatts or less; Uses less than 50 gallons per minute of water on an annualized basis
	Large-scale	Electrical design capacity of greater than 20 megawatts; Uses more than 50 gallons per minute of water or less on an annualized basis
DeKalb County, Georgia	Data center, accessory	Under 2,000 square Feet, limited to Office-Institutional and Office-Distribution zoned parcels
	Data center, campus	One or multiple buildings built across one or multiple phases totaling at least 500,000 square feet

	Data center, major	Area between 100,000 square feet and 499,999 square feet and may include a substation
	Data center, medium	Area between 20,000 square feet and 99,999 square feet and may include a substation
	Data center, minor	Area of less than 20,000 square feet and does not have a substation (if includes a substation, then medium)

In addition to the two examples in Table 8, the Montgomery County Council in Maryland is reviewing proposed changes to their zoning to address data centers. The proposed language defines data centers based on function and electricity demand ("a building or group of buildings, with an electricity demand greater than 20 megawatts (MW)…") and other site infrastructure ("backup and on-site operational power generation, fuel storage, electrochemical energy storage, electrical substations and distribution, center cooling, and heat dissipation facilities").

Comments from the Planning Staff at Montgomery County make a case for size-based definitions because "not all uses that meet the definition proposed for Data Center are the same size." The Planning Staff suggest defining data centers based on three size thresholds:

- small-scale (under 20-25,000 square feet),
- medium-scale (moderate external impacts and up to 150-200,000 square feet), and
- large-scale (major external impacts and larger than 200,000 square feet).

The proposed size thresholds then carry forward to other proposed changes, such as "a range of setbacks that are tied back to the size of the Data Center" and thus able to tailor requirements to the expected impacts of different data centers.

For jurisdictions that expect to deal with data centers of varying sizes or desire to address variation in data center sizes in their code, differentiating between data centers may enable more tailored requirements to address variation in impacts. Examples to date, illustrate defining data center scale by consumption like Linn County, Iowa (megawatts and/or gallons per minute on an annualized basis) or by footprint, as proposed in DeKalb County, Georgia or by planning staff in Montgomery County, Maryland.

Megawatt-based Thresholds

The proposed language in Montgomery County, Maryland and adopted language in Linn County, Iowa use 20 megawatts as an electricity demand threshold to define a data center. This threshold aligns with prior US Department of Energy "large load" threshold designations based on loads likely to impact interstate transmission. In Minnesota, this threshold differs from the definition in state statute which uses a threshold of 100+ megawatts. A defined threshold that is too large may fail to apply requirements to large loads that are likely to have impacts on the electricity system.

Addressing Data Center Campuses

Many jurisdictions are increasingly concerned with the impacts from hyperscale data centers, and so are differentiating between individual data centers and data center campuses. This can be addressed like with DeKalb County in Table 8 or add language that specifies aggregation across individual facilities. For example, Linn County's language specifies that multiple buildings comprising a campus should be aggregated to determine the large or small-scale thresholds. Monticello, Minnesota defines a data center campus by emphasizing more than one building connected by common operational systems. Frederick County, Maryland uses the term "critical digital infrastructure facility" to cover one or more buildings.

Example Ordinance Language: Data Center Campuses

Linn County, Iowa | For the purposes of determining compliance with power and water usage thresholds in this ordinance, all data center buildings that are part of a phased or multi-building campus shall be evaluated in the aggregate, regardless of whether such buildings are constructed simultaneously or in separate phases.

Monticello, Minnesota | Data center campus. A facility comprised of more than one principal data center building, but otherwise interconnected by power supply, communication systems, power generation or other operational systems to form a unified Data Center facility. This definition may include, but shall not be limited to, "Technology Campus", "Cloud Computing Center", "Information Technology Campus", and similar phrases and terms. May include accessory and appurtenant facilities as defined by this ordinance for "data center". The term data center campus shall not include data mining as defined by this ordinance.

Frederick County, Maryland | CRITICAL DIGITAL INFRASTRUCTURE FACILITY. A facility consisting of one or more buildings used primarily for the storage, management, processing, and transmission of digital data, and which houses computer or network equipment, systems, servers, appliances, and other associated components related to digital data operations. The facility may also include customary accessory uses such as an office use, air handlers, power generators and storage, water cooling and storage facilities, and associated utility infrastructure needed to support sustained operations of the digital infrastructure.

Separately Defining Accessory Data Centers

Given the different sizes and uses for data centers as a broad category, another strategy being used is to specifically differentiate accessory or ancillary data centers. Accessory data centers are hosted on-site by other primary uses. For example, hospitals, universities, or businesses that may require their own data storage. Some jurisdictions specifically include accessory data centers as a defined category to apply different requirements to them, such as allowing them in office or other non-industrial zoned areas. Irving, Texas has a specific definition for accessory use based on square footage and Santa Clara County, California has a definition based on proportion of total square footage and a limit of 9 MW. DeKalb County, Georgia proposed (but did not pass) a definition for accessory use, see Table 8. Monticello, Minnesota includes a definition for accessory uses, emphasizing requirements for visual screening and the separation of power generation from designated accessory uses.

Example Ordinance Language: Accessory Data Centers

Irving, Texas | Data center - accessory use shall mean a container or equipment structure no larger than 1,000 square feet in area that is engaged in the storage, management, processing, and/or transmission of digital data, which houses computer and/or network equipment, systems, servers and other associated components related to digital data operations.

City of Santa Clara, California | Data Center, ancillary. A facility of networked computer servers for private use by an industrial user, and subordinate and accessory to the primary use. Ancillary Data Centers are limited to 20% of the building square footage on a site and a maximum power draw of nine (9) Megawatts.

Monticello, Minnesota | Data center, accessory. A use which is incidental and subordinate in both area and extent to a principal use of property and which serves the principal use for the purpose of storage, management, processing, and transmission of digital data, which houses computer or network equipment. Such accessory use shall not include any mechanical equipment not fully shielded by building walls and shall not include any external power generation equipment.

Separating Infrastructure for Electricity

It is also important to consider what is considered accessory to the data center building to determine what other needed facilities should be evaluated independently or jointly. Some definitions include a range of accessory uses to the primary data center, such as additional buildings, fuel storage, water storage and cooling equipment or generators (see examples below from Frederick County, Maryland and Cannon Falls, Minnesota). Frederick County, Maryland and Loudoun County, Virginia illustrate separating out specific other on-site uses from the data center facilities, such as electric substations or mechanical equipment, such as backup generators or other on-site energy generation. A rationale for separating mechanical equipment from the data center is to allow additional review for backup generator proposals which may help ensure backup generators are not being used or planned for in ways that differ from the expected use cases.

Example Ordinance Language: Separating Infrastructure for Electricity

Frederick County, Maryland | CRITICAL DIGITAL INFRASTRUCTURE FACILITY. A facility consisting of one or more buildings used primarily for the storage, management, processing, and transmission of digital data, and which houses computer or network equipment, systems, servers, appliances, and other associated components related to digital data operations. The facility may also include customary accessory uses such as an office use, air handlers, power generators and storage, water cooling and storage facilities, and associated utility infrastructure needed to support sustained operations of the digital infrastructure.

CRITICAL DIGITAL INFRASTRUCTURE ELECTRIC SUBSTATION.A high-voltage electric system facility used to switch generators, equipment, and circuits or lines in and out of a system, change AC voltages from one level to another, or change alternating current to direct current or direct current to alternating current. Critical digital infrastructure electric substations may only be constructed in conjunction with a critical digital infrastructure facility.

Cannon Falls, Minnesota | DATA CENTER. A facility used primarily for the storage, management, processing, and transmission of digital data which houses computer or network equipment, systems, services, appliances, and other associated components related to digital storage and related operations. Such facility may include the following accessory uses, all of which together with the facility to which they serve constitute the Data Center:

Access (public or private); Buildings for support offices, storage, logistics, maintenance, and security; Enclosed energy, battery and fuel storage facilities; Public and private water and wastewater facilities; Water treatment facilities; Water storage and cooling facilities and associated water pumps, tanks, and equipment; Communication, broadband, and fiber optic utilities; Air handlers, cooling equipment, and heat pumps; and Electrical generators.

Loudoun County, Virginia | Data Center: An establishment engaging in the storage, management, processing, and/or transmission of digital data, and housing computer and/or network equipment, systems, servers, appliances, and other associated components related to digital data operations.

Data Center Mechanical Equipment: On-site exterior machines used to sustain and/or provide energy for the operations of a Data Center.

Data Center Moratoria

Local jurisdictions are increasingly using moratoria to slow or stop data center development. Most moratoria are temporary and are used to build capacity or study data centers before deciding whether or how to permit data centers.

Minnesota law enables cities to enact moratoria based on Minnesota Statutes § 462.355, subd. 4 under an Interim ordinance and counties under Minnesota Statutes § 394.34. This toolkit section uses the more common term moratorium, but it is also common in Minnesota to see interim ordinance used given the statute language.

Research from the Georgetown Climate Center clusters data center moratoria into three categories: some moratoria are temporary to establish needed regulation in places with limited development to-date , others are open-ended in places without any prior development , and some respond to impacts observed in places with existing development.[124] In Minnesota, moratoria are generally not allowed to function as preventative perhaps as seen in other places, but rather are used to support the planning process and any required studies on an issue. The Minnesota League of Cities includes details on interim ordinances in the Zoning Guide for Cities.

Moratoria are being considered at state and local levels, this review focuses solely on local examples. This is not a comprehensive review of moratoria but rather intended to illustrate common strategies. For national information on moratoria, Interconnected Capital, LLC is updating a national moratorium tracker and for more up-to-date information on Minnesota, CURE is tracking ordinances and moratoria in the state.

