

2024

REPORT CARD FOR
WISCONSIN'S
INFRASTRUCTURE



**WISCONSIN SECTION
OF THE
AMERICAN SOCIETY
OF CIVIL ENGINEERS**





Table of Contents

- Contributor List 2
- Executive Summary..... 3
- Grading Scale 4
- 2024 Report Card for Wisconsin’s Infrastructure 5
- Recommendations to Raise the Grade..... 6

- Infrastructure categories

 - Aviation7
 - Bridges19
 - Broadband26
 - Dams34
 - Drinking Water.....43
 - Energy.....52
 - Hazardous Waste68
 - Inland Waterways.....78
 - Ports87
 - Public Parks93
 - Rail.....100
 - Roads108
 - Schools.....119
 - Solid Waste.....123
 - Stormwater.....131
 - Transit.....138
 - Wastewater.....150



We thank each infrastructure professional for contributing to **THE 2024 REPORT CARD FOR WISCONSIN'S INFRASTRUCTURE.**

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2024 Wisconsin Report Card Executive Summary

Infrastructure in Wisconsin consists of multipurpose, wide-ranging systems spanning transportation, water, energy, and broadband, among others. ASCE members in Wisconsin are proud to be the first state in the nation to deliver a grade for telecommunications service among our *Report Cards for State Infrastructure*. The 2024 Wisconsin Report Card also examines the physical infrastructure of Wisconsin's public parks and rail for the first time. After extensive research, we determined that available data are insufficient to grade school facilities, and therefore reported an "I" for incomplete. Overall, of the 17 categories, the report finds infrastructure performance in Wisconsin has improved from our prior evaluation in 2020.

Wisconsin's infrastructure is benefiting from the Infrastructure Investment and Jobs Act (IIJA), a five-year federal investment increasing funding across all infrastructure categories ASCE evaluates. As of June 2024, the IIJA and two other federal measures from 2022 focused on climate and American manufacturing have delivered \$7.1 billion of public funding to Wisconsin, which the White House estimates is being matched with \$4 billion more of private sector investments. These dollar figures include big buckets of game-changing funds like \$1 billion now harnessed by Wisconsin's Broadband Office. Other infrastructure needs are also being addressed. Milwaukee is using \$41 million to replace lead service lines from its drinking water network, and a two-lane bridge over Springbrook Creek in northeastern Wisconsin will be replaced with additional bicycle and pedestrian features thanks to a \$13.5 million federal grant.

Owning, operating, and maintaining Wisconsin's infrastructure systems is a continuous endeavor, and increased funding meets new challenges of inflation, workforce shortages, and extreme weather. Management of hazardous and solid wastes has improved, but emerging knowledge and regulations of "forever chemicals" create future needs, particularly for water systems. Parks and schools serve nearly all Wisconsin residents, but state-level restrictions on local funding methods have resulted in significant maintenance backlogs. With enhanced public information and awareness among decision-makers, the state can renew, modernize, and invest in our infrastructure to maintain its competitiveness.

About The Report Card for America's Infrastructure

Every four years, America's civil engineers provide a comprehensive assessment of the nation's 17 major infrastructure categories in ASCE's Report Card for America's Infrastructure. Using a simple A to F school report card format, the Report Card examines current infrastructure conditions and needs, assigning grades and making recommendations to raise them.

The ASCE Committee on America's Infrastructure, made up of 31 dedicated civil engineers from across the country with decades of expertise in all categories, volunteers their time to work with ASCE Infrastructure Initiatives staff to prepare the Report Card. The Committee assesses all relevant data and reports, consults with technical and industry experts, and assigns grades using the following criteria:

Methodology

CAPACITY

Does the infrastructure's capacity meet current and future demands?

CONDITION

What is the infrastructure's existing and near-future physical condition?

FUNDING

What is the current level of funding from all levels of government for the infrastructure category as compared to the estimated funding need?

FUTURE NEED

What is the cost to improve the infrastructure? Will future funding prospects address the need?

OPERATION AND MAINTENANCE

What is the owners' ability to operate and maintain the infrastructure properly? Is the infrastructure in compliance with government regulations?

PUBLIC SAFETY

To what extent is the public's safety jeopardized by the condition of the infrastructure and what could be the consequences of failure?

RESILIENCE

What is the infrastructure system's capability to prevent or protect against significant multi-hazard threats and incidents? How able is it to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security?

INNOVATION

What new and innovative techniques, materials, technologies, and delivery methods are being implemented to improve the infrastructure?

In addition to this national Report Card, ASCE's sections and branches also prepare state reports on a rolling basis. Visit InfrastructureReportCard.org to learn about your state's infrastructure.



2024 Report Card for Wisconsin's Infrastructure

 AVIATION 	 PUBLIC PARKS 
 BRIDGES 	 RAIL 
 BROADBAND 	 ROADS 
 DAMS 	 SCHOOLS 
 DRINKING WATER 	 SOLID WASTE 
 ENERGY 	 STORMWATER 
 HAZARDOUS WASTE 	 TRANSIT 
 INLAND WATERWAYS 	 WASTEWATER 
 PORTS 	



Recommendations to Raise the Grade

1) Increase overall investment across all infrastructure systems

Bolster existing funding mechanisms for fiscal sustainability and remove restrictions on reliable, innovative fee or tax structures.

2) Ensure infrastructure is safe, resilient, and reliable

Water and transportation systems across Wisconsin must deal with challenges that can be addressed through improved planning and design, as well as the use of the latest codes and standards, and asset management.

3) Monitor access and improve data collection

Wisconsin's broadband, transit, parks, and water systems — its environmental stewardship of wastes — will improve as managers increase accessibility to all residents and conduct greater, more frequent data collection.



Aviation





EXECUTIVE SUMMARY

The Wisconsin aviation network includes 97 airports, 87 of which are part of the National Plan of Integrated Airport Systems. Eight airports provide commercial airline services. In 2022, commercial airlines transported more than 4.4 million passengers, an increase of 18.9% over 2021, but still behind the 5.5 million passengers recorded in 2019. This reduction alleviated capacity challenges emerging at some airports before the COVID-19 pandemic. Lower passenger numbers will be short-lived, as these same airports have already exceeded or will exceed their pre-pandemic numbers in 2024. In general, the condition of commercial aviation airports meets or exceeds standards based on the Wisconsin State Airport System Plan 2030. At the same time, many aspects of the general aviation airports are below standard, especially in factors such as runway and taxiway lighting, visual aids and approach lighting, and terminal facilities. Airports have identified \$166 million in construction projects from 2023-2027 during the most recent five-year Airport Improvement Program, but data is only from commercial service airlines. According to the Airports Council International, Wisconsin airport infrastructure needs total \$1.4 billion from 2023 to 2027. That's compared to only \$400 to 450 million of funding available over the same period.

BACKGROUND

Aviation is an integral part of Wisconsin's transportation system, moving people and goods throughout the state, nation, and world. Wisconsin has a vibrant and diverse aviation community composed of commercial airlines, business aviation, and recreational flyers. Every Wisconsin citizen is impacted by the benefits aviation provides.

The airports that support these activities are significant assets and essential to Wisconsin's economy. The connectivity and quality airports play a notable role when people and businesses consider Wisconsin as a place to live and work. According to the 2010 Economic Significance of the Aviation Industry in Wisconsin, Wisconsin aviation facilities supporting \$6.9 billion in output (sales), nearly 91,000 jobs and provided \$3.5 billion in personal income to the state. Business growth in Wisconsin relies on a safe and efficient aviation system.

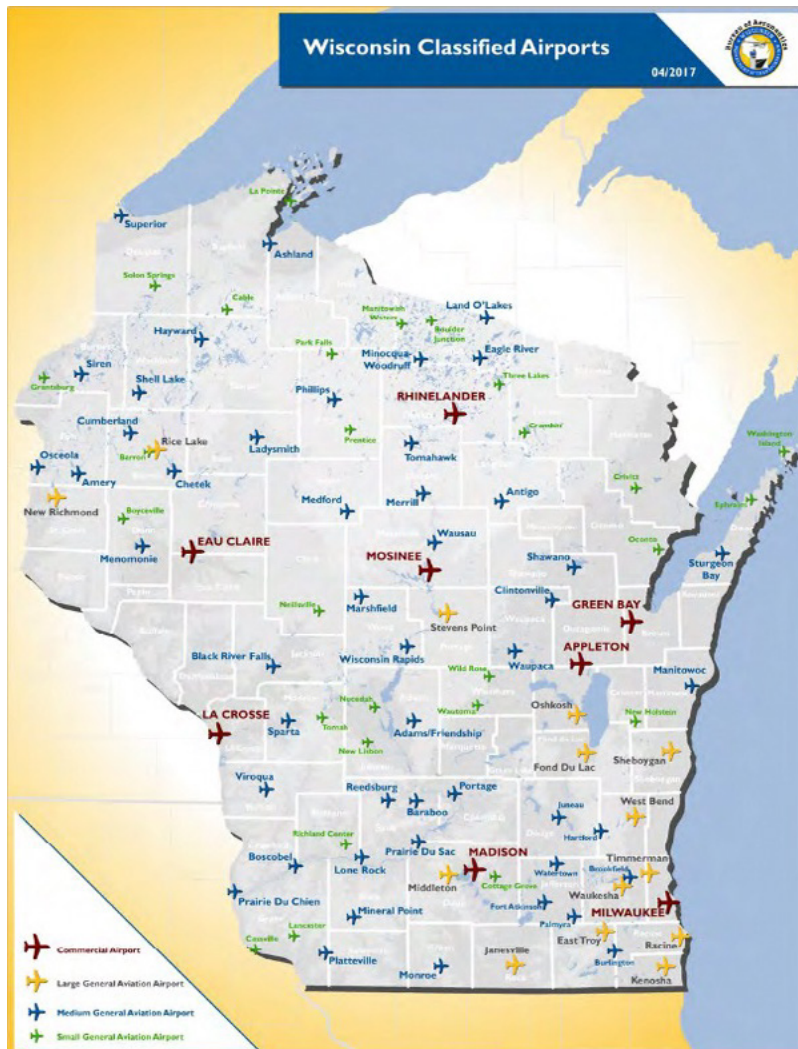
With the geographic challenges of rural Wisconsin, it is critical for business, tourism, and emergency relief to be able to access all parts of the state.

Wisconsin has 87 airports in the National Plan of Integrated Airport Systems (NPIAS) across the state, including eight commercial airports, which provide passenger air service. The eight commercial air service airports include one medium hub, Milwaukee (MKE), two small hubs, Appleton (ATW) and Madison (MSN), and five non-hubs, Eau Claire (EAU), Green Bay (GRB), La Crosse (LSE), Mosinee (CWA) and Rhinelander (RHI). These airports serve all of the major airlines, many of the budget airlines, and a few charter services. They are geographically well situated and meet Wisconsin's air service need with over 90% of Wisconsin's population is within two hours of a medium hub or 60-90 minutes of a small or non-hub.

With the investments Wisconsin airports have made, the Wisconsin airport system has been able to remain stable both in capacity and condition since the 2020 Wisconsin Infrastructure Report Card. The number of airports in the

system and services provided are relatively unchanged over the past four years. The system of airports remains a vital part of Wisconsin’s transportation link to national and global markets.

Wisconsin State Airport System Map

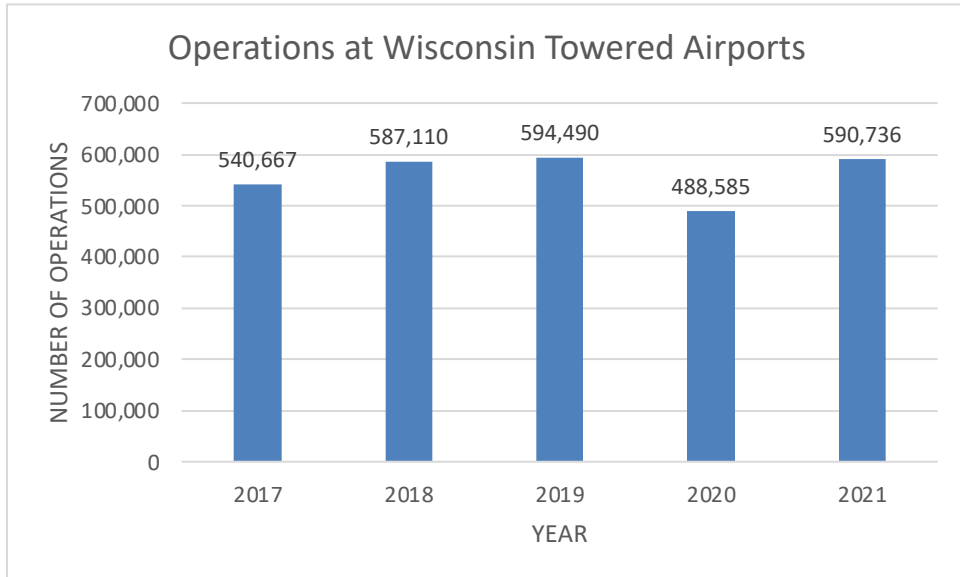


Source: 2020 Bureau of Aeronautics Annual Report

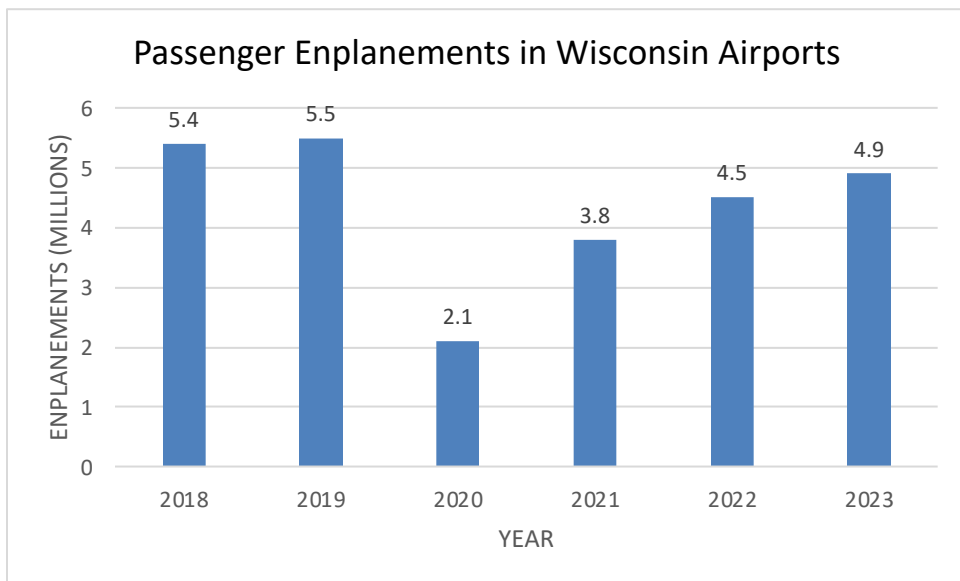
CAPACITY

In general, capacity is sufficient at the commercial airports in Wisconsin. Wisconsin data showed incremental growth year over year of overall operations (take-offs and landings) and paid passenger enplanements prior to COVID-19. Even though airports have experienced increases in 2021, 2022 and 2023, they are still lagging behind pre-pandemic levels. However, data indicates travel levels are recovering. If the number of enplanements

continues at the current rate, some of the airports could see the number of annual passengers and scheduled flights surpass the pre-COVID-19 levels as early as 2024. One such airport is the Appleton International Airport (ATW), which, as of the end of 2021, is the only airport to surpass its pre-COVID-19 overall operations. This sharp increase led to a major expansion of the concourse to address capacity needs, which is currently under construction.



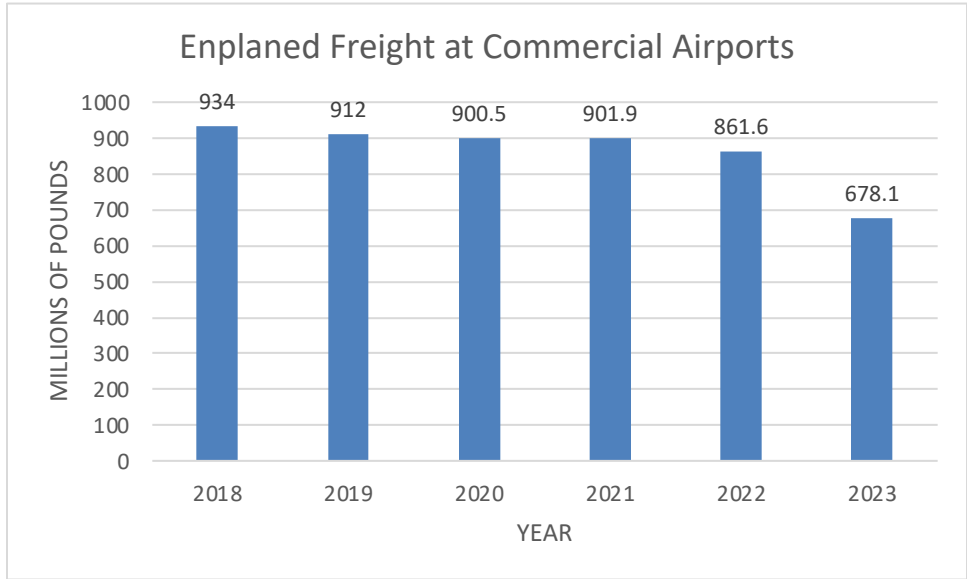
Source: Wisconsin Aviation Activity Report – Towered Airports



Source: Federal Aviation Administration Passenger Boarding & All-Cargo Data

While passenger enplanements have increased, enplaned freight levels in Wisconsin have decreased over the last five years. This decrease in enplaned freight mirrors

national trends as carriers are finding cheaper and more efficient ways to transport goods.



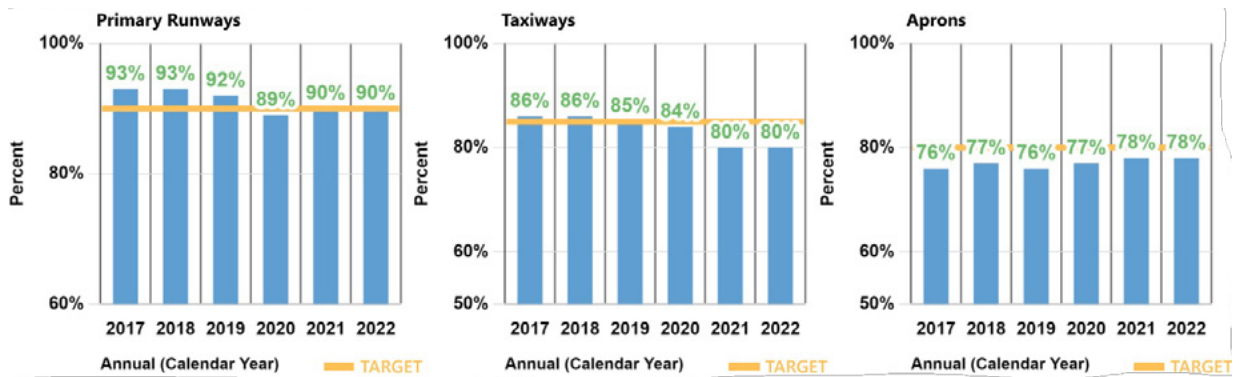
Source: Federal Aviation Administration Passenger Boarding & All-Cargo Data

CONDITION

Pavement condition ratings are a primary indicator of the long-term structural health of the state’s airport system. The Pavement Condition Index (PCI) method, developed by the U.S. Army Corps of Engineers, is used for rating pavement condition based on visual inspection. The PCI is a numerical rating that ranges from 0 to 100, with 100 denoting excellent condition. A PCI of

56 or higher is rated as “fair or above” and uses this as a performance measure goal. As of the 2023 Mobility Accountability Preservation Safety Servis (MAPSS) Performance Improvement Report the state is meeting its goal of 90% for primary runways but is falling short of its goal of 85% for taxiways and 80% for aprons.

Percent of airport rated fair or above



The Wisconsin State Airport System Plan 2030 set an objective for the pavement condition (runways, taxiways and aprons) of an area-weighted PCI rating of 75 or better for commercial service airports and an area-weighted PCI rating of 70 or better for general aviation

airports. As of 2021, the commercial service airports and general aviation airports had average PCI ratings of 74.7 and 68.6, respectively.

Table: Pavement Condition Index (PCI) of Commercial Airports in Wisconsin

Airport Name	FAA Designator	Inspection Year	Pavement Area, square feet	Area-Weighted PCI
Milwaukee Mitchell International Airport	MKE	2020	17,039,827	63
Dane County Regional Airport-Truax Field	MSN	2021	10,141,927	73
Green Bay - Austin Straubel International Airport	GRB	2021	7,473,245	70
Appleton International Airport	ATW	2021	7,398,929	70
La Crosse Regional Airport	LSE	2021	6,442,593	76
Central Wisconsin Airport	CWA	2021	4,249,855	93
Chippewa Valley Regional Airport	EAU	2021	3,952,493	82
Rhineland-Oneida County Airport	RHI	2020	3,112,239	73

Wisconsin has prioritized the importance of the pavement condition requiring long-term infrastructure health and pavement needs be included in airports six-year plans. In 2020 alone of the \$73 million spent on airport improvement projects, \$43 million was spent on reconditioning or rehabilitating pavement.

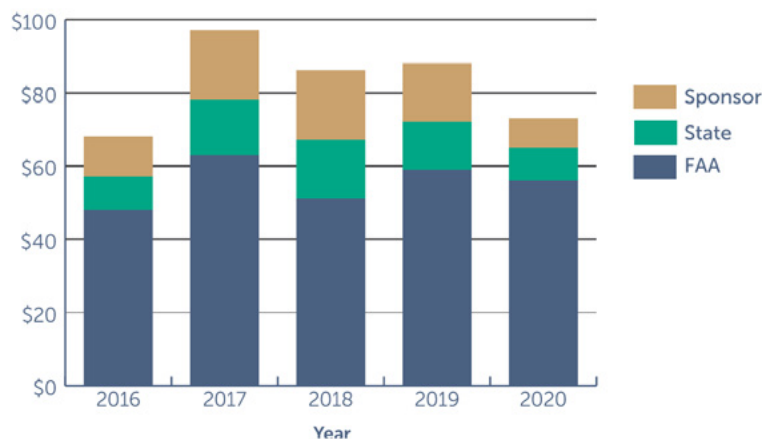
Although the condition of most attributes at commercial service airports are close to meeting goals set by in the WSASP, according to the WSASP many aspects of general aviation airports are in poor condition. These aspects include runway and taxiway lighting, visual aids and approach lighting, terminal facilities, stormwater management planning, and land use zoning ordinances.

FUNDING

In 2020, more than \$73 million in federal, state, and local funds supported 94 Airport Improvement Program (AIP) projects. The Wisconsin Bureau of Aeronautics' five-year program, which encompasses 2020 to 2025,

estimates a total budget need of \$1.07 billion in airport infrastructure projects to meet current and projected aviation demand in support of Wisconsin's economy and the quality of communities.

Funding History for Airport Improvement Projects (millions)



Passenger facility charges (PFC) are capped at \$4.50 per enplaned passenger per flight segment, up to a maximum of four segments for a round trip (or \$18). PFC collections provide a valuable funding source for Wisconsin airports to fulfill the sponsor portion of federal grants, or for standalone projects. The PFC funds must be used at the specific airports from which they are collected and provide enhanced safety, security or capacity; reduce noise; or increase air carrier competition. Over half of the commercial airports in Wisconsin have maxed out their PFC funds for years to come by allocating them to pay for previous projects, hamstringing them as they attempt to keep pace with the passenger and cargo volume. Additional revenue is provided from parking fees, on-site concessions, fuel

sales, hangar rentals and land leases, but this revenue is typically utilized for operations and maintenance of those same facilities.

Under the Infrastructure Investment and Jobs Act Wisconsin airports have received additional grants of about \$39 million annually from 2022-2024. This influx of funds has helped to bridge the gap between available funds and airport infrastructure needs, but if current funding levels remain the same, there will still be approximately \$600 million in deferred projects. With such a large deficit, airport managers will be required to make tough decisions on whether to use funds to focus on capacity to meet demand or maintenance to address the aging infrastructure.

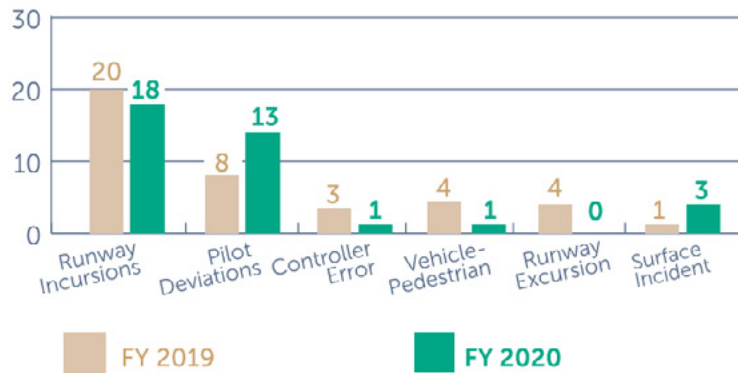


PUBLIC SAFETY AND RESILIENCE

Wisconsin airports are responsible for providing the traveling public a safe environment in accordance with Federal Aviation Administration (FAA) regulations. This safe environment includes safety areas, object free areas,

critical areas, runway protection zones, approach and departure surface protections, perimeter fences, wildlife hazard mitigation, and increased levels of navigational aids at larger airports.

Runway Incidents at Towered Airports



Source: FAA

Upon identifying that runway incursions were consistently being the largest safety issue in 2019 and 2020, the Bureau of Aeronautics partnered with the FAA’s Runway Safety Action Team to increase outreach and participation from all major airport interests. Meetings were held throughout the state and focused on educating the participants on 10 ways to help prevent runway incursions.

Commercial service airports have Transportation Security Administration (TSA) check points for passengers and their baggage. Aircraft Rescue and Fire Fighting (ARFF) facilities are located at commercial service airports and many of the larger general aviation airports. Commercial service and larger general aviation airports have public safety and airport operations personnel on staff for airside and/or landside activities at the airport. Law enforcement is also present at these airports. These airports often have a security badging process and airfield drivers’ training to protect employees and airport users.

Commercial service airports that have TSA and general aviation airports are fenced to keep pedestrians out and for wildlife control. Smaller general aviation airports may have a full or partial perimeter fence. In these cases, the fence may be used to deter pedestrians from entering and for wildlife control if there is a closed perimeter fence.

Wisconsin has several military airports that are included in the statewide emergency action plan and would be involved in search and rescue activities. Condition of military airports are not included in this chapter.

10 Ways to Help Prevent Runway Incursions

- 1 See the “Big Picture”**
Monitor both ground and tower communications when possible.
- 2 Transmit Clearly**
Make your instructions and read backs complete and easy to understand.
- 3 Listen Carefully**
Listen to your clearance. Listen to what you read back. Do not let communications become automatic.
- 4 Copy Clearances**
Clearances can change. Keep a note pad and copy your clearance. If needed refer to your notes.
- 5 Situational Awareness**
Know your location. If unfamiliar with an airport keep a current airport diagram available for easy reference.
- 6 Admit When Lost**
If you get lost on an airport ask ATC for help. Better to damage your pride than your airplane.
- 7 Sterile Cockpit**
Maintain a sterile cockpit until reaching cruising altitude. Explain to your passengers that talking should be kept to a minimum.
- 8 Understand Signs, Lights and Markings**
Keep current with airport signs, lights and markings. Know what they mean and what action to take.
- 9 Never Assume**
Do not take clearances for granted. Look both ways before entering or crossing taxiways and runways.
- 10 Follow Procedures**
Establish safe procedures for airport operations. Then follow them.

Many airports throughout Wisconsin have a role to play in ensuring the resilience of the state, as they would be involved in the response to a disaster by helping with the transportation of critical supplies, equipment, and emergency personnel.

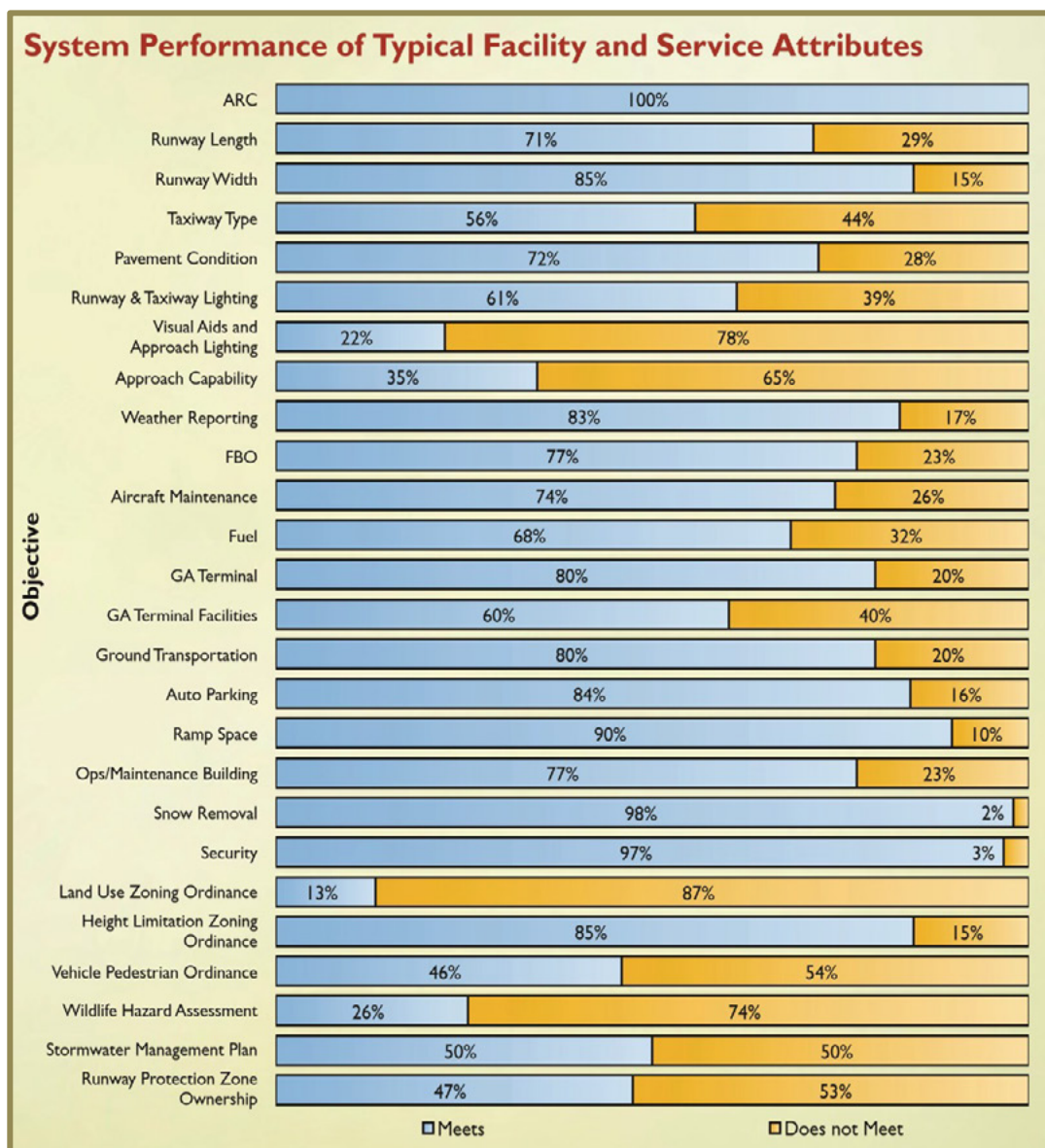
Wisconsin airports need to remain open as much as

possible during inclement weather, which includes harsh winter conditions. These conditions require de-icing of aircraft. Anti-icing and de-icing agents are used at air carrier airports and some larger general aviation airports. Most are biodegradable and either collected or treated on-site in accordance with permit requirements.

FUTURE NEED

Through the WSASP 2030, the state utilized typical facility and service attributes (FSAs) to evaluate and document each airport's performance in a report card. Below is a table from the executive summary depicting

the state's performance when evaluated for various typical FSAs. The table shows a comparison against the state's goals in 2010.



Using these reports, the 2030 WSASP recommended approximately \$700 million over the next 20 years in construction funding to bring the airports up to typical facility and service expectations. A more current and all-encompassing number comes from ACI's state infrastructure need in which they summarized airport needs that also include the maintenance of the airport, the airport's environment, and the needs of the community. In the most recent five-year report covering 2023-2027, Wisconsin airports have a need of \$1.4 billion in construction projects. Wisconsin has done

well in the past securing federal funds (entitlement and discretionary) for projects, but with the state having to secure over 38% of project funding from discretionary funds, there are concerns since the discretionary funding is never guaranteed and fluctuates from year to year. To be able to continue to construct projects identified in the AICP, there will need to be a committed policy to federally fund airport projects as well as owners who are able to cover their sponsor match by either finance or find new revenue options.

Many airports have begun to implement established sustainability technologies, such as geothermal to reduce heating and cooling costs and solar panels to provide power, and, in some cases, generate revenue by selling excess power back to the grid.

INNOVATION

Wisconsin airports have followed the FAA's plan to transition from ground-based equipment to Next Generation Air Transportation System (NextGen) space-based navigation. They have continued to make the investments into new GPS/Area Navigation (RNAV) approaches, by identifying and clearing obstructed runway approaches. The eventual transition over to NextGen will be up to FAA funding, but Wisconsin is making progress to be ready when implemented.

Many airports have begun to implement established sustainability technologies, such as geothermal to reduce heating and cooling costs and solar panels to

provide power, and, in some cases, generate revenue by selling excess power back to the grid. The state needs to continue to explore and implement non-aeronautical economic generators so that Wisconsin airports can maintain and improve without any additional tax burden to the state and its users.

Unmanned Aircraft Systems (UAS) are rapidly becoming major users of national airspace. The state has a website for users to become educated about their responsibilities and the regulations pertaining to the operation of UAS.



Aviation



RECOMMENDATIONS TO RAISE THE GRADE

To bring the grade up, Wisconsin should consider:

- Increasing federal and state funding so that new pavement and maintenance projects can be reliably scheduled. Delayed maintenance will cost taxpayers more money to conduct major rehabilitation or even reconstruction.
- Evaluating cost share requirements of grants to non-commercial airports. Many general aviation airports do not have the funding or funding sources available to participate in project cost shares, thus resulting in delayed maintenance and updates.
- Investigating the resilience of the Wisconsin aviation system in the wake of more frequent and severe weather events, such as flooding and snowstorms.
- Increasing the frequency of the release of the Wisconsin State Airport System Plan to ensure that the state/airports stay on top of any necessary changes.
- Preparing updates to Economic Significance of the Aviation Industry in Wisconsin every 3-4 years so the general public and politicians are aware of the impact that aviation has in Wisconsin in a dynamic economy.

ACRONYMS AND ABBREVIATIONS

AARF	Aircraft Rescue and Fire Fighting	GPS	Global Positioning System
ACIP	Airport Capital Improvement Plan	MKE	Milwaukee Mitchell International Airport
AIP	Airport Improvement Projects	MSN	Dane County Regional Airport - Madison
ARC	Airport Reference Code	NPIAS	National Plan of Integrated Airport Systems
BOA	Bureau of Aeronautics	PCI	Pavement Condition Index
FAA	Federal Aviation Administration	RNAV	Area Navigation
FBO	Fixed Based Operator	SASP	State Airport System Plan
FSA	Facility and Service Objective/Attributes	TSA	Transportation Security Administration
FY	Fiscal Year	UAS	Unmanned Aircraft Systems
GA	General Aviation	WSASP	Wisconsin State Airport System Plan
		YTD	Year-to-Date



Aviation



SOURCES

Wisconsin State Airport System Plan 2030 Executive Summary

<https://wisconsin.gov/Documents/projects/multimodal/air/sasp1-execs.pdf>

Wisconsin State Airport System Plan 2030 Appendix E: Acronyms

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2020 Wisconsin Department of Transportation Bureau of Aeronautics Annual Report

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Wisconsin 5-Year Airport Improvement Program

<https://wisconsin.gov/Documents/doing-bus/local-gov/astnce-pgms/aid/airport/air-5yr-plan.pdf>

Airports Council International – Growing needs of Wisconsin Airports

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2010 Economic Significance of the Aviation Industry in Wisconsin

<https://wisconsin.gov/Documents/doing-bus/aeronautics/resources/aero-econsig.pdf>

2023 Wisconsin Department of Transportation MAPSS Performance Scorecard

<https://wisconsin.gov/Documents/about-wisdot/performance/mapss/scorecard.pdf>

Wisconsin Airport pavement condition

<https://idea.appliedpavement.com/hosting/wisconsin/airport-details/airport-details.html>

<https://www.faa.gov/bil/airport-infrastructure>



Bridges



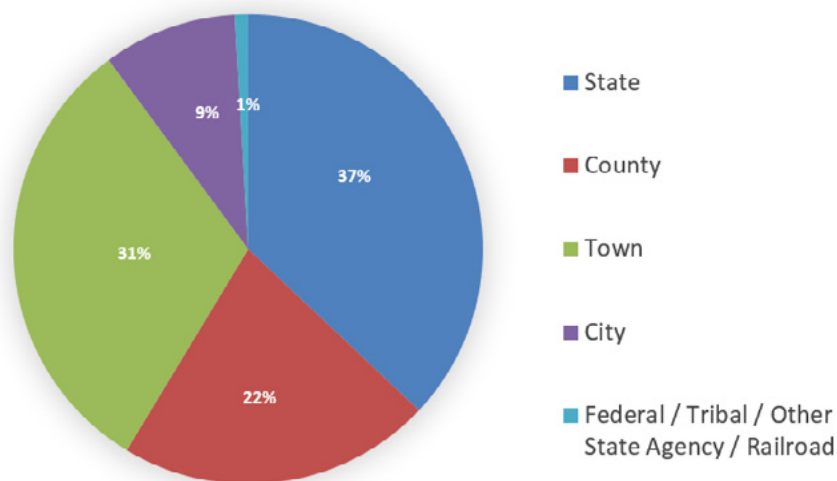


EXECUTIVE SUMMARY

Wisconsin's 14,412 bridges provide critical connections to schools, hospitals, offices, and more. Bridge owners in Wisconsin have long prioritized investment in bridges, but the rate of improvement has stalled. In 2023, 6.5% of bridges in Wisconsin were rated with at least one major structural component in poor condition, per the National Bridge Inventory rating system. This percentage was slightly lower than the national average but relatively unchanged from the previous decade. Poor bridges are not unsafe, but they do require significant maintenance, rehabilitation, or replacement. The Wisconsin Department of Transportation tracks and manages bridge assets and plans future maintenance and replacement needs. However, local and federal legislatures must agree on how to fund these needs. Both a state fuel tax increase and establishing mileage-based user fees are initiatives that could be explored to close the funding gap and improve the condition of Wisconsin's bridges.

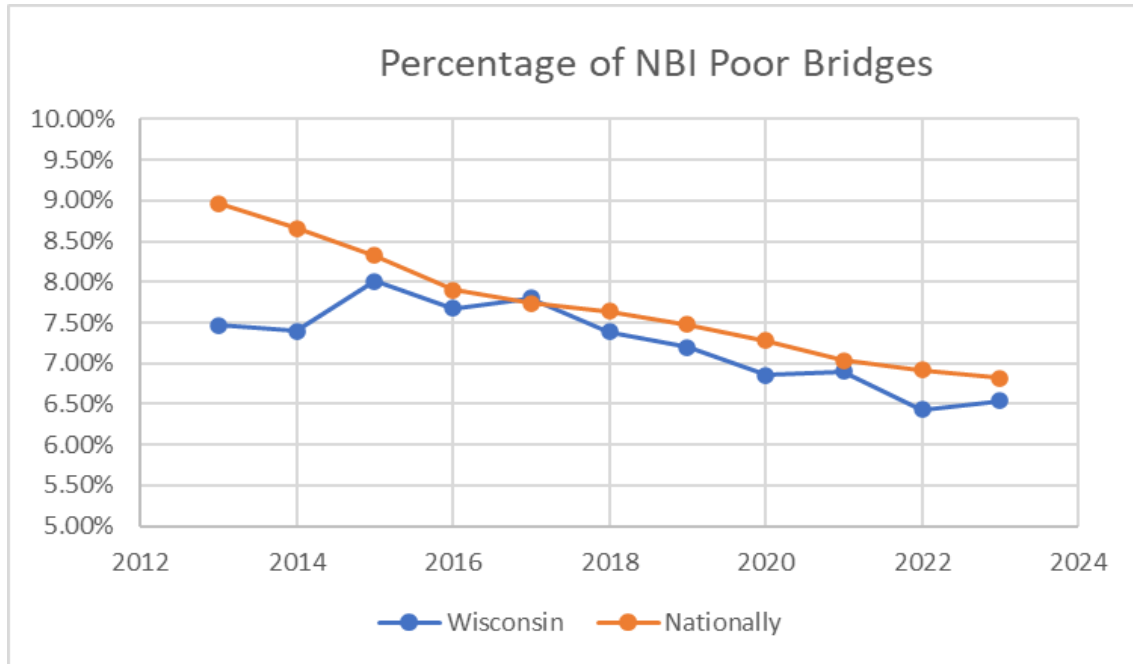
CONDITION & CAPACITY

Wisconsin Bridge Owners



Whether they offer reliable access to work, home, medical facilities, schools, or enable businesses to efficiently transport goods to different markets; safe, well-maintained bridges play a critical role to residents of Wisconsin. There

has been a substantial increase in the public's awareness of the significance of bridges to our nation's economy and the safety of the traveling public.

