



WISCONSIN
2020
INFRASTRUCTURE
REPORT CARD

Wisconsin Section of the American Society of Civil Engineers
INFRASTRUCTUREREPORTCARD.ORG/WISCONSIN

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EXECUTIVE SUMMARY

Access to reliable, safe infrastructure improves the quality of life and “sets the table” for sustainable economic growth. Positive economic growth hinges on the availability and capacity of underlying systems that must support it, namely our infrastructure. *Clean water (surface and drinking water), roads, bridges, transit systems, airports, water and sewer systems, dams, ports, and energy systems are categories of infrastructure that directly affect our ability to live, work, play and produce economic expansion and development. Infrastructure provides the foundation of our state’s economy and is integral to preserving our high quality of life.*

Much of Wisconsin’s infrastructure requires capacity or maintenance upgrades or is reaching the end of its expected lifespan. You will see this reflected in Wisconsin’s grades. Systems built decades ago need upgrading to better prepare for security threats, larger storm events, increased use of renewable fuels, new technology and a changing population.

Wisconsin ASCE report card committee of engineering experts assessed the overall GPA as a C.

Given the analysis of this report, the committee makes the following recommendations to raise the grade:

1. Wisconsin must increase overall investment across all infrastructure sectors to ensure safe, resilient, and reliable systems to maintain and improve the quality of life and economic health for the state’s residents.
2. Leadership at the state and federal levels must have targeted discussions and build consensus to facilitate necessary updates for outdated infrastructure based on the needs of Wisconsinites.
3. Along with increased investments, efficiencies and new technologies can help bridge the gap between smart investment and overall infrastructure needs, encourage new methods of design and construction, and defray costs while providing for a better future for Wisconsin.
4. Project priorities should be set for investment in the state’s most outdated and over capacity infrastructure needs.

The COVID-19 health crises hit during the latter part of this report card effort and was not included as discussion in the individual chapters. However, this pandemic caused great changes to our infrastructure use and funding. Commercial water demand dropped, most commuters stayed off the roads and away from transit, and airports have been virtually empty. A sizable portion of the existing infrastructure systems just mentioned are supported with user generated revenue streams, that significantly declined or vanished because of our “new normal.” Additional demands continue to be placed on municipal and state budgets, leaving less support for parks, schools, and other publicly-owned infrastructure. These short-falls in funding need to be rectified. At the time of this writing, the health crisis continues to place unprecedented strains on our economy. At the federal level, congress should make infrastructure investment a centerpiece of its immediate response and long-term economic recovery strategy. Now is the time to renew, modernize and invest in our infrastructure to maintain our great state and our country’s competitiveness. Please use this 2020 ASCE Wisconsin Report Card to better understand and advocate for the state of Wisconsin’s infrastructure.

2020 REPORT CARD FOR WISCONSIN'S INFRASTRUCTURE



 AVIATION 

 PORTS 

 BRIDGES 

 ROADS 

 DAMS 

 SOLID WASTE 

 DRINKING
WATER 

 STORMWATER 

 ENERGY 

 TRANSIT 

 HAZARDOUS
WASTE 

 WASTEWATER 

 INLAND
WATERWAYS 

ABOUT THE INFRASTRUCTURE REPORT CARD

GRADING CRITERIA

ASCE-WI's 2020 Report Card Committee is a group of dedicated civil and environmental engineers from Wisconsin, who volunteered their time to collect and analyze data, prepare, review, and revise each section, and develop the final Report Card. The committee worked with ASCE's Committee on America's Infrastructure and ASCE Infrastructure Initiative staff to provide Wisconsin with a snapshot of the state of our infrastructure, as it relates to us at home, and on a national basis.



The Report Card Sections are analyzed based on the following eight criteria:

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?

GRADING SCALE



EXCEPTIONAL: FIT FOR THE FUTURE

The infrastructure in the system or network is generally in excellent condition, typically new or recently rehabilitated, and meets capacity needs for the future. A few elements show signs of general deterioration that require attention. Facilities meet modern standards for functionality and are resilient to withstand most disasters and severe weather events.



GOOD: ADEQUATE FOR NOW

The infrastructure in the system or network is in good to excellent condition; some elements show signs of general deterioration that require attention. A few elements exhibit significant deficiencies. Safe and reliable with minimal capacity issues and minimal risk.



MEDIOCRE: REQUIRES ATTENTION

The infrastructure in the system or network is in fair to good condition; it shows general signs of deterioration and requires attention. Some elements exhibit significant deficiencies in conditions and functionality, with increasing vulnerability to risk.



POOR: AT RISK

The infrastructure is in poor to fair condition and mostly below standard, with many elements approaching the end of their service life. A large portion of the system exhibits significant deterioration. Condition and capacity are of significant concern with strong risk of failure.



FAILING/CRITICAL: UNFIT FOR PURPOSE

The infrastructure in the system is in unacceptable condition with widespread advanced signs of deterioration. Many of the components of the system exhibit signs of imminent failure.



AVIATION



AVIATION GRADE: C+

EXECUTIVE SUMMARY

Aviation is an integral part of Wisconsin's transportation system, moving people and goods throughout the state, nation, and world. The state has eight commercial airports and 90 general aviation airports. In recent years, commercial airlines transported more than 5.5 million passengers to and from Wisconsin. The state's largest commercial airport, Milwaukee's Mitchell International Airport, was ranked 52nd nationwide in total passengers. In 2018, Wisconsin's aviation industry saw an increase at commercial service airports and operations in towered airports, but a slight decrease in freight traffic. In general, the condition of commercial aviation airports meets or exceeds standards and capacity is sufficient. Ninety percent of airport pavement on primary runways and taxiways are rated at fair or above. However, general aviation airports need investment and attention. In the most recent five-year Capital Improvement Plan, Wisconsin airports have identified a need of \$1.13 billion in construction projects from 2019-2025. Airport owners need to be able to finance a portion of their projects, find new revenue options, and utilize reliable, robust federal funding to meet future needs.

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 consisting of airlines, business aviation, and recreational flyers. Every Wisconsin citizen is impacted by the benefits aviation provides.

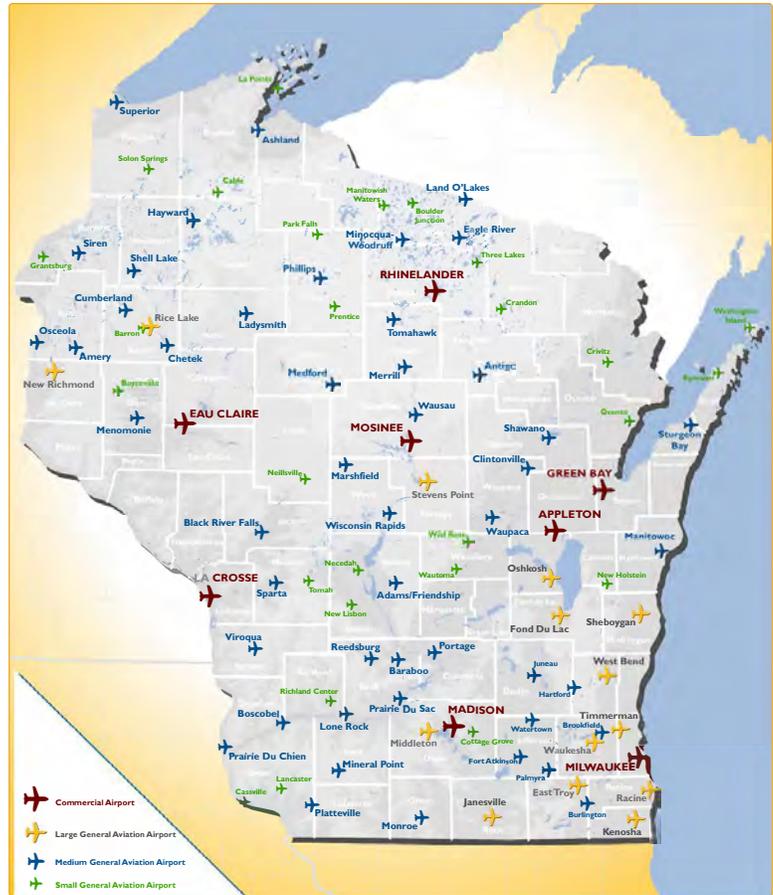
The airports that support these activities are significant assets and essential to Wisconsin’s economy. Good airports play a notable role when people and businesses consider Wisconsin as a place to live and work. Business growth in Wisconsin relies on a safe and efficient aviation system. With the geographic challenges of Wisconsin, access to all parts of the state to support business, tourism, and ensure expedient emergency relief is critical.

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), one small hub – Madison (MSN), and six non-hubs. These airports are geographically well-situated and meet Wisconsin’s air service needs. Over 90% of Wisconsin’s population is within two hours of a medium hub or 60-90 minutes of a small or non-hub.

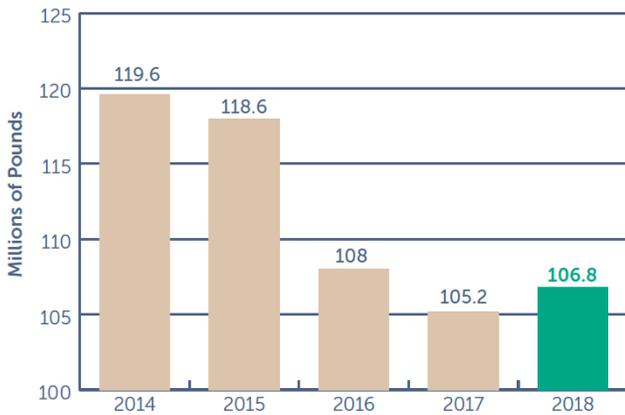
The Wisconsin Airport System has remained stable both in capacity and condition. The number of airports in the system and services provided have kept pace with needs and remained relatively unchanged over the last decade. The system of airports remains a vital part of Wisconsin’s transportation link to national and global markets.

CAPACITY

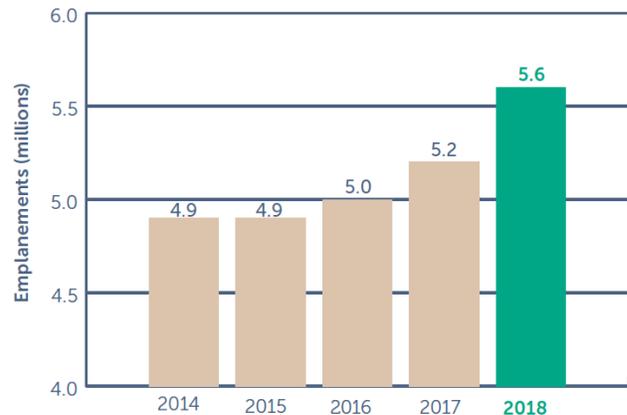
Overall operations, take-offs and landings, and paid passenger enplanements have experienced minor increases over the last four to five years. Although with a slight increase over the last year, freight has decreased roughly 10% over the last five years. Despite the increases in recent years’ enplanements, Wisconsin’s airport capacity generally remains sufficient.



Enplaned Freight at Commercial Airports



Passenger Enplanements by Year (millions)



CONDITION

Pavement condition ratings are a primary indicator of the long-term structural health of the state’s airport system. There are three pavement areas which are rated: primary runways, taxiways, and aprons. The Pavement Condition Index (PCI) method, developed by the United States 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 being a pavement in excellent condition. A PCI of 56 or higher is rated as “fair or above”. Test results of the publicly owned airports identified in the State’s Airport System Plan (SASP) rated all pavement areas fair or above for 2017 and 2018. Primary runways and taxiways hit their respective targets of 90 percent of airport pavement of fair or above, while aprons were three points below their 80 percent goal.

Although the condition of commercial service airports is good in most attributes, 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.

OPERATION, MAINTENANCE, AND FUNDING

There are a few common sources of funding and financing used by airports including revenues, general obligation bonds, federal/state/local grants such as the Airport Improvement Program (AIP), and fees such as the Passenger Facilities Charge (PFCs). The PFC Program allows the collection of PFC fees – federally capped at no more than \$4.50 – for every enplaned passenger at commercial airports.

In 2018, more than \$75 million in federal, state, and local funds supported 62 airport improvement projects. Wisconsin Bureau of Aeronautics’ 5-year program, which encompasses 2019 to 2025, estimates a total budget need of \$1.13 billion to keep the system productively serving Wisconsin’s economy and communities.

Several municipalities in Wisconsin that have airports under their jurisdiction require them to comply with their sustainability policies for design, construction, and operations. Some larger airports in Wisconsin have asset management programs. The Wisconsin Bureau of Aeronautics has a pavement management plan, performs airport economic impact studies, and a state system plan.

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 level of navigational aids at larger airports.

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. Measures taken to protect employees and airport users include a security badging process and airfield drivers' training.

Depending on their classification, airports may be fenced for security purposes and/or wildlife control. Commercial service airports that have TSA and general aviation airports are oftentimes fenced while smaller general aviation airports may have a full, partial or no perimeter fence.

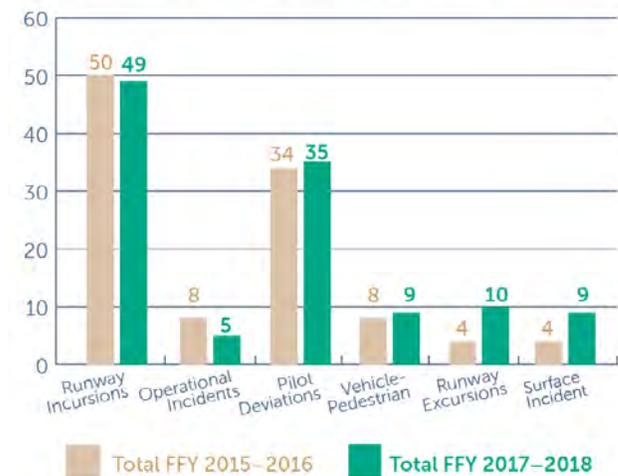
Wisconsin has several military airports that are included in the statewide emergency action plan and would be involved in search and rescue activities. Many airports throughout Wisconsin have a role to play in ensuring the resilience of the state as they would be involved in the response to a disaster by helping with the transportation of critical supplies, equipment, and emergency personnel. Condition of military airports are not included in this chapter.

Wisconsin airports need to remain open as much as possible during inclement weather, which includes harsh winter conditions. This requires 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

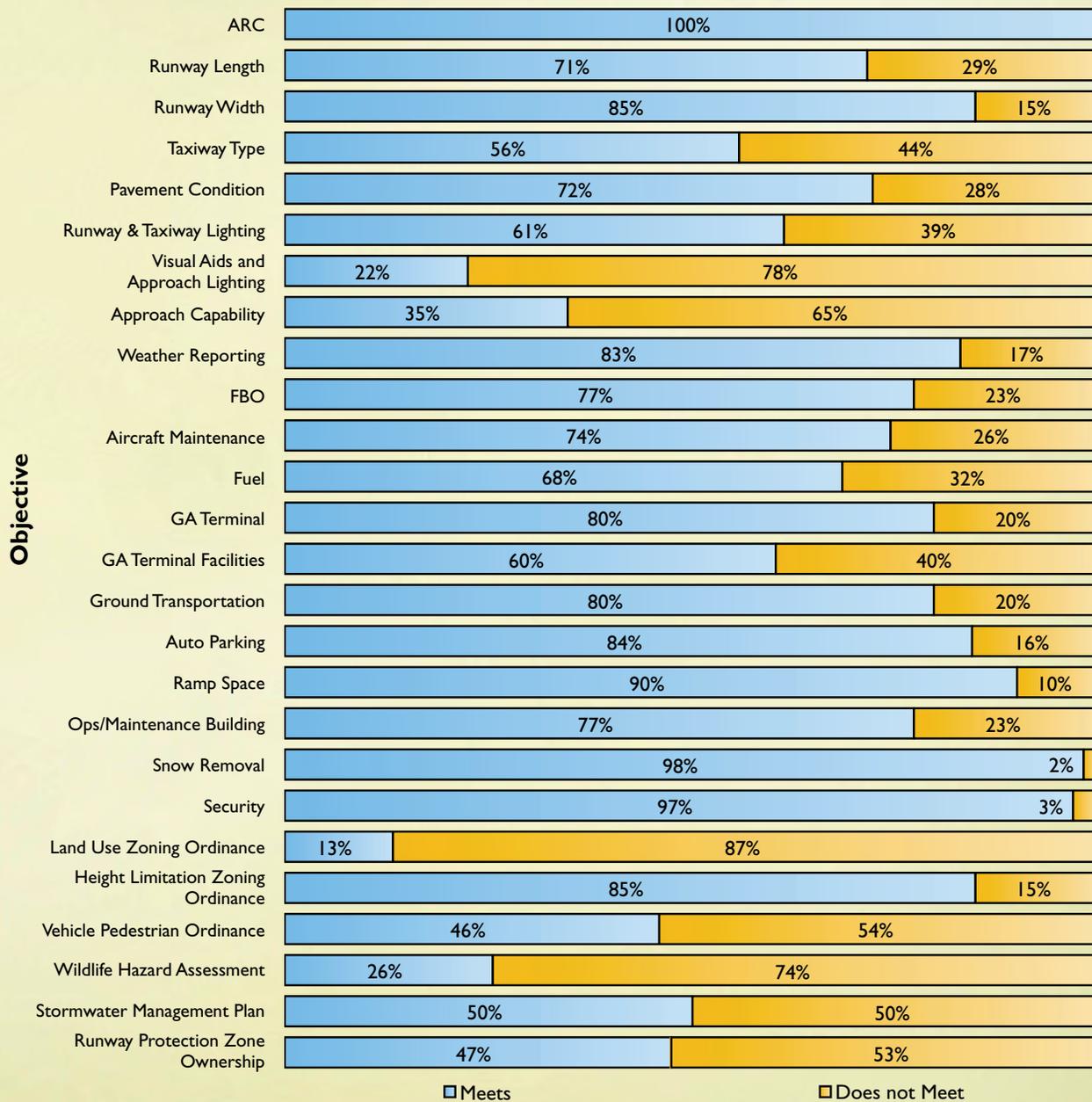
Through the 2030 Wisconsin State Airport System Plan (WSASP), the state utilized typical facility and service attributes (FSAs) to evaluate and document each airport's performance in a report card. Below is a table providing the percentage of system's 98 airports meeting the standards in 2010, as well as the statewide target. The table is from the executive summary and depicts the state's performance when being evaluated for various facility and service attributes. The table shows a comparison against the state's goals in 2010.

Runway Incidents at Towered Airports



Source: 2018 Bureau of Aeronautics Annual Report

System Performance of Typical Facility and Service Attributes



Source: Wisconsin State Airport System Plan 2030 Executive Summary

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 all-encompassing number comes from the state's Airport Capital Improvement Plan (ACIP) in which each airport identifies yearly potential airport projects that also include the maintenance of the airport, the airports environment, and the needs of the community. In the most recent 5-year report covering from 2019-2025, Wisconsin airports have identified a need of \$1.13 billion in construction projects. To be able to construct these projects, there will need to be a committed policy to federally fund airport projects as well as owners who are able to either finance their portion of the project or find new revenue options.

INNOVATION

Wisconsin airports have followed FAA's plan to transition from ground-based equipment to NextGen space-based navigation. They have begun to make the investment into new GPS/RNAV approaches, but eventual transition over to NextGen will be up to FAA funding.

Some airports in Wisconsin have begun to utilize alternative non-aeronautical economic generators (such as solar panels and farm leases) on their properties. The state needs to continue to explore and implement such generators so that Wisconsin airports can maintain and improve without any additional tax burden to the state and its users.

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



RECOMMENDATIONS TO RAISE THE GRADE

- Increase federal and state funding to allow for new pavement and maintenance to be reliably scheduled. Delayed maintenance will cost taxpayers more money to conduct major rehabilitation or even reconstruction.
- Provide training to reduce runway incidents.
- Investigate the resilience of the Wisconsin aviation system in the wake of more frequent and severe weather events such as flooding and snowstorms.
- Plan to have the *Wisconsin State Airport System Plan* completed or updated on a regular basis to ensure that the state/airports stay on top of any necessary changes.
- Prepare updates to *Economic Significance of the Aviation Industry in Wisconsin* every 5-7 years so that the general public and politicians are aware of the impact that aviation has in the State of Wisconsin.

ACRONYMS and ABBREVIATIONS

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



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

<https://wisconsin.gov/Documents/projects/multimodal/air/sasp16-app-e.pdf>

2018 Wisconsin Department of Transportation Bureau of Aeronautics Annual Report

<https://wisconsin.gov/Documents/doing-business/aeronautics/resources/2018-aero-ann-report.pdf>

National Plan of Integrated Airport Systems (2019-2023) Appendix A

https://www.faa.gov/airports/planning_capacity/npias/reports/media/NPIAS-Report-2019-2023-Appendix-A.pdf

2010 Economic Significance of the Aviation Industry in Wisconsin

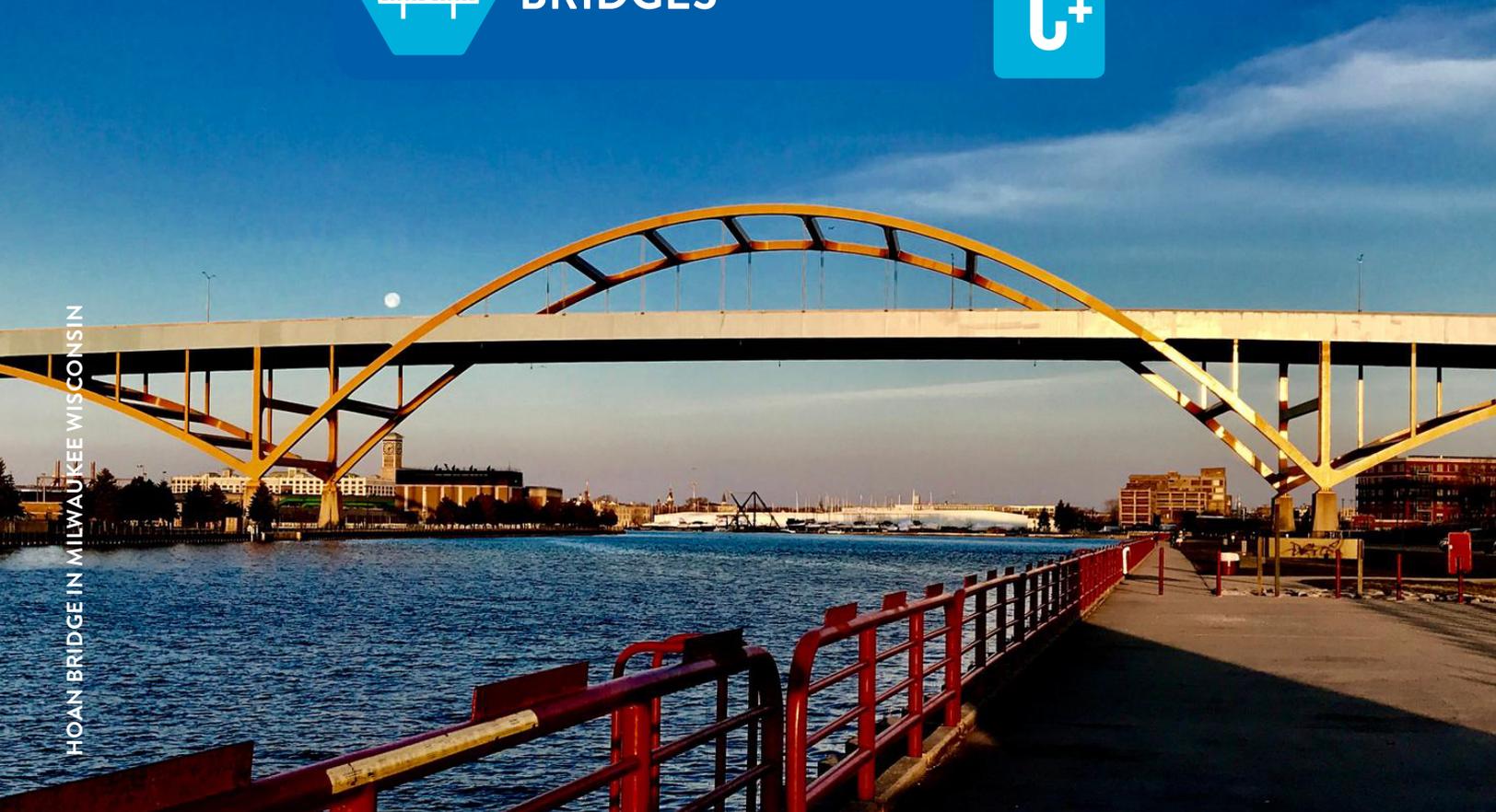
<https://wisconsin.gov/Documents/doing-business/aeronautics/resources/aero-econsig.pdf>



BRIDGES



HOAN BRIDGE IN MILWAUKEE WISCONSIN



BRIDGES GRADE: C+

EXECUTIVE SUMMARY

Wisconsin's 14,275 bridges provide the state with critical infrastructure connecting residents with their jobs, schools, businesses, and places of worship as well as hospitals and other emergency response services. In 2018, 7.4 percent of Wisconsin bridges were considered structurally deficient. While the bridge safety rating was better than the national average, we still have more than 1,000 bridges in our state that are considered structurally deficient. That amount has essentially remained the same for the past eight years. A 2019 report by the American Road and Transportation Builders Association identified 1,955 bridges in Wisconsin that require repair, with an estimated price tag of \$1.4 billion. Delays to these repairs will increase this cost as damage increases and the value of money decreases. Developing policy solutions and alternative project delivery methods, as well as utilizing advanced, high-performance materials for bridge construction and repair to help achieve cost savings are all crucial steps. Finally, the state should utilize Wisconsin's asset management system to increase bridge preservation efforts.

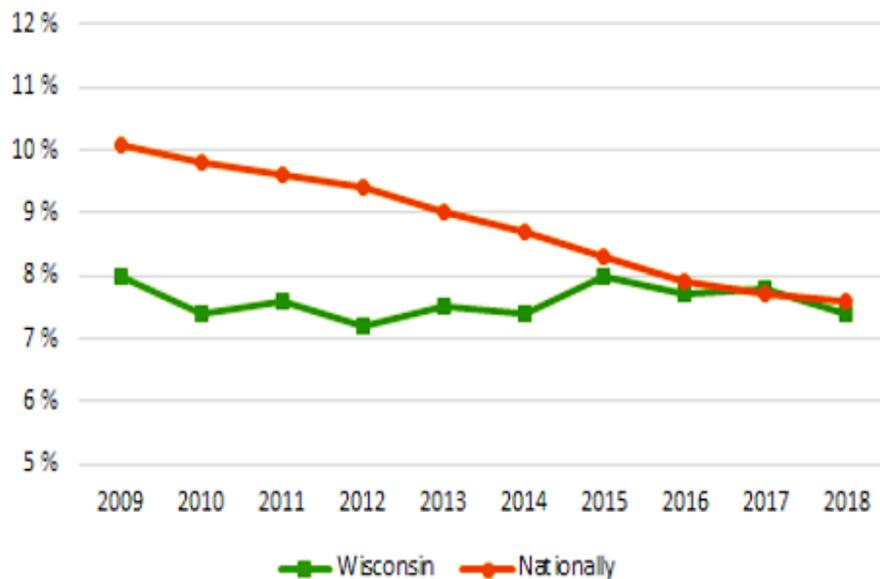
CONDITION & CAPACITY

Whether it is reliable access to work, home, medical facilities, schools, or enabling businesses to efficiently transport goods to different markets, safe, well-maintained bridges play a critical role to residents of Wisconsin. Thanks to continued efforts of ASCE's National Report Card and recent efforts by several states (including 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 2018, 7.4% - or one in 13 - of the 14,275 bridges (of which 99.9% are publicly owned) in the state of Wisconsin were structurally deficient. A structurally deficient designation means a critical load-carrying element is found to be in poor condition due to deterioration or damage requiring significant maintenance, rehabilitation, or replacement. Wisconsin's 7.4% of structurally deficient bridges is slightly below the national value (7.6%). However, as the national percentage has steadily decreased over the past decade, Wisconsin's value has remained relatively constant. This stagnation is an indication that Wisconsin has shifted its funding priority away from transportation infrastructure.



Percentage of Structurally Deficient Bridges

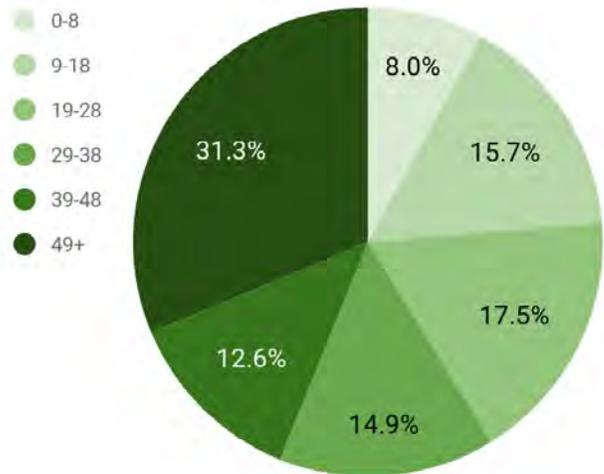


Another useful indicator is the percentage of the state's total deck area that belongs to structurally deficient bridges. 4.2% of the total bridge area in Wisconsin belonged to structurally deficient bridges in 2018 which is below the national average of 5.4%. This is an indication that higher traffic volume bridges are less likely to be structurally deficient in Wisconsin.

As of the end of 2018, the average age of a bridge in Wisconsin was just under 40 years old, which is slightly lower than the national average (just under 45 years). A majority of these bridges are designed for a lifespan of 50 years. Nearly one in three (31%) bridges in the state of Wisconsin are 49 years or older. Therefore, a significant number of bridges will soon need major rehabilitation or replacement.

Some bridges can only carry traffic up to a certain weight, requiring load restrictions to be posted on the bridge. In 2018, about 1 in 19 (5.3%) bridges in Wisconsin required such restrictions. While this rate is lower than the national average of 1 in 10 (9.5%), it is important to keep in mind posted bridges can dramatically increase driving time for larger and heavier vehicles serving emergency response, public transit and the movement of goods.

Wisconsin's Bridges by Age



FUNDING & FUTURE NEED

Wisconsin's bridge funding comes from a combination of federal and state funds and user fees. Federal dollars make up 24% of Wisconsin's total transportation revenue and are raised primarily through the federal gas tax and 56% of transportation revenue comes from state resources which include fuel taxes and vehicle title and registration fees. The remaining funding comes from bonding and local funding.

The federal fuel tax is 18.4 cents per gallon of gasoline. 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 2020 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 of fuel. This amount was formerly indexed, adjusted annually based on inflation and fuel consumption. In 2005, the State Legislature eliminated the annual indexing with a final adjustment made in 2006, so today the tax amount remains constant.

The Multimodal Local Supplement (MLS) Program is a \$75 million transportation grant program for local governments created as part of the 2019-2021 state budget. The competitive program allows cities and villages, counties, and towns to apply for funding for a wide variety of transportation projects, including bridges. This program is in addition to the General Transportation Aids Program (TAP) and the Local Roads Improvement Program (LRIP).

Wisconsin's Transportation Fund is a "segregated fund" through a constitutional amendment passed in 2014. This firewall requires funds raised through the use of the state's transportation system be expended only for transportation-related purposes. This benefits road and bridge projects by putting motor-fuel and vehicle registration fees directly back to use for maintenance of the state's transportation infrastructure.

A 2019 report by the American Road and Transportation Builders Association (ARTBA) identified 1,955 bridges in the state that require repair, with an estimated price tag of \$1.4 billion. Delays to these repairs will increase this cost as damage increases and the value of money decreases. As fuel efficiency improves and the number of hybrid and electric vehicles increases, the revenue collected from motor-fuel taxes will not keep up with the rehabilitation or replacement needs due to wear and tear on the state's roads and bridges. A recent increase in hybrid and electric vehicle registration fees included in the Governor's budget is intended to help narrow this gap

and amounts to about \$400 million in additional revenue over two years. Increases in motor vehicle title and licensing fees as well as municipal “wheel taxes” also contribute to funding transportation needs including bridges.

Despite measures to raise revenue for transportation funding, Wisconsin faces a long-term funding crisis. Bonding is a borrowing mechanism used by the state to help fund transportation projects. These bonds must be repaid over time, and almost 20% of transportation-generated revenue currently goes toward repayment of that debt, up from 10% in 2006. Many policymakers have proposed a gas tax to help bolster funding for transportation maintenance and reconstruction projects, but this measure continues to fail in the legislature. Likewise, efforts to fund studies to investigate tolling have fallen flat. In short, there are few points of agreement among lawmakers and the governor regarding how long-term transportation funding in Wisconsin should be addressed.

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

OPERATIONS & MAINTENANCE

The Wisconsin Structures Asset Management System (WiSAMS) is a software tool developed in-house by the WisDOT Bureau of Structures (BOS). WiSAMS is a planning tool which 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. Bridge preservation and rehabilitation is preferred over replacement if the final structure continues to serve the needs of the traveling public.

INNOVATION & RESILIENCY

Over the past decade the WisDOT BOS implemented Accelerated Bridge Construction (ABC) techniques for bridge construction projects that fit certain criteria. The ABC initiative utilizes different methods of project delivery and construction to reduce schedule, on-site construction time, and public impact. Some benefits of using ABC methods include minimized traffic impacts, increased safety during construction, increased long term durability with shop fabrication, and reduced impacts on environmentally sensitive areas. Some examples of these techniques include prefabricated bridge elements and lateral sliding, where the bridge superstructure is built off-line and slid into place over a night or weekend.



PREFABRICