CLINTON COUNTY BOARD OF COMMISSIONERS

Chairperson
Bruce DeLong
Vice-Chairperson
Zach Rudat
Members
Nicole Fickes
Brian Hurtekant
Robert Showers
John Andrews
Dwight Washington

COURTHOUSE
100 E. STATE STREET
ST. JOHNS, MICHIGAN 48879-1571
989-224-5120

Administrator/Controller
John F. Fuentes
Clerk of the Board
Debra A. Sutherland

AGENDA

CLINTON COUNTY BOARD OF COMMISSIONERS MEETING
Board of Commissioners Room, Courthouse
100 E. State St., Suite 2200, St. Johns

TUESDAY, MARCH 31, 2026

9:00 a.m. Call to Order
Moment of Silence
Pledge of Allegiance
Roll Call
Approval of Agenda
Presentation of Minutes
- March 12, 2026 Board of Commissioners Special Meeting Minutes

Communications
1. Eagle Township Resolution Adopting an Ordinance Amending the Interim Zoning Ordinance
2. Eagle Township Resolution Imposing a Moratorium on the Issuance of Permits, Licenses, or Approvals for Data Centers and Direct the Planning Commission to Study Data Center Uses
3. Victor Township Planning Commission Resolution Regarding Clarification and Amendment of Clinton County Kennel Ordinance, Licensing, and Inspection Practices
4. Victor Township Resolution Regarding Clarification and Amendment of Clinton County Kennel Ordinance, Licensing and Inspection Practices
5. Wexford County Resolution in Support of Repealing MCL 46.415(2)
6. Washtenaw County Resolution Supporting State Legislative Action for Fiscal Accountability and Local Zoning Authority
7. LEAP Letter of Support

9:03 a.m. Administrator/Controller's Report

9:06 a.m. Public Comments *(limit of 3 minutes per speaker)*

9:15 a.m. Clinton County Sheriff Annual Report – Sheriff Dush

9:25 a.m. Mid-Michigan District Health Department Update

9:26 a.m. Approval of Commissioners' Expense Accounts

9:27 a.m. COMMITTEE MEETING REPORTS:

- Ways & Means Committee Meeting – March 26, 2026
- Human Resources Committee Meeting – March 26, 2026

9:37 a.m. Commissioners' Comments

Adjournment

PACKET INFORMATION IS CURRENT AS OF POSTING DATE. NOTE: ADDITIONAL INFORMATION MAY BE PRESENTED ON SCHEDULED AGENDA ITEMS. AGENDA ITEMS MAY ALSO BE ADDED DUE TO BUSINESS NEEDS. TO REQUEST ACCOMMODATIONS OR MATERIALS IN AN ALTERNATIVE FORMAT, PLEASE CONTACT ADMINISTRATIVE SERVICES AT 989-224-5120 OR VIA EMAIL AT ADMIN@CLINTON-COUNTY.ORG NO LATER THAN 48 HOURS PRIOR TO THE MEETING.

LINK to County YouTube Channel: https://www.youtube.com/@ClintonCounty-MI

WAYS AND MEANS COMMITTEE
MARCH 26, 2026 AT 9:00 A.M.
CLINTON COUNTY COURTHOUSE
BOARD OF COMMISSIONERS ROOM
100 EAST STATE STREET, ST. JOHNS, MI 48879

1	9:00	CALL TO ORDER, ADDITIONS TO THE AGENDA
2	9:02	LIMITED PUBLIC COMMENTS (LIMIT OF 3 MINUTES PER SPEAKER)
3	9:05	CLINTON AREA TRANSIT – ANNUAL UPDATE (MALISSA SCHUTT)
4	9:20	VETERAN AFFAIRS UPDATE (AMY POCAN)
5	9:35	ROAD COMMISSION UPDATE (MIKE FREDERICK AND GAIL WATKINS)
6	9:50	PARKS & GREEN SPACE COMMISSION – NON-MOTORIZED REGIONAL TRAIL CONNECTION LETTER OF SUPPORT (KYLE THORNTON)
7	10:05	WASTE MANAGEMENT (KATE NEESE): A. RECYCLING SERVICES AGREEMENT WITH GRANGER FOR SPECIAL COLLECTION EVENTS B. APPROVE PARTICIPATION IN SCRAP TIRE GRANT OPPORTUNITY
8	10:20	FACILITY AND FLEET SERVICES – 2026 MAJOR CAPITAL IMPROVEMENT PROJECT STATUS UPDATE (ROB WOOTEN)
9	10:35	REVIEW RFP FOR JAIL DESIGN DEVELOPMENT SERVICES AND COST ESTIMATES (ROB WOOTEN)
10	10:50	OPIOID LITIGATION SETTLEMENT RESOLUTION (ADMINISTRATION)
11	11:00	PLANNING UPDATE (LYNN WILSON)
12	11:10	APPROVAL OF BUDGET CALENDAR (ADMINISTRATION)
13	11:15	APRIL 2026 OPEN MEETINGS AND EVENTS CALENDAR (ADMINISTRATION)
14	11:20	ACCOUNTS PAYABLE INVOICES PAID TOTALS
15	11:25	COMMISSIONERS' COMMENTS
16	11:30	ADMINISTRATOR'S REPORT
17	11:35	ANY OTHER BUSINESS

HUMAN RESOURCES COMMITTEE
MARCH 26, 2026 AT 10:00 A.M.
(OR IMMEDIATELY FOLLOWING THE WAYS AND MEANS COMMITTEE MEETING)
CLINTON COUNTY COURTHOUSE
BOARD OF COMMISSIONERS ROOM
100 EAST STATE STREET, ST. JOHNS, MI 48879

1	10:00	CALL TO ORDER, ADDITIONS TO THE AGENDA
2	10:02	LIMITED PUBLIC COMMENTS (LIMIT OF 3 MINUTES PER SPEAKER)
3	10:05	RESOLUTION – NATIONAL 911 TELECOMMUNICATORS WEEK IN APRIL (ADMINISTRATION)
4	10:10	PROSECUTING ATTORNEY REQUEST (ADMINISTRATION)
5	10:20	COUNTY CLERK/ROD REQUEST (ADMINISTRATION)
6	10:30	PLANNING & ZONING – HR CONSULTING PROPOSAL (ADMINISTRATION) –NO ATTACHMENT
7	10:40	COMMITTEE/COMMISSION APPOINTMENTS (ADMINISTRATION)
8	10:50	COMMISSIONERS' COMMENTS
9	11:00	ADMINISTRATOR'S REPORT
10	11:05	ANY OTHER BUSINESS

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This meeting is posted to the Clinton County Meetings YouTube Channel: **https://www.youtube.com/@ClintonCounty-MI**

DATE 03/12/2026

The Clinton County Board of Commissioners met on Thursday, March 12, 2026, at 9:00 a.m. with Chairperson Bruce DeLong presiding.

MOMENT OF SILENCE AND PLEDGE OF ALLEGIANCE

Chairperson DeLong called for a moment of silence. The pledge of allegiance was given to the flag of the United States of America.

ROLL CALL

Roll was called with a quorum of the members in attendance:
Nicole Fickes, Zach Rudat, Bruce DeLong, Brian Hurtekant, Robert Showers, John Andrews and Dwight Washington.

COUNTY PERSONNEL

John Fuentes, Todd Campbell and Debra Sutherland

VISITORS

Eric Voisinet, Kevin Garvey, Jennings West, Kathy George, Dawn Levey, Bruce Levey, Louis Faivor, Dan Smith, Joe Thelen, Nancy Hughson, John Weber, Rob Mack, Larry Kindel, Donna Graham, Jon Thelen, Theresa Owen, Ed Thelen, Maggie Sayles, Val Vail Shirey, Jim Lawless and Dawn Lawless.

AGENDA

The agenda was presented for approval.

BOARD ACTION: Commissioner Showers moved, seconded by Commissioner Rudat to approve the agenda as printed. Motion carried.

APPROVAL OF MINUTES

The following minutes were presented for review and approval:
- February 24, 2026 Board of Commissioners Meeting

BOARD ACTION: Commissioner Showers moved, seconded by Commissioner Washington to approve the minutes as printed. Motion carried.

PUBLIC COMMENTS

Chairperson DeLong called for public comments. The following individuals offered public comments:
- Bruce Levey, Duplain Township Supervisor;
- Larry Kindel, Greenbush Township Trustee;
- Jennings West, Ovid Township Supervisor.

DISCUSSION ON PLANNING & ZONING SERVICES

Administrator/Controller Fuentes provided a brief overview of the materials included in the meeting packet and summarized how prior meeting discussions led to the requests presented.

Chairperson DeLong called for discussion.

Discussion held.

BOARD ACTION: Commissioner Rudat moved, seconded by Commissioner Fickes that the County preserves Planning and Zoning at the County level indefinitely. Voting on the motion by roll call vote, those voting aye were Commissioners Rudat, Fickes, Hurtekant and Delong. Those voting nay were Andrews, Showers, and Washington. Four ayes, three nays. Motion carried.

BOARD ACTION: Commissioner Showers moved, seconded by Commissioner Andrews to create an equitable payment system that will recognize what each Township should contribute to the yearly shortfall, and they will be responsible to take care of the shortfall for the Planning and Zoning services that they use.

Discussion followed.

Commissioner Showers amended his motion, seconded by Commissioner Andrews to create an equitable payment system that will recognize what each Township should contribute to the yearly shortfall beginning in 2027. Voting on the motion by roll call vote, those voting aye were Commissioners Andrews, Showers, Washington and Hurtekant. Those voting nay were Commissioners Rudat, Fickes and DeLong. Four ayes, three nays. Motion carried.

PLANNING COMMISSION APPOINTMENTS

APPOINTMENT OF REBECCA BRINKLEY BATTERBEE TO THE PLANNING COMMISSION

BOARD ACTION: Commissioner Fickes moved, seconded by Commissioner Showers to appoint Rebecca Brinkley Batterbee to the Planning Commission for the remainder of a three (3) year term expiring May 1, 2028. Chairperson DeLong called for further nominations. Commissioner Rudat moved to nominate Stephanie Schaefer. Chairperson DeLong asked for support. There was no support for the nomination. Nominations closed. Commissioner Rudat asked for the record to reflect that the nominee, Rebecca Brinkley Batterbee resided in Bingham Township. Motion carried.

APPOINTMENT OF BRIAN BYERS TO THE PLANNING COMMISSION

BOARD ACTION: Commissioner Fickes called for further nominations to appointment to the Planning Commission for the remainder of a three (3) year term expiring May 1, 2026.

Commissioner Washington nominated Jason Almerigi, seconded by Commissioner Andrews.

Commissioner Showers nominated Brian Byers of Dewitt Township, seconded by Commissioner Hurtekant.

Commissioner Rudat nominated Bill Irrer, no support.

Nominations closed. Voting on the motion by roll call vote, those voting Commissioner Showers(Byers), Washington(Almerigi), Hurtekant(Byers), Fickes(Byers), Andrews(Almerigi), Rudat(Byers) and DeLong(Byers). Five for Brian Byers, two for Jason Almerifi. Brian Byers is appointed to the Planning Commission for the remainder of a three (3) year term expiring May 1, 2026.

REAPPOINTMENT OF BRIAN BYERS TO THE PLANNING COMMISSION

BOARD ACTION: Commissioner Showers moved, seconded by Commissioner Washington to reappoint Brian Byers to the Planning Commission for a three (3) year term expiring May 1, 2029. Chairperson DeLong called for further nominations. There were none. Motion carried.

ZONING BOARD OF APPEALS APPOINTMENTS

APPOINTMENT OF MARK WINSOR TO THE ZONING BOARD OF APPEALS

BOARD ACTION: Commissioner Fickes moved, seconded by Commissioner Showers to appoint Mark Winsor to the Zoning Board of Appeals for the remainder of a three-year (3) term expiring December 31, 2026. Chairperson DeLong called for further nominations. There were none. Motion carried.

APPOINTMENT OF WILLIAM KEITH JONES TO THE ZONING BOARD OF APPEALS

BOARD ACTION: Commissioner Fickes moved, seconded by Commissioner Showers to appoint William Keith Jones to the Zoning Board of Appeals for the remainder of a three-year (3) term expiring December 31, 2028. Chairperson DeLong called for further nominations. There were none. Motion carried.

ADMINISTRATOR/ CONTROLLER'S REPORT

Administrator/Controller Fuentes had nothing to report.

COMMISSIONERS' COMMENTS

Chairperson DeLong called for Commissioners' comments.

Commisioner Rudat, Commissioner Hurtekant, Commissioner Fickes and Commissioner Washington offerred comments.

ADJOURNMENT

BOARD ACTION: With no further business to come before the Board, Chairperson DeLong entertained a motion to adjourn. Commissioner showers moved, seconded by Commissioner Andrews. Chairperson DeLong declared the meeting adjourned at 10:16 a.m.

Stephanie Dush

Stephanie L. Dush, Clerk of the Board

NOTE: These minutes are subject to approval on March 31, 2026.

EAGLE TOWNSHIP
CLINTON COUNTY

RESOLUTION NO. 02-17-2026-05

A RESOLUTION ADOPTING AN ORDINANCE AMENDING THE INTERIM ZONING ORDINANCE

At a meeting of the Township Board for the Township of Eagle, Clinton County, Michigan, held on the 17th day of February, 2026, at 6:00 p.m., at the Township Hall, 14318 Michigan Street, Eagle, Michigan.

PRESENT: Supervisor Stroud, Clerk Briggs-Dudley, Treasurer C. Hoppes, Trustee Currie, Trustee M. Hoppes

ABSENT: None

The following preamble and resolution were offered by Clerk Briggs-Dudley and seconded by Treasurer C. Hoppes.

WHEREAS, the Michigan Zoning Enabling Act ("MZEA"), 2006 PA 110, authorizes local units of government to regulate the use of land by zoning ordinance to promote public health, safety, and welfare; and

WHEREAS, Section 404 of the MZEA authorizes local units of government to adopt an interim zoning ordinance during the period required for the preparation and enactment of an initial zoning ordinance;

WHEREAS, pursuant to Section 404 of the MZEA, local units of government may amend an interim zoning ordinance;

WHEREAS, pursuant to Section 404 of the MZEA, the planning commission of a township shall submit recommendations for amendments to an interim zoning ordinance to the county planning commission;

WHEREAS, pursuant to Section 404 of the MZEA, an interim zoning ordinance or amendment is considered approved 15 days from the date it is submitted to the legislative body;

WHEREAS, pursuant to Section 404 of the MZEA, after approval of an interim zoning ordinance or amendment, the legislative body, by a majority vote of its members, may give the interim zoning ordinance or amendment immediate effect;

WHEREAS, the Township Board of Eagle Township ("Township Board") adopted an interim zoning ordinance (the "Interim Zoning Ordinance") on December 21, 2023; and

WHEREAS, on December 18, 2025, pursuant to the MZEA, the Township Board extended the Interim Zoning Ordinance through December 31, 2026; and

WHEREAS, on January 27, 2026, the Eagle Township Planning Commission ("Planning Commission") met and discussed an amendment to the Interim Zoning (the "Amendment"); and

WHEREAS, the Planning Commission simultaneously submitted the amendment to the to the Clinton County Planning Commission for review in accordance with the MZEA and the Township Board on February 3, 2026; and

WHEREAS, pursuant to Section 404 of the MZEA, the Amendment is considered approved 15 days from submittal to the Township Board; and

WHEREAS, 15 days from submittal to the Township Board is February 18, 2026; and

WHEREAS, the Township Board has reviewed the Amendment and determines it is in the best interests of the health, safety and welfare of the residents of the Township to give the Amendment, as described in **Exhibit A** immediate effect.

NOW, THEREFORE, the Township Board of the Township of Eagle resolves as follows:

1. Ordinance No. 01-2026, An Ordinance Amending the Interim Zoning Ordinance (the "Ordinance") (attached hereto as **Exhibit A**), approved February 18, 2026, shall be filed with the Township Clerk and shall be immediately effective on February 18, 2026.

2. The Clerk shall publish a notice of adoption of the Ordinance, substantially similar to the attached **Exhibit B**, within 15 days of adoption.

3. Any resolution that conflicts with this Resolution is repealed, but only to the extent necessary to give this Resolution full force and effect.

A vote on the above Resolution was taken and was as follows:

ADOPTED:

YEAS: Treasurer C. Hoppes, Trustee Currie, Trustee M. Hoppes, Clerk Briggs-Dudley, Supervisor Stroud

NAYS: None

STATE OF MICHIGAN)
) ss.
COUNTY OF CLINTON)

I, the undersigned, the duly qualified and acting Clerk of the Township Board of the Township of Eagle, Michigan, CERTIFY that the foregoing is a true and complete copy of certain proceedings taken by the Township Board of said Township at a meeting held on the 17th day of February, 2026.

Laurie Briggs-Dudley

Laurie Briggs-Dudley, Township Clerk

CERTIFICATE

I hereby certify that:

1. The above is a true copy of Ordinance No. 01-2026 adopted by the Eagle Township Board at a duly scheduled and noticed meeting of that Township Board held on February 17, 2026, pursuant to the required statutory procedures.
2. A summary of Ordinance No 01-2026 was duly published in the Lansing State Journal newspaper, a newspaper that circulates within Eagle Township, on February 20, 2026.
3. Within 1 week after such publication, I recorded Ordinance No 01-2026 in a book of ordinances kept by me for the purpose, including the date of passage of the ordinance, the name of the members of the township board voting, and how each member voted.
4. Within 15 days after adoption of Ordinance 01-2026, I filed an attested copy of said Ordinance with the Clinton County Planning Commission and Clinton County Clerk on February 20, 2026.

ATTESTED:

Laurie Briggs-Dudley

Laurie Briggs-Dudley, Eagle Township Clerk

Dated: February 20, 2026

EXHIBIT A

EAGLE TOWNSHIP

ORDINANCE NO.01-2026

AN ORDINANCE TO AMEND THE INTERIM ZONING ORDINANCE REGARDING MORATORIUMS

The Township of Eagle ordains:

Section 1. Addition of New Section 6.01(F) to the Interim Zoning Ordinance.

A new Section 6.01(F) is added to Article 6 of the Eagle Township Interim Zoning Ordinance and reads in its entirety as follows:

Moratorium by Resolution. The Township Board may, by resolution, impose a temporary moratorium on the review or issuance of any applications, permits, rezonings, licenses, or approvals for existing, new, or emerging land uses in the Township if the Township Board determines that a temporary moratorium is necessary to review, enact, or amend provisions of the master plan or zoning ordinance to address land uses that may impact the health, safety, or welfare of Township residents or property. A temporary moratorium may also be imposed by the Township Board upon the recommendation of the Planning Commission when the Planning Commission determines that a moratorium is needed to allow it sufficient time to review and recommend amendments to the master plan or zoning ordinance concerning existing, new, or emerging land uses that may adversely affect the health, safety, or welfare of Township residents or property. The resolution must state the purpose of the moratorium and include findings of the Township Board or Planning Commission in support of the moratorium and why the Township Board has determined that the temporary moratorium is necessary and in the best interest of the public health, safety, or welfare. Any resolution adopted pursuant to this Section must specify the length of the initial moratorium which shall not exceed twelve (12) months. In addition to the initial moratorium, the Township Board may extend the temporary moratorium if the Township Board determines that more time is necessary to review, enact, or amend provisions of the master plan or zoning ordinance to regulate land uses. Any extension shall not exceed six (6) additional months. Notice of the resolution must be published within seven (7) days of its adoption. The notice must include the following:

(1) A summary of the resolution's effect.

(2) The length of the moratorium and whether an extension is possible.

(3) Where the public may inspect the resolution enacting the moratorium.

Section 2. Validity and Severability.

If any portion of this Ordinance is found invalid for any reason, such holding will not affect the validity of the remaining portions of this Ordinance.

Section 3. Repealer.

Any ordinances or parts of ordinances that conflict with this Ordinance are repealed, but only to the extent necessary to give this Ordinance full force and effect.

Section 4. Effective Date.

This Ordinance takes effect February 18, 2026.

EXHIBIT B

EAGLE TOWNSHIP
NOTICE OF ORDINANCE ADOPTION AND SUMMARY

TAKE NOTICE that on February 17, 2026, the Township Board of Eagle Township, Clinton County, Michigan, adopted Ordinance No. 01-2026, An Ordinance Amending the Interim Zoning Ordinance (the "Ordinance"). Upon a majority vote of the Township Board, the Ordinance took immediate effect on February 18, 2026. The Ordinance is available for inspection at the Township Hall, 14318 Michigan Street, Eagle, MI 48822, during regular business hours. Copies may be obtained for a reasonable charge. The following is a summary of the Ordinance.

SUMMARY OF ORDINANCE NO. 01-2026

Section 1. Addition of New Section 6.01(F). This Section authorizes the Township Board to impose a temporary moratorium, by resolution, on land-use applications, permits, rezonings, licenses, or approvals when needed to review or amend the master plan or zoning ordinance to address land uses affecting public health, safety, or welfare. Any resolution must state the moratorium's purpose, supporting findings, and its duration (up to 12 months), with possible extensions of up to 6 months. A notice summarizing the moratorium must be published within seven days and include its effect, duration, and where the resolution may be inspected.

Section 2. Validity and Severability. This Section provides that if any portion of the Ordinance is held invalid, the remaining portions will continue in full force and effect.

Section 3. Repealer. This Section repeals any conflicting ordinances or ordinance provisions, but only to the extent necessary to give the new Ordinance full effect.

Section 4. Effective Date. This Section states that the Ordinance takes effect on February 18, 2026.

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EAGLE TOWNSHIP
CLINTON COUNTY

RESOLUTION 02-17-2026-06

RESOLUTION TO IMPOSE A MORATORIUM ON THE ISSUANCE OF PERMITS, LICENSES, OR APPROVALS FOR DATA CENTERS AND DIRECT THE PLANNING COMMISSION TO STUDY DATA CENTER USES

At a regular meeting of the Township Board for the Township of Eagle, Clinton County, Michigan, held on the 17th day of February, 2026, at 6:00 p.m.

PRESENT: Supervisor Stroud, Clerk Briggs-Dudley, Treasurer C. Hoppes, Trustee Currie, Trustee M. Hoppes

ABSENT: None

The following preamble and resolution were offered by Clerk Briggs-Dudley and seconded by Trustee M. Hoppes.

WHEREAS, the Michigan Zoning Enabling Act, 2006 P.A. 110, being MCL 125.3101 *et seq.*, authorizes Eagle Township (the "Township") to adopt reasonable regulations to control the establishment and use of Data Centers in the Township; and

WHEREAS, "Data Centers," for purposes of this moratorium, means a structure that principally houses information technology infrastructure and equipment for building, running, and delivering applications and for the storage of digital data, including without limitation cryptocurrency mining and artificial intelligence; and

WHEREAS, the establishment of Data Centers, particularly in more rural areas, is a new and emerging land use that may have substantial and adverse impacts on adjacent and nearby properties; and

WHEREAS, according to various scientific and media reports, some of which are attached as **Exhibit A**, Data Centers consume enormous amounts of electricity and potentially water; and

WHEREAS, based on these reports, the Township Board finds that Data Centers pose a potential risk to the Township's electrical grid and water supply; and

WHEREAS, regulated utilities and Data Center developers are litigating how Data Centers will be regulated throughout the State of Michigan;

WHEREAS, the Township finds that it is necessary and reasonable to establish a moratorium upon the issuance of any and all permits, licenses, and approvals for any property subject to or under the jurisdiction of the Township's Interim Zoning Ordinance for the establishment and use of Data Centers for 12 months or until the Township adopts new regulations concerning Data Centers and such regulations take effect, whichever occurs first; and

WHEREAS, pursuant to Section 6.01(F) of the Interim Zoning Ordinance, the Township Board may impose temporary moratoria by resolution on the review or issuance of any and all applications, permits, rezonings, licenses, or approvals for special or other land uses in the Township if the Township Board desires to review, enact, or amend provisions of the master plan or zoning ordinance to regulate existing or emerging land uses that may impact the health, safety, or welfare of township residents or property; and

WHEREAS, the Township finds that adopting such a moratorium is in the best interest of the public health, safety, and welfare and that the Township desires to review, enact, or amend provisions of the master plan and/or the Township Interim Zoning Ordinance in order to determine whether regulations are necessary for the use and development of Data Centers in the Township; and

WHEREAS, the Township finds it in the best interest of the public health, safety, and welfare of the Township for the Planning Commission to study Data Center uses and their impacts on the Township and submit written findings and recommendations to the Township Board, as outlined in **Exhibit B**.

NOW, THEREFORE, the Township Board of Eagle Township resolves as follows:

1. The Township Board hereby petitions the Township Planning Commission to consider regulations regarding Data Centers, including without limitation where such uses may be permissible and appropriate, regulations to mitigate adverse impacts on adjacent properties and uses, and thereafter make recommendations to the Township Board regarding any such proposed amendments in accordance with the procedures set forth in the Michigan Zoning Enabling Act, Public Act 110 of 2006, as amended.

2. For purposes of this Resolution, a "Data Center" means a structure that principally houses information technology infrastructure and equipment for building, running, and delivering applications, and the storage of digital data, including without limitation cryptocurrency mining and artificial intelligence.

3. In accordance with Section 6.01(F) of the Interim Zoning Ordinance, the Township Board finds that adopting such a moratorium is in the best interest of the public health, safety, and welfare and that the Township desires to review, enact, or amend provisions of the master plan and/or the Township Interim Zoning Ordinance in order to determine whether regulations are necessary for the use and development of Data Centers in the Township.

4. Imposing a moratorium, on a limited temporary basis, is reasonable and necessary to allow time for review of and potential amendments to the Township's Interim Zoning Ordinance and/or Master Plan.

5. A moratorium should be imposed upon the issuance of any and all permits, licenses, and approvals for any property subject to or under the jurisdiction of the Township's Zoning

Ordinance for the establishment and use of Data Centers or until an amendment to the Township's Zoning Ordinance regarding Data Centers is effective, whichever occurs first.

6. A moratorium is hereby imposed on the review or issuance of any and all applications, permits, rezonings, licenses, or approvals in the Township for Data Centers, so long as this Resolution is in effect.

7. The moratorium imposed by this Resolution shall remain in effect for 12 months following the effective date of this Resolution, or until Data Center regulatory amendments to the Township's Interim Zoning Ordinance become effective, whichever occurs first. Before this moratorium expires, the Township Board may by resolution extend the moratorium for up to 6 months. If an extension is adopted, the Township will publish notice of the extension.

8. The Township further directs the Planning Commission to study Data Center uses and their impacts on the Township and submit written findings and recommendations to the Township Board, as outlined in **Exhibit B**.

9. Any resolutions or parts of resolutions in conflict with this Resolution are hereby repealed only to the extent necessary to give this Resolution full force and effect.

10. This Resolution shall be published within 7 days of its adoption in accordance with Section 6.01(F) of the Interim Zoning Ordinance and shall become effective on February 18, 2026.

A vote on the above Resolution was taken and was as follows:

ADOPTED:

YEAS: Trustee Currie, Trustee M. Hoppes, Clerk Briggs-Dudley, Treasurer C. Hoppes, Supervisor Stroud

NAYS: None

STATE OF MICHIGAN)
) ss.
COUNTY OF CLINTON)

I, the undersigned, the duly qualified and acting Township Clerk of Eagle Township, Michigan, CERTIFY that the foregoing is a true and complete copy of certain proceedings taken by the Township Board of said Township at a regular meeting held on the 17th day of February, 2026.

Laurie Briggs-Dudley, Township Clerk

CERTIFICATE

I hereby certify that:

1. The above is a true copy of Resolution 02-17-2026-06 adopted by the Eagle Township Board at a duly scheduled and noticed meeting of that Township Board held on February 17, 2026, pursuant to the required statutory procedures.
2. A summary of Resolution 02-17-2026-06 was duly published in the Lansing State Journal newspaper, a newspaper that circulates within Eagle Township, on February 20, 2026.
3. Within 1 week after such publication, I recorded Resolution 02-17-2026-06 in a book of resolutions kept by me for the purpose, including the date of passage of the resolution, the name of the members of the township board voting, and how each member voted.
4. Within 14 days after adoption of Resolution 02-17-2026-06, I filed an attested copy of said Resolution with the Clinton County Planning Commission and Clinton County Clerk on February 20, 2026.

ATTESTED:

Laurie Briggs-Dudley, Eagle Township Clerk
Dated: February 20, 2026

EXHIBIT A

Article 1: Global Data Center Expansion and Human Health Eco-Environment and Health

Article 2: Air Quality and Greenhouse Gas Emissions Assessment of Data Centers in Texas

Article 3: Data Center pollution is linked to asthma, heart attacks and more

Article 4: Data Centers and Water Consumption

Article 5: What Happens when Data Centers come to town: University of Michigan study

Article 6: Digital Infernos: Why data centers are putting firefighters on the Front Lines

Article 7: The Real Safety Risks of Data Centers: What Local Communities Need to Know

ARTICLE 1

Eco-Environment & Health 4 (2025) 100157

Contents lists available at ScienceDirect

Eco-Environment & Health

journal homepage: www.journals.elsevier.com/eco-environment-and-health

Commentary

Global data center expansion and human health: A call for empirical research

Yu Tao [a,*], Peng Gao [b]

[a] School of Eco-Environment, Harbin Institute of Technology, Shenzhen 518055, China
[b] Department of Environmental Health, Harvard T.H. Chan School of Public Health, Boston, MA 02115, USA

Data centers (Fig. 1)—the backbone of the digital economy—are rapidly expanding globally to meet surging demand, yet this growth brings underappreciated risks to human health. They consumed 1.5% of global electricity in 2024 and are expected to represent nearly 10% of the electricity demand growth from 2024 to 2030 [1]. Despite efforts to curb their carbon and water footprints, the public health implications of data center expansion remain largely overlooked.

Data centers generate significant noise pollution primarily from diesel generators and Heating, Ventilation, and Air Conditioning (HVAC) systems, with internal noise levels reaching up to 96 A-weighted decibels (dBA)—well above the 85 dBA threshold considered harmful to hearing [2]. This persistent noise adversely affects data center staff, nearby communities, and local wildlife, prompting increased public concern and a push for noise mitigation strategies.

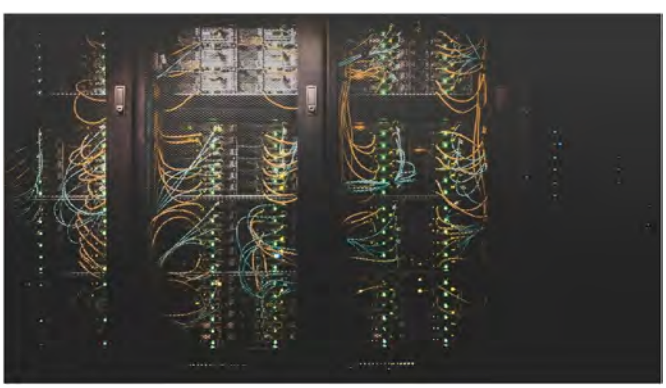

Fig. 1. A photograph of physical infrastructure essential for contemporary data management and storage in a modern data center. Photo by Taylor Vick on Unsplash (available for free use).

Air pollution is the most acute concern. Fossil-fueled power plants and diesel backup generators that power data centers emit hazardous pollutants such as nitrogen oxides and fine particulate matter, increasing rates of respiratory diseases, cardiovascular conditions, and elevating cancer risk in nearby communities. A recent model indicates that the U. S. data centers in 2030 could contribute to nearly 1300 deaths annually, resulting in a public health burden of more than $20 billion [3].

Moreover, significant water needs for cooling, often from drinking supplies, create additional challenges. In certain areas, data centers consume up to 57% of cooling water from potable sources [4], worsening water scarcity in stressed regions. A typical hyperscale data center can use 3–7 million gallons of water per day for cooling purposes. Such consumption exacerbates local water insecurity, increasing the risk of waterborne diseases, dehydration, and poor hygiene in affected communities.

To protect communities, policymakers and industry must proactively mitigate these health risks. Key strategies include: (i) Power data centers with renewable sources and replace diesel generators with battery storage or fuel cells to eliminate exhaust emissions. (ii) Use advanced cooling technologies to reduce water use and recycle waste heat, alleviating local water scarcity and enhancing energy efficiency. (iii) Mandate public reporting of data center pollution. Greater transparency and stricter standards would hold operators accountable and encourage cleaner practices. (iv) Position new data centers away from populated or polluted areas and choose cleaner, low-density sites for energy-intensive workloads to reduce human exposure.

Empirical research is urgently needed to inform policy. Little is known about long-term health outcomes in data center host communities. Interdisciplinary studies should quantify pollution exposures (air, water, noise) and track associated health effects. Life-cycle assessments of data centers—from power generation to hardware disposal—can identify critical emission sources. Such evidence is vital to ensure that the digital revolution does not come at the expense of public health.

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In summary, the global data center boom is emerging as a public health concern. Proactive mitigation and targeted research are imperative to safeguard public health while sustaining digital innovation.

CRediT authorship contribution statement

Yu Tao: Writing – original draft, Funding acquisition, Conceptualization. **Peng Gao:** Writing – review & editing.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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ARTICLE 2

Air Quality and Greenhouse Gas Emissions Assessment of Data Centers in Texas: Quantifying Impacts and Environmental Tradeoffs

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Summary:

This study comprehensively assessed air quality (AQ) and greenhouse gas (GHG) emissions associated with the rapid expansion of data centers in Texas. Recognizing Texas as a major data center hub due to its infrastructure, electricity market, and favorable business conditions, the study distinctly separated AQ impacts from GHG emissions to clarify their different sources, regulatory frameworks, and mitigation strategies.

The analysis highlighted substantial GHG emissions, primarily from electricity consumption and cooling systems, as the dominant contributor. Operational electricity use in a standard 10-megawatt data center was estimated to generate approximately 37,668 metric tons of CO_2 annually. Additionally, embodied emissions from construction materials and IT equipment significantly contribute to the total lifecycle carbon footprint.

Local AQ impacts, often overlooked in existing literature, were closely examined. Diesel-powered backup generators, construction equipment, and employee commuting were identified as notable sources of criteria pollutants such as nitrogen oxides (NO_x) and particulate matter (PM), particularly in urban regions already facing air quality challenges. For instance, generator testing alone can emit around 12 metric tons of NO_x annually per large data center, exacerbating ozone pollution in areas such as Houston and Dallas-Fort Worth.

Several mitigation strategies were discussed, including advanced cooling technologies, renewable energy integration, cleaner backup power solutions such as fuel cells and battery storage, sustainable construction practices, and comprehensive emission reporting frameworks. Case studies from Texas (e.g., CyrusOne, Microsoft, Digital Realty) and international best practices provided practical examples of successful emission reduction approaches.

Predictive modeling based on ERCOT's 2025 Long-Term Load Forecast shows that electricity demand from data centers in Texas is projected to grow significantly by 2030. Utility-submitted forecasts estimate up to around 78 gigawatts of new data center load by the end of the decade, with ERCOT adjusting that figure to approximately 39 gigawatts to reflect historical implementation rates. If this expansion occurs without targeted interventions, associated greenhouse gas emissions from operational electricity use alone could range between 170 to 205 million metric tons of CO_2 per year, depending on realized capacity, facility efficiency, and grid carbon intensity. However, with aggressive adoption of renewable energy procurement, advanced cooling systems, and cleaner backup power technologies, emissions could be reduced by 50 to 80%, potentially avoiding 85 to 165 million metric tons of annual CO_2 emissions across Texas by 2030. These findings highlight both the scale of the environmental challenge and the critical role that proactive technological and policy measures can play in shaping sustainable digital infrastructure growth.

The paper identified critical research and policy gaps, emphasizing the need for cumulative air dispersion modeling, standardized emissions reporting, and AQ-specific regulatory frameworks. It concluded with actionable recommendations for policymakers and industry stakeholders, advocating mandatory efficiency standards, renewable energy mandates, AQ-focused regulations, and enhanced transparency through emissions disclosures. Ultimately, proactive adoption of these strategies can balance Texas's digital infrastructure growth with essential environmental and community health protections, ensuring sustainability in the long term.

Keywords: Data centers; Texas; Air quality; Greenhouse gas emissions; Lifecycle assessment; Diesel generators; Embodied carbon; Cooling systems; Renewable energy; Scope 1 emissions; Scope 2 emissions; Scope 3 emissions; Energy infrastructure; Environmental impact; ICT sector; Sustainability.

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1. Introduction

The rapid increase in numbers of digital technologies has driven exponential growth in data center construction and electricity use. Globally, data centers consumed approximately 220 to 320 terawatt-hours (TWh) of electricity in 2021, accounting for 0.9 to 1.3 percent of global final electricity demand (IEA, 2022). In the United States, data centers consumed about 2 percent of the national electricity supply, with the majority concentrated in high-demand regions such as Northern Virginia, Silicon Valley, and Texas (Wang et al., 2023). Within Texas, the Dallas–Fort Worth metroplex alone hosts over 400 megawatts (MW) of commissioned colocation capacity, placing it among the top three data center hubs in North America (CBRE, 2023).

The environmental impact of this infrastructure extends across the full life cycle of data center construction, operation, and decommissioning. Greenhouse gas (GHG) emissions are a major concern, particularly Scope 2 emissions from electricity consumption. For a typical facility operating at 10 MW around the clock, annual electricity use exceeds 87,000 megawatt-hours (MWh), which, if powered by a natural gas-dominant grid like ERCOT's, corresponds to over 30,000 metric tons of carbon dioxide equivalent (CO_{2e}) per year (Hasan et al., 2022). In areas where coal-fired generation is still active, such as parts of East Texas, the emissions intensity can exceed 0.55 metric tons CO_{2e} per MWh (EPA eGRID, 2022).

In addition to electricity-based emissions, data centers also generate Scope 1 emissions through on-site combustion sources, primarily diesel backup generators. A single 2.5 MW diesel generator emits over 5 metric tons of nitrogen oxides (NO_x) and 0.3 metric tons of particulate matter (PM_{10}) during 100 hours of annual testing, based on EPA AP-42 emission factors. Many hyperscale facilities operate multiple generators, which can collectively emit several dozen tons of criteria pollutants each year, especially when tested in parallel. In Texas, where generator testing is often performed during hot summer months to align with peak demand reliability protocols, these emissions can coincide with meteorological conditions that exacerbate ozone formation and pollutant dispersion constraints (Mughal et al., 2023; TCEQ, 2022).

Scope 3 emissions, which include embedded carbon from construction materials, server manufacturing, refrigerants, and logistics, often rival or exceed operational emissions. For example, life cycle assessments indicate that server manufacturing alone can account for 20 to 30 percent of a data center's 15-year GHG footprint, depending on hardware refresh rates (Alva et al., 2022; Sharma et al., 2023). Recent work by Stobbe et al. (2023) emphasized that shifting IT workloads to cloud providers may obscure these upstream emissions under traditional accounting frameworks, since customer emissions become categorized as Scope 3 under cloud vendor inventories.

While the carbon impacts of data centers have been increasingly quantified in recent years, the associated air quality (AQ) impacts remain insufficiently characterized, particularly at the local and regional level. Diesel generators emit not only CO_2 but also NO_x, volatile organic compounds (VOCs), carbon monoxide (CO), and particulate matter, all of which are regulated under the Clean Air Act. The Dallas–Fort Worth region is currently designated as nonattainment for ozone under the 2015 National Ambient Air Quality Standards (NAAQS). In such regions, even minor increases in NO_x can contribute to violations of federal standards due to the region's

NO_x-limited photochemical regime. Generator emissions, though episodic, are not negligible. A cluster of ten data centers, each with five backup generators operating for 100 hours per year, can release over 250 metric tons of NO_x annually, enough to trigger regulatory scrutiny or permit modifications if aggregated as a stationary source complex (Qureshi et al., 2022; Nayyar et al., 2021).

Cooling systems further complicate both GHG and AQ assessments. Direct refrigerant leakage can release hydrofluorocarbons (HFCs), which have global warming potentials (GWPs) between 1,300 and 3,900 times that of CO_2. For instance, R-410A, a common refrigerant in data center HVAC systems, has a GWP of 2,088. If 5 percent of a 1,000-pound charge leaks annually across a facility, the resulting emissions are equivalent to over 100 metric tons of CO_2e. Indirectly, the electricity required for cooling increases both GHG emissions and power plant-related air pollutant emissions, particularly during peak summer periods when air conditioning loads dominate grid profiles (Kamali & Hewage, 2023).

Despite these impacts, air quality regulation of data centers in Texas remains fragmented. Backup generators are typically permitted as emergency units and may be exempt from detailed dispersion modeling under the assumption of infrequent use. However, in practice, cumulative testing emissions, combined with load shedding or grid support contracts, can lead to routine non-emergency operation. TCEQ permitting guidance generally does not require ambient air quality analysis for backup units unless trigger thresholds are exceeded, which may fail to capture cumulative impacts in densely clustered industrial parks such as those in Houston’s Energy Corridor or Richardson’s Telecom Corridor (TCEQ, 2023; Mughal et al., 2023).

The scientific literature has advanced a number of mitigation strategies, particularly in the area of GHG emissions. These include carbon-aware workload scheduling, dynamic load shifting between geographic regions with cleaner electricity, power purchase agreements (PPAs) with renewable providers, and server energy optimization algorithms (Zhao et al., 2023). Less attention has been paid to technologies or strategies aimed at minimizing air pollutant emissions. Potential approaches include substituting diesel generators with natural gas or hydrogen-based systems, deploying battery energy storage, or scheduling generator testing during periods of favorable atmospheric dispersion.

This paper aims to provide a comprehensive and quantitative assessment of both greenhouse gas and air quality emissions associated with data center development and operation in Texas. It systematically distinguishes between direct and indirect emission sources, assesses their spatial and temporal variability, and evaluates regulatory frameworks and mitigation options. A particular emphasis is placed on the underexplored air quality dimension, given its implications for local health outcomes, permitting, and environmental justice. By treating GHG and AQ domains in parallel but distinct analytical tracks, this study offers a more complete scientific basis for environmental planning in the rapidly expanding digital economy of Texas.

1.1 Overview of Data Centers in Texas:

Texas has emerged as one of the fastest-growing regions for data center development in the United States, driven by a combination of factors including low electricity prices, abundant land, favorable regulatory conditions, business-friendly tax incentives, and access to robust fiber infrastructure. According to ERCOT's 2025 Long-Term Load Forecast, utility-submitted plans suggest that up to 77,965 megawatts of new data center electricity demand could materialize by 2030, with a realistically adjusted projection of approximately 38,878 megawatts based on historical fulfillment trends. The Dallas-Fort Worth metroplex remains the state's dominant data center hub, accounting for a significant share of current and planned capacity, followed by active clusters in Austin, San Antonio, and Houston. As of 2023, Dallas-Fort Worth alone hosted over 590 megawatts of commissioned multi-tenant data center capacity, placing it among the top three data center markets in North America in terms of both floor space and electrical load (CBRE, 2023). This rapid growth trajectory positions Texas as a key contributor to the national data infrastructure buildout while also making it a critical focal point for addressing the environmental impacts of large-scale digital operations.

Electricity supply is a key driver in the siting and operation of data centers. Texas operates its own independent power grid through the Electric Reliability Council of Texas (ERCOT). The ERCOT grid serves approximately 90 percent of the state's electric load. Its generation mix includes natural gas (42 percent), wind (24 percent), coal (17 percent), solar (6 percent), and nuclear (10 percent), based on 2022 data. Because of this mix, the carbon intensity of grid electricity in Texas averages about 0.43 metric tons of CO_2 per megawatt-hour (EPA eGRID, 2022). However, this value can vary significantly depending on location and time of day. For example, during midday in West Texas, solar and wind can dominate generation, while in East Texas, coal and gas remain major contributors.

The size and configuration of data centers in Texas vary widely. Enterprise and colocation facilities typically range from 5 MW to over 50 MW of connected capacity. Hyperscale facilities built by companies like Meta, Microsoft, and Google often exceed 100 MW, with campuses spread across hundreds of acres. Smaller edge data centers, serving local caching or IoT functions, operate in the 0.5 to 2 MW range. Despite their differences in scale, all types rely on continuous electricity supply, redundant backup systems, and climate control to maintain high availability.

Texas offers a combination of financial and regulatory incentives that have contributed to its rapid growth as a data center hub. At the state level, the Texas Data Center Exemption provides sales and use tax exemptions for facilities investing at least $200 million and creating a minimum of 20 jobs, covering items such as servers, cooling systems, generators, and electricity use (Texas Comptroller of Public Accounts, 2023). Additional property tax abatements are available through local agreements such as Chapter 312, often reducing taxes by up to 80 percent (Griffith & Williams, 2021). Moreover, the Texas Commission on Environmental Quality (TCEQ) allows emergency diesel generators to operate under a permit-by-rule (30 TAC §106.511), reducing permitting burdens for backup power infrastructure (TCEQ, n.d.).

Data centers in Texas are typically designed with N+1 or 2N redundancy for both power and cooling systems, meaning that at least one backup unit is available for every critical system (Uptime Institute, 2023). Most facilities deploy multiple diesel generators, each typically ranging from 1 to 3 MW, to meet full site load during utility outages (Hasan et al., 2022). In a 30 MW data center, this often results in 10 to 15 generators, each equipped with large aboveground diesel storage tanks and automatic transfer switches (Kamali & Hewage, 2023). These units are not idle; monthly testing and routine maintenance are standard industry practice, resulting in 50 to 150 operating hours per generator annually, even in the absence of grid failures (EPA, 2021).

Permitting backup generator systems falls under the authority of the TCEQ. These units are typically classified as emergency sources and are often authorized under a permit-by-rule, which exempts them from detailed air dispersion modeling as long as they operate below defined usage thresholds (TCEQ, n.d.). While this approach simplifies compliance for individual facilities, it does not account for the cumulative impacts of multiple data centers operating within proximity such as in industrial parks or technology corridors; areas where aggregated emissions of NO_x and PM may contribute to local air quality degradation, especially in nonattainment regions.

Cooling infrastructure is a major contributor to energy consumption in data center operations. Most large facilities in Texas rely on air-cooled chillers or direct expansion systems, although liquid cooling is becoming more common in high-density computing environments (Kamali & Hewage, 2023). Cooling systems can account for 20 to 40 percent of a data center's total energy use, with the exact share depending on factors such as ambient temperature, humidity, and server utilization (Hasan et al., 2022). The climate in Texas, particularly during extended summer periods, increases cooling demand relative to regions with more temperate weather, such as the Pacific Northwest. Consequently, Power Usage Effectiveness (PUE) values for data centers in Texas typically range from 1.3 to 1.5 under optimized design and operational conditions (ASHRAE, 2021).

The siting of data centers relative to urban populations, vulnerable communities, and ozone nonattainment regions is an important consideration for both public health and regulatory oversight. In the Houston metropolitan area, many data centers are located along Beltway 8 and in the Energy Corridor, where they are adjacent to communities already burdened by industrial air pollution (TCEQ, 2023). Similarly, in the Dallas-Fort Worth region, clusters of large-scale facilities have developed near residential areas in cities such as Plano, Richardson, and Irving (EPA, 2022). In these locations, emissions from diesel backup generators can exacerbate existing air quality challenges, particularly during the ozone season or periods of atmospheric stagnation when pollutant dispersion is limited. These cumulative exposures may be of concern in areas already designated as nonattainment for ground-level ozone under the NAAQS.

This section shows that Texas provides a favorable environment for data center development due to its infrastructure, energy market, and policies. However, the same characteristics that make Texas attractive for this industry, such as lenient permitting and fossil fuel reliance, also increase the potential for environmental impacts. The next sections will provide a deeper analysis of those impacts, starting with a full accounting of greenhouse gas emissions across the data center life cycle, followed by air quality emission sources and their implications for public health and compliance.

2. Literature Review

2.1 Current Trends in Data Center Development in Texas

Data center development in Texas has accelerated over the past decade, driven by increasing demand for cloud computing, artificial intelligence, and high-speed content delivery. According to commercial market reports, the Dallas–Fort Worth metroplex is among the top three largest data center hubs in North America, with more than 400 MW of commissioned colocation capacity as of 2023. Houston, Austin, and San Antonio are also experiencing rapid expansion, fueled by enterprise demand and the availability of competitive electricity pricing (Wang et al., 2023).

The state's independent electricity grid, operated by the ERCOT, is a major draw for operators seeking control over power sourcing. In 2022, the ERCOT grid's generation mix included 42 percent natural gas, 24 percent wind, 17 percent coal, and 6 percent solar, with the remaining share from nuclear (EPA eGRID, 2022). Because of this mix, the carbon intensity of electricity in Texas remains relatively high compared to regions with a greater share of renewables.

Data center siting patterns in Texas show clustering in urban and suburban areas with existing fiber infrastructure and low-cost land. For example, the city of Richardson, north of Dallas, houses dozens of hyperscale and colocation facilities in close proximity, often within 500 meters of residential zones. Similarly, Houston's Energy Corridor and areas along Beltway 8 are home to multiple enterprise and disaster-recovery centers. These patterns raise concerns about cumulative local emissions from diesel backup generators and cooling systems, particularly in ozone nonattainment areas such as Dallas–Fort Worth and Houston.

2.2 Previous Studies on Data Centers' Impact on AQ and GHG Emissions

A growing body of research has assessed the climate impacts of data centers, although fewer studies have examined their local air quality consequences. Most GHG-focused studies emphasize Scope 2 emissions, which dominate due to the heavy electricity demands of servers, cooling systems, and infrastructure. Hasan et al. (2022) and Sharma et al. (2023) report that operational emissions typically account for more than 60 percent of a facility's total lifecycle carbon footprint. These emissions vary based on data center location, the local grid's fuel mix, and the energy efficiency of installed equipment.

Lifecycle assessments (LCA) of data centers reveal that Scope 3 emissions can also be substantial. Alva et al. (2022) estimate that the embedded carbon from server manufacturing, construction materials, and supply chains contributes 25 to 35 percent of total lifecycle GHGs, depending on hardware replacement intervals. Data centers with shorter refresh cycles or extensive use of high-performance computing clusters may exhibit even higher Scope 3 ratios.

Kamali and Hewage (2023) highlight that cooling systems can contribute both directly and indirectly to emissions. Direct emissions occur through the leakage of refrigerants with high global warming potential (e.g., R-134a, R-410A), while indirect emissions result from increased electricity use, especially during summer months in warm climates like Texas. Cooling can account for up to 40 percent of a facility's energy use, particularly in air-cooled systems without economizer cycles.

Compared to GHG studies, relatively few have addressed air quality impacts in detail. However, several papers document the emissions of criteria pollutants from backup generators. Qureshi et al. (2022) and Nayyar et al. (2021) model emissions from diesel generator testing at large-scale data centers and report annual emissions ranging from 10 to 50 tons of NO_x per site, depending on testing hours and generator configuration. These emissions are particularly concerning in ozone-sensitive regions like North Texas, where NO_x contributes to local exceedance of the NAAQS.

Other studies, such as those by Stobbe et al. (2023), caution that cloud-based computing may mask environmental burdens by shifting them from users to providers. Their work suggests that more transparent carbon accounting methods are needed to avoid underreporting of cloud-based emissions, especially as AI and big data applications grow.

A number of modeling studies also propose mitigation strategies, such as carbon-aware workload shifting, geographical load balancing based on real-time grid emissions, and use of on-site renewables. Zhao et al. (2023) demonstrate that shifting workloads from carbon-intensive regions to cleaner grids can reduce Scope 2 emissions by up to 20 percent without hardware upgrades. However, such strategies often require advanced coordination and may have unintended consequences on local power loads and grid stability.

Despite growing attention to the environmental footprint of data centers, important research gaps remain. First, air quality impacts are often overlooked or treated only qualitatively in the literature. Most existing studies either focus exclusively on GHGs or combine AQ and GHG emissions without distinguishing their regulatory, spatial, or temporal implications. This is a critical limitation, particularly in Texas where ozone nonattainment status, local permitting policies, and cumulative community exposures demand a more detailed understanding of criteria pollutant emissions. Second, there is limited regional analysis of how backup generator emissions interact with local meteorology, atmospheric chemistry, and neighborhood vulnerability. Few studies employ dispersion modeling or health risk assessment to quantify potential exposures near clustered data center campuses. Third, while lifecycle GHG emissions have been studied extensively at global or national scales, very few assessments disaggregate impacts by component (e.g., servers vs. construction materials) or by lifecycle stage (e.g., manufacturing vs. disposal) in a Texas-specific context. Finally, current mitigation studies often prioritize technological innovation (e.g., load shifting, renewable sourcing) over operational changes that may yield near-term reductions in both GHG and AQ impacts, such as rescheduling generator tests or using low-emission fuels.

3. Data Center Construction and Its Impact

3.1 Materials Used in Construction

Construction materials significantly affect the environmental footprint of data centers. Key materials include reinforced concrete, structural steel, aluminum, glass, insulation, and copper wiring. Concrete and steel represent the largest portion, accounting for about 70-85% of total construction-related emissions (Alva et al., 2022).

Concrete production involves calcination of limestone and fossil fuel combustion, resulting in high CO_2 emissions. Typically, manufacturing one ton of cement releases approximately 0.9 tons of CO_2. A standard 10-megawatt (MW) data center might utilize between 5,000 and 10,000 cubic meters of concrete, leading to an estimated emission of around 1,000-2,000 metric tons of CO_2. Structural steel, another major component, emits approximately 1.9 tons of CO_2 per ton produced. A data center of similar size typically requires around 500-1,000 tons of structural steel, thus contributing an additional 950-1,900 metric tons of CO_2 (Hasan et al., 2022; Sharma et al., 2023).

Manufacturing these materials also generates air pollutants such as PM, NO_x, sulfur dioxide (SO_2), and VOCs. Although these emissions occur off-site, they affect air quality in nearby communities, especially those located close to cement plants and steel mills.

3.2 Energy Consumption During Construction

Construction activities for data centers involve extensive use of diesel-powered equipment, including cranes, excavators, loaders, bulldozers, concrete mixers, and generators. These machines consume significant amounts of diesel fuel, resulting in direct emissions of greenhouse gases and air pollutants.

The U.S. EPA estimates that a medium-sized construction project consumes approximately 200,000-500,000 liters of diesel fuel, producing 500-1,300 metric tons of CO_2 (EPA NONROAD, 2021). Construction activities also emit substantial amounts of NO_x, PM, and CO from heavy machinery, as summarized below:

- NO_x: Approximately 3-5 metric tons per 100,000 liters of diesel fuel consumed.
- PM: Approximately 0.2-0.5 metric tons per 100,000 liters.
- CO: Approximately 0.6-1.0 metric tons per 100,000 liters (EPA NONROAD, 2021).

Considering typical fuel consumption during data center construction, total emissions can be significant, especially in densely populated urban or suburban locations. Table 1 presents estimated emissions from construction activities associated with a typical 10 MW data center, including both embodied and direct sources.

Table 1. Estimated Emissions from Construction Activities for a 10 MW Data Center

Source/Activity	GHG Emissions (metric tons CO_2)	NO_x (metric tons)	PM (metric tons)	CO (metric tons)
Concrete Production	1,000-2,000	-	-	-
Steel Production	950-1,900	-	-	-
Diesel Fuel Combustion (on-site machinery)	500-1,300	6-25	0.4-2.5	1-5
Material Transportation (diesel trucks)	100-300	2–5	0.1-0.5	0.5-1.5
Total	2,550-5,500	8-30	0.5–3.0	1.5-6.5

(Sources: Hasan et al., 2022; Sharma et al., 2023; EPA NONROAD, 2021)

3.3 Urban Planning and Location Considerations

The site chosen for data centers significantly influences environmental impacts. Siting facilities in undeveloped rural areas requires new infrastructure development, including roads, electrical transmission lines, water and sewer systems, which increases overall emissions. Alternatively, locating data centers in urban industrial zones may decrease the need for new infrastructure but could exacerbate local air quality issues due to cumulative emissions from multiple sources.

In Texas, many data centers are clustered in suburban areas or near urban industrial zones. The Dallas–Fort Worth metroplex, particularly Richardson and Plano, hosts dense concentrations of facilities. Similarly, Houston's Energy Corridor along Beltway 8 includes numerous data centers close to residential neighborhoods. These siting patterns raise concerns regarding cumulative air quality impacts and the adequacy of existing regulatory oversight.

Currently, Texas lacks detailed permitting requirements for data center construction regarding local air quality impacts. Unlike power plants or industrial facilities, data center construction rarely triggers Environmental Impact Statements (EIS). Furthermore, air dispersion modeling and cumulative impact analyses are not mandatory for typical data center construction permits, creating a potential regulatory gap.

3.4 Research and Policy Gaps

A significant research gap exists regarding detailed quantification of emissions at each construction stage, particularly concerning air quality pollutants. Most available studies primarily focus on greenhouse gases and rarely differentiate emissions based on specific construction activities or machinery types. Furthermore, construction-phase air quality modeling, particularly dispersion modeling of NO_x and PM emissions, is virtually absent from the literature.

On the policy side, Texas currently lacks stringent regulations for mitigating air pollutant emissions during construction. Adoption of cleaner, more efficient equipment (such as Tier 4 diesel engines with advanced emission controls) is not mandatory statewide for private-sector data center construction. Without explicit regulatory incentives or mandates, widespread adoption of cleaner construction practices remains uncertain.

4. Operational Emissions

The operational phase is the longest period in a data center's lifecycle and contributes substantially to both GHG emissions and AQ impacts. These emissions are primarily driven by electricity use, cooling systems, and backup power operations, each of which has distinct environmental implications.

4.1 Energy Consumption

Direct Emissions from Electricity Use

Data centers rely predominantly on electricity drawn from local power grids. Texas operates its own independent grid, known as the ERCOT, which covers approximately 90% of the state. ERCOT's power generation in 2022 comprised primarily natural gas (42%), wind power (24%), coal (17%), nuclear (10%), and solar (6%) (EPA eGRID, 2022). This energy mix yields an average emissions intensity of approximately 0.43 metric tons of CO_2 per MWh.

For context, a typical 10 megawatt (MW) data center running continuously consumes roughly 87,600 MWh annually (calculated as 10 MW multiplied by 24 hours/day and 365 days/year). Given ERCOT's average emission factor, this equates to approximately 37,668 metric tons of CO_2 emissions per year from electricity alone, a substantial contribution when considering the numerous data centers across Texas.

The type of power source directly influences these emissions. Facilities drawing electricity predominantly from renewable sources, such as wind or solar, can significantly lower operational carbon emissions. Conversely, facilities served mainly by coal or natural gas have notably higher emissions intensities. Given the geographical variation in Texas's power generation, the location of a data center within the state critically influences its environmental footprint.

Indirect Emissions from the Energy Supply Chain

Beyond direct electricity use, additional emissions arise indirectly from fuel extraction, processing, and transportation within the electricity supply chain. Upstream activities add approximately 5 to 10 percent to the direct emissions of electricity production, and transmission losses within the grid further increase this figure by an estimated 6 to 7 percent. While often excluded from facility-level emissions inventories, these indirect emissions contribute meaningfully to the data center's full lifecycle impact and should be accounted for when evaluating comprehensive environmental strategies (Hasan et al., 2022).

4.2 Cooling Systems

Cooling systems are critical components of data centers, especially in Texas, where high summer temperatures elevate cooling demand significantly. These systems generally consume between 20 and 40 percent of the facility's total electricity, making them a key source of indirect emissions. Three primary cooling technologies are used: air-cooled chillers, water-cooled chillers, and direct expansion (DX) systems.

Air-cooled chillers are the most common in Texas, offering a balance of simplicity and efficiency, with typical Power Usage Effectiveness (PUE) values ranging from 1.3 to 1.5. Water-cooled chillers are more energy-efficient (PUE typically between 1.2 and 1.3), but their widespread use is restricted by water availability, especially in drought-prone areas. DX systems, often found in smaller data centers, are less efficient, frequently having PUE values exceeding 1.5, resulting in higher electricity consumption and associated emissions (Kamali & Hewage, 2023).

Cooling systems also utilize refrigerants, which pose direct greenhouse gas emission risks due to leakage. Refrigerants such as R-410A (GWP of 2,088) and R-134a (GWP of 1,430) are common in data center cooling applications. Annual leakage rates typically range from 2 to 5 percent of the total refrigerant inventory. For example, a large data center cooling system containing approximately 1,000 kg of R-410A could annually leak between 20 and 50 kg, equating to about 42 to 104 metric tons of CO_2-equivalent emissions. Given these impacts, refrigerant selection and leak management strategies present crucial opportunities to reduce GHG emissions at the operational level. Table 2 compares the energy use, emissions, and refrigerant leakage across common cooling system types for a 10 MW data center under typical Texas climate conditions.

Table 2. Cooling System Comparison for a 10 MW Data Center

Cooling System	Typical PUE	Annual Electricity (MWh)	Annual CO_2 from Electricity (metric tons)	Annual Refrigerant Leakage (metric tons CO_2e)
Air-cooled	1.3–1.5	26,280–43,800	11,300–18,800	42–104
Water-cooled	1.2–1.3	17,520–26,280	7,500–11,300	42–104
DX systems	>1.5	>43,800	>18,800	42–104

(Sources: EPA eGRID, 2022; Kamali & Hewage, 2023)

4.3 Backup Power Systems

Data centers require highly reliable power supplies, typically employing diesel-powered backup generators to maintain continuous operations during grid outages. These generators are usually tested monthly, resulting in 50 to 150 hours of annual operation per generator, significantly contributing to local AQ issues.

A single 2.5 MW diesel generator tested for 100 hours annually consumes about 50,000 liters of diesel, producing approximately 130 metric tons of CO_2. Additionally, diesel combustion generates significant quantities of local air pollutants such as NO_x, PM, and CO. Using typical emission factors from EPA's AP-42, this same generator would emit approximately 1.2 metric tons of NO_x and 0.05 metric tons of PM per year during testing.

Facilities often have multiple generators for redundancy, magnifying these emissions. A facility with ten such generators can thus emit approximately 1,300 metric tons of CO_2 and 12 metric tons of NO_x annually from routine testing alone. Such emissions contribute significantly to local ozone formation and particulate pollution, particularly problematic in Texas's major metropolitan areas like Houston and Dallas–Fort Worth, which already face air quality challenges.

Backup generators also involve the storage of large diesel fuel quantities, commonly 10,000 to 50,000 liters per generator. Accidental fuel spills or leaks, although infrequent, can lead to significant localized soil, water, and air contamination, requiring costly remediation efforts and posing additional environmental risks.

4.4 Research and Policy Gaps

Research gaps in the operational phase primarily concern the detailed analysis and modeling of local air quality impacts from diesel generators. Most studies currently rely on general emission factors and lack specific modeling of cumulative impacts from multiple nearby data centers. Furthermore, detailed refrigerant leakage rates and mitigation strategies specific to Texas are not well documented.

From a policy standpoint, Texas currently has limited regulation explicitly addressing cumulative AQ impacts from clustered data centers' operational emissions. While some regions require basic permitting for generators, detailed ambient air quality assessments or cumulative impact studies are rare. Additionally, Texas lacks comprehensive refrigerant management regulations to address leakage rates systematically.

5. Indirect Environmental Impacts

Data centers not only have direct emissions from their own electricity use and on-site operations, but they also produce indirect environmental impacts. These indirect impacts occur through the supply chain, manufacturing processes, transportation of equipment, and daily commuting of employees. Properly accounting for these indirect emissions is crucial to fully understand the environmental impact of data centers.

5.1 Supply Chain Impacts

Manufacturing of Hardware and Software

Data centers rely on sophisticated equipment, including servers, storage devices, networking hardware, and supporting infrastructure like batteries and power distribution units.

Manufacturing these items involves substantial energy consumption and results in significant greenhouse gas emissions.

Lifecycle assessments indicate server manufacturing alone can contribute approximately 20-30 percent of a data center's total GHG footprint over its operational lifetime (Alva et al., 2022). For instance, producing a single server unit results in approximately 1.2 to 2.0 metric tons of CO_2 emissions. Given that a typical 10 MW data center houses around 5,000 to 10,000 servers, total emissions from server manufacturing could range from 6,000 to 20,000 metric tons CO_2e.

Manufacturing processes also generate air pollutants, including PM, NO_x, SO_2, and VOCs. These emissions are particularly notable in regions hosting electronics manufacturing plants, often outside of the United States. However, increasing onshore manufacturing within the U.S., including Texas, could shift these impacts closer to domestic urban centers, raising additional concerns about localized air quality.

Embedded Carbon in IT Infrastructure

Embedded carbon refers to the total emissions generated from raw material extraction, production, transportation, installation, and disposal of infrastructure components. In addition to servers, critical elements such as storage arrays, networking equipment, and uninterrupted power supply (UPS) systems contain significant embedded carbon.

Networking equipment, including routers and switches, typically has embedded carbon emissions ranging from 0.5 to 1.0 metric ton CO_2 per unit, while storage arrays can range from 2.0 to 5.0 metric tons CO_2 per unit, depending on their capacity and technology (Sharma et al., 2023). Table 3 summarizes typical embedded carbon emissions associated with various IT infrastructure components within a standard 10 MW facility.

Table 3. Embedded Carbon in Typical IT Infrastructure for a 10 MW Data Center.

Equipment Type	Quantity Range (units)	Emission per Unit (metric tons CO_2e)	Total Emissions (metric tons CO_2e)
Servers	5,000–10,000	1.2–2.0	6,000–20,000
Storage Arrays	100–300	2.0–5.0	200–1,500
Network Switches	200–500	0.5–1.0	100–500
UPS Batteries	50–150	1.0–2.0	50–300
Total			6,350–22,300

(Sources: Alva et al., 2022; Sharma et al., 2023)

5.2 Transportation Emissions

Commuting of Data Center Workers

Daily commuting of data center staff contributes indirectly to both greenhouse gas and air quality impacts. Data centers typically employ 20–100 full-time workers depending on size and complexity. Assuming each worker travels an average daily commute of 30 miles (round trip) in a gasoline-powered vehicle averaging 25 miles per gallon, annual emissions per worker would amount to approximately 2.9 metric tons of CO_2 per year.

In addition to CO_2, commuting also releases local pollutants, such as NO_x and PM, especially during peak hours when congestion exacerbates emission rates. In Texas metropolitan areas, employee commuting emissions add cumulative pressure on urban air quality management, particularly in ozone nonattainment zones like Dallas–Fort Worth and Houston. The following table presents typical annual commuting emissions for various facility sizes.Table 4 estimates the annual emissions from employee commuting based on facility size, using assumptions consistent with the EPA MOVES4 model.

Table 4. Annual Commuting Emissions for Data Center Workers.

Facility Size	Number of Workers	Annual CO_2 Emissions (metric tons)	Annual NO_x Emissions (kg)	Annual PM Emissions (kg)
Small (1–5 MW)	20–40	58–116	50–100	5–10
Medium (5–20 MW)	40–80	116–232	100–200	10–20
Large (>20 MW)	80–100+	232–290+	200–250+	20–25+

(Calculated using EPA MOVES4 model assumptions)

Shipping and Distribution

Transportation emissions also arise from shipping equipment to the data center. Server equipment, manufactured domestically or internationally, is typically delivered by trucks and cargo ships, each emitting substantial GHGs and AQ pollutants. The magnitude of emissions varies widely based on shipping distance, mode, and efficiency of transport vehicles.

For example, transporting a standard 40-foot container from manufacturing hubs in Asia to Texas involves maritime shipping and long-haul trucking, emitting roughly 3–6 metric tons of CO_2 per container shipment. For a medium-sized data center, requiring multiple containers per year, annual emissions could range from 30 to 120 metric tons of CO_2, along with associated NO_x, SO_2, and PM emissions from heavy-duty diesel engines used in shipping and trucking.

5.3 Research and Policy Gaps

Significant gaps remain in quantifying the indirect emissions from the data center supply chain and transportation segments, particularly regarding air quality pollutants. Current literature largely focuses on global averages without detailed regional analyses. For Texas specifically, limited data exists on localized impacts of manufacturing and transportation emissions tied to data center equipment.

Policy gaps are also evident, as Texas currently lacks comprehensive guidance or incentives to reduce indirect environmental impacts. Regulations or voluntary programs targeting supply chain transparency, local sourcing of equipment, or employee commuting incentives remain underdeveloped. Addressing these gaps with detailed emissions analyses and targeted policy measures could yield significant environmental improvements.

6. Policy and Regulatory Framework

Understanding the policy and regulatory framework that governs AQ and GHG emissions from data centers in Texas is crucial. Data centers must comply with local, state, and federal regulations designed to manage emissions and improve energy efficiency. While GHG regulations primarily influence emissions through energy management, AQ regulations specifically address local pollutant emissions that affect human health and environmental quality.

6.1 Local, State, and Federal Regulations

Air Quality Regulations

At the federal level, air quality regulations are primarily established by the EPA under the Clean Air Act. The EPA sets NAAQS for six criteria pollutants: ozone, PM, CO, NO_x, SO_2, and lead. These standards require states to monitor and reduce air pollutants, particularly in designated nonattainment areas.

In Texas, the TCEQ enforces these federal standards and issues permits for stationary sources like data center diesel generators. Texas has several ozone nonattainment regions, notably Houston and Dallas–Fort Worth, requiring stricter controls on local NO_x and VOC emissions. Data centers located in these nonattainment areas face additional scrutiny when applying for permits related to diesel generator operations.

Despite these standards, TCEQ regulations do not currently require cumulative air dispersion modeling for data center generators unless certain thresholds are exceeded (TCEQ, 2022). This policy gap could lead to localized air quality impacts that remain unaddressed, especially in urbanized regions with multiple data centers clustered together.

Greenhouse Gas Regulations

Federally, greenhouse gases are regulated primarily through reporting requirements and performance standards. The EPA administers the Mandatory Greenhouse Gas Reporting Rule, requiring facilities emitting over 25,000 metric tons of CO_2-equivalent per year to report their emissions (EPA, 2023). Large data centers potentially meet this reporting threshold, depending on their electricity consumption and operational practices.

At the state level, Texas does not impose specific greenhouse gas emission limits or comprehensive carbon pricing mechanisms. However, many data center operators voluntarily participate in programs such as renewable energy credits (RECs), power purchase agreements (PPAs), or sustainability certifications like LEED to reduce their emissions footprint. Table 5 provides an overview of key regulatory frameworks governing air quality and greenhouse gas emissions from data center operations in Texas, including both federal and state-level authorities.

Table 5. Regulatory Summary for Data Center Emissions in Texas.

Emission Type	Regulatory Authority	Key Standards/Regulations	Applicability to Data Centers
AQ	EPA	Clean Air Act, NAAQS (Ozone, PM, NO_x, SO_2)	Diesel generators, HVAC systems
AQ	TCEQ	Permitting rules for stationary sources	Generators above specific thresholds
GHG	EPA	Mandatory Greenhouse Gas Reporting Rule	Facilities emitting >25,000 MT CO_2e/yr
GHG	Texas (TCEQ, ERCOT)	No specific statewide GHG limit or price	Voluntary renewable sourcing programs

6.2 Energy Efficiency Standards and Incentives

Energy efficiency is a key approach to reducing emissions from data centers. Texas provides several incentives designed to encourage efficient energy use, although these are generally voluntary and market-driven rather than mandated by regulation. The state offers sales and use tax exemptions for data centers investing more than $200 million, provided they create jobs and meet minimum efficiency benchmarks. Similarly, local governments often provide property tax abatements or rebates to attract large data centers.

Additionally, the Texas Public Utility Commission supports efficiency improvements through utility-run demand-side management programs. These programs encourage data centers to adopt energy-saving technologies, such as efficient cooling systems, energy management software, and advanced power distribution units.

Despite these incentives, Texas lacks mandatory statewide efficiency standards specifically targeting data centers. Facilities commonly adopt industry-driven standards such as the Green Grid's Power Usage Effectiveness (PUE) metric, which quantifies energy efficiency. However, without state-level mandates, adoption of best practices remains uneven. Table 6 outlines current energy efficiency incentives available to data centers in Texas as of April 2025, highlighting opportunities for cost savings through tax exemptions and utility programs.

Table 6. Energy Efficiency Incentives Available for Data Centers in Texas (April 2025)

Incentive Type	Description	Eligibility	Potential Benefit
Sales Tax Exemption	Exemption for data centers investing >$200 million	Large data centers creating new jobs	6.25% sales tax savings
Property Tax Rebates	Negotiated property tax abatement	Data centers meeting local requirements	Significant reduction in property tax
Utility DSM Programs	Demand-side management incentives (rebates, financing)	Facilities adopting energy-efficient tech	Reduced upfront cost of improvements

6.3 Carbon Footprint Disclosure and Transparency

Transparency regarding carbon emissions is increasingly important for data center stakeholders. Currently, most data centers voluntarily report emissions through mechanisms such as sustainability reports, corporate environmental disclosures, or participation in external frameworks such as the Carbon Disclosure Project (CDP).

However, no mandatory statewide regulations in Texas require comprehensive public disclosure of carbon footprints for data centers. Voluntary disclosures vary significantly in terms of accuracy, comprehensiveness, and frequency. The lack of standardized reporting makes comparing environmental performance across facilities challenging.

To improve transparency, clear statewide guidelines or standardized frameworks for reporting Scope 1 (on-site), Scope 2 (electricity-related), and Scope 3 (indirect supply-chain) emissions would be beneficial. Enhanced transparency could enable better decision-making by policymakers, consumers, and communities, ultimately driving more effective emission reduction efforts.

6.4 Research and Policy Gaps

Several policy gaps currently limit effective management of AQ and GHG emissions from data centers in Texas. Firstly, the absence of cumulative AQ impact analyses in permitting decisions could allow localized air quality issues to emerge in data center clusters without regulatory oversight.

Secondly, the voluntary nature of GHG emission reporting and energy efficiency standards leaves significant room for improvement. Without mandatory efficiency targets or standardized disclosure requirements, adoption of best practices remains inconsistent. Statewide policy initiatives establishing mandatory efficiency standards, detailed emissions reporting, and renewable energy procurement targets could significantly mitigate emissions.

7. Mitigation Strategies

Mitigating environmental impacts of data centers involves systematically reducing both GHG emissions and AQ pollutants. Effective strategies include improvements in energy efficiency, integration of renewable energy, carbon offsetting, circular economy practices, and technological innovation.

7.1 Energy Efficiency Improvements

Energy efficiency is among the most cost-effective methods for reducing data center emissions. Efficiency can lower total energy demand, thus reducing both direct and indirect environmental impacts.

Energy-Saving Technologies

Adopting energy-efficient technologies significantly reduces electricity consumption. Advanced cooling solutions, such as free-air cooling and economizer systems, leverage outside air to reduce cooling loads. Studies show free-air cooling can reduce cooling-related energy consumption by 30-50%, particularly effective during mild weather conditions common in fall and winter in Texas (Kamali & Hewage, 2023).

Servers with higher computational efficiency also offer substantial benefits. Modern server models can perform more computational tasks per unit of electricity consumed. Data from recent lifecycle assessments suggest energy-efficient servers could reduce total facility electricity usage by up to 20–30%, translating to thousands of metric tons of CO_2 emissions savings annually for large data centers (Hasan et al., 2022).

Integration of Renewable Energy

Integrating renewable energy directly into data center operations is another critical mitigation strategy. Texas is already a leader in renewable energy, particularly wind and solar power. Data centers adopting renewable energy can significantly reduce their Scope 2 GHG emissions. A facility using 100% renewable power could reduce electricity-related CO_2 emissions to near zero, eliminating tens of thousands of metric tons annually compared to fossil-fuel-reliant facilities. Renewable integration is increasingly facilitated through PPAs and RECs. These financial mechanisms allow data centers to purchase renewable electricity generated off-site, significantly reducing their carbon footprint. Table 7 estimates the potential reductions in annual CO_2 emissions for a 10 MW data center using various mitigation strategies, including advanced cooling, energy-efficient hardware, and renewable electricity sourcing.

Table 7. Potential Emissions Reductions from Energy Efficiency and Renewable Integration (10 MW Facility).

Mitigation Strategy	Typical Reduction in Electricity (%)	Annual CO_2 Emissions Reduction (metric tons)
Advanced Cooling (Economizer)	30–50% (cooling only)	3,400–9,400
Energy-efficient Servers	20–30% (facility-wide)	7,500–11,300
100% Renewable Electricity	100% (facility-wide)	37,668

(Based on average ERCOT emissions factors and typical facility energy use)

7.2 Carbon Offset and Neutrality Programs

Carbon offsetting involves compensating for emissions by funding projects that remove or reduce equivalent emissions elsewhere. Data centers can achieve carbon neutrality through high-quality offset programs, such as reforestation, renewable energy projects, or methane capture projects. However, reliance solely on offsets is controversial, as it does not address local AQ impacts or the root causes of emissions.

In Texas, data centers frequently use RECs to demonstrate carbon reduction. While valuable, RECs often do not address local AQ pollutants from diesel generators or cooling systems. Comprehensive carbon neutrality should therefore be complemented with direct emissions reduction measures.

7.3 Circular Economy Approaches

Circular economy practices aim to reduce resource use and waste generation. These approaches involve reusing, refurbishing, recycling, and sustainably disposing of IT equipment. Extending the lifespan of servers from a typical 3–5 years to 5–7 years can substantially reduce embedded carbon emissions, as server manufacturing accounts for significant lifecycle emissions (Alva et al., 2022).

Additionally, recycling electronic waste (e-waste) responsibly prevents hazardous materials from entering landfills and reduces the need for new raw material extraction, indirectly reducing emissions from manufacturing processes.

7.4 Technological Advancements

Emerging technologies offer significant opportunities to reduce emissions. Artificial intelligence (AI) and machine learning (ML) applications in data center operations can optimize cooling efficiency, workload management, and energy utilization in real-time.

AI-driven cooling management systems, for example, can dynamically adjust cooling outputs based on predictive analytics and real-time data. Studies suggest AI-managed cooling can improve overall facility energy efficiency by approximately 15–25%, reducing annual emissions substantially (Zhao et al., 2023).

Cloud computing and workload optimization technologies can shift computing tasks between facilities based on real-time grid emissions. Shifting workloads to facilities powered by renewable energy can further reduce emissions, although practical implementation requires robust infrastructure and effective coordination.

7.5 Mitigating Air Quality Impacts

While strategies to reduce greenhouse gases are broadly established, addressing local air quality impacts requires targeted approaches, especially regarding diesel backup generators.

Using alternative fuels such as natural gas or renewable diesel in backup generators could reduce AQ pollutants significantly. Renewable diesel can reduce PM emissions by up to 30% and NO_x by around 5–15% compared to conventional diesel. Additionally, replacing diesel generators with battery storage or fuel cells would virtually eliminate local AQ emissions, significantly benefiting urban areas in Texas with existing air quality challenges.

Scheduling generator testing during periods with favorable weather conditions and improved dispersion conditions could also reduce localized impacts, benefiting communities in nonattainment areas like Houston and Dallas. Table 8 presents estimated reductions in air pollutant emissions, specifically NO_x and particulate matter, from replacing conventional diesel generators with alternative backup power strategies in a typical 10-generator data center.

Table 8. AQ Emissions Reductions from Alternative Backup Power Strategies (Typical 10-generator facility).

Strategy	NO_x Reduction (%)	PM Reduction (%)
Renewable Diesel Fuel	5–15%	20–30%
Natural Gas Generators	60–80%	90–100%
Battery Energy Storage/Fuel Cells	~100%	~100%

(Source: EPA Alternative Fuels Database, 2022)

7.6 Research and Policy Gaps

Current research and policy frameworks have primarily emphasized GHG mitigation, with less emphasis on AQ-specific strategies. Research on battery and fuel cell viability, renewable diesel availability, and AQ-focused workload shifting remain limited, particularly specific to Texas conditions.

Policy gaps also exist, notably the lack of incentives or regulations specifically promoting AQ-focused mitigation strategies in backup systems. Developing targeted regulations and incentives encouraging cleaner backup power solutions and advanced operational practices could significantly reduce AQ impacts.

8. Case Studies and Best Practices

Analyzing case studies and best practices provides insight into successful strategies for reducing AQ and GHG impacts from data centers. Texas-specific examples demonstrate regional applications, while global comparisons offer broader perspectives that could inform local implementation.

8.1 Data Center Initiatives in Texas

Several data centers in Texas have adopted sustainable practices, demonstrating leadership in reducing both AQ and GHG emissions.

CyrusOne Data Centers (Dallas, Texas)

CyrusOne has integrated renewable energy extensively. The company's Dallas data centers purchase RECs equivalent to 100% of their electricity consumption, significantly lowering Scope 2 GHG emissions. Additionally, CyrusOne employs advanced cooling systems, including air-side economizers, reducing electricity use by approximately 30–40% compared to traditional cooling methods (CyrusOne Sustainability Report, 2023).

Microsoft Data Center Campus (San Antonio, Texas)

Microsoft has committed to carbon neutrality across its data centers, including its Texas locations. In San Antonio, Microsoft utilizes renewable PPAs and advanced cooling systems. The site also deploys diesel generator alternatives such as battery storage and natural gas generators to reduce local AQ impacts. These measures have reduced their annual NO_x and PM emissions significantly compared to traditional diesel-based backup solutions (Microsoft Environmental Sustainability Report, 2023).

Digital Realty (Houston, Texas)

Digital Realty's data centers in Houston emphasize sustainable construction materials and methods, significantly reducing their embedded carbon. These facilities utilize modular construction techniques and recycled materials, cutting construction-related GHG emissions by roughly 20%. Additionally, Digital Realty schedules generator testing during periods with optimal weather conditions, minimizing local AQ impacts, especially important in the Houston nonattainment area (Digital Realty Sustainability Report, 2023). Table 9 summarizes selected sustainability initiatives implemented by major data center operators in Texas, highlighting both greenhouse gas and air quality impact reduction strategies based on publicly reported data.

Table 9. Summary of Texas Data Center Sustainability Initiatives.

Data Center Operator	Location	Key Mitigation Strategies	Estimated GHG Reduction (%)	AQ Reduction Strategies
CyrusOne	Dallas	100% RECs, Advanced Cooling	~60–80%	Reduced generator testing emissions
Microsoft	San Antonio	Renewable PPAs, Battery Storage, Natural Gas Backup	~70–90%	60–80% reduction in NO_x and PM
Digital Realty	Houston	Sustainable Construction, Optimal Testing Scheduling	~20–30% (construction phase)	Minimization of AQ impacts during testing

(Sources: CyrusOne, Microsoft, Digital Realty Sustainability Reports, 2023)

8.2 Global Comparisons

International best practices offer valuable lessons and models applicable in Texas, potentially guiding local data centers toward improved sustainability.

Google Data Center (Hamina, Finland)

Google's facility in Finland employs seawater cooling, entirely eliminating the need for energy-intensive chillers. This approach reduces cooling-related electricity use by nearly 90%, significantly lowering associated GHG emissions. While seawater cooling is location-specific, similar innovative cooling approaches, such as groundwater or reclaimed water systems, could be adapted in water-available regions of Texas (Google Environmental Report, 2023).

Equinix Data Center (Amsterdam, Netherlands)

Equinix integrates waste heat reuse at their Amsterdam facility. Heat generated by servers is captured and redistributed to local heating networks, reducing city-wide fossil fuel usage. Such practices significantly decrease net GHG emissions at the community level. In urban Texas environments, capturing and redistributing data center waste heat for local heating or industrial processes could similarly enhance regional energy efficiency and emissions reduction (Equinix Sustainability Report, 2023).

NTT Data Center (Tokyo, Japan)

NTT uses fuel cells and battery storage systems extensively to replace diesel generators, significantly reducing local AQ pollutants. Their use of hydrogen fuel cells virtually eliminates NO_x, SO_2, and PM emissions from backup power operations. Implementing similar fuel cell and battery solutions in Texas metropolitan areas, especially those in nonattainment zones, could effectively mitigate localized AQ issues (NTT Sustainability Report, 2023). Table 10 highlights global data center best practices with high potential for reducing both greenhouse gas and air pollutant emissions, along with an assessment of their feasibility for implementation in the Texas context.

Table 10. Global Data Center Best Practices and Potential for Texas Implementation.

Global Example	Location	Key Strategy	GHG Reduction Potential	AQ Reduction Potential	Texas Implementation Feasibility
Google	Hamina, Finland	Seawater Cooling	High (~90%)	Moderate–High	Moderate (location-dependent)
Equinix	Amsterdam, Netherlands	Waste Heat Reuse	High	Moderate	High (urban areas)
NTT	Tokyo, Japan	Fuel Cells, Battery Storage	High	High	High (urban areas, AQ-focused)

(Sources: Google, Equinix, NTT Sustainability Reports, 2023)

8.3 Lessons Learned and Recommendations

The Texas examples highlight successes in renewable energy procurement, advanced cooling technologies, sustainable construction practices, and improved backup systems. Global cases demonstrate additional opportunities, such as waste heat reuse and innovative cooling approaches, adaptable to Texas's specific climate and infrastructural conditions.

For effective implementation in Texas, policymakers and data center operators should:

- Enhance incentives or create mandates for adopting cleaner backup power technologies such as fuel cells and batteries, especially in AQ-sensitive areas.
- Promote renewable integration through direct PPAs or mandatory renewable purchasing standards.
- Facilitate municipal-level partnerships to reuse waste heat from data centers in district heating, cooling, or other industrial processes.
- Establish state-specific guidelines encouraging sustainable construction practices and material recycling for embedded carbon reduction.

8.4 Research and Policy Gaps

Despite promising examples, there remains limited quantitative research on the localized environmental impacts and potential benefits of innovative practices in Texas specifically. Comprehensive analyses quantifying the cumulative effects of adopting best practices across multiple Texas facilities are sparse.

Additionally, clear policy frameworks providing incentives or mandates for adopting these proven global best practices do not currently exist at the Texas state level. Development of targeted policies promoting innovative cooling systems, cleaner backup technologies, and heat recovery practices would accelerate sustainability improvements significantly.

9. Future Outlook

Considering the rapid growth in digital demand, the environmental impacts from data centers are projected to intensify without targeted interventions. This section explores emerging technologies, predictive modeling of future emissions, and provides actionable recommendations for policymakers to effectively manage AQ and GHG emissions from data centers in Texas.

9.1 Emerging Technologies

Technological innovation remains critical for reducing the environmental footprint of data centers. Several promising technologies and practices are anticipated to become mainstream over the next decade, significantly mitigating emissions.

Advanced Cooling Systems

Emerging cooling technologies such as liquid immersion cooling, direct-to-chip cooling, and phase-change materials offer substantial efficiency improvements. Immersion cooling, for instance, involves submerging server equipment in non-conductive cooling fluid, potentially reducing cooling-related electricity use by up to 60–80% compared to traditional air-cooled systems (Kamali & Hewage, 2023). Such technology not only cuts GHG emissions but indirectly reduces local AQ impacts associated with grid electricity generation.

Hydrogen Fuel Cells and Battery Storage

Hydrogen-based fuel cells and advanced battery storage technologies promise substantial reductions in local AQ pollutants by replacing diesel backup generators. These technologies can virtually eliminate NO_x, SO_2, and particulate matter (PM) emissions. With Texas increasingly investing in hydrogen infrastructure, fuel cell deployment in data centers could become economically viable within the next decade, particularly in urban nonattainment areas.

AI Optimization

AI-driven energy management systems that dynamically optimize server loads, cooling demands, and energy procurement can substantially reduce energy usage. Studies project that comprehensive AI-based optimization may decrease overall energy consumption by 15-25%, significantly lowering GHG emissions (Zhao et al., 2023). Implementing AI-driven energy management in Texas facilities could yield considerable environmental benefits, especially in grid-intensive operations. Table 11 presents estimated emissions reductions from select emerging technologies for a 10 MW data center, focusing on both greenhouse gas and air quality benefits achievable through energy savings and cleaner backup systems.

Table 11. Potential Emissions Reductions from Emerging Technologies (10 MW Facility).

Technology/Practice	Estimated Energy Savings (%)	GHG Reduction (metric tons/year)	AQ Reduction Potential
Immersion Cooling	60–80% (cooling energy)	6,800–15,000	Moderate–High (indirect)
Hydrogen Fuel Cells	100% (generator emissions)	1,300	High (local NO_x, PM)
AI Optimization	15–25% (total facility)	5,600–9,400	Moderate–High (indirect)

(Estimates based on typical operational characteristics and emissions profiles)

9.2 Predictive Modeling of Future Emissions

Predictive modeling provides essential insights into potential environmental impacts from the projected growth of data centers in Texas. Under a business-as-usual scenario, with data center capacity potentially doubling by 2030, operational electricity use could approach 10-15 TWh annually statewide, resulting in approximately 4.3-6.5 million metric tons of CO_2 emissions per year.

Advanced models incorporating energy efficiency improvements, widespread renewable energy adoption, and cleaner backup power options show potential reductions in emissions by approximately 50-80% compared to business-as-usual scenarios. These predictions highlight the significant role technology adoption and policy interventions can play in managing future impacts. Table 12 presents predictive modeling scenarios for data center electricity use, greenhouse gas emissions, and air quality impacts in Texas by 2030, comparing business-as-usual growth with varying levels of technology adoption and mitigation strategies.

Table 12. Predictive Modeling Scenarios for Texas Data Centers by 2030.

Scenario	Projected Electricity (TWh)	Annual GHG Emissions (million metric tons CO_2)	Annual AQ Impacts (NO_x, PM)
Business-as-Usual	10–15	4.3–6.5	High (increased diesel use)
Moderate Technology Adoption	8–10	2.0–3.5	Moderate
Aggressive Mitigation (Renewables, Advanced Cooling, Fuel Cells)	5–8	0.8–1.5	Low–Moderate

9.3 Policy Recommendations

To ensure sustainable growth of data centers in Texas, policymakers should pursue targeted regulations and incentives addressing both AQ and GHG emissions.

Mandatory Energy Efficiency Standards

Implementing mandatory statewide efficiency standards based on metrics such as Power Usage Effectiveness (PUE) would drive widespread adoption of energy-efficient cooling technologies, optimized server management, and AI-based energy systems.

Renewable Energy Procurement Requirements

Introducing statewide targets or incentives encouraging or mandating renewable energy procurement for data centers could substantially reduce Scope 2 GHG emissions. Establishing renewable energy thresholds (e.g., 50% by 2030, 100% by 2040) would provide clear pathways for industry compliance.

AQ-Focused Regulations for Backup Power

Enacting regulations or strong incentives promoting alternatives to diesel generators (e.g., hydrogen fuel cells, natural gas generators, or battery storage) in urban nonattainment areas could significantly mitigate local AQ impacts. State incentives could encourage rapid adoption by covering initial investment or providing favorable financing terms.

Standardized Emissions Reporting and Disclosure

Creating a comprehensive emissions reporting framework that includes Scope 1, 2, and 3 emissions would improve transparency, enable better tracking of environmental performance, and allow policymakers and communities to make informed decisions. Table 13 outlines recommended policy actions aimed at reducing greenhouse gas and air pollutant emissions from data centers in Texas, along with estimated implementation timelines and potential environmental outcomes.

Table 13. Recommended Policy Actions and Potential Outcomes.

Policy Action	Target Emission Type	Implementation Timeline	Potential Impact
Mandatory Efficiency Standards	GHG, indirect AQ	2–3 years	High (energy savings 15–30%)
Renewable Energy Procurement Mandates	GHG	3–5 years	Very High (emission reduction ~70–100%)
AQ Regulations for Backup Generators	AQ (NO_x, PM)	2–4 years	High (local pollutant reductions ~60–100%)
Emissions Reporting and Transparency	GHG, AQ	Immediate–2 years	Moderate–High (improved compliance, accountability)

9.4 Research and Policy Gaps

Research into comprehensive modeling of cumulative AQ impacts and specific benefits of emerging technologies within Texas remains limited. Developing detailed, site-specific air dispersion models and lifecycle emissions analyses would provide more accurate guidance for policy development.

Additionally, the lack of robust and standardized emissions disclosure policies hinders effective tracking and management of emissions. Creating statewide standards for emissions reporting and transparency would fill a critical policy gap, supporting effective environmental management across the industry. By proactively adopting emerging technologies, utilizing predictive modeling, and implementing clear, targeted policies, Texas can significantly reduce the future environmental impacts associated with data center growth, ensuring long-term sustainability in the digital economy.

10. Conclusion

This study provided a comprehensive assessment of both air quality (AQ) and greenhouse gas (GHG) emissions associated with data centers in Texas. The rapid growth of data centers, driven by increasing digitalization, cloud computing, and artificial intelligence demand, presents significant environmental implications. Separating AQ and GHG emissions allowed for a clearer understanding of their distinct impacts, regulatory contexts, and potential mitigation strategies.

10.1 Summary of Key Findings

Tables bellow provides a comprehensive, quantitative summary of emissions, clearly distinguishing AQ from GHG impacts. They also include primary sources used throughout your paper, enabling straightforward referencing. Table 14 summarizes key air quality impacts from data centers in Texas, identifying major emission sources, associated pollutants, estimated annual emissions, and their localized or regional effects. Table 15 summarizes the major sources of greenhouse gas emissions associated with data centers in Texas, including both direct and indirect contributors across operational, construction, and supply chain phases.

Table 14. Summary of Air Quality (AQ) Impacts from Data Centers in Texas.

Emission Source	Pollutants	Typical Annual Emissions	Main Impact
Diesel Generator Testing	NO_x, PM, CO, VOCs	NO_x: 1.2 tons/generator/year PM: 0.05 tons/generator/year	Local ozone formation, respiratory impacts
Construction Machinery	NO_x, PM, CO, VOCs	NO_x: 6–25 tons/site PM: 0.4–2.5 tons/site	Short-term localized AQ deterioration
Employee Commuting	NO_x, PM	NO_x: 50–250 kg/facility/year PM: 5–25 kg/facility/year	Urban AQ degradation, ozone formation
Material Transportation (Construction Phase)	NO_x, PM, CO	NO_x: 2–5 tons/site PM: 0.1–0.5 tons/site	Localized AQ impact along transport routes
Electricity Generation (indirect)	NO_x, SO_2, PM	Varies by fuel source (coal & gas dominant)	Regional AQ impacts, ozone precursors
Cooling Systems (indirect)	NO_x, SO_2, PM	Indirect (linked to electricity use)	Indirect regional AQ impacts via power plants

Table 15. Summary of GHG Impacts from Data Centers in Texas.

Emission Source	GHG Type	Typical Annual Emissions	Main Impact
Operational Electricity Consumption	CO_2	~37,668 metric tons/year (10 MW facility)	Dominant operational GHG emission
Construction Materials (Embodied Carbon)	CO_2	2,550–5,500 metric tons/site (concrete & steel)	Significant upfront lifecycle emission
Diesel Generator Testing	CO_2	~130 metric tons/generator/year	Direct onsite combustion emissions
Refrigerant Leakage (Cooling)	HFCs	42–104 metric tons CO_2e/year (typical leakage rate)	High Global Warming Potential (GWP)
Server & IT Equipment Manufacturing	CO_2	6,350–22,300 metric tons/facility	Major embedded GHG contributor
Transportation of Equipment (Scope 3)	CO_2	30–120 metric tons CO_2/site/year	Indirect supply chain emissions
Employee Commuting (Scope 3)	CO_2	58–290 metric tons/year (varies with facility size)	Indirect community-level GHG impacts
Fuel Extraction & Transmission Losses (Indirect)	CO_2	~5–10% additional to direct emissions	Upstream emissions in electricity supply chain

The analysis identified several critical points regarding data center environmental impacts:

Operational emissions represent the largest share of data centers' GHG emissions. A typical 10-megawatt (MW) facility in Texas, using the current electricity grid mix, emits approximately 37,668 metric tons of CO_2 per year. Cooling systems alone can account for 20–40% of this energy use, making efficiency improvements vital.

Construction-related emissions are substantial. Embodied carbon from construction materials like concrete and steel contributes significantly, with emissions ranging from 2,550 to 5,500 metric tons of CO_2 per typical data center. Construction also produces localized AQ pollutants such as NO_x and particulate matter (PM), often overlooked by regulatory frameworks.

Indirect supply chain emissions are significant. Server manufacturing and equipment transport account for roughly 20–30% of lifecycle emissions. Employee commuting and logistics further exacerbate both AQ and GHG impacts.

Backup diesel generators substantially impact local air quality. Routine testing of diesel generators at a single large data center facility can produce up to 12 metric tons of NO_x annually, significantly affecting local AQ, particularly in urban ozone nonattainment areas like Houston and Dallas–Fort Worth.

Table 16 provides a consolidated estimate of annual greenhouse gas and nitrogen oxide emissions for a typical 10 MW data center in Texas, capturing both operational and embedded sources.

Table 16. Summary of Annual Emissions for a Typical 10 MW Texas Data Center.

Emission Source	Annual GHG Emissions (metric tons CO_2)	Annual AQ Emissions (NO_x, metric tons)
Electricity Consumption (Operational)	37,668	-
Construction (Materials and Equipment)	2,550–5,500	8–30 (construction phase)
Diesel Generator Testing (Operational)	1,300	~12
Embedded Emissions (IT Infrastructure)	6,350–22,300	-

10.2 Recommendations for Industry and Policy

To effectively mitigate both GHG and AQ impacts, the following recommendations are offered to stakeholders, policymakers, and industry leaders:

Enhance Energy Efficiency: Data centers should adopt advanced cooling technologies, energy-efficient servers, and artificial intelligence (AI)-based optimization. These measures can reduce operational emissions significantly, with potential electricity use reductions of 15–30%.

Transition to Renewable Energy Sources: Increasing renewable energy use through RECs, PPAs, or direct renewable generation can dramatically lower Scope 2 GHG emissions, achieving nearly complete carbon neutrality for operational electricity use.

Adopt Cleaner Backup Power Solutions: Replacing diesel generators with fuel cells, battery storage, or natural gas generators can significantly improve local air quality, reducing NO_x and PM emissions by 60–100%.

Implement Comprehensive Emissions Reporting Standards: Statewide mandatory emissions reporting encompassing Scope 1, 2, and 3 emissions would ensure transparency, allowing better environmental management and informed policy decisions.

Promote Sustainable Construction Practices: Encouraging or mandating sustainable construction practices and materials recycling can substantially reduce lifecycle emissions from construction phases and embedded carbon within data center infrastructure.

Table 17 outlines key recommended actions for reducing emissions from data centers in Texas, along with the primary pollutant types targeted and the expected magnitude of environmental benefits.

Table 17. Recommended Actions and Expected Benefits.

Recommended Action	Primary Emission Type	Potential Impact
Advanced Cooling and Efficiency	GHG, indirect AQ	~15–30% reduction in energy-related emissions
Renewable Energy Integration	GHG	~70–100% reduction in electricity-related emissions
Cleaner Backup Power (Fuel Cells, Batteries)	AQ (NO_x, PM)	~60–100% reduction in local AQ emissions
Standardized Emissions Reporting	GHG, AQ	Improved transparency and regulatory compliance
Sustainable Construction Practices	GHG, indirect AQ	~20–30% reduction in construction-related emissions

10.3 Closing Remarks and Future Directions

Addressing the environmental impacts of Texas's rapidly growing data center sector demands coordinated efforts combining innovative technology adoption, stringent regulatory oversight, and transparent emission management practices. While existing efforts have made meaningful progress, notable gaps remain, particularly in regulating cumulative AQ impacts and embedding rigorous GHG emissions standards.

Future research should further quantify cumulative AQ impacts using detailed dispersion modeling, particularly within clustered data center developments. Additionally, refining lifecycle assessments specific to Texas data centers will improve policy guidance and environmental management strategies. Policymakers must actively engage with industry stakeholders to develop clear and enforceable standards that drive continuous improvement, ensuring the long-term sustainability of Texas's expanding digital infrastructure.

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ARTICLE 3

IEEE Spectrum

OPINION AI

We Need to Talk About AI's Impact on Public Health › Data-center pollution is linked to asthma, heart attacks, and more

BY ADAM WIERMAN SHAOLEI REN

01 MAY 2025

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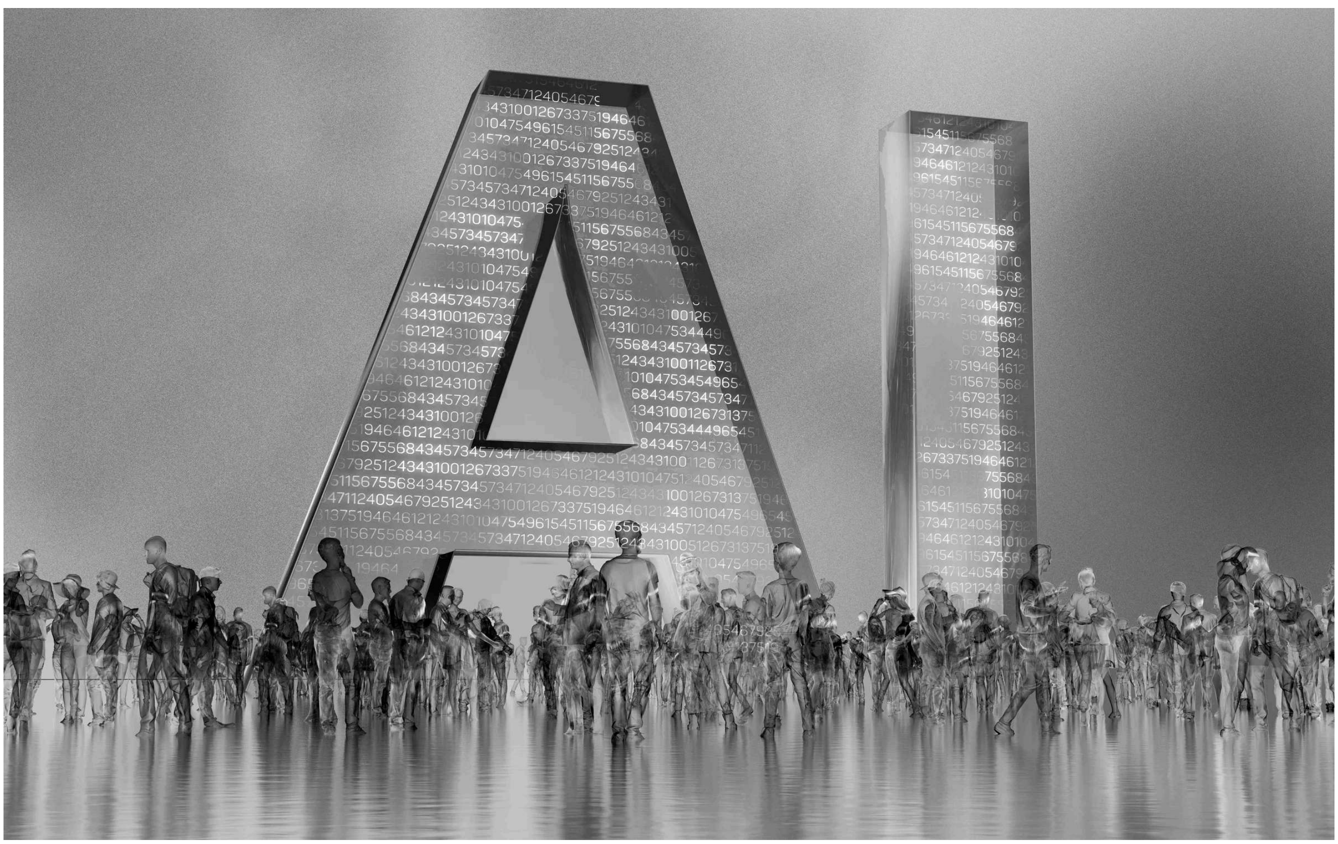

GETTY IMAGES/IEEE SPECTRUM

MOST PEOPLE HAVE HEARD ABOUT THE environmental impact of today's AI boom, stemming from sprawling data centers packed with power-hungry servers. In the United States alone, the demand for AI is projected to push data-center electricity consumption to 6.7 to 12.0 percent of the nation's total by 2028. By that same date, water consumption for cooling these data-center facilities is predicted to double, or even quadruple, compared to the 2023 level.

But many people haven't made the connection between data centers and public health. The power plants and backup generators needed to keep data centers working generate harmful air pollutants, such as fine particulate matter and nitrogen oxides (NOx). These pollutants take an immediate toll on human health, triggering asthma symptoms, heart attacks, and even cognitive decline.

But AI's contribution to air pollution and the public health burden is often missing from conversations about responsible AI design. Why?

Because ambient air pollution is a "silent killer." While concerns about the public health impacts of data centers, including potential links to cancer rate increases, are beginning to surface, most AI-model developers, practitioners, and users simply aren't aware of the serious health risks tied to the energy and infrastructure powering modern AI systems.

The Danger of Ambient Air Pollution

Ambient air pollution is responsible for approximately 4 million premature deaths worldwide each year. The biggest culprit are tiny particles 2.5 micrometers or less in diameter (referred to as PM 2.5), which can travel deep into the respiratory tract and lungs. Along with high blood pressure, smoking, and high blood sugar, air pollution is a leading health risk factor. The World Bank estimates the global cost of air pollution at US $8.1 trillion, equivalent to 6.1 percent of global gross domestic product.

Contrary to common belief, air pollutants don't stay near their emission sources: They can travel hundreds of miles. Moreover, PM 2.5 is considered a "nonthreshold" pollutant, meaning that there's no safe level of exposure.

With the danger of this pollution well established, the question becomes: How much is AI responsible for? In our research as professors at Caltech and the University of California, Riverside, we've set out to answer that question.

Quantifying the Public Health Cost of AI

To ensure that AI services are available even during grid outages, data centers rely on large sets of backup generators that usually burn diesel fuel. While the total operation time of backup generators is limited and regulated by local environmental agencies, their emission rates are high. A typical diesel generator can release 200 to 600 times more NOx than a natural gas power plant producing the same amount of electricity.

A recent report by the state of Virginia revealed that backup generators at Virginia's data centers emitted about 7 percent of what permits allowed in 2023. According to the U.S. Environmental Protection Agency's COBRA modeling tool, which maps how air pollution affects human health at the local, state, and federal levels, the public health cost of those emissions in Virginia is estimated at $150 million, affecting communities as far away as Florida. Imagine the impact if data centers maxed out their permitted emissions.

Further compounding the public health risk, a large set of data-center generators in a region may operate simultaneously during grid outages or grid shortages as part of demand-response programs, potentially triggering short-term spikes in PM2.5 and NOx emissions that are especially harmful to people with lung problems.

Next, let's look beyond the backup generators to the supply of energy from the grid. The bulk of the electricity powering AI data centers comes from power plants that burn fossil fuels, which release harmful air pollutants, including PM 2.5 and NOx. Despite years of progress, power plants remain a leading source of air pollution in the United States.

We calculated that training a single large generative AI model in the United States, such as Meta's Llama 3.1, can produce as much PM 2.5 as more than 10,000 round trips by car between Los Angeles and New York City.

According to our research, in 2023, air pollution attributed to U.S. data centers was responsible for an estimated $6 billion in public health damages. If the current AI growth trend continues, this number is projected to reach $10 billion to $20 billion per year by 2030, rivaling the impact of emissions from

California's 30 million vehicles.

Why Carbon and Energy Efficiency Aren't the Whole Story

To date, efforts to mitigate AI's environmental footprint have focused mostly on carbon emissions and energy efficiency. These efforts are important, but they may not alleviate health impacts, which strongly depend on where the emissions occur.

Carbon anywhere is carbon everywhere. The climate impact of carbon dioxide is largely the same no matter where it's emitted. But the health impact of air pollution depends heavily on regional factors such as local sources of energy, wind patterns, weather, and population density.

Even though carbon emissions and health-damaging air pollutants have some shared sources, an exclusive focus on cutting carbon does not necessarily reduce, and could even exacerbate, public health risks. For instance, our latest (and unpublished) research has shown that redistributing Meta's energy loads in 2023 across its U.S. data centers to prioritize carbon reductions could potentially lower overall carbon emissions by 7.2 percent, but would increase public health costs by 2.8 percent.

Likewise, focusing solely on energy efficiency can reduce air pollutant emissions, but doesn't guarantee a decrease in health impact. That's because training the same AI model using the same amount of energy can yield vastly different health outcomes depending on the location. Across Meta's U.S. data centers, we've found that the public health cost of training the same model can vary by more than a factor of 10.

We Need Health-Informed AI

Supply-side solutions, such as using alternative fuels for backup generators and sourcing electricity from clean fuels, can reduce AI's public health impact, but they come with significant challenges.

Clean backup generators that offer the same level of reliability as diesel are still limited. And despite advancements in renewable energy, fossil fuels remain deeply embedded in the energy fuel mix. The U.S. Energy Information Administration projects that coal-based electricity generation in 2050 will remain at approximately 30 percent of the 2024 level under the alternative electricity scenario, in which power plants continue operating under rules existing prior to April 2024. Globally, the share of coal and other fossil fuels in electricity

Globally, the share of coal and other fossil fuels in electricity generation has remained nearly flat over the past four decades, underscoring the difficulty of entirely changing the energy supply that powers data centers.

We believe that demand-side strategies that consider the spatial and temporal variations in health impacts can provide effective and actionable solutions immediately. These strategies are particularly well-suited for AI data centers with substantial operational flexibility. For example, AI training can often run at any available data centers and typically do not face hard deadlines, so those jobs can be routed to locations or deferred to times that have less impact on public health. Similarly, inference jobs—the work a model does to create an output—can be routed among multiple data centers without affecting user experience.

By incorporating public health impact as a key performance metric, these flexibilities can be harnessed to reduce AI's growing health burden. Crucially, this health-informed approach to AI requires minimal changes to existing systems. Companies simply need to consider public health costs when making decisions.

While the public health cost of AI is growing rapidly, AI also holds tremendous promise for advancing public health. For holds tremendous promise for advancing public health. For example, within the energy sector, AI can navigate the complex decision space of real-time power plant dispatch. By aligning grid stability with public health objectives, AI can help minimize health costs while maintaining a reliable power supply.

AI is rapidly becoming a public utility and will continue to reshape society profoundly. Therefore, we must examine AI through a public lens, with its public health impact as a critical consideration. If we continue to overlook it, the public health cost of AI will only grow. Health-informed AI offers a clear path forward for advancing AI while promoting cleaner air and healthier communities.

ARTICLE 4

EESI
Environmental and Energy Study Institute

Advancing science-based climate solutions

Data Centers and Water Consumption

By Miguel Yañez-Barnuevo (/authors/miguel-yanez) (mailto: myanez@eesi.org)

June 25, 2025

Highlights:

- Data center developers are increasingly tapping into freshwater resources to quench the thirst of data centers, which is putting nearby communities at risk.
- Large data centers can consume up to 5 million gallons *per day*, equivalent to the water use of a town populated by 10,000 to 50,000 people.
- With larger and new AI-focused data centers, water consumption is increasing alongside energy usage and carbon emissions.
- Novel technologies like direct-to-chip cooling and immersion cooling can reduce water and energy usage by data centers.

Data centers have a thirst for water, and their rapid expansion threatens freshwater supplies. Only 3% of Earth's water is freshwater, and only 0.5% of all water (https://www.eesi.org/articles/view/how-water-reuse-can-address-scarcity) is accessible and safe for human consumption. Freshwater is critical for survival. On average, a human being can live without water for only three days (https://www.medicalnewstoday.com/articles/325174#how-long-can-you-live-without-water). Increasing drought and water shortages are reducing water availability (https://www.eesi.org/articles/view/how-water-reuse-can-address-scarcity). Meanwhile, data center developers are increasingly tapping into surface and underground aquifers to cool their facilities.

Data center water usage closely parallels energy usage and carbon emissions. As data centers use more energy for their typical data center operations and to meet AI requests, they consume larger amounts of water to cool their processor chips, so as to avoid overheating and potential damage. Similarly, as energy use increases in data centers, so do carbon emissions.

AI/Data Center Resources

- **Article | Data Center Energy Needs Could Upend Power Grids and Threaten the Climate (https://www.eesi.org/articles/view/data-center-energy-needs-are-upending-power-grids-and-threatening-the-climate)**
- **Article | Data Center Buildout Is Hungry for Fossil Fuels (https://www.eesi.org/articles/view/data-center-buildout-is-hungry-for-fossil-fuels)**
- **Briefing | Artificial Intelligence: Implications for Energy and the Environment (https://www.eesi.org/briefings/view/092525ai)**
- **All EESI Data Center Resources (https://www.eesi.org/page/Data+Centers)**

A medium-sized data center can consume up to roughly 110 million gallons of water (https://www.npr.org/2022/08/30/1119938708/data-centers-backbone-of-the-digital-economy-face-water-scarcity-and-climate-ris) per year for cooling purposes, equivalent to the annual water usage of approximately 1,000 households. Larger data centers can each "drink" up to 5 million gallons per day, or about 1.8 billion annually (https://www.washingtonpost.com/climate-environment/2023/04/25/data-centers-drought-water-use/), usage equivalent to a town of 10,000 to 50,000 people. Together, the nation's 5,426 data centers (https://www.eesi.org/articles/view/data-center-energy-needs-are-upending-power-grids-and-threatening-the-climate) consume billions of gallons of water annually. One report estimated that U.S. data centers consume 449 million gallons of water per day (https://www.nature.com/articles/s41545-021-00101-w)and 163.7 billion gallons annually (as of 2021). A 2016 report (https://journal.uptimeinstitute.com/dont-ignore-water-consumption/) found that fewer than one-third of data center operators track water consumption. Water consumption is expected to continue increasing as data centers grow in number, size, and complexity.

According to scientists at the University of California, Riverside, each 100-word AI prompt is estimated to use roughly one bottle of water (https://www.washingtonpost.com/technology/2024/09/18/energy-ai-use-electricity-water-data-centers/) (or 519 milliliters). This may not sound like much, but billions of AI users worldwide enter prompts into systems like ChatGPT every minute. Large language models require many energy-intensive calculations (https://insideclimatenews.org/news/28092024/ai-water-usage/), necessitating liquid cooling systems.

The Water Cycle of Data Centers

A data center's water footprint is calculated as the sum of three categories (https://arxiv.org/pdf/2304.03271): on-site water usage, water use by power plant facilities that supply power to data centers, and water consumption during the manufacturing process of processor chips. Water can come from various sources, including blue sources (https://iopscience.iop.org/article/10.1088/1748-9326/abfba1) (e.g., surface water and groundwater), piped sources such as municipal water, and gray sources (e.g., purified reclaimed water). Using recycled or non-potable water to meet a data center's cooling needs is a well-established practice to conserve limited potable water resources, particularly in dry or drought-prone areas.

In the context of data centers, "water consumption" (https://arxiv.org/pdf/2304.03271) refers to the amount of water withdrawn from blue or gray sources minus the water discharged by the centers (primarily warm water left over from cooling the IT racks). The consumed water is generally the water that evaporates or is otherwise taken out of immediate human usage. Withdrawal of fresh water from local streams or underground aquifers may lead to aquifer exhaustion, particularly in water-stressed areas.

Researchers at The Green Grid (https://www.thegreengrid.org/), a nonprofit industry consortium, developed a metric called Water Usage Effectiveness (https://www.datacenterknowledge.com/cooling/a-guide-to-data-center-water-usage-effectiveness-wue-and-best-practices) (WUE) to measure water usage by data centers. Similar to the Power Usage Effectiveness (https://www.vertiv.com/en-emea/about/news-and-insights/articles/educational-articles/what-is-pue-power-usage-effectiveness-and-what-does-it-measure/#:~:text=Does%20It%20Measure?-,What%20Is%20PUE%20(Power%20Usage%20Effectiveness)%20and%20What%20Does%20It,There%20are%20several%20practical%20considerations) (PU metric, which measures the energy efficiency of a data center, the WUE metric assesses the efficiency of a data center's water use. WUE is reported in liters per kilowatt-hour (kWh) (https://www.datacenterknowledge.com/cooling/a-guide-to-data-center-water-usage-effectiveness-wue-and-best-practices): a data center's total water consumption, measured in liters, is divided by the total energy consumed by that data center in kilowatt-hours in the same time period. While "0" is the ideal WUE score (https://www.datacenterknowledge.com/cooling/a-guide-to-data-center-water-usage-effectiveness-wue-and-best-practices), this can only be achieved in air-cooled data centers, and most data centers cannot meet this target due to their location's climate conditions. The average WUE across data centers is 1.9 liters per kWh (https://www.datacenterknowledge.com/cooling/a-guide-to-data-center-water-usage-effectiveness-wue-and-best-practices), which is a great goal to beat.

Data centers' water usage depends on various factors, including location, climate, water availability, size, and IT rack chip densities. In hotter climates, like in the southwest United States, data centers need to use more water to cool the building and equipment. With the increasing number of centers supporting AI requests, chip density is also growing, which leads to higher room temperatures, necessitating the use of more water chillers at the server level to maintain cool temperatures. Most data centers use a combination of chillers and on-site cooling towers to avoid chip overheating.

Cooling data centers is a complex operation (https://arxiv.org/pdf/2304.03271). At the server level, water chillers cool IT rooms to maintain optimal temperatures and prevent damage to chips. This can be achieved through air cooling using water evaporation, which is an open-loop and more water-intensive method, or through server liquid cooling (https://www.datacenterdynamics.com/en/analysis/an-introduction-to-liquid-cooling-in-the-data-center/). Server cooling is a more expensive approach that delivers the liquid coolant directly to the graphics processing units (GPUs) and central processing units (CPUs). Direct-to-chip liquid cooling and immersive liquid cooling (https://www.datacenterdynamics.com/en/analysis/an-introduction-to-liquid-cooling-in-the-data-center/) are two standard server liquid cooling technologies that dissipate heat while significantly reducing water consumption. During immersive cooling, water or specialized synthetic liquids flood the chips, absorbing the heat. The difference between direct server liquid cooling and air cooling through evaporation can be compared to the difference between drip irrigation and flooding in agriculture.

In areas with limited water availability (https://www.npr.org/2022/08/30/1119938708/data-centers-backbone-of-the-digital-economy-face-water-scarcity-and-climate-ris), server liquid cooling is the best choice, as it requires minimal water consumption. Conversely, in areas with a strained power grid, an evaporative air cooling tower is a suitable building design, as it requires minimal power usage.

Regardless of the approach chosen, a heat exchanger is necessary to capture (https://blog.equinix.com/blog/2024/09/19/how-data-centers-use-water-and-how-were-working-to-use-water-responsibly/)the hot air or hot water produced as a byproduct of the cooling process. Hot water coming from the servers is cooled by water from either the air-cooled chiller or a cooling tower. Likewise, hot air is exchanged with cooler air. A heat exchanger transfers heat from the server room to the building's cooling system.

Approximately 80% of the water (https://arxiv.org/pdf/2304.03271) (typically freshwater) withdrawn by data centers evaporates, with the remaining water discharged to municipal wastewater facilities. The large volume of wastewater from data centers may overwhelm existing (https://ketos.co/ai-data-centers-wastewater-discharge-and-the-growing-need-for-effective-water-management#:~:text=The%20influx%20of%20wastewater%20from,time%20to%20manage%20the%20influx.) local facilities, which were not designed to handle such a high volume.

Besides on-site water consumption, a significant portion of data center water usage originates from the power facilities where they obtain their energy. Because 56% of the electricity used to power data centers nationwide (https://arxiv.org/pdf/2411.09786) comes from fossil fuels, a significant portion of data center water consumption is derived from steam-generating power plants. Fossil fuel power plants rely on large boilers filled with water that is superheated by natural gas or coal to produce steam, which in turn rotates a turbine and generates electricity. Water withdrawals from these power plants (https://www.srs.fs.usda.gov/pubs/ja/2023/ja_2023_caldwell_002.pdf) are a significant source of water stress, particularly in drought-prone areas and in the summer, when water levels are lower and electricity demands are higher.

A federal report estimated (https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usage-report.pdf) that the indirect water consumption footprint (from electricity use) of data centers in the United States was roughly 211 billion gallons in 2023. Given that 176 terawatt-hours (TWh) of electricity were consumed by data centers in 2023, the centers' indirect water consumption can be estimated at 1.2 gallons per kWh on average nationally in 2023. As data centers are expected to consume up to 1,050 TWh annually by 2030 (https://www.eesi.org/articles/view/data-center-energy-needs-are-upending-power-grids-and-threatening-the-climate), water usage will increase in parallel.

Chip and server manufacturing are significant sources of water consumption for data centers. Semiconductors and computer chips are integral to data center processing. Each server in a data center contains multiple CPUs, GPUs, and memory chips. (https://ifp.org/how-to-build-an-ai-data-center/) Larger data centers and those that support AI requests can contain tens of thousands of servers, each with multiple chips. Ultrapure water is ideal for cleaning, etching, and rinsing chips during the manufacturing process. (https://www.weforum.org/stories/2024/07/the-water-challenge-for-semiconductor-manufacturing-and-big-tech-what-needs-to-be-done/) Creating ultrapure water is a highly water-intensive process, requiring approximately 1,500 gallons of piped water to produce 1,000 gallons of ultrapure water. An average chip manufacturing facility (https://www.weforum.org/stories/2024/07/the-water-challenge-for-semiconductor-manufacturing-and-big-tech-what-needs-to-be-done/)consumes approximately 10 million gallons of ultrapure water per day. A single chip installed in a data center has already consumed thousands (https://cwrrr.org/resources/analysis-reviews/8-things-you-should-know-about-water-and-semiconductors/) of gallons of water by the time it reaches the site.

Water-cooled high computing systems in a data center.
Credit: ECMWF Data Center.

Water Impacts in Nearby Communities

The water consumption of the 5,426 data centers nationwide (https://www.statista.com/statistics/1228433/data-centers-worldwide-by-country/) is already impacting local communities. Northern Virginia is considered the world capital for data centers, with over 300 operational data centers (https://www.governing.com/infrastructure/the-data-center-capital-of-the-world-is-in-virginia) spread across four counties: Fairfax, Loudoun, Prince William, and Fauquier (https://www.ft.com/content/1d468bd2-6712-4cdd-ac71-21e0ace2d048). Collectively, all data centers in Northern Virginia consumed close to 2 billion gallons of water in 2023, a 63% increase from 2019 (https://www.ft.com/content/1d468bd2-6712-4cdd-ac71-21e0ace2d048). Loudoun County, with approximately 200 (https://virginiabusiness.com/loudoun-county-advances-changes-to-data-center-regulations/) operational data centers, used around 900 million gallons of water in 2023 (https://vcnva.org/agenda-item/responsible-data-center-development/). This has led Loudoun Water, the county's water authority, to rely heavily on potable water for data centers rather than reclaimed water.

Making Data Centers More Water-Efficient

Data center developers' most common choice is to withdraw water from blue sources and employ water-intensive practices, such as air cooling through water evaporation. However, there are other options. To make a more sustainable choice for nearby communities and ecosystems, developers can instead use innovative water management techniques to reduce water consumption, including closed-loop cooling systems, immersion cooling, air cooling, and using non-potable water sources (e.g., recycled wastewater and captured water).

Closed-loop cooling systems enable the reuse of both recycled wastewater and freshwater, allowing water supplies to be used multiple times. A cooling tower can use external air to cool the heated water, allowing it to return to its original temperature. These systems can reduce freshwater use by up to 70% (https://www.weforum.org/stories/2024/11/circular-water-solutions-sustainable-data-centres/#:~:text=To%20further%20mitigate%20the%20broader,Aquapreneur%20Innovation%20Initiative%2C%20visit%20UpLink.).

Free cooling is a method where outside cold air is drawn into the data center to cool the equipment. Data centers must be located in cooler climates for this strategy to be effective.

Air cooling involves air conditioning vents and tubes that remove heat generated by chips (https://www.digitalrealty.com/resources/articles/future-of-data-center-cooling) as they process data and AI requests. This method is most effective in areas where electricity is cheaper and water resources are limited.

Immersion cooling in data centers involves bathing servers, chips, and other components in a specialized dielectric (or non-conductive) fluid. Hardware is submerged in specially designed tanks filled with the coolant. (https://www.grcooling.com/blog/forecasting-data-center-immersion-cooling-technology/#:~:text=Immersion%20cooling%20submerges%20computer%20hardware,it%20into%20a%20heat%20exchanger.) The non-conductive liquid absorbs the heat from the chips and transfers it to a heat exchanger, where it is cooled down before flowing back into the tank. Immersion cooling is a novel process that entails higher upfront costs than conventional direct liquid cooling, but provides significant energy savings and space-optimization benefits for data center developers. Since the technology uses synthetic fluids, it requires significantly less water than other approaches.

Powering data centers with renewable energy sources, like solar or wind, requires significantly less water consumption than obtaining energy from fossil fuel power plants. With approximately 56% of the electricity used to power data centers nationwide (https://arxiv.org/pdf/2411.09786) coming from fossil fuels, deploying more clean energy to power these facilities can significantly reduce water consumption. Coal plants are the most water-intensive facilities, requiring approximately 19,185 gallons of water (https://www.eia.gov/todayinenergy/detail.php?id=56820#:~:text=Natural%20gas%20plants%20use%20a,19%2C185%20gal%2FMWh%20for%20coal.) per megawatt-hour (MWh) of power generation. Natural gas power plants consume approximately 2,800 gallons per MWh (https://www.eia.gov/todayinenergy/detail.php?id=56820#:~:text=Natural%20gas%20plants%20use%20a,19%2C185%20gal%2FMWh%20for%20coal.). In 2022, 40% of all total U.S. annual water withdrawals, or about 48.5 trillion gallons (https://iopscience.iop.org/article/10.1088/1748-9326/ad6fb8), were made by coal and gas power plants. Of those 48.5 trillion gallons, 962 billion gallons of water were consumed (https://iopscience.iop.org/article/10.1088/1748-9326/ad6fb8) and were no longer available for direct downstream use. Meanwhile, rooftop solar panels and wind turbines do not need any cooling water, and they are not a steam-based energy technology like coal and natural gas.

If the United States moves toward 100% renewable energy generation and the retirement of fossil fuel plants, the water savings would be enormous, with billions of gallons of water saved, and more freshwater would be available for both human consumption and natural ecosystems.

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WHAT HAPPENS WHEN DATA CENTERS COME TO TOWN?

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Introduction

The rapid growth of data centers, with their enormous energy and water demands, necessitates targeted policy interventions to mitigate environmental impacts and protect local communities. To address these issues, states with existing data center tax breaks should adopt sustainable growth policies for data centers, mandating energy audits, strict performance standards, and renewable energy integration, while also requiring transparency in energy usage reporting. "Renewable energy additionality" clauses should ensure data centers contribute to new renewable capacity rather than relying on existing resources. If these measures prove insufficient, states should consider repealing tax breaks to slow unsustainable data center growth. States without tax breaks should avoid such incentives altogether while simultaneously implementing mandatory reporting requirements to hold data centers accountable for their environmental impact. Broader measures should include protecting local tax revenues for schools, regulating utility rate hikes to prevent cost-shifting to consumers, and aligning data center energy demands with state climate goals to avoid prolonging reliance on fossil fuels.

Key Findings

Increased Utility Rates: Data centers increase local electric utility rates by driving up overall energy demand, which can strain grid capacity and force utilities to invest in costly infrastructure upgrades. These costs are passed on to residents through higher rates. Data centers have also secured long-term power agreements, which reduce the available supply and push prices up for other consumers.

High Resource Consumption: A single data center can consume up to 2 megawatt hours of power—equivalent to the power used by 2,000 homes—and millions of gallons of water annually for cooling, straining local resources and infrastructure.

Ineffective Tax Incentives: Tax breaks for data centers do not deliver the promised economic benefits, such as high-paying jobs, and they reduce local tax revenues, while shifting financial burdens onto communities and schools.

Climate and Energy Challenges: Data centers' massive energy demands are prolonging the operation of fossil fuel plants and undermining state renewable energy goals, as seen in states like Michigan, Virginia, and Nebraska.

Resource Efficiency Trade-Off: While advanced cooling methods like liquid immersion and direct-to-chip cooling offer energy efficiency improvements, current technologies force a trade-off between energy and water efficiency, limiting sustainable solutions.

Policy Solutions: To mitigate data centers' environmental impacts and align their growth with sustainability goals, policymakers should adopt model laws like the German Energy Efficiency Act, add requirements for new renewable energy, and enforce transparency through mandatory reporting.

Background: Data Centers and the Environment

What is a data center?

A data center is a specialized facility designed to house and manage an organization's IT infrastructure, including servers, storage systems, networking equipment, and other hardware essential for processing, storing, and distributing vast amounts of data. These facilities serve as the backbone of modern digital services, enabling everything from cloud computing and online transactions to streaming platforms and artificial intelligence (AI) applications. Data center designs incorporate advanced cooling systems, backup power, and in-house cybersecurity measures to ensure efficiency, reliability, and security. As data centers continue to grow in scale and complexity, their energy use and environmental footprint are also expanding.

Why are data centers growing so rapidly?

Data centers are growing rapidly due to the exponential increase in data generation and consumption occurring across industries. The proliferation of cloud computing, internet of things (IoT) devices, artificial intelligence, and big data analytics has created an insatiable demand for storage, processing power, and connectivity. AI has largely driven increases in data center electricity demands as advanced machine learning models require massive computational power for training and inference. One estimate suggests that a prompt on ChatGPT requires 10 times more energy than a traditional Google search.[1] Businesses and consumers rely on seamless and instantaneous access to online services, streaming platforms, and real-time applications, necessitating server infrastructure to support these needs. Additionally, the shift to remote work and hybrid models during the COVID-19 pandemic further accelerated the reliance on cloud-based solutions, pushing data center expansion.

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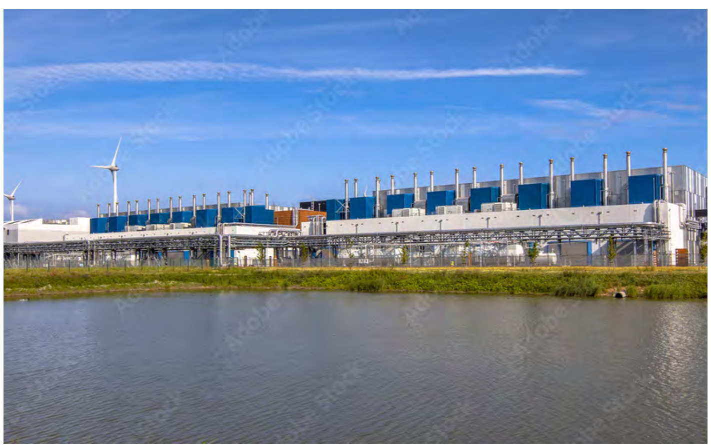
Why do data centers consume water for cooling?

For higher-density data centers, liquid cooling is required to maintain performance requirements. Data centers generate heat primarily due to the electrical energy consumed by servers, storage systems, and networking equipment. When electricity powers these components, a significant portion is converted into heat due to resistance in circuits, semiconductor switching losses, and other inefficiencies. High-performance computing tasks, such as AI training, cloud computing, and large-scale data processing, further intensify heat generation because they demand continuous, heavy workloads.

If this heat is not removed, rising temperatures lead to hardware malfunctions, reduced efficiency, and even permanent damage. Water cooling is often used because it absorbs heat more effectively than air thanks to water's high specific heat capacity (ability to store thermal energy) and thermal conductivity (ability to transfer heat). Twenty-two percent of data center facilities use water-based cooling systems to absorb and dissipate heat more efficiently than air alone.[2] Systems like chilled water loops, liquid immersion cooling, or evaporative cooling circulate water to capture and carry away heat and maintain safe operating temperatures while improving energy efficiency compared to air-based methods.

How much water and electricity do data centers use?

Data centers are rapidly growing consumers of electricity and water, driven by their energy-intensive operations and cooling requirements. On average, a single data center can consume up to 2 megawatt hours (MWh) of electricity, which is roughly the equivalent power consumption of a small town. Data centers consumed more than 4% of U.S. electricity in 2023, with estimates suggesting that this consumption could rise to 12% by 2028.[3] This massive electricity demand is matched by equally staggering water consumption, as cooling these power-hungry facilities requires vast amounts of water—some individual data centers use hundreds of millions of gallons annually, dwarfing the usage of entire communities the data centers are within. Most facilities use over 10 million gallons (38 million liters) of water per year.[4] Google's Council Bluffs data center in Iowa uses around 980 million gallons (3709 million liters) of water per year, which is equivalent to the annual water usage of over 4 million homes.[5]



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How does data center cooling work?

Data center cooling relies on six main technologies to manage heat dissipation and maintain optimal performance.

1. Water-cooled systems are water-intensive but energy-efficient.[6] Chilled water cooling systems use a refrigeration cycle to cool air via chilled coils.
2. Air-cooled systems rely on fans and compressors, consuming more electricity but less water, while Direct Expansion (DX) cooling uses refrigerant to absorb heat directly from the air, making it suitable for smaller data centers.
3. Computer Room Air Handlers (CRAHs) circulate chilled water and air in separate loops, offering efficient temperature and humidity control for larger spaces.
4. Emerging technologies like liquid immersion cooling and direct-to-chip liquid cooling use dielectric fluids to cool components directly, enabling higher power densities and energy savings but requiring specialized equipment.

While these cooling technologies each offer distinct trade-offs between water and energy use, the fundamental challenge remains. Data centers must prioritize either water efficiency or energy efficiency, as existing systems cannot yet optimize both simultaneously. Data center cooling can be optimized for either energy efficiency or water efficiency, but with current cooling technology, achieving both is not possible.

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The impossibility of an environmentally friendly data center

Data centers cannot fully operate on renewable energy alone. Renewable energy sources like solar and wind are inconsistent and cannot meet the uptime (time during which a machine, especially a computer, is in operation) requirements of data centers. Tier 1 data centers require 99.671% uptime while Tier 4s demand 99.995%. These factors make it impossible for data centers to depend solely on renewables without compromising reliability.

As demand for cloud computing and AI-driven technologies accelerates, data centers are being constructed at a rapid pace, often in areas where existing power infrastructure is insufficient to meet their enormous energy needs. **To ease concerns about environmental impact, data center operators frequently pledge that their facilities will eventually run on clean energy, including next-generation nuclear sources such as small modular reactors (SMRs). However, these SMRs remain largely theoretical, with no commercially viable models yet in operation.**[7] In the interim, companies claim they will rely on fossil fuels as a temporary "bridge" until greener solutions become available. Yet in practice, this transition is often delayed or abandoned altogether, resulting in the direct commissioning of new fossil fuel power plants to keep these facilities online.

This gap between promise and reality underscores the fundamental contradiction in labeling data centers as "environmentally friendly." Battery storage is essential for balancing the intermittent nature of renewable energy generation, but batteries rapidly degrade and are reliant on rare minerals like lithium, nickel, cobalt, manganese, lead, and copper. These minerals are already in short supply due to high demand from the electric vehicle industry. Data centers will also always have an environmental footprint through material resource consumption, water usage, and electricity demands. This makes it unfeasible for them to be completely environmentally friendly.

The Effects on Local Communities

Data centers do not bring in high-paying tech jobs

Data centers do not bring high-paying tech jobs to local communities because they operate as infrastructure projects rather than traditional job-creating businesses. Although the construction of data centers can create many jobs, those are short-lived. Once data centers are built, they require relatively few employees since the facilities primarily house computers and servers.[8] The jobs that data centers do create locally are typically low-wage, term-limited, non-technical positions such as security, maintenance, and janitorial work. These roles are often filled by contractors rather than full-time employees, meaning they lack union protections, benefits, and job security. As a result, these positions tend to be short-term and do not contribute to sustained economic growth or long-term career opportunities for local residents.

Subsidies intended to encourage job creation result in corporate benefits without local hiring. For example, tax breaks for data centers in Washington State were intended to create jobs in rural areas but primarily benefited large corporations like Microsoft.[9] Since the inception of the incentives, more than $300 million in tax revenue has been forgone—money that would otherwise have supported public services such as education, emergency services, and infrastructure. In exchange, the data centers have created few jobs and have required limited staffing for operations. In Quincy, a small town that hosts several large data centers, the local fire department is so underfunded that it struggles to retain personnel and replace outdated equipment—even as Microsoft and other tech giants operate multimillion-dollar facilities nearby. In some cases, the cost to taxpayers for each job created can exceed $1 million. Furthermore, the state has little oversight or enforcement mechanisms to ensure that the tech companies deliver on promised benefits. Despite initial legislative goals to boost local employment and economic vitality, the reality is that taxpayers are heavily subsidizing wealthy corporations with minimal transparency or accountability regarding the actual economic impact.

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Data center tax breaks only benefit corporations

Data center companies locate sites based on electricity prices, land availability, and climate conditions. Although tax breaks are often justified as a way for communities to attract data centers, these policies do not affect data center location decisions. As an executive responsible for Microsoft's North American data centers stated in 2024, "I can't think of a site selection or placement decision that was decided on a set of tax incentives."[10]

A new data center in Genesee County, Alabama, could reduce revenues to schools and the local government by $1.7 million each year.[11] Developers are seeking a minimum $167 million in tax breaks for the creation of 200 jobs, or $838,000 per job. These figures far exceed reasonable benchmarks for economic development incentives, making it unlikely that taxpayers will ever see a return on investment. These subsidies would come on top of approximately $100 million in state funding already spent on preparing the STAMP (Science and Technology Advanced Manufacturing Park) site, making the per-job cost difficult to justify. The high subsidies for STAMP would serve only to boost corporate profits rather than provide meaningful economic benefits to the local community.

Reduced tax revenue for independent school districts

In the case of Switch's data center in Michigan, the company sought exemptions from property taxes that funded school districts. This move directly reduced the revenue streams for Caledonia Community Schools and Kent Intermediate School District, resulting in a prolonged legal dispute.[12]

In Michigan, tax breaks for data centers exempt them from paying personal property taxes, including on machinery and computers, some of the most valuable assets in their operations.[13] While they may still pay real property taxes on land and buildings, the overall tax contribution to schools is significantly diminished. This loss of revenue means less funding for educational programs, teacher salaries, and facility improvements, directly impacting the quality of education for students. These tax incentives have shifted the financial burden onto residents and other businesses, who must make up for the lost revenue through higher taxes and reduced public services. Michigan lawmakers initially considered legislation that would have required school districts to reimburse the company for taxes already paid, further straining school finances.

Photo credit: Monkey Business - stock.adobe.com

Higher energy rates for consumers

When data centers are built, they raise utility rates for nearby communities. **As demand surges, utility companies often pass the costs of infrastructure upgrades and increased energy procurement onto residents and small businesses through higher rates.**[14]

Many communities, especially in rural or suburban areas, do not realize the connection until their monthly bills spike. Companies and legislatures also withhold information about the electricity and water use of data centers, preventing consumers from realizing that increased utility costs are often associated with the arrival of energy-intensive facilities. By keeping usage data confidential or vaguely reported, corporations and policymakers avoid public scrutiny, even as these facilities strain local resources. Without clear disclosures, residents remain unaware of how much water is diverted for cooling systems or how much electricity is consumed—information that could help communities push for fairer cost distribution or sustainable practices.

This lack of accountability allows data center operators to expand rapidly while shifting the financial and environmental burdens onto utility customers. As a result, many residents must pay higher bills without understanding the cause, leaving them unable to advocate for better regulations or compensation.[15] The financial strain caused by data centers most severely impacts lower-income households, whose utility bills represent a disproportionate share of their income, exacerbating economic inequality in the region.

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While communities face higher bills, data centers frequently negotiate lower rates through bulk Power Purchasing Agreements (PPAs) with investor-owned utility companies.[16] These agreements allow data centers to operate at reduced costs despite their massive energy consumption, further shifting the financial burden onto local households and businesses. In August 2024, Meta signed two long-term PPAs with German power producer RWE for a combined 374 megawatt production in Illinois and Louisiana.[17] Despite solar PPA prices holding steady, energy prices for residential consumers have increased by 20.7% in Clark County, Illinois, and 39.0% in Laffite, Louisiana.[18] Data centers and utility companies frequently collaborate to lobby state regulators for rate increases, exacerbating the disparity. In Michigan, DTE and Switch have spent over $2 million lobbying the state house, senate, and Public Service Commission to raise electric rates; residential electricity rates have increased by 25% since the construction of the Switch data center in 2017 and are now 17% higher than the national average.[19] This figure has yet to include the additional $217.4 million rate hike approved by the Michigan Public Service Commission this year.[20] This dynamic leaves communities bearing the brunt of higher utility prices without reaping the economic benefits promised by data center development.

Data Centers Keep Fossil Fuel Plants Open

The rapidly growing energy demands of data centers have forced states to delay the retirement of coal and gas plants and even consider building new fossil fuel facilities.

Michigan

Data centers undermine Michigan's climate plan by increasing electricity demand to a level that justifies keeping fossil fuel plants online. The state's climate law includes an "offramp" provision, allowing fossil fuel generation to continue if renewable energy capacity is insufficient.[21] As artificial intelligence and cloud computing drive higher energy consumption, utilities like Consumers Energy have warned that meeting renewable portfolio standards may become more challenging. Similar data centers have derailed climate goals in other states.[22]

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Virginia

Data centers have prolonged the use of coal and led to new natural gas proposals in Virginia.[23] PJM Interconnection announced that Virginia's coal power plants will continue operating to meet electricity requirements of data centers while waiting for renewable energy infrastructure to catch up. This situation is especially acute in Virginia, which hosts about half of all U.S. data centers and faces projected power demand increases of 85% over the next 15 years.[24] While renewable energy projects, like the Sumitomo Corp's 1.5 gigawatt solar and battery initiative are being developed, the immediate power requirements are so substantial that coal plants in West Virginia and Maryland are being kept operational well beyond their planned retirement dates.[25] PJM Interconnection has proposed a $5.9 billion project to build new transmission lines that would deliver electricity across multiple states to Virginia.[26] The transmission network would transport power from several West Virginia coal plants that are scheduled to shut down.

Nebraska

The 644-MW North Omaha Station coal plant, originally scheduled to close in 2023, will now remain active until at least 2026 due to increased power needs from nearby data centers.[27] Meta's facility alone consumes nearly as much power as the entire North Omaha station produces, while Google's data center in Papillon is an even larger power consumer. The problem is compounded by local resistance to renewable energy projects and regulatory hurdles slowing the transition to natural gas. Meanwhile, state officials have actively courted these tech companies with special electricity rates.

Utah

Lawmakers in Utah have cited the power demands of data centers as justification for extending the life of the Intermountain Power Project coal plant.[28] This trend is part of a broader strategy where tech companies are repurposing coal sites to power data centers, attracted by their existing infrastructure including power lines, water access, and workforce availability.

Georgia

Georgia Power, facing power shortages by 2025 due to increasing data center development, has arranged to purchase 750 MW of electricity from Mississippi Power's Plant Daniel, which was originally scheduled to retire its coal units in 2027.[29] This arrangement will extend the life of inefficient 50-year-old coal-burning facilities for an additional 5–10 years.

Washington

Since the state's hydropower capacity is reaching its limits, counties are increasingly forced to rely on energy from the open market, where utilities buy electricity from a mix of carbon-emitting energy sources to meet the growing demand. In Grant County, Washington, data centers now account for nearly 40% of the county's total electricity demand, equivalent to the power used by 190,000 households.[30] To meet this demand, utilities have been forced to rely on "unspecified" power sources, which include fossil fuels like natural gas, purchased from the open market. This shift has reduced the share of renewable energy in the state's power mix, despite Washington's ambitious clean energy goals. The finite capacity of hydropower, combined with the rapid growth of data centers, has created a situation where utilities must either risk blackouts or continue to depend on fossil fuels to meet energy needs.

Indiana

Indiana's House Bill 1007 will keep coal and gas plants running while subsidizing small nuclear reactors to guarantee the power supply for AI data centers.[31] The bill creates financial incentives for SMR (Small Modular Reactors) development through tax credits funded by energy generation cost savings brought about by keeping fossil fuel plants online. Additional provisions will keep fossil fuel plants open for even longer, even when they are economically or environmentally unviable, by requiring regulatory reviews before any major retirements. If regulators determine that retiring a plant would threaten grid reliability, utilities will be barred from shutting it down and allowed to pass the full cost of continued operation onto consumers through rate hikes. At the same time, the bill encourages utilities to fast-track new generation projects to meet surging demand from data centers. These investments will further drive up electricity prices as the costs of construction, subsidies, and guaranteed returns for utilities are recovered from ratepayers. By prioritizing uninterrupted power for large corporate consumers over a managed transition to cleaner energy, the bill locks Indiana into higher electric rates and prolonged dependence on fossil fuels, leaving households and small businesses to bear the financial burden.

Michigan recently passed a data center tax exemption bill; what is in it?

Public Act 207 of 2024 grants tax exemptions for data center equipment purchases for brownfield sites (sites that are previously developed properties that are abandoned, underutilized, or contaminated due to past industrial or commercial activities) until 2050 or 2065.[32] These exemptions apply to both the construction and operational phases of data centers. To qualify, facilities must meet certain criteria, including capital investment of at least $250 million and creating at least 30 jobs that pay 150% of the region's median wage.

Photo credit: New Africa - stock.adobe.com

The tax breaks will reduce state revenue, raise utility prices for local communities, and create minimal employment benefits for a niche industry with limited job creation potential. AI data centers typically have lifespans of around 15-20 years.[33] A tax exemption for qualifying data centers until 2050 is expected to completely exempt these facilities from all construction and operating taxes throughout their life cycle.

The increased demand for resources by data centers strains local grids, which leads utilities to invest in infrastructure upgrades while passing the costs to consumers through higher rates. Some data centers negotiate special rates or exemptions, creating a situation where other customers, including households, bear the cost of maintaining the grid's stability.

In Grand Rapids, a data center is already contributing to higher utility prices for residents. Since the construction of the Switch data center in 2015, the city has announced its 10th consecutive year of water supply rate increases for households, averaging an increase of 3.438% annually, a 49% greater increase than the statewide average during the same period.[34] Meanwhile, Switch has secured a 22-site, 200-megawatt, tax-exempt utility deal with Consumers Energy with plans to expand further starting January 2025.[35] The construction of the data center has enabled DigitalBridge, the parent company of Switch, to exploit the favorable regulatory environment while shifting the costs to residential consumers.

Policy Recommendations For States With Existing Tax Breaks

There are currently no state or federal laws that directly restrict or deter the construction of data centers. Over a dozen states have implemented tax break laws specifically designed to incentivize their development. The rapid expansion of data centers has also placed a strain on local utility and grid infrastructure. In all states with data center tax breaks, households who share utility and grid infrastructures with data centers have been pushed toward relying more on non-renewable energy sources and have experienced higher electricity rates.[36]

States with existing tax breaks for data centers should consider adopting elements from the model laws described below. The strongest of these laws is the German Energy Efficiency Act.

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California SB 57: Data center tariffs

California's Ratepayer and Technological Innovation Protection Act would impose specific requirements on data centers to align with California's climate and grid reliability goals. By July 1, 2026, data centers would need to operate under a special tariff system designed to ensure they do not shift costs to other ratepayers. Data centers would also be required to enter into 12-year binding contracts to cover transmission and distribution costs, with provisions for exit fees and insurance bonds to mitigate financial risks if they cease operations or underutilize energy. They would need to prepay for necessary grid infrastructure upgrades in exchange for expedited interconnection, with potential reimbursement over time. By January 1, 2030, 100% of electricity delivered to data centers would need to come from zero-carbon resources, without increasing emissions elsewhere in the western grid. The bill would define data centers as large-scale energy consumers which house servers and related equipment for data processing, storage, and distribution.[37]

California SB 222: Data center energy usage reporting and modeling

California's SB 222 would mandate that data centers estimate and report the total energy used for developing "covered models" (AI models requiring significant computing power) to developers upon contract termination or request. Developers would be required to publish this energy usage data on their websites before commercial use or third-party availability. The bill would also require data center operators to annually report energy consumption and performance data to the California Energy Commission, including metrics on total energy use, efficiency, renewable energy usage, and energy used for AI development. The commission would set energy efficiency standards for data centers, prioritizing cost-effectiveness, technological feasibility, and alignment with California's greenhouse gas reduction targets, while requiring new or significantly altered data centers to incorporate load-management and demand response capabilities.[38]

Virginia SB1234: Prohibiting data center costs from being passed on to customers

Virginia's SB1234 would establish a provision to regulate how costs associated with the construction or extension of electric distribution infrastructure for data centers are handled. The bill stipulates that no costs related to building or expanding such infrastructure can be allocated to or recovered from any other utility customer. This includes expenses for land acquisition tied to the infrastructure. This means that the financial responsibility for these costs must fall entirely on the data center or the entity benefiting from the infrastructure and cannot be passed on to other customers through their utility rates or charges. The provision aims to ensure that other customers are not burdened with the costs of infrastructure projects that primarily serve data centers.[39]

Virginia HB2578: Retail sales and use tax for data centers

HB 2578 would expand eligibility requirements for their existing sales and use tax exemption by mandating that data centers purchase a certain percentage of their annual electric load from clean energy resources and demonstrate sufficient investment in energy efficiency measures that provide system-wide benefits. It would also require that backup generators meet specific emissions standards. It would require the Commission on Electric Utility Regulation to examine the cost and feasibility of data centers using non-diesel-fired, onsite backup and primary generation and report their findings to the General Assembly. The Department of Energy would be tasked with identifying opportunities for the beneficial use of data center waste heat, creating an interactive map of data centers and potential heat users, developing a strategic plan to accelerate heat reuse, designating an employee to lead these efforts, and convening a stakeholder group to prepare a report for the General Assembly.[40]

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The German Energy Efficiency Act

The German Energy Efficiency Act (Energieeffizienzgesetz, or EEffG) establishes a sustainable growth model for data centers. It mandates energy audits, performance standards, renewable energy use, and public reporting to drive sustainability and efficiency while supporting national energy transition goals. One major requirement is that large data centers must conduct regular energy audits to identify opportunities for reducing energy consumption and improving efficiency. The Act also mandates that data centers meet specific energy performance standards, encouraging the adoption of advanced cooling technologies, server virtualization, and other energy-saving measures. Operators of data centers are incentivized to use renewable energy sources, either through on-site generation or procurement from certified green energy providers. The Act further promotes transparency by requiring data centers to publicly report their energy usage and efficiency metrics. These provisions ensure that data centers contribute to Germany's broader energy transition goals by minimizing their environmental impact while maintaining operational efficiency.[41]

Recommendation: Adopt the German Energy Efficiency Act model

States with existing data center tax breaks should adopt the German Energy Act model to most effectively deter the rapid expansion of data center construction. The act prioritizes the integration of renewable energy sources and imposes strict efficiency standards on data centers, ensuring that their growth does not disproportionately burden the grid or increase reliance on non-renewable energy. U.S. states that adopt similar provisions would require data centers benefiting from tax incentives to meet high energy efficiency benchmarks, invest in on-site renewable energy systems, and contribute to grid modernization efforts. This would not only mitigate the negative impacts on ratepayers but also ensure that data center growth aligns with broader climate and sustainability goals through renewable energy portfolio requirements.

One Step Further: Require new renewable energy production

To prevent the increased use of fossil fuels resulting from data center construction and operation, a policy should be implemented requiring data centers to produce or procure 100% of their energy from renewable sources. This mandate would ensure that data centers do not contribute to rising demand for non-renewable energy. To address the risk of data centers' monopolizing renewable energy supplies and shifting consumers onto fossil fuel-based grids, the policy should include a "renewable energy additionality" clause. This clause would require data centers to generate new renewable energy capacity (e.g., by building on-site solar farms or funding new wind projects) rather than relying on existing renewable infrastructure. This approach ensures that data centers expand the overall supply of renewable energy rather than competing with consumers for limited resources. The policy should also include provisions for grid modernization and energy storage investments to stabilize renewable energy availability and prevent price spikes that could disproportionately affect consumers. By prioritizing both renewable energy procurement and expansion, this policy would support data center growth while safeguarding consumer access to clean energy.

If all else fails, repeal

If all other measures to manage the environmental and infrastructural impacts of data center growth prove ineffective, states retain the option to repeal tax breaks for future data center construction. Although repealing tax breaks would not encourage data center operators to prioritize sustainability, it would eliminate a policy that benefits companies at the expense of communities.

Policy Recommendation For States Without Data Center Tax Breaks

Do not enact data center tax breaks

For states that have not passed data center tax breaks, the most simple policy recommendation is to avoid implementing such incentives in the first place. Legislators should refrain from passing laws that grant tax breaks to data centers, as these incentives often fail to deliver promised economic benefits and impose significant costs on state and local budgets. Despite claims of job creation, data centers typically generate few permanent positions relative to the scale of public subsidy they receive. The high energy consumption and environmental impact of data centers can strain local infrastructure and undermine climate goals. Redirecting public resources toward initiatives with more substantial and equitable economic returns, such as education, workforce development, or renewable energy, offers a more responsible and effective use of taxpayer dollars.

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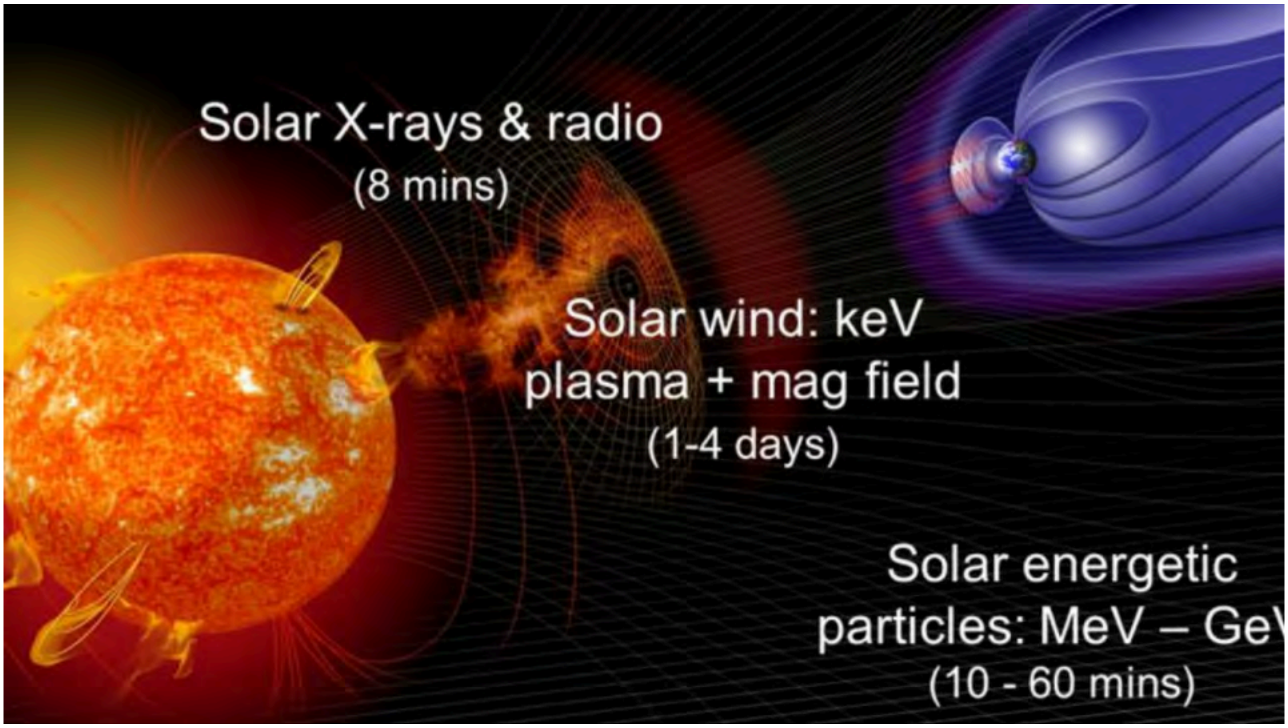
ARTICLE 6



The Silent Threat: Understanding the Risks of Fires from Geomagnetic Storms Following Solar Flares

Read more

01 Oct 2025

Digital Infernos: Why data centers are putting firefighters on the Front Lines

EN

Illustration of Data Center Frie Risks. Executed by Microsoft Co-Pilot.

As the world becomes increasingly reliant on cloud computing and digital infrastructure, the threat of fire in data centers has escalated from a technical concern to a public safety issue.

Recent incidents across the globe—from **South Korea to the United States**—have exposed the vul**nerabilities of these high-tech hubs** and prompted a radical shift: **some data centers are now stationing full-time firefighters on-site.**

Fires with Far-Reaching Consequences

In September 2025, a fire at **South Korea's National Information Resources Service** disabled critical government systems, including the database used to manage life-sustaining treatment decisions for terminal patients. Hospitals were left scrambling, unable to access directives, and families were forced to make urgent decisions without digital support.

Meanwhile, in Ohio, a two-alarm blaze at an Amazon data center caused an estimated $50 million in damages. Local firefighters reported delays entering the facility due to strict security protocols, underscoring the need for specialized access and rapid response.

These incidents are not isolated. As data centers grow in size and complexity, so do the risks. Lithium-ion batteries, high-voltage equipment, and densely packed server rooms create volatile environments where even a small spark can trigger catastrophic outages.

Firefighters on Site: A New Standard

As data centers grow in size and strategic importance, some are now stationing full-time firefighters on-site to protect critical infrastructure from fire-related disasters.

According to *Futurism*'s September 2025 report, this trend reflects growing concern over the vulnerability of cloud computing hubs, which power everything from banking systems to emergency services. The article notes that this shift is part of a broader movement to treat data centers as "mission-critical assets," akin to hospitals or military installations.

These teams are equipped to handle **electrical fires, battery explosions, and smoke suppression** in sensitive environments. According to the International Association of Fire Fighters (IAFF), this marks a shift in how digital infrastructure is protected—treating data centers as mission-critical assets on par with hospitals and military installations.

Facilities are also investing in:

- Fire-resistant construction materials
- Advanced smoke and heat detection systems
- AI-powered monitoring to identify anomalies before ignition
- Emergency protocols tailored to digital environments

🌐 A Global Wake-Up Call

The September 26 fire in Daejeon, South Korea, which crippled hundreds of public services, has become a case study in digital disaster. It revealed how deeply intertwined data centers are with everyday life—from healthcare and transportation to emergency response and governance.

Experts warn that as climate change increases the frequency of extreme weather events, the risk of fire-related disruptions will grow. Governments and tech companies are now racing to fortify their facilities, not just with firewalls—but with fire crews.

Why Firefighters Are Needed

- **High Heat & Power Loads**: Data centers operate with immense electrical loads and cooling systems, making them prone to overheating and electrical fires.
- **Critical Infrastructure**: A fire at a major data center could disrupt national communications, financial transactions, and public safety systems.
- **Rapid Response**: On-site firefighters can respond instantly to alarms, reducing damage and downtime compared to municipal crews.

Prevention and Preparedness

Some facilities now include:

- Fire-resistant building materials
- Advanced smoke detection and suppression systems
- AI-driven monitoring to detect anomalies before ignition
- Dedicated fire teams trained in electrical and lithium-ion battery hazards

Read more:

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https://www.thenews.com.pk/latest/1347185-south-korea-digital-services-seems-dead-after-data-center-fire

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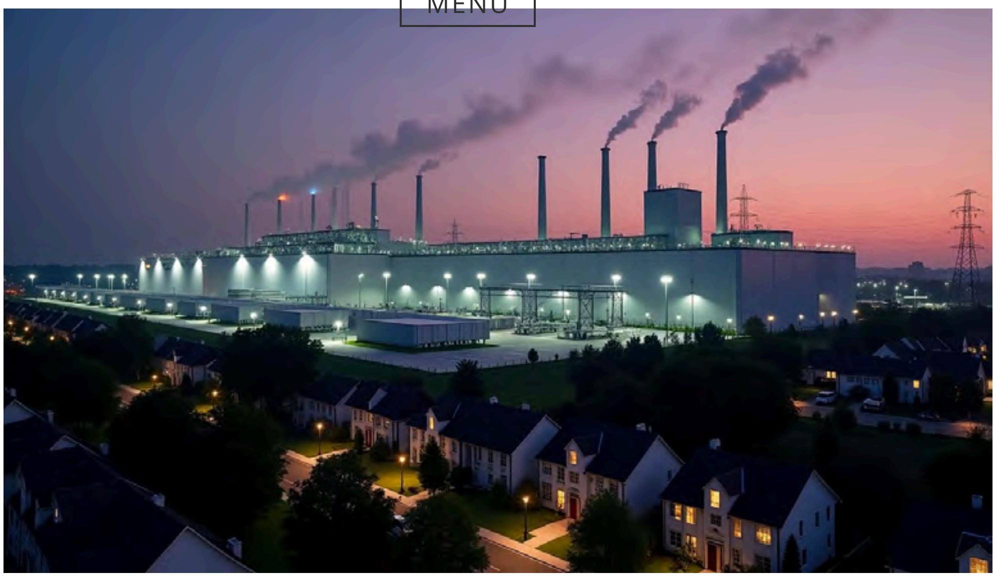

THE REAL SAFETY RISKS OF DATA CENTERS: WHAT LOCAL COMMUNITIES NEED TO KNOW.

Posted on September 12, 2025 by **conimby**

What are your thoughts on data centers?

Data centers might pose risks to their host communities. These digital hubs are growing fast, and this raises real concerns about their effect on the environment, health, and resources. Data centers used 4% of all U.S. electricity in 2023. This number could jump to 6-12% by 2030 . A single large data center needs about 5 million gallons of water each day – the same amount that a town of 50,000 people uses .

The problems go beyond just using too many resources. Almost a third of California's working and planned data centers sit in areas already dealing with serious diesel pollution . This shows why data centers can be bad news for many local residents. Scientists at UC Riverside and Caltech predict these facilities could trigger 600,000 asthma attacks by 2030. The health costs could reach $20 billion .

Data centers do bring some good news. They create jobs and boost local tax income. Take Virginia as an example. The state gained over 26,000 jobs in operations and construction during 2023 . Local governments collected $1 billion in taxes from these facilities in 2022 . The benefits look good, but people still ask if living near a data center is safe. Communities now face proposals that could add up to 80 million square feet of new facilities nationwide . They must weigh both sides carefully.

Understanding the core safety risks of data centers

Data centers create several major safety risks that go beyond just using up resources. Their biggest threat lies in how they affect electrical grid stability. Power grids can experience cascading outages that affect whole regions at the time these facilities suddenly disconnect [1]. Grid operators have documented more than 30 "near-miss" incidents over the last several years since 2020 [1].

The situation becomes more concerning with data centers creating "bad harmonics" – these erratic voltage spikes damage household appliances and raise fire risks. Research shows that 75% of highly distorted power readings show up within 50 miles of major data center operations [2].

These facilities' health effects are also worrying. People who keep taking in fine particulates from diesel backup generators often develop respiratory problems [3]. On top of that, the chemically treated cooling water becomes unsafe for drinking or farming [4].

Research indicates that living close to data centers doesn't pose electromagnetic field risks [5]. However, water availability has become a critical issue. Meta's data center construction in Georgia led to nearby residents' wells running dry [6].

The cooling systems and backup generators create noise that disturbs local residents despite soundproofing efforts [5]. These facilities put pressure on local utilities and can drive up residential costs, while companies often get better utility rates [4].

How data centers affect communities differently

Data centers' community effects largely depend on where they're built. Communities in Western states like California and Texas that already face serious environmental challenges often become home to these facilities [7]. The situation looks different on the East Coast. Virginia's data centers tend to pop up in areas with fewer environmental problems. All the same, clusters with high or very high environmental justice burdens house more than 40% of data centers across the country [7].

Communities where these centers appear often struggle with poverty and lower education levels. Research shows a strong relationship (r = 0.867) between social vulnerability and data center locations [7]. This pattern makes us ask hard questions about how companies choose their sites.

The promised economic rewards don't quite add up. Virginia's data centers brought in $1 billion in tax money [8]. Yet each facility creates nowhere near 100 direct jobs [8]. Local residents might see their electricity bills jump by 19% by 2028 as these centers' power needs grow [9].

Different locations use vastly different amounts of resources. New data centers planned for Virginia would just need 40 gigawatts of extra power – almost three times what the state can currently produce [10]. Local communities trying to meet their climate goals might stay stuck with fossil fuels longer than planned [11].

Living near these centers makes everything worse. One neighbor summed it up perfectly when they asked about the cooling systems: "How am I going to relax with something buzzing at me 24/7?" [10]

What local communities can do to stay informed

Local communities now have powerful tools to stand up for their rights when data centers come knocking. Recent tracking shows grassroots groups fighting data centers have sprung up in 28 U.S. states [12]. These groups serve as the first defense line against questionable developments.

Community action that works usually starts with letter-writing campaigns and residents speaking up at government meetings [12]. These grassroots efforts pack a real punch. A developer in Virginia pulled its rezoning application after facing strong public feedback [13].

Residents need reliable information to make their case. Tools like CalEnviroScreen offer interactive maps that show pollution levels in different areas [14]. These maps help identify neighborhoods that already bear too much environmental burden. Some places, like Washington state, make data centers complete health impact studies before they can build [15].

What should communities just need:

- Regular reports on energy and water use, similar to California's proposed laws (AB 93 and AB 222) [16]
- New industrial zoning rules that look at the full picture of impacts [16]
- Health impact studies before construction that everyone can see [16]

Communities nationwide have won fights against old zoning rules. Lancaster, Pennsylvania's residents asked whether data centers could really count as "wholesale trade and storage." They ended up getting a public hearing to look at this classification again [17].

Conclusion

Data centers are without doubt a double-edged sword for local communities. They create jobs and generate tax revenue, but safety risks need our attention. Local residents face legitimate concerns about unstable electrical grids, diesel generators causing air pollution, water contamination, and resource depletion.

Local communities must carefully evaluate these trade-offs. Data centers' disproportionate concentration in vulnerable areas raises serious environmental justice questions. These digital fortresses strain local utilities heavily. Companies often get preferential rates that could push costs onto residential users.

Communities should organize and promote their interests when facing data center proposals. People have successfully used letter-writing campaigns and public comments at government meetings to voice their concerns. They have also asked for detailed health impact assessments. On top of that, they can push for mandatory resource usage reports and updated zoning rules that show the full picture of cumulative effects.

We need balanced solutions that recognize both economic benefits and environmental costs of these facilities. Future development requires transparency, accountability, and community participation at every stage. Communities can ensure these digital infrastructure hubs serve their long-term wellbeing through informed participation.

What do you think?

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TAGGED AI, COMMUNITY, CONIMBY, DATA, DATA CENTERS

EXHIBIT B

PLANNING COMMISSION STUDY FRAMEWORK – DATA CENTER USES

I. Purpose:

To guide the Planning Commission in evaluating data center uses during the moratorium period with emphasis on farmland preservation, rural land use compatibility, and infrastructure capacity.

II. Study Framework:

a. Land Use Definition: Define and classify data centers as a distinct land use.

b. Farmland Preservation: Evaluate impacts on agricultural and residential zoning districts, contiguous farmland, and long-term farm viability.

c. Infrastructure Capacity: Assess electrical, water, wastewater, and road impacts in rural service areas.

d. Environmental Impacts: Evaluate water usage, groundwater impacts, heat discharge, noise, and light pollution.

e. Emergency Services: Assess fire protection, emergency access, and service capacity.

f. Rural Character: Evaluate scale, massing, buffering, and compatibility with surrounding land uses.

g. Zoning Options: Recommend prohibition, restriction, or conditional allowance and draft ordinance amendments as appropriate.

III. Deliverables:

Written findings, recommendations, and draft zoning amendments to the Township Board within a reasonable time during the moratorium period.

89351:00001:202265330-4

Resolution 2026-02-01
February 3, 2026

RESOLUTION OF THE VICTOR TOWNSHIP PLANNING COMMISSION

REGARDING CLARIFICATION AND AMENDMENT OF CLINTON COUNTY KENNEL ORDINANCE, LICENSING, AND INSPECTION PRACTICES

WHEREAS, the Victor Township Planning Commission is charged with promoting orderly land use, public health, and the welfare of residents and animals within Victor Township; and

WHEREAS, Clinton County regulates kennel operations through its Kennel Ordinance, licensing process, and inspection procedures; and

WHEREAS, the current Clinton County Kennel Ordinance contains ambiguous and inconsistent definitions regarding "private kennel" and "commercial kennel," leading to uncertainty in interpretation and enforcement; and

WHEREAS, the lack of clear distinctions between private and commercial kennels creates potential legal vulnerabilities, inconsistent application of standards, and challenges in fair and uniform administration of the ordinance; and

WHEREAS, Clinton County–issued Kennel licenses do not specify whether the license is for a private kennel or a commercial kennel, further compounding regulatory ambiguity and complicating compliance, recordkeeping, and enforcement; and

WHEREAS, Clinton County's Kennel inspection checklist does not differentiate between private and commercial kennel operations, despite the differing scale, intensity of use, and regulatory considerations applicable to each; and

WHEREAS, the absence of clear distinctions undermines established legal precedent that different types of kennel operations may warrant different regulatory treatment based on use, impact, and public interest considerations; and

WHEREAS, clarity in definitions and inspection standards is essential to protect animal health and welfare, ensure appropriate oversight, and maintain consistent and defensible regulatory practices; and

WHEREAS, if Clinton County is going to maintain and enforce a Kennel Ordinance and actively regulate kennel operations, it is in the best interest of Victor Township, its residents, and Clinton County to ensure that such regulations are precise, enforceable, and reflective of current best practices in animal care and land use regulation; **or, in the**

alternative, that Clinton County consider repealing its Kennel Ordinance and relying solely on applicable State law for the regulation of kennels;

NOW, THEREFORE, BE IT RESOLVED that the Victor Township Planning Commission respectfully requests that Clinton County take the following actions:

1. Amend the Clinton County Kennel Ordinance to clearly and distinctly define "private kennel" and "commercial kennel," including objective criteria such as number of animals, purpose of keeping, and whether breeding, boarding, or sale of animals is conducted for profit, etc;

2. Revise Clinton County–issued Kennel licenses to explicitly designate whether the license is for a private kennel or a commercial kennel; and

3. Update the Clinton County Kennel inspection checklist to include separate standards and criteria for private kennels and commercial kennels, reflecting the differing operational and animal welfare considerations applicable to each;

BE IT FURTHER RESOLVED that a copy of this Resolution be transmitted to the Clinton County Board of Commissioners, the Clinton County Animal Control Department, and any other relevant County officials responsible for kennel regulation and enforcement.

ROLL CALL VOTE

A roll call vote was taken as follows:

- **Pesch** — Yes
- **Marek** — Yes
- **Ashley** — Yes
- **Malkin** — Yes
- **Mitchel** — Absent
- **Sell** — Yes
- **Voisinet** — Yes

ADOPTED this 3rd day of February, 2026, by the Victor Township Planning Commission.

Resolution 2026-02-01
February 10, 2026

RESOLUTION OF THE VICTOR TOWNSHIP BOARD OF COMMISSIONERS REGARDING CLARIFICATION AND AMENDMENT OF CLINTON COUNTY KENNEL ORDINANCE, LICENSING, AND INSPECTION PRACTICES

WHEREAS, the Victor Township Board Of Commissioners is charged with promoting orderly land use, public health, and the welfare of residents and animals within Victor Township; and

WHEREAS, Clinton County regulates kennel operations through its Kennel Ordinance, licensing process, and inspection procedures; and

WHEREAS, the current Clinton County Kennel Ordinance contains ambiguous and inconsistent definitions regarding “private kennel” and “commercial kennel,” leading to uncertainty in interpretation and enforcement; and

WHEREAS, the lack of clear distinctions between private and commercial kennels creates potential legal vulnerabilities, inconsistent application of standards, and challenges in fair and uniform administration of the ordinance; and

WHEREAS, Clinton County–issued Kennel licenses do not specify whether the license is for a private kennel or a commercial kennel, further compounding regulatory ambiguity and complicating compliance, recordkeeping, and enforcement; and

WHEREAS, Clinton County’s Kennel inspection checklist does not differentiate between private and commercial kennel operations, despite the differing scale, intensity of use, and regulatory considerations applicable to each; and

WHEREAS, the absence of clear distinctions undermines established legal precedent that different types of kennel operations may warrant different regulatory treatment based on use, impact, and public interest considerations; and

WHEREAS, clarity in definitions and inspection standards is essential to protect animal health and welfare, ensure appropriate oversight, and maintain consistent and defensible regulatory practices; and

WHEREAS, if Clinton County is going to maintain and enforce a Kennel Ordinance and actively regulate kennel operations, it is in the best interest of Victor Township, its residents, and Clinton County to ensure that such regulations are precise, enforceable, and reflective of current best practices in animal care and land use regulation; **or, in the alternative, that Clinton County consider repealing its Kennel Ordinance and relying solely on applicable State law for the regulation of kennels**;

NOW, THEREFORE, BE IT RESOLVED that the Victor Township Board Of Commissioners respectfully requests that Clinton County take the following actions:

1. Amend the Clinton County Kennel Ordinance to clearly and distinctly define "private kennel" and "commercial kennel," including objective criteria such as number of animals, purpose of keeping, and whether breeding, boarding, or sale of animals is conducted for profit, etc;

2. Revise Clinton County–issued Kennel licenses to explicitly designate whether the license is for a private kennel or a commercial kennel; and

3. Update the Clinton County Kennel inspection checklist to include separate standards and criteria for private kennels and commercial kennels, reflecting the differing operational and animal welfare considerations applicable to each.

BE IT FURTHER RESOLVED that a copy of this Resolution be transmitted to the Clinton County Board of Commissioners, the Clinton County Animal Control Department, and any other relevant County officials responsible for kennel regulation and enforcement.

Roll call: Members voting yes: Willoughby, Wiswasser, Prange, Pesch, Sayles. Members voting no: None Members absent: None

Upon recording the vote, the Supervisor declared adopted on this 10th day of February, 2026.

Lianne Prange
Victor Township Clerk

STATE OF MICHIGAN)
)ss
COUNTY OF CLINTON)

I, Lianne Prange, the duly qualified and acting Clerk of the Township of Victor, County of Clinton, State of Michigan, do hereby certify that the above is a true and correct copy of the Resolution adopted by the Victor Township Board, at a regular meeting held on the 10th day of February 2026.

Lianne Prange
Victor Township Clerk

Communication #5
03/31/26 Brd Mtg

Minutes of a regular meeting of the Wexford County Board of Commissioners, held at the Wexford County Courthouse, 437 E. Division St., Cadillac, Michigan on the eighteenth day of February 2026 at 4:00 p.m.

PRESENT: Sogge, Nelson, Nyman, Bengelink, Bush, Theobald, Baughan, Potter & Taylor.

ABSENT: None.

The following preamble and resolution were offered by Commissioner Theobald and supported by Commissioner Bush.

RESOLUTION NO. 26-06
RESOLUTION IN SUPPORT OF REPEALING MCL 46.415 (2)

WHEREAS, the County Board of Commissioners currently establishes all aspects of compensation, benefits and mileage reimbursements for its officials and its employees and fund the same, solely from County funds; and

WHEREAS, mileage reimbursement for County Board of Commissioners and county officials and employees is currently statutorily different as the County Board of Commissioners is limited by the limitations set forth in MCL 46.415(2); and

WHEREAS, many counties adopt the applicable IRS mileage rate for business travel which for 2026 is 72.5 cents per mile; and

WHEREAS, a County Board of Commissioner generally is required to undertake travel in the performance of the duties of their office; and

WHEREAS, when officials and employees of a County travel, the mileage reimbursement exceeds that of County Board of Commissioners mileage reimbursement for their County travel; and

WHEREAS, the current statutory difference in mileage reimbursement for official travel at the County level is both irrational and illogical.

NOW THEREFORE BE IT RESOLVED that the members of the Michigan Legislature are called upon to repeal MCL 46.415(2) in its entirety to allow Counties to establish all aspects of compensation and mileage for their commissioners, officials and its employees to be paid solely from County funds.

BE IT FURTHER RESOLVED, that a copy of this Resolution shall be sent to all Michigan Counties and members of the Michigan Legislature.

A ROLL CALL VOTE WAS TAKEN AS FOLLOWS:

AYES: Baughan, Potter, Sogge, Nelson, Nyman, Bengelink, Bush, Theobald & Taylor.

NAYS: None.

RESOLUTION DECLARED ADOPTED.

____
Chairperson, Wexford County Board of Commissioners

____
Alaina M. Nyman, County Clerk

STATE OF MICHIGAN)
) ss.
COUNTY OF WEXFORD)

I hereby certify that the foregoing is a true and complete copy of Resolution 26-06 adopted by the County Board of Commissioners of Wexford County at a regular meeting held on February 18, 2026, and I further certify that public notice of such meeting was given as provided by law.

____
Alaina M. Nyman, County Clerk

A RESOLUTION SUPPORTING STATE LEGISLATIVE ACTION FOR FISCAL ACCOUNTABILITY AND LOCAL ZONING AUTHORITY

WASHTENAW COUNTY BOARD OF COMMISSIONERS

MARCH 18, 2026

WHEREAS, State Representative Jimmie Wilson Jr. has introduced House Bill 5362 to rescinds a $100 million state grant previously allocated to the University of Michigan for a high-performance computing facility in partnership with Los Alamos National Laboratory; and

WHEREAS, the Washtenaw County Board of Commissioners recognizes that the University of Michigan is one of the wealthiest public institutions in the United States, and that taxpayer-funded site readiness grants should be prioritized for projects with clear, locally-negotiated community benefits rather than facilities exempt from local taxation; and

WHEREAS, serious concerns have been raised by residents and local officials in Ypsilanti Township regarding the transparency of the project's scale, its proximity to residential areas, and its massive projected energy demand of 110 megawatts, nearly four times the power used by all households in the Township; and

WHEREAS, the University’s current constitutional independence allows it to bypass local zoning ordinances, leaving municipalities with no legal mechanism to ensure that large-scale industrial projects adhere to community standards for noise, safety, and environmental protection; and

WHEREAS, Representative Wilson has proposed a Michigan Constitutional Amendment that would require state universities to comply with local zoning and public planning processes for non-academic industrial developments;

NOW THEREFORE BE IT RESOLVED, that the Washtenaw County Board of Commissioners formally supports House Bill 5362 and the "clawback" of the $100 million grant, urging that these funds be reallocated to urgent community infrastructure needs;

BE IT FURTHER RESOLVED, that the Washtenaw County Board of Commissioners supports the proposed Constitutional Amendment to restore local planning authority, ensuring that large-scale university developments are subject to the same public scrutiny and zoning requirements as any other industrial developer;

BE IT FURTHER RESOLVED, that a copy of this resolution be transmitted to the Governor of Michigan, the Washtenaw County’s state legislative delegation, and other Counties as a communication.

COMMISSIONER	Y	N	A	COMMISSIONER	Y	N	A	COMMISSIONER	Y	N	A
Beeman				Maciejewski	X			Somerville	X		
Hodge				Rabhi	X						
LaBarre	X			Sanders	X						
Lyte	X			Scott							

CLERK/REGISTER'S CERTIFICATE - CERTIFIED COPY ROLL CALL VOTE: 6 0 0

STATE OF MICHIGAN)

COUNTY OF WASHTENAW)SS.

I, Lawrence Kestenbaum, Clerk/Register of said County of Washtenaw and Clerk of Circuit Court for said County, do hereby certify that the foregoing is a true and accurate copy of a resolution adopted by the Washtenaw County Board of Commissioners at a session held at the County Administration Building in the City of Ann Arbor, Michigan, on March 18, 2026, as it appears of record in my office. In Testimony Whereof, I have hereunto set my hand and affixed the seal of said Court at Ann Arbor, this 19th day of March 2026.

LAWRENCE KESTENBAUM, Clerk/Register

BY: Brenden McArthur

Brenden McArthur, Deputy Clerk

BY: Katie Scott

COMMISSIONER KATIE SCOTT, DISTRICT 9
CHAIR OF THE BOARD OF COMMISIONERS

Res. No. 26-055

March, 17th, 2026

Dr. Wei Liao
Professor and Director
Anaerobic Digestion Research and Education Center (ADREC)
Michigan State University

RE: Letter of Support
Project: AI-Optimized Distributed Bio-Digital Infrastructure for National Data Services, Resource Recovery, and Rural Resilience in U.S. Animal Agriculture

Dear Dr. Liao,

The Lansing Economic Area Partnership (LEAP) is pleased to provide this **letter in support of the proposed USDA-NIFA Sustainable Agricultural Systems project**, "AI-Optimized Distributed Bio-Digital Infrastructure for National Data Services, Resource Recovery, and Rural Resilience in U.S. Animal Agriculture." As the regional economic development organization serving Ingham, Eaton, and Clinton counties, LEAP works on behalf of more than 90 public and private sector partners to advance economic opportunity and prosperity for businesses and residents across the Lansing tri-county region, serving as the lead economic development organization for Region 7 within the State of Michigan's Collaborative Development Council framework.

LEAP supports innovative efforts that strengthen the connection between agriculture, energy, and emerging digital infrastructure, particularly through our AgTech industry cluster focus in terms of business startup support, as well as attraction of new-to-market companies in this space. The proposed integration of dairy-based renewable energy systems with distributed computing infrastructure presents a unique opportunity to create new value in agricultural communities through renewable electricity, nutrient recovery products, and digital hosting services. We believe this project has strong potential to improve farm viability, encourage local investment, support economic diversification, and strengthen long-term rural resilience.

With its strong agricultural foundation, proximity to Michigan State University, and growing interest in advanced energy and technology-driven industries, the Lansing region is well positioned to benefit from this work. This effort has the potential to help position the region as a leader in innovative infrastructure that bridges traditional agriculture with the digital economy. LEAP is pleased to support this important effort and appreciates your and MSU's leadership in advancing solutions that connect agriculture, energy, and digital infrastructure.

Please contact our office should you require additional information or have any questions at (517) 285-6360.

Sincerely,

Robert L. Trezise, Jr.
President & CEO

1000 S Washington Avenue, Suite #201 | Lansing, Michigan, 48910-1682 P: (517) 702-3387 | F: (517) 702-3390 | purelansing.com

CLINTON COUNTY SHERIFF’S OFFICE

Serving Clinton County since 1839

ANNUAL REPORT 2025

Sean Dush, Sheriff

1347 E. Townsend Road
St. Johns, MI 48879
989-224-5200

To the Clinton County Board of Commissioners and the Residents of Clinton County,

On behalf of the dedicated men and women of the Clinton County Sheriff's Office, I am proud to present the **2025 Annual Report**. This report provides a snapshot of the many accomplishments achieved over the past year by our exceptional staff, who continue to deliver the highest level of service to the citizens of Clinton County. With the continued support of County Administration and the Board of Commissioners, our Sheriff's Office has once again made meaningful advances in public safety throughout the county.

As I complete my fourth year serving as your Sheriff, I would like to highlight several positive departmental improvements and initiatives implemented during 2025:

- Approval from the Board of Commissioners to hire three additional deputies, increasing staffing to five Road Patrol Deputies per shift—an increase not seen since at least 1991.

- Purchase of new duty handguns for all Road Patrol and Corrections personnel, including the transition of Road Patrol Deputies to a Red Dot Sight platform.

- Expansion of the Road Patrol fleet with two additional patrol vehicles.

- Implementation of an inmate classification system within the Corrections Division.

- Enhancement of the Corrections Officer Training Program.

- Establishment of a Sheriff's Office Dive Team consisting of 12 trained members and a dedicated boat, supported in part by generous donations from a county resident that allowed for the purchase of additional equipment.

- Refurbishment of the front office administrative area, creating a more efficient, organized, and user-friendly workspace.

- Utilization of donated funds to purchase bullet-resistant vests and handguns for Corrections Officers, enabling them to assist with prisoner transports.

- Successful grant applications and insurance reimbursements through MMRMA to support departmental training.

- Completion of a comprehensive purge of the Corrections Division archive area.

• Initiation of a full records room purge in accordance with the State of Michigan records retention schedule.

• Upgrades to the Corrections Division medical office, including new cabinetry and filing systems.

• Development of a professional recruiting video to assist with hiring efforts and showcasing the Sheriff's Office as an employer of choice.

Within this report, you will find information about each division of the Clinton County Sheriff's Office. While this document highlights key activities and achievements, it represents only a portion of the daily efforts carried out by our personnel across the county. Much of the important work done by our staff occurs quietly and without recognition, and we take great pride in that service. We are grateful for the continued trust and support of our community.

As public servants, we place the highest value on human life and stand ready at all times to go above and beyond the call of duty to protect our community. We recognize that we cannot do this work alone and deeply value our partnerships with local law enforcement agencies, fire and medical services, Central Dispatch, and our dedicated volunteer groups, including Victim Services and the Mounted Division. Their commitment and cooperation are essential to our shared success.

It is often said that the Sheriff's Office responds to our citizens on their worst days, every day. Our personnel view these moments as opportunities to serve with professionalism, compassion, and integrity. I am thankful for a well-trained and committed office that continues to rise to every challenge in service to this community. I extend my sincere gratitude to every member of the Clinton County Sheriff's Office for their daily sacrifices and unwavering dedication.

While we are proud of the progress made in 2025, we also recognize there is always room for improvement. We remain committed to continuous growth and to finding new ways to enhance public safety. We look forward to continuing our work to ensure Clinton County remains a safe place to live, work, and play.

Thank you for entrusting the Clinton County Sheriff's Office with the responsibility of serving you.

Sheriff Sean Dush

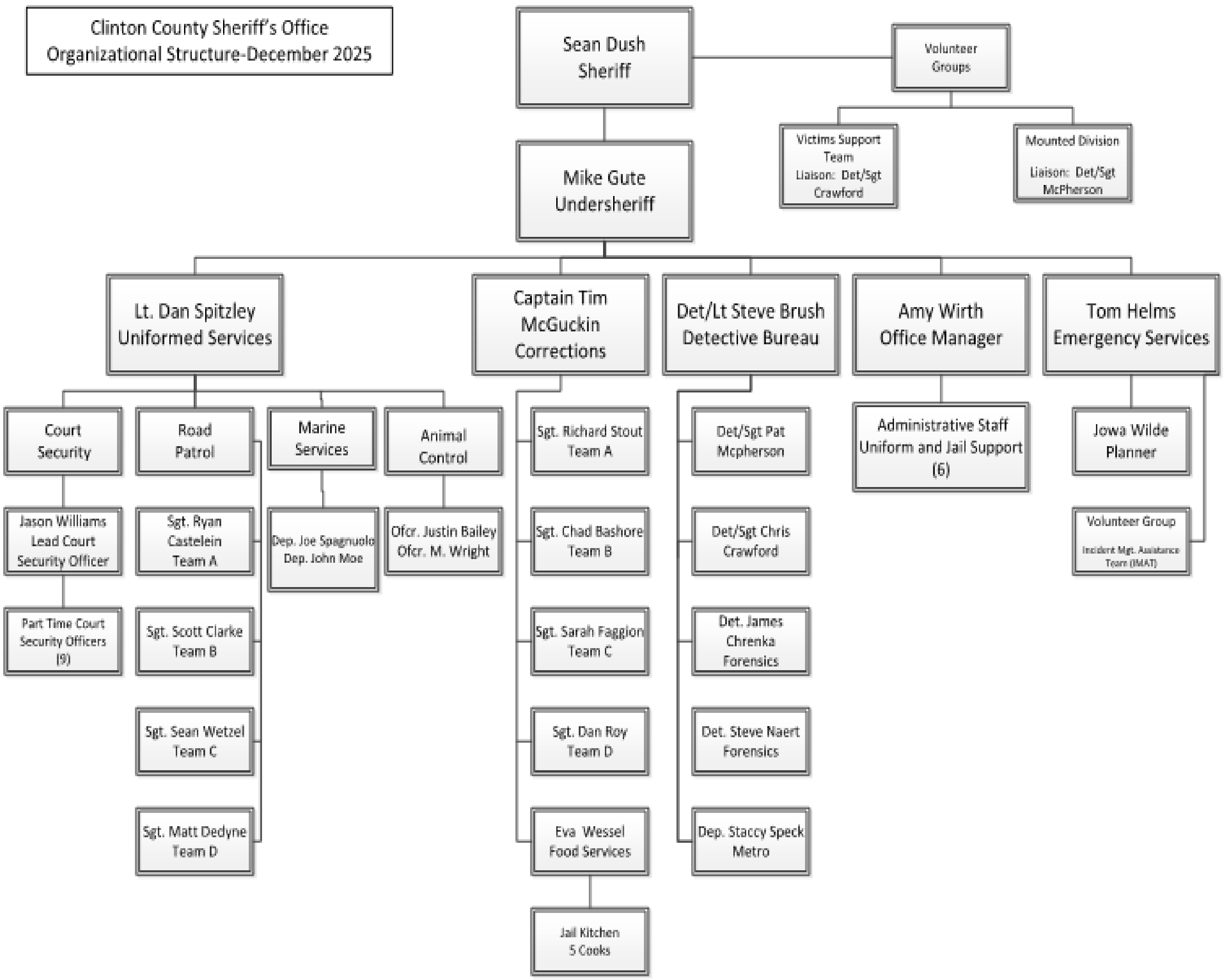
FOREWORD

The Statistical data in this report came primarily from information maintained by the Sheriff's Office Administration Division, Central Dispatch, and the Michigan State Police.

Additional information on the content of this publication can be obtained by contacting the Office of Clinton County Sheriff, 1347 East Townsend Road, St. Johns, MI, 48879.

> *"The mission of the Clinton County Sheriff's Office is to provide for the protection and preservation of public safety and property; and the effective and efficient operation of a secure and humane correctional facility."*

OFFICE OF CLINTON COUNTY SHERIFF
2025



TRAFFIC ENFORCEMENT STATISTICS 2021-2025					
	2021	**2022**	**2023**	**2024**	**2025**
Traffic Citation	3,786	5,117	4,357	4,960	5738
Verbals	923	4,377	3,208	3,668	3,899
Traffic Stops	4,366	6,548	8,669	9,912	10,632
Drug Arrests	54	52	42	30	23
Driver Suspended	219	251	195	159	195
Drunk Driving	123	118	91	114	119
Seat Belts	23	34	28	0	25

TRAFFIC CRASH STATISTICS 2021-2025					
	2021	**2022**	**2023**	**2024**	**2025**
Property Damage Crash	478	531	483	372	472
Personal Injury Crash	123	110	81	88	105
Fatal Crash	4	4	8	6	5
Car Deer	956	1,026	1,030	1056	1099

COMPLAINT ACTIVITY 2021-2025					
	2021	**2022**	**2023**	**2024**	**2025**
Self-Initiated	14,263	16,612	16,530	18,453	19,572
Calls for Service	7,486	7,812	7,352	7,653	8,301
TOTAL	21,749	24,424	23,882	26,106	27,873
Written Reports	2,816	3,160	3,190	3,418	3,746

Violation of Controlled Substance Act Drug Arrests by Township 2025	
Bath	1
Bengal	0
Bingham	3
Dallas	0
DeWitt	5
Duplain	0
Eagle	4
Essex	0
Greenbush	1
Lebanon	0
Olive	1
Ovid	4
Riley	0
Victor	1
Watertown	3
Westphalia	0
Total	**23**

Drunk Driving Arrests By Township 2025	
Bath	1
Bengal	6
Bingham	16
Dallas	2
DeWitt	6
Duplain	3
Eagle	20
Essex	3
Greenbush	9
Lebanon	2
Olive	15
Ovid	7
Riley	1
Victor	8
Watertown	18
Westphalia	2
Total	**119**

2025 JAIL DIVISION

- During 2025, the Clinton County Jail booked in a total of 1,706 individuals. Of that number, 1,253 were male, 453 were female, 0 unknowns.
- The average daily count for the year was: 87 locals and 2 boarders, for a Daily Average total of 89.
- Approximately 105,000 meals were served from the kitchen.

JAIL REVENUE 2021-2025					
	Actual 2021	**Actual 2022**	**Actual 2023**	**Actual 2024**	**Actual 2025**
Transport Inmates	$600	$1,137	$609	$1180	$831
Work Release Room & Board	0	0	0	0	0
CL CO Inmate Room & Board– Direct	0	0	$3,193	$683	$411
CL CO Inmate Room & Board Congress Collection	$53,472	$34,092	$20,333	$12,962	$6037
Lodge Prisoners	$42,088	$42,111	$103,888	$110,495	$65,965
Jail Medical Reimburse – Direct	$15,203	$17,551	$12,618	$10,253	$19,753
Jail Medical Reimburse – Congress Collection	$49	$52	$7	$1153	$97
Jail Inmate Telephone	$46,101	$21,308	$28,995	$136,175	$106,004
TOTALS	**$157,513**	**$116,251**	**$169,643**	**$272,901**	**$199,098**

Other Revenue 2025	
Social Security Reimbursement for 2025	$7200
Bond Fee	$870
Booking Fee	$7530

2025 VICTIM SUPPORT TEAM

The Victim Support Team is a group of dedicated volunteers trained to assist Police Officers, Fire Departments, and EMS agencies in dealing with victims to provide immediate crisis intervention. This assistance is utilized in events of sudden or unexpected death that occurs due to car crash, suicide, fire, homicide, illness, drowning, or other traumatic incidents. The advocates also provide victim assistance when there is not a death in situations like criminal sexual conduct, kidnapping, breaking and entering, and house fires. The Advocates strive to offer comfort, compassionate support, and sympathy to the victims and victims surviving family members.

Advocates of the Victim Support Team complete a 20-hour course over a weekend to learn how to lend support to the victims of violent crimes and assist families during a crisis. The advocates also must complete 12 additional hours of training every year to stay compliant as an advocate. The advocates have a monthly meeting, and advocates are on call 24 hours a day and respond anywhere in Clinton County. On some occasions the advocates are requested to assist other county advocate teams. This request can require a response for an advocate to travel a few hours outside of Clinton County. All the advocates time for training and call outs is voluntary and there is no reimbursement for fuel or mileage.

For the budget year of 2025 The Victim Support Team has been 100% self-funded through an annual flower sale fundraiser. This fundraiser pays for advocates to go to the annual Victim Advocate Conference hosted by the Michigan Sheriff Association. Along with the conference cost the fundraiser pays for all attending advocates lodging for the conference. Other costs the fundraiser covers are minor office supplies and advocate coats and shirts.

The team is led by Coordinator Vicki Wieber. Coordinator Wieber has been a volunteer advocate for over 30 years and has been the team's coordinator since 2005.

The team is supported by Det/Sgt Crawford who is the Liaison Officer from the Sheriff's Office. Det/Sgt Crawford is assigned to the team to address training needs, operational evaluations, and any other team concerns.

The Clinton County Victim Support Team is staffed and supported by Aaron Baker, Brenda Olson, Peggy Haviland, Olivia Miller, Sue Moe, Cindy Ortman, Emily Palmatier, Denise Palmer, Bob Pung, Eveline Ritter, James Sheldon, Peg Vining, and Joann Webster.

The above team members have collaboratively accrued 148 hours in monthly meetings. 88 hours at the annual conference. This is in addition to the 204 hours spent on call outs. The above team members accrued 498 hours of volunteer time for the Clinton County Victim Support Team.

For 2025 there was a noticeable uptick in calls for service for The Clinton County Victim Support Team. The Clinton County Victim Support team responded to 21 percent more call for service than in 2024. This demonstrates the need for this team and how important they are to the first responders and the community.

Looking forward to 2026 the Clinton County Victim Support Team will continue to support first responders and the community. The team is fully staffed going into 2026. This is very important for the members since this is a completely volunteer team. With a full staff the number of calls can be spread out over more people, reducing the risk of the volunteers getting burned out.

2025 INCIDENTS	NUMBER OF CALL OUTS
HOMICIDE	0
KIDNAPPING/ASSAULT	0
CSC	0
BREAKING AND ENTERING	0
SUICIDE	6
DOMESTIC	0
FATAL CRASH	4
PERSONAL INJURY CRASH	0
DEATH NOTIFICATIONS	34
HOUSE FIRES	0
HOSPITAL CALLS	0
COURT APPEARANCE	0
ASSIST OTHER AGENCY	0
TOTAL CALL OUTS	44
TOTAL HOURS SPENT AT CALLS	236
TOTAL TRAINING HOURS	114
TOTAL MEETING HOURS	148
TOTAL MILES TRAVELED	5397

Clinton County Sheriff’s Office
Mounted Division
2025

The Sheriff’s Office Mounted Division is a group of volunteers whose members are deputized by the Sheriff under special duty status with limited police powers and are available for call to duty at any time to assist with scheduled events, training exercises, and emergencies. The unit operates under a 501c3 non-profit status with the primary responsibilities of promoting the Office of the Sheriff, supporting law enforcement efforts in Clinton County, and upon the request of the Sheriff assisting our law enforcement mutual aid partner agencies. The Mounted Division meets monthly at the Sheriff’s Office to discuss events and training needs. The Mounted Division is led by a member of the unit picked by the Sheriff with the rank of Captain and a Liaison from the Sheriff’s Office sworn full-time staff.

In 2025 the Mounted Division consisted of 27 members who were involved in 52 different events for a total of 1,970 hours of service. They completed 458 hours of training and another 280 hours supporting the Mounted Division for a total of **2,708** hours for the year. The Mounted Division normally provides a uniform presence at local high school football games, numerous parades and other events including the Presentation of Colors at the MSU Stallion Expo, Shop with a Cop, Fill a Cop Car in support of the local food bank, and the Clinton County 4-H Fair. This year, members went through an 8-hour handgun training course put on by Sheriff’s Office staff. Also, members with horses received a weekend of specialized training to make them more proficient in their duties.

This year the Mounted Division responded to requests for service in Eagle Township for a missing/suicidal person and to Bath Township to provide 24-hour security at the scene of a plane crash.

The operating budget for the Mounted Division comes primarily from a country western show they host every fall. They receive additional funds by way of donations given for some of the events they are involved with.

2025
TRAINING

The Clinton County Sheriff's Office has in place a training program for all staff members to keep abreast of the changes taking place in the criminal justice field to enable them to perform their duties and meeting the Michigan Commission on Law Enforcement Standards Yearly Continuing Professional Education training requirements.

Our three-phase training program involves the following process:

1. **Sheriff's Office Core Training:** Training that is identified and developed using a Training Committee comprised of personnel from each division within the Sheriff's Office. An analysis of each job responsibility and duty is reviewed to identify the essential skills, knowledge and abilities required to perform their duties in an effective and efficient manner.

2. **Clinton County Law Enforcement Core Training:** Heads of each law enforcement agency in Clinton County working together to implement common training for the law enforcement officers in Clinton County. The concept of minimizing training costs is met by utilizing trainers from each of the agencies to provide quality training, which is evaluated by the attendees and agency heads.

3. **Enhancement Training:** Additionally designated members of the Sheriff's Office are sent to courses that certify them as instructors on specific topics. Upon completion of their training, they have the responsibility to provide instruction to other members of the Sheriff's Office in their area of expertise.

2025 CORE and Enhancement Training

PBT	Taser recertifications
FOIA Management	Methamphetamine Investigation
Field Training	SFST Update
Mental Health	Liquor Law Enforcement
Armorer's Course	Street Survival (various topics)
Firearms Instructor Courses	Legal Update
Crash Investigation	LEIN
Hostage Negotiations	Domestic Violence
Interview Techniques	School Violence Training
Laser & Radar Operator	Abandoned Vehicle Update
Marine School	Ethnics and Professionalism
Evidence Training	Drone Training and Certification
Criminal Investigation	CPR and First Aid
Records Management - OSSI	Computer Forensics
Defensive Tactics	Forensic Interview Techniques

CLINTON COUNTY EMERGENCY MANAGEMENT
2025 ANNUAL REPORT

PROGRAM OVERVIEW

In 2025 Clinton County Emergency Management continued building and sustaining capabilities for our first responders and county residents, as well as preventing, preparing for, responding to, and recovering from emergencies. This was accomplished with one full-time employee, one part-time grant funded employee (subject to grant restrictions and rules), and 10 non-paid, professional Incident Management Assistance Team (IMAT) volunteers.

2025 Major Events

In 2025 there were no major events requiring Emergency Management intervention, however there were several minor incidents, or planned events, the Emergency Operations Center (EOC) was actively monitoring totaling 30 days for the year.

Emergency Management responded to the following minor incident in 2025:

- March 31 – Strong Storms- The EOC was activated for 2 days to monitor the situation and coordinate communications as needed. As a result of storm damage sustained throughout neighboring counties on Sunday March 30th, IMAT deployed for damage assessment. No significant storm damage occurred within Clinton County, and no resource requests were submitted requiring Emergency Management support actions beyond the initial damage assessment.

2025 Accomplishments

- Social Media Outreach – As in the past, Emergency Management continued to increase its social media outreach in 2025. Social media continues to allow Emergency Management to quickly reach tens of thousands of residents to provide preparedness tips and information during a crisis. This tool continues to be very effective in providing crisis communication information during both small and large events. This capability remains a critical tool in crisis communications.

- Emergency Exercises – Throughout 2025 Emergency Management participated in several emergency preparedness exercises with local, regional, and state partners. Participating or conducting emergency exercises with our partners allows us to test our emergency response plans, assets, and resources in a controlled manner where shortfalls can be discovered and corrected before an actual emergency incident or event.

- Emergency Management Training - Throughout 2025 Emergency Management personnel, including IMAT, participated in several professional training events and conferences focusing on safety, emergency preparedness, and continuing professional development education. This training allows Clinton County Emergency Management to stay informed on ever changing best practices in the Emergency Management field.

- Community Outreach - Emergency Management participated in the following community outreach activities in 2025:

  - January 24 & 31 – Meet with local students – Emergency Management met with two local students (SJMS & SJHS) who had contacted Emergency Management with career questions related to Emergency Management. Each student received approximately one hour of one-on-one contact learning about Emergency Management as a career, as well as what specifically Emergency Management does in Clinton County.

  - May 30 – Eureka Touch a Truck – Emergency Management participated in the event by bringing our large emergency response truck, Mobile Incident Command Post (MICP), our sUAS (drone) equipment, our UTV, various IMAT response equipment, and community preparedness information and giveaways. Those in attendance were able to explore our equipment and learn about what we do to serve our community.

  - July 25 – July 31 – Emergency Management was at the Clinton County 4H fair with our Mobile Incident Command Post (MICP). Throughout the week Emergency Management and IMAT staffed the MICP to monitor weather conditions, enact emergency response plans if needed, be the liaison with the Clinton County Sheriff's Office Mounted Division, and function as a resource for 4H fair staff and fairgoers. Emergency Management also flew numerous sUAS (drone) flights throughout the week to ensure there were no obvious public safety concerns. A cooling station using Emergency Management resources accessible to all in attendance at the 4H fair in an effort to minimize heat related concerns. While out on the fairgrounds July 31st, Emergency Management was dispatched to respond to, and care for a female fair participant experiencing a medical emergency. Emergency Management was able to provide initial care for the female until Clinton Area Ambulance arrived on scene to take over. No other emergencies occurred during the event requiring Emergency Management action. During the week Emergency Management used various opportunities to train new IMAT members on Emergency Management equipment and procedures. Emergency Management received numerous positive feedback from 4H staff, St Johns Police Officers, and the public about having a presence during the fair.

  - August 5 – St Johns Police National Night Out (NNO) - Emergency Management participated in the event by bringing our large emergency response truck, our UTV, our sUAS (drone) equipment, various IMAT response equipment, and community preparedness information and giveaways. Those in attendance were able to explore our equipment and learn about what we do to serve our community.

  - October 28 – Emergency Management participated in a trunk or treat event at Smith Hall in St Johns. Emergency Management IMAT handed out candy to children during the event.

  - November 7 – Emergency Management participated at the Clinton County RESA career fair at DeWitt High School. This event was open to Clinton County 8th and 10th grade students from all school districts within the county. Emergency Management IMAT displayed our large emergency response truck, small emergency response truck, UTV, our sUAS (drone) equipment, and our Mobile Incident Command Post (MICP). Students were able to explore the Emergency Management equipment, watch our equipment demonstrations, ask questions about the equipment, and ask questions regarding a career in Emergency Management.

  - December 5, 6 and 12 – Three Christmas light parades – Emergency Management decorated our UTV and a trailer in a Christmas theme to participate in the St Johns, Ovid, and Westphalia light parades.

- Continued building and sustainment of Incident Management Assistance Team (IMAT) –These volunteers are comprised of local, credentialed, emergency management professionals as well as a few members in training. IMAT is mainly tasked with providing emergency scene support for on-scene incident commanders. Additional IMAT responsibilities include the transportation, set up/demobilization and operation of Mobile Incident Command Post, sUAS (drone) flights, general scene support, decision making advice for incident commanders, Clinton County EOC interface, and interfacing with other local, state, and federal partners. IMAT is also able to augment all functions and positions within the EOC if needed. IMAT is also trained to be the subject matter experts of the MICP as well as all other Clinton County Emergency Management equipment and assets.

- In 2025 IMAT logged over 400 hours of time working on Emergency Management activities, planned events, and incident response. Almost all of this time was comprised of volunteer non-paid hours.

2025 IMAT responses

In 2025 Clinton County Emergency Management Incident Management Assistance Team (IMAT) responded and/or assisted with several incidents/events within the county.

- February 1 – IMAT assisted with technical advice and direction on a deliberate waste oil spill. A physical response was not necessary.
- February 6 – IMAT assisted with technical advice and direction with a minor fuel spill at Kroger gas in St. Johns.
- February 11 – IMAT assisted with technical advice and direction on a deliberate waste oil spill. A physical response was not necessary.
- March 30 - IMAT conducted county wide storm damage assessment.
- June 13 – IMAT assisted with technical advice and direction on an Anhydrous Ammonia spill. A physical response was not necessary.
- July 12 – IMAT was called to assist the Clinton County Special Operations Team (SOT) with an incident in Bath Township involving a suspect with a weapon. IMAT was cancelled before arriving on scene.
- August 11 - IMAT assisted the Clinton County Special Operations Team (SOT) with on scene support during a barricaded suspect in Bath Township. IMAT provided the Mobile Incident Command Post (MICP) as well as other Emergency Management assets and resources.
- September 2 – IMAT assisted Clinton County Sheriff's Office in the search for a missing/endangered suicidal subject. IMAT provided the Mobile Incident Command Post (MICP), sUAS (drone) support/search flights as well as other Emergency Management assets and resources.
- October 7 – IMAT was called to assist the Clinton County Sheriff's Office with an incident in Elsie involving a domestic incident/flee elude. IMAT was cancelled before arriving on scene.
- October 16 – IMAT was called to Bath Township to assist Bath Township Police and Fire with a small plane crash with 3 fatalities. IMAT provided wide area scene lighting and portable generators at the crash site. IMAT also provided technical advice and assistance during the incident.

Goals and Challenges for 2026

Emergency Management Staffing – With one full-time Emergency Manager, one part-time grant funded employee (subject to grant restrictions and rules), and 10 non-paid Incident Management Assistance Team (IMAT) volunteers, 24/7 Emergency Management staffing remains a challenge. With an increase in 24/7 Emergency Management/IMAT calls it has become increasingly difficult to manage 24/7/365 callouts and ensure a guaranteed response with only one full-time employee. Emergency Management will continue to request the addition of one full-time non-grant funded employee to assist in meeting our mission.

Grant Funding Reductions – With the consistent reduction in Federal grant funding, and elimination of some Federal grant programs, Clinton County Emergency Management is suffering a negative impact. With reduced Federal funds Emergency Management is unable to continue the level of building and sustaining of Emergency Management capabilities we have had in the past two decades. The reduction, or elimination, of Federal grant funding also threatens the fully funded part-time Emergency Management Regional Planner position as well as the partially funded full-time Emergency Manager position. The loss of any or all Federal funding would drastically impact the ability to continue the basic required level of service to Clinton County unless the losses were made up for by county funds.

School Safety and Preparedness – Emergency Management will continue to build and sustain partnerships with all Clinton County school districts in 2026. We will accomplish this by remaining a resource and point of contact for school safety guidance including the sharing of ever evolving new "best practices", and by helping school leadership interpret and comply with new and ever-changing statutory requirements. We will also continue to remain engaged with each school by attending school safety planning meetings, conducting regular site visits, and attending lockdown drills throughout the school year.

Employee Emergency Preparedness - Emergency Management, at the direction of Clinton County Administration, will continue working toward a goal of creating a "safety culture" through employee preparedness. To accomplish this goal, Emergency Management will continue facilitating preparedness activities such as hosting CPR, First Aid, AED, Stop the Bleed, and other lifesaving trainings for county employees, maintaining an active presence on the Court Security Committee and the county Safety Committee. Emergency Management will also continue to assist in the creation of building emergency response plans for all Clinton County owned buildings. Emergency Management is also tasked with designing and conducting future emergency drills at all Clinton County owned buildings and properties.

Continue Building New Public Safety and Community Partnerships- Emergency Management will continue attending various local meetings with public safety officials and community partners to become more active in relationship building and pre-event planning as well as educating those groups in the capabilities and mission of Clinton County Emergency Management.

Sustaining and Building IMAT Capabilities – In 2026 Emergency Management will continue to sustain and build capabilities within the Emergency Management Incident Management Team (IMAT). IMAT will continue to train and exercise as well as stay up to date on the latest principles and laws affecting Emergency Management. Emergency Management will continue maintaining and augmenting existing equipment, replacing equipment which has reached end of useful life, and by adding new equipment and technologies to enhance and increase IMAT capabilities all while maintaining a constant “mission ready” status.

Community Outreach – In 2026 Emergency Management will continue to participate in community outreach events throughout Clinton County, and our region, to promote Emergency Preparedness, community engagement, and an understanding of who we are and what we do for Clinton County.

Sustaining and Building Depth within Emergency Operations Center and Emergency Support Functions – In 2026 Emergency Management will continue to reduce identified gaps in our Emergency Support Functions (ESF’s) and Emergency Operations Center Team. Doing so is absolutely critical to meet the needs of any long-term emergency incident or disaster we may face in the future. This will be accomplished by:

- Actively engaging ESF leads, recruiting more members and contact lists within the ESF.
- Emergency Management will facilitate training events for ESF’s and EOC team members.
- Requesting additional county-funded Emergency Management staffing.
- Recruiting other vetted and properly trained volunteer personnel to augment the EOC team and Emergency Management Director as needed.
    - Other Clinton County Employees with Emergency Management training and experience to function as a Deputy Emergency Manager as needed.
    - Other State and Local Emergency Managers.

CENTRAL RECORDS

Central Records has the responsibility to respond to all requests for Administrative Services for the public. They are directly responsible for registering and processing all visitors to the confined areas of the jail. **They respond to over 9,887 incoming calls to the Sheriff's Office**, respond to requests for information, process all criminal complaints, criminal histories for other agencies, compile information in the criminal records management system, fingerprint responsibilities for all Concealed Purchase License, pre-employment, and firearm inspections. They provide information on a variety of subjects to the general public and perform a critical support service to the public and the Sheriff's Office.

CENTRAL RECORDS ACTIVITY SUMMARY

	2024	2025
Firearms Registered	4,435	6,837

Other Services	2025	Revenue
Ink & CPL & Employment Fingerprinting	973	$14,595
Sex Offender Registry	81	$1,850
Police Report Requests	999	$4995
Abandoned Vehicles Processed	97	N/A
Individuals Screened for Entry into Jail	1336	N/A
Subpoenas Processed	816	N/A
Sheriff Sales (mortgage) Adjournments	19 328	$3,198
Personal Protection Orders	74	N/A
Records Checks	884	N/A
FOIA Requests	249	$7,073

2025
ANIMAL CONTROL

The Clinton County Animal Control consists of two full-time Animal Control Officers. Their primary responsibilities are investigating dogs and livestock running at large, handling lost and found pets, investigating animal bites, and investigating animal welfare (abandonment, cruelty, and neglect) complaints. They are also responsible for monitoring and caring for the animals held at the Clinton County Animal Shelter. In 2025 there were 3,099 dog licenses sold in Clinton County.

- 865 Complaints
- 419 Animals picked up
- 48 Citations (dog running at large, unlicensed dogs, and animal cruelty)

Listed below is the revenue for Animal Control:

- $76,300 Dog License fees
- $680 Kennel License fees
- $5,798 Other Fees
- $823.93 Contributions

2025
UNIFORM DIVISION

The Uniform Division of the Sheriff's Office provides direct Law Enforcement services to all Clinton County residents. They respond to all emergency calls for service and are the primary provider of traffic enforcement on all secondary roadways, highways and expressways. They transport prisoners, serve civil processes, provide court security and conduct safety education programs as well as numerous other enforcement responsibilities.

During 2025 Deputies traveled over 453,000 miles patrolling Clinton County. Deputies issued 5738 traffic citations and responded to 1681 traffic crashes. Of these, the Sheriff's Office Crash Investigation Team investigated 5 fatal crashes and 2 serious injury crashes as well as assisting another local agency with 1 serious injury crash investigation. Deputies arrested 119 intoxicated drivers and 195 suspended drivers. They issued 25 seat belt violations and arrested 23 individuals for possessing illegal narcotics.

All deputies are trained in basic crash investigation with 4 Deputies having specialized crash reconstruction training. The uniform division also has certified Deputies in radar and laser speed detection/measurement, Intoxilizer 9000 and Preliminary Breath Testing for operating while Intoxicated offenses, Firearm and subject control tactics. We have members on the Clinton County Dive Team as well as crime scene technicians, hostage negotiators and several members on the County Special Operation's Team. We have instructors in various disciplines including defensive tactics and subject control, CPR, AED, Firearms and standard field sobriety. Deputies also maintain the yearly Michigan Commission on Law Enforcement Standards Continuing Professional Education training requirements.

Recently we were fortunate to add additional Road Patrol staffing increasing our number of Deputies per shift. Deputies continue to operate in single person patrol vehicles. We are fortunate to have a staff of highly trained and professional individuals who are committed to public service and perform their duties in a highly effective manner.

UNIFORM CRIME REPORT – ACTUAL OFFENSES		
		2025
CSC		15
Robbery		1
Intimidation/Stalking		17
Domestic Assault		72
Felonious Assault		19
Simple Assault		13
Arson		2
Breaking and Entering		18
Homicide		2
Kidnapping		0
Larceny		50
Stolen Vehicles		11
Fraud/NSF		69
Retail Fraud		26
Malicious Destruction of Property		34
OWI		119
VCSA		23
Crash Reports		1,697
All Others (warrants, driving offenses, liquor violations, etc.)		1,551
TOTAL		**3,739**
UNIFORM DIVISION STATS	**2024**	**2025**
• Calls for service	7,653	8,301
• Self-Initiated Calls	18,453	19,572
• Total Calls Responded to	26,106	27,873
• Written Reports generated by responses	3,418	3,746
Traffic Crashes	**2024**	**2025**
• Car/Deer	1,056	1,099
• Property Damage	372	472
• Personal Injury	88	105
• Fatal	6	5
Total Accidents	**1522**	**1681**

CLINTON COUNTY COURT SECURITY
2025 YEAR END REPORT

The following is a summary of activity for the Clinton County Court Security for 2025. Multiple areas of activity are tracked throughout the year.

2025 TOTALS

	Total Screened	Inmates Handled	Arrests	Probation Arrests	Warrant Arrests	**Walk-In Arraignments**	**Fingerprint/DNA Testing**
January	4189	113	8	6	2	8	12
February	4362	97	8	3	5	10	13
March	4419	82	9	6	3	11	13
April	5007	76	2	1	1	15	19
May	4887	79	2	2	0	8	17
June	4515	70	4	4	0	6	9
July	5354	82	5	0	5	14	19
August	4853	81	3	3	0	24	16
September	4979	105	12	6	6	7	12
October	5544	95	7	2	5	14	10
November	3981	79	5	3	2	14	14
December	3978	80	7	4	3	21	16
Year Totals:	56068*	1039	72^	40	32	152	170

* Total persons screen this year was down significantly from 2024. Remaining totals remained nearly same as the year before with an increase in total number of walk-in arraignments.
^ Arrest numbers do not reflect the number of people taken into custody from sentencings, only those taken into custody for warrants, probation violation warrants and parole detainers.

The following are additional highlights of CSO activity for 2025:

- The courthouse continued to undergo several renovation projects that impacted security operations. Starting in the spring, all the boilers in the building were replaced in a month-long effort, requiring continuous coordination between court security and contractors. Key coordination points included managing contractor use of the prisoner elevator and addressing noise concerns with the Circuit and Family Court dockets. The projects, concluding with the installation of new generators, concluded late fall of 2025. The courthouse has returned to normal operating practices and procedures.

- Security staff responded to several alarms throughout the year. These alarms consisted of weather alerts and false alarms in offices and the Probate Courtroom
- On August 6th, the courthouse conducted a fire drill in conjunction with Fleet and Facilities and Emergency Management. Drill ran smoothly, and no issues were identified.

- Court security staff responded to multiple medical emergencies on the courthouse grounds.
    - One incident involved a defendant on trial. Defendant complained of blood sugar spiking, heart palpitations, and feeling lightheaded. Clinton EMS responded and evaluated the defendant. Defendant was cleared medically and returned to court to continue the trial.
    - One incident involved a subject who was sentenced and taken into custody in Circuit Court. She collapsed in the holding cell area and EMS was contacted. Subject was taken to the hospital for further evaluation and treatment.
    - One incident involved a juror during a jury trial in Probate Court. As the jurors were exiting the court room, the juror passed out. EMS was called to the scene. Juror was evaluated and refused further treatment.

- Court security was involved in four use of force incidents.
    - Two incidents involved in- custody prisoners not following bailiff commands to face away while riding on the elevator. Both subjects were moved to gain compliance.
    - One subject had to be forcibly removed from the Circuit Court after being sentenced to jail.
    - One subject came through screening and was non-compliant with normal screening procedures. Subject was verbally abusive, disorderly, and threatening physical assault. Subject was taken into custody after refusing to leave and was charged with trespassing and resisting and obstructing. Case was adjudicated through District Court as the result of a plea bargain.

- Court security staff was requested and attended several County Board of Commission meetings, including all Planning and Zoning meetings that were held after hours.

- Court security staff was tasked with providing extra manpower for several high-profile trials/hearings that garnered significant attention from the media and general public. The extra staffing allowed these events to occur with no significant issues.

- Court security's newfound property procedure was implemented. Numerous found items had been stored in the security office for several years. Owners of five pieces of found property were identified and contacted via mailed letters to retrieve their property within 30 days. Two of the five persons responded and retrieved their property. The remaining 38 pieces of property were disposed of in accordance with the new policy. Incident report was completed documenting the disposal. This practice will continue as needed.

- Under the Chief Judge's direction, a review of the most recent court security audit, including recommendations for actions to further progress towards compliance occurred. Below are the general considerations as provided by the Michigan Municipal Risk Management Authority.

    - Create an area inside the entrance for two screening areas, side by side, to address busy court days and designated as optimal by staff. This second area could also be used for employees.

- Garden-level windows should be hardened with security technology or protective equipment. Mindful, this may be something fire authority may weigh in on.
  - The increasing threat level for court staff, especially judges, should be considered. Modifications to the area where judges currently park should be considered.
  - There are several areas where additional security cameras should be considered.
  - One area of significant concern involves the lock-up area of the building. The design of these rooms, although quite common, are not ideal. This design creates additional need for extra staffing when in use. This is critical. Good policy and practice for moving any or all incarcerated people, to and from court, and to the lock-up should be priority. We recommend higher risk people always be belly-chained outside the lock-up or in court as ordered by the judge.
  - Ideally, a security post should always have a minimum of two staff assigned, preferably three. This is a SCAO recommendation.

- Above recommendations were discussed at the security meeting held January 6th 2026.
  - Garden windows and a security gate in the parking area for the judges are ongoing discussions still being considered.
  - In regard to the screening areas, it was decided that the screening area as used, currently is the best and only option. Recommendations to put key fob access on the Administrative and Accounting offices was suggested.
  - Lastly, all prisoners coming from and going back to the jail are all placed in belly chains unless there is some extenuating circumstance preventing it.

CRIMINAL INVESTIGATION DIVISION
YEAR END REPORT
2025

SHERIFF'S OFFICE DETECTIVE BUREAU

The Sheriff's Office Detective Bureau is comprised of (1) Detective Lieutenant, (2) Detective Sergeants, (2) certified forensic electronics Detectives, and (1) Detective assigned to the Tri-County Metro Narcotics Task Force.

In 2025, the Sheriff's Office Detective Bureau investigated 203 complaints. These included 62 allegations forwarded to the Sheriff's Office by the Michigan Department of Health and Human Services for investigation. Of these 62 complaints, 54 were forwarded by Child Protective Services involving Child Sexual Assault or Abuse and 8 were forwarded by Adult Protective Services involving allegations of physical abuse or financial exploitation against vulnerable adults. In addition to the allegations of criminal sexual conduct involving children, Detectives investigated an additional 17 complaints of sex crimes involving adults, 37 Fraud complaints, and conducted or assisted in 12 Death Investigations. Additional investigations involved Home Invasions, Breaking & Entering, Larcenies, Weapon Offenses, Forgery, Stolen Property, Bomb Threats, Parental Kidnapping, Malicious Destruction of Property, Misconduct in Office, and requests to assist other agencies in their investigations.

The Sheriff's Office is the only Law Enforcement Agency within Clinton County with Detectives certified to perform forensic examinations of electronic devices. Both Sheriff Office Detectives certified in electronic forensics are also affiliated with the Michigan State Police's ICAC Division (Internet Crimes Against Children) and assist with Cyber Crimes statewide as needed. In 2025, the Sheriff's Office Detective Bureau examined 122 devices. These devices involved cases not only being investigated by the Sheriff's Office, but in assistance of cases being investigated by Law Enforcement agencies in Dewitt Charter Township, Bath Charter Township, City of Dewitt, City of St. Johns, and City of Ovid.

The Sheriff's Office continues to support the Tri-County Metro Narcotics Task Force with (1) full-time Detective embedded with the Michigan State Police providing specialized investigation and enforcement of narcotic laws in Michigan. In 2025, TCM investigated 10 complaints in Clinton County resulting in 5 arrests involving meth, cocaine, and oxycodone. 1 search warrant was conducted, and 12 firearms were seized as part of their investigations.

CASES OF NOTE FOR 2025

In February, Sheriff's Office Detectives began investigating a 61-year-old male for several felony counts of Criminal Sexual Conduct and Child Sexually Abusive Material involving the suspect's minor grandchildren. The suspect was convicted in Clinton County and sentenced up to 25 years in prison. The suspect was also convicted of similar charges involving children in Macomb County.

In 2024 and again in 2025, the Michigan Supreme Court ruled that a sentence of life without the possibility of parole was unconstitutional for convicted offenders under 21 years of age. In November, the Clinton County Prosecutor's Office asked Sheriff's Office Detectives for assistance with follow-up interviews and fact finding related to the resentencing of two MDOC inmates convicted in 1999 for the 1st Degree Murder of 20-year-old Kassandra Sandborn in Clinton County.

MARINE PATROL

The primary goals of the Marine Program are to provide boater safety instruction for 12–16-year-olds, conduct inspections of boat liveries, provide for enforcement of the Marine Safety Laws and to address the Sheriff's responsibility for the recovery of all drowned bodies as mandated by P.A. 139, 1947.

Funding for this program is through a grant from the Michigan Department of Natural Resources. Funding provides for a 75% match for reimbursement of officer's wages, fringe benefits, equipment needs, supplies and materials. Equipment for the program consists of a 17-ft 520 Impact Brunswick Commercial boat equipped with a 95-hp Mercury outboard, trailer and associated equipment.

Program responsibilities are assigned to two part-time deputies. These Marine Patrol Specialists have completed the required Michigan Sheriff's Association State Marine Training Academy, are fully deputized officers and are certified as Boating Safety Instructors by the Michigan Department of Natural Resources. Duties for this program are conducted during the period between Memorial Day and Labor Day, with enforcement patrols concentrated on weekends and holidays.

www.mmdhd.org

Mid-Michigan District Health Department
March 2026 Newsletter

Happy March! As we head into this fake spring (I see the snow in the forecast), I am definitely feeling optimistic about the upcoming spring and summer seasons. After a fairly tough and cold winter, I am ready for some sun and of course all of the activities that come with it! (For me, playing copious amounts of golf).

For this month's newsletter, we will take a look at Severe Weather Safety, Measles Safety, and we will recognize some of our AMAZING staff! So with that, enjoy the newsletter!

-Brady Guilbault, MMDHD Public Information Officer

Severe Weather Safety

Severe Weather Awareness Week will be held March 15-21, with a **Statewide Tornado Drill being conducted on March 18 at 1 p.m**. The hope is that the tornado drill begins a broader conversation about emergency preparedness, beginning with questions like:

- **Do you have a plan?**
- **Where will you go?**
- **What will you do?**
- **Do you know the alert systems in your area?**
- **How will you communicate?**

Unfortunately, a lot of individuals do not think about these things until it is too late. Prepare your family, engage your community, and help build a prepared and resilient Michigan!

Click on the "Plan Ahead" button below. This resource section will provide you with templates on how to build an emergency preparedness kit, create a family communication plan, assemble a preparedness kit for your pet, and more!

Plan Ahead!

Spring Break Safety: Measles Prevention

Measles, one of the world's most contagious diseases known to man, was declared eliminated in the U.S. in 2000. At the time, most cases came from unvaccinated international travelers, and outbreaks stayed small because vaccination rates among U.S. citizens were high.

But over the past year, things have been changing...

Measles is now spreading between community members, with the U.S. reporting more than 2,250 cases in 2025, **the most in more than three decades**. Vaccination rates have dropped from 95% in 2019 to about 92% today, falling below the level needed to prevent outbreaks.

If the Centers for Disease Control and Prevention (CDC) determines that measles has been spreading continuously in the U.S. for a full year, it would no longer be considered eliminated, and community outbreaks could become even more common.

What does this mean for spring travel?

The risk for catching and spreading measles tends to increase during popular travel and gathering times, like spring break. To protect yourself and your loved ones:

- Make sure everyone eligible is up to date with the **MMR (measles, mumps, and rubella) vaccine**
- Check CDC **travel guidance** for tips and travel notices
- If vaccination isn't an option, avoid areas with active outbreaks

By staying up to date with the MMR vaccine and taking precautions when traveling, we can protect ourselves and our community—especially those who are at high risk for severe illness, such as babies who are too young to be vaccinated and people with weakened immune systems.

Check Your Destination for Travel Health Notices

Registered Dietitian Day

Each March, healthcare organizations across the country recognize National Nutrition Month, an initiative that encourages informed food choices, regular physical activity and the development of sustainable healthy habits. March also includes Registered Dietitian Nutritionist Day, observed this year on March 11, 2026.

Created in 2008, this day recognizes the dedication of RDNs, widely regarded as food and nutrition experts. These professionals serve in hospitals, clinics and community settings where they translate evidence-based nutrition science into practical care.

At MMDHD we are proud to recognize our RDs: Gayle, Laura, and Deidra!

International Board Certified Lactation Consultant Day

Last week, on March 4th, we celebrated IBCLC Day!

International Board Certified Lactation Consultant (IBCLC) Day recognizes and celebrates people who significantly transform world health by providing skilled lactation care to expectant parents, families, and babies.

At MMDHD, we are proud to have Bethann & Megan on staff, both of whom are IBCLCs!

What is an IBCLC? They are healthcare professionals specializing in the clinical management of breastfeeding and lactation. IBCLCs are certified by the International Board of Lactation Consultant Examiners® under the direction of the U.S. National Commission for Certifying Agencies. IBCLCs work in a variety of healthcare settings, including hospitals, pediatric offices, public health clinics, and private practice, where care is provided in your home or the consultant's office in the community.

Follow MMDHD on Social Media!

CLINTON COUNTY BOARD OF COMMISSIONERS

COURTHOUSE
100 E. STATE STREET
ST. JOHNS, MICHIGAN 48879-1571
989-224-5120

2026-

RESOLUTION AUTHORIZING ENTRY OF PARTICIPATION AGREEMENTS IN PARTIAL SETTLEMENT OF THE NATIONAL PRESCRIPTION OPIATE LITIGATION

WHEREAS, the County of Clinton filed a lawsuit to address the public nuisance that is the Opioid Epidemic; and

WHEREAS, Associated Pharmacies, Inc.; J M Smith Corporation; Louisiana Wholesale Drug Company, Inc.; Morris and Dickson Co.; North Carolina Mutual Wholesale Drug Company, Inc.; United Natural Foods, Inc.; and their subsidiaries ("Six Remnant Defendants") have negotiated a proposed settlement agreement ("Proposed Settlement") for Eligible Entities; and

WHEREAS, the Proposed Settlement contains an agreement for the Six Remnant Defendants to pay a combined $97,625,000.00 in cash to resolve pending opioid-related litigation; and

WHEREAS, the County of Clinton previously executed Participation Agreements for the Distributor and Janssen Settlements, the Teva, Allergan, CVS, Walmart, Walgreens Settlements, the Kroger Settlement, the Sandoz Settlement, and the Secondary Manufacturer and Purdue/Sackler Settlements, which have conferred and continue to confer valuable benefits;

THEREFORE BE IT RESOLVED, the Clinton County Board of Commissioners authorizes the execution of a Participation Agreement for the Remnant Defendants Settlement.

STATE OF MICHIGAN
COUNTY OF CLINTON

I, DEBRA A. SUTHERLAND, Clerk of the County of Clinton do hereby certify that the foregoing resolution was duly adopted by the Clinton County Board of Commissioners at the regular meeting held March 31, 2026 is on file in the records of this office.

____
Debra A. Sutherland, Clinton County Clerk

CLINTON COUNTY BOARD OF COMMISSIONERS

COURTHOUSE
100 E. STATE STREET
ST. JOHNS, MICHIGAN 48879-1571
989-224-5120

2026-

RESOLUTION OF APPRECIATION TO THE CLINTON COUNTY 9-1-1 CENTRAL DISPATCH TELECOMMUNICATORS DURING NATIONAL PUBLIC SAFETY TELECOMMUNICATORS WEEK (APRIL 12-18, 2026)

WHEREAS, Clinton County's Central Dispatch links the citizens of Clinton County, neighboring communities, and associated public safety agencies with efficient, reliable, responsive, and professional public safety communication services; and

WHEREAS, Clinton County 9-1-1 Telecommunicator professionals daily serve the citizens of Clinton County by answering their emergency calls for police, fire, and emergency medical services and by dispatching the appropriate assistance as quickly as possible; and

WHEREAS, Clinton County 9-1-1 Telecommunicator professionals are an integral part of the emergency response system, playing a crucial and life-saving role by answering and prioritizing calls for police, fire, and medical assistance, providing essential medical instructions to callers, and coordinating the dispatch of emergency personnel; and

WHEREAS, Clinton County 9-1-1 Telecommunicator professionals are the single vital link for our police officers, firefighters, and EMS personnel by monitoring their activities and providing them with information to ensure their safety; and

WHEREAS, Clinton County 9-1-1 Telecommunicator professionals possess strong communication skills, active listening, quick thinking and decision making, multitasking, knowledge of local resources and emergency protocols with emotional stability; and

WHEREAS, Clinton County 9-1-1 Telecommunicator professionals have contributed substantially to the apprehension of criminals, suppression of fires, and treatment of the injured; and

WHEREAS, each Telecommunicator professional has handled difficult and traumatic situations, such as death, suicide, abuse, medical emergencies, fires, and other traumatic events while maintaining accuracy and composure in these high-pressure situations during the performance of their job.

THEREFORE BE IT RESOLVED, that the Clinton County Board of Commissioners declares the week of April 12-18, 2026 to be National Public Safety Telecommunicators Week in Clinton County, in honor of the Clinton County 9-1-1 Telecommunicator professionals for their crucial role in the protection of life and property, for the Public Safety Agencies and the Citizens of Clinton County.

STATE OF MICHIGAN
COUNTY OF CLINTON

I, DEBRA A. SUTHERLAND, Clerk of the County of Clinton do hereby certify that the foregoing resolution was duly adopted by the Clinton County Board of Commissioners at the regular meeting held March 31, 2026 is on file in the records of this office.

____
Debra A. Sutherland, Clinton County Clerk