[124] Birchard, *What to Make of Data Center Moratoriums?*

Why Consider a Moratorium?

Moratoria are most commonly being used to allow jurisdictions time to understand and address identified issues with data centers in local code prior to determining whether to allow data centers as a permitted use. Common issues referenced in moratoria include data center impacts to health and safety for both construction and operation, use of water and electricity resources, challenges to comprehensive and local planning, and impacts to resident health. The examples below illustrate different ways that local jurisdictions describe the impacts and need to study the impacts prior to any or further data center development.

Example Ordinance Language: Moratoria

Manitowoc County, Wisconsin | WHEREAS, a moratorium would allow the county to fully explore, analyze, and research the environmental, economic, health, and safety impacts of Data Centers and develop consistent zoning and regulatory standards to be applied to Data Centers in Manitowoc County

Kootenai County, Idaho | WHEREAS, the Kootenai County Board of Commissioners ("Board") hereby finds that the typical demands of data centers with respect to water, electricity, air pollution, building size, noise, parking, and traffic circulation constitute an imminent peril to the public health, safety, and welfare of the citizens of Kootenai County, particularly with respect to the quantity and quality of water in the Rathdrum Prairie Aquifer, such that an Emergency Moratorium should be placed on new applications for building and associated development permits for data centers as defined herein...

Dane County, Wisconsin | The Dane County Board of Supervisors finds: (1) There are potential health and safety concerns related to the construction and operation of data centers, including overburdening public services and infrastructure. (2) There are potential impacts on property values, conversion of productive agricultural land, and the general welfare of residents, businesses, and visitors. (3) The construction and operation of data centers is not consistent with existing county plans and ordinances, including the Dane County Comprehensive Plan and the Dane County Zoning Ordinance.

In Minnesota, examples from Inver Grove Heights, Rosemount, and Carver City use the same language describing the purpose and intent of a data center moratorium. Eagan, Minnesota also has a mortarium/interim ordinance, but with slightly different language.

Example Ordinance Language from Minnesota: Moratoria

Inver Grove Heights, Minnesota | Purpose and Intent. The purpose and intent of this Interim Ordinance ("Ordinance") is to protect the planning process and the health, safety, and welfare of the citizens of the City of Inver Grove Heights ("City") by: (i) imposing, pursuant to Minnesota Statutes, Section 462.355, subdivision 4, a moratorium on Data Centers, as that term is defined herein, during the term of this Ordinance; and (ii) authorizing a study related to the local regulation of Data Centers.

Most moratoria are enacted by cities or counties, but at least one example illustrates coordination across different local authorities. In Michigan, Ypsilanti Township first passed a resolution to "request and urge" Ypsilanti Community Utilities Authority (YCUA) to enact a moratorium, as the entity that provides water supply and wastewater treatment services and the expertise (or identify third party contractors on YCUA's behalf) to rigorously analyze water-related concerns. YUCA then approved a moratorium in accordance with the township's resolution. This suggests that coordination across local entities may – depending on who has permitting authority – may be necessary to enact the goals of moratoria.

How Long do Moratoria Last?

Most moratoria are temporary for a specified duration, most commonly 12 months but some extending for 18 months (Dane County and Manitowoc County Wisconsin) and others 5-6 months.

The temporary period defined by a moratorium allows for necessary studies to evaluate impacts, review current code and enact changes to code, and to determine whether more permanent limits are required.. Examples of shorter periods of time, such as an earlier moratorium in Monterey Park, California for a month and a half, was extended by City Council and more recently residents of Monterey Park voted to prohibit data centers in the city (the first example of this nationally). Monterey Park's example illustrates the connection between moratoria and ballot measures, as well as that the duration of a moratorium may be adjusted with future council or board action. Some moratoria from other states establish an open-ended period to be ended by subsequent council action at an undetermined time or a specific time period that may be ended by further action.

Minnesota law limits moratoria lasting more than a year. City interim ordinances generally begin with a maximum one-year period, with extensions available only under specified statutory conditions. County interim zoning may last one year and be renewed for one additional year.

What Kind of Actions are Moratoria Requiring?

The overarching goals of moratoria are to (1) adequately study the potential impacts and (2) address data centers in local code amendments or changes, often with a specific focus on zoning. Some moratoria describe general research on the impacts of data centers, while others focus solely on a zoning study, but often the two areas are integrated to include studies on both the localized impacts and addressing those impacts in local regulations, including land use, permit types, and standards applicable to different data centers.

In Minnesota, a city or county may enact a moratorium based on the following conditions:

- underway or authorized future studies,
- hearings related to adoption or changes to a comprehensive plan or ordinance, or
- annexation.

Example Ordinance Language: Moratoria Requiring Actions

Manitowoc County, Wisconsin |The purpose of the moratorium is to allow Manitowoc County time to research the possible environmental, economic, public health, safety, and general welfare effects of data centers and establish consistent zoning and regulatory standards to be applied to data centers in Manitowoc County and to allow the Planning and Park Commission to conduct hearings and make recommendations to the County Board regarding amendments to this or other county ordinances.

Inver Grove Heights, Minnesota| conduct a study of Data Centers, including, without limitation, a study related to the appropriate zoning districts for location of Data Centers, use types (i.e. permitted, conditional, etc.) for Data Centers of various scales, potential performance standards for Data Centers of various scales, their relevant localized impacts and how other communities regulate them and provide the City Council with recommendations on whether and how the Zoning Code could be amended to regulate Data Centers

Ypsilanti Community Utilities Authority, Michigan | as a provider of water and wastewater services to multiple counties includes a more specific set of required analyses, including:

a) Long-term water supply and comprehensive capacity analysis, which shall include peak demand modeling, drought, and emergency resilience;

b) Long-term wastewater treatment and sewer capacity analysis, which shall include wastewater treatment compatibility studies, effluent composition, temperature analysis, and the Authority's thermal discharge and water quality impact assessments;

c) Financial and ratepayer impact analysis, which shall include prevention of cross- subsidization of required capital improvements to serve the aforementioned centers so as to ensure that no costs are shifted to the Authority's existing customers and ratepayers;

d) Infrastructure and capital planning analysis, which shall include all required upgrades and expansion costs that would be attributed to providing water and sewer capacity to the centers referenced in the resolution, including infrastructure stress and redundancy analysis, the costs of which shall be borne by any center referenced in the resolution seeking water and sewer services from YCUA;

e) Environmental and sustainability review;

f) Emergency response and system resiliency assessment…."

These studies will help ensure that YCUA can "sustainability meet the high-volume continuous water and sewer demands…[and] safely treat and discharge the wastewater associated with these facilities without experiencing capacity degradation affecting residential, commercial, and light industrial properties" (Ypsilanti Township).

Zoning Classification and Mechanisms

After defining data centers, allowing or disallowing data centers in certain land use types is a next critical step – whether a jurisdiction is interested in stopping or pausing data centers to actively recruiting data center development – to align siting with community preferences. This section offers a set of common land use classification and zoning mechanisms being used to address data center development.

Data centers are permitted in multiple land use classifications, including business parks/districts or office, commercial districts or commercial warehousing, light manufacturing, and the range of industrial land uses (light, general, moderate, heavy, and industrial districts). The range of land use categories that allow data centers may reflect the different types of data centers. Defining data centers to recognize the difference between a large hyper-scale data center and a smaller enterprise data center, may allow for specifying which type of data center is allowed in certain land uses. Even places that zone data centers in existing industrial areas recommend carefully considering where data centers are allowed.

Research on data centers in Virginia found that data centers have been built too close to residential or other sensitive areas because they were not considered an industrial use and therefore abutted incompatible uses. This was in part because zoning ordinances were not updated to reflect the evolving data center industry, including larger and hyperscale facilities. Based on Virginia's experience, modern data centers are characterized as industrial land uses (including large-scale building(s), with industrial scale cooling equipment, back up generators, substations, transmission lines).[125]

Choosing Between Permitted and Conditional Uses

Allowing data centers to be permitted by-right can be more cost and time efficient for developers, but is increasingly less common for data centers. By-right permitting allows development to occur without further discretionary land-use approval in allowed land use classifications, provided that all current zoning, code, environmental, and utility requirements are met. Jurisdictions that allow data centers by-right typically restrict them to specific land use categories or special districts.

Conditional-use review gives local officials more discretion to assess project-specific impacts and impose conditions than by-right permitting. In Minnesota, applicants who satisfy the conditional use ordinance's applicable standards are generally entitled to approval, but vindicating that entitlement can involve delay and litigation costs.

- In Salt Lake City, Utah, data centers are included as by-right in manufacturing districts or special use districts but local code stipulates that data centers must adhere to the consumption limits that apply to all commercial and industrial land uses, and including some land use designations that are required to use closed-loop cooling systems.
- In Rosemount, Minnesota, data centers are a permitted use in general and heavy industrial areas and in areas designated as employment districts which provide a "suitable environment for employment centers, business headquarters, offices and professional uses, warehousing, light industrial uses, and associated complementary uses." The under-construction Meta facility in Rosemount falls into this "employment district" land use category (B-2) – rezoned from agricultural to a business park planned unit development (PUD) in 2023. In April, 2026 Rosemount placed a one-year moratorium on new data center development.

Local jurisdictions are moving to requiring conditional use permits for data centers, rather than allowing data centers as a by-right use. This change was recommended by places with a longer history of data center development for jurisdictions considering how to handle data centers in the future. The hesitancy surrounding by-right permitting has emerged for two reasons.

[125] Sarte et al., *Data Centers in Virginia*.

- First, this by-right permitting does not require a separate project-specific public hearing, including public comment periods and input on siting decisions.
- Second, it may allow for data center development in areas where the facilities were not originally intended, without further review from local decision making bodies.

In places like Loudoun County, Virginia by-right zoning allowed for development to occur too close to residential areas and data centers were developed in areas where they were not envisioned by the community. Loudoun County has since changed permitting to conditional use.

What is a Planned Unit Development (PUD) in Minnesota?

Planned Unit Developments (PUDs) are being used in Minnesota for data centers. But the term can be confusing as it is used in different ways by different municipalities. PUDs have historically been used for suburban residential development to change minimum lot requirements or allow for more or consolidated greenspace. PUDs have been used to support sustainability goals and public benefits by adding more open space, allowing for a greater mix of housing types, and increasing opportunities for affordable housing.

Some PUDs function like an overlay zone or district, which provides flexibility to site design, often allowing for more collaborative planning between a developer and the city for a specific project. Underlying zoning designations continue to determine the basic allowable uses and the general standards for development. For data centers, PUDs are being used to create zoning for data centers and to evaluate whether "specific locations are appropriate for the expected land use impacts and characteristics of data center development" (Monticello, MN). Monticello's PUD ordinance provides a standard set of requirements for data center projects within the city, including but not limited to zoning, demonstrating that serving the data center will not create shortages in the City's sanitary sewer or water supply capacity, financial guarantees, other supply guarantees (electricity, transportation), performance standards, and public benefits.

Other uses of a PUD function like a variance, where a PUD plan approves variances to established regulations for a specific development without changing the underlying zoning ordinance. A PUD allows for deviations from standard rules in exchange for public benefits, or exactions. Examples of deviations requested for data centers include increasing building height, increasing buffers,

increasing setbacks, designating a number of allowable accessory structures on site, changes to allowable lighting, fence height, planting and facade standards.

In the context of residential development, researchers have cautioned against PUDs for standard development and suggest they be used only for "unique or innovative projects." For data centers, this may align with campuses that do not align with underlying zoning but are trying to achieve sustainability or other public goals. PUDs are not the only way to address zoning for data centers and some cities may want to amend the comprehensive plan and related zoning ordinances.

Adding Requirements with Overlay Zones

Some local governments are using overlay zones or districts to determine requirements for data centers, without complete modifications to the comprehensive plan. This zoning technique allows a jurisdiction to designate data center development based on certain criteria (proximity to other land uses, prior industrial sites, needed infrastructure) or where development is the most technically feasible. Overlay districts often place additional zoning requirements and can be developed for a specific parcel or area, or can "float" until a proposal that meets the criteria is received.

For example, Prince William County, Virginia developed an overlay zone (called the Data Center Opportunity Zone Overlay District) that included land in proximity to high voltage transmission lines of 115 kV or more and planned or zoned for office or industrial uses. Data centers are completely prohibited in agricultural, residential, PMR (planned mixed residential), B-2 (neighborhood business), B-3 (convenience retail), and V (village) districts. Prince William County's overlay zone also included site design standards specific to data centers, including: building placement, screening, buffers, fencing, design standards, and noise attenuation. In this case, data centers are by-right in the overlay zone but overlay zones can be conditional use.

As of June 2026, Prince William County, VA is amending their overlay district to "to reduce and redefine the boundaries of the Overlay District, limiting it to parcels that meet one or more County-defined eligibility pathways…" Frederick County, Maryland has used a similar overlay zone, Critical Digital Infrastructure Overlay Zone, to limit data center development to a specific site that was previously home to aluminum manufacturing. This overlay zone aims to prevent data center sprawl, align with existing infrastructure, and preserve other industrial land for other industries.

Mitigating Noise Pollution: Standards and Studies

Noise is a primary concern for data centers and one of the most frequent issues raised by residents that live nearby to data centers. Noise can be addressed both by a range of interventions, including noise-specific limits, zoning, site design, and building design. Noise pollution standards are set by the Minnesota Pollution Control Agency, and these standards can be used in conjunction with studies to inform other requirements to mitigate noise.

Noise is generally understood to be any undesirable sound. For data centers, noise stems primarily from cooling equipment (e.g., air handling units, air-cooled chillers) and on-site power generation sources (primarily diesel generators) or other electrical equipment and mechanical devices.

Mitigating noise impacts for data centers involves three components: establishing a noise standard, including site and building specific noise reduction interventions, and limiting generator use (to backup need only and specifying acceptable testing hours). Noise is an evolving area in local code, but local ordinances now may be more likely to address both dBA (A-weighted) and dBC (C-weighted).

- dBA measures were developed to be accurate to human hearing at normal or low volumes, and to the frequencies humans tend to hear more acutely, such as higher pitched noises, this may leave out low-end frequencies (deeper sounds or more physical vibrations).
- dBC measures audible frequencies more equally and is often used to assess peak/impact noise or hearing protection performance.[126]
- A decibel meter measures sound level pressure (SPL) which can be measured in dBA or dBC.

Most sound standards have typically focused on dBA measurements, situations that may have more familiarity with dBC include sound engineers or local jurisdictions dealing with live music venues.[127] The most extensive area of research on (in)compatible noise has historically been related to transportation and roadway noise, which is relatively consistent sound. The noise from data centers may have impulse noise (sharp, sudden sounds) and intermittent noise in addition to more consistent noise.

Local ordinances for data centers are now more likely to establish limits of 50-60 dBA and 65-75 dBC to better address the noise associated with data centers, including lower-end frequencies. Acceptable noise levels are often associated with common levels of transportation-related noise – this may differ in

[126] The Noise Chap, "dB(A) and dB(C) in Noise Assessments."
[127] The Production Academy, *dBA vs. dBC*.

urban, suburban, or rural areas and therefore require different standards.[128] A Loudoun County Supervisor has been documenting lessons learned from his experience, and recommends limiting "noise to a maximum of 50 dBA (audible sound) perceived noise at the sending property line and reduc[ing] any dBC Tonal/Narrow band noise to background noise levels."[129]

Example Ordinance Language: Noise

Linn County, Iowa | 55 dBA or 65 dBC for residentially zoned property adjacent to the proposed development; 65 dBA or 75 dBC for non-residential property

Prince William County, Virginia | Residential/Mixed Use District: 60 Maximum dBA Daytime & 55 Maximum dBA Nighttime; Commercial/Office: 65 Maximum dBA Daytime & 60 Maximum dBA Nighttime

Industrial: 79 Maximum dBA Daytime & 72 Maximum dBA Nighttime.
For residential zoning districts: Maximum permissible C-weighted sound level at the receiving property: Daytime 73 dB(C); Nighttime 68 dB(C).

Frederick County, Maryland | establishes maximum sound pressure levels from any source to be 70 in industrial uses, 64 in commercial uses, and 55 in residential, institutional, and all other uses.

As a part of developing Prince William County, Virginia's noise ordinance, an additional recommendation was included (but not adopted) to establish "octave band limits" which aligns with examples emerging from Europe. Divide County, North Dakota includes octave band limits for cryptocurrency mining data centers. Using octave band limits (Hz) in addition to dBA and dBC standards allows for standards that recognize how human hearing is more sensitive to different frequencies of sound. Sound level meters can simultaneously measure dBA, dBC, and Hz.[130]

Current MPCA Standards

Local governments in Minnesota cannot set maximum sound pressure level standards more stringent than the state standards (Minnesota Statutes § 116.07) set by the Minnesota Pollution Control Agency

[128] Prince William County, *11.B) Presentation - Prince William County Noise Ordinance Update - Wade Hugh, Office of Executive Management - Mobility, Economic Growth, and Resiliency*.
[129] Turner, *Loudoun County, Virginia: Data Center Capital of the World "A Strategy for a Changing Paradigm."*
[130] Klein, "Key Zoning Ordinance Components - Gaining Data Center Benefits Without Harming Area Residents"; Prince William County, *11.B) Presentation - Prince William County Noise Ordinance Update - Wade Hugh, Office of Executive Management - Mobility, Economic Growth, and Resiliency*.

(MPCA). The MPCA has daytime and nighttime standards (see Table 9).[131] The L_{10} and L_{50} levels indicate that over a one-hour monitoring period, noise levels cannot exceed the standard more than 10% (L_{10}) and 50% (L_{50}) of the time.

Table 9. Basic noise rules based on land use classification

Noise Area Classification (NAC)	Daytime		Nighttime	
	L_{10}	L_{50}	L_{10}	L_{50}
1	65	60	55	50
2	70	65	70	65
3	80	75	80	75

Note: NAC 1: Residential housing, religious activities, camping and picnicking areas, health services,hotels, educational services; NAC 2: Retail, business and government services, recreational activities, transit passenger terminals; NAC 3: Manufacturing, fairgrounds and amusement parks, agricultural and forestry activities

The MPCA standards reflect dBA measurements, and the state standard does not include dBC or Hz limits (see Table 9). However, the supporting guidance from MPCA illustrates the difference between A-weighted and C-weighted measurements.[132]

Noise Studies

Ordinances require noise studies that are used in conjunction with noise standards to establish initial site conditions and ensure compliance with established standards (see Table 9). Local jurisdictions in Minnesota cannot establish standards more stringent than the statewide MPCA standards, but they can require tailored studies or assessments at multiple project phases, including a preliminary assessment to support design decisions, post-construction assessments to determine as-built compliance, and ongoing studies. Examples, like Monticello, Minnesota, also require "a Noise Impact Statement for

[131] Minnesota Pollution Control Agency, *A Guide to Noise Control in Minnesota*.
[132] Minnesota Pollution Control Agency, *A Guide to Noise Control in Minnesota*, 9.

low-frequency sound emissions and demonstrate mitigation plans consistent with the recommendations of the Statement" which may be able to address concerned raised related to dBC or Hz measurements that are not reflected in MPCA standards.

Additionally, different ordinances specify qualifications or oversight of the evaluation firm or engineer and may require a liaison during operations. Some ordinances require alignment with ANSI/ISO standards for measuring noise.[133]

Example Ordinance Language: Preliminary Noise Studies

Preliminary noise studies are used to establish baseline noise conditions and support the application of sufficient mitigation measures (see Site Design & Performance Standards) prior to approval of building permits or construction activities. Baseline studies are used to establish ambient levels that are used to assess data center noise.

Linn County, Iowa | The average decibel limit is specific to source of the sound and does not count against cumulative ambient decibel levels as established in a baseline acoustic evaluation.

Frederick County, Maryland | Uses a study to assess noise and inform layout, design, and control measures. Study requirements include assessments at three scenarios: normal operation, generator testing & maintenance, and an emergency scenario with all equipment. For multiple buildings, the County requires sound levels for each phase of build-out to ensure compliance across phases.

Cannon Falls and Monticello, Minnesota | Explicitly require noise studies prior to approvals to demonstrate that noise standards will not be exceeded. Studies that model sound impacts help demonstrate that the proposed mitigation measures will comply with noise standards.

Example Ordinance Language: Post-Construction Noise Studies

Post-construction requirements for an initial noise study and periodic noise studies enable continued compliance with noise standards. Initial noise studies may be required prior to final approvals.

Chandler, Arizona | Upon issuance of a certificate of occupancy or certificate of completion, whichever occurs first, the Data Center operator must conduct a noise study performed by a third-party acoustical engineer to document noise levels emanating from the Data Center measured at the property line of the nearest property to the Data Center

[133] Schirn, "Making AI Data Centers More Sustainable."

property that is planned or zoned for residential land uses, or other noise sensitive use as reasonably determined by the Zoning Administrator during peak operation of the Data Center mechanical equipment.

Monticello, Minnesota | Prior to commencement of operation of the DCPUD principal use facilities, the operator must conduct an additional noise study, preparing calculations for proposed equipment to determine noise levels as measured at the property line of neighboring property to the DCPUD or other noise sensitive uses as reasonably determined by the City. Where results exceed limits, the operator of the DCPUD shall be required to submit plans which detail the installation of sound mitigation measures within the DCPUD boundary which are necessary to compliance with MPCA noise rules.

Example Ordinance Language: Periodic or Ongoing Noise Studies

Chandler, Arizona | The Data Center operator must also conduct an additional noise study, as measured at the property line of the nearest property to the Data Center property that is planned or zoned for residential land uses, or other noise sensitive use as reasonably determined by the Zoning Administrator, annually during peak operation of the Data Center mechanical equipment for five years after completion of the initial post-construction noise study. The Data Center operator must provide the results of the noise study to the City within thirty days of the anniversary of the date on which the certificate of occupancy or certificate of completion was issued by the City.

Frederick County, Maryland | Within 6 months of the date of occupancy of any completed CDI building, and biennially thereafter, actual sound levels for scenarios a and b listed under (F)(1)(c)(3). above must be measured by a qualified engineer with experience in environmental acoustics and a final sound level report must be submitted to the county for review and approval.

Linn County, Iowa | Commencing on the fifth anniversary of the end of construction, as defined hereafter, and continuing every five years thereafter, for so long as the data center operates, a noise evaluation shall be completed at the operators expense by a certified professional by the Institute of Noise Control Engineering (INCE), or a licensed professional engineer (PE) to verify compliance with the county's standards in section 107-151(l)(1).

Monticello, Minnesota | An additional sound study shall be completed once per year during peak operation of the DCPUD mechanical equipment upon commencement of operation of the DCPUD principal use facilities. Such study shall utilize similar locations and methods used in the Ambient Noise Study for comparison purposes.

Example Ordinance Language: Specifying an Evaluation Party

Some ordinances specifically require an independent, third party, or licensed engineer to conduct specified studies.

Examples

Linn County, Iowa | A pre- and post-construction noise evaluation shall be completed by a certified professional by the Institute of Noise Control Engineering (INCE), or a licensed Professional Engineer (PE) to verify compliance with the County's standards.

St. Louis, Missouri (Proposed) | Baseline noise levels, as measured by a third-party measurement professional approved by the city…

Frederick County, Maryland | All applications for site plan approval must include a sound study that is prepared by a qualified engineer with experience in environmental acoustics.

Example Ordinance Language: Requiring a Liaison

Monticello, Minnesota | Upon commencement of the operation of the DCPUD, the operator of a DCPUD must provide a liaison to respond to complaints about noise emanating from the DCPUD.

Chandler, Arizona | Upon request by City staff after issuance of a certificate of occupancy and commencement of the operation of the Data Center, the operator of a Data Center must provide an on-site neighborhood liaison between the hours of 8:00 am and 10:00 pm MST each day to respond to complaints about noise emanating from the Data Center.

Generator Testing Days and Hours

Local jurisdictions often limit when generators can be used for non-emergency purposes. This may include language that specifies generator use only as backup power for emergencies and establishing days of the week and specific hours for generator testing. The goal of these requirements is to limit the impact of noise and air pollution on nearby residences or other adjacent activities that may be disturbed in the mornings, evenings, and weekends by generator testing.

Data center ordinances frequently include generator testing hours during weekdays (M-F) and business hours (8am-5 or 6pm). Some jurisdictions require a testing schedule to be filed annually (Monticello, Minnesota). Loudoun County, Virginia includes more limited testing hours based on times of the year (May 1 - Sept 30: 5pm and 7pm; October 1 - April 30: 11am-5pm).

Jurisdictions that include language limiting backup generator use to emergency situations (e.g., power outages) are responding to the use of backup generators to reduce electricity demand at peak times

when there may be grid stress or limited supply (see Section Reducing Electricity Use and Backup Generator Use).

Example Ordinance Language: Generator Use Limits

Monticello, Minnesota | Back-up power generators within the DCPUD may only be used for back- up electrical supply during a power outage. Curtailment of power supply or voluntary shutdown of power is not considered a power outage.

Loudoun County, Virginia | Except for generator testing or commissioning activities, generator use is limited to backup/emergency use only.

Site Design & Performance Standards

Site design requirements for data centers can have secondary impacts on other considerations, including visual aesthetics and noise. Site design requirements for data centers usually include buffers, landscaping, screening, and setback requirements. Table 10 summarizes site design considerations, these requirements may be used together to support site designs that mitigate negative building and accessory equipment aesthetics, noise, and light.

Frederick County, Maryland's requirements recognize that the tools in Table 10 may be used together and require a more holistically analysis of visual impacts to determine which tools to use. Frederick County requires submission of a viewshed analysis as a part of the site development plan "to assure that visual impacts are avoided or minimized to the maximum extent practicable…."

Other places with data center experience recommend site requirements that include:

- Robust screening requirements for data centers to completely screen the views of the operation from the adjacent roadways and non-industrial land uses, including buildings and externally mounted equipment.
- Mitigate the continuous sound generated from the site.
- Mitigate lighting impacts (as data center sites are often well lit due to security concerns).

In addition to requirements applicable to data center operations, the construction period can create a substantial amount of traffic, noise, and light pollution for an extended period of time before a data center is operational. Requirements to mitigate impacts during construction may be beneficial.

Table 10: Summary of Site Design Requirements for Data Centers

Requirement	Description	Specification	Secondary impacts
Setbacks	The required minimum distance between the data center structures and the property line, public roads, or other adjacent structures.	Setback requirements vary but may recognize a need for tailored requirements based on the adjacent land use. Setback requirements may also vary based on the land use classification or future plans. For example, larger buffers may preserve land for high-priority uses, such as transit or higher-density use, while data centers developed in overlay or industrial districts or parks, may benefit from being grouped in ways that effectively share infrastructure. In general, identified setbacks from residential range from 200-500 feet. But some jurisdictions are starting to require much larger set-backs for hyperscale data centers (e.g., 1,000 feet). *Examples* Linn County, Iowa includes a required 200 feet setback from the property line and a required 1000 feet setback from "closest outer wall of a place of public assembly" and residential property line.	Noise attenuation: sound level decreases with distance from cooling system and backup generators Provides space for adequate buffers and visual screening Provides space for safety buffers and emergency access May provide additional space for future needs (stormwater retention, open/green space corridors

		Monticello, Minnesota Specifies a 200 feet setback for residential, civic/institutional, mixed-uses, public parkland, or public recreational. With a 300' for sites over 300 gross acres. Both Tempe, Arizona and Frederick County, Maryland include 500' setbacks from all abutting residential. Cass County, Missouri requires 1,000 feet from the property line, but stipulates that a greater setback may be required to achieve the required noise performance standard.	
Buffering, Landscaping, and Screening	Buffers: Open or vegetated space separating a data center property from adjacent land uses. Sufficient buffers are particularly important when a data center abuts a different incompatible land use, such as residential. Landscaping: Plantings may be used to enhance the aesthetics of data center buildings or to improve site aesthetics, such as plantings on berms or other buffer areas.	Buffer specifications vary widely but range from 50 to 500 feet. Like setback requirements, some jurisdictions adjust buffer requirements (both width and density of plantings) based on the adjoining or adjacent land use (see Prince William County, Virginia). Buffer and planting requirements may be detailed in local code or code may refer to a separate standards manual which details both buffer width and planting requirements. Jurisdictions may request buffer tree surveys and planting plans. *Examples* York County, Virginia requires a tree survey of the buffer area on the landscape plan and notes that supplemental planting may be required to achieve adequate screening.	Use buffer space to provide aesthetic screening Noise attenuation: help absorb sound from cooling systems and backup generators[134] Light pollution mitigation: sites are well lit due to security concerns, robust screening will help block light from reaching nearby areas

[134] Arbor Day Foundation, "Using Trees and Shrubs to Reduce Noise."

	Screening: Physical barriers that hide on-site buildings and equipment from adjacent roadways, with a focus on non-industrial land uses. Screening materials may include screen walls or plantings.	Frederick County, Maryland requires that screening for not just buildings but all related ground level and rooftop equipment (ranging from electrical to cooling).	

Building Design & Performance Standards

Building design requirements work concurrently with site design to mitigate noise, light, and unfavorable aesthetics from data centers. Local jurisdictions include building requirements that address facades and other visual aspects of the building, soundproofing, lighting, energy efficiency, or water use.

Generally facade requirements focus on shifting the aesthetics of data center buildings from warehouses to office buildings, including requirements such as windows, door or entryways (including planting requirements), materials, patterns, textures, height, roofing, and screening (Frederick County, Maryland, York County, Virginia). Building design standards often work in conjunction with site design standards to address aesthetics (Loudoun County, Virginia) and other issues such as noise.

Noise can be addressed through building design by including both equipment and building soundproofing measures. Equipment soundproofing may include using materials that help absorb noise, sound blankets, and mechanical sound attenuators. Building soundproofing includes acoustic barriers or shields, as well as the site-level strategies (see Table 10).[135]

[135] Yañez-Barnuevo, "Communities Are Raising Noise Pollution Concerns About Data Centers."

Managing Climate and Environmental Impacts

Examples of local codes directly addressing climate and environmental impacts of data centers are increasingly common to more directly address the direct and indirect impacts of data centers. Tools being used to manage climate and environmental impacts include: requirements for additional studies, plans, or use agreements, and additional performance requirements beyond those typically seen in site or building design.

Studies or Plans Specific to Climate and Environmental Impacts

Examples already included in discussions of the study requirements included in some moratoria (see discussion about studies being required by moratoria) reflect parallel studies being included in code that address project-specific impacts. Study requirements most commonly included in local codes focus on water systems, either exclusively water supply or both water supply and wastewater.

Example Ordinance Language: Water Impacts

Linn County, Iowa | Water Study. A water study shall be submitted demonstrating that sufficient water resources are available to support the proposed use as described in Section 107-151 § (n)(1) below.

Salt Lake City, Utah | Water Use Report Required: A land use applicant shall certify the anticipated daily water use of the proposed land use in a manner satisfactory to the Department of Public Utilities. The Department of Public Utilities may require an anticipated daily water use report of any land use applicant proposing a new use or expansion of an existing use.

Note: Salt Lake City's requirements are applicable to uses beyond data centers.

Monticello, Minnesota | A conceptual utility study that identifies both City and private utility supply and demand on the relevant system, including water and wastewater system information. Such study shall illustrate the phasing for construction of municipal water and wastewater systems, and shall demonstrate to the satisfaction of the City that the proposed municipal facility can both (1) be adequately served by the existing or planned capacity of the utility, and (2) will not impede access or limit service capacity to those utilities by other future users in the City's planning and service

territory; (3) is designed to provide adequate service to the furthest extent of the DCPUD, and (4) that the applicant has provided sufficient information regarding the financial capacity and ability to secure performance to support the required improvements or system upgrades.

Atlanta, Georgia | Water consumption plan: outlining the total water requirements of the data center, including cooling needs, and any strategies to reduce or mitigate excessive water usage. The plan must demonstrate that the water usage will not significantly strain the City of Atlanta's water supply, which serves both the city and surrounding metropolitan areas from the Chattahoochee River.

Water conservation and sustainability plan: which includes measures to minimize the data center's impact on regional water resources, such as the use of water-efficient cooling technologies and closed-loop systems.

Stormwater management plan: which addresses how the site's development and operation will manage stormwater runoff, as well as any mitigation measures to prevent negative impacts on local water systems.

York County, Virginia | A hazardous materials management and stormwater runoff control plan shall be submitted detailing the methods to be proposed to ensure that no hazardous or petroleum-based products are permitted to infiltrate into groundwater or surface water resources.

DeKalb County, Georgia (Not Passed) | Water Consumption and Sustainability Plan: A Water Consumption and Sustainability Plan shall address conservation and scarcity, outlining the total water requirement of the data center, including cooling needs, and any strategies to reduce or mitigate excessive water usage. The plan shall demonstrate that the water usage shall not significantly strain DeKalb County's water supply. The Water Consumption and Sustainability Plan shall specifically evaluate:

i. The vulnerability of the project and project site to water scarcity and drought.
ii. Disturbance of public services (i.e., transport, communication, sanitation, fresh water, and electricity supply).
iii. Identify any drought monitoring and forecasting systems that exist in the project area.
iv. Proposed water scarcity/drought management measures to alleviate risk, including water storage, alternative sources, and reduced use of resources.
v. The adoption of advanced low-water or water-free cooling systems that align with the regional drought and water-scarcity planning from the Metropolitan North Georgia Water Planning District.
Sewer Plan: A Sewer Plan shall evaluate and include:
i. Actual and expected daily sewerage flow.
ii. Identify potential or planned sanitary sewer capacity projects with the purpose of improving the DeKalb County water system.
iii. An on-site treatment plan, including any necessary equipment to conduct trace analyses and consistent monitoring of chemical use for on-site water preparation and treatment.
iv. An analysis of the community's treatment system, or a private treatment system, to determine whether either has adequate capacity to serve the forecasted growth, or has programmed improvements to add capacity to accommodate the forecasted growth.
v. Clear indication of pipe size, material type, percent grade, and length of all pipes.

vi. A utility plan with direction of sewer flow.
vii. Disclose pretreatment or discharge permit request if any effluent leaves the closed loop system to sanitary or storm sewers for the Department of Watershed Management Industrial Pretreatment Program Review.
viii. Submit a Closure and Disposal Plan at decommissioning covering treatment systems, chemical waste, and related infrastructure.
ix. Disclose Water Usage Effectiveness (WUE) target or performance metric.
Note: DeKalb County's proposed language did not pass in July 2026, but does include a robust set of studies to help assess impacts and therefore is still included as an example.

Monticello, Minnesota | The applicant will demonstrate that the project will be served with and connected to City sanitary sewer and water supplies for specified data center demands and is able to demonstrate to the satisfaction of the City that the DCPUD will not create shortages in the capacity of the City's sanitary sewer and water supplies or create an inability to provide adequate utility service in other existing or planned areas of the City, including the Monticello Orderly Annexation Area.

Many jurisdictions require plans or studies directly, while others, like Monticello, Minnesota, describe the requirement as "demonstrate" which could entail both studies and/or plans to address the required information related to the sanitary sewer and water supply systems.

The examples above are specific to data centers, but some jurisdictions that may have multiple industry demands on water systems or are interested in considering data centers within broader industrial development plans may consider requirements specific to large water users generally rather than solely data centers. For example, Elko New Market in Minnesota requires a "Significant User Allocation Agreement" for any significant user of more than ten thousand (10,000) gallons of water per day or one million (1,000,000) gallons of water annually from the city's water system. This Agreement requires projected annual consumption, average daily demand, peak instantaneous demand, maximum daily peaking factor, month of the year when maximum daily peak is likely to occur, and a monthly schedule of anticipated peaking factors.

A Need for More Accurate Water Assessments in Local Code

Accurately assessing how much water a data center will use on-site and off-site is complicated and accurate assessments are difficult to obtain. Research highlights the importance of considering water use across water and electricity systems, because water is used for energy production as well. However, this is under-analyzed and incorporated in regional planning due to a lack of sufficient data on facility cooling systems, seasonal

usage, and interaction with local ecological systems.[136] More data transparency is needed to be able to more accurately assess localized stress due to direct water use and more dispersed impacts from indirect water use.[137] Although many smaller local governments may face limitations in capacity and resources to address regional impacts without coordination and support from state agencies. See Section Indirect Water Use: Water-Energy Nexus and Data Center Siting in Minnesota & Local Government Role.

The project supporting this toolkit conducted a simple regional analysis focused on municipal water use to understand regional impacts, studies like (and more detailed versions of) this may provide a picture of regional impacts to inform planning, limits to water use, and requirements for sensitive regionally-specific ecological systems. See Section Regional Water Impacts.

There are limited examples of study or planning requirements related to the energy system, but this may be changing with examples emerging in recent months. These emerging requirements reflect both individual facility requirements and understanding broader transmission impacts, understanding both of these areas may give a clearer picture of the ways a single project may impact system upgrades, related investments, and implications for electricity rates.

Example Ordinance Language: Electricity Impacts

Atlanta, Georgia | Energy consumption plan: outlining estimates of peak electricity demand and strategies for mitigating strain on local power infrastructure, including proposed improvements or alternatives to minimize the need for additional transmission lines.

Transmission line impact assessment: identifying the need for new or upgraded transmission lines to meet the data center's electricity requirements. This assessment must include the potential environmental impact on public land, including tree removal from city-owned land and rights-of-way.

Dekalb County, Georgia (not passed) | Energy Consumption and Sustainability Plan: An Energy Consumption Sustainability Plan shall contain the estimated energy load before construction and the daily operational load once constructed. This assessment shall outline:
i. Estimates of peak electricity demand and strategies for mitigating strain on local power infrastructure.

[136] Ferreira et al., *Economic, Fiscal, and Energy-Related Impacts of Data Centers in the Great Lakes Region*.
[137] Privette et al., "Data Centers Water Footprint."

ii. Proposed improvements or alternatives to minimize the need for additional transmission lines and the designated power provider.
iii. The use of sustainable alternatives for on-site water or power generation, such as solar panels, rooftop cisterns, small-scale wind turbines, or other renewable energy sources which shall offset at least 10% of total power or water usage.
iv. A decommissioning plan, in the event data infrastructure is not sold or transferred, for recycling all on-site electronic infrastructure through certified recyclers that follow Responsible Recycling (R2) Standard for Electronics Recyclers and/or e-Stewards® Standard for Responsible
Recycling and Reuse of Electronic Equipment.
v. Planned use of sustainable practices to limit or offset the center's use of power and water.
Transmission Line Impact Assessment: A Transmission Line Impact Assessment shall identify the need for new or upgraded transmission lines to meet the data center's electricity requirements. This assessment shall include the potential environmental impact on public land, including tree removal from county-owned land and rights-of-way. This plan shall also include information on the planned substation's location and shall show the screening mechanism(s), which shall include a minimum of an eight (8) foot tall decorative brick wall if potentially visible by the public.

Eden Prairie, Minnesota (proposed) | Respective to the City's Climate Action Plan goals, the applicant must provide a narrative demonstrating how the data center project aligns with the following sustainability objectives:

a. Positively impacts on the goal of community-wide carbon neutrality by 2050.
b. Contributes to the interim goal that 80% of all new construction projects are net zero emissions by 2040
c. Contributes to the interim goal that the City meets 10% of its electricity load through the use of on-site solar by 2040.

St. Louis, Missouri (proposed) | Whether the applicant has: an executed Interconnection Study Agreement, COnstruction Agreement, and/or Electric Service Agreement with an electric service provider,; had received a Whill Serve letter from an electric service provider; and/or has proof of on-site, connected to the grid generation or the behind the meter that demonstrates how the applicant will meet renewable energy thresholds. If so, the applicant shall provide copies in their application.

These examples provide information and detailed directly to local governments, while other requirements reply primarily on utility assessments for feasibility, such as a letter from the utility confirming sufficient proximity and capacity to serve, including the amount of energy and voltage level for phases and final buildout (York County, Virginia); although even this level of information may be more than otherwise received about energy consumption.

Some requirements, like St. Louis' proposed application requirement for interconnection or other utility studies, leverage studies that are already being done by electric utilities and are just requiring those to be shared with the city. Other requirements include new studies or plans specific to meeting local code requirements.

Other examples of studies or plans required in local code include: tree preservation and reforestation (Atlanta and Dekalb County, GA), environmental impacts and resource conservation study (Eden Prairie, Minnesota - proposed) and fuel delivery and refueling plan (St. Louis, Missouri - proposed).

Other Mechanisms for Transparency

Local governments throughout the US have been using energy benchmarking and disclosure ordinances to track and disclose information about building energy performance for decades. Historically, these policies have focused primarily on commercial[138] and multi-family residential buildings and have often exempted industrial buildings. But some existing ordinances, such as Salt Lake City, require commercial stand-alone data centers to benchmark energy consumption. For many jurisdictions, extending benchmarking and disclosure ordinances to data centers – or other industrial properties – will require an ordinance update, as is currently proposed in Chicago.[139] See Section Energy Efficiency and Conservation.

Performance Requirements: Climate, Energy, and Water

Existing examples of performance requirements include requirements specific to data centers and examples of requirements that apply to all industrial developments, including data centers. For example, Salt Lake City has a daily limit for new or expanded commercial and industrial uses of 200,000 gallons of potable water per day – this requirement is supported by a required water use report. Santa Clara, California has a requirement to maximize recycled water use for multifamily and non-residential buildings, including commercial and industrial and construction activities. Both of these examples demonstrate addressing commercial and industrial water use generally.

Multiple justifications require data centers to demonstrate water conservation measures. Language requiring conservation varies, from "shall employ water conservation methods (e.g. rainwater harvesting and water recycling systems)" (York County, Virginia) to specific references to cooling systems or low-water fixtures (Eden Prairie, Minnesota - proposed).

The Georgetown Climate Center has proposed several possible local requirements: incorporate energy efficiency into the design of data center servers, cooling units, and building envelope; require a minimum percentage of all roof space to be covered with solar arrays to partially offset electricity demand from the facility; require a percentage of on-site backup needs to be met by battery storage rather than generators; and monitor and periodically report energy efficiency and emissions data. GCC recommends including these as requirements in data center-specific overlay zones (as discussed in

[138] Institute for Market Transformation, *Comparison of U.S. Commercial Building Energy Benchmarking and Transparency Policies*.
[139] Evans, "Data Centers Should Be Required To Disclose Water And Energy Use, City Panel Recommends."

Section Zoning Classification and Mechanisms). There may be opportunity to jointly address climate, energy, and water using systems such as waste heat re-use (see Section Waste Heat Recovery & Reuse).

To date, very few local codes detail data center renewable energy standards. The only example identified is St. Louis, Missouri includes a proposed requirement for data centers to demonstrate compliance with renewable energy targets through Renewable Energy Certificates (RECs) and/or on-site renewable energy generation and storage.

Minnesota Cities are Limited by the State Building Code

Local governments in Minnesota cannot enact building code requirements beyond what the State Building Code, this includes the energy code which covers specifications related to how energy is used in a building.

Municipalities seeking to encourage renewable energy use (solar, geothermal, etc.) likely need to consider mechanisms other than building code requirements.

Outside of the Building Code, Minnesota requires that qualified large-scale data centers demonstrate certification from a set of possible sustainable design or green building standards. See Section Energy Efficiency and Conservation.

Jurisdictions are increasingly requiring Tier 4 generators in their local code which have more effective and advanced capture of Nitrogen Oxides (NOx) and Particulate Matter (PM).

Example Ordinance Language: Backup Power Generation

Eden Prairie, Minnesota **(proposed)** | Proof or certification that any backup power generators will be Tier 4 backup generators to limit air pollution as certified by the EPA.

Frederick County, Maryland | Generators must meet or exceed Tier 4 or equivalent emission standards as defined by the United States Environmental Protection Agency.

Site Restoration, Remediation, or Decommissioning

Conversations throughout this project raised questions about the longevity of data center projects and the impacts on natural systems or required maintenance of infrastructure that could outlast a project. Concurrently, others have been raising questions about thinking beyond the life of a data center project. Issues surrounding decommissioning include the impact of a large tax loss to local budgets, pressure to fill the void left by a large facility, uncertain future of the site (ownership, redevelopment). Early planning for the end-of-life of a data center enables upfront decisions, assessments, and requirements that reflect the "lifecycle thinking [that] should be embedded into every data center agreement, investment, and plan."[140] Local governments are starting to include planning and financial requirements to address the lifecycle of data centers and the implications that may have on a range of issues.

Table 11. Example decommissioning language included in local ordinances

Decommissioning requirements	**Susquehanna County, Pennsylvania** Requires decommissioning after 12 months of discontinued use. Decommissioning entails removing hazardous materials and contents, grading and re-seeding the site. **Smithfield Township, Pennsylvania** Requires the site "restored to a condition that existed prior to the project or the facility altered in a manner that will allow for a beneficial reuse of the property." Including removal of equipment, structures, etc. that will no longer be used. Also requires a "decommissioning agreement" as a part of the approval process to ensure decommissioning requirements are met within 12 months of ceasing operations. **Divide County, North Dakota** *Decommissioning shall include removal of all improvements, so that any agricultural ground upon which the improvement was located is again tillable and suitable for agricultural uses.*
Decommissioning studies or plans	**Susquehanna County, Pennsylvania**

[140] Hamilton, "Commentary."

	An independent and certified Professional Engineer shall be retained to estimate the total cost of decommissioning ("Decommissioning Costs") without regard to salvage value of the equipment, and the cost of decommissioning net salvage value of the equipment ("Net Decommissioning Costs"). Said estimates shall be *submitted to the Planning Commission after the first year of operation and every fifth year thereafter.* **Cass County, Missouri** *A reclamation plan for returning the subject property to its original condition shall be required with the application. The plan shall be binding to the extent that it shall indicate the intent of the reclamation. This initial reclamation plan shall be revised in advance of the time that such reclamation efforts would begin. At such time, the revised and final plan shall be submitted to the BZA for approval. It shall be reviewed as part of a public hearing process, under the same procedures as the original application.* **Eden Prairie, Minnesota** includes a requirement for a decommissioning study in the proposed ordinance.
Financial requirements	**Susquehanna County, Pennsylvania** *The Facility Owner or Operator shall post and maintain Decommissioning Funds in an amount equal to Net Decommissioning Costs +10%. The Decommissioning* *Funds shall be posted and maintained with a bonding company, Federal or Commonwealth chartered lending institution…* **Cass County, Missouri** *The BZA may require a bond or other method of financial assurance acceptable to the County in the amount that will guarantee the reclamation of the site within a period of time to be specified and approved by the BZA. Such surety shall be properly executed prior to any grading or construction, and shall be released in segments upon written approval of the County.* **Smithfield Township, Pennsylvania** The decommissioning agreement shall include a bond or letter of credit that

	demonstrates adequate financing is in place for decommissioning. **Divide County, North Dakota** *Abandonment or Ceasing: A bond shall be posted when filing an application and the applicant has been notified that the land use applied for is in violation of this ordinance. The applicant shall post a bond equal to one hundred fifty percent (150%) of the amount estimated by a licensed engineer and approved by the Divide County Planning and Zoning Committee, to be required to terminate the violation and bring the land or structure into compliance.*

Beyond decommissioning, local governments could also consider repurposing for public use. Further, the issues raised by data centers may highlight lifecycle questions that local governments may want to consider across large industrial projects, not exclusively data centers.[141]

In addition to mechanisms that ensure end-of-life considerations and financial requirements, some jurisdictions include risk mitigation planning and measures throughout the life of a project. For example, Monticello, Minnesota requires financial guarantees for the installation and extension of municipal utilities and infrastructure to ensure infrastructure is not stranded or insufficiently extended. Eden Prairie's proposed ordinance includes additional studies like a "community impacts study" which looks more closely at a range of community impacts (emergency services, solid waste, schools, etc.) that may have implications for approvals, siting, design, and end-of-life planning

[141] Murthy, "Decommissioning Data Centers."

07 | FAQ Guide

This section includes

- Data Center Basics
- Siting and Localized Impacts
- Local Economy and Fiscal Effects
- Electricity
- Water, Wastewater, and Stormwater

Data Center Basics

Why do hyperscale data centers raise a unique set of local issues?

A hyperscale data center is a very large data center built to support large-scale cloud and digital services, including storage, computing, and artificial intelligence workloads.

A hyperscale data center may be a single large building or a multi-building campus. Its building footprint (square feet) matters, but its power demand is often the more important number which is driven density (watt/square foot). The threshold for hyperscale data centers varies, with 100MW used in Minnesota Statutes, but some local ordinances focused on facilities 20 MW or larger given estimates of when a facility may impact the larger grid. A 100 MW facility can resemble the peak electric load of a city of roughly 100,000 people; some of the larger proposed campuses can be several times that size. Generally, 100 MW may be used as a quick indicator of whether a data center meets the threshold for a hyperscale facility. But local governments may be interested in not only the impacts of a single building, but a campus of multiple buildings or multiple buildings (of varying or sometimes smaller sizes) on different sites but in proximity to one another.

Compared with smaller data centers, hyperscale campuses may require larger sites, new substations or power lines, more backup generators, more cooling equipment, and more careful review of water, wastewater, stormwater, noise, and tax impacts. For more information:

See sections:

- What is a Data Center?
- Defining Data Centers

What are the main systems in a data center?

The main systems are server rooms, cooling systems, electric infrastructure, backup power systems, fire protection, security, and site infrastructure.

Data centers require cooling because servers and related computing equipment give off heat while they operate. The more computing work a facility performs, the more heat it must remove. Cooling equipment can affect electricity use, water use, and ordinary operating noise. For more information on cooling and related impacts:

See sections:

- Direct Water Use
- Open-Loop and Closed-Loop Cooling Systems
- Waste Heat Recovery & Reuse
- Mitigating Noise Pollution: Standards and Studies

Data centers also require electric infrastructure to serve a large and continuous load. Most data center facilities have backup generators to maintain operations during power outages. For information on electricity requirements and backup generators:

See sections:

- Data Center Electricity Use
- Backup Generator Use
- Mitigating Noise Pollution: Standards and Studies
- Generator Testing Days and Hours

For local governments, the most visible project components are usually the buildings, roads, fencing, lighting, cooling equipment, electric substations or transmission connections, backup generators, stormwater systems, and water or wastewater connections. For discussions of site design and performance:

See sections:

- Building Design & Performance Standards

Siting and Localized Impacts

How can a data center affect nearby neighborhoods and community facilities?

Impacts differ during construction and operation. Construction can bring traffic, dust, noise, and road wear. Operation can bring visual impacts, lighting, cooling noise, generator testing, security fencing, and limits on future nearby land uses.

During construction, residents may experience heavy truck traffic, construction noise, dust, temporary road closures, and pressure on local roads. Construction can also last longer than residents expect if the project is built in phases.

During operation, the main local impacts are usually land use, visual aesthetics, lighting, sound from mechanical equipment, backup generator testing, stormwater runoff, water and wastewater service, and emergency response. These impacts depend heavily on the site design, distance from residential areas, topography, buffers, equipment location, and operating practices. For more information:

See sections:

- Local Governments in Data Center Siting in Minnesota
- Zoning Classification and Mechanisms
- Mitigating Noise Pollution: Standards and Studies
- Site Design & Performance Standards
- Performance Requirements: Climate, Energy, and Water

What noise concerns do data centers raise?

There are two main noise issues: operating noise and generator-testing noise.

Operating noise comes from cooling equipment, fans, transformers, and other electrical or mechanical equipment. This sound may be steady. In a quiet rural area, a steady hum can be noticeable even when the measured decibel level is not especially high. Effectively addressing noise in local ordinances has become a key issue and debate often surrounds how to not only address loud and high-pitched noises, but the lower frequency hum from data centers. Local governments in Minnesota use the MPCA's noise standards.

Backup generator noise is different. Generators usually do not run all the time. They are often used during outages and during periodic testing. Backup generators are often tested monthly for at least 30 minutes and may undergo additional annual testing lasting 90 minutes or more. To mitigate noise from generators, some local governments are explicit in their use during emergencies and specify testing hours and days.

In addition to noise standards, testing times, it is increasingly common to see requirements for noise studies. For a noise study to address the full range of noise concerns, specifics to consider include assumptions about regular operations, generator testing, number of generators running at once, receptor locations, and property-line limits.

Noise may also be factored into site and building design considerations, including set backs, site requirements for berms, plantings, or screening to help with noise attenuation. For more information:

See sections:

- Mitigating Noise Pollution: Standards and Studies
- Backup Generator Use
- Site Design & Performance Standards
- Building Design & Performance Standards

What local air pollution concerns do data centers raise?

The main source of direct local air pollution is backup generators, most often diesel-powered.

Data centers use backup generators to maintain power during outages. Operators also test generators periodically to make sure they work. Those testing periods can produce local emissions even if no power outage occurs.

Diesel generators can emit nitrogen oxides, particulate matter, and other pollutants regulated by the US Environmental Protection Agency and Minnesota Pollution Control Agency. Newer Tier 4 diesel generators are much cleaner than older diesel units, especially compared with Tier 2 units, but they do not eliminate emissions. Natural gas generators may reduce some local pollutants, but they may have similar emissions across certain pollutants and may raise reliability, fuel storage, or cost questions.

The most useful project facts are the number of generators, fuel type, emissions tier, testing schedule, testing duration, limits on simultaneous testing, and applicable air permits. As noted with noise, some local jurisdictions are limiting the times (days, hours) when testing can occur, limiting use to emergencies (if desired), and requiring the use of cleaner Tier 4 generators. For more information:

See sections:

- Backup Generator Use
- Generator Testing Days and Hours

What public safety and emergency response issues may arise?

Data centers may require emergency planning for fire response, fuel storage, spill response, site access, battery systems if used, and coordination with local emergency services.

A large data center may include diesel tanks, backup generators, electrical equipment, security fencing, fire-suppression systems, and possibly battery energy storage. Local fire, police, emergency-management, and public works staff may need information about site access, shutoff procedures, hazardous materials, emergency contacts, and training needs.

If the project creates new emergency-response burdens, a development agreement or other local approval may address training, access, cost reimbursement, or equipment needs, depending on state and local law. Additionally, impact assessments may need to incorporate water demand assessments for emergency scenarios.

See section:

- Project Planning & Development Agreement

Local Economy and Fiscal Effects

How can a data center affect local tax revenues?

The main long-term local economic benefit is usually tax base, not permanent employment.

Data centers can add substantial real property value and, in some states, taxable personal property or equipment value. That can increase local tax revenues for cities, counties, school districts, and other taxing jurisdictions. A data center can have high taxable value because of the buildings, land improvements, electrical equipment, and sometimes taxable computer or business equipment, depending on state law.

Tax abatements or incentives reduce some of those benefits, but do not necessarily eliminate them. The local fiscal question is the expected net benefit after accounting for any abatement, infrastructure costs, public-service costs, and other commitments. For more information:

See section:

- Economic Considerations

What kinds of jobs do hyperscale data centers create?

Large, hyperscale data centers typically create a large number of construction jobs given the size of the facility, but typically create fewer long-term operational jobs.

Data centers can create many temporary construction jobs. Construction may involve large numbers of workers over several years, especially for a large phased campus. Those jobs may benefit regional contractors, electricians, equipment operators, engineers, and construction trades.

The permanent workforce is usually much smaller than the construction workforce. Long-term jobs may include technicians, security, facility maintenance, operations, and management. A hyperscale data center may be a valuable employer, but it is not usually a large permanent jobs engine in the same way as a hospital, university, or labor-intensive factory. For more information:

See section:

- Economic Considerations

Electricity

How much electricity do data centers use?

Data centers are often described by electrical demand, such as 20 MW, 100 MW, or 300 MW. A large hyperscale campus can use electricity on the scale of a city. At the upper end, proposed campuses can require more power than many cities use at peak.

Estimates of current and future data center electricity use vary widely. Demand is expected to grow, but projections differ. For local review, national estimates are less important than the project's own proposed maximum load, ramp schedule, and utility-service plan. National forecasts are also prone to some errors and should be used to support decisions, but with an understanding of the assumptions and potential errors. A facility's acreage or square footage may give a rough clue, but the most useful measure is the number of megawatts the facility is designed to use. For more information:

See section:

- Data Center Electricity Use
- Evaluate Feasibility: Power Supply, Water Availability, and Wastewater Capacity
- Project Planning & Development Agreement

What grid upgrades might a data center require?

Depending on size and local grid capacity, a data center may require distribution upgrades, dedicated feeders, a new substation, transmission upgrades, or a high-voltage transmission connection.

Smaller data centers may connect to existing distribution circuits, although the utility may still need to upgrade feeders, transformers, substations, or protective equipment. Medium-size facilities may need dedicated feeders or substation work. Large hyperscale campuses are more likely to require a dedicated substation and a connection to higher-voltage power lines. For more information:

See sections:

- What is a Data Center?
- Data Center Electricity Use
- Electricity Transmission System in Southeast Minnesota

How can a data center affect electricity rates?

A data center can raise rates, reduce rates, or have little effect. The answer depends on cost allocation, tariff design, utility investment, and who bears the risk if the project changes.

In a regulated utility system, utilities recover approved costs through rates. A data center can push rates upward if serving it requires major new investments and the cost of those investments is spread to other customers. This risk is larger if the utility builds infrastructure for expected load and the data center is delayed, reduced, or canceled.

The effect can also run the other way. If a data center pays the incremental costs it causes and contributes to fixed system costs, its large and steady electricity use can help spread some costs across more sales. That can reduce average rates compared to what they would have been without the data center.

The key question is who pays for the infrastructure and electricity to serve the data center. A good tariff or contract should also address the risk that the project is delayed, downsized, canceled, or uses less power than forecast. Regulators and utilities can reduce that risk through project-specific cost assignment, collateral, minimum payment obligations, exit fees, and clear rules for shared upgrades. For more information:

See sections:

- Cost of Service Regulation
- Mitigating Cost Shifting from Industry to Other Users

How can the risk of ratepayers paying for a canceled or downsized data center be reduced?

Utilities and regulators can use long-term contracts, minimum payment obligations, collateral, letters of credit, direct assignment of project-specific costs, and exit fees.

If a utility builds a dedicated feeder, substation, or other direct connection for a data center, those costs are usually easier to assign to the data center rather than other customers. If upgrades also benefit the broader grid, cost allocation is more difficult and should be addressed before large investments are made.

Contracts may require the customer to pay for a minimum amount of service even if it uses less electricity than expected. They may also require security deposits, letters of credit, or other financial assurance before major utility investments begin. Exit fees or capacity reservation charges can help protect other customers if the project withdraws after the utility has already invested.

See sections:

- Cost of Service Regulation
- Mitigating Cost Shifting from Industry to Other Users
- Minnesota's Very-Large Customer Class

Who determines how large loads, such as data centers, pay for electricity?

Large electric customers usually do not simply pay the same way a home or small business does. They may be served under a large-load tariff, a special contract, or interconnection rules that assign costs for new power lines, substations, and other upgrades.

For investor-owned utilities, these arrangements are often reviewed by a state public utility commission. Rural cooperatives and municipal utilities may follow different rules. The main issues are cost allocation, minimum payments, collateral, exit fees, reliability, and protection against stranded costs.

In Minnesota, very large customer arrangements with covered public utilities are reviewed under Minn. Stat. § 216B.1622, and qualified large-scale data centers may also pay fees under Minn. Stat. § 216B.72.

See sections:

- Minnesota's Very-Large Customer Class

Can data centers reduce power use during peak times?

Some can, but many hyperscale facilities are built for continuous, high-reliability operation.

Data centers typically require continuous power, which can make them difficult to serve during stressed grid conditions. Still, some data centers may be able to shift certain workloads, use onsite resources, or reduce demand during a few high-stress hours each year.

Different types of compute loads have different levels of flexibility. Crypto mining facilities are often more willing to curtail because they can suspend operations when electricity prices are high or when grid programs pay them to reduce demand. Hyperscale cloud and artificial-intelligence (AI) facilities may be less flexible because their customers often require high availability, although the discussion around AI data centers and flexibility is ongoing and changing.

Even limited flexibility can matter because the grid is built to serve peak demand. If a large load can reliably reduce demand during the tightest hours, it may reduce the cost of serving that load. That flexibility must be real, measurable, and enforceable to count in utility planning. For more information:

See section:

- Flexibility

Can onsite generation, solar panels, or batteries meet a data center's electricity needs?

They can help in some cases, but they rarely eliminate the need for grid service or backup power.

Onsite energy resources can include solar, batteries, fuel cells, natural gas turbines, or other resources. These options may help a data center manage costs, improve reliability, or reduce demand during peak periods. They can also require additional land, equipment, permits, and infrastructure.

Onsite solar usually cannot match the scale and timing of a hyperscale facility's round-the-clock electricity demand. Solar produces power only when the sun is available, while data centers typically need continuous power. Batteries can help with short-duration backup, demand management, and reliability, but they usually do not replace the grid or long-duration backup power for a large hyperscale campus.

Backup generators remain common because operators need the facility to keep running during outages. Those generators are most often diesel-powered, although some facilities may use natural gas or other technologies. For more information:

See sections:

- Backup Generator Use
- Climate Goals and Renewable Energy Use

Can data centers buy renewable power?

Yes. Many data center owners buy renewable power or renewable energy credits, but that does not always mean the facility is physically powered by renewable energy every hour.

Data center owners often enter into power purchase agreements with renewable energy projects. They may also buy renewable energy credits. A renewable energy credit is a certificate associated with renewable electricity generation; buying credits is not the same as receiving that specific electric energy at the facility. These arrangements can support new renewable generation and help companies meet climate or sustainability goals.

The electricity physically serving the facility usually comes from the grid. Unless the facility is directly connected to a specific generator, electricity from many resources is mixed on the system. A claim that a data center buys enough renewable energy over a year is different from a claim that it is powered by carbon-free electricity every hour. For more information:

See section:

- Climate Goals and Renewable Energy Use

What are the climate concerns associated with data centers?

Large data centers increase electricity demand. If that demand is served by fossil fuel generation or delays fossil plant retirements, emissions may remain higher than they would otherwise have been.

Data centers generally rely on the generation mix available from the utility or regional grid that serves them. Renewable procurement can reduce emissions, especially when it supports new clean resources. The effect depends on the details: whether the clean power is additional to what would have been built anyway, whether it is available when the data center needs power, and whether the project changes the operation of the broader grid.

See sections:

- Climate Goals and Renewable Energy Use

Water, Wastewater, and Stormwater

How much water do data centers need?

Water use depends heavily on cooling design, climate, and site operations.

The main differences in water demand are dictated by cooling systems. The three common categories are open-loop cooling, closed-loop cooling, and air cooling.

Open-loop cooling systems generally use the most water because they rely on water evaporation. Closed-loop cooling systems reuse water and require smaller amounts of makeup water over time. Air-cooled systems use little or no water for cooling, although they may still use water for bathrooms, offices, fire protection, landscaping, humidification, or other site needs. Many data center facilities use some combination of cooling systems to remove heat directly from equipment and to remove heat from the overall facility.

The most important project-specific numbers are average daily water use, peak-day water use, seasonal variation, water source, cooling design, and whether the demand would limit future community growth or other economic development goals.

See sections:

- Direct Water Use
- Open-Loop and Closed-Loop Cooling Systems

How does cooling design affect water and electricity use?

Cooling design often involves a tradeoff between water use and electricity use.

Water-based cooling systems can reduce the electricity needed for cooling but increase water demand. Air cooling reduces water use but may require more electricity for fans and mechanical cooling, especially during hot weather.

The practical question is which resource is scarcer at the site: water capacity or electric capacity. For more information:

See section:

- Indirect Water Use: Water-Energy Nexus

Do data centers use municipal water or drill their own wells?

Most data centers prefer municipal water and wastewater service when it is available.

Many data centers prefer municipal service because it is reliable, easier to permit, and easier to operate. Municipal service also allows local governments to review capacity and impose service terms. Data centers, like other uses, follow Minnesota state water allocation priorities during times of limited supply, even if water is provided by municipal water service.

In some places, a project may seek private wells, industrial water supply, recycled water, or other sources. For more information:

See section:

- Water Supply and Availability

Can local governments require or negotiate lower-water designs?

Often yes, depending on local authority, project timing, and the approvals the developer needs.

Data center developers may come to a municipality with a preferred design. Local governments may be able to negotiate or condition approvals on design changes before approving zoning, development agreements, utility service, or other local approvals.

See sections:

- Evaluate Feasibility: Power Supply, Water Availability, and Wastewater Capacity
- Project Planning & Development Agreement

What is in data center wastewater?

Usually ordinary sanitary wastewater, but if water-based cooling is used, cooling-system discharge that may contain heat, dissolved minerals, coolants, and treatment chemicals.

A data center operates servers, cooling equipment, electrical systems, backup power, and building systems. For many facilities, especially air-cooled facilities, wastewater may look similar to office or light-industrial wastewater.

Water-based cooling can create additional concerns. As water evaporates or circulates, dissolved minerals in the water can become more concentrated. Cooling-system water may also involve pH control, corrosion control, scale control, or biological control. Those issues may require pretreatment, limits on discharge, or operational controls. Closed-loop coolants are raising emerging questions about discharge that may need to be monitored going forward.

See section:

- Wastewater Systems and Use

Do data centers treat their own wastewater?

Many data centers rely on municipal wastewater service, but some projects may include pretreatment, recycling, holding ponds, or other onsite systems.

Municipal wastewater service is often attractive because it is reliable and avoids the cost of building a separate treatment system. Some data centers may use onsite pretreatment or water recycling if local wastewater capacity is limited, if the cooling design makes reuse practical, or if concerns about wastewater effluent may require pretesting.

Some communities have negotiated holding ponds or other storage to manage emergency discharges or unusual operating conditions. Whether that is needed depends on the cooling system, wastewater quality, local treatment capacity, and the terms of utility service.

See section:

- Wastewater Systems and Use

Can data centers use recycled water?

Yes, in some cases, especially when a suitable recycled-water source is nearby.

Recycled water or greywater can reduce demand for potable water. It works best when the source is close to the data center and the water quality matches the cooling system's needs. Reuse may be impractical if the source is far away or if the water quality does not match the cooling system's needs without additional treatment.

See section:

- Recycled Water Use

How do data centers affect stormwater runoff?

Data centers can create large impervious surfaces through buildings, roads, parking, substations, and other site improvements. A campus with large roofs, internal roads, parking areas, and substation pads can change how fast water leaves the site during heavy rain.

Stormwater review should consider grading, runoff rate, runoff volume, erosion control, wetlands, drainage to neighboring properties, and long-term maintenance of stormwater features. Large sites may also change where water flows during heavy rain.

Stormwater impacts are usually handled through state and local permitting, site-plan review, grading plans, and stormwater management requirements.

In Minnesota, construction sites disturbing one or more acres generally require coverage under the Minnesota Pollution Control Agency construction stormwater permit.

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