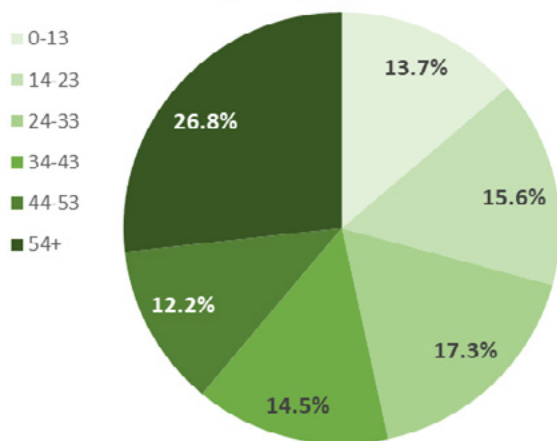


As of 2023, 6.5% of the 14,412 bridges in Wisconsin have at least one major structural component deemed in poor condition. NBI defines poor condition with the following guidance: advanced corrosion, deterioration, cracking, chipping, or significant erosion of concrete bridge piers. Wisconsin’s 6.5% is slightly below the national ratio (6.8%). However, as the national ratio has steadily decreased over the past decade, the Wisconsin ratio has remained relatively constant with a slight decrease in the second half of the last decade.

Another useful indicator is the percentage of deck area that is rated as poor per NBI ratings. Some 4.3% of the total bridge area in Wisconsin was rated as poor in 2023. For comparison, the national average is 4.9% of the total bridge deck area.

As of the end of 2023, the average age of a bridge in Wisconsin was approximately 40 years old, which is slightly lower than the national average (just over 46 years). Most of these bridges are designed for a lifespan of 50 years. Nearly 39% of bridges in Wisconsin are 45 years or older. This is an increase from the 2020 Wisconsin Infrastructure Report Card which reflected 31%. Therefore, a significant number of bridges are aging still require major rehabilitation or replacement.

Wisconsin's Bridges by Age



Some bridges are posted with load restrictions, meaning they can only carry traffic up to a certain weight. In 2023, about 1 in 26 (3.6%) bridges in Wisconsin required such restrictions. While this rate is significantly lower than reported in the 2020 Wisconsin Report Card of 1 in 19 (5.3%) and lower than the current national average of 1 in 8 (11.3%), it is important to keep in mind posted bridges can dramatically increase driving time for larger and heavier vehicles serving as emergency responders, public transit providers, and freight haulers. Regardless, the reduction in posted bridges in Wisconsin over the past four years is a positive trend.

FUNDING & FUTURE NEED

Wisconsin's bridge funding comes from three principal funding sources: the state transportation fund, bond proceeds, and federal funds. In addition, general purpose revenue from the state's general fund has been used to support transportation programs in recent biennia. Federal dollars make up 26% of Wisconsin's total transportation revenue according to WisDOT's 2021-2023 Biennial Budget. Some 65% of the transportation revenue comes from state sources, which largely consists of motor fuel taxes, vehicle registration/title fees, and driver license fees. Approximately 3% of the total transportation revenue comes from the general fund, while the remainder comes from bonding and local funding.

Comparing this current breakdown to the breakdown provided in the 2020 Wisconsin Infrastructure Report Card, the use of bonding has been decreased while state funding has been significantly increased. Although this is a positive trend, more is needed to address the long-term funding crisis.

The federal fuel tax on gasoline is 18.4 cents per gallon. It was last raised in 1993 and is not indexed for inflation. In practical terms, the lack of a federal gas tax increase means the Federal Highway Administration (FHWA) is allotting funding for 2024 projects using 1993 funding levels. This greatly impacts the amount of total work that can be done using these dollars. Meanwhile, Wisconsin's gas tax is 30.9 cents per gallon. This amount was formerly indexed, adjusted annually based on inflation and fuel consumption. In 2005, the State Legislature eliminated the annual indexing adjustment, so today the tax amount remains constant.

Revenue from the motor fuel tax, a critical source of transportation funding, is likely to erode because of vehicles' increasing fuel efficiency and the more prevalent use of electric vehicles. The average fuel efficiency of U.S. passenger vehicles increased from 20 miles per gallon in 2010 to 24.5 miles per gallon in 2020. Average fuel efficiency is expected to increase another 31% by 2030, to 32 miles per gallon, and increase 51% by 2040, to 37



miles per gallon.

The Infrastructure Investment and Jobs Act (IIJA) of 2021, also called the Bipartisan Infrastructure Law, provided a significant investment in Wisconsin's transportation system, starting in 2022. The IIJA includes the single largest dedicated bridge investment since the construction of the Interstate Highway System. Based on formula funding alone, Wisconsin is expected to receive approximately \$5.4 billion over five years in federal funding for highways and bridges. As of November 2022, \$2.2 billion has been announced in Wisconsin for roads, bridges, roadway safety, and major projects. This includes \$90 million in formula funding for bridges in 2022 and 2023.

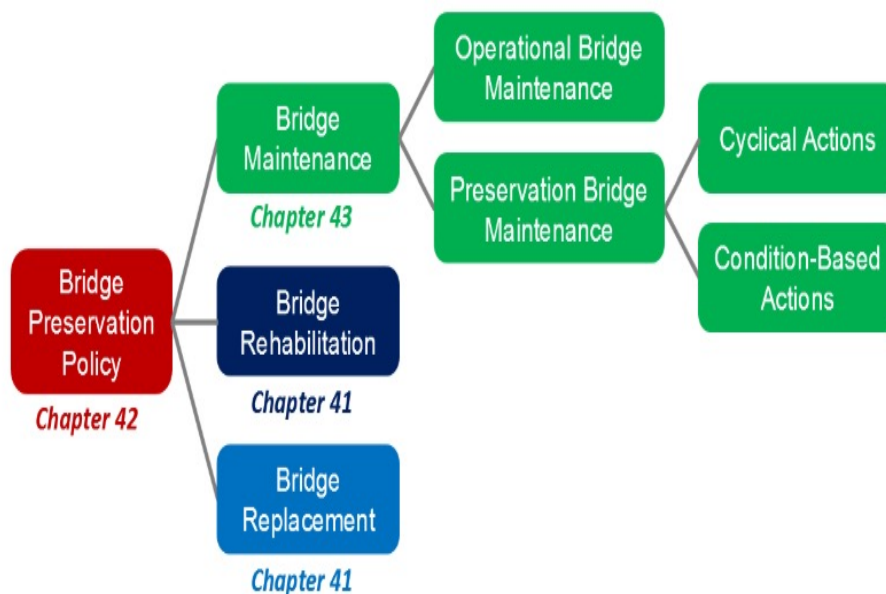
While there has been increased investment at the local, state, and federal levels in recent years, additional, sustained transportation funding is needed to maintain and improve the state's transportation network and make sure it is fit for the future. Inflation in the cost of providing highway and bridge repairs is hindering the ability of increased funds to address the state's transportation needs. The FHWA's national highway construction cost index, which measures labor and materials cost, increased by 27% in 2022.

See the Roads chapter for more information on public spending on highways, including bridges.

OPERATIONS & MAINTENANCE

As discussed in the 2020 Wisconsin Report Card, the WisDOT Bureau of Structures (BOS) has developed an in-house software tool called the Wisconsin Structures Asset Management Systems (WiSAMS). WiSAMS is a

planning tool that analyzes current structure condition based on information collected from routine biennial bridge inspections, projects future bridge deterioration, and recommends structure work at the appropriate time.



Since the 2020 Wisconsin Report Card, BOS has continued to work on developing this tool and building a more robust bridge preservation and asset management program. In Chapters 41 through 43 of the WisDOT Bridge Manual, BOS outlines program-level goals, objectives, measures, strategies, policy, procedure, and workflow for bridge preservation and maintenance actions often performed through the annual WisDOT Highway Maintenance Work Plan.

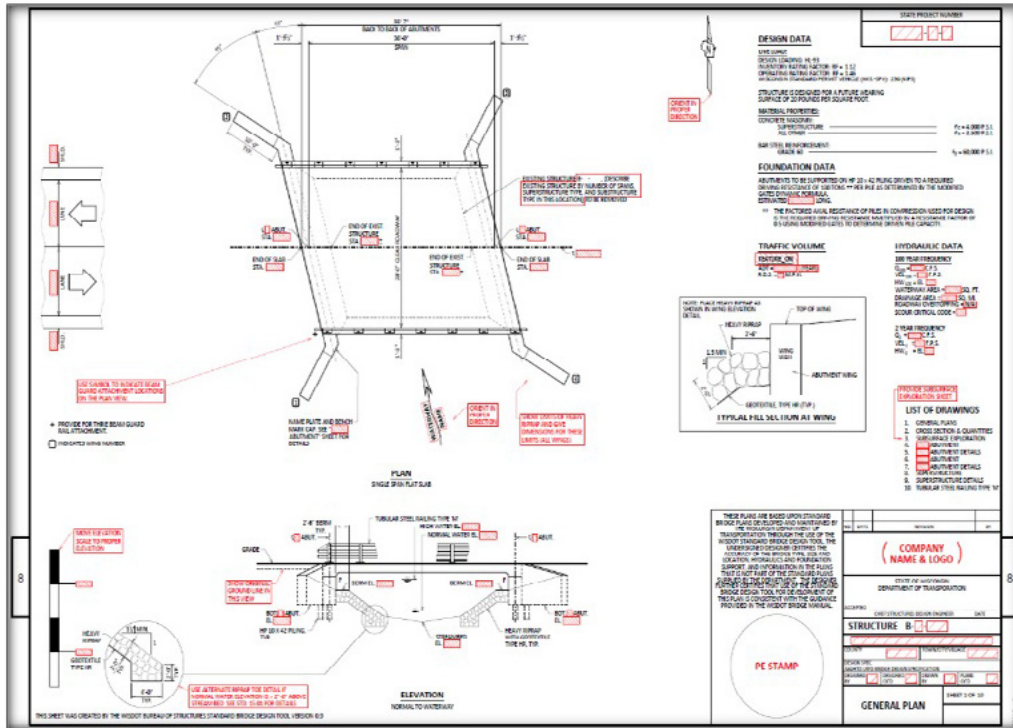
With recent funding allocations, BOS is starting an effort

to inventory and inspect all structures in the state with span lengths from 6 feet to 20 feet. An example of this type of structure is a concrete box culvert with a distance between the inside faces of the vertical walls less than 20 feet wide. BOS anticipates there are approximately 25,000 bridge-like structures in the state, and this is the first step in creating rehabilitation and replacement policies for these bridge-like structures. These 25,000 bridge-like structures are in addition to the 14,412 bridges currently inventoried.

INNOVATION & RESILIENCE

Per Wisconsin legislation, the Design-Bid-Build (DBB) project delivery method is the only method allowed for state-funded transportation projects. However, recent legislation allowed pilot programs to utilize the Design-Build (DB) method. Unlike the DBB process, the DB process allows for the design and construction phases to overlap, reducing project delivery time. The DB method generally increases the design-builder's risk and reduces the owner's risk. Over the past three years Wisconsin

has completed three DB pilot projects, and WisDOT has identified three more potential Design-Build projects as well as the replacement of the John A. Blatnik Bridge between Superior, Wisconsin and Duluth, Minnesota, which is a joint effort between the transportation departments of Wisconsin and Minnesota. WisDOT is still within its pilot programs for DB efforts and will continue to identify potential DB projects and refine this project delivery method.



The Wisconsin DOT in 2019 applied for and received a grant through FHWA's State Transportation Innovation Council (STIC) Incentive program and developed the Standard Bridge Design Tool. This pilot program has been through two phases and is now available for the intended

replacement of small local bridges. The Standard Bridge Design Tool reduces the cost of design and construction of local bridges by delivering standardized plans for bridges that meet the criteria for the tool. With the tool, design timelines can be reduced to as little as ten months.





Bridges



RECOMMENDATIONS TO RAISE THE GRADE

On average, the typical bridge in Wisconsin is at or near the end of its design life. Despite the recent historic federal and state funding efforts, there are still no long-term solutions to address the transportation funding needed to make substantial impacts to the aging bridges of Wisconsin. If the state and federal government continue to delay funding decisions, conditions will only worsen. Therefore, we recommend the following to raise the bridge grade:

- Address short-term transportation funding needs by raising the state motor fuel tax and reinstating indexing to keep pace with inflation.
- For long-term funding, continue to study and pilot mileage-based user fees.
- Continue to develop and utilize alternative project delivery methods to achieve cost savings and quicker repairs or replacements of bridges.
- Continue to utilize and improve the state's asset management system to increase bridge preservation efforts.

SOURCES

Wisconsin Department of Transportation Wisconsin Bridge Manual, Chapters 41, 42, & 43
U.S. Department of Transportation, Federal Highway Administration, National Bridge Inventory <https://www.fhwa.dot.gov/bridge/britab.cfm>

Wisconsin Department of Transportation Bureau of Structures - Bridge Inventory Data

<https://www.whitehouse.gov/wp-content/uploads/2023/06/Wisconsin-Fact-Sheet-June.pdf>

<https://www.whitehouse.gov/wp-content/uploads/2023/02/Wisconsin-Fact-Sheet-E3.pdf>

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https://docs.legis.wisconsin.gov/misc/lfb/informational_papers/january_2023/0039_transportation_finance_informational_paper_39.pdf

<https://wisconsin.gov/Documents/about-wisdot/performance/budget/2021-23BiennialBudgetHighlights.pdf>

https://tripnet.org/wp-content/uploads/2023/10/TRIP_Keeping_Wisconsin_Mobile_Report_October_2023.pdf



Broadband





EXECUTIVE SUMMARY

Broadband infrastructure delivers connectivity across wireline and wireless modalities for Wisconsin residents and businesses to access information, interconnection, and commerce. Civil engineers play an increasingly important role in installation and operation as broadband networks grow and iterate for greater performance and resilience. Wisconsin's Broadband Office has increased its programming and technical capacity to deploy at least \$1 billion in new federal investments from the 2021 Infrastructure Investment and Jobs Act (IIJA). The Office leverages those resources to reduce the 5.4% of all locations in Wisconsin unserved by broadband and 7.4% with below-standard connectivity speeds. Infrastructure deployment and upkeep challenges vary by geography. Wisconsin's rural areas require more government incentives and facilitation for the investments of internet service providers. Households of school children are another challenge as one-third of state school districts report that at least a quarter of their students lack home internet access necessary to complete homework. While Wisconsin implements IIJA funding, decision-making on broadband would improve with more robust and independently-verified information on network performance and follow-up analysis of planning recently completed for federal compliance.

BACKGROUND

The Federal Communications Commission (FCC) defines broadband capability as a download speed of 100 megabits (MGB) per second or higher, and upload speeds of 20 MGB or higher (100/20). Internet access can be provided by satellite, digital subscriber line (DSL), coaxial cable, microwave, or fiber. Presently, the FCC does not consider wireless connections, such as cell phones, in its assessment of broadband access. Infrastructure includes tower-supported antennae/repeaters (wireless), and fiber optic or copper wire

(wired). Wired communications also involve a significant amount of underground duct-installed circuiting.

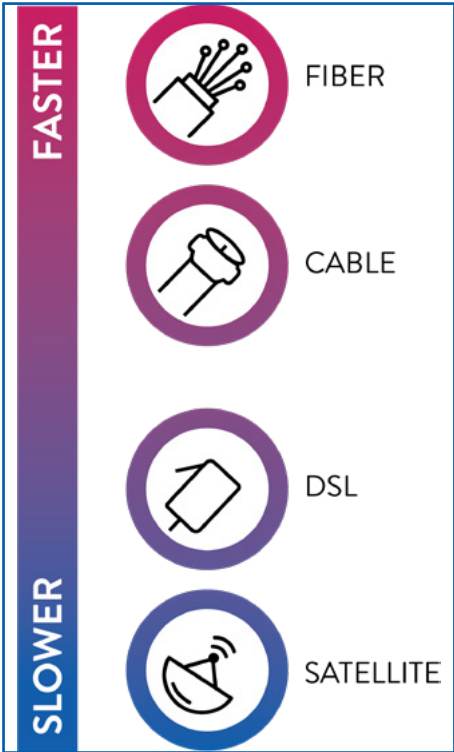
As broadband continues to grow and evolve, a key priority is achieving faster speeds that allow for greater productivity. As shown in Figure 1, fiber connections provide the fastest speeds. With this in mind, fiber and cable installations are a priority for broadband development.

CAPACITY: The Current State of Broadband in Wisconsin

Per the National Broadband Map developed by the Federal Communications Commission and released in December 2023, there are 2,700,000 broadband serviceable locations in the state of Wisconsin. There are also 75,533 locations with no service at all, which means that 97% of all locations in the state have some form of broadband service. The map also indicates that there are 146,114 unserved broadband serviceable locations. An unserved broadband serviceable location is defined as a location that does not meet minimum 25/3 broadband speeds. In addition, there are 200,064 underserved broadband serviceable locations in Wisconsin. An underserved broadband serviceable location is defined as a location that does not meet minimum 100/20 broadband speeds. As a result, 5.4% of all locations in Wisconsin are unserved, and 7.4% of all locations are underserved.



Figure 1. Broadband Speed



A further breakdown of serviceable locations can be evaluated by the type of broadband service. These types are defined below:

1. Fiber
2. Fixed Wireless
3. Cable
4. Copper
5. Satellite

Table 1 provides a breakdown of served, underserved, and unserved locations. For this table, served locations are defined as 100/20 or faster, underserved locations are defined as between 25/3 and 100/20, and unserved locations are defined as slower than 25/3.

Table 1. Percent of all Broadband Service Locations in Wisconsin by Technology and Service Status

Type of Location	Speed	Technology					Total
		Fiber	Fixed	Cable	Copper	Wireless	
Served Locations	≥ 100/20	32%	14%	69%	5%	2%	80%
Underserved Locations	≥ 25/3 and < 100/20		44%	1%	27%	98%	9%
Unserved Locations	< 25/3		34%	30%	30%		10%
No Service		68%	8%		39%		1%

(Source: Wisconsin Broadband Office)

Table 2 provides a breakdown of how broadband locations are served in actual practice. With respect to served locations, fiber and cable represent 98.4% of these locations. In underserved locations, copper and fixed

wireless represent 96.4% of these locations. Finally, with respect to unserved locations, copper and fixed wireless represent 100% of these locations.

Table 2. Broadband Service Availability in Wisconsin

Type of Location	Technology						Total
	Fiber	Cable	Fiber & Cable	Fixed Wireless	Copper	Copper & Fixed Wireless	
Served Locations	215,471	1,082,743	512,047			30,015	1,840,276
Underserved Locations			7,313	141,543	41,593	27,323	217,772
Unserved Locations				96,341	40,140	84,443	221,075
No Service							25,038
Total	215,471	1,082,743	519,360	237,884	81,733	141,781	2,304,161

(Source: Wisconsin Broadband Office)

CONDITION: Availability, Speed, and Reliability

As noted in the previous section, a significant number of locations in Wisconsin are unserved or underserved. This means that there are limitations to broadband access and high speeds for many Wisconsinites. Lower speeds, in turn, lead to reduced reliability with respect to broadband access. With lower speeds, users may not be able to perform the online tasks that need to be accomplished. In addition, video functions that are often critical to operating in the online world may be hampered or even nonexistent. A prime example of the negative effects of poor broadband access involves the resulting limitations of telehealth in rural areas. In-person medical facilities are often rare in rural areas of Wisconsin. As a result, patients would be required to

drive long distances just to visit a doctor. The use of telehealth can reduce the need for these in-person visits. However, reliable broadband access is required to access telehealth services. Northern Wisconsin is an area where telehealth services are critical but broadband access is often limited.

The COVID-19 crisis threatens to exacerbate the “digital divide” between students who have fast, reliable at-home internet access and those who do not. This divide has long been significant, but recent events underscore its importance – it now can determine which students have a seat in their new virtual classroom and which are left to fend for themselves.

According to 2018 data from the U.S. Census Bureau, nearly 370,000 Wisconsinites – 6.6% of the state population – did not have an internet subscription in their homes. This included more than 82,000 Wisconsinites under the age of 18. These students without reliable internet access risk falling behind in classes that have moved online, potentially widening existing racial and socioeconomic achievement gaps.

FUNDING: Current and Recent Broadband Investments in Wisconsin

Since 2014, the Wisconsin Broadband Office has distributed \$319 million in grants for the deployment of broadband infrastructure. These funds have covered 458 projects and have supported new and/or enhanced services to approximately 450,000 homes in the state.

The applicable funding statutes and sources of funding are as follows:

1. State Broadband Expansion Grant Program
2. ARPA Broadband Grant Access Program
3. Cares Broadband Access Grant Program
4. Capital Projects Fund Broadband Infrastructure Program
5. Other Federal Broadband Investments in Wisconsin
6. Bipartisan Infrastructure Law (especially BEAD program)

State Broadband Expansion Grant Program

- \$214 million in grants have been awarded since 2014.
- 363 grants have been awarded since 2014.

The State Broadband Expansion Grant Program is authorized under Wisconsin Statute 196.504. These grants are used to support the construction of broadband infrastructure in areas where broadband service is underserved or unserved.

ARPA Broadband Access Grant Program

- \$100 million in grants were awarded in 2021.
- 83 grants were awarded in 2021.

Additional funding was allocated to the state of Wisconsin as part of the American Rescue Plan Act (ARPA). This

While most Wisconsin households have reliable access, home access for all students is far from assured. About one-third of all school districts report that at least a quarter of their students do not “have enough internet access at home to complete homework assignments and other school related activities,” according to survey data from the Wisconsin Department of Public Instruction (DPI).

funding was placed into the ARPA Broadband Access Grant Program. Grants were awarded to build fiber capacity in underserved areas of the state.

CARES Broadband Access Grant Program

- \$5.4 million in grants were awarded in 2020.
- 12 grants were awarded in 2020.

Additional funding was allocated to the state of Wisconsin as part of the Coronavirus Aid, Relief, and Economic Security Act (CARES). This funding was placed into the CARES Broadband Access Grant Program. Grants were awarded to build fiber and fixed wireless capacity in underserved areas of the state.

Capital Projects Fund Broadband Access Grant Program

- \$42 million in grants will be awarded on a competitive basis through Spring 2024.

Additional funding was allocated to the state of Wisconsin as part of the ARPA Capital Projects Fund Program. This funding was placed into the Capital Projects Fund Broadband Access Grant Program. Grants will be awarded to build infrastructure in areas of Wisconsin that do not have 100/20 broadband service. Priorities for these grants are affordability and investment in communities that have been disproportionately affected by the COVID-19 pandemic.

Other Federal Broadband Investments in Wisconsin

Table 3 provides additional federal broadband investment sources in Wisconsin. These sources address multiple aspects of broadband development. They include infrastructure development, household connectivity, service improvements for federally recognized tribes in Wisconsin, rural broadband access, and educational broadband access.

Table 3. Other Federal Investments in Wisconsin

	Program (Entity)	Funding Amount Wisconsin	Description
Grants – Funding Determined	Enabling Middle Mile Broadband Infrastructure Program (NTIA)	\$3,861,515	Cooperative to build middle mile infrastructure in Wisconsin and two neighboring states – One Award
	ReConnect Grant Program (USDA)	\$3,095,922	Connect an estimated 184 households to broadband – One Award (2020)
	Tribal Broadband Connectivity Program (NTIA)	\$36,527,118	9 of 11 federally recognized tribes in Wisconsin have received NTIA-administered competitive grants
	Emergency Connectivity Fund (FCC)	\$92,737,520	Funding for the reasonable costs of laptop and tablet computers, hotspots, and broadband internet connections – Recipients: School districts, schools, and libraries
	Rural Development Opportunity Fund (FCC)	\$178,700,000	Expansion of rural broadband access
	Affordable Connectivity Program (FCC)	\$142,069,641	Approximately 387,312 households have been enrolled in this program as of August 2023
	Total	\$456,991,716	
Grants – Funding TBD	Alternative Connect America Cost Model (FCC)	TBD	Funding to rate-of return carriers that voluntarily transferred to a new cost model for calculating high-cost support in exchange for meeting defined broadband buildout requirements
Loans	ReConnect Loan Program (USDA)	\$28,000,000	Financing of projects to provide internet to 10,000 people – One Loan (2023)

(Source: Wisconsin Broadband Office)

FUTURE NEED: Goals and Required Broadband Investment

Per the five-year action plan developed by the Wisconsin Broadband Office, An Internet for All Wisconsin, the goal is to ensure that all broadband serviceable locations have 100/20 internet speeds by the year 2030. This is termed universal service. A detailed implementation plan has been developed as part of this action plan.

With respect to the cost to achieve universal service, this varies depending on the mix of technology services desired to meet the 2030 goal. Per the five-year action plan, based on initial modeling, the cost to achieve universal service by solely utilizing fiber to bring 464,000 underserved and unserved locations to 100/20 speeds is approximately \$2.2 billion.

Bipartisan Infrastructure Law

With respect to future broadband development, the Bipartisan Infrastructure Law (BIL), which became Federal law in November 2021, is key to growth and meeting the goals of Wisconsin’s 5-year broadband plan. BIL provides \$65 billion in funding nationwide to ensure that all Americans have access to affordable and reliable broadband service. As part of BIL, the Broadband Equity, Access, and Deployment (BEAD) program will provide broadband funding to the state of Wisconsin. BEAD funding will expand high speed internet access through investments in planning, infrastructure deployment and adoption programs Administration of BEAD funding will be performed by the National Telecommunications and Information Administration (NTIA).

OPERATIONS AND MAINTENANCE: Challenges in Rural Expansion

Providing proper operational support and maintenance of broadband systems is critical to ensuring that broadband access improves in Wisconsin. A challenge in building broadband infrastructure in rural areas is adequate maintenance of the system. This challenge has proven to be an impediment to building rural broadband infrastructure due to geographical and topographic limitations. In addition, smaller subscriber bases make it more difficult to have sufficient funding for maintenance and discourages the building of rural broadband infrastructure as a result.

With these challenges in mind, it is important to ensure that there is adequate funding for operations and maintenance, particularly in rural areas, to ensure the development of increased broadband capacity in Wisconsin.

Broadband access for Wisconsin families remains a critical equity issue, and helping students get access to online learning where they live is an important goal. In a little more than a month, Wisconsin schools and libraries have been approved for over \$52 million in federal funding to address these needs through the Federal Communication Commission Emergency Connectivity Fund (ECF).

In total, 296 projects to get students, school staff, and library patrons' access to broadband internet and learning devices have been approved for funding over three waves of applications.

PUBLIC SAFETY: The Effects of Unserved and Underserved Broadband Areas

Broadband access is certainly a critical component of economic development. However, the lack of broadband access can also prove to be a serious detriment to public safety. Emergency response may be limited or

delayed if broadband communications are hampered. Disaster response is also negatively affected if broadband communications are unable to handle the high volume of communications that will inevitably be part of such events.

RESILIENCE: The Ability to Respond

With respect to broadband access, resilience is defined by the reliability of service. Even in areas where service is present, reliability can be inconsistent. This is often true in areas of northern Wisconsin. Service gaps related to

broadband can be problematic during extreme weather conditions and events and responses to emergencies in general. In addition, business activities can be adversely affected by broadband service interruptions.

INNOVATION: Finding New Ways to Improve Broadband Infrastructure

Innovation has been at the core of broadband development. Modern technologies have facilitated the increase in internet speed and connectivity. The FCC only this year updated the definition of broadband from 25/3 Mbps to a new standard, finally rendering DSL copper technology outdated. Technologies such as fiber

and cable and some licensed wireless spectrums provide faster speeds required by today's residential business and government broadband users. Low-earth-orbit (LEO) satellite broadband will have a place serving very remote locations where the cost of deployment is not sustainable.

CONCLUSION

As stated previously, the state of Wisconsin will require \$2.2 billion in funding to connect all of Wisconsin with fiber-optic infrastructure, however only \$1 billion in funding is available through BEAD. This means that alternate technologies in high-cost areas will be required to achieve the goals of the 5-year broadband statewide

plan. Additional state funding will be an essential element of the funding needed for the 5-year broadband statewide plan. Increasing the availability of high-speed broadband access is the core goal, and increased funding for broadband spending will help make this a reality.



Broadband



RECOMMENDATIONS

- Execute BEAD program funding.
- Evaluate any potential gaps and provide state funding to extend service to remaining unserved and underserved locations.

SOURCES

Wisconsin's Digital Divide and its Impacts on Learning

Focus #10 • May 2020

Full Report

Wisconsin Department of Public Instruction

Schools and Libraries Receive Federal Funding to Get Students Connected

Tuesday, November 2, 2021

Public Service Commission of Wisconsin and Wisconsin Broadband Office

Internet for All Wisconsin – Five-Year Action Plan



Dams





EXECUTIVE SUMMARY

Wisconsin's dams are owned by private entities or government, and they are regulated by either the state or federal government to ensure public benefits of water supply, hydropower, inland navigation, flood protection, tourism and recreation, irrigation source water, and fish and wildlife habitat. Several hundred of the approximately 1,000 largest dams have greatly exceeded their design life of 50 to 75 years and need rehabilitation. The Association of State Dam Safety Officials (ASDSO) estimates \$1.75 billion as the total cost to rehabilitate Wisconsin's dams rated in less than satisfactory condition and \$380 million for those structures with high-hazard potential. Over the past several years, more frequent and intense precipitation events have resulted in floods challenging dam performance. To protect the health, safety, and welfare of the public and minimize the possible adverse consequences from dam failures, increases to rehabilitation funding and regulatory resources are needed and overdue.

BACKGROUND

According to the National Inventory of Dams (NID) [1], a real-time database maintained by the US Army Corps of Engineers (USACE), Wisconsin is home to 1,004 inventoried dams. A dam is an artificial barrier that has the ability to impound water, wastewater, or

any liquid-borne material for the purpose of storage or control of water [2]. The Wisconsin Department of Natural Resources (WDNR) estimates there are approximately another 3,000 dams under state jurisdiction, but more limited data exist about those.

Little Falls Dam, Willow River State Park near Hudson, Wisconsin

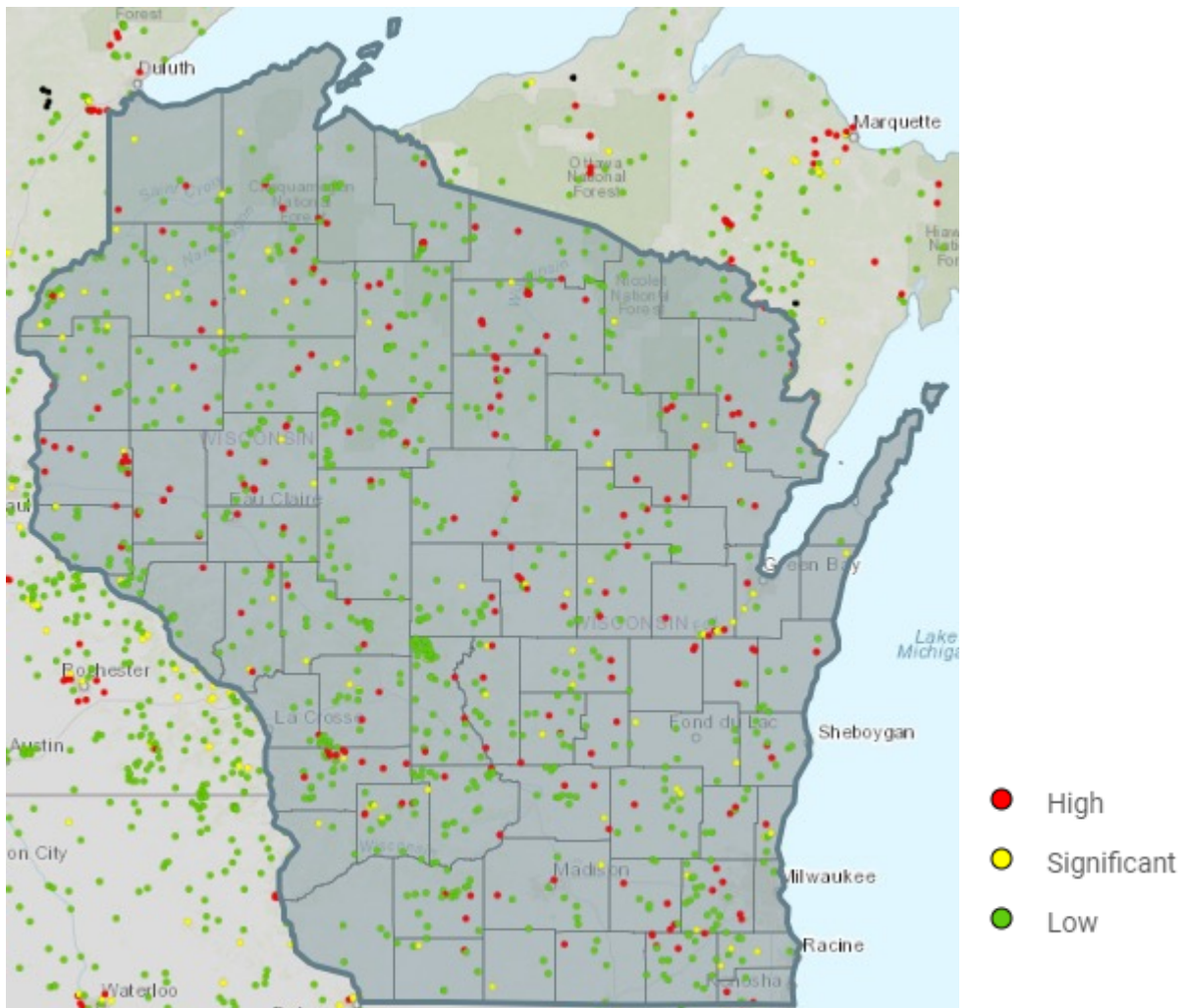


Source: Mead & Hunt

Of the 1,004 Wisconsin dams in the NID, 206 are classified as having a high hazard potential. The hazard potential is the possible adverse incremental consequences that result from the release of water or stored contents due to failure or mis-operation of the dam or appurtenances. The hazard potential classification is a system that categorizes dams according to the degree of adverse incremental consequences of a failure or mis-operation and does not reflect in any way on the current condition of the dam. There are three hazard potential classification levels based on order of increasing adverse incremental consequences: low, significant, and high.

Adverse consequences typically concern loss of human life, economic loss, lifeline disruption, and environmental impact. Failure or mis-operation of a low hazard potential dam results in no probable loss of human life and minor economic and/or environmental losses typically limited to the owner's property. Failure or mis-operation of a significant hazard potential dam results in no probable loss of human life but can cause economic losses, environmental damage, or disruption to lifeline facilities. Failure or mis-operation of a high hazard potential dam will probably cause loss of human life [3].

Wisconsin dams shown by hazard potential



(Source: National Inventory of Dams)

The NID lists 83 significant hazard potential dams and 715 low hazard potential dams in Wisconsin. The WDNR is the state agency responsible for regulating dams that are not Federally regulated [4]. The WDNR regulates 988 dams[5]. The WDNR classifies dams as either large or small where dams that do not meet the criteria for a large dam are considered small. A large dam has a structural height of 25 feet or more and impounds more than 15 acre-feet of water, or has a structural height of more than 6 feet and impounds 50 acre-feet or more of water [6].

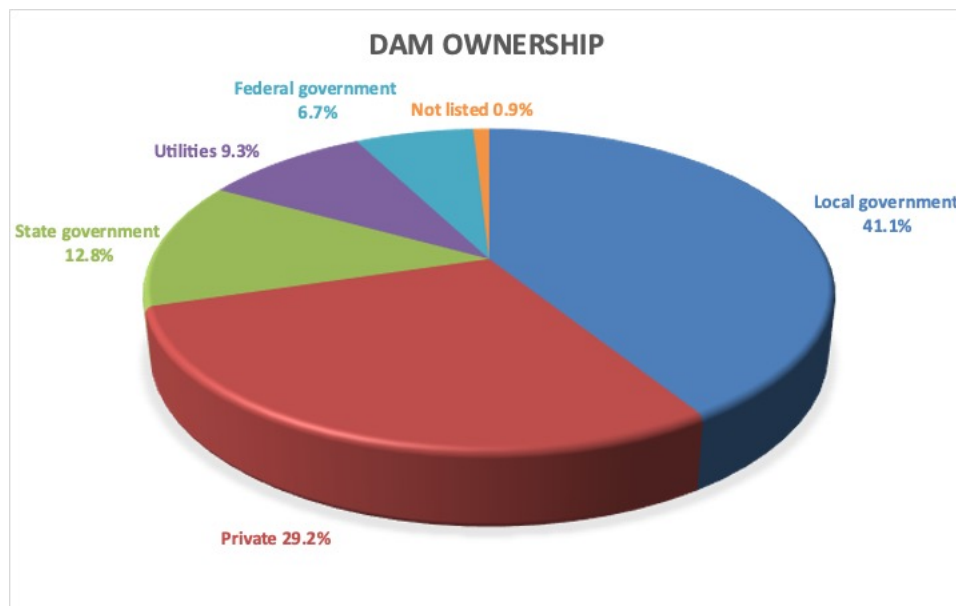
WDNR Regulated Dams	
Classification	Number
High hazard potential	185
Significant hazard potential	103
Low hazard potential	700

CONDITION AND CAPACITY

All dams in Wisconsin, regardless of their ownership or regulatory status, were collectively considered for the report card evaluation. While the condition status of all dams is not available, the authors have used publicly available information to assess the condition of Wisconsin’s dams.

Dams in Wisconsin provide several benefits to the public including water supply, hydropower, inland navigation,

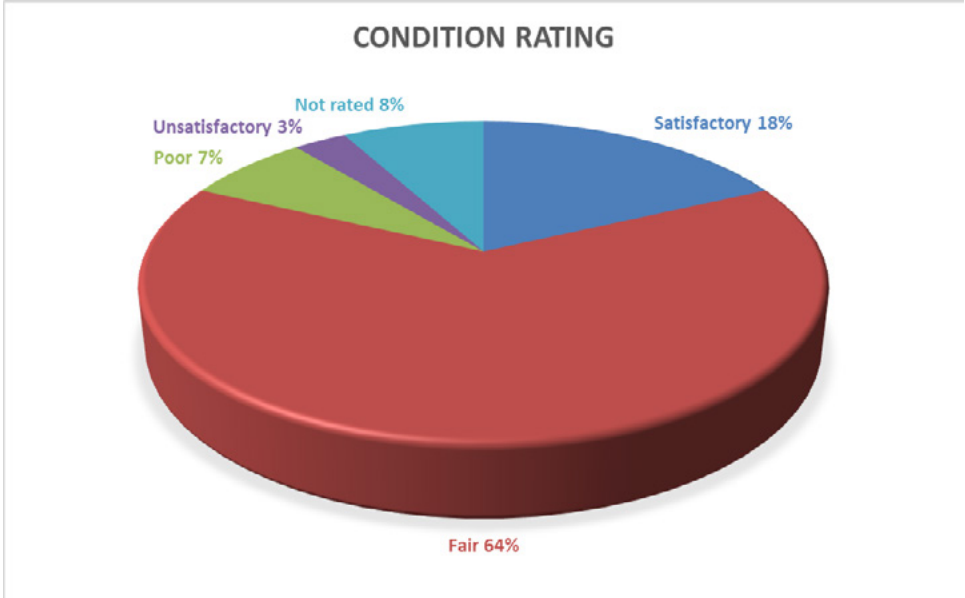
flood protection, recreational opportunities, irrigation source water, fish and wildlife habitat, and wetland creation. These dams are owned by a variety of entities: approximately 41.1% local government, 29.2% private, 12.8% state government, 9.3% utilities, 6.7% federal government, and 0.9% not listed [7].



Source: Association of State Dam Safety Officials, Wisconsin Dam Safety Performance Report 2023

The average age of dams in Wisconsin is over 50 years which puts it near the end of a typical design life of 50 to 75 years. The WDNR assigns a condition rating to state-regulated dams in the categories of Satisfactory,

Fair, Poor, Unsatisfactory, or Not rated. As of the end of 2023, 153 dams (18%) were rated as Satisfactory, 535 (64%) as Fair, 57 (7%) as Poor, 25 (3%) as Unsatisfactory, and 66 (8%) as Not rated [5].



Source: Wisconsin Department of Natural Resources

Prairie du Sac Dam, furthest downstream dam on the Wisconsin River



Source: Mead & Hunt

OPERATIONS AND MAINTENANCE; FUNDING AND FUTURE NEED

According to the NID, there are 33 Federally owned dams in Wisconsin which includes one flood control dam and 13 navigational dams owned by the USACE, one dam owned by the Bureau of Indian Affairs, three dams owned by the Fish and Wildlife Service, and 15 dams owned by the Forest Service. The authors have no information on which to judge the adequacy of funding for maintaining these dams.

Of the approximately 130 state-owned dams, 93 have been identified as having some deficiency such as cracked concrete or corroded steel; however, only 22 are rated Poor or Unsatisfactory and could be considered as having deficiencies that require major reconstruction or repair[5].

Wisconsin statute 31.19 requires owners of large dams to have a professional engineer inspect the dam at a frequency established by the dam's hazard potential classification. High hazard potential dams must be inspected on average every 2 years between the inspection conducted by the WDNR every ten years. Significant hazard potential dams must be inspected at least two times between the inspection conducted by the WDNR every ten years. Low hazard potential dams must be inspected at least once every ten years [6]. In 2022, all state-regulated high hazard potential dams that were due for inspection had inspections completed or were allowed a deferment. Circumstances for deferment vary, but they are typically granted when the dam is undergoing repairs during their inspection year. Wisconsin has an average of 19 state-regulated high hazard potential dams per full-time equivalent

(FTE) regulator compared to the national average of 28 state-regulated high hazard potential dams per FTE regulator [7]. For the approximately 3,000 other dams under state jurisdiction, there are fewer regulatory requirements; however, the WDNR does plan reviews and permitting of those structures, thus the staffing rate per high hazard potential dam does not provide the full picture of staff workload.

Of the approximately 130 state-owned dams, 93 have been identified as having some deficiency such as cracked concrete or corroded steel; however, only 22 are rated Poor or Unsatisfactory and could be considered as having deficiencies that require major reconstruction or repair [5]. The state does not have an estimate of the total cost to repair these dams. Rehabilitation of state-owned dams is funded through biennial budget requests from the WDNR's Division of Fish, Wildlife, and Parks which is the steward of state-owned dams.

The state funds a Dam Removal Grant Program that provides financial assistance to both public and private dam owners for the removal of dams they own. This program has approximately \$500,000 allocated for dam removal in the current biennial budget with a maximum award of \$50,000 per project [8]. The state also funds a Municipal Dam Grant Program with approximately \$3.5 million available for dam maintenance, repair, modification, or abandonment and removal of dams owned by a municipality, tribe, or public inland lake protection and rehabilitation district. The Municipal Dam Grant Program awards funds using a cost-sharing basis up to a maximum award of \$1.0 million per project [9]. Selection for grant funding is competitive and based on a ranking system that considers the dam's hazard potential classification, whether land use controls are in effect downstream of the dam, whether the project involves dam removal or an increase in spillway capacity to meet regulatory requirements, whether there is an Emergency Action Plan (EAP) and Inspection, Operation, and Maintenance (IOM) Plan on file with the WDNR, and whether the municipality has a dedicated fund to cover operation and maintenance costs. The demand for the Municipal Dam Grant Program funding has always exceeded the available funds since the inception of the

program in 1991, indicating there is a need for greater funding. Wisconsin does not have a grant program for maintenance, repair, or modification of dams that are privately owned.

In 2022, Wisconsin had an operating budget of approximately \$900,000 for its dam safety program [7]. This funding came from a combination of state budget allocation and a Federal grant. According to the Association of State Dam Safety Officials (ASDSO), as of 2022, Wisconsin budgeted \$250 more per state-regulated dam compared to the national average of \$820 per dam. Though, like the staffing rate for inspections, this funding rate omits the smaller structures that represent a majority of state-regulated dams. Wisconsin has 7.75 FTE dam safety staff authorized in the state budget. In 2023, staffing vacancies in the Watershed Management program of the WDNR resulted in only 6.25 FTE dam safety staff [5].

The total cost to rehabilitate Wisconsin’s non-Federally owned and non-Federally regulated dams is unknown.

The WDNR has not undertaken a comprehensive effort to estimate this cost and is not aware of another entity that has. One could make an order of magnitude approximation of the cost to rehabilitate Wisconsin’s non-Federally owned and non-Federally regulated dams based on the funding requests from the Municipal Dam Grant Program. Over the last 10 years, an average of 28 projects sought funding from the grant program in each biennium and the average dam project needed \$321,800 for rehabilitation. This average cost has not been adjusted for inflation. If the average rehabilitation cost over the last 10 years is applied to the 988 dams that are state-regulated, the cost to rehabilitate the non-Federally owned and non-Federally regulated dams is on the order of \$320 million [5]. A 2023 report from the ASDSO estimated the cost of rehabilitating Wisconsin’s 1,025 non-Federally owned dams at \$1.75 billion [10]. The ASDSO cost estimate is more than five times the crude cost estimate developed from the municipal dam grant program data.



PUBLIC SAFETY, RESILIENCE, AND INNOVATION

A dam failure can have adverse consequences for both life safety and economic loss in the affected area. As such, regulatory dam safety programs at both the state and Federal levels were established to protect the public health and welfare. The severity of adverse consequences from a dam failure depends on several factors associated with the failure mechanism and the time it takes for failure to occur, but it is primarily dependent on the nature and extent of development in the potential inundation zone. Because dammed rivers in Wisconsin provide many lakes and flowages that are vital for recreational opportunities that drive tourism in the state, the economic impact from the loss of an impoundment is high.

To lessen the probability of loss of human life from a dam failure, owners of high or significant hazard potential dams should have an EAP that is regularly tested. Simply having an EAP is necessary first step, but unless that EAP is routinely tested through an exercise that simulates the emergency management response to a potential dam failure, the effectiveness of the emergency response can be compromised and increase the probability of loss of life. Wisconsin law requires that all large dams, regardless of hazard potential classification, have an EAP. At the beginning of 2024, 173 out of 185(94%) high hazard potential dams have an EAP [5].

The WDNR provides public outreach on dam safety through quarterly dam safety newsletters to interested parties that subscribe, attendance at public meetings when requested, and staffed booths at select conferences and events. A dam failure can impact public safety in myriad ways from transportation systems to lifeline facilities to the infrastructure of whole communities. Therefore, educating the public to understand the risks of living downstream of dams is critically important.

The state and Federal agencies having jurisdiction over dams in Wisconsin use databases to maintain records of inspections, construction plans, and engineering studies for each dam. This information guides regulators in understanding the condition of each dam and establishing orders to address deficiencies.

There are presently no sustainability requirements for design and/or construction of dams in Wisconsin. The WDNR does have stated policies on sustainability, most notably Green Tier, which is a voluntary program where companies that are meeting environmental regulations and striving toward superior environmental performance commit to having a functioning Environmental Management System (EMS) which guides their environmental improvement objectives and takes the WDNR from the traditional regulator to a resource and a partner in helping participants discover new opportunities to improve environmental stewardship. However, none of the policies directly impact or influence the regulation of dams or construction practices at regulated dams [5].

Over the past several years, more frequent intense precipitation events have resulted in floods that have challenged the performance of many dams throughout Wisconsin. Increases in precipitation amount, intensity, and frequency of extreme events coupled with changes to land use conditions brought about through development can result in floods with a low annual exceedance probability (AEP) occurring more frequently. These low AEP flood events can exceed the spillway capacity of some dams and increase the chances of dam failure. As a result, some dams will need rehabilitation to provide greater spillway capacity and/or make repairs to damages that occurred from a low AEP flood event. This need for rehabilitation will drive the demand for increased funding from state and Federal governments.



Dams



RECOMMENDATIONS TO RAISE THE GRADE

- Increase grant funding to better align with costs of needed rehabilitation. Raise current funding levels of \$4M every two years to \$20M every two years.
- Continue educating the public on the benefits of dams and building awareness of the risks associated with living downstream of dams.
- Continue removing dams that no longer serve a useful purpose

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**Drinking
Water**





EXECUTIVE SUMMARY

Wisconsin has more than 11,200 public water systems, the most in the nation. More than 80% of these are in areas where people do not remain for long periods, such as campgrounds, parks, and restaurants. In comparison, 5% of these are municipal systems that serve more than 4 million residents, or 95% of the entire population of Wisconsin. Water systems are generally encountering several natural and manmade water quality issues, and must contend with aging water treatment and distribution systems to serve their communities in the future. Bacteria, nitrates, arsenic, radium, lead, and PFAS forever chemicals are significant water quality concerns. In total, the EPA estimates that \$11.8 billion is required in Wisconsin to address infrastructure over the next two decades. Needs will likely increase over time unless immediately addressed. Recent increases in drinking water infrastructure funding through the Infrastructure Investment and Jobs Act are laudable but insufficient to ensure residents have better access to safe and reliable supply for future generations.

CAPACITY

At the end of 2022, Wisconsin had more than 11,200 public water systems (PWS), the largest number of any state. Each of these PWSs is regulated by the Wisconsin Department of Natural Resources (WDNR). 56 of these systems use Wisconsin lakes and include some of the state's largest communities, including Milwaukee and

Green Bay. These surface water systems supply almost one third of the state's population while groundwater systems consist of more than 99 percent of all PWSs. Table 1 shows a breakdown of Wisconsin PWSs and population served.

Recent increases in drinking water infrastructure funding through the Infrastructure Investment and Jobs Act are laudable but insufficient to ensure residents have better access to safe and reliable supply for future generations.

Table 1 Wisconsin Public Water System Summary

PWS Type	Number of PWS	Population Served by PWS	Percent of Total PWS	Population Percent Served by PWS
Municipal Community Water System ¹	609	4,034,633	5.42	95.18
Other-Than-Municipal Water System ²	431	61,264	3.84	1.45
Non-Transient Non-Community Water System ³	910	126,559	8.1	2.99
Transient Non-Community Water System ⁴	9,281	16,283	82.64	0.38
Total	11,231	4,238,739	100.0	100.0

1 Owned by cities, villages, towns, or sanitary districts. Includes care and correctional facilities owned by governmental agencies.

2 Mobile home parks, apartment buildings, condominiums, and long-term care facilities with privately owned wells that serve residents.

3 Regularly serve at least 25 of the same people for at least six months per year. Includes schools, day cares, office buildings, industrial facilities, dairies, and many other types of facilities.

4 Serve at least 25 people (not all the same) for at least 60 days per year. Includes campgrounds, parks, motels, restaurants, taverns, and churches.

In general, drinking water capacity in Wisconsin is adequate with plentiful access to groundwater aquifers and surface water supply, such as Lake Winnebago, Lake Michigan, and Lake Superior. However, the Central Sands Lakes Study Report, prepared by the WDNR in May 2021 as a result of 2017 Wisconsin Act 10, showed that lake [groundwater] levels are being affected by the collective withdrawals of high-capacity wells used for agriculture irrigation purposes. The end recommendation was a creation of a water use district for a comprehensive, regional approach for this 1.75 million acre area that spans 8 counties.

In addition to being regulated by the WDNR, most drinking water utilities are also regulated by the Public Service Commission of Wisconsin (PSCW). The PSCW’s Division of Water Utility Regulation and Analysis oversees more than 575 drinking water utilities. The PSCW’s main responsibilities are to establish water utility rates and service standards, review and approve

construction projects, review utility organizational transactions, investigate customer complaints, promote utility effectiveness and viability, and manage utility data and information.

The PSCW requires these water utilities to file an annual report that documents financial and operational information such as water sales and use data, and includes inventories of water system infrastructure. Based on 2022 PSCW Annual Report data, Wisconsin water utilities produced 168.9 billion gallons of water but sold 139.5 billion gallons. The approximately 29.4 billion gallons of nonrevenue water represents approximately 17.4% of the total amount of water produced. Utilities estimate that approximately 27.6 billion gallons, or 13.2% of the total amount produced, were lost to water leakages. Although difficult to quantify, the cost of this wasted water is on the order of tens of millions of dollars in pumping and treatment costs, resulting in inflated water rates for consumers.

CONDITION

Age of the 22,700 miles of water main within Wisconsin spans a wide range. This represents an increase of approximately 2,500 miles of water main since 2018. As reported at the end of 2022, 1.1% of the water mains were installed before 1900, 11.7% were installed between 1901 and 1940, 21.9% were installed between 1941 and 1970, 37.5% were installed between 1971 and 2000, and 27.8% were installed after 2001.

Between 2018 and 2022, approximately 434 miles of new pipe were added to municipal water systems, which represented a similar rate of growth as seen between 2008 and 2018, as reported in the previous report card. During that same period of 2018 to 2022, an average of 0.6% were retired each year, with 118 miles, or 0.5%, being retired in 2022. A vast majority of the cast iron water mains installed before 1970 will soon, or have already, reached the end of its useful life and will require replacement or rehabilitation. Replacement and rehabilitation will help reduce water loss and O&M

costs associated with repairing breaks. At an average of 0.5% replacement each year, it would take 200 years to completely replace the distribution piping of a water system. Two hundred years is more than double the useful life of a typical water main.

Over the past 4 years, the average number of water main breaks for all Wisconsin water systems was nearly 3,300 breaks each year, or about 15 breaks per 100 miles of pipe, which matches the American Water Works Association (AWWA) Partnership for Safe Water's optimization goal for water main breaks. Milwaukee alone reported nearly 430 breaks a year, or more than 1 break per day. These numbers are down slightly compared to the previous report card. Locating and repairing water main breaks is expensive from both a financial and labor perspective. Repairing a water main break can often tie up municipal laborers for the better part of a day and can cause traffic and business disruptions and damage to private property.

OPERATIONS AND MAINTENANCE

Wisconsin is one of only a few states where all municipal water utility rates and service standards are established by a state agency, in this case, the PSCW. One of the PSCW's primary goals is to help ensure that water utilities have sufficient financial capacity to provide public health and safety to customers at just and reasonable rates. In addition, PSCW monitors utilities' financial sufficiency and has the authority to step in and require that municipalities raise their rates if not achieving certain financial benchmarks or reduce their rates if achieving too high of a rate of return on rate base. If a water utility decides to voluntarily raise its water rates, review and approval through the PSCW is required. According to the PSCW Wisconsin Water Rates Dashboard tool and based on August 2020 water rates, the median monthly drinking water bill for a residential customer that uses 7,500 gallons is \$48.50, which includes a public fire protection charge. When compared to average monthly water bill range of the nation's largest 50 cities, as reported in 2021, this value lands on the upper quartile of that range. However, most large water utilities are able to enjoy economies of scale, and the actual average

water monthly water bill range would likely be higher if all utilities were to be taken into account. That same 2021 report indicated a 5.5 percent compound average rate of change from 2000 through 2020.

Because of this arrangement, which has been in effect since 1907 when the PSCW was created, most water utilities in Wisconsin are in a relatively good position to remain financially viable. However, ongoing, committed capital improvement funding for many water utilities is still lacking, as evidenced by the average water main replacement cycle of 200 years. With limited local government resources to go around, prioritizing spending on buried infrastructure is now far more complicated than simply replacing the water main when the overlying roadway gets replaced. Water utilities should be conducting a risk-based infrastructure assessment (asset management plan) that includes a capital improvement plan that incorporates planned water main replacement to support typical useful life spans. Utilities should also evaluate the best options for incorporating the cost of an ongoing, long-term replacement program into their

rate structures. Several communities across Wisconsin, including Marshfield, Janesville, and Fort Atkinson, have integrated long-term water main replacement costs into their water tariffs using an expense depreciation mechanism to cash-fund annual water main

replacements. This unique funding mechanism allows the utilities to pay for water main replacement without bonding or borrowing funds, thereby reducing total costs in the long run by avoiding interest on debt.

FUNDING

To supplement retained earnings from revenue generated by utility customers, many utilities utilize WDNR's Safe Drinking Water Loan Program (SDWLP), which combines state funds with capitalization grants from the U.S. Environmental Protection Agency (USEPA) and Drinking Water State Revolving Funds (DWSRF). The SDWLP offers fixed-rate, subsidized (low-interest) loans and grants (principal forgiveness). The Infrastructure Investment and Jobs Act of 2021 (IIJA), also known as the Bipartisan Infrastructure Law (BIL), will provide over \$600 million in additional funding in Federal Fiscal Years 2022 through 2026 to the SDWLP and includes separate funding categories for supplemental base funding, Emerging Contaminants, and Lead Service Line Replacements.

Typically, there have been more loan funds available than requested but funding requests have exceeded

loan funds recently. Use of SDWLP funds comes with certain regulatory requirements, such as disadvantaged business enterprise (women and minority) participation, Davis-Bacon (federal) wage rates, monthly reporting, and Use of American Iron & Steel or Build America, Buy America, which utilities will need to consider when evaluating their funding options.

Other funding sources include United States Department of Agriculture Rural Development (USDA RD), USEPA Water Infrastructure Finance and Innovation Act (WIFIA), and Community Development Block Grant–Public Facilities (CDBG–PF). To date, there has only been one drinking water-related closed loan through the WIFIA program (City of Waukesha) and several other communities have been selected to apply for the funding but have not yet applied or closed on the loan.

FUTURE NEED

The 2023 USEPA 7th Drinking Water Infrastructure Needs Survey and Assessment (DWINSA) identified nearly \$11.8 billion in total Wisconsin project costs needed between January 1, 2021 and December 31, 2040 to address infrastructure deficiencies. The results of the 7th DWINSA form the basis for allotting DWSRF funds to state agencies. Wisconsin costs have been increasing: in 2018 the total need was \$8.6 billion, and in 2011 it was \$8.0 billion. It should be noted these costs include only DWSRF-eligible projects and fall short of reflecting the full range of infrastructure needs associated with constructing additional storage or supply because of population growth, fire protection, operation and maintenance costs, and developing alternative supply.

As part of the 7th DWINSA, information on lead service laterals (LSL) was also collected for calendar year 2021.

Based on these findings, it was estimated that Wisconsin had approximately 341,000 public LSLs. Based on 2022 PSCW Annual Report data, water utilities reported nearly 300,000 known public LSLs and almost 80,000 unknown services that may contain lead. Assuming that Wisconsin has 340,000 public LSLs, this represents a cost of approximately \$2.7 to \$3.7 billion and does not factor in the costs of replacing any private LSLs. The number of private LSLs in Wisconsin in 2022 was reported to be over 141,000 with 47,000 unknown services that may contain lead. Assuming there were 160,000 private LSLs, this represents a cost of approximately \$800 million to \$1.1 billion to replace all of them. The existing BIL funding is not adequate to cover these anticipated costs. PSCW offers a private LSL replacement program, where up to 50% of the cost can be subsidized through water rate revenues and the

remainder is typically taken on by the property owner in the form of a loan. Absent any additional federal or state grant funding, these costs will still fall directly on ratepayers either through direct charges or increases in water rates.

Following national trends, while Wisconsin population continues to increase, water use is declining because of more efficient plumbing fixtures (low-flow showerheads and toilets), general public awareness of conservation,

PUBLIC SAFETY

During 2022, more than 99% of public water systems in Wisconsin met all health-based maximum contaminant level (MCL) standards for contaminants regulated under the Safe Drinking Water Act (SDWA). When an MCL violation occurs, the WDNR works with public water systems to help correct the issue and return the system to compliance as soon as possible. Only 90 systems (out of 11,231 statewide) experienced an MCL violation, with the most common contaminants present were bacteria (26), nitrate/nitrite (31), arsenic (12), radium (14), and copper (17). According to a 2022 legislative report from the state's Groundwater Coordinating Council, nitrate continues to be Wisconsin's most widespread groundwater contaminant and is increasing in extent and severity, with 10% of private well samples exceeding the MCL of 10 parts per million.

One of the most significant issues facing Wisconsin is the presence of lead in drinking water, which is mostly caused by lead water service lines. Lead can have severe effects on human health, such as impaired brain development in infants and children and damage to the nervous system and kidneys in adults. In 2022, there were 24 public water systems that exceeded the lead action level of 15 parts per billion. Additionally, according to the data collected by the Centers for Disease Control and Prevention in 2018, Wisconsin ranks among the top three states for percentage of children found to have lead poisoning.

At the time of this writing, the proposed Lead and Copper Rule Improvements finished the public comment period and received nearly 1,600 comments from individuals,

and industrial adoption of water recycling technology and other efficient processes. While declining sales can help defer, reduce, and/or eliminate the need to make costly investments in infrastructure in the long run, in the short run, reduced revenues can pose a problem for municipal systems, as many utility expenses are fixed. As a result, lower per capita water use may result in water rate increases.

water utilities, and professional organizations. In addition to lowering the action level from 15 to 10 parts per billion, it also includes proactive full LSL replacement within a 10-year period (with limited exceptions). Although the BIL funding includes \$15 billion for LSL replacements, it does not cover the full expected cost of \$50 to \$80 billion, which will likely hinder progress. To effectively remove lead from a water system, utilities will need proper levels of funding, particularly for the customer (private) owned portion of an LSL.

In 2023 the USEPA released proposed national primary drinking water regulations for per- and polyfluoroalkyl substances (PFAS), also known as forever chemicals, that would establish legally enforceable MCLs for PFOA, PFOS, PFNA, HFPO-DA, PFHxS, and PFBS. The final rule is expected to be implemented in 2024. PFAS are a group of human-made chemicals used for decades in numerous products, including non-stick cookware, fast food wrappers, stain-resistant sprays, and certain types of firefighting foam. Adverse health effects include thyroid disease, low birthweights, and cancer. In November 2023, the WDNR released the results of voluntary shallow private well testing that was conducted in the summer and fall of 2022. Over 450 homes voluntarily submitted samples to test for 44 different PFAS substances. Seventeen of the samples exceeded the proposed PFOA and PFOS MCLs. Roughly 7 in 10 of the private wells contains one or more detectable levels of PFAS substances. These contaminants were mainly associated with human waste sources, such as septic systems, especially in shallow groundwater.

RESILIENCE AND INNOVATION

The integrity of a water system and safety of consumers' drinking water can be threatened by a myriad of factors. Proper planning, including conservation and utility efficiency, is needed to make sure that utilities can meet future demands. The USEPA recognized this issue, and in 2018 America's Water Infrastructure Act (AWIA) was signed into law requiring drinking water systems serving more than 3,300 people to develop or update risk and resiliency assessments and emergency response plans. All impacted communities have submitted their assessments and plans by 2021 and the first five-year update to USEPA for communities over 50,000 population will be required in 2025.

As part of the PSCW-required annual reports, utilities are required to submit information regarding non-revenue water, as defined by the AWWA. Although not required to complete a full water audit each year, this level of audit provides a useful tool to help identify cost-effective intervention measures for reducing water loss

and optimizing revenue capture. Utilities should adopt best practices as outlined within AWWA M36 Water Audits and Loss Control Programs and complete a full audit using the AWWA Free Water Audit Software. If appropriate, leak detection services should be utilized by utilities to locate water main leaks and breaks.

As indicated previously, risk-based infrastructure planning is one example of innovation in asset management. Implementation of advanced metering infrastructure is another example of innovation to lower labor costs, reduce overall water usage, and optimize revenue capture, provided a utility is organized and equipped to deliver these potential benefits. Lastly, utilities should perform cost-benefit analyses on critical water mains to determine if innovative pipe rehabilitation procedures, such as cured-in-place pipe, spray-in-place pipe, slip-lining, or swage-lining could be reasonable, cost effective alternatives to complete main replacement.



Drinking Water



RECOMMENDATIONS TO RAISE THE GRADE

- Encourage, incentivize, or require water utilities to develop risk-based pipeline prioritization and asset management programs to assist in proactive water main replacement and reduce excessive water loss.
- Ensure that water rates cover the full cost of service, including O&M and long-term replacement needs. Recommend that utilities evaluate cash-funding annual water main replacements using an expense depreciation mechanism.
- Expand/strengthen the SDWLP, increase principal forgiveness funding and opportunities, and streamline/reduce federal requirements to encourage participation.
- Increase and expand federal and state funding for replacement of lead services to reduce ratepayer burden.
- Encourage utilities to investigate water conservation and efficiency measures, including implementing uniform or increasing block rate structures and performing full water audits.
- Adopt innovative technologies to improve maintenance, reduce water loss, enhance productivity, and reduce life-cycle costs.

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Drinking Water



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Energy





EXECUTIVE SUMMARY

Wisconsin faces challenges to maintain electric grid reliability as demand for energy increases and state and regional partners convert generation from fossil fuels to low-carbon sources. Duration and frequency of outages have increased over the last five years. Coal power production has dropped by one-third, and meanwhile, natural gas production has increased by two-thirds from 2015 to 2020. Wind, hydroelectric, and solar increased in that span, but remain fractional compared to gas generation, where overreliance on one source presents resilience risks. Electric rates help to fund significant portions of energy grid projects connecting power from sources to uses, and Wisconsin's \$0.14 per KWh rate is slightly higher than the national average. However, residents pay less on monthly bills than the average partly because conservation efforts appear successful. Wisconsin's energy transmission systems must be expanded, improved, and maintained to connect new solar and wind generation. The electric distribution system will require additional maintenance and hardening of the infrastructure to provide reliability because of extreme weather events.

BACKGROUND

Wisconsin does not possess any oil, natural gas, or coal resources. All these fuels must be imported. However, Wisconsin is the 9th largest producer of ethanol in the nation. Natural gas replaced coal as the source for the largest percentage of electric generation in 2022. To make this happen, the natural gas transmission network has been expanded greatly in recent years beginning with the Guardian Pipeline in 2002. The Guardian Pipeline runs from Joliet, IL to West Green Bay, WI. Many smaller but significant gas transmission pipelines have also been added throughout the state.

The Public Service Commission of Wisconsin (PSCW) is the governing body for Public Utilities in the State of Wisconsin. The PSCW sets utility rates and regulates safety. Utilities are also subject to legislation such as the Renewable Portfolio Standard (RPS) requirements from state law for renewable energy expansion.

90% of electricity customers in Wisconsin are served by investor-owned utilities (IOU) with the remainder served by municipal or community owned utilities.

The three main components of electrical energy infrastructure are generation, transmission, and distribution. The two main types of energy supplied to customers are electricity and natural gas. Propane gas is used to a much lesser extent and mostly in rural areas. The conversion from fossil fuel electric generation to reduce CO₂ emissions is a strong driver for new infrastructure spending. Wind farms, solar arrays, battery storage facilities, and new transmission lines to connect them to the energy grid require large amounts of capital spending. Utilities are also increasing their commitment to natural gas usage to provide sufficient dispatchable power when wind, solar, and battery power are not available.

The cross-country natural gas pipeline system generally runs at maximum capacity on peak days. Additional gas for new base load electrical generation would require hundreds of miles of new large diameter high pressure pipe installation. One alternative to increased capacity and reliability of gas is the construction of Liquefied Natural Gas (LNG) facilities.

Wisconsin Energy Group is adding large scale expensive, liquefied natural gas storage facilities. The process of liquefying natural gas when demand is low and then vaporizing it when demand is high may more than double the cost of the fuel but this is less costly than adding pipeline capacity. FERC sets the rates for local gas distribution utilities to make capital contributions to gas transmission companies to build the additional pipelines, even including paying the transmission company for income tax on the payments. Large volumes of gas can be stored underground in Illinois or Michigan or as LNG. Wisconsin has no feasible geology for underground storage. LNG plants have the added benefit of supply assurance in the event of a temporary transmission pipeline outage.

Electricity generation can be either base-load or intermittent. Hydroelectric, nuclear, and fossil fuel

power plants are base load and always available. Wind and solar are not always available. Battery energy can be stored when demand is low and then is available as needed. Renewable is becoming more diverse while base load generation is becoming less diverse. Energy storage is a great challenge in Wisconsin because it is either inefficient, expensive to develop, or not needed on a large scale. Just as Wisconsin has no geological formations to store natural gas, neither is the geology ideal for carbon capture.

Wisconsin has 15,700 miles of high-voltage transmission lines. The main transmission grid in Wisconsin is owned and operated by the American Transmission Company and paid proportionately by the regional electric distribution utilities they serve. From ATC's plans: In 2023, the energy used by consumers in ATC's service area that came from renewable resources was less than 10%. That is expected to increase to nearly 50% by 2042. Transmission line improvements are coordinated at the regional level by the Midwest Independent System Operator (MISO). MISO produces an annual review and report of transmission system needs.

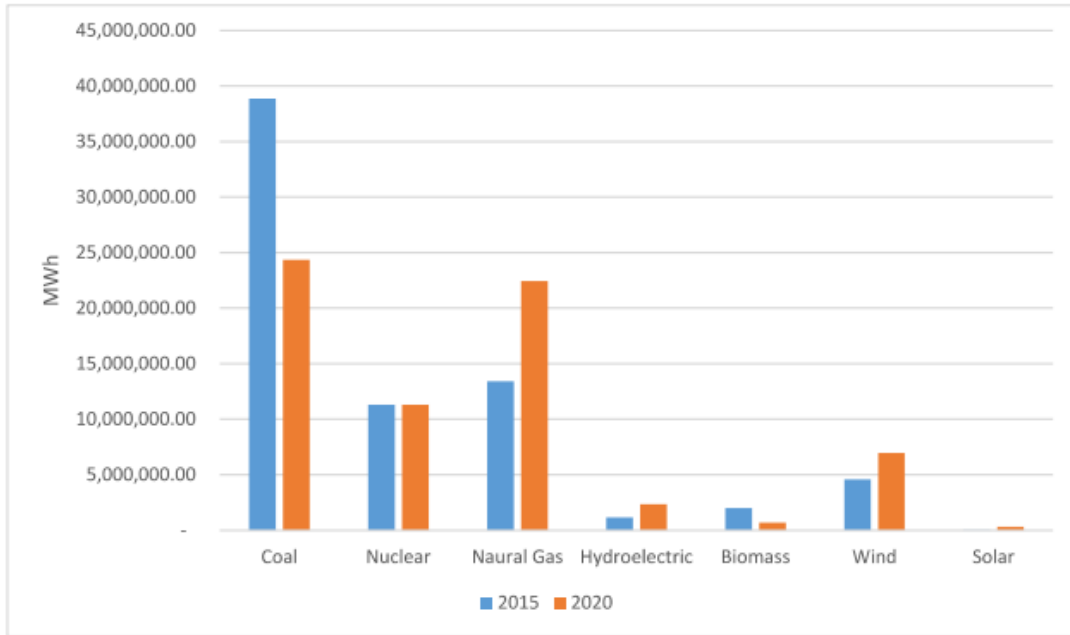
CAPACITY

Utilities have long argued that a diverse mix of energy sources are important for reliability and protection from price spikes in any one energy source. However, Wisconsin is currently reducing its diversity of base-load supply as coal-fired generation is eliminated and with the potential elimination of the Point Beach Nuclear Plant. The high reliance on natural gas places Wisconsinites at risk for higher energy bills if natural gas prices increase.

Note that the commodity price of fuels is a pass through to customers and price hikes are not a cost absorbed by utilities.

A comparison of electric generation in Wisconsin, figure 1 confirms the rapid elimination of coal and replacement by alternative sources.

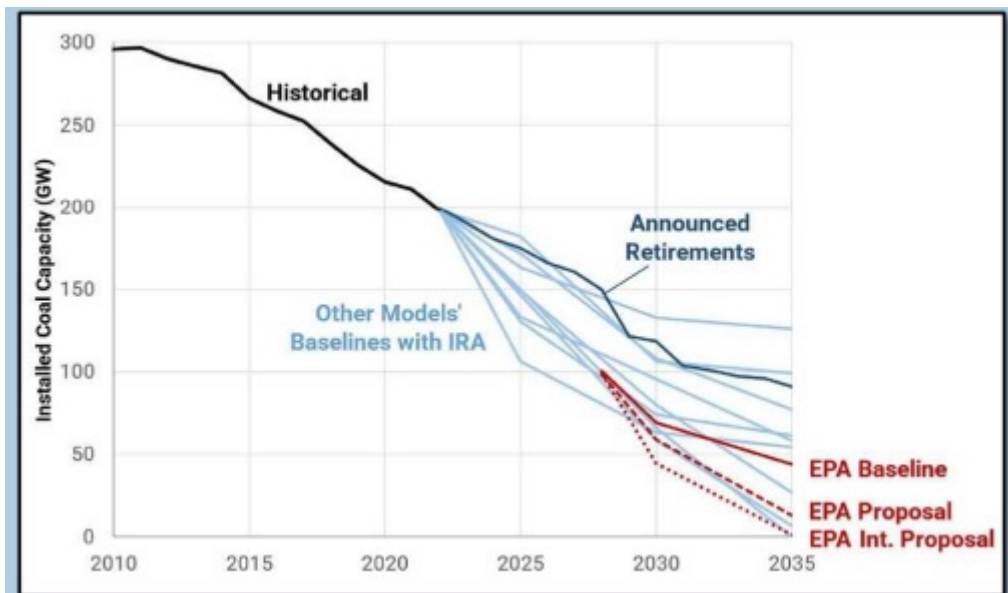
Figure 1. Generation of Electricity in Wisconsin by source, 2015 and 2020 (2)



The rapid planned conversion of electric generation capacity from coal to renewable energy across the entire United States is continuing. See figure 2. Recently

the largest utility in Wisconsin, WEC Energy Group announced plans to eliminate coal generation by 2032, 3 years earlier than was previously forecast. (3)

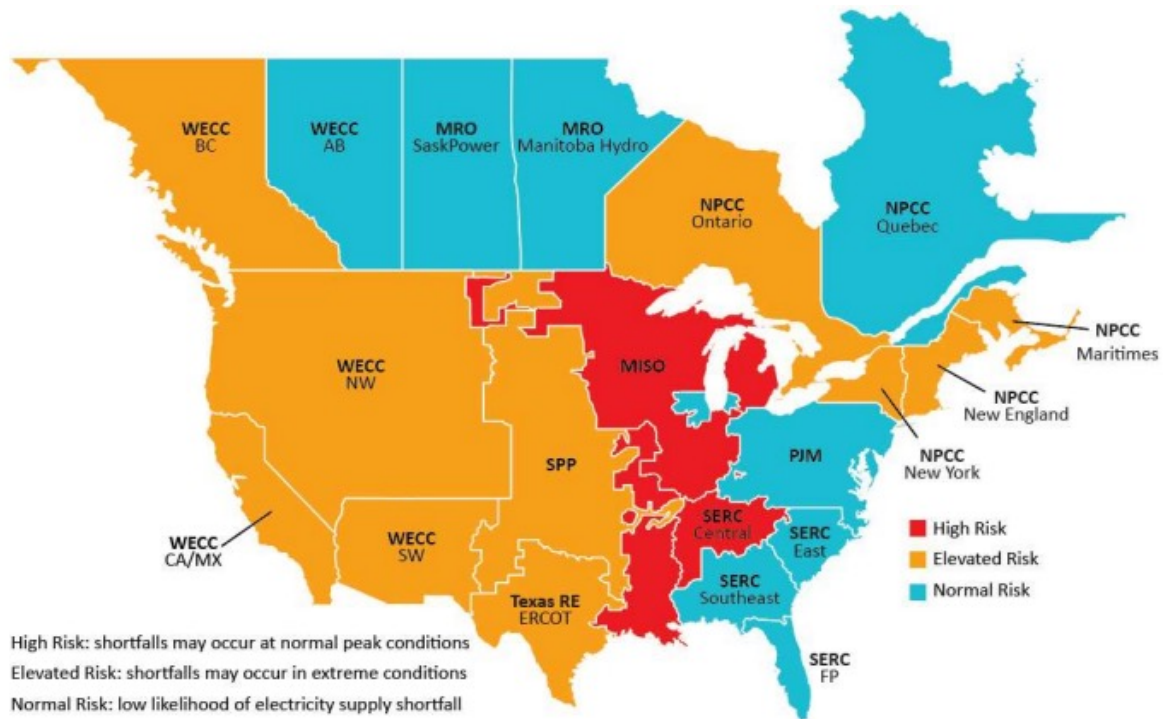
Figure 2. Planned Reduction of Coal Generation Capacity in the U.S. (1)



Such a rapid change to newer technologies carries risks to reliability. Figure 3 shows the currently assessed risk levels for the various system operator regions of the United States and Canada. System operators plan

for and manage the supply of electricity to match the demand. MISO includes all of Wisconsin. MISO is rated high risk for potential future electricity supply shortfalls in the 2024-to-2028-time horizon.

Figure 3. System Operators Risk Area Summary 2024 to 2028 (1)



A broader diversity of base-load supply could be achieved by investing in small-scale nuclear power plants and maintaining only the lowest cost and most efficient of the remaining coal fired power plants. WEC Energy Group’s Elm Road Generation Station, one of the newest and most advanced coal plants in the nation, is now slated to be converted to natural gas well before the end of its design life. Diversity of energy supply could be achieved by carbon capture at Elm Road, but re-examining CO2 emissions targets may be needed while technology for carbon capture improves beyond just in ground storage.

There are not enough high-profile champions of small-scale nuclear energy. At the current rate of progress, the implementation of a first installation is many years away. Public education will have to go hand in hand with an increase in government support at the state and federal

level. The utilities will not move out in front of political and public support for new nuclear energy.

Many goals can be achieved at the state level, but increased use of small-scale nuclear and technological improvement (including carbon capture) must also be supported by federal grants, funding and tax credits.

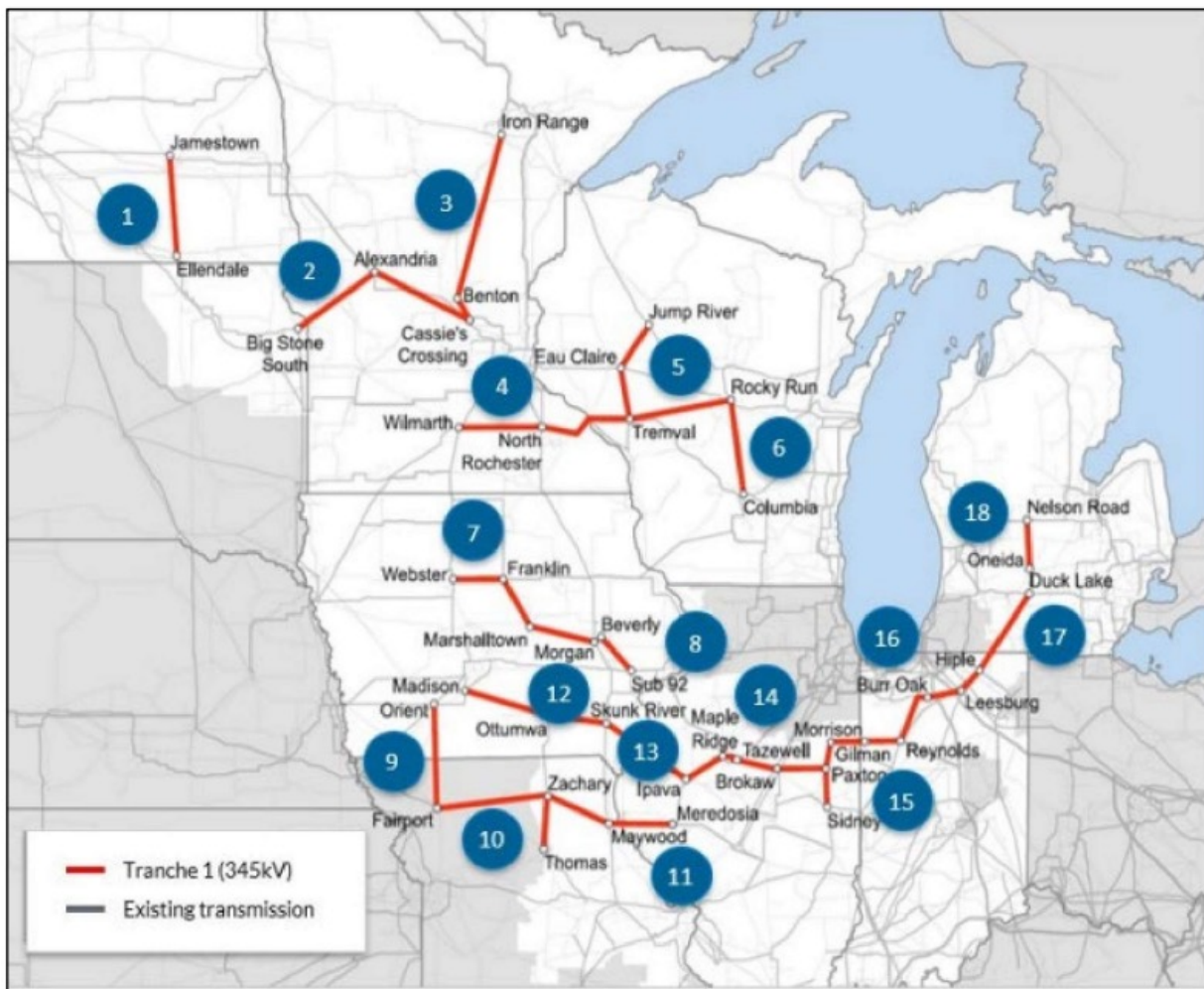
The goals should include lower electricity and gas rates and lower CO2 emissions, from diverse and reliable sources of energy. Solar and wind energy have become very low-cost producers of electricity, however with more and more wind and solar the need for energy storage is increasing and the technology for cost-effective energy storage has not kept pace. Achieving the cost and reliability goals will require innovative technology, political will, regulatory changes, and close collaboration by all the stakeholders, including citizens, politicians, utilities, and the PSCW.

Wisconsin needs an Integrated Resource Plan. An IRP coordinates energy investments between utilities to achieve the greatest future benefits considering reliability, cost efficiency, and the environment. The PSCW current planning process is the Strategic Energy Assessment which is too backward focused. This causes many millions of dollars in excess spending and higher rates for customers when PSCW decisions are made while considering only one utility at a time. An IRP engages many stakeholders that may not have a clear

role in the current planning process including regulators, environmental groups and communities.¹³

Figure 4 shows the current planned transmission line improvements. The planned region-wide cost for these projects known as ‘tranche 1’ is \$10.4 billion. A breakdown of the purposes of all planned projects shows that 11% are for generator interconnection projects, 39% are for reliability, 42% are for age and condition, and 20% are for load growth. ATC has a part in 3 of the planned projects.⁶

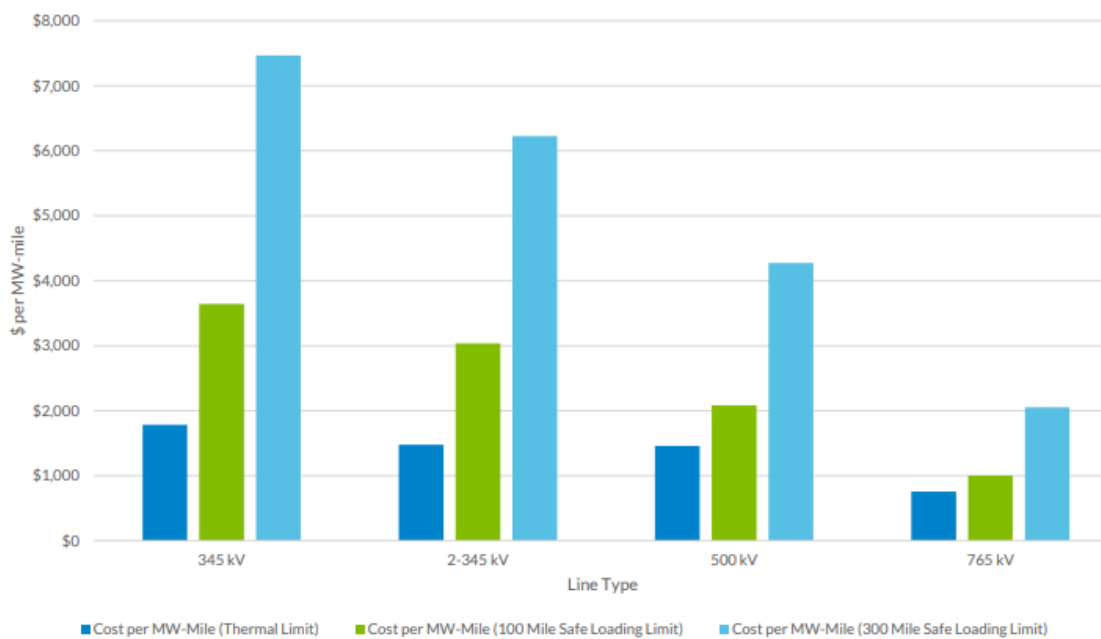
Figure 4. MISO Tranche 1, 10 Year Capital Projects Plan



In 2021 and 2023, MISO studied the efficiency benefits of doubling the voltage of their highest voltage transmission lines from 345KV to 765KV. Figure 5 shows the benefits. MISO plans for the addition of 765kV projects in its tranche 2 plan in the 11-to-20-year time horizon. Alternative to the 765kV line would

be a high voltage direct current (HVDC) alternative preferred by some stakeholders. These transmission lines are proposed for moving electricity east and west across the territory especially for large additions of renewable generation and transfer of energy between states.⁵

Figure 5. Comparison of Capital Cost Per MW-Mile.



CONDITION, OPERATION AND MAINTENANCE (O&M)

Utilities will continue to spend to maintain and improve the transmission and distribution infrastructure of both gas and electricity, with electric distribution and transmission requiring greater attention to reliability of overhead cable and wires. Maintenance and hardening of the overhead cable and wire infrastructure will need to

keep pace with the increased hazards of climate change induced severe weather events. Along with burying wires or strengthening of power pole and wires is the increasing need for tree trimming to lessen storm outages. An added factor is tree die-off from emerald ash borer and other invasive species and diseases.

FUNDING

Most energy infrastructure has a different funding mechanism than government-owned infrastructure and therefore has different challenges. The owners of public energy utilities, stock and bond holders, are rewarded when capital investments are made, and rates increase. Spending on infrastructure increases rates, and so this is a priority for energy utilities, especially when older infrastructure has reached the end of its depreciation life and can no longer be used to justify the current customer rates.

A utility whose rates are steady, or decreasing will find

less demand for their stocks and bonds and the price of those stocks and bonds will decline. When the stock and bond prices decline the cost of funding that utility by borrowing increases, and now the customer rates will increase due to the higher borrowing cost. The lowered rates will have to rise again. Until the funding paradigm changes, customers should expect higher and higher rates. What is needed is a way to reward the utility owners for lowering rates, alongside only necessary and efficient spending on infrastructure. One way to do this would be to allow the efficient utility small increases

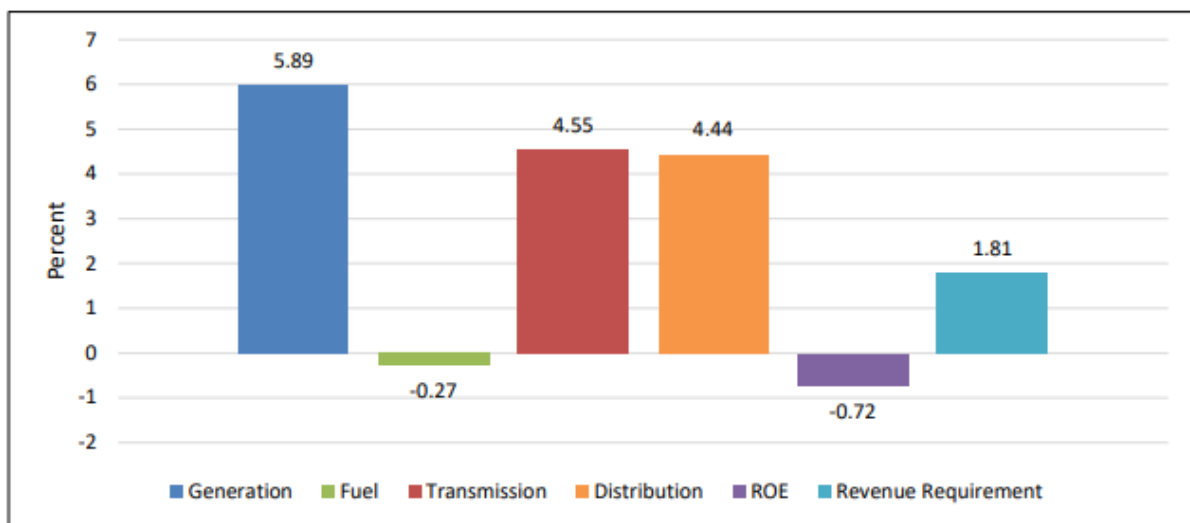
in their allowable rate of return as they successfully maintain quality infrastructure without raising customer rates. This has never been done for electric rates but had been done to reduce natural gas prices in Wisconsin many years ago.

WEC Energy Group built the Elm Road generating station in 2011 at a cost of more than \$2 billion dollars, plus subsequent upgrades. Now WEC is planning to convert that plant along with others (Paris, Oak Creek, Columbia and Weston) from coal to natural gas by 2032. Conversion of Oak Creek generation from coal to gas is at a cost of \$1.28 billion, and Paris at a cost of \$280 million. The Oak Creek location requires an LNG facility at a cost of \$456 million and a 33-mile gas pipeline for \$186 million. Critics argue that these costs

and commitments to fossil fuel are out of place when 2050 is the planned date for net zero carbon emissions. Customers who are still paying for the original coal plant will pay for the conversion to gas, and later the conversion to carbon neutrality.¹¹

A current controversy involves the early retirement of coal fired electric generation. The utilities are allowed to continue to earn their rate of return on their investment in these facilities even though they may have retired them from productive use until their investment is fully depreciated. It can be argued that since there is no longer any risk associated with the retired facility that the utility should recover the remainder of the depreciation at bond rates rather than at stock market rates.⁷ Figure 6 shows the drivers of the various sources of rate impacts.

Fig. 6. Drivers of Customer Rate Changes, 10 Year Annual Average²



Wisconsin residential electric rates are \$0.14 per kWh (Kilowatt hour), above the Midwest and U.S. rates by about 1 cent. The average residential monthly electric bill in Wisconsin is lower than the Midwest and U.S. national averages because Wisconsinites use less electricity per

month on average. Conservation efforts appear to be working. On the other hand, Wisconsin is far behind the times in updating the International Energy Conservation Code, (IECC) code for residential buildings. The latest code could further reduce energy consumption.¹⁰

FUTURE NEED

Unless alternatives are developed under an IRP the Oak Creek LNG facility and other connecting gas pipelines will need to be completed for reliability of gas supplies as well as reducing the cost of long-term firm gas supply contracts with the cross-country pipeline operators.

Electric transmission and distribution improvements are a continuing challenge. Old lines need repair or replacement. Additional transmission lines are needed to connect renewable energy sources and improve reliability. Improved design standards are needed to

account for increasingly intense extreme weather events. Tree trimming and rights-of-way clearing are a continuous requirement for safety and to reduce storm related outages.

PUBLIC SAFETY

The historical high safety record of the natural gas and electric distribution systems have been further improved via asset management systems that also save money by accurate and timely targeting of facility replacement. Gas transportation safety has evolved under the tightening of regulations that require advanced inspection techniques like in-line inspections and close interval cathodic protection surveillance on continuous multi-year cycles.

In 2020, the PSCW participated in cybersecurity training provided by the National Association of Regulatory Utility Commissioners. Also, federal and energy sector representatives participated in the Department of Energy's Liberty Eclipse exercise for cybersecurity. The last large scale emergency response exercise that included a cybersecurity component was Dark Sky in 2018. Dark Sky was a simulated large-scale long-term power outage exercise. Additional efforts are needed for these fast-evolving threats.

RESILIENCE

As explained earlier the regional transmission network is considered high risk in the 2024 to 2028 timeframe.

Distribution resilience is measured as Customer electric utility outages are measured by the following three statistical records:

1. SAIDI (System Average Interruption Duration Index) or the total minutes of interruption for the average customer.
2. CAIDI (Customer Average Interruption Duration Index) or the average time to restore service.
3. SAIFI (System Average Interruption Frequency Index) or how often the average customer

The increasing complexity of the grid with distributed energy resources (DER) requires better management and control systems.

Utilities are understandably tight-lipped about their cybersecurity programs. However, the PSCW and government must assure that Wisconsin citizens are adequately protected from cyber criminals. More must be done in this regard by legislators, regulators (PSCW) and the utilities themselves.

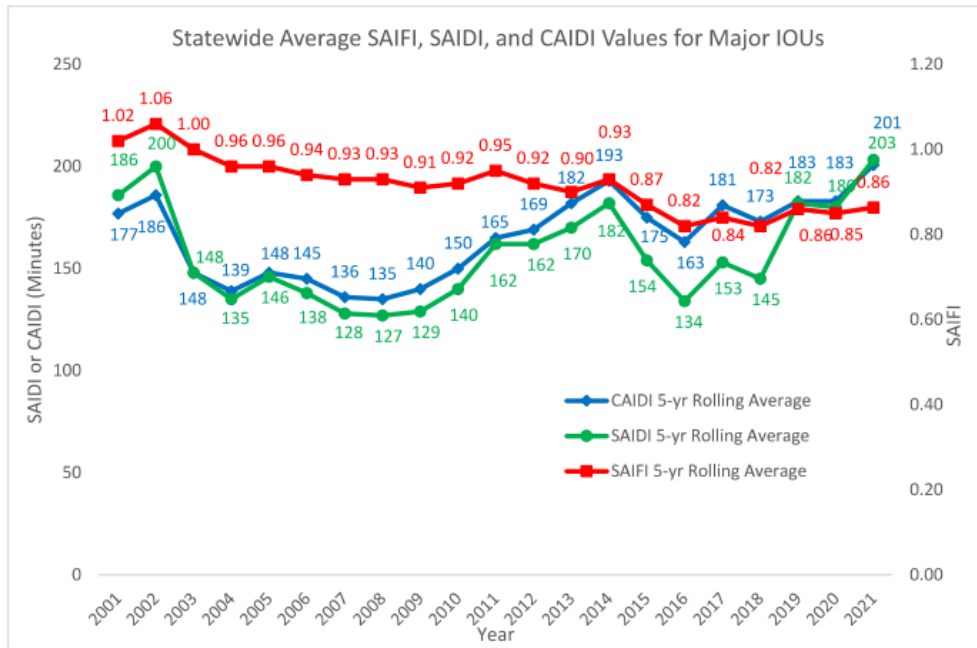
Physical security and monitoring must also be increased for the safety of electric and gas transmission. Two transmission towers in Wisconsin collapsed after saboteurs removed bolts in October 2004.¹² A current big screen movie's major plot has vigilantes blowing up a pipeline.

Other areas of the country have also experienced targeted attacks on utility infrastructure. In 2020, an attacker used a high-powered rifle to damage two electrical substations in Moore County, North Carolina. 40,000 customers lost power for up to four days.⁹

experiences a sustained interruption.

The total minutes of customer interruptions, SAIDI, and CAIDI, interruptions per customer have both been climbing for the past 3 years. The standard measures of customer interruptions displayed in Fig. ___ are displayed as 5-year rolling averages. A rolling 5-year average moderates changes that may be due to abnormal years, but also mutes systemic changes as may be occurring with the 3-year increase in SAIDI and CAIDI. Severe weather is always the biggest cause of outages. Tree trimming around power lines is one method to reduce storm related power outages.

Fig. 7. Interruption Frequency and Duration Statistics



INNOVATION

Seventy-five electric providers in Wisconsin offer time-of-use rates which encourage customers to use more energy at nighttime when low-cost wind energy is in excess supply and to use less energy in the afternoons when air conditioning demand is highest. Similarly, real-time pricing options are available to commercial and industrial customers of 26 electricity providers. Right now, the customers taking advantage of these options are a small fraction of the total.

Focus on Energy is Wisconsin’s energy efficiency and renewable resource program. It supports a portfolio of programs to help customers reduce energy consumption and carbon emissions. Focus on Energy is financed by PSCW approved rate additions collected by the utilities. In 2020, Focus restructured their programs to assure continued energy savings success well into the future. Wisconsin Focus on Energy earns \$6 of energy savings for every \$1 spent.

In August 2024, Wisconsin became the first state in the nation to launch the Home Efficiency Rebate (HOMES) program, and the second state to launch the HEAR program, Home Electrification and Appliance program. Both programs are part of the Inflation Reduction Act.

78% of Wisconsin residential customers have advanced electric meters. Most Wisconsin customers are also served by utilities with advanced customer information systems. These advanced technologies can improve resiliency, data security, provide customers with improved information on their personal use, and support advancements such as time-of-use rates.

Wisconsin utilities use advanced technologies such as LIDAR (Light Detection and Ranging) for utility route selection and design, and drones for pipeline and transmission line monitoring and inspections.

The rush to electrification of all vehicles hit a snag recently when electric vehicles performed poorly under the stress of cold Wisconsin winter temperatures. The revolution of transportation energy must be open and flexible to allow for further innovation in hybrid vehicles, and alternative clean fuels like hydrogen. Planning for the expansion of the electric vehicle charging network must be coordinated with its impact on the electric grid. Because there is no fair allocation of the cost of Green House Gas (GHG) pollution, like a carbon tax, there is minimal incentive to move buyers to smaller, efficient vehicles of all types.



Energy



RECOMMENDATIONS TO RAISE THE GRADE

1. Wisconsin needs an Integrated Resource Plan to be developed by regulators, PSCW, and community and environmental organizations. Many millions of dollars will be saved by coordination of generation and transmission improvements for all Wisconsin utilities. Ensure that energy efficiency, conservation, and renewable energy are attractive, economically viable alternatives for Wisconsin's energy needs
2. The IRP should take an immediate and critical look at the early retirement and short-term conversion of coal to natural gas plants and ways to reduce the customer rate impacts.
3. The IRP should include a workable long-range plan for greenhouse gas reductions that do not sacrifice reliability, but also control customer rate increases.
4. ATC and the PSCW must work with MISO to make timely improvements to the generation and transmission infrastructure to remove MISO from the high-risk category of future capacity and reliability. As distributed energy resources are added there must be coordination and innovation to assure continued grid stability.
5. Continue to reduce greenhouse gas emissions through conservation, renewables, and nuclear energy. Research and develop clean coal, energy storage, and carbon capture technologies.
6. The diverse base load fuel sources of the past are quickly becoming an excessive reliance on natural gas base loading and intermittent supplies of solar and wind. This must be reversed by developing new nuclear supplies. Push for utility-scale energy storage for Wisconsin.
7. Harden the transmission and distribution infrastructure to prepare for severe weather events. Address the rise in customer interruptions by forestry work or other means.
8. Increase the funding of Focus on Energy to take advantage of the proven savings from this program. Maximize the success of the HOMES and HEAR conservation programs.
9. Increase diligence and preparedness to avert and recover from potential cyber-attacks. Improve the reliability and redundancy of system controls and communications along with blocking directed cyber intrusions. An appropriate level of transparency must be established. Regulators must be able to assure the public that utilities are adequately protecting the public from costly ransomware and destructive physical attacks.
10. Support transportation fuel efficiency by improving electric vehicle charging convenience and providing incentives for efficient and low carbon vehicles including plug-in hybrids and electric vehicles.
11. The PSCW should work with utilities, consumer advocates, and environmental organizations to develop alternative rate making innovations that incentivize utilities to lower rates or lessen rate increases.
12. The PSCW must examine the Utility's rate recovery for early retirement of coal plants to determine if returns on investment are commensurate with risk, or if they are excessive.
13. We must utilize new approaches, materials, and technologies to ensure our infrastructure can withstand or quickly recover from natural hazards and direct physical attacks.



Energy



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Energy



ACRONYMS AND ABBREVIATIONS

ATC	American Transmission Company
CAIDI	Customer Average Interruption Duration Index
CUB	Citizens Utility Board
DER	Distributed Energy Resources
DOE	Department of Energy
GHG	Green House Gas
IECC	International Energy Conservation Code
IRP	Integrated Resource Plan
PSCW	Public Service Commission of Wisconsin
LIDAR	Light Detecting and Ranging
MISO	Midwest Independent System Operator
NARUC	National Association of Regulatory Utility Commissioners
NERC	North American Electric Reliability Corporation
RPS	Renewable Portfolio Standard
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index

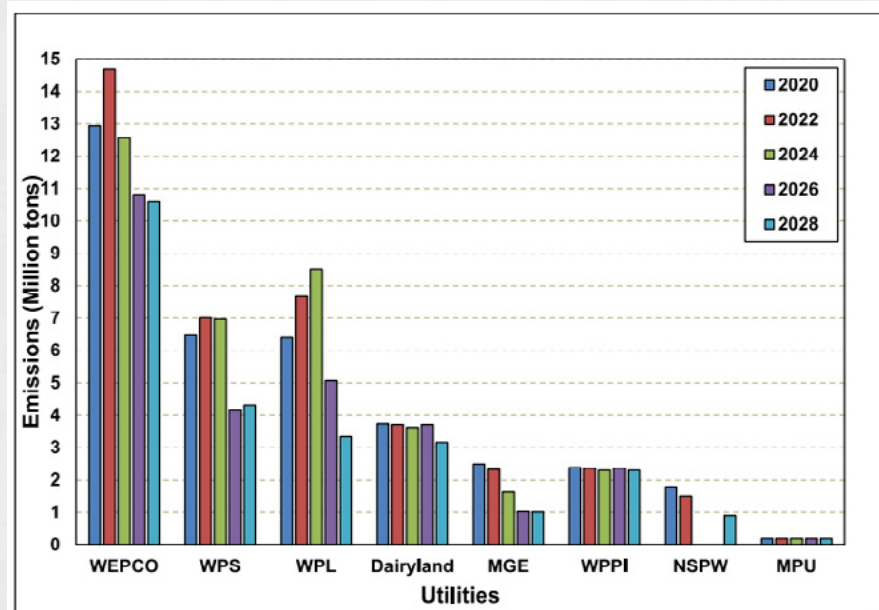


Energy



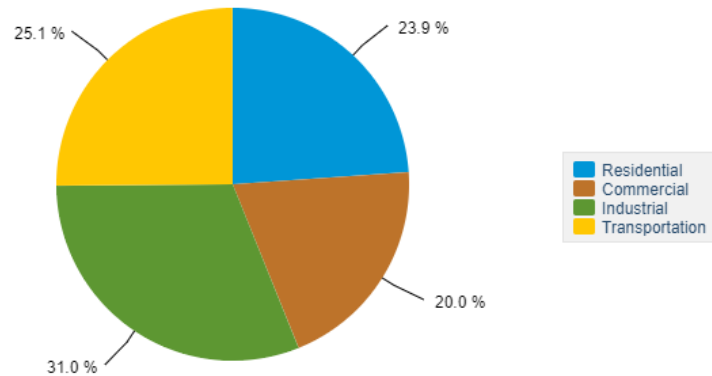
APPENDIX

Fig. 8 Annual Emissions Forecast for Wisconsin by Electric Provider PSCW²



Wisconsin Energy Consumption by End-Use Sector, 2021

[DOWNLOAD](#)



Source: Energy Information Administration, State Energy Data System



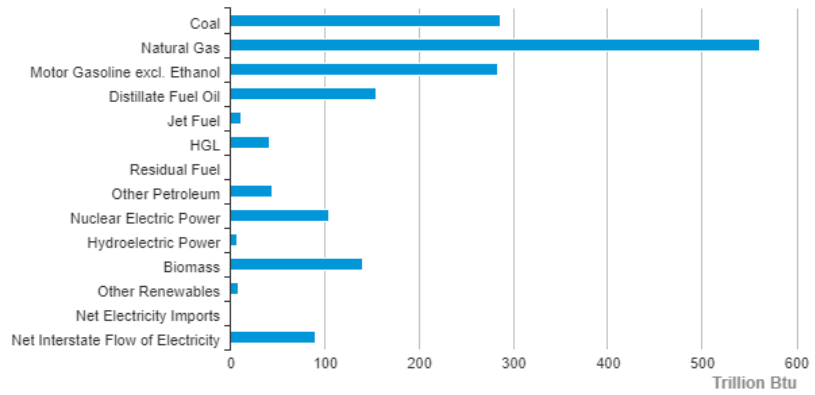
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APPENDIX (cont.)

Wisconsin Energy Consumption Estimates, 2021

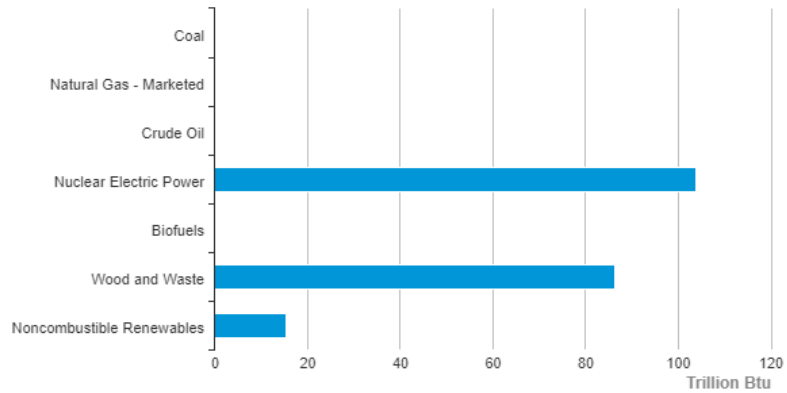
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Source: Energy Information Administration, State Energy Data System

Wisconsin Energy Production Estimates, 2021

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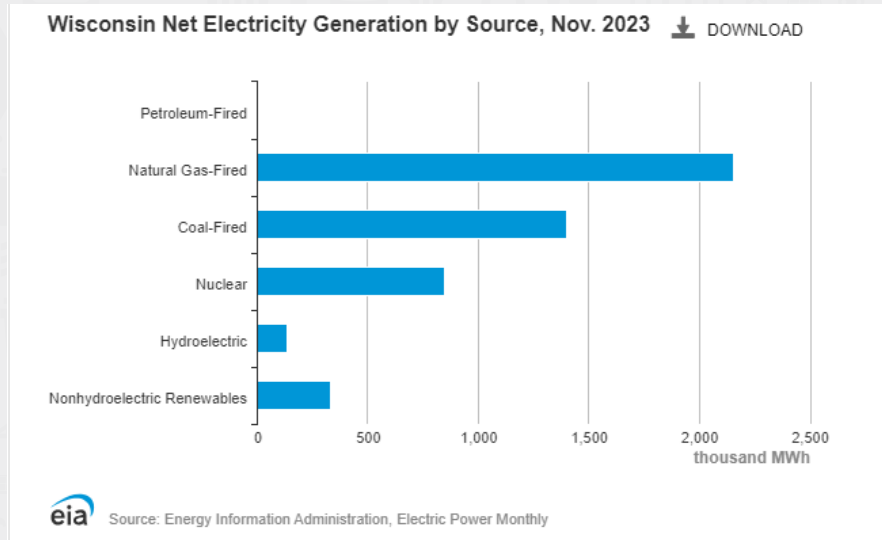
Source: Energy Information Administration, State Energy Data System



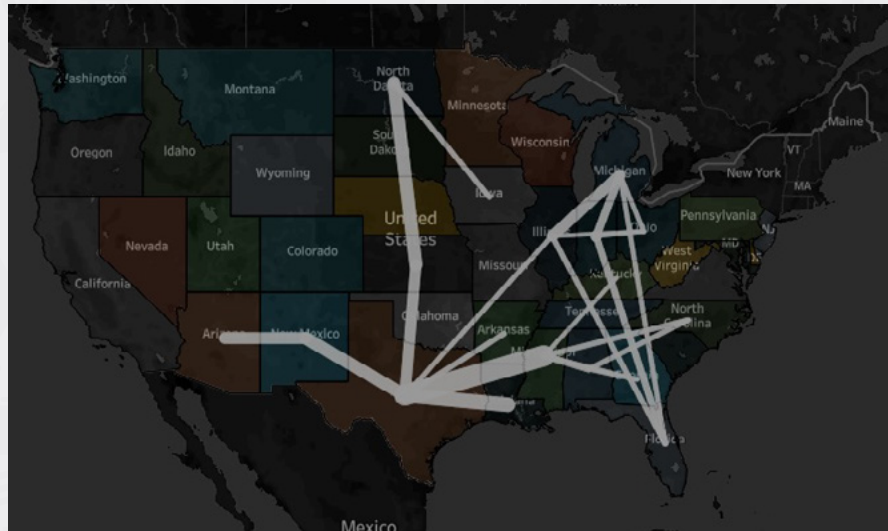
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APPENDIX (cont.)



2025 Projected Carbon Dioxide Pipelines



<https://decarbamerica.org/interactive-maps/carbon-dioxide-pipelines/>



Hazardous Waste





EXECUTIVE SUMMARY

Wisconsin has been a leader in hazardous waste minimization and management, hazardous waste cleanup, and identifying emerging contaminant issues. The state has a strong history of pollution prevention programs and activities, such as removing mercury from schools. The impact of those early activities is evident in today's hazardous and solid waste management programs and the Wisconsin Department of Natural Resources Green Tier program, the first of its kind in the country. Green Tier is a nonregulatory voluntary program to support businesses, local governments/communities, and other organizations in doing more than regulations require, going beyond compliance, and documenting their efforts with annual audits and reports. As the United States moves to 'green technologies,' there is a demand for the critical minerals needed to produce them. Both the recovery and recycling of critical minerals in waste reduce the need for mining.

BACKGROUND

The quote, "nothing in this world is certain except death and taxes," was attributed to Benjamin Franklin, who should have thought to add 'and waste'. In a world of 8.1 billion, waste is a certainty and managing waste is critical to human health and environmental protection (2). The Resource Conservation & Recovery Act created the framework—Subtitle C (hazardous) and Subtitle D (non-hazardous)—for America's waste management programs. Nationally, almost 300 million tons of Subtitle D municipal solid waste (MSW) were generated in 2018 (3). In 2019 about 30 million tons of RCRA Subtitle C hazardous waste (roughly 10% of MSW by weight) was generated and managed in the US (4). Even though hazardous waste is strictly regulated, the potential still exists for spills.

Hazardous wastes are either specifically listed as hazardous by EPA or a state, or exhibit one or more characteristics: ignitability, corrosivity, reactivity, or toxicity. The hazardous waste identification process is shown in Figure 1 (5). If a waste is hazardous, it is by definition subject to EPA's RCRA Subtitle C regulations. RCRA Subtitle C requires 'cradle to grave' management and provides the critical foundation needed to protect human health and the environment. Wastes excluded from solid waste regulation and wastes excluded from hazardous waste regulation can be found under for the Definition of Solid waste and Solid and Hazardous Waste Exclusions (6).

RCRA Subtitle C



CONDITION AND CAPACITY

In the US the quantity of RCRA hazardous waste generated ranged from 21.9 to 30.7 million tons per year from 2001 to 2019. The amount of waste ultimately land disposed ranged from 16.1 to 25.4 million tons. The portion disposed of in landfills or surface impoundments ranged between 3.7 and 9.9 percent, while the land application and land treatment categories represented a very small percentage (0.8 percent or less). Over that same period, the US economy grew by 43.5 percent as measured by real GDP and the US population grew by 15.2 percent. RCRA hazardous waste generation per capita decreased by 3.3 percent in the US, while RCRA hazardous waste generation per dollar of GDP decreased by 22.4 percent. The vast majority of wastes are disposed of, with smaller proportions sent for material recovery (metals, solvents); energy recovery; treatment; or stored for future disposal (7).

The Department of Natural Resources (DNR) is responsible for managing hazardous waste in Wisconsin. Wisconsin was #15 on the top 20 list of states generating hazardous waste (274,000 tons) in 2019 (4). There are approximately 11,000 businesses, schools and government institutions that generate varying quantities of hazardous waste (8). The amount generated per capita and per dollar of GDP has declined as shown above.

There is a tremendous amount of hazardous waste management information posted on EPA's website. Appendix 1 and (9) contain the list of information and

links to Program Areas, Regulations for Specific Wastes, and Initiatives for Special Projects.

National Capacity Assessment

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), was amended by the Superfund Amendments and Reauthorization Act including provisions under Section 104(c)(10) that require states to assure the availability of hazardous waste treatment or disposal facilities that have adequate capacity to manage the hazardous waste expected to be generated within the state over 20 years, before EPA can provide any federal remedial action funding to the state. The Agency's 2019 assessment of the availability of capacity for the treatment and disposal of hazardous waste generation, as documented in the 2019 National Capacity Assessment Report, indicates that there exists adequate capacity nationwide through the year 2044 (10).

Federal Cleanup Initiatives Administered by Wisconsin Department of Natural Resources

The four key federal contaminated land cleanup programs utilized in Wisconsin are: (a) the Superfund program; (b) the Resource Conservation and Recovery Act (RCRA) leaking underground storage tank (LUST) program; (c) federal brownfields programs; and (d) the RCRA program to clean up hazardous waste sites. The programs are administered by DNR's Remediation and Redevelopment program (11).

The cleanup of hazardous substance discharges and environmentally contaminated land in Wisconsin is regulated through a combination of federal and state laws. Wisconsin statute, Chapter 292, regulates remedial action at sites with discharges of any substance which may pose a substantial threat to human health or the environment. The DNR implements the state's direct-response programs, establishes standards and implements federal programs in cooperation with the EPA. DNR's Remediation and Redevelopment Program integrates all aspects of the cleanup process. The majority of cleanups underway are being financed by the property owner and managed by DNR. When responsible parties do not finance the cleanup, DNR can allocate state and federal funds to do so. There are also financial assistance programs available (11).

Overview of Brownfields, Contaminated Properties and Spills

A "brownfield" is defined as an abandoned, idle or underused commercial or industrial property where expansion or redevelopment is hindered by real or perceived contamination. The Remediation and Redevelopment program staff can assist affected parties such as business owners, private land owners, lenders, tenants and local units of government to understand their obligations, provide technical expertise and help identify available financial resources. Fees apply for some of these services (11).

Since 1998, the State of Wisconsin has provided grants totaling \$121.4 million to private industry and local governments to assist brownfields investigation, cleanup and redevelopment. When local and federal brownfields-specific incentives are included, the total is \$162 million. A UW-Whitewater study, "The Economic and Fiscal Impact of Wisconsin's Brownfield's Investments", assessed the economic and fiscal impacts of Wisconsin investing public funds into cleaning up and reusing brownfields properties. The principal finding is that the Wisconsin's modest investment in brownfields programs over the last 17 years has translated into the leveraging of private and other public investment totaling 14 times the state's investment into Wisconsin's economy. Redevelopment of these brownfields properties also directly and indirectly created or resulted in the

retention of 54,483 permanent jobs. As a result, the citizens of Wisconsin have gained numerous economic, community and environmental benefits (12).

Superfund

Superfund includes three cleanup components: (a) an emergency response program for sites posing an immediate and substantial danger; (b) a site assessment program to evaluate potential Superfund sites; and (c) a remedial action program for longer-term cleanup remedies (13).

There are thirty-six sites National Priority List sites in the State of Wisconsin. Information is available about the status of each site (14). The 2020 Infrastructure Report Card indicated that one was in the remedial design/remedial action phase, one was in the remedial investigation/feasibility study and 28 were working towards reaching the Sitewide Ready for Anticipated Use performance measure and delisting (15 p. 49). As expected, increased funding would make it possible to complete additional remediation projects. PFAS is an emerging contaminant, one where several PFAS compounds have been designated as hazardous substances. That is expected to put a major demand on hazardous waste management and other environmental programs. At this time, the total costs to clean up PFAS-contaminated sites are unknown.

Leaking Underground Storage Tank Program

The federal leaking underground storage tank (LUST) trust fund was established in 1986 to provide funding for states to manage the cleanup of leaks from underground petroleum storage tanks. EPA provides federal funding to states to manage the cleanup at LUST sites. DNR acts as the lead state agency in all cleanup actions and is the state recipient of the EPA LUST grant. DNR is authorized to enforce owner-financed cleanups at LUST petroleum spills and at any non-petroleum spills and to manage cleanups in cases where the owner is unknown or cannot or will not finance the necessary action. As with the Superfund program, actual cleanups are carried out by private contractors. Federal funding provides 90% of the cost of implementing the LUST program and the state must pay the remaining 10% (11).

Wisconsin DNR Green Tier Program (1)

To oversimplify, there are two sides to DNR (carrot and stick)—the regulatory/enforcement side (the stick) and the nonregulatory/support business (carrot) side. Green Tier, the first program of its kind in the country, is a nonregulatory voluntary program designed to support businesses, local governments/ communities, and other organizations that are dedicated to going beyond compliance to achieve superior environmental performance through continual improvement. Green Tier participants work to minimize their environmental footprint and do more than what permits and regulations require. They document their efforts with annual audits and reports to identify opportunities for improvement, fix problems and verify progress (1).

Features of Green Tier include:

- Participants have an environmental management system (EMS) at the functional equivalent of ISO 14,001 in place.
- The EMS is audited regularly and improvements measured.
- There is a commitment to going beyond compliance to superior environmental performance.

- A company is matched with a DNR employee who functions as a single point of contact for information and assistance.
- Each participant gives a commitment to solve environmental issues and share best practices.
- There are three levels—Tier 1, Tier 2, and Charters.

As of January 9, 2024, there are 42 participants in Tier 1, which includes a total of 154 facilities. There are also 8 participants in Tier 2, which includes a total of 12 facilities, and seven Charters with 186 signatories. Information on each, including descriptions and annual reports can be found on the Green Tier website.

The potential benefits of the Green Tier Program's systematic approach include less pollution, reduced energy, reduced costs, reduced liability, improved operations and support for innovation. The annual reports for Green Tier Program participants describe their specific benefits and experiences (1). Green Tier offers the opportunity to promote sustainable development, improve management of our natural resources, as well as our economic and institutional assets.

PUBLIC SAFETY; RESILIENCE; INNOVATION

The Green Tier program Tier 1, Tier 2 and Charter participants and their public commitments and data provide specifics of the many environmental and business benefits with which to defend the public safety aspects of this program. Wisconsin's many programs committed to waste minimization; continuous environmental improvement; measuring and reducing wastes, energy and costs; and sharing information with others provide a foundation for resilience, as well.

There are, however, a number of emerging contaminants of concern, including pharmaceuticals and personal care products, per- and polyfluorinated alkyl substances and agricultural pesticides (16). Much is unknown about the threat to human health or the environment for these

products. Research will be required to clarify these issues.

Wisconsin may have an opportunity to demonstrate innovation. On May 20, 2024 the U.S. EPA announced more than \$8 million in grant awards to the Wisconsin Department of Employment and Economic Development to expedite the assessment and cleanup of brownfield sites in Wisconsin while advancing environmental justice. These investments through EPA's Brownfields Multipurpose, Assessment, and Cleanup and Revolving Loan Fund grant programs have the potential to transform once-polluted, vacant, and abandoned properties into community assets in overburdened communities (17).

OPERATIONS AND MAINTENANCE; FUNDING

The environmental management account receives revenues primarily from several state solid waste tipping fees paid by Wisconsin landfills for each ton of solid waste disposed in the landfill. State tipping fees total \$12.997 per ton including \$9.64 deposited in the environmental management account (18). This account consists of: (a) the nonpoint account, and (b) the environmental management account, which primarily supports DNR

programs related to recycling, groundwater, and cleanup of contaminated lands. In 2018-19 DNR had 114.5 staff and appropriations of \$11.9 million to administer this work (12). In 2021-22 DNR had 104.5 staff and solid waste tipping fees of about \$15 million in the environmental management account. Staffing appears to have dropped (18).

FUTURE NEEDS

Circular Economy Strategies - United States Geological Survey (USGS) List of 50 Critical Minerals (19)

USGS released a new list of 50 mineral commodities critical to the U.S. economy and national security after an extensive multi-agency assessment. “Critical minerals play a significant role in our national security, economy, renewable energy development and infrastructure,” said Tanya Trujillo, Assistant Secretary of the Interior for Water and Science. “USGS data collection and analysis, scans the horizon for emerging issues in crucial supply chains, and every three years identifies the nation’s current vulnerabilities to potential disruptions.” The list of 50 critical minerals is in Appendix 2 below. (19).

Extracting critical minerals from waste streams is one of a number of solutions that several federal agencies, (Department of the Interior’s USGS and Office of Surface Mining; Reclamation and Enforcement, the Department of Energy, and the Environmental Protection Agency), research institutions and public/private ventures in the U.S. are pursuing from various recycling and reprocessing programs (20). Because recycling has associated costs of collection, sorting and separation infrastructure, there is an urgent need to implement policies and regulatory frameworks to encourage higher recycling rates (21).



Hazardous Waste



RECOMMENDATIONS TO RAISE THE GRADE

- Increase state funding to eliminate the backlog of unfunded remedial actions.
- Evaluate and address staff shortages and training gaps throughout the Wisconsin DNR.
- Establish a protective and scientifically sound regulatory framework for managing PFAS remediation.
- Support and grow the successful Green Tier Program in communities and environmental and other volunteer organizations.
- Evaluate the chemical composition of waste streams for critical mineral content.

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Hazardous Waste



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Hazardous Waste



APPENDIX 1. USEPA. Hazardous Waste (9)

Program Areas

- About Hazardous Waste
- Corrective Action
- Generators
- Identification
- Import and Export Requirements
- Land Disposal Restrictions
- Permitting for Treatment Storage and Disposal Facilities
- Recycling
- State Authorization
- Test Methods (SW-846)
- Transporters

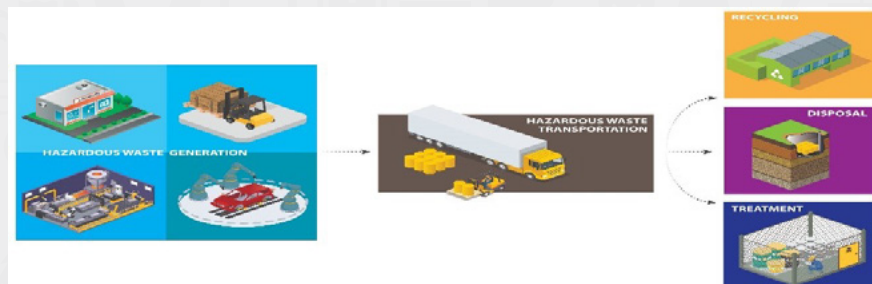
Regulations for Specific Wastes

- Academic Laboratory Wastes
- Cathode Ray Tubes (CRTs)
- Hand Sanitizer
- Household Hazardous Waste
- Mixed Radiological Wastes
- Pharmaceutical hazardous wastes
- Polychlorinated Biphenyls (PCBs)
- Solar Panel Wastes
- Solvent-Contaminated Wipes
- Special Wastes
- Universal Waste
- Used Oil

Initiatives and Special Projects

- Used Drum Management and Reconditioning
- Addressing PFAS Under RCRA
- Management of Used Lithium-Ion Batteries
- Modernizing Public Notice for RCRA Hazardous Waste
- Reducing the Open Burning and Open Detonation of Waste Explosives
- Revised the Import-Export Regulations
- Leading the Electronic Manifest Initiative

Cradle-to-Grave Management of Hazardous Waste





**Hazardous
Waste**



APPENDIX 2. US Geological Survey 2022 List of Critical Minerals (16)

Aluminum, used in almost all sectors of the economy; Antimony, used in lead-acid batteries and flame retardants; Arsenic, used in semi-conductors; Barite, used in hydrocarbon production; Beryllium, used as an alloying agent in aerospace and defense industries; Bismuth, used in medical and atomic research; Cerium, used in catalytic converters, ceramics, glass, metallurgy, and polishing compounds; Cesium, used in research and development; Chromium, used primarily in stainless steel and other alloys; Cobalt, used in rechargeable batteries and superalloys; Dysprosium, used in permanent magnets, data storage devices, and lasers; Erbium, used in fiber optics, optical amplifiers, lasers, and glass colorants; Europium, used in phosphors and nuclear control rods; Fluorspar, used in the manufacture of aluminum, cement, steel, gasoline, and fluorine chemicals; Gadolinium, used in medical imaging, permanent magnets, and steelmaking; Gallium, used for integrated circuits and optical devices like LEDs; Germanium, used for fiber optics and night vision applications Graphite , used for lubricants, batteries, and fuel cells; Hafnium, used for nuclear control rods, alloys, and high-temperature ceramics; Holmium, used in permanent magnets, nuclear control rods, and lasers; Indium, used in liquid crystal display screens; Iridium, used as coating of anodes for electrochemical processes and as a chemical catalyst; Lanthanum, used to produce catalysts, ceramics, glass, polishing compounds, metallurgy, and batteries; Lithium, used for rechargeable batteries; Lutetium, used in scintillators for medical imaging, electronics, and some cancer therapies; Magnesium, used as an alloy and for reducing metals; Manganese, used in steelmaking and batteries; Neodymium, used in permanent magnets, rubber catalysts, and in medical and industrial lasers; Nickel, used to make stainless steel, superalloys, and rechargeable batteries; Niobium, used mostly in steel and superalloys; Palladium, used in catalytic converters and as a catalyst agent; Platinum, used in catalytic converters; Praseodymium, used in permanent magnets, batteries, aerospace alloys, ceramics, and colorants; Rhodium, used in catalytic converters, electrical components, and as a catalyst; Rubidium, used for research and development in electronics; Ruthenium, used as catalysts, as well as electrical contacts and chip resistors in computers; Samarium, used in permanent magnets, as an absorber in nuclear reactors, and in cancer treatments; Scandium, used for alloys, ceramics, and fuel cells; Tantalum, used in electronic components, mostly capacitors and in superalloys; Tellurium, used in solar cells, thermoelectric devices, and as alloying additive; Terbium, used in permanent magnets, fiber optics, lasers, and solid-state devices; Thulium, used in various metal alloys and in lasers; Tin, used as protective coatings and alloys for steel; Titanium, used as a white pigment or metal alloys; Tungsten, primarily used to make wear-resistant metals; Vanadium, primarily used as alloying agent for iron and steel; Ytterbium, used for catalysts, scintillometers, lasers, and metallurgy; Yttrium, used for ceramic, catalysts, lasers, metallurgy, and phosphors; Zinc, primarily used in metallurgy to produce galvanized steel; Zirconium, used in the high-temperature ceramics and corrosion-resistant alloys (16).



Inland Waterways





EXECUTIVE SUMMARY

Wisconsin's major inland waterway corridor is the Mississippi River, which provides 213 miles of navigation channels maintained by the U.S. Army Corps of Engineers (USACE). In 2021, 26.8 million tons of cargo were transported over barges on this "freight highway." Locks and dams along the inland waterways are now asked to perform beyond their intended design life. Additionally, since the early 2000s, the percentage of vessels experiencing delays has increased from 6% to 43%, and the average delay per lockage has risen from 26 to 93 minutes. The minimal available funding has only kept the locks and dams functional with component replacements. However, the increased frequency of scheduled and unscheduled maintenance work has decreased system performance. Major rehabilitation of these structures with increased, predictable funding is needed to ensure long-term durability.

INTRODUCTION

Inland waterways consist of the navigation channels and associated structures—including locks, dams, training structures to keep river flow within the navigation channel, and navigational aids—that support commercial transport of materials between ports, terminals, or other locations, primarily by river barge. Barge transport provides a fuel-efficient way to move goods across the country. A barge can move goods four times farther than trucks and one-third farther than trains using the same amount of fuel. [2] Nationally, 60% of grain exports and 20% of the coal used to generate electricity are moved on inland waterways. [3] In Wisconsin in 2021, 26.8 million tons of cargo, composed primarily of food products, were transported along the Mississippi River. Other transported products included chemicals, bulk materials, and manufactured goods. [4] River transport accounted for 3.5 million tons of agricultural exports and import of 1.4 million tons of various goods for the Wisconsin counties adjacent to the river and the corresponding Minnesota

counties across the river in 2021. [5]

The Mississippi River is the only significant commercial waterway currently operating in Wisconsin. USACE operates and maintains 213 miles [6] of the Mississippi River in Wisconsin as a "water highway" for freight. This section of waterway includes nine locks and dams [2] operated by the USACE St. Paul District, and Lock and Dam #11 (Dubuque, Iowa), which is operated by the USACE Rock Island District (Figure 1). Prior to 2004 [7], the Detroit District USACE operated nine dams and 17 locks [8] along the Fox River entering Green Bay, but that waterway has not been commercially operational since 2015 when the Menasha Lock was closed to prevent the spread of round goby, an invasive fish. [9] The USACE Chicago District is now responsible for the Fox River projects and an electric fish barrier is currently being considered for this location. [9]

Figure 1. Portion of Upper Mississippi River and Illinois Waterway Map from USACE [10]

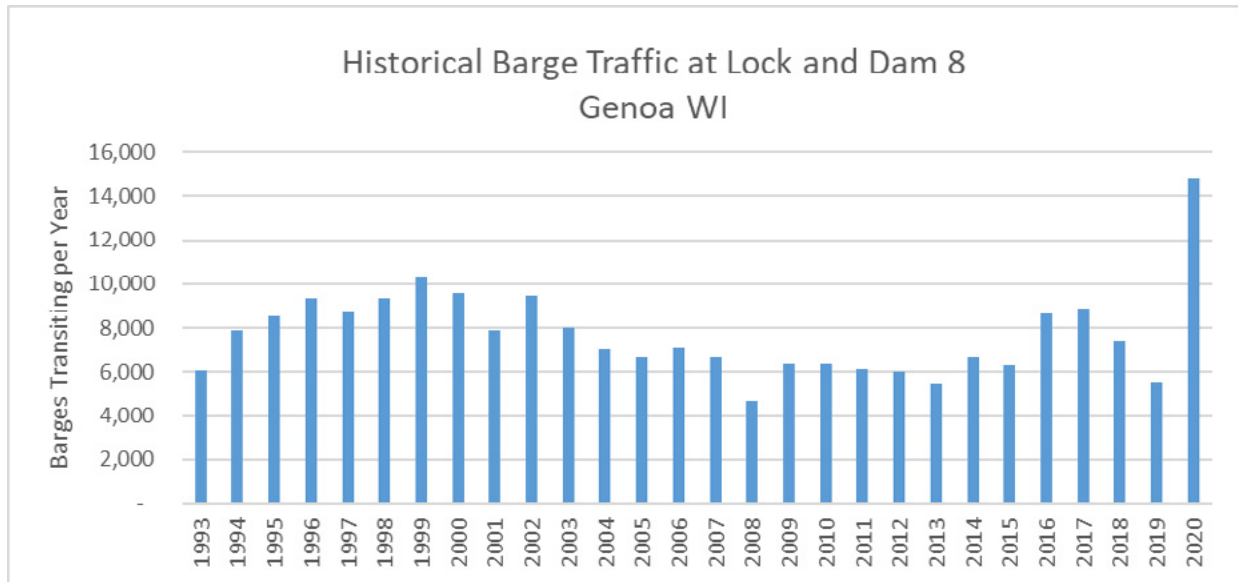


CAPACITY

Until recently, freight traffic on the Mississippi River waterway in Wisconsin, north of Lock and Dam 11, had generally declined since usage peaked in 1999, when over 10,500 barges carried approximately 18.4 million tons. Figure 2 presents annual traffic at Lock and Dam 8. Barge traffic has recently rebounded somewhat, at least in part due to increased transport of corn and soybean harvests [11]. In 2016 and 2017 an average of 9,000

barges passed through the locks each year, carrying 15.8 million tons of freight. After two moderate years in 2018 and 2019, barge traffic in 2020 exceeded the 1990s highs, with over 14,000 loaded barges on average passing through the system. Assuming the traffic in the 1990s represents the system capabilities, usage during a normal year is currently about 85% of capacity, but high traffic years (such as 2020) can exceed these levels.

Figure 2. Annual Barge Traffic at Lock and Dam 8 [1]



Delays at locks due to heavy traffic and/or maintenance closures increase the cost of shipping goods along the waterways. Between 2001-2010 and 2016-2020, the percentage of vessels experiencing delay increased from 6% to 43% and average delay per lockage increased from

26 to 93 minutes. [1] The deteriorating condition of the locks and dams requires results in increased need for maintenance, exacerbating delays and, ultimately, increasing shipping costs.

CONDITION

Most of the locks and dams along the Mississippi River were built in the 1930s with an expected 50-year lifespan. Four of the ten 10 locks and dams were refurbished in the 1990s and the rest in the early 2000s. The most recent refurbishment project, Lock & Dam 8, was 20 years ago. [12] Many, if not all, of the locks in this river area require extensive overhaul. Targeted funding allowing component replacement has temporarily kept the locks and dams functional, but major rehabilitation

is needed to ensure long-term durability by extending facility life. [13] [14] The current state of the Mississippi River locks and dams has increased delays (Table1); all the locks and dams have continued to increase wait periods and number of tows delayed. [1] The lack of funding prevents dredging practices as often as recommended by the USACE. [16] Table 1 shows the condition of the locks and dams based on the number of vessels delayed at the lock.

Table 1: Condition of Locks and Dams on Mississippi River

Lock and Dam	Last Refurbished in	Average tow delay (hours) ^a	
		2011-2015	2016-2020
3	1991	1.0	1.7
4	1994	0.8	1.3
5A	2000	0.7	1.9
5	1998	0.7	1.7
6	1999	0.7	1.6
7	2002	2.9 ^c	1.5
8	2003	1.1	1.5
9	2003	0.8	1.3
10	2000 ^b	0.6	1.2
11	2008	1.6	1.9

a - From USACE Public Lock Usage Files [1]

b - Date not provided by USACE

c- Lock and Dam 7 experienced anomalously high wait times in 2012 and 2013

FUNDING

Construction and rehabilitation costs for inland waterways, including locks, are shared by the federal government through the U.S. General Fund and by users through the Inland Waterways Trust Fund (IWTF). The IWTF is supported by a 29-cents-per-gallon tax on barge fuel and is used as the non-federal match for federal appropriations. In April 2015, this user tax was increased by nine cents for the first time since 1995 upon the urging of the Inland Waterways Users Board—a group composed of industry representatives who monitor the use of the IWTF—with the aim of increasing potential investment in the system. Federal projects are authorized through the biennial Water Resources Development Act and federal funding comes through annual appropriations. Operation and maintenance costs for inland waterways are covered in full by the federal government.

The USACE has initiated the Civil Works Public-Private Partnerships Pilot Program to investigate the viability of new methods that significantly reduce the cost and duration of project delivery “by providing significant up-

front funding, leveraging appropriations while optimizing local participation, and promoting risk sharing in project delivery”. [17] One of the four initial pilot projects is the Brazos Island Harbor Channel Improvement Project in Texas, which would incorporate investment from at least three private entities to deepen the Port of Brownsville ship channel and construct additional measures.

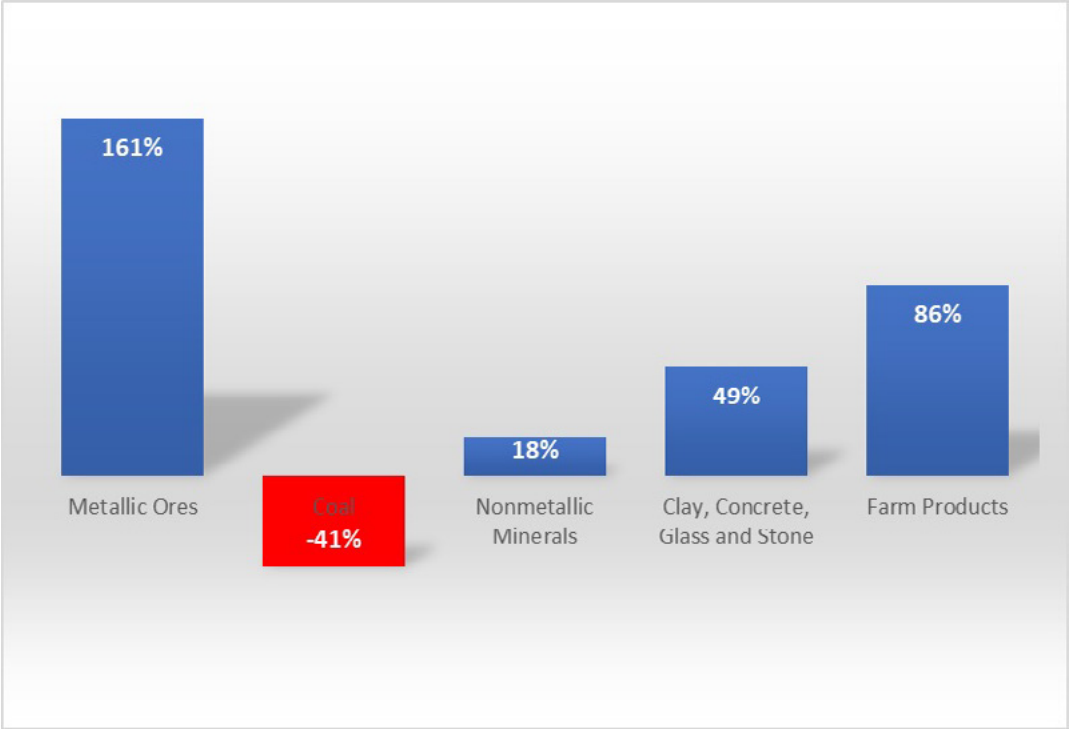
Repair funding depends upon an appropriations process that can result in variable or erratic funding levels from year to year, which has been implicated in contributing to construction delays in high profile inland navigation projects [18]. Historically, the lack of consistent, reliable funding has affected system operations and maintenance and the implementation of major rehabilitation needed to keep the Mississippi River operating at an acceptable level of performance. The USACE currently uses asset management techniques to focus funding based on risk and consequences of failure. This approach focuses on reliability as opposed to “significant facility life extensions”. [13]

FUTURE NEEDS

Overall, the Wisconsin Department of Transportation (WisDOT) State Freight Plan, last updated in 2023, [14] foresees increases of 30.6% and 43.7% in the weight and value, respectively, of waterborne freight transported between 2017 and 2050. The previous version of the same report [16] projected differential changes in the

transport of several commodities as shown in Figure 3. The impacts of these changes on inland waterway transport are not clear, as a large portion of this transport would occur at Great Lakes ports, but it can be inferred that there is potential for increased demand for barge transit in the future.

Figure 3. Projected Growth in Wisconsin Waterborne Freight by 2040 [16]



According to the USACE, despite increased funding for component replacement:

“Operations and Maintenance and Major Rehabilitation Programs are unable to adequately fund maintenance activities to ensure the navigation system operates at an acceptable level of performance.” [13]

Even with ongoing rehabilitation, most of the dam gates

in the system are over 80 years old and until they are replaced the risk of failure in the ability to hold the navigation pools will increase.

Increased funding would be required for the rehabilitation necessary to significantly extend the life expectancy of the existing lock and dam structures. USACE staff is currently developing a dam gate recapitalization plan for the system. No new locks or dams are planned.

OPERATION AND MAINTENANCE

Operation and maintenance (O&M) include actions at the lock and dam structures as well as channel dredging to maintain the 9-foot channel depth. [19] The USACE Operation and Maintenance Budget for Fiscal Year (FY) 2024 allotted \$93 million for O&M and channel improvement along its portion of the Mississippi River, including \$17 million for maintenance from the Infrastructure Investment and Jobs Act (IIJA). [19] Prior years' allocations were \$108 million (FY 2022) and \$102 million (FY 2023), with FY 2022 including \$10 million in IIJA funds. At current levels of appropriations, many channels are not dredged as often as the USACE recommends. [16]

The USACE is in the process of replacing the miter gates on Locks and Dams 3 – 10. [15] New miter gates were installed at Locks and Dams 5A and 8 in 2022. [15] The installation of new gates at Lock and Dam 10 is planned for FY 2024, and the gates for Locks and Dams 6 and 7 are scheduled for 2025. The design of gates for Locks and Dams 3, 4 and 5 is underway.

Note that the USACE allocated \$7.716 million in FY 2023 for O&M and certain other work activities along the Fox River waterway system. The Fox River is no longer used commercially, but recreational use continues. The USACE has turned control of the locks over to the Fox River Navigational System Authority. [7]

PUBLIC SAFETY

Reduced efficiency or, in the most extreme case, system closure would result in an increased reliance on trucks to transport goods over long distances. Increased truck traffic would likely increase the need for road repairs and the incidence of crashes on roadways in Wisconsin and

elsewhere. Also, due to the efficiency of cargo transportation by barge over trucks, failures along the waterway would be expected to increase transportation costs and greenhouse gas emissions.

RESILIENCE & INNOVATION

The USACE budgeting process considers risk to project performance when prioritizing repair and improvement projects on the waterway system nationwide. In March 2016, the USACE issued the report *Technologies to Extend*

the Life of Existing Infrastructure to disseminate best practices regarding life-cycle maintenance management, innovative technologies, and emerging capabilities at USACE locks and dams. [20]





Inland Waterways



RECOMMENDATIONS TO RAISE THE GRADE

- Consider allowing USACE contract authority for projects or developing some other appropriate mechanism to avoid the stop-and-start of construction currently happening because of erratic funding.
- Fund waterways projects to the authorized levels and do so consistently, passing a Water Resources Development Act on a two-year cycle.
- Ensure full utilization of the Inland Waterways Trust Fund by providing matching federal appropriations and increasing funding for operations and maintenance each year.
- Utilize alternative financing and delivery methods, such as public-private partnerships, when appropriate.

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Inland Waterways



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Ports





EXECUTIVE SUMMARY

Wisconsin's port infrastructure – with 29 harbors and eight major ports – facilitates both safe and efficient transportation of cargo and people. The system generates over \$1 billion of economic activity and reduces road congestion, offering an alternative to heavier-polluting land freight movement. Ports in the state are in fair to good condition but show general signs of deterioration that require attention. Some infrastructure elements, including facility resiliency to changing environmental conditions, exhibit significant deficiencies in conditions and functionality, increasing vulnerability to risk. Approximately \$129 million was invested in port infrastructure from 2018-2022, with an additional \$74 million planned after 2022. Current funding levels are satisfactory for existing needs. Environmental challenges, however, such as lake level changes and severe weather events, require increased attention to maintain resilience. Wisconsin ports are exploring improvements in vehicle electrification and the beneficial use of dredge material. Cruise lines for tourists have been added to two ports in Wisconsin. Wisconsin's port infrastructure meets the state's needs but will require ongoing investment and strategic planning to adapt to future changes and challenges.

BACKGROUND

Ports are a unique type of infrastructure that are managed locally by the port and applicable port district, but impact the economy of the entire state through the competitive importing and exporting of goods. According to an economic impact study of maritime shipping in the Great Lakes completed in 2023 (Martin Associates, 2023), maritime shipping resulted in 6,792 jobs and generated \$1.4 billion in economic activity for the state of Wisconsin.

Shipping is a safe, efficient, and integrated multimodal transportation system in Wisconsin. As such, increasing maritime activity would provide economic, social, and environmental benefits. Transportation of goods by water supports environmental sustainability by moving

more freight with less fuel, which in turn reduces greenhouse gas emissions and improves air quality. Increase of port activity may need to consider impacts to abutting communities to support consideration of environmental justice issues. Additional maritime activity would also help reduce highway congestion and increase the capacity of the transportation network in Wisconsin.

Wisconsin has 29 harbors with commercial and recreational activities. Of these, there are eight major ports with significant commercial activities, three of which are located on Lake Michigan (Milwaukee, Manitowoc, and Sturgeon Bay), two on Green Bay (Marinette and Green Bay), two on the Mississippi

River (Prairie du Chien and La Crosse), and one on Lake Superior (Duluth-Superior). This evaluation of Wisconsin’s port infrastructure largely focused on these eight ports. The other 21 harbors support recreational and smaller commercial activities which provide benefit to their local communities such as tourism, commercial and charter fishing, and public access to lake and waterfront.

Wisconsin ports encompass a range of public infrastructure categories. These generally include bulkheads, dockwalls, piers, buildings, navigational channels, roadways, rail systems, utilities (storm, sanitary, electrical), fencing, and lighting. For the purposes of this study, Wisconsin port infrastructure was assessed as an overall combined system supporting port activities, which include importing and exporting

goods and materials, marine vessel construction and repair, and waterway public transportation. Also worth noting is that, generally, Wisconsin ports are structured as land lease operations whereby port lands (controlled by a public entity) are leased to operators who in many cases build and maintain the port structures. Some port governments have operations that are leased to a private entity that utilize structures and equipment owned by the port. In many cases, the public port entity is responsible for maintenance of infrastructure such as dockwalls, roads, and utilities. The following assessment of Wisconsin port infrastructure is intended to broadly encompass the various private and public activities composing the overall port operation and associated infrastructure.

CONDITION AND CAPACITY

Wisconsin port infrastructure is generally considered to be in fair and serviceable condition. A significant amount of the dockwalls and harbor protective systems like breakwaters and jetties were originally constructed between the 1930s and 1960s. Much of this infrastructure has progressed to a later stage of its service life and major rehabilitations and replacements will be necessary in the coming decades. No significant repairs or rehabilitations are being deferred. However, some routine maintenance or dredging is being deferred.

Wisconsin ports typically handle a diverse array of cargo, including dry and liquid bulk materials, breakbulk, oversize, and critical cargos. Additionally, Wisconsin ports support vessel construction and maintenance industries as well as ferry and cruise ship services. The table below lists the eight ports that were evaluated for this Report Card. The ports were characterized by their annual cargo shipped and received (2021 data).

Table 1 - Cargo Tonnage by Port

Port	Annual Cargo Shipped/Received ¹ (tons)
Superior (Duluth) ²	32,500,000
Milwaukee	2,400,000
Green Bay	2,200,000
La Crosse	1,000,000
Prairie Du Chien	1,000,000
Manitowoc	194,000
Marinette (Menominee)	152,000
Sturgeon Bay ³	0

1. Data derived from USACE, Detroit District Harbor Factsheets and Wisconsin Commercial Ports Association. Data generally reflects 2021 values.

2. Cargo data for Superior is shared between Port of Superior, Wisc., and Port of Duluth, Minn.

3. Port of Sturgeon Bay primarily supports ship building and maintenance industry and has little import/export activity

Most of the Wisconsin port import/export activity occurs at the Port of Duluth-Superior, which is shared with the state of Minnesota. The Superior portion of this port moves more commodities than all of the other ports

in Wisconsin combined. Major exports from Duluth-Superior include iron ore and coal. This port, in addition to the seven others evaluated, was identified as having sufficient capacity.

OPERATIONS AND MAINTENANCE; FUNDING AND FUTURE NEED

Port owners/operators implement a range of operation and maintenance plans. Maintenance and inspection schedules also vary based on the responsible party's level of activity. All the ports evaluated in this report see regular dredging performed by USACE to maintain federal channels as well as repairs to federal coastal structures.

capital investments over a five-year period (2018-2022) of about \$129 million. Funds committed for planned infrastructure projects over a five-year period after 2022 equaled about \$74 million. Table 2 summarizes these investment levels between two infrastructure categories: ports and terminals and waterway infrastructure. Note that these figures are applicable to Wisconsin's Great Lakes ports and do not include those ports on the Mississippi River.

According to a survey of infrastructure spending for the Great Lakes and St. Lawrence Seaway completed in 2023 (Martin Associates, 2023), Wisconsin reported

Table 2 - Fixed Asset Capital Investments, Public and Private Sectors

	Actual Funding (2018 – 2022)	Funds Committed (Post-2022)
Ports & Terminals	\$80,597,940	\$72,865,000
Waterway Infrastructure	\$48,120,764	\$1,200,000
Total	\$128,718,704	\$74,065,000

Source: Infrastructure Investment Survey of the Great Lakes and St. Lawrence Seaway System, Martin Associates, December 2023

A significant source of Wisconsin's port maintenance and improvement funding is the Harbor Assistance Program (HAP). This program, administered by WisDOT, provides grant funding to 29 eligible ports for dock reconstruction, mooring structure replacement, dredging, and the construction of certain port facilities. Both public and private entities within the eligible ports may receive HAP funding, which requires a 20% grant match. According to WisDOT sources, as of 2023 the program has provided 154 grants worth over \$220 million since its start in 1980.

sources, the program has provided 218 grants worth over \$120 million since its start in 1987, with only one port-related project funded in 2002.

A second source of state funding administered through WisDOT is the Transportation Economic Assistance (TEA) Program, which provides matching state grants to governing bodies for infrastructure projects, including harbor projects. The purpose of the program is to help attract businesses to set up in the state or entice existing businesses to expand. This grant program, which requires a 50% match, is not used as much as the HAP program for port infrastructure projects. According to WisDOT

Federal grant dollars have been successfully accessed for port infrastructure projects. As an example, in 2023 an agricultural maritime export facility was completed at Port Milwaukee. Port Milwaukee received a \$9.3 million award through the U.S. Department of Transportation's Maritime Administration via their Port Infrastructure Development Program (PIDP) to support funding for the project.

Overall, funding for the maintenance and improvement of Wisconsin ports, provided through a mix of federal, state, and local sources, is considered adequate for current needs.

Regarding future port needs related to infrastructure, Great Lakes cruise ship tourism continues to increase, bringing new and different ships to Wisconsin's ports. According to Cruise the Great Lakes, a regional cruise marketing program, cruise ships will make nearly 600

Great Lakes port visits in 2024 which includes Wisconsin ports such as Milwaukee and Green Bay. These port visits are double what they were a decade ago. These trends may require individual ports to evaluate the sufficiency of their infrastructure and make improvements to facilitate cruise ship visits. Additional future infrastructure needs are related to securing facilities and plans for sustainable

management of dredged material that incorporate beneficial use approaches. Disposal facilities such as the one in Milwaukee are nearing their capacity and additional locations or uses for dredge material will be necessary in the coming decade. USACE has identified an operational goal of putting 70% of dredged material into beneficial use.

PUBLIC SAFETY AND RESILIENCE

Most of Wisconsin's commercial ports have minimal public interaction and therefore do not present significant risks to public safety. Some limited public interaction exists where public parklands and waterways adjoin port spaces and operations. Vessels maneuvering into and out of ports come into proximity of recreational boaters. Upland port operations, such as trucking and rail transportation, interact with public activities. Two ports, Manitowoc and Milwaukee, host car-ferry operations, where greater numbers of people interact with port operations on a daily basis. However, in general, there is little evidence of impacts to public safety resulting from the condition of the state's port infrastructure.

The primary environmental factors with the potential to affect Wisconsin port infrastructure include extremes in lake elevations, storm-driven wind/wave events, and lake ice damage to waterfront facilities during winter months. Wisconsin ports vary in their susceptibility to these environmental factors as well as their approaches for preparing for, withstanding, and recovering from these conditions. Arguably, the most important environmental factor affecting port operations is extreme low water levels, which exacerbate dredging and dock repair activities and impact port operations by requiring reduced loading and draft of freight vessels. However, high lake levels, combined with more frequent and intense storms resulting from climate change, can also have major impacts on port infrastructure. For example, in January 2020, a major winter storm hit Port Milwaukee while lake levels were near record high levels, resulting in port flooding and over \$10 million in damage. Ports will need to identify coastal vulnerabilities to inform prioritization of sustainable solutions. USACE is currently leading a multi-agency study of coastal resiliency in the Great Lakes (Great Lakes Coastal Resiliency Study) that will serve as a key resource for ports to assess projected coastal conditions when constructing or replacing infrastructure.

The study is due to be completed around 2027.

The evaluation of port infrastructure completed for this Report Card did not find evidence that entities responsible for port infrastructure improvement are including sustainability requirements in infrastructure bids for design and/or construction. Some private port entities, such as the large boat builders and maintenance operators in Marinette and Sturgeon Bay, have sustainability policies and employ sustainability requirements in their operations. While these policies may encompass port infrastructure improvements, they would be limited to their specific facilities and operations. Additionally, there appears to be limited utilization of asset management plans or systems among public port operators.





Ports



RECOMMENDATIONS TO RAISE THE GRADE

To raise the ports infrastructure grade in Wisconsin, the following actions are recommended:

- Increase use of sustainability principles in design and construction of port infrastructure.
- Port owners and operators should utilize asset management to prioritize limited funding and pinpoint needed repairs.
- Support completion of the Great Lakes Coastal Resiliency Study being led by USACE and incorporate its results into port infrastructure planning, construction, and replacement activities.

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Public Parks





EXECUTIVE SUMMARY

Wisconsin's state and local park systems have suffered from neglect due to reductions in government funding at all levels. Wisconsin State Parks had a \$1 billion backlog of critical infrastructure needs as of early 2023. The Wisconsin Department of Natural Resources has used its limited resources to address water supply and wastewater issues. Still, it faces new treatment challenges like PFAS contamination of potable water sources. Milwaukee County Parks, for example, has a significant backlog of repair needs. Since the state legislature eliminated general fund revenue for state parks in 2015, the system has struggled to generate sufficient resources for operations from user fees, permits, and licenses. These mechanisms also inadequately facilitate capital budgeting and larger upgrade projects. State-imposed limits on local tax levies have also constrained the ability of local governments to fund their park systems. To improve Wisconsin park infrastructure performance, state and local governments need to develop new sources of park revenue. Changes could include reinstating general tax revenue funding, adding or increasing user fees, and applying sales and use taxes on specific items and businesses.

CONDITION AND CAPACITY

There are 6.6 million acres of publicly managed land available in Wisconsin for outdoor recreation; comprised of 1.75 million acres of national parks and forests, 1.82 million acres of State parks and forests, 0.21 million acres of private land trusts, and 2.86 million acres of County forests and other local parks³. The majority of this land is managed forests, which help support the timber industry and outdoor recreation. Wisconsin State Parks and trails total about 156,000 acres³.

The National Park Service (NPS) manages the Apostle Islands National Lakeshore in Lake Superior. In 2023, the NPS designated the 1200-mile Ice Age National Scenic Trail, and a 220-mile segment of the North Country Scenic Trail, which also passes through seven other states, as units of the National Park System⁴. The designation will not result in any immediate changes to the size or structure of the trails which already have access points, signage, operating budgets, superintendents,

staff, and dedicated volunteers. Thousands of volunteers contributed more than 150,000 hours to support trail preservation, maintenance, and education projects in 20224. It is hoped that the new designation will provide new revenue sources for the maintenance of the trails and acquisition of new off-road trail segments.

The Wisconsin Department of Natural Resources (WDNR) reports that the state has 15,000 lakes, 8,400 river miles and 6.6 million acres available for public recreation, comprising about 17 percent of the total area of the state^{1,2}. Wisconsin State Parks averaged 3.1 visits per state resident in 2017, well above the nation average of 2.5 visits per year^{1,3}. State Park visits increased substantially during the pandemic years and have remained close to those levels. The majority of available recreational area is in the northern part of the state, which has a much lower population density than the southeastern region, while the highest number of

park visits is concentrated in the southeastern region of the state.

The WDNR spent an average of \$3.39 per state resident on parks, which is the second lowest rate of all states; and \$1.09 per visit, lowest in the country, despite being ranked 17th nationally in participation^{1,3}. Wisconsin has the only state park system in the country that is funded almost entirely by user fees, licenses, and concessions.

The Wisconsin State Park system is comprised of 50 state parks, 39 state trails and 8 southern state forests. The state reported 22.2 million visits in 2021, a 27.2% increase over the 2019 total of 17.5 million visits³. This increase was attributed to the coronavirus pandemic, which brought more people outdoors to recreate. Park entry sticker sales, which are a key source of revenue for the parks, rose by 52.2% from 2019 to 2021; an increase driven by the pandemic³, and have remained at this level¹¹.

WDNR has a Statewide Comprehensive Recreation Plan (SCORP)², as required to participate in the Federal Land and Water Conservation Program (LWCF), an important source of funding for outdoor recreation. The LWCF provides matching grants that support acquisition of recreational assets.

Park infrastructure, including roads, bridges, visitor facilities and drinking water and wastewater system

have deteriorated over time, with the State, County, and local governments being challenged to keep up with maintenance, due to reduced or non-existent funding. The WDNR has placed a priority on maintaining and upgrading drinking water and wastewater infrastructure throughout the State Parks system.

Milwaukee County, which has previously won the National Gold Medal for Excellence from the National Recreation and Park Association¹², has been particularly challenged at maintaining existing facilities, such as the horticultural domes at Mitchell Park, due to the years of deferred maintenance and a lack of adequate funding⁵. The Milwaukee County Park system was established over 115 years ago and includes 158 parks and 11 parkways encompassing 15,325 acres. The Wisconsin Policy Forum's 2018 assessment of the condition of buildings and related infrastructure of the Milwaukee County Parks system rated the condition of most of the facilities as fair to poor⁶. In an open spaces plan prepared by Milwaukee County and the Southeastern Wisconsin Regional Planning Commission (SEWRPC), an estimated \$417 million over 25 years (in 2020 dollars) are needed to address deferred maintenance and capital improvements, and this does not include the funding needed for the Mitchell Park Domes¹².

OPERATIONS AND MAINTENANCE

Aging and dilapidated infrastructure have complicated the operation and maintenance of the Wisconsin State Park system. "We have 6000 (capital improvement) projects on the books, including failing fresh water and septic systems, roofs, bridges, buildings and much more" according to Steve Schmelzer, WDNR Parks Director. "Some of the water systems were built in the 1930's and have aged out." The problem is exacerbated by a 20% reduction in staff and a 43% increase in visitors in the past 15 years¹.

The Wisconsin Policy Forum (WPF) has documented an alarming backlog of infrastructure repair and replacement needs for the Milwaukee County Parks system. In a 2018 report entitled Delay of Game,

the WPF found that almost every form of Milwaukee County Parks infrastructure has pressing needs over the next 10 years, including 85% of parking lots and service yards, 75% of paved walkways, 73% of paved parkways, 54% of Oak Leaf Trail segments and basketball courts, 48% of tennis courts, 47% of large buildings, and the deterioration of the Mitchell Park Domes⁶. The Domes has its own set of challenges, with numerous studies completed or underway to determine whether to rehabilitate or replace the existing structures.

FUNDING AND FUTURE NEED

Funding for operations and infrastructure maintenance of the State Parks system has decreased in recent years, with occasional infusions of new funding as a result of state budget surpluses. The State Park system is funded almost entirely by user fees, licenses, and concessions. Support of the State Park system from general purpose revenue was ended by the 2015-2017 State budget³. Even as income from user fees, licenses, and concessions have increased, such as during the pandemic, the State Park system is not able to access the additional income without direct approval from the State legislature.

Federal grants during the pandemic, such as from the American Rescue Plan Act, were a big help to State, County, and local parks; however those grants are expiring, with no anticipation of additional grants being available. State Parks management has learned how to manage the system under these funding constraints, but has been forced to neglect needed infrastructure maintenance as a result of the funding shortfalls.

Milwaukee County Parks, which is the largest county park system in the state, are funded through the County tax levy, the amount of which has decreased, both in terms of amounts and as a percentage of the overall levy. Milwaukee County does not have an entry or user fee to access their park properties; but charges an entry or user fee for facilities such as museums, golf courses, and pools. The County has worked to generate additional revenue from concessions and event fees. This additional income is not enough to keep up with the needs of the system, which includes many structures built 60 or more years ago. Milwaukee County Parks has a goal of providing affordable access to underserved populations by maintaining free or low-cost entry for their assets.

Other County Park systems, such as Waukesha County and Washington County, charge a daily or annual entry fee for park visitors, in addition to concession and event fees.

RESILIENCE

Wisconsin parks are often located in areas that are most vulnerable to damage from extreme weather events, such as

Both systems have reduced costs by installing license plate readers at park entrances and developing more efficient systems for collecting annual park entry fees. This has allowed these park systems to better manage their needs for infrastructure maintenance. These park systems, along with Dane County, include a higher percentage of naturalized areas, compared to Milwaukee County Parks, allowing for less maintenance.

State and local parks systems and trails have benefited from the formation of non-profit, volunteer “Friends Groups” that help meet the needs for capital improvements and facility maintenance. There are 88 Friends Groups for the State Parks system, under the umbrella of the Friends of Wisconsin State Parks, that implement and fund park improvements and provide volunteer labor for a variety of maintenance activities. The State Parks Friends groups also have access to matching state grants through the Knowles Nelson Stewardship program, and to other grant sources, such as the Natural Resources Foundation. The State Park system relies heavily on the financial support and volunteer labor of Friends groups to supplement shortfalls in funding from the State.

County parks and trails have also developed Friends groups to provide financial support and volunteer labor in the face of revenue shortfalls. One example is an initiative by the Friends of the Mitchell Park Domes to obtain funding to rehabilitate the three dome structures and interconnecting building. The WPF, in their April 2024 report entitled “Natural Partners”, provides recommendations for Milwaukee County to partner with the Milwaukee Metropolitan Sewerage District (MMSD) and local cities and villages to address infrastructure maintenance and mutual beneficial improvements, such as storm water management¹².

flooding, wind, and ice storms. The severity and frequency of these types of events appears to have increased over the

last several decades, as has the costs of repairs. The WDNR maintains an emergency fund to deal with the damage to infrastructure caused by these types of events.

The WDNR has several sustainability initiatives underway, in keeping with their role as stewards of the State's natural resources. These initiatives have primarily focused on measures to mitigate climate change, and to prioritize Environmental Justice⁷. These measures are applied to infrastructure in the parks system by addressing storm water management and drinking water needs.

Green infrastructure measures are being implemented to address impacts from excess storm water runoff. However, budget shortfalls have limited the ability to make significant retrofits of existing facilities. The recent discovery of PFAS contamination in drinking water sources will have a significant impact on the DNR's infrastructure improvement efforts.

Many properties in the State Parks system are built around water resources, such as lakes and rivers. The

DNR has an overall goal of sustainable water resources management, including the provision of swimmable and fishable waters, and the support of public fishing. Park infrastructure includes boat launches and beaches, along with other supporting facilities that need to be managed in a sustainable and resilient manner, with safe drinking water and functioning wastewater disposal systems.

The Wisconsin State Park system responded to the initial surge of the Covid pandemic in 2020 by closing offices and buildings to the public, and allowing free entry to State Park properties. The pandemic drove a large increase in visitors to the parks, and necessitated capacity closures at some properties. Restrictions were also placed on the size of events and formal gatherings, to limit the number of people in close proximity. These measures were incrementally relaxed as the pandemic waned, but visits to the park properties have remained at a higher level than before the pandemic. There are no pandemic related restrictions in place at this time.

PUBLIC SAFETY AND INNOVATION

Wisconsin State Parks uses a vehicle sticker system for entry control to properties. State parks generally have an entry booth at vehicle entry points, where vehicle stickers are checked. Entry booths can be manned or unmanned, depending on the configuration of the property and the availability of staff. Some properties have gates that are closed during non-park hours, either manually or automatically. Some buildings are also equipped with automatic locking system that secure the building after hours. There are many uncontrolled access points to parks, with parking lots that are checked by park rangers on an intermittent basis to see if vehicles are displaying their stickers.

Individual trail passes are required for state trails and other select properties for cyclists, rollerbladers/skiers, and cross-country skiers. Users are expected to have a trail pass on their person when using these facilities. Rangers check for trail passes on an intermittent basis.

State Parks are subject to occasional criminal activity such as vehicle break-ins, theft, and vandalism. Park staff does what they can to monitor and address this issue, but are limited in their enforcement authority. State Park wardens are required for enforcement measures and are in short supply (220 statewide)⁸. This can lead to increases in vehicle break-ins and vandalism to facilities such as observation towers and restrooms.

County and local parks have similar issues to varying degrees, with more problems in the denser urban areas. Vandalism of un-monitored restroom facilities occasionally result in long term closures due to budget and manpower constraints. During the pandemic, Waukesha County Parks changed from manned entry booths to video monitoring of vehicle stickers, and now, license plates, at park entrances. Washington County Parks implemented a similar system. Video monitoring can also be used to deter criminal activity.



Public Parks



RECOMMENDATIONS TO RAISE THE GRADE

Following are some measures the State could take to improve the condition and maintenance of infrastructure in their park system:

- Return to funding the State Parks system with general fund revenue, similar to pre-2015 funding. Wisconsin is the only State in the country that does not support their park system with general fund revenue.
- Provide new sources of revenue to the state parks by legislative measures such as redirecting the state real estate transfer tax, or using existing or new sales tax revenue, with a potential emphasis on outdoor recreational equipment sales.
- Increase Park user fees. Wisconsin State Parks user fees have not been increased in almost 10 years. User fee increases would need to be balanced against the potential impact to underserved populations. An option to purchase a State Parks vehicle sticker and trail pass as part of the annual vehicular license renewal process would likely generate income for the park system, especially with the newly introduced policy (starting in 2025) of vehicle stickers being valid for the following 12 months⁹.
- Provide additional fee-based services. Measures such as expanding electrified campsites within State Parks would have short term costs but would generate additional revenue to recover those costs and support other programs.³
- Increase state license fees, such as hunting and fishing licenses, and snowmobile and ATV/UTV license fees. This could also include the introduction of a license for small watercraft such as canoes or kayaks.³
- Provide tax credits for conservation donations.
- Look for efficiencies between the State and local units of government by sharing resources.

Milwaukee County Parks will need to overcome substantial obstacles to maintaining their park facilities and infrastructure. The County is severely limited in its ability to raise funds to meet basic needs, even with the newly created sales tax; much less fund repairs, replacement, and maintenance of County Parks infrastructure and facilities. Following are some measures Milwaukee County could consider to improve their ability to maintain the infrastructure in their park system:

- Work with the State legislature to develop additional funding that is dedicated to operating and maintaining park facilities and infrastructure, possibly as an additional sales tax or a property tax component.
- Sell or donate selected assets to others to reduce maintenance expenses.
- Create more partnerships with non-profit “Friends” groups and corporate sponsors to provide resources and volunteers for maintenance activities.
- Develop partnership relationships with municipalities and the MMSD to address infrastructure maintenance while enhancing storm water management and addressing other local needs. Tax Incremental Districts set up by local cities and villages could include funds dedicated to infrastructure maintenance and park improvements. There is also the potential to work with MMSD to obtain grant funding for infrastructure maintenance related to water resource management through programs such as the Clean Water Fund¹².



Public Parks



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Rail





EXECUTIVE SUMMARY

Wisconsin's rail system has approximately 3,300 miles of track, 82% of which is owned and operated by 11 private railroad companies, with the remainder publicly owned. Some 77% of the rail system meets Class II operations standards. Thirty % of freight (by value) moving in Wisconsin is transported by rail. Of all modes, freight movements by rail are forecasted to increase the most, with a 172% increase expected by 2050. Three passenger rail services currently service pockets of Wisconsin, although expansion is expected in terms of existing services and new rail lines.

BACKGROUND

Wisconsin has a rich history of rail. In 1847, one year before statehood was granted, Wisconsin's first freight was shipped by rail. By 1851, passenger rail service had begun. By 1920, the rail transportation system had become so robust and vital to the state's growth that every county in the state had a rail line, and, by the 1930s, the state's rail lines had grown to nearly 7,000 total miles.

Rail serves as an integral part of Wisconsin's freight network. It is estimated that 32% of freight by tonnage (211.5 million tons), and 30% of freight by value (\$174.3 billion) was transported to, from, or through Wisconsin via rail in 2022. Eleven railroad companies currently operate within Wisconsin (see Table 1 for a breakdown of mileage by railroad). Four of the six Class I railroads, which are those with operating revenues of \$490 million or more, operate in the state. Additionally, there are two regional and five short line railroads operating in the state.

Since 1977, Wisconsin has been committed to long-term investment in rail transportation. Rail investments can happen through a variety of funding programs. In 1992, Wisconsin voters approved an amendment to the state constitution allowing the state to become directly involved in rail acquisition, rehabilitation, and development projects.

Table 1: Wisconsin's Railroad Mileage by Classification

Railroad	Operating Miles in WI
Class I Railroads	
Burlington Northern Santa Fe Railway Company (BNSF)	245
Canadian National Railway Company (CN)	861
Canadian Pacific Kansas City Limited (CPKC)	301
Union Pacific Railroad (UP)	595
Class II and III Railroads	
Escanaba & Lake Superior Railroad Company (ESL)	121
Fox Valley and Lake Superior Railroad (FVLS)	459
Municipality of East Troy Wisconsin (METWR)	7
Tomahawk Railway Limited Partnership (TR)	8
Wisconsin & Southern Railroad Company (WSOR)	625
Wisconsin Great Northern Railroad, Inc. (WGN)	26
Wisconsin Northern Railroad (WNR)	38
Switching and Terminal Railroads	
Madison Terminal Railway	1
Port Milwaukee	1
Rail + Transload, Inc.	1
Total Miles of Track Operated	3,289

Wisconsin has around 600 miles of publicly owned railroads that the state, Rail Transit Commissions (RTCs), local governments, or a combination of public entities own.

For passenger service, Amtrak operates three service lines within Wisconsin. On May 21, 2024, the state sponsored Borealis train began its daily round trip service between Minneapolis/St. Paul and Chicago. The Borealis

train operates along the same corridor as the Empire Builder, which currently provides one daily round-trip between Chicago, Milwaukee, Minneapolis/St. Paul and Seattle/Portland. In addition, Amtrak operates the Hiawatha, a state-sponsored regional intercity passenger route connecting Milwaukee to Chicago that has three stops in Wisconsin. Finally, Chicago's Metra commuter rail has one stop in Kenosha, Wisc., on the Union Pacific North (UP-N) line.

CONDITION & CAPACITY

Rail condition along Wisconsin’s nearly 3,300 miles of track is a focus of regular conversations between the railroad operators and the Wisconsin Department of Transportation (WisDOT). In addition, rail investments also occur through WisDOT highway programs.

Many of the 600 miles of publicly owned track were built for lighter equipment, so over the past 30 years, Wisconsin & Southern Railroad has been conducting ongoing efforts to rebuild these lines to be able to support typical FRA Class 2 track safety standards and operate at speeds up to

25 miles per hour and carry rail cars with gross weight of 286,000-pounds. As of 2023, 77% of the publicly owned track now meets Class 2 operating standards, leaving another 23% in need of upgrading.

Condition and capacity issues along privately owned rail are privately known by each of the individual railroads, but not typically publicly shared. There are, however, a handful of known bottlenecks along the publicly supported freight rail network that have been identified and have been summarized in Table 2.

Table 2: Freight Rail Bottlenecks, Publicly Supported System

Railroad	Description
WSOR/CPKC	WSOR not able to access Port Milwaukee without trackage rights over CPKC.
UP	UP does not have sufficient clearance under eleven bridges through Milwaukee for use by double-stack container cars.
WSOR/UP	WSOR must use UP-owned track segment (and await UP dispatching) in Janesville to move between the Waukesha or Madison subdivisions and the Monroe Subdivision, Fox Lake Subdivision, and Chicago.
WSOR	Merrimac Bridge (Reedsburg Subdivision) limited to 263,000-pound carloads at 10 mph. Shippers in Baraboo and Reedsburg are thus limited to 263,000-pound carloads.
WSOR	WSOR limited to 10 trains per week (each way) over Metra operated, UP-N owned track to interchange with other railroads at Belt Railway yard at Clearing, Ill. (Chicago).

OPERATIONS AND MAINTENANCE

The vast majority of the rail operating in Wisconsin is privately owned and operated by freight railroad companies, making it difficult to assess any owners’ ability to operate and maintain their rail without access to private information.

RTCs lease publicly owned rail to private railroads and typically pass nearly all the responsibility for operation and maintenance along to them. However, WisDOT’s Performance Improvement Program, which is focused

on the core goal areas of Mobility, Accountability, Preservation, Safety, and Service (MAPPS), has upgraded nearly all (95%) of the publicly owned rail to Federal Railroad Administration (FRA) Class 2 operating speed standards. Being able to operate this leased line at higher speeds and with heavier cars enhances the economic viability of the state-owned rail. A specific funding source for these operational upgrades, however, has not been specifically established.

FUNDING AND FUTURE NEED

Since 1977, Wisconsin has been committed to long-term investment in rail transportation. Rail investments can happen through a variety of funding programs. In 1992, Wisconsin voters approved an amendment to the state constitution allowing the state to become directly involved in rail acquisition, rehabilitation, and development projects. Two programs operate under this authority: the Freight Railroad Infrastructure Improvement Program (FRIIP) and the Freight Railroad Preservation Program (FRPP).

The Railway-Highway Crossings (Section 130) Program, managed by the Federal Highway Administration (FHWA), provides funds for the elimination of hazards at railway-highway crossings. In Wisconsin, these funds are divided between the Office of the Commissioner of Railroads (OCR) Safety Program, which is focused on warning devices at crossings, and WisDOT's Crossing Safety Program, which is focused on warning device improvements as well as the elimination of hazards.

Wisconsin also has a state-funded Crossing Surface Repair Program, which is currently programmed at \$467,300 per year for the replacement of railroad crossings on the state highway system that are in poor condition and do not have programmed improvement projects.

Finally, there are several federal grant programs such as the FRA's Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program, Corridor Identification and Development Program and Restoration and

Enhancement Grant Program, which can be leveraged to fund rail investments.

WisDOT has led several corridor initiatives to identify future needs for passenger rail expansion throughout Wisconsin. The following list summarizes some of the needs that have been identified:

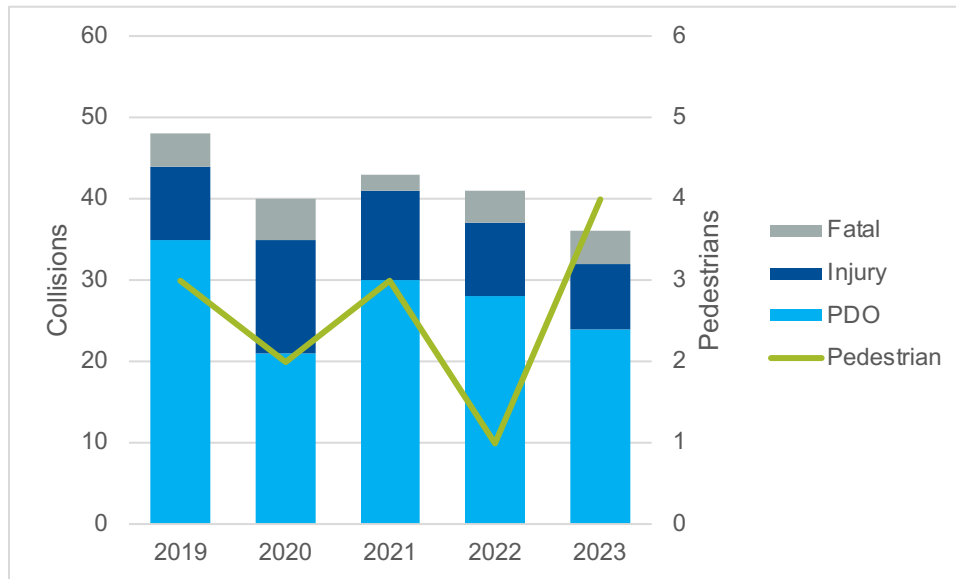
- Expansion of the La Crosse Yard,
- Realignment of track approaches at the Mississippi River bridge,
- Conversion of yard track to a signalized second main track in La Crescent, Wis.,
- Freight bypass of the Milwaukee Intermodal Station by way of the Muskego Yard,
- Train control upgrades for approximately two miles of track near the Milwaukee Intermodal Station,
- A second platform at the Milwaukee Airport Railroad Station (MARS),
- Sealed corridor along the Hiawatha service corridor,
- Expansion of the Hiawatha to extend to Green Bay as well as Eau Claire and/or Madison (by way of Watertown and Waukesha County), and
- Crossovers and track improvements along Metra's UP North Line.

PUBLIC SAFETY

As of May 2024, the Department of Transportation (DOT) Grade Crossing Inventory System (GCIS) indicates there are 6,773 rail crossings located throughout Wisconsin. Close to 70% of the crossings throughout the state are public crossings, with the remaining 30% are privately-owned crossings. According to FRA data, a total of 208 collisions occurred between 2019 and 2023 at highway-rail

grade crossings in Wisconsin. Of these collisions, 51 (25%) resulted in injury and 19 (9%) resulted in death. Thirteen of the collisions (6%) involved pedestrians. See Figure 1 for a year-by-year representation of the five-year data. While private crossings make up nearly 30% of the crossings statewide, only 10% of the collisions occurred at private crossings, indicating a greater risk exists at public crossings.

FIGURE 1: Five Years of Collision Data for Wisconsin At-Grade Crossings



While the total number of collisions has been decreasing since 2021, the moving five-year average percentage of injury and fatality collisions (25% and 9%, respectively) remained the same for 2023 as it was in 2022.

In 2021, the process began for the development of a Wisconsin Highway-Railway Grade Crossing State Action Plan (SAP) as required by FRA regulation (49 CFR 234). This plan, which was finalized in February 2022, involved a data-driven process focused on safety along both publicly and privately owned rail throughout Wisconsin. The purpose of the SAP is to provide implementable strategies and action steps to improve rail safety. Of particular focus were the highway-rail and pathway grade crossings. A thorough review of the most recent five years of collision data and a risk assessment were conducted to identify priority highway-rail grade crossing locations in need of treatment and establish an action plan with specific goals, objectives and strategies. The following summarizes the ten defined goals:

1. Reduce the number and rate of incidents at railroad grade crossings.
2. Reduce the number of severe incidents at locations with reoccurring incidents within the last five years.

1. Efficiently deliver and manage projects in highway improvement, OCR safety, WisDOT safety, and crossing surface repair programs.
2. Maintain a program to repair deficient railroad crossing surfaces on the State Trunk Highway network.
3. Implement and maintain safety improvements at interconnected crossing systems.
4. Evaluate rail corridors for potential crossing consolidations.
5. Improve data collection and analysis on railroad crossings.
6. Implement design improvements at railroad grade crossings when undertaking highway improvement projects.
7. Engage statewide stakeholders in education and enforcement.
8. Reduce trespassing.

RESILIENCE

Resilience in a rail network that is predominantly privately owned is a challenge to establish as minimal parallel routes exist within the network. Instead, railroad companies will contract with each other to operate on sections of track owned by another company as needed to complete their route. Establishing such operating agreements is typically less expensive than constructing, owning, and operating on a parallel network. As a result, a failure in any segment of track may result in a lack of service to an area within Wisconsin, or a significant reroute of rail traffic over track owned/operated by another railroad company to continue service. Such failures within the system are typically addressed quickly, as there are financial consequences

to extended outages. However, service failures are at the discretion of the private railroad company that owns and operates the track to address.

Similarly, it is entirely up to the private railroad company that owns and operates the rail to prevent and protect against significant multi-hazard threats and incidents. A private railroad company's policy on the inspection and maintenance of its train cars, which may carry hazardous materials, is at the discretion of the private railroad company. Such derailments can have significant consequences to public health and safety; however, the state does not retain any authority in these matters.

INNOVATION

The FRA and the railroad industry are working on the development of Intelligent Railroad Systems that would incorporate new sensor, computer, and digital communications technologies into train control, braking systems, grade crossings, defect detection, and planning and scheduling systems. The first step was the development of the Highway-Rail Intersection (HRI) User Service. This Intelligent Transportation Systems (ITS) Architecture provides for the integration of the traffic management systems and railroad operating systems and has the capability to provide information to the locomotive engineer about potential situations at a crossing and notify the traffic management center of an approaching train.

Until the infrastructure has been fully implemented nationwide, alternative technology solutions have come to market to aid in the exchange of information between vehicular and rail traffic. One example of this is centered on addressing the impact of blocked highway-rail crossings. Blocked crossings have recently emerged as a significant safety concern for roadway operating agencies, as response times for emergency services can be significantly impacted. Innovative technology solutions have been developed that detect and predict train arrivals based on information gathered from track-side detection units that leverage historical data and artificial intelligence (AI). This information can then be leveraged to notify emergency services of the pending arrivals or can be broadcast to the general traveling public through roadside message boards.



Rail



RECOMMENDATIONS TO RAISE THE GRADE

- Continued investment in upgrading publicly owned track to Class II standards.
 - Secure funding for projects to address known freight bottlenecks, and to address deficiencies identified by the SAP but not yet programmed for improvement.
- Initiate a statewide analysis of crossing locations that exceed FRA predicted accident volumes to identify and justify potential grade separations and ensure the construction of a needed grade separation is considered when highway projects are studied and scoped.
- Continue the work started with the SAP to annually review a refreshed list of crossings with multiple severe incidents within the past five years, categorize the safety deficiencies, and identify potential safety treatments within available funding sources.
 - Promote evaluation of rail corridors for opportunities to consolidate crossings through stakeholder involvement and education regarding incentive funding opportunities.
- Expand engagement in statewide education and enforcement surrounding safety at grade crossings and the dangers of trespassing by working with local municipalities and local enforcement agencies and connecting them to the various outreach tools and trainings available through the FRA, Operation Lifesaver, and other advocacy organizations.
 - Continue to monitor changes in international trade flows and work with communities directly and/or through RTCs that are impacted by dramatic changes in train frequencies.

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Roads





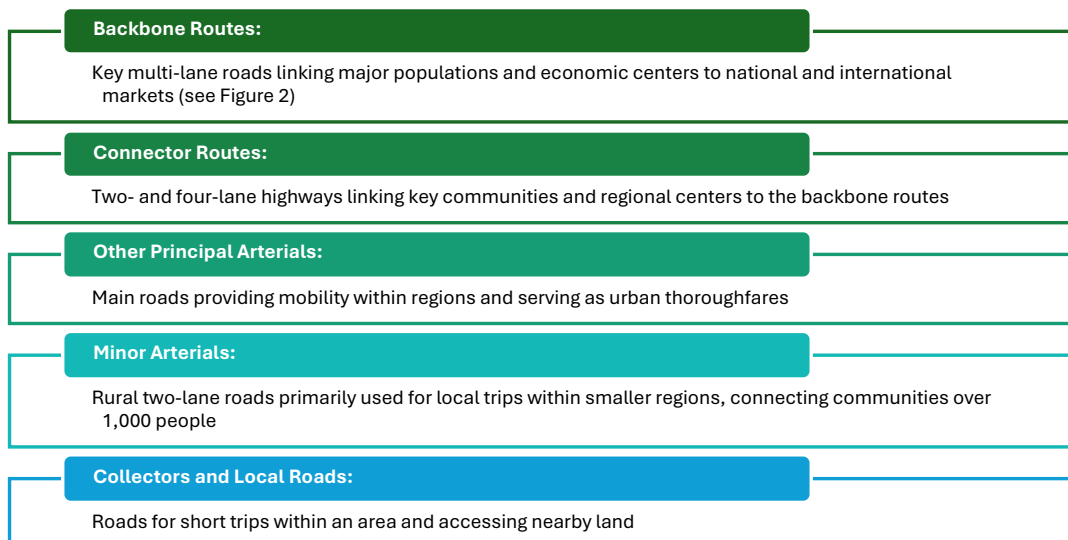
EXECUTIVE SUMMARY

Recently, increased funding from local, state, and federal governments – including 2021’s Infrastructure Investment and Jobs Act – has improved the performance of Wisconsin’s 115,500 miles of roadways. 86% of state highway pavement was rated in fair or better condition in 2023, up from 83% in 2020. Challenges exist for sustaining roads throughout the state including the recent rise of costs due to inflation and limitations in the workforce. Deferred maintenance also significantly increases repair costs. Deficient Wisconsin roads cost state motorists \$7.6 billion annually due to vehicle wear and tear, wasted fuel due to congestion, and the overall cost of road crashes. Almost 600 road users lost their lives in Wisconsin in both 2021 and 2022, but the statewide fatality rate was 10.1 per 100,000 residents – lower than the national average of 12.8. However, in rural parts of the state, Wisconsin’s fatality rate is double the national mark. To execute Wisconsin’s long-range Connect 2050 transportation plan, state and local decision-makers should harness recently beefed federal investments and craft financially sustainable funding mechanisms for road improvements as well as safer designs that move more people across all travel modes through the state’s diverse land uses.

CONDITION AND CAPACITY

Wisconsin’s state trunk highway system can be divided into five sub-systems:

Figure 1: Sub-Systems of Wisconsin’s Trunk Highway System



According to pavement condition analysis conducted by the Wisconsin Department of Transportation (WisDOT) using the Pavement Condition Index (PCI) method, over 99% of the state's 14,000 mile backbone highway system is rated fair or better. This system is composed of

priority corridors and carries 85% of the freight tonnage traversing Wisconsin's state trunk highways. The backbone system has improved by 0.3% since 2023 and has consistently exceeded target levels (see Figure 3).

Figure 2: Wisconsin's Backbone and Connector Corridors

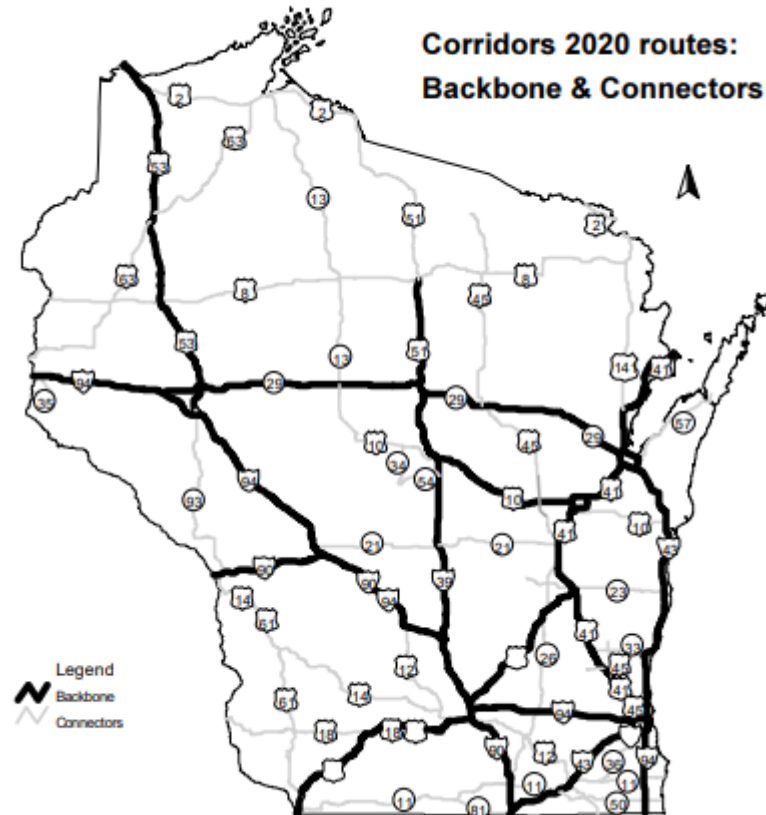


Figure 3: Percent of state highway pavements rated fair or better

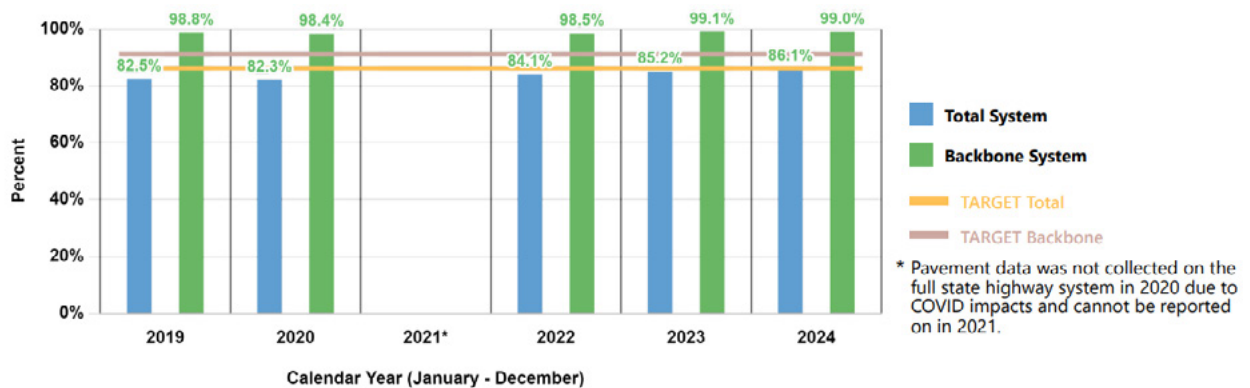
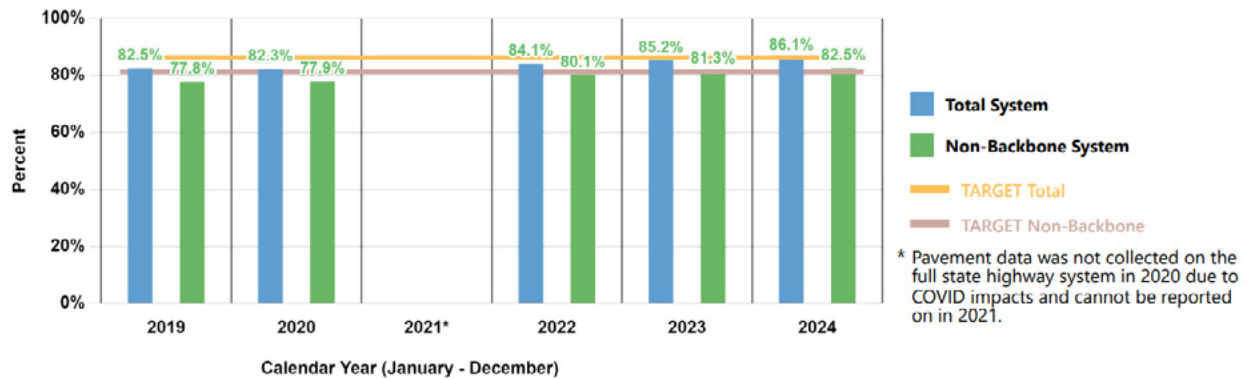


Figure 4: Percent of state highway pavements rated fair or better



The state’s non-backbone system, which consists of the remaining state-owned system and carries over 50% of state highway traffic, exceeded the target level of 80% of pavement rated fair or better (see Figure 4).

However, according to the national transportation research group TRIP, in 2023, nearly half of major roads in Wisconsin were rated poor or mediocre (see Table 1) based on their International Roughness Index (IRI) score.

The 2023 TRIP Report also states that 17% of rural roads were rated in poor condition (16th highest in the nation). As roads and highways continue to age, they will reach a point of deterioration where routine paving and maintenance will not be adequate to keep pavement surfaces in good condition. Costly reconstruction of the roadway and its underlying surfaces will become necessary.

Table 1: Condition of Wisconsin’s Major Roads based on IRI Score

Location	VOC	Safety	Congestion	TOTAL
Eau Claire	\$501	\$267	\$354	\$1,122
Green Bay-Appleton-Oshkosh	\$909	\$298	\$389	\$1,596
Kenosha	\$989	\$469	\$639	\$2,097
Madison	\$976	\$265	\$860	\$2,101
Milwaukee	\$1,010	\$385	\$1,078	\$2,473
Wausau	\$506	\$368	\$369	\$1,243
WISCONSIN STATEWIDE	\$3.1 Billion	\$2.6 Billion	\$1.9 Billion	\$7.6 Billion

TRIP states that deficient roads cost Wisconsin drivers \$7.6 billion annually due to wear and tear on vehicles, wasted fuel due to congestion, and the cost due to crashes. The cost to drivers in the two largest Wisconsin urban areas of Milwaukee and Madison is estimated at more than \$2,400 and \$2,100 per year, respectively.

Increased levels of traffic congestion in Wisconsin affect commuters, businesses, shippers, and manufacturers.

High congestion levels can also cause prospective businesses to look at other states when considering expansion or relocation. TRIP estimates the value of lost time and wasted fuel in Wisconsin is approximately \$1.9 billion a year. Table 2 below details the number of hours lost annually for each driver in the state’s largest urban areas, as well as the per-driver cost of lost time and wasted fuel due to congestion.

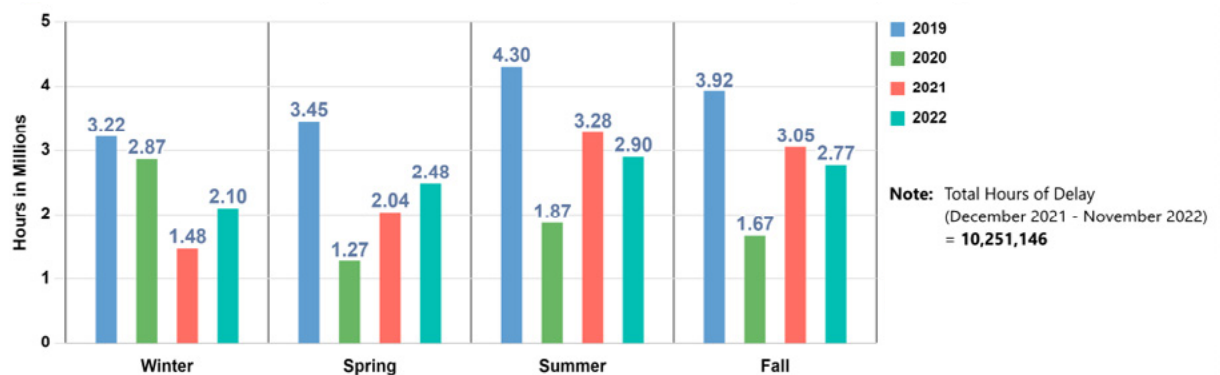
Table 2: Congestion Time Loss and Costs in 2022 in Wisconsin’s Largest Urban Areas

Urban Area	Hours Lost to Congestion	Annual Cost Per Driver	Gallons of Fuel Wasted Per Driver
Eau Claire	14	\$354	5
Green Bay-Appleton-Oshkosh	15	\$389	7
Kenosha	22	\$639	12
Madison	41	\$860	18
Milwaukee	46	\$1,078	22
Wausau	14	\$369	6

There are approximately 115,500 miles of public roadways in Wisconsin, about 14,000 miles of which are interstate and state highways. From 2000 to 2019, vehicle miles traveled (VMT) in Wisconsin increased by 16%. By April 2020, due to the COVID-19 pandemic, vehicle travel dropped by as much as 36% compared to the same month the previous year. By 2022, VMT in Wisconsin had rebounded to 3% below pre-pandemic levels. During the first six months of 2023, VMT in Wisconsin was 2% higher than it was during the first six months of 2022. According to WisDOT’s Mobility, Accountability, Preservation,

Safety, and Service (MAPSS) Performance Improvement Report, there was an uptick in vehicle hours of delay in 2022 compared to previous year (see Figure 5). The delay numbers were still 31% below what was recorded in 2019, indicating the delay figures remain favorable to what was recorded before the changes that stemmed from the COVID-19 pandemic. Four of the 13 Metropolitan Planning Agencies (MPAs) recorded a decrease in vehicle hours of delay, while the majority reported an increase during the reporting period of December 2021 and November 2022.

Figure 5: Vehicle hours of delay on Interstates in 13 of Wisconsin’s metropolitan planning agencies



This congestion is expected to have an adverse impact on the \$603 billion worth of commodities that are shipped annually using Wisconsin highways. Wisconsin’s ranking for transportation infrastructure on a national basis

by publications such as the Reason Foundation (33rd, 2023) and US News & World Report (27th, 2023) have increased since 2019, but are still in the lower 50th percentile of states.

FUNDING AND FUTURE NEED

Although there has been increased investment at the local, state, and federal levels in recent years, additional sustained transportation funding is needed to maintain and improve the state's transportation network. The 2019-2021 Wisconsin Biennial Budget included a one-time transportation funding increase of \$318 million (an increase of 20%). The state's 2021-2023 Biennial Budget provided a 6.8%, \$2.1 billion increase to maintain "real dollar" purchasing power in transportation. The 2023-2025 Biennial Budget provides \$2.2 billion in total funding for the State Highway Rehabilitation (SHR), a 7.9% increase over the base funding of the previous biennium. In addition, the 2023-2025 budget provides \$591.9 million (\$210.1 million in state funds, \$381.8 million in federal funds) for the Major Highway Development program, which is a 4.7% increase over the 2021-2023 biennial budget. No additional Transportation Revenue Bonds were authorized for the Major Highway Development program for the 2023-2025 biennium.

In recent years, the state has increased funding for local road and bridge rehabilitation and reconstruction. It has allocated 70% of the additional federal funding to needed improvements. Additionally, the state has committed an additional \$190 million to local road and bridge projects as part of a new supplemental grant in the Local Road Improvement.

Wisconsin transportation funding was boosted in 2021 with the passage of the Infrastructure Investment and Jobs Act (IIJA). The IIJA will provide \$5.5 billion for road and bridge repairs in Wisconsin over the five years of the bill, including a 25% increase in highway and bridge funding provided to Wisconsin in Fiscal Year (FY) 2022. Wisconsin selected 40 local road improvement projects to fund with \$35 million of IIJA funding in FY 2022. Many of these projects were in areas with fewer than 20,000 people.

However, inflation in the cost of providing highway and bridge repairs is hindering the ability of increased funds

to address the state's transportation needs. The Federal Highway Administration's national highway construction cost index increased by 27% in 2022. During the first, second, and third quarters of 2023, the construction cost index increased 2.7%, 3.8%, and 6.0%, respectively, compared to the quarter prior. All these sector-specific inflation rates are higher than the quarterly average of 1.4%.

Wisconsin's motor fuel tax stands at 31 cents per gallon for gasoline, diesel, and gasohol. There is an additional petroleum inspection fee of 2 cents per gallon, bringing the total tax to 33 cents per gallon for each fuel type. This tax rate is a crucial component of the state's approach to funding transportation infrastructure. However, the increasing construction cost index, coupled with the erosion of motor fuel tax revenues due to factors like inflation, improved fuel efficiency, and the growing adoption of hybrid and electric vehicles, poses challenges to meeting the state's transportation funding needs. Unlike the annual statutory adjustments made to the fuel tax rate in the early 1980s when there was significant inflation in the costs of construction and labor, Wisconsin's motor fuel tax rate has remained unchanged for over 15 years. The last annual indexing adjustment was made in 2006, which brought the tax rate of 31 cents per gallon and is the same rate used today. However, the inflation rates affecting construction costs have been markedly higher than average and since there has been no recent increase in the motor fuel tax rate, funding capabilities have become increasingly strained. There are no immediate plans to increase the motor fuel tax to counteract these financial pressures.

WisDOT is addressing the challenges associated with maintaining and enhancing Wisconsin's transportation infrastructure amidst inflation and evolving transportation needs with key strategies, including leveraging IIJA funds and adopting Connect 2050, a long-term, multimodal transportation plan with various goals and objectives to guide development of the statewide transportation system through 2050.

The key goals and objectives of Wisconsin's Connect 2050 are:

- **Sustainable Funding:** Ensure long-term, efficient transportation funding to maintain a safe and accessible system that supports Wisconsin's economy.
- **Partnerships:** Foster inclusive and collaborative partnerships to address diverse transportation needs, including adapting to technological and social changes.
- **Data-Driven Decision-Making:** Emphasize continuous improvement and strategic use of data to inform transportation investments.
- **Mobility and Connectivity:** Increase transportation options and connections to enhance mobility for people and goods, focusing on efficiency and resilience.
- **Technology Integration:** Embrace and leverage technological advancements to improve transportation safety, efficiency, and environmental sustainability.

- **Safety:** Prioritize transportation safety across all modes, aiming for zero fatalities through education, engineering, enforcement, and emergency management.
- **Resiliency and Reliability:** Develop a transportation system that is resilient to natural and human-made incidents, ensuring consistent and reliable operation.
- **Environmental Balance:** Balance transportation needs with environmental, socioeconomic, historic, and cultural resources, aiming to minimize and mitigate impacts.

The plan adopts a vision-plan approach for Wisconsin's future transportation system by outlining the necessity for updates to existing plans and the creation of new strategies to remain responsive to evolving transportation challenges and opportunities.

PUBLIC SAFETY

Unfortunately, 2,967 people died on Wisconsin roads from 2018 through 2022. In 2022, the state's traffic fatalities included 72 (12%) pedestrians and 14 (2%) bicyclist fatalities, which are both lower than the national averages of 18% and 3%, respectively. There were 594 traffic fatalities in 2022, which was nearly the same as the 593 traffic fatalities in 2021. Based on data from the U.S. Department of Transportation's Fatality Analysis Reporting System, Wisconsin's fatality rate for 2022 was 10.1 deaths per 100,000 people and was lower than the national average of 12.8. As of September 30, 2023, Wisconsin had a 2% decrease in fatalities from the prior five-year rolling average of 582 and preliminary data indicates the total traffic fatalities in 2023 was 578. Wisconsin's traffic fatality rate of 0.96 fatalities per 100 million VMT is lower than the national average of 1.35. Even though the measurement of fatalities per 100 million VMT can make regions with higher driving rates seem disproportionately safe, the fatalities per capita offers similar insights that traffic safety in Wisconsin is better than the national average. However, the fatality rate on the state's rural non-interstate roads of 1.49 fatalities per 100 million miles of travel is more than

twice the national average of 0.76. Both fatality rates increased from the rates in the 2018 TRIP report.

While driver behavior and vehicle characteristics can be contributing factors in fatal crashes, roadway features also play a significant role in roadway safety. Improving aspects like the number of lanes, lane widths, lighting, lane markings, rumble strips, shoulders, guard rails, median barriers, and intersection design can significantly improve road safety and reduce the number of traffic fatalities, crashes, and injuries.

Traffic crashes impose a tremendous economic cost to Wisconsin. In 2022 alone, the cost resulting from traffic crashes in which roadway features were likely a contributing factor totaled \$2.6 billion. According to a 2015 National Highway Traffic Safety Administration report, the economic costs include work and household productivity losses, property damage, medical costs, rehabilitation costs, legal and court costs, congestion costs, and emergency services. Table 3 below represents the average fatalities and cost per driver between 2017 and 2021. According to an April 2024 Wisconsin Policy Forum report, the relatively higher crash costs in

Kenosha may be a result of poor road conditions, since Kenosha has an average road quality rating of 4.96, which is below the statewide average and worse than many other large Wisconsin cities. Poor road conditions

often lead to more severe accidents, which can increase the costs associated with crashes, including medical bills, legal fees, and vehicle repairs.

Table 3: Average Fatalities between 2017 and 2021 and the annual cost of crashes per driver based on TRIP analysis of National Highway Traffic Safety Administration data

Location	Average Fatalities 2017-2021	Crash Costs per Driver
Eau Claire	6	\$267
Green Bay-Appleton-Oshkosh	40	\$298
Kenosha	17	\$469
Madison	35	\$265
Milwaukee	83	\$385
Wausau	13	\$368

In addition, investing in multimodal transportation and improving safety features for multimodal and active modes of transportation (i.e., bicyclists and pedestrians) can offer significant benefits that extend beyond improving safety for bicyclists and pedestrians. A multimodal approach enhances the overall efficiency and sustainability of the transportation system, reducing congestion on roads by providing viable alternatives to single-occupancy vehicle travel. In turn, this leads to lower greenhouse gas emissions, contributing to better air quality and environmental health.

Moreover, multimodal transportation fosters inclusivity by providing transportation options for all segments of the population, including those who do not drive, such as the elderly, low-income individuals, and those with disabilities. This equitable access to transportation supports social inclusion, enabling more people to participate in economic, educational, and social activities.

In economic terms, multimodal transportation investments can stimulate local economies by improving access to businesses and job opportunities. Well-connected and accessible transportation networks make communities more attractive to businesses and

residents alike, potentially increasing property values and promoting economic development. Additionally, promoting active modes of transportation like walking and cycling can lead to public health benefits, reducing healthcare costs associated with sedentary lifestyles and traffic-related injuries.

WisDOT is in the process of updating and combining the Wisconsin Bicycle Transportation Plan and the Wisconsin Pedestrian Policy Plan into a comprehensive document called the Wisconsin Active Transportation Plan 2050 (ATP). This plan will focus on human-powered transportation modes, such as walking and bicycling, and aims to align with the broader goals of Connect 2050. The ATP will focus on several key goals: improving safety by aiming to eliminate serious and fatal crashes involving vulnerable road users; ensuring equitable access to active transportation for everyone, regardless of age, ability, or location; increasing the number of people who choose active transportation for various types of trips; creating connected and user-friendly transportation networks; promoting the benefits of active transportation to support healthy lifestyles and environmental sustainability; and providing comprehensive support to local communities in designing and implementing active transportation projects.

OPERATION AND MAINTENANCE

While municipalities maintain the local transportation network, WisDOT contracts with all 72 county highway departments to perform much of the maintenance of the state highway system (interstates and federally and state-numbered highways).

County highway departments utilize Performance-based Maintenance (PbM), Routine Maintenance Agreements (RMAs), and Discretionary Maintenance Agreements (DMAs) to perform state highway work such as repairing potholes, removing snow, applying salt, seal coating, crack filling, mowing, and controlling invasive species and brush along the roadsides. Traffic Maintenance Agreements (TMAs) are also used to maintain roadway signs and pavement markings.

During winter operations, salt brine has been utilized more frequently to anti-ice, pre-wet (salt), and de-ice. Anti-icing prevents the formation of frost and the bonding of snow and ice to the pavement, which makes it easier for the plow to remove mechanically while de-icing uses chemical or mechanical means to break the bond that has formed between ice and the pavement. Pre-wetting is the addition of salt brine or other liquid agents to salt and sand which helps the mixture stick to the road instead of blowing off to the shoulder, reducing the amount of material needed. Some

county highway departments are implementing liquid-only plow routes. Doing so cuts down on salt use, which is better for the environment and reduces winter maintenance costs.

In the 2021-2023 Biennial Budget, \$602.7 million in total was allotted for the State Highway Maintenance, Routine Maintenance, Traffic Operations, and State-owned Lift Bridges programs, a 5% decrease from the \$637.6 million provided in the 2019-2021 budget. Unlike previous WisDOT Budget Highlight reports, the 2023-2025 WisDOT Budget Highlight report distinguishes highway management and operations and routine maintenance into separate programs. The 2023-2025 budget allocates a total of \$222.3 million (\$206.5 million in state funds, \$15.8 million in federal funds) for the State Highway Maintenance and Traffic Operations programs, marking a 10.26% increase from the previous budget. In addition, the 2023-2025 Biennial Budget earmarks \$382.4 million for the Routine Maintenance program, showing a 1.5% rise from the 2021-2023 budget. A Cornell Local Roads Program report on maintaining pavements found that every \$1 of deferred maintenance on roads and bridges costs an additional \$4 to \$5 in needed future repairs, showcasing the economic benefit of proactive maintenance and investment.

INNOVATION AND RESILIENCE

Maximizing existing revenue is a priority for leaders of all infrastructure sectors in Wisconsin. WisDOT is no different. The department has implemented numerous policies and practices designed to stretch available dollars such as:

- The Division of Transportation System Development (DTSD) has developed a program to foster innovative ideas in construction management, design development, data collection, maintenance, and asset management. Their success has won an award through the FHWA's Every Day Counts program. Some of their implemented innovations include field use of iPads for construction and bridge inspections, continual movement to a paperless environment, and expanded use of InfraWorks software.
- Implementation of dynamic part-time shoulder use to add capacity only when needed; this practice keeps the shoulders intact for most hours of the day and may help to defer major and costly widening projects.

- Adopting uniform material selection policies. One example is pavement markings, as consistent marking can enhance motorist safety and result in the most efficient use of dollars for both the project as well as maintenance.

Other innovations include right-time treatments, balancing preservation and expansion, value engineering, reusing materials onsite, cost reduction incentives, and performance-based maintenance.

One way WisDOT has improved the resiliency of the state's roadways is the development of Traffic Incident Management (TIM), which is a collaborative effort of public safety and transportation agencies. TIM consists of a planned and coordinated multi-disciplinary process to detect, respond to, and clear traffic incidents so that traffic flow may be restored as safely and quickly as possible. Effective TIM reduces the duration and impacts of traffic incidents and improves the safety of motorists, crash victims, and emergency responders.



Roads



RECOMMENDATIONS TO RAISE THE GRADE

The poor condition of the roadway system in Wisconsin causes increased travel time, wear and tear on vehicles, and crashes. This results in billions of dollars of increased expenses to motorists due to lost time, repairs to vehicles, and health care costs. Some steps that can be taken to remedy some of these issues include:

- Make needed geometric repairs, create sufficient clear zones, and update traffic operations where needed to improve the safety of the state's roadways and reduce congestion.
- Enhance non-state roads by implementing traffic calming measures to improve safety for all users, ensuring sustainable funding and investment in pedestrian and cycling infrastructure for alternative transport options, leveraging partnerships with state agencies and technology for smarter traffic management to ease congestion, and fostering regional collaboration with WisDOT partners and stakeholders to identify strategic opportunities and to meet diverse infrastructure needs effectively.
- Create an integrated multimodal transportation system, especially in urban areas, to help improve congestion and provide more active transportation opportunities.
- Continue to leverage federal funding opportunities in the Infrastructure Investment and Jobs Act and state and local funding to focus on long-term investment toward increased safety and condition of roads and transportation systems.
- Provide sustainable investments that offset the loss from fuel tax revenues associated with electrification and fuel efficiency.
- Develop a more balanced maintenance, rehabilitation, and reconstruction approach to the state's roadways to provide the optimum cost-effective life-cycle for pavement structures.

SUMMARY AND CONCLUSION

Wisconsin's roadway system is a critical infrastructure component, supporting economic activity and providing vital connectivity for residents and businesses. While recent investments and improvements have yielded positive outcomes in certain areas, significant challenges remain. Inflation and the evolving needs of a modern transportation network put pressure on existing funding models, necessitating innovative solutions and sustainable funding mechanisms.

The state's focus on enhancing safety through reduced traffic fatalities and injuries and improving roadway conditions is commendable. Yet, the disparity in road conditions across the state, alongside rising costs and safety concerns, underscores the need for a more holistic and sustained approach to infrastructure investment. Emphasizing multimodal and active transportation, leveraging technology for smarter traffic management, and adopting a balanced maintenance and rehabilitation strategy are essential steps forward.

To truly elevate the grade of Wisconsin's roadway infrastructure, a comprehensive, forward-looking strategy that includes increased investment, innovative funding, and a focus on safety and efficiency is imperative. By addressing these critical areas, Wisconsin can ensure a resilient, sustainable, and safe transportation network that meets the needs of its residents and supports economic growth.



Roads



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Schools





EXECUTIVE SUMMARY

Public information on physical infrastructure and facilities performance in Wisconsin's 469 school districts – 2,242 schools in all – was too scarce or outdated to assign a letter grade. The Wisconsin Department of Public Instruction has not completed a school facility survey since 1999, so instead, the chapter reviews the top ten school districts based on enrollment. The assessment of these districts offers insight into statewide school facilities, but those systems are likely to have more technical capacity and funding methods than more rural and smaller systems. Project planning and prioritization are driven locally, and ballot box bond measures frequently support funding for necessary infrastructure work. Facilities planning and proactive work for resilience is therefore limited by unpredictable election results and the small portion of automatic tax funding appropriated to capital budgets. To better ascertain the conditions and needs of Wisconsin's schools, the state should update its school facility survey and decision-makers should explore ways to increase funding for the more capable physical assets.

CAPACITY & CONDITIONS

There are 469 school districts with 2,242 schools and 60,337 full time equivalent teachers in Wisconsin. According to 2022 nationsreportcard.gov, there are 13.75 students per each teacher in Wisconsin. However, there has been a general decline of enrollment for the last 10 years in the state based on the outgoing seniors versus the incoming kindergarteners. Projections indicate there will continue to be a 1.4% annual decline throughout the State resulting in an expected 3-13% drop in enrollment in as little as 5 years, consistent with the decline of the general population of the State of Wisconsin.

Enrollments of the top ten school districts in the State of Wisconsin are as follows:

- Waukesha School District: 11,796 students (796 faculty/27 schools)
- Madison School District: 25,224 students (2,064 faculty/54 schools)
- Sheboygan School District: 9,438 students (702 faculty/25 schools)
- Kenosha School District: 18,622 students (1,328 faculty/41 schools)
- Racine School District: 15,809 students (1,346 faculty/27 schools)
- Appleton School District: 15,282 students (1,900 faculty/36 schools)
- Green Bay school District: 19,000 students (3,000 faculty/44 schools)
- Milwaukee School District: 67,500 students (5,265 faculty/156 schools)
- Eau Claire School District: 11,000 students (1,700 faculty/24 schools)
- Janesville School District: 9,526 students (1,392 faculty/23 schools)

FUNDING AND FUTURE NEED

The 829,359 students in Wisconsin each cost \$12,794 in expenditures. School funding totaled \$6.08 billion in 2020 - a mix of State (47.9%), Federal (6.8%), school district tax (40.7%), and local revenue (4.6%). This results in a funding shortfall of approximately \$4.5 billion.

A snapshot of the revenue of 5 of the aforementioned school districts are as follows:

- Appleton School District: \$230,383,000 total revenue (\$14,632 per student)
- Green Bay School District: \$347,113,000 total revenue (\$18,106 per student)
- Milwaukee School District: \$1,300,595,000 total revenue (\$18,188 per student)
- Eau Claire School District: \$168,784,000 total revenue (\$15,333 per student)
- Janesville School District: \$147,027,000 total revenue (\$15,357 per student)

PUBLIC SAFETY/RESILIENCE

The safety of students, faculty, and staff are of utmost importance. As such, school districts create a safe learning environment. For instance, the Green Bay School District's biggest concern is security and they are installing a crisis alert system, of which they have received a grant for \$152,903 to update floor plans and implement the program. Similarly, the Janesville School District is making strides to improve safety and security by imple-

School districts provide a quality learning environment as fiscally responsible as they can. For some, like the Kenosha School District, they are implementing District Improvement Plans that include "right sizing procedures" to address the 13 buildings that are at or below 59% utilization which may result in school consolidations or closings. For others like the Sheboygan School District, it consists of Middle School Building Projects. They propose to rebuild Urban Middle School (on a new site) and build a new Farnsworth Middle School (on the existing site). In addition, it is also identified in their 2023-2024 Long Range Plan that P.E./athletic upgrades are necessary. The future of these projects is dependent upon the outcome of the November 2024 referendum, similar to that in numerous school districts throughout the State. The Madison School District also recently utilized a facility referendum in 2020 to address Equity Projects & Programs at 5 high schools and 1 elementary school.

menting "layered" security and improving traffic flow, while the Sheboygan School District is hoping to meet one of the goals of their 2023-2-24 Long Range Plan to enhance security as well as implementing infrastructure for data storage and enhancing their fiber optic network as part of their upcoming referendum.

OPERATIONS AND MAINTENANCE

With 2,242 buildings of various ages and disrepair, lead paint and asbestos are still found in a good portion of the facilities. Legal notices and action plans are in place for those facilities. Riverside High School in Milwaukee is known to be the oldest in the State dating back to 1857. However, Janesville is not far behind operating with a building from 1880. With aging facilities, Janesville and other districts are reporting buildings that have mechanical, electrical, and plumbing systems that are nearing the end of their useful life. HVAC systems in

these old buildings are competing with single pane windows, less insulation, and roofs that are in need of repair. In the Summer of 2021, the Waukesha School District performed a Full Facility Evaluation of its elementary schools. In doing so, 2.5% of the operating budget is needed to address its maintenance program related to safety, structural, and mechanical issues.



Schools



RECOMMENDATIONS TO RAISE THE GRADE

Even though enrollment in Wisconsin schools is declining, school districts must still do what they can to update existing infrastructure or build new if necessary. However, there still are demonstrated funding gaps that do not always allow them to keep up with operations and maintenance costs, much less improve safety or enhance opportunities for extracurricular activities. It is imperative that school districts submit their financial reports to the Wisconsin Department of Public Instruction so as to not jeopardize their State funding. Without a consistent Federal data collection process to aggregate information on the condition of schools, Wisconsin has no current data available. It would be beneficial for the DPI to update the School Facility Survey that was last conducted 25 years ago. In the absence of this data, it was not prudent to assign a grade to the school infrastructure in the State of Wisconsin based on the 10 largest school districts. Thus, at this time we conclude that the chapter should be assigned an Incomplete grade, but should be revisited for further evaluation if additional data is made available in the future when the next ASCE Wisconsin Section Infrastructure Report Card is completed.



Solid Waste





EXECUTIVE SUMMARY

Wisconsin households, businesses, and institutions generate 4.6 million tons of municipal solid waste (MSW) and recyclables yearly. The predominant method for managing MSW in Wisconsin is landfilling. Those facilities now have sufficient capacity and good conditions because of regulatory oversight and increases in tipping fees controlling demand for landfill space. Recycling rates have stagnated in recent years, and those diversion programs are funded primarily by historically low values of recycled goods. However, Wisconsinites recycle more than the national average. The state set a goal to reduce food waste by 50% by 2030, which is aligned with EPA's national goal. Attaining the food waste mark and other solid waste goals requires Wisconsin to transition to a system that values MSW as a resource to be utilized rather than a waste to be landfilled. Recycling higher portions of waste generated is one of several "7R" methods Wisconsin should continue supporting, including reducing single-use items. The 7Rs are: 1. Rethink; 2. Refuse; 3. Reduce; 4. Reuse; 5. Repair; 6. Recycle; and 7. Rot. (4) Both incentives and mandates, balanced between economic, social, and environmental impacts, are needed for all MSW management efforts to succeed in the future.

BACKGROUND

The Environmental Protection Agency (EPA) defines MSW as end-of-life materials (solid, liquid or containers of gas) from commercial, institutional or household sources that include packaging, yard trimmings, furniture, clothing, bottles, cans, food, newspaper, appliances, electronics and batteries. It does not include industrial or

hazardous waste (5). MSW, as collected, is commingled, contaminated (diapers) and moist (food waste). For public health and safety, it must be collected and managed before it smells, attracts insects and rodents and creates a problem, particularly in urban areas.

CONDITION AND CAPACITY

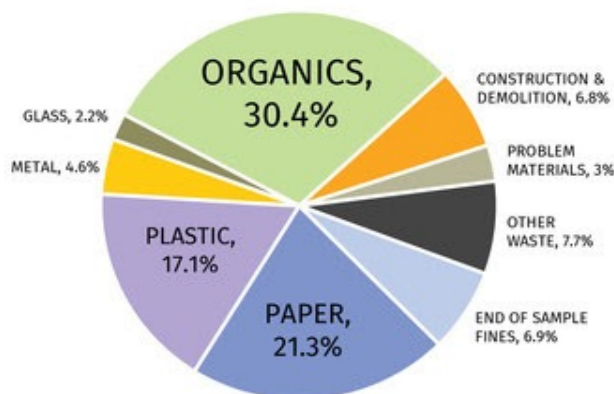
Wisconsin generates about 4.6 million tons of MSW and recyclables each year. The average person in Wisconsin generates 4.7 pounds of trash (residential and their share of commercial trash) each day and recycles 1.9 pounds (about 40%) of that trash per day. The national average

rate of MSW is approximately 5 pounds per person per day and about 33% of that amount is recycled and composted (6). Wisconsin appears to be recycling at a higher rate than the national average.

Figure 1 below shows the 2021 results of Wisconsin’s Statewide Waste Composition Study. Organics-30.4%, include wasted food, food scraps and yard waste; paper-21.3%, includes cardboard, compostable paper and office

paper; plastic-17.1%, includes plastic bottles, plastic wrap and other flexible films. Other categories listed are less than 10% each (2), including metals- 4.6%, problem materials-3%, such as appliances, batteries, sharps; and glass 2% (7).

Figure 1. Municipal Solid Waste (MSW) Statewide Waste Composition (2)



As shown in Table 1 below, the tonnage of recyclables collected in Wisconsin has been relatively flat over the last ten years, with the exception of OCC (old corrugated cardboard) and plastics, which increased and other paper which decreased (8). The recent Statewide

Waste Characterization Study found that about 19% of the MSW going into landfills in Wisconsin could have been recycled through existing curbside programs and drop-off sites. These recyclables were valued at \$87 million dollars (9).

Table 1. Recyclable Materials Collected by Wisconsin Responsible Units (in tons)

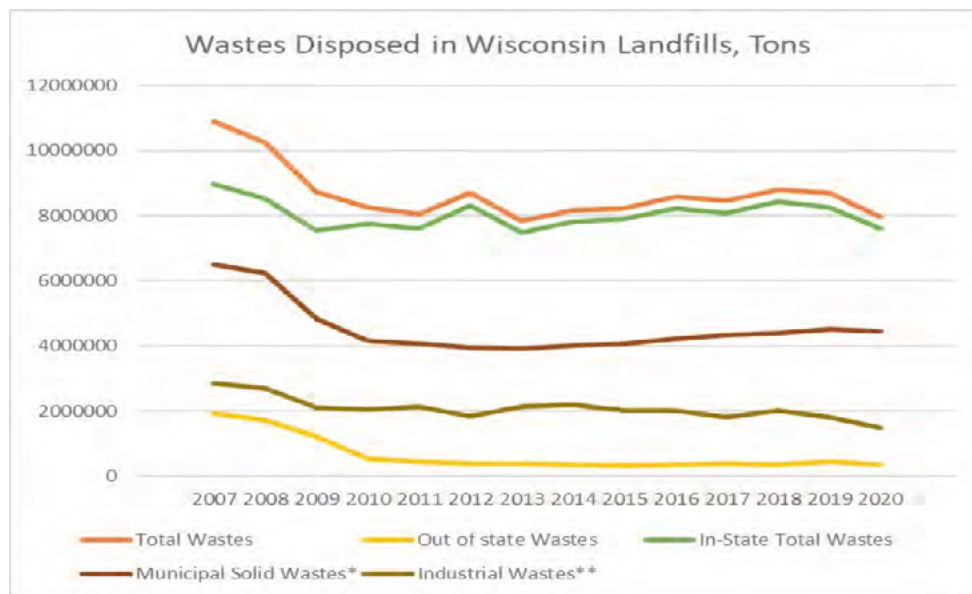
<https://dnr.wisconsin.gov/sites/default/files/topic/Recycling/TableRUCollection.pdf> (8)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
OCC	54323	53974	65181	68041	74833	74198	67593	78113	101774	124397
All other paper	206659	208220	185267	195460	192002	194674	188627	182525	154147	127485
Al containers	8092	10752	11494	6162	6241	6515	6208	6982	7787	8082
Steel (tin) bimetal containers	14536	18032	18282	17763	17963	16756	16718	17314	15573	16164
Glass containers	81062	92297	98572	91724	95438	91872	94835	92120	107747	98431
Plastic containers #1-7	26097	29599	33905	30962	31832	37481	47344	34072	36402	35452
Total Mandatory Reporting	390824	412899	412767	410192	418376	421526	421495	411125	423431	410011

Figure 2 below shows that landfill tonnage has been relatively flat (10). A large increase in Wisconsin's landfill fees in 2009 caused the amount of trash deposited in Wisconsin landfills to decrease. This is reflected in the steep decrease in out-of-state waste (yellow) to Wisconsin landfills, but also the decrease in in-state waste (green) waste. Industries became more conscious of the environmental and financial benefits of reducing waste. Some heavy industry also left the state (10).

One of the longest and deepest traditions surrounding the University of Wisconsin, the Wisconsin Idea signifies a general principle: that education should influence people's lives beyond the boundaries of the classroom (11). That the Wisconsin Idea extends into counties through UW-Extension activities, like promoting recycling, contributes in no small measure to Wisconsin being a leader in solid waste management.

Figure 2. Wastes Disposed in Wisconsin Landfills, Tons (10)



State of Wisconsin laws and regulations are in place that meet the requirements of the EPA for activities including collecting, storing, transporting, treating and disposing of solid waste. Permits or licenses are required for facilities including landfills; storage facilities; transfer facilities; solid waste processing facilities; incinerators; woodburning facilities; yard and food residuals composting facilities; and municipal solid waste combustors (12).

and the environment. Solid waste landfills in Wisconsin are designed by professional engineers, constructed and operated to minimize the risk of pollution. Liquids and gases are managed within the facilities. Landfill operators must monitor their facilities to detect any contamination, report monitoring data to the DNR and respond quickly to any problems. Funds are set aside during landfill operation to ensure that monitoring and maintenance continue after the landfill closes (12). DNR staff inspect landfills regularly, as required.

There is state regulatory oversight of landfills. The DNR regulates landfills to prevent negative impacts to people

FUNDING

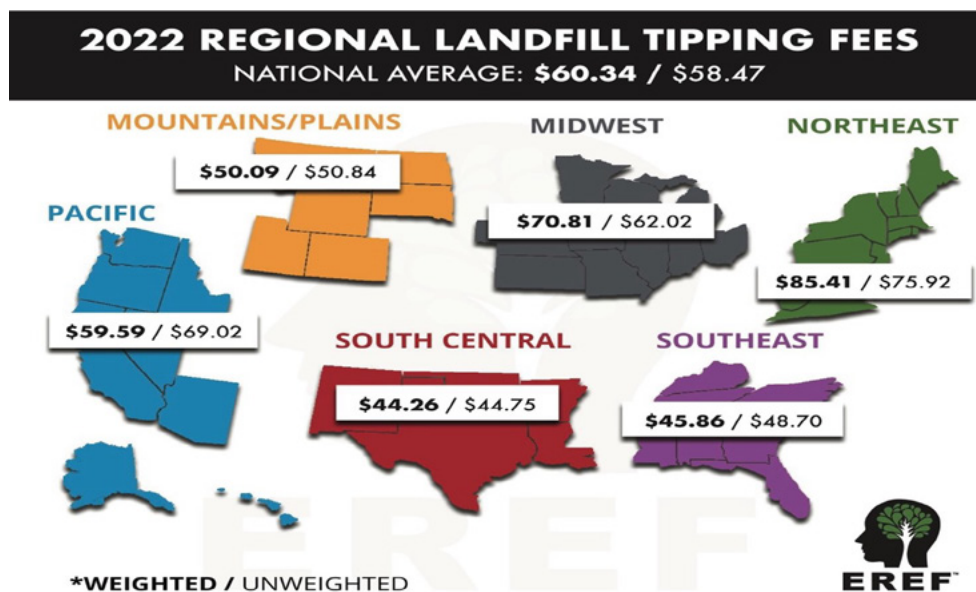
Most MSW and recycling collection is funded through user fees, with some additional revenues from state aid for recycling. Wisconsin's solid waste and recycling program is funded by surcharges, facility fees, and the general fund. The recycling grant remains at \$20 million

per year, but the costs of collection and processing have increased (so it is funding a lower percentage of municipal recycling expenses). E-waste activities are funded by an e-waste program fee. There are many additional fees, as well (13).

State law places charges, known as tipping fees, on trash delivered to landfills. Waste haulers pay tip fees to the landfill owners/operators to place waste at the landfill. Consumers pay taxes or are charged directly by the haulers to have their garbage/recyclables picked up each week. Portions of the tip fee revenues go to the state’s environmental fund and pay for grants to local government for recycling programs and other environmental protection practices (13).

The national average tipping fee for 2022 was \$60.34. The Midwest regional landfill tipping fee was \$70.81(14). The unweighted average is the average of all fees, with the fees of each reporting landfill being equally weighted. The weighted average is the average of all fees based on the relative amount of MSW managed at each reporting landfill (14). Increasing landfill tipping fees has been an effective strategy for reducing MSW to landfills in Wisconsin.

Figure 3. 2022 Regional Landfill Tipping Fees (14)



FUTURE NEED

Permitted landfill and recycling capacity is driven by local and regional demands. ASCE Wisconsin 2020 Infrastructure Report Card reported that there were no new landfills constructed in the state since 1996 (16). There is a large amount of information collected about landfills both by the DNR Solid waste tip fees and landfill tonnage reports | | Wisconsin DNR and the USEPA <https://www.epa.gov/lmop/project-and-landfill-data-state>. Based on this information, it seems reasonable to conclude that there is adequate capacity

which is due to landfill expansions. Southeast Wisconsin has the highest concentration of population, number of landfills and landfill deposits. If it were necessary to site a new landfill, it is likely to be controversial anywhere in the state, especially in densely populated SE Wisconsin (10).

Wisconsin’s electronics recycling law bans electronics such as TVs, computers and cell phones from Wisconsin landfills and incinerators. E-Cycle Wisconsin takes a product stewardship approach to electronics recycling.

Each year, manufacturers of products covered by Wisconsin's electronics recycling law must pay for electronics to be recycled. This funding makes it easier for individuals and schools to recycle old electronics. E-Cycle Wisconsin is a statewide, manufacturer-funded

program that recycles certain electronics used in homes and schools. Individuals and K-12 schools can use E-Cycle Wisconsin to save on electronics recycling. Others may use the program to find responsible recyclers. (17).

OPERATIONS AND MAINTENANCE

The operations and maintenance of solid waste facilities are subject to oversight by state regulatory agencies

requiring reporting and site inspections.

PUBLIC SAFETY

Each MSW facility is required to have an approved O&M manual, as well as a H&S Plan. The public has very

limited access to these facilities.

INNOVATION

The operational life of a new landfill cell is 2-15 years, depending on operations, which makes it possible to incorporate new designs using state-of-the-art technologies. The design life of the rest of the state's infrastructure is generally much longer, 50 years or more.

food in the United States in 2019" EPA estimates that 40% of food waste is from households, 40% from food service providers and 20% from food retailers (19).

Food waste is now the largest category of MSW going to landfill. Food waste is made up of edible food (food not eaten) and non-edible food scraps (like egg shells, cores, rinds, etc.) and is co-mingled in MSW. In June 2024 the USEPA announced the National Strategy for Reducing Food Loss and Waste and Recycling Organics. EPA aligned the food waste part of the goal with the United Nations Sustainable Development Goal Target 12.3 by 2030- halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chain, including post-harvest losses (18). In the April 2023 report, "2019 Wasted Food Report Estimates of generation and management of wasted

A UW-Madison study, "Life-cycle comparison of five engineered systems for managing food waste" (20) concluded in Waste Management & Research "Household food waste to wastewater or to solid waste? That is the question" that if food waste is disposed of through a food waste disposer to a wastewater system and contributes to uptake of nitrogen and phosphorus during treatment and is used as a soil amendment (with or without digestion to methane which is burned as a substitute for fossil fuels), it is beneficially reused (21). Food waste is going down the drain (through food waste disposers or not) or into the kitchen garbage container in every kitchen every day. Sending food waste to wastewater is also a strategy to reduce food waste to landfill.

RESILIENCE

In the 2020 Report Card for Wisconsin's Infrastructure, ASCE defines resilience as the ability to quickly recover and reconstitute critical services with minimum consequences for public safety and health, the economy, and national security (22). Wisconsin's complex web of public sector and private ownership and management of

MSW activities from collection to recycling to landfilling, that differs from one municipality to another, requires a robust collaboration between state government, local government, private companies, individuals and organizations. This diversification and collaboration contribute to resilience.



Solid Waste



RECOMMENDATIONS TO RAISE THE GRADE

- Adopt tougher recycling requirements, particularly emphasizing food waste.
- Continue Statewide Waste Composition Studies on a regular schedule to track and measure recyclables going to landfills in Wisconsin, as a basis for MSW policy decisions.
- Increase funding to the WDNR Recycling Program to cover increasing costs related to the program and for increased outreach to support recycling goals.
- Research optimum landfill fees.

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Solid Waste



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Stormwater





EXECUTIVE SUMMARY

Stormwater management infrastructure is a network of structures and practices that work together to manage the flow of rainwater and snow melt. It includes items such as storm drains, culverts and sewers, detention ponds, permeable pavement surfaces, and green infrastructure spaces built to hold and absorb water. These systems can help reduce flooding, improve water quality, and protect downstream natural habitats by controlling water movement across built and natural landscapes. Wisconsin's stormwater infrastructure faces critical challenges that demand urgent attention, especially in an era of increasing frequency of extreme weather events and continued urbanization. Insufficient capacity, deteriorating conditions, neglect, and nearly \$1B in funding shortfalls threaten public safety and infrastructure resilience. Existing systems are already struggling to meet current demands, and without strategic intervention, they may fail to address future needs. The chapter delves into an analysis of Wisconsin's stormwater infrastructure based on eight key criteria, offering opportunities to collaborate to raise the grade and ensure the long-term sustainability and resilience of this vital system.

BACKGROUND

Wisconsin's stormwater management falls under the jurisdiction of various local state, county, and municipal authorities, with oversight from the Department of Natural Resources authorized by the U.S. Environmental Protection Agency (EPA) through the Clean Water Act.¹ The state's diverse geography, including urban and rural areas, complicates the management of stormwater runoff. Urban stormwater runoff contains toxic pollutants from roads, parking lots, construction sites, industrial storage yards and lawns.² In compliance with the Clean Water Act, Wisconsin enacted NR151 and the MS4 program, which regulates storm water discharges from construction sites, industrial facilities,

and municipalities. Prior to the enactment of these federal and associated state regulations, runoff was collected and conveyed, untreated as quickly as possible away from buildings and other critical infrastructure. This fundamental shift in philosophy now mandates that developed hydrology more closely mimic an undeveloped state, where runoff is slower, cleaner, and in smaller quantities. With an increasing population and expanding urban areas, the strain on stormwater systems is evident. The current infrastructure struggles to keep pace with the demands of a changing climate, necessitating a deep, comprehensive assessment.

CAPACITY

Stormwater conveyance systems are almost entirely designed/sized based on model estimations of rainfall depth and intensity from the National Oceanic and Atmospheric Administration (NOAA). For projects that are subject to current state law/code, these systems are designed with capacity relative to the 10-year, 24-hour storm event.¹ (i.e. a storm that has a 10% probability of occurring in any given year and whose total precipitation

is measured over a 24-hour period) Communities in Wisconsin are feeling the wide-spread impacts of the changing climate and are starting to take action to protect themselves from future changes and to handle the intensifying volume of runoff during heavy rainfall events.² Aging systems and outdated design standards contribute to frequent overflows, threatening both urban and rural areas.

CONDITION

The physical condition of stormwater infrastructure can be difficult and/or expensive to assess as most of this built infrastructure is predominantly underground. Furthermore, there are very few systems with mandates to ascertain conditional assessments with any regularity. This general lack of conditional assessment can be concerning, with many components that have undergone inspection are exhibiting signs of deterioration or damage. In many cases, municipalities are completely unaware until issues or even a failure occurs.⁸ It's important to highlight those more proactive communities, such as Stevens Point, that have managed

to work regular, ongoing inspections into their budget. This proper asset management aims to mitigate the myriad issues that can be avoided before they become more hazardous, and expensive. These issues are often as straightforward as aging infrastructure coming to the end of its long lifecycle but can also be as sudden as a growing telecommunications network directionally boring right through our culverts and storm drains.⁸ These blockages can cause erosion, sedimentation, and structural issues compromise the effectiveness of stormwater management, posing risks to water quality and public safety.

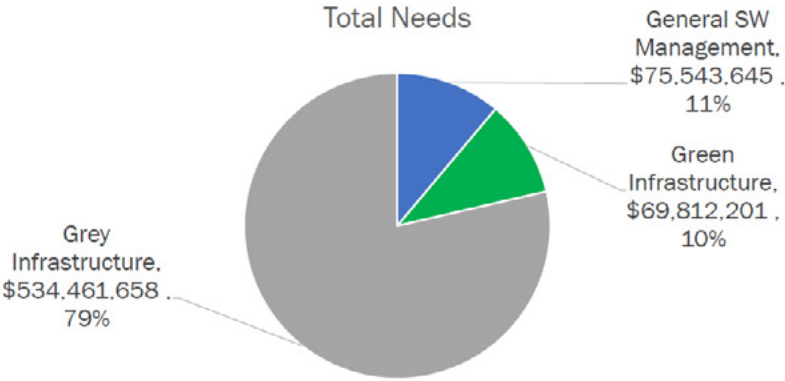
OPERATION AND MAINTENANCE (O&M)

Operation and maintenance of stormwater systems protocols and procedures depends on a large variety of factors and influences. Culverts, storm sewer pipes, and other stormwater quantity systems may require very little maintenance once properly installed. Conversely, many water quality systems, such as constructed ponds, biofiltration, and green infrastructure solutions require regular, ongoing inspection and other protocols to ensure that these systems are functioning as designed. For example, many ponds are designed to slow down runoff rates to mimic more natural, undeveloped conditions while also removing pollutants prior to discharge into natural ecosystems. If that pond is working properly,

pollutants will eventually accumulate to a concentration as to render the pond ineffective at further pollutant removal. Those pollutants must be removed and disposed of safely. Many other general stormwater programs, such as street sweeping and leaf collection aim to remove phosphorus sources prior to entering water bodies to guard against harmful algal blooms. Inadequate O&M practices contribute to the premature deterioration of nearly any and all stormwater infrastructure systems. A lack of regular maintenance exacerbates existing issues, hindering the system's ability to function optimally and comply with environmental regulations.

FUNDING

Storm Water Category Breakdown



Wisconsinites fund stormwater infrastructure projects through a variety of different avenues. Since 1998, 120 Wisconsin municipalities have implemented stormwater utilities to fund their local stormwater programs. It's important to note that Act 20, which took effect in 2013, significantly slowed stormwater utility implementation, as it limited any municipal government's ability to establish any new user fees without a commensurate reduction in the local tax levy or exception passed through on a balloted referendum.⁹ Annual utilities garner anywhere from \$10-\$150 per parcel per year with

an average single family home payment at approximately \$60 per year. These rates are typically assessed based on annual municipal stormwater budgets against any property's amount of impervious area. i.e. Rates and associated utility usage fees are assessed based on how much runoff a given parcel creates. Current funding levels for stormwater infrastructure fall short of the estimated needs. Insufficient financial support hampers the implementation of necessary upgrades, hindering the system's ability to meet current demands and prepare for the future.

FUTURE NEED

The cost to improve Wisconsin's stormwater infrastructure is substantial, and current funding prospects are insufficient. Under protocols from the EPA, The Clean Watersheds Needs Survey (CWNS) is a comprehensive assessment of capital cost needs to meet the water quality and water-related public health goals of the Clean Water Act. Prior to February of 2024, the last needs survey was published for Wisconsin in 2012. Final reports for the 2022 report from a pool of 160 municipalities, show Wisconsin's clean watershed needs

have increased from \$6B to \$12.0B with stormwater specific needs increasing from \$560M to \$683M.³ For a breakdown of where those dollars are needed, see Figure 1, 2, 3 & 4. Addressing future needs requires a strategic financial commitment to ensure the resilience and sustainability of the stormwater system. It's important to note that as much as the CWNS aims to assess needs over the next twenty years, most capital improvement plans only forecast out 5 years.

PUBLIC SAFETY

The deteriorating condition of stormwater infrastructure poses a significant threat to public safety. Increased risks of flooding and waterborne diseases underscore the urgency of addressing deficiencies to protect communities across the state. In addition to the potential major, catastrophic events, there are minor, yet ubiquitous impacts felt from the effects of relentless onslaught of errant runoff. Misplaced runoff can cause erosion to surrounding soils supporting all the other nearby infrastructure systems.¹⁰ (i.e. potholes, settling foundations, etc.) Furthermore, pipes and culverts do not meet the definition of a bridge per the Federal Highway Administration and are therefore not subject to the same rigorous inspection protocols. Nonetheless, these culverts and storm sewers certainly

pose risk to public safety in the event of their sudden failure. An axiom common in the highway preservation community indicates that the three most important elements to maximizing the life of highway pavements are “drainage, drainage and drainage.”³ If our drainage systems are designed and maintained properly, these systems protect bridges, pavements, and other critical infrastructure assets by effectively moving water away without eroding and corroding structural elements leading to damage and premature failure. In like manner, stormwater quality systems hold the key to pollutant removal prior to re-entry into local, natural waterways to protect public health. Public health and safety can be compromised by lack of maintenance and potential failure in these systems.

RESILIENCE

Resilience is the ability to adapt to and recover from a disruptive event. Key disruptors for stormwater infrastructure in Wisconsin include severe weather, economic impacts, and social stability. Wisconsin’s stormwater infrastructure lacks the resilience needed to withstand multi-hazard threats. Climate change-induced extreme weather events and other hazards could have severe consequences, necessitating investments in adaptive measures and infrastructure

upgrades. Fortunately, investments made in flood mitigation have an incredible ROI. According to FEMA, every dollar spent on riverine flood mitigation returns seven dollars in damage prevention.⁵ In addition to the physical and quantifiable economic impacts of flooding, it’s important to consider the unquantifiable impacts of lost or damaged items and heirlooms with significant community or cultural significance.

INNOVATION

Compared to other sectors of infrastructure, stormwater management is much more prone to change due to the variable, unpredictable, and escalating nature of our changing weather patterns. Innovation is essential to ensure that we are adapting to these changing demands. Integrating cutting-edge solutions is crucial to enhancing the efficiency and effectiveness of the infrastructure, addressing current challenges, and preparing for future demands. The Upper Midwest Science Center has programs monitoring effectiveness of agricultural conservation practices with “Edge-of-Field” Monitoring.⁶ In an effort to deliver vetted innovations towards stormwater quality systems, the Standards Oversight Council is an inter-agency

collaboration that develops WDNR technical standards and design and maintenance guides.¹¹ University studies and collaborations aim to maximize the opportunities associated with the proximity of Wisconsin’s Fresh Coast. Milwaukee’s own Water Council supports innovations in Water with BREW 2.0, which can assist late stage startups secure funding and take the next steps towards market delivery.⁷ Stevens Point deploys GIS mapping at the operations level to gather and utilize data on asset management and stormwater system inspections to ensure that time and dollars are used as efficiently as possible.⁸ These and so many more programs aim to deliver innovative solutions to improve our water and the quality of life that comes from its proper management.



Stormwater



RECOMMENDATIONS TO RAISE THE GRADE

- **Investment in Infrastructure:** Ensure collaboration and cooperation between industry and policy makers to secure additional funding to address immediate needs and enhance the capacity of stormwater systems to meet current and future demands.
- **Implement Comprehensive Asset Management Programs:** Establish, fund, and enforce regular maintenance programs to ensure the longevity and optimal functioning of stormwater infrastructure.
- **Promote Green Infrastructure:** Integrate viable green infrastructure solutions, such as subsurface storage and infiltration systems, permeable pavements, harvest and reuse systems, and green roofs, to enhance the resilience of stormwater systems and promote sustainable water management.
- **Enhance Collaboration:** Foster collaboration between municipalities, regulatory agencies, and the private sector to streamline decision-making processes and facilitate efficient implementation of stormwater management initiatives and innovative technologies.
- **Public Awareness and Education:** Launch public awareness campaigns to educate communities about the importance of stormwater management, encouraging responsible practices and garnering support for infrastructure improvements.



Stormwater



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Transit





EXECUTIVE SUMMARY

Public transit is essential to everyday living in communities across the country, providing access to jobs, schools, shopping, healthcare, and other services, while enabling equitable access and sustainable mobility options. Unfortunately, 45% of Americans have no access to transit. Meanwhile, much of the existing system is aging, and transit agencies often lack sufficient funds to keep their existing systems in good working order. Over a 10-year period across the country, 19% of transit vehicles, and 6% of fixed guideway elements like tracks and tunnels were rated in “poor” condition. Currently, there is a \$176 billion transit backlog, a deficit that is expected to grow to more than \$250 billion through 2029. Meanwhile, transit ridership is declining, a trend compounded by the COVID-19 pandemic. Failure to address the transit revenue shortfall will only exacerbate ridership declines as service cuts mean that trip delays and reliability issues become more frequent. This stands to increase congestion, hamper the economy, and worsen air quality in the coming years.

CAPACITY & CONDITION

Wisconsin’s public transit systems take many forms, ranging from large urban bus systems to rural shared-ride taxi services. Some services are publicly operated, while others are operated by private, for-profit companies under contract with public entities.

Two large bus transit systems are operated in Milwaukee and Madison, while medium and small bus transit systems are provided in 21 communities across Wisconsin. Public intercity and commuter/regional bus routes are operated statewide by 14 public and private service providers, including Amtrak connecting service. Shared-ride taxi services arranged by local jurisdictions through private taxi companies are provided in 45 small communities and rural areas. Additional demand responsive services, including van services and curb-to-curb taxi and bus services, are provided to support the mobility needs of seniors and individuals with disabilities. The public transit systems in Wisconsin are shown in Map 1.

Interstate and intercity rail transportation is operated by Amtrak’s Hiawatha service, operating 7 times daily between Milwaukee and Chicago, and twice daily in the Chicago to Minneapolis/St. Paul corridor through Milwaukee and St. Paul via their Empire Builder and Borealis Service.

Additionally, commuter rail service is provided from Kenosha to Chicago by Metra Rail. Connector streetcar and trolley services include the Kenosha Transit Electric Streetcar operated by the City of Kenosha and The Hop operated by the City of Milwaukee.

Although not detailed in this report, water ferry service is provided at six locations statewide. Water ferry service is provided by the Lake Express in Milwaukee, the S.S. Badger, a carferry that offers service across Lake Michigan from Manitowoc, the Merrimac Ferry on the Wisconsin River between Merrimac and Okee, the Madeline Island Ferry Line on Lake Superior, the Washington Island Ferry

Line in Door County, and the Cassville Ferry on the Mississippi River in Southwest Wisconsin.

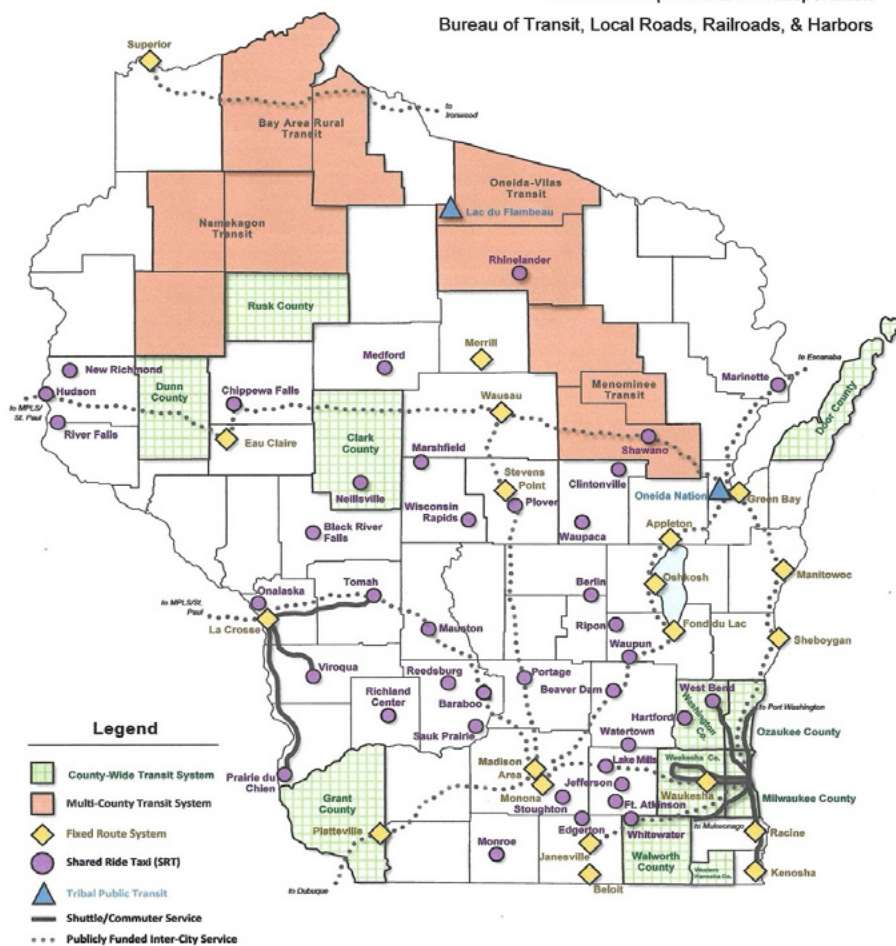
Lastly, although child school transport is a critical component of the transit system in Wisconsin, school bus systems and providers are not included in this report.

While public transit connects people to a variety of destinations, the highest single trip purpose is to get to work, with 55% of transit trips being work related. Other trips are made for school (14%), shopping, tourism, and recreation (20%), and medical services (11%). Transit also meets a critical need for the millions of transit-dependent riders who cannot afford or are unable to drive, such as young, elderly, disabled, and low-income individuals.

The Wisconsin Department of Transportation (WisDOT) has established a goal of 55% of the statewide population served by transit. This represents the population that resides within a one-quarter mile walking distance from a fixed bus route for Wisconsin's bus systems and the population within the service area for shared-ride taxi and other public transit systems (i.e., not fixed route). Statewide service coverage of 54% shown in the 2020 Report Card represented a decline from 56% in 2016. It has now declined further, reaching 53% statewide in 2023, due to continuing reductions in available transit routes and service.

Wisconsin Public Transit Systems 2024

Wisconsin Department of Transportation
Bureau of Transit, Local Roads, Railroads, & Harbors



This map identifies the general coverage areas of public transit systems within Wisconsin. For specific route information, contact transit systems directly. For Intercity Bus Service, additional information is here — <https://wisconsin.gov/Pages/travel/pub-transit/bus-service.aspx>

While transit ridership in Wisconsin was generally declining prior to 2020, ridership dramatically dropped in early 2020 as a direct result of the impacts of the COVID-19 pandemic. As shown in Table 1, bus ridership on Wisconsin public transit systems, not including demand responsive services, decreased from nearly 50.8 million riders in 2019 to 27.4 million riders in 2020, a decrease of 46%. The decline in ridership continued into 2021, but is recovering, increasing to 37.8 million in 2023.

Table 1

Wisconsin Transit Ridership: 2019 - 2023		
Year	Transit Bus	Amtrak
2019	50,795,841	971,800
2020	27,436,037	465,200
2021	25,910,395	290,100
2022	31,918,047	568,200
2023	37,745,341	724,900

Source: Federal Transit Administration National Transit Database

Unlike public bus ridership, passengers boarding and deboarding Amtrak trains in Wisconsin had been steadily growing prior to the pandemic. Similar to bus transit, train ridership fell during the pandemic, but is steadily recovering. However, ridership in 2023 still remains 25% below pre-pandemic levels. Ridership on The Hop in 2023, which continues to be free for riders, also showed recovery, and is now only 39% below ridership levels in its

initial year of service in 2019.

Keeping the state’s transit system in a state of good repair is essential for providing safe and reliable transit service. Transit systems statewide continue to face growing backlogs of high-priority capital improvement needs. Operating agencies not only must maintain bus fleets, but also require paratransit, support, and other service vehicles.

As summarized in the Federal Transit Administration’s (FTA) National Transit Database, a total of 1,280 revenue vehicles are in service in the 12 transit systems which were included in the 2022 database for Wisconsin. Of this total, 10% of all revenue vehicles currently exceed their useful lives. Some 9.3% of the 796 buses where vehicle age was included in the database were identified as vehicles which exceed their useful life. This represents a noteworthy improvement from the 23% of vehicles exceeding their useful lives as reported in the 2020 transit Report Card chapter.

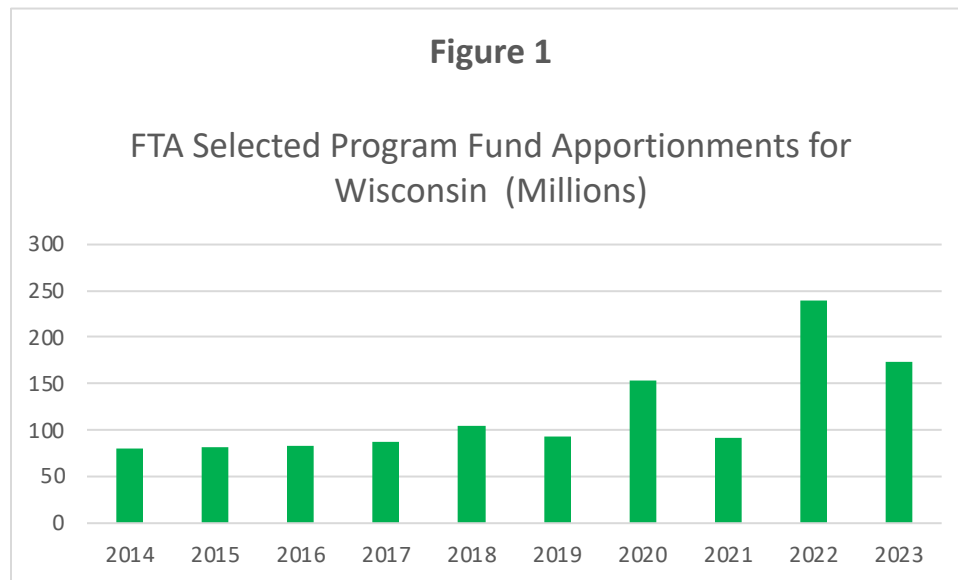
Buses remaining in service past their useful lives result in increased maintenance expenses and decreased service dependability. Continued capital investment is needed to keep vehicle replacement cycles in line with accepted replacement guidelines, and maintain dependable transit service.



Madison Metro Bus Storage Facility. Source: Wisconsin State Journal

The operation of transit service requires the provision and maintenance of elements such as bus stops, shelters, park-and-ride lots, transit stations, and other amenities. As reported in the prior Report Card, maintenance, operation, and storage facilities in large, medium and small systems have been reported as aging or inadequate to support bus services. Condition data reported in

the 2020 Report Card has not been updated. Transit operators continue to invest in modernizing facilities, adding new maintenance equipment, and expanding bus storage capacities. Also of particular note, the City of Madison has been awarded \$6.4 million in 2022 as part of the federal Bipartisan Infrastructure Law to rehabilitate its maintenance and administrative facility.



Source: Federal Transit Administration

O&M, FUNDING & FUTURE NEED

State and federal capital assistance is critical to support transit investment in Wisconsin. Most of Wisconsin’s transit systems rely on state and federal funding for capital needs, including vehicles, facilities, equipment, and new technology. Local funding for capital improvements is provided primarily through property tax levies and farebox revenues. State law has placed limits on local tax levy increases, placing decisions on transit needs in direct competition with other local funding needs and priorities.

In November 2021, the Infrastructure Investment and Jobs Act (IIJA) - also known as the Bipartisan Infrastructure Law or BIL - was signed into law. As shown in Figure 1, this legislation dramatically increased federal transit funding for Wisconsin. Based on formula funding alone, Wisconsin expects to receive about \$599 million over five years to improve public transportation options across the state. In the first year, this represented about a 32% increase over formula transit funding levels provided in the Fixing America’s Surface Transportation

(FAST) Act. In addition to these formula funds, grants will be available for additional capital improvements under several FTA programs, such as the Low and No Emission Grant Program, the Grants for Buses and Bus Facilities Competitive Program, and the Capital Investment Grants (CIG) Program. One of the most significant projects funded in part with a Small Starts Grant in Wisconsin is the East-West Bus Rapid Transit system in Madison which begins operation in September, 2024.

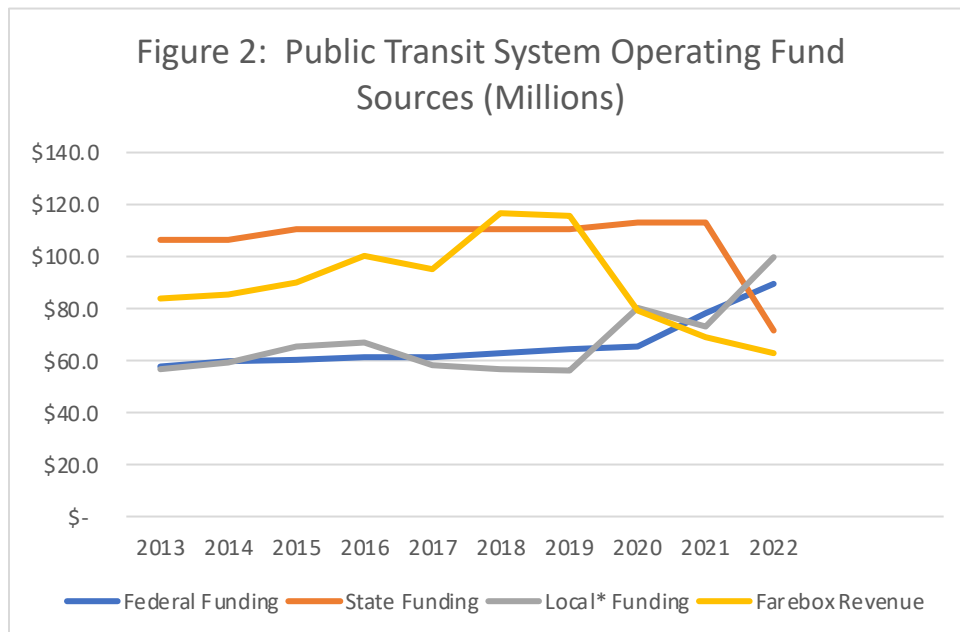
While the IIJA provides opportunities to make much-needed improvements in its transit infrastructure, issues related to operation and maintenance costs have been intensified during the COVID19 pandemic and its aftermath. Bus ridership reductions seen since the start of the pandemic cause reduction in farebox revenues, which in turn impact efforts to sustain operating revenues.

Although ridership recovery has begun, changes have been seen in travel patterns in general. Most notably, there have been changes in work trips as more people have

started working from home, at least during certain days of the week. With slow recovery in ridership, additional upward pressure could occur on transit fares to generate needed revenue to support operation. This could adversely impact performance at a time when recovery continues and a strong transit system is needed.

Public transportation agencies continued operation during the height of the pandemic, but as noted above, ridership and associated fare revenues declined dramatically. To

continue service, transit agencies implemented measures to address the spread of the virus, such as limiting the number of passengers boarding and sanitizing buses. Transit was also supported by federal funds provided under the Coronavirus Aid, Relief, and Economic Security Act (CARES) Act, the Consolidated Appropriations Act of 2021, and the American Rescue Plan Act. These supplemental appropriations totaled over \$470 million to support transit in Wisconsin.



* Primarily property tax revenue.
Source: Wisconsin Legislative Fiscal Bureau

As shown in Figure 2, funding sources for transit system operating costs are provided through a combination of federal, state, local, and farebox revenues.

With the exception of the one-year drop in 2022, where aid was reduced to offset federal pandemic aid awards provided to operating agencies, state assistance has remained nearly constant since receiving a 10% cut by the Wisconsin Legislature in 2011. Figure 2 also shows the effect of ridership changes on farebox revenues, and highlights the increases in federal assistance and local funding needed to support public transit services as a result of the pandemic.

Fiscal challenges loom for public transit in Wisconsin as federal pandemic relief support will run out after 2024 and farebox revenues are still expected to be impacted

by slow ridership recovery. Transit system officials expect ridership to continue to recover, but it could remain below pre-pandemic levels for at least the next few years. Unless addressed through state and federal support, this change could further result in less frequent service, reduced hours of operation, less accessibility to jobs, and, in some cases, elimination of service completely in areas of low ridership. These effects are especially being felt by services in small communities and throughout rural areas. The elimination of restrictions imposed by the Wisconsin Legislature, which reduced annual transit operating assistance by 10%, repealed regional transit authorities, eliminated a \$100 million capital bonding program, and placed limitations on increases in local property tax levies, could help provide needed revenue. Additionally, the funding source for state operating aid is no longer included in the state's

Transportation Fund and requires appropriations from the General Fund as part of the state budget, eliminating a potentially stable source of funding support.

Prior to the COVID-19 pandemic, continuous growth in passenger rail ridership was being seen, and further growth in transportation by rail can be achieved through expansion of rail services.

In 2023, Wisconsin received five \$500 million grants

through the Federal Railroad Administration's Corridor Identification and Development Program to study expanding Amtrak service from Milwaukee to Chicago, Green Bay, Madison, Eau Claire and the Twin Cities, and improvements to two current AMTRAK routes to Milwaukee. Funding for implementation could be available from the \$66 billion included in the IIJA for rail expansion, provided support can be obtained from the Wisconsin Legislature.



Photo Source: Biztimes.com

Work is also underway on a study to revive Kenosha-Racine-Milwaukee (KRM) commuter rail service. Compared to Amtrak's more inland Chicago to Milwaukee route, the KRM service would stop more frequently and operate at lower speeds. The most recent plan contemplated a total of 14 round trips per day. This lakefront line would operate on freight tracks owned by the Union Pacific, and would cross over onto Canadian Pacific tracks that feed into the Milwaukee Intermodal Station.

In Milwaukee, the city recently launched a new connector line for The Hop, providing service from downtown to the Lakefront and Summerfest grounds. Milwaukee is currently considering expansion of service to the Fiserv Forum and east side, and potentially to the city's Bronzeville Area just north of downtown and Walker's Point area south of downtown. Similar to the proposed Amtrak expansion, the city must face hurdles from the

State Legislature, which currently does not provide operating cost support and has significantly narrowed the streetcar's potential funding sources.

Regional transportation authorities were eliminated and their creation banned by the Wisconsin Legislature in 2011. The repeal of this ban would allow the development of more complete and vibrant transit systems in areas throughout the state by providing services extending beyond current jurisdictional boundaries. In addition to managing a dedicated and sustainable source of funding, the opportunities created could enhance the coordination and efficiency of transit services for local units of government, including expanded systems, the development of alternative connections between potential workforce and employment centers, and access to commercial centers currently not available.

PUBLIC SAFETY

Transit is already one of the safest operating modes of transportation. Service should be safe for passengers, system operators, and all other travel modes interacting with the system. New safety requirements have been included in the IIJA to further preserve and advance transit safety. FTA’s updated National Public Transportation Safety Plan includes recommended standards and state-of-the-art practices to improve transit safety.

Based on WisDOT data, the number of crashes statewide involving transit-related vehicles is summarized in Table 2. As compared to all crashes in Wisconsin, these totals represent less than 0.5% of statewide crashes annually. Also noteworthy, in the time period from 2019 and 2023, between 550 and 600 traffic fatalities occurred annually on public roadways in Wisconsin, as compared to a total of 8 fatal crashes involving transit vehicles over that same 5 year period.

Table 2					
Wisconsin Crashes with Transit Vehicle Involved:					
2019 - 2023					
Year	Vehicle Type	Crash Severity			Total
		Fatal	Injury	Prop Dam	
2019	Coach		8	43	
	Pas Van		13	38	
	Tr Bus		113	396	
	Total	0	134	477	611
2020	Coach		2	12	
	Pas Van		7	17	
	Tr Bus	2	90	197	
	Total	2	99	226	327
2021	Coach		2	18	
	Pas Van		4	17	
	Tr Bus	4	96	285	
	Total	4	102	320	426
2022	Coach		2	35	
	Pas Van		4	33	
	Tr Bus	1	111	307	
	Total	1	117	375	493
2023	Coach	1	3	21	
	Pas Van		6	27	
	Tr Bus		81	342	
	Total	1	90	390	481

Source: Wisconsin Department of Transportation and University of Wisconsin

While crashes and fatalities involving transit vehicles remain low when compare to all forms of vehicular traffic, assaults and violence on buses have become more frequent. As a result, concerns with driver and passenger safety have become more prominent for transit service providers. Some of the risk factors in driver assaults come from direct interaction with the public and passengers, fare enforcement, and inadequate means of evading assaults.

In Wisconsin, driver and passenger safety issues are being

addressed through equipment and other improvements installed on transit vehicles. Many buses are equipped with two-way radios and automatic vehicle locator systems. The Milwaukee County Transit System has also equipped buses with interior- and exterior-facing cameras. Other safety initiatives Addito deter assaults include automated fare collection systems, security personnel on buses, and protective barriers for drivers. Further expansion of these bus infrastructure improvements can improve safety and security issues on transit vehicles.

RESILIENCE

A strong and healthy transit system is a fundamental component of a resilient and sustainable transportation system in Wisconsin. Transit operation reduces vehicle miles of travel on the state's roadways by providing an alternative to individual passenger vehicle use. These services can result in greater efficiencies on roadways and travel time improvements. Reductions in traffic demand generated by an effective transit system can minimize traffic congestion, reduce fuel consumption and emissions, and improve safety and efficiency. Current and continued investments by operating agencies in programs

to replace diesel transit vehicles with low- or no-emission vehicles will further benefit air quality.

Other than annual snowfall events typical of Wisconsin weather, extreme weather events have not been an issue for transit in Wisconsin. The COVID-19 pandemic provided a challenge to the resilience of transit service in the state. Operating agencies were able to successfully respond and preserve transit operation during the pandemic, but required a large infusion of federal funding support to maintain needed services.

INNOVATION

Advancements in technology have provided opportunities for improvements in many different areas of transit equipment, operations, safety, and information services for passengers. Many examples of the integration of technology into transit systems can already be found in transit services throughout Wisconsin, ranging from large urban systems to services in small communities and rural areas.

Automatic vehicle locator systems provide real-time information to passengers on the arrival of transit vehicles, including messages on signage at transit stops and stations and via web-based applications. Automated fare payment and collection equipment are currently being deployed and will serve to improve transit service efficiency and reduce boarding and travel times. These also can be expected to improve safety and security for bus drivers by reducing issues with passengers related to fare collection.

Demand responsive services are using improved software applications to better plan and coordinate passenger services. These applications improve response times, decrease revenue hours and miles traveled for vehicles in service, and can increase the number of transit trips per hour of service.

With further evolution of connected vehicle and communication technologies, more opportunities will become available for improved vehicle-to-vehicle and vehicle-to-traffic control communications supporting more efficient operation. They also can provide opportunities for the implementation of advanced traveler information systems. As these technologies become available and are implemented in the future, further enhancements in transit system performance and safety can be achieved.



Transit



RECOMMENDATIONS TO RAISE THE GRADE

The following are recommendations to raise the grade for transit in Wisconsin:

- The federal surface transportation program authorized under the IIJA is set to expire at the end of Fiscal Year (FY) 2026. Timely reauthorization is needed to maintain the positive momentum in transit service productivity and asset conditions achieved under the IIJA, and include an effective means to support public transit operations in the face of looming operating deficits.
- As discussed earlier, the Wisconsin Legislature previously enacted legislation which placed limits on and reduced annual transit operating assistance, repealed regional transit authorities, eliminated a \$100 million capital bonding program, and placed limits on increases in local property tax levies. Additionally, the funding source for state operating aid is also no longer included in the State's Transportation Fund and requires appropriations from the general fund as part of the State budget. An increased, dedicated source of state funds is needed to defray local transit operating costs, stabilize fares, ease property tax burden, and remove barriers imposed by the state to generate supplemental funds by local jurisdictions.
- Address driver and passenger safety issues through advanced communications technologies, safety patrols, and other bus- and transit-related infrastructure improvements.
- Advance the design, construction, and operation of high-speed bus and rail transit corridors and other transit travel time enhancements in transportation systems to help make transit the travel mode of choice, and to reduce congestion and improve safety in primary travel corridors.
- Repeal the ban on regional transit authorities (RTAs) enacted in 2011 by the Wisconsin Legislature, which would once again allow the creation of RTAs throughout Wisconsin to overcome barriers to developing, operating, and funding multi-jurisdictional transit service areas.



Transit



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Wastewater





EXECUTIVE SUMMARY

Wisconsin's municipal wastewater utilities are challenged by aging infrastructure, growth, and new environmental controls on wastewater discharge. Worthwhile projects far exceed available funding. In February 2024, the state government informed applicants to the Clean Watershed Fund that demand for the program exceeded capacity by \$654 million in the 2023-2025 cycle. Wisconsin's estimated needs for municipal wastewater infrastructure maintenance and upgrades total \$5.5 billion over the next twenty years. Larger facilities are adopting asset management plans, a tool to proactively track and maintain their systems, but smaller facilities lack the resources to develop such plans. Improved resilience of wastewater conveyance, collection, and treatment systems is key to addressing more frequent hazard events, but rural facilities struggle to implement solutions like backup energy systems. In the last five years, the State of Wisconsin has seen an increase in toxic discharge test failures at wastewater treatment facilities caused by overdosing of phosphorus treatment chemicals or industrial chemicals seeping into municipal systems. As facilities start to have PFAS limits applied in their permits for effluent and biosolids, more innovative solutions will need to be designed and implemented to meet permitted limits.

CONDITION AND CAPACITY

Aging infrastructure, population growth and new wastewater discharge limits are posing challenges to Wisconsin's municipal wastewater utilities. Wisconsin has 603 operational municipal wastewater treatment facilities and 867 operational wastewater collection systems as reported in the 2022 U.S. Environmental Protection Agency (EPA) Clean Watersheds Needs Survey (CWNS).

Many of the municipal wastewater treatment plants (WWTP) were constructed or upgraded between the mid-1970s and the late 1980s when the federal government provided 55% grant funding for treatment plant projects. Wisconsin demonstrates a proactive approach to facility planning by assigning WWTPs a

typical design life of 20 years. However, many of the state's wastewater infrastructure systems are reaching the age where they need to be replaced or rehabilitated.

According to the 2022 CWNS, 4.36 million people in Wisconsin were served by municipal facilities. As of January 1, 2023, the state's estimated population was 5,951,400 people. Therefore, approximately 27% of Wisconsin residents do not have access to wastewater collection and treatment, but mainly rely on on-site systems or holding tanks. The state does not have the ability to track failing on-site systems.

It is not difficult to find sanitary collection systems that are beyond their expected design life and in need of

replacement or rehabilitation. The older sewer systems are susceptible to inflow and infiltration (I&I) such as rain and/or groundwater that seeps into the system and overwhelms pipe and treatment plant capacity causing back-ups, sanitary sewer overflows, and wastewater bypasses at treatment plants. However, rainfall is not the only reason why overflows occur. Equipment failures, power outages, and broken pipes are just a few other reasons attributed to reported overflows.

From 2019 through 2022, there were 790 reported events that totaled 3.99 billion gallons of municipal wastewater overflows. Industrial wastewater overflows data was not available to be quantified for this report. Rainfall was the cause cited for 405 of the overflow events and 92% of the overflow volume. Combined sewer systems accounted for 3.8 billion gallons or 95% of the total overflow volume from 7 reported events over the four-year period. Sanitary sewer overflows were the most frequent with 623 reported events or 79% of the total.

Reported Volume of Overflows (million gallons)	2019	2020	2021	2022	Total Volume 2019-2022	% of Total
Combined Sewer Overflow	563	2,107	380	751	3,801	95%
Sanitary Sewer Overflow	43	63	14	21	141	4%
Treatment Facility Overflow	38	9	1	2	50	1%
Total Volume (MG):	644	2,179	395	774	3,992	100%

Reported Number of Overflows	2019	2020	2021	2022	Total Events 2019-2022	% of Total
Combined Sewer Overflow	2	2	2	1	7	1%
Sanitary Sewer Overflow	204	198	100	121	623	79%
Treatment Facility Overflow	69	35	31	25	160	20%
Total Events:	275	235	133	147	790	100%

FUNDING AND FUTURE NEED

The 2022 EPA CWNS estimated the municipal wastewater needs for Wisconsin total \$5.5 billion over the next 20 years. The needs are categorized and presented in the figure below.

Needs Category	2022 Needs \$ (millions)	%
I Secondary Wastewater Treatment	327	6
II Advanced Wastewater Treatment	1,946	35
IIIA I/I Correction	50	1

III-B Sewer Replacement Rehabilitation	1,266	23
IV-A New Collector Sewers and Appurtenances	248	5
IV-B New Interceptor Sewers and Appurtenances	479	9
V CSO Correction	1,191	22
Total Wastewater Needs	5,507	100

Wisconsin funds wastewater infrastructure through local user fees and federal grants and financing mechanisms. The state's three major sources of grant funding include: The United States Department of Agriculture (USDA) Rural Development Program, the Wisconsin Economic Development Corporation (WEDC) Community Development Block Grants, and the DNR Clean Water Fund (CWF).

Since 1966, the USDA's program has provided grants for wastewater treatment projects. The program serves communities with populations of 10,000 and less with 40-year loans and has been fairly stable with a trend of between \$10 and \$15 million per year. Additionally, since 1997, the WEDC Community Development Block Grants program has funded numerous wastewater treatment facilities in low to moderate income communities. The WEDC program shows a decreasing funding trend since 2013. In general, as grant dollars are expected to continue to decline, municipalities will need to raise their rates sufficiently to fund an increasing share of the cost of providing sewer service. This can be especially challenging for low-income communities and

communities with aging infrastructure.

The WDNR and the Department of Administration (DOA) jointly administer the state of Wisconsin CWF program under the Environmental Improvement Fund (EIF). The program has provided over \$6.9 billion in loans since its inception in 1991. In Wisconsin, the state match is provided through revenue obligation bonds. Since the beginning of the CWF program in 1991 through the 2022-2023 funding cycle, no application has been denied due to a lack of loan funds.

However, in February 2024, stakeholders were notified that applications for financial assistance in the 2023-2024 fiscal year significantly exceeded available funding. A total of \$521 million, including \$56 million in principal forgiveness, in CWF financial assistance has been requested by municipalities as of April 2024. The amount of financial assistance provided by the CWF has increased by an average of 10% each year, but the increases will no longer keep up with the demand based on 2023-2024 applications and the 2024-2025 projections. The estimated demand for the CWF

program could exceed funding capacity by \$654 million in the 2023-2025 biennium.

The large increase in demand between 2022-2024 is attributed to three possible causes: 1) anticipated increases in funding from the Infrastructure Investment and Jobs Act (IIJA); 2) backlog of projects from supply chain issues and inflation concerns; and 3) submission of projects before the Build America, Buy America Act requirements are in effect due to concerns of higher construction costs.

With the uncertainty of funding, municipalities that have relied on the CWF program are having to explore other funding mechanisms such as general obligation bonding. Critical infrastructure updates are potentially being deferred.

While federal grants and financing mechanisms are important, most of Wisconsin's funding for wastewater infrastructure comes from sewer user fees. Sewer

connection fees also pay for capital expenditures for new treatment capacity and conveyance infrastructure. Of the communities that responded according to The Cost of Clean, 2019 Wisconsin Sewer User Charge Survey Report, about 6% have a property tax, in addition to sewer rates, that is allocated towards funding wastewater needs. Sewer user fees are typically used for operation and maintenance of the wastewater treatment plant and collection system, with limited funds available for capital improvements.

The highest sewer rates and high annual rates of increase occur in communities that range from 1,000-2,000 people. Communities of this size represent the majority of the sewered communities in Wisconsin. Due to the economies of scale, sewer rates trend downward for each household as the population being served by the WWTP increases. Facilities that regionalize with larger communities receive priority funding from the CWF program.

OPERATIONS AND MAINTENANCE

Wisconsin Administrative Code NR 210.23 required that all owners of collection systems develop and implement a Capacity, Management, Operation and Maintenance (CMOM) Program by August 1, 2016. While owners are required to have a CMOM program in place, the documentation is not submitted to the Wisconsin Department of Natural Resources (DNR) for review; rather it must be available upon request. In 2023, updated inspection protocol at the DNR requires that the CMOM is reviewed during each inspection. As indicated in *The Cost of Clean, 2019 Wisconsin Sewer User Charge Survey Report*, there has been a significant increase in televising sewers since the implementation of the CMOM program. In 2019, average communities were televising approximately 15% of their sewers per year, which would provide for a complete inspection of the collection system over a 7-year period.

Municipal wastewater treatment plant owners are required to submit a Compliance Maintenance Annual Report (CMAR) to DNR every year per NR 208.04, Wisconsin Administrative Code. The CMAR is a self-evaluation tool that describes wastewater management activities, physical conditions, and performance of the treatment works which can impact permit compliance.

There are a variety of sections including sections on staffing and preventative maintenance, operator certification and education, and financial management of the system. Facilities report on whether they have O&M manuals, paper file or computer file systems for maintenance, and rate the overall maintenance of the plant. Over time, more facilities are using computer file systems for maintenance. Asset management plans are being adopted by larger facilities, but smaller facilities lack the resources to put together such plans.

Facilities also report on any Whole Effluent Toxicity (WET) failures in the CMAR. Whole effluent toxicity (WET) measures the combined toxic effect to aquatic organisms from all pollutants contained in a facility's wastewater effluent. WET tests measure an effluent's effect on the test organisms' ability to survive, grow and reproduce. WET test exposures consist of different effluent concentrations, usually diluted with the receiving water that it is discharged into. The WET test organisms used in Wisconsin are *Pimephales promelas* (fathead minnow), *Ceriodaphnia dubia* (a zooplankton), and sometimes *Selenastrum capricornutum* (a green algae). These species are known to be sensitive to toxic substances and are representative of aquatic populations

found in Wisconsin waters. There are two types of WET tests - acute and chronic. The objective of an acute WET test is to find the concentration of effluent that causes death during a short-term exposure. The objective of a chronic WET test is to find the concentration of effluent that causes sublethal effects (reductions in reproduction or growth) during a longer-term exposure.- In the last five years, the State of Wisconsin has seen an increase of WET test failures at wastewater treatment facilities. This means that the effluent being discharged has caused toxicity to one or all three of the WET test organisms. Failures are caused by a variety of reasons including overdosing of phosphorus treatment chemicals, and industrial discharges to municipal systems.

While the CMAR data is submitted electronically by permittees, according to correspondence with DNR, the data is not compiled into a centralized database. To compile the CMAR data, it would require manually reviewing over 900 individual reports and recording the data. Each CMAR is reviewed individually by DNR staff.

In 2014, Wisconsin Administrative Code NR 110 was updated to include operator certification for

Sanitary Sewage Collection Systems. The study guide was developed and published in 2018. After this was completed, at the time of WPDES permit issuance following 2018, collection system operators will have a permit term of 5 years to obtain collection system certification. This is required for collection systems owned by treatment plants but is voluntary for satellite sewage collection systems. As this certification has become required, communities have had to find someone that can become certified and responsible for the system. Since 2020, wastewater treatment plants and collection systems have been experiencing staffing shortages as seen nationwide in other industries.

“The DNR recently updated its program guidance, “Disinfection Requirements for Discharges to Recreational Use Waters,” which clarifies how factors in ch. NR 210, Wis. Adm. Code, may be applied to publicly and privately owned domestic sewage treatment works that discharge to Wisconsin surface waters. As a result, approximately an additional 100 municipal wastewater treatment facilities will be required to install, upgrade, or operate disinfection equipment over the next 10 years.”

RESILIENCE

Wisconsin has seen impacts from fluctuations in storm event intensity and frequency from climate change. Wastewater treatment facilities can be inundated from receiving groundwater and stormwater entering the collection system (infiltration and inflow, I&I) during flood and snow events. Municipalities, therefore, are urged to consider the resilience of their conveyance, collection, and treatment systems. A major concern for rural facilities is having back-up generators at lift stations in case of power outages.

In 2018, America’s Water Infrastructure Act (AWIA) was signed into law and amended Section 1433 of the Safe Drinking Water Act (SDWA). It requires community (drinking) water systems serving more than 3,300 people to develop or update risk and resilience assessments (RRAs) and emergency response plans (ERPs). Wastewater treatment systems are not required to certify completion of RRAs or ERPs to the EPA. The EPA does encourage wastewater treatment plant

systems to plan for disasters that could disrupt system operations by conducting RRAs and developing ERPs. To encourage this, the EPA, the National Rural Water Association (NRWA), and the Rural Community Assistance Partnership (RCAP) will provide signed certificates of completion to wastewater treatments systems that develop RRAs or ERPs under the guidance of a NRWA or RCAP technical assistance provider. Wastewater operators could then receive CEU credit hours for the time they spent developing the RRAs and ERPs. The Wisconsin DNR accepts these CEU credits hours for operators to use towards their continuing education requirements. The DNR also recommends that wastewater treatment facilities complete vulnerability assessments to help identify and prioritize the best security measures for each wastewater systems, including cybersecurity.

PUBLIC SAFETY

A matter of increasing importance to public health and wastewater operations is the challenge of previously undiscovered microconstituents. A recent example, Perfluoroalkyl and polyfluoroalkyl substances (PFAS), are a class of human-made, highly-fluorinated chemicals that have been manufactured and used in industrial and consumer products worldwide since the 1950s. These chemical species are synthetic and do not occur naturally in the environment.

As wastewater facilities work on decreasing toxicity in their wastewater effluent, more work is needed to evaluate the public health concerns of toxicity. There is also only currently one laboratory in Wisconsin that is certified to perform WET tests.

In 2022, a new rule was passed in Wisconsin that included surface water quality standards for perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). Beginning with Wisconsin Pollutant Discharge (WPDES) surface water permits slated for issuance on October 1, 2022 and thereafter, PFOS and PFOA monitoring will be included in selected WPDES permits based the rule parameters. Depending on results of the monitoring for each wastewater treatment facility, PFOS and PFOA limits may be added to the next WPDES permit. Starting in January 2024, PFAS monitoring of biosolids is being added to WPDES permits for all facilities that

generate biosolids. The DNR has developed an Interim Strategy for permittees to use when considering disposal of PFOS or PFOA impacted municipal sludge.

Wastewater treatment plants are not the original sources and do not add or remove PFAS during the treatment process. If a wastewater treatment facility is given PFOS/PFOA limits, a source reduction program will need to be started in that municipality. If source reduction does not work for the facility to meet permit requirements, significant investment in research for new treatment technologies and disposal techniques will be required. In addition, many permittees have biosolids programs that may be impacted. Public education and outreach will continue to be needed to address the treatment and public health concerns with microconstituents.

“Whole effluent toxicity (WET) tests are a critical component of WPDES permits. The primary goal of WET testing is to ensure that wastewater effluent discharged into Wisconsin surface waters do not negatively impact aquatic ecosystems. The WDNR typically incorporates a WET limit into a WPDES permit when wastewater effluent has impacted or has the potential to impact the aquatic environment.” During the past five years, there has been an increase in positive WET test results throughout Wisconsin. This increased toxicity has been caused by a variety of reasons including overdosing of phosphorus treatment chemicals, and industrial discharges that include chemicals such as Quaternary Ammonium that is used for disinfection. As wastewater facilities work on decreasing toxicity in their wastewater effluent, more work is needed to evaluate the public health concerns of toxicity. There is also only currently one laboratory in Wisconsin that is certified to perform WET tests. This causes capacity problems for facilities trying to get their WET tests performed during the required time periods. It also is an additional large expense for facilities to ship the many samples required for this test to reach Superior, Wisconsin within the twenty-four-hour holding period.

INNOVATION

As wastewater treatment facilities work on solutions for high PFAS in their effluent and biosolids, wastewater facilities in Wisconsin are coming up with innovative solutions. In May 2022, the City of Marinette Wastewater Treatment facility biosolids drying process to essentially dehydrate the solids portion of the wastewater stream to provide easy and cheaper transport of the biosolids to the Columbia Ridge Landfill in the state of Oregon. This was the only landfill in the United States who would take the biosolids with PFAS from 2019 to 2023. In 2023, the facility started to dispose of the biosolids in a landfill in Wisconsin. Through source reductions and the drying process, the dried biosolids have PFAS values below the DNR Interim Strategy limits. As facilities start to have PFAS limits applied in their permits for effluent and biosolids, more innovative solutions will need to be designed and implemented to meet permitted limits.

From the 2022 Clean Waters Survey, “The Milwaukee (Wisconsin) Metropolitan Sewerage District reported Category II needs to increase the capacity of the

District’s Jones Island Water Reclamation Facility to use landfill gas, a natural byproduct of decomposition in the city’s Metro Landfill, in place of natural gas. The landfill gas will be used as a source of energy to help power the treatment plant and will also be used to produce biosolids-based commercial fertilizer that is sold across the country. This Category II project will build infrastructure to treat gas from the landfill and deliver it to the district’s landfill gas pipeline.” The Green Bay Metropolitan Sewerage District (NEW Water) used federal funding to build a new solids handling facility called the Resource Recovery and Electrical Energy (R2E2) project. This project allows NEW Water to produce electricity and to recover and reuse heat. In 2019, New Water’s biogas engine generators produced enough electricity to power about 1,560 homes for an entire year. With funding, other facilities could engineer innovative solutions to harness energy, allowing more energy to be useable on the grid by other entities and lowering rates for customers.





Wastewater



RECOMMENDATIONS TO RAISE THE GRADE

- The potential impacts of climate change and aging infrastructure lead to such as I&I may impact collection systems such that future capacity will be more difficult to predict and costly to address. Ongoing monitoring and planning are required to maintain or achieve sustainable collection systems. Capital improvement projects will be needed in order to achieve needed capacity.
- Causes of overflows included rainfall, equipment failures, broken pipes and power outages. CSOs which have the biggest volume and SSOs which are more frequent, should be addressed through capital improvements and maintenance. Consider adding on-site power generation or portable generators at lift stations to match the requirements for treatment plants in order to prevent overflows during power outages.
- For the first time, requested financial assistance exceeded the funding capacity of the Clean Water Fund program. More federal, state, and local funding is needed to help municipalities and utilities make upgrades to maintain their systems and meet existing and new regulatory requirements.
- Emphasize asset management programs for wastewater utilities.
- The state of Wisconsin should convert CMAR data collection into a database format where data can be queried and quantified for improved state-wide reporting and data analysis.
- Develop and grow wastewater workforce to meet current needs and address current challenges.
- Treatment facilities should complete vulnerability assessments to help identify and prioritize the best security measures for each wastewater systems, including cybersecurity.
- Increase the number of certified laboratories in Wisconsin to perform WET tests.
- Permit holders may incur significant capital and operating expenses to deal with PFAS once limits are established. Planning is necessary for the physical facilities and financial needs for achieving these anticipated limits. New innovative treatments options should be encouraged as well as pretreatment programs at industrial users.



Wastewater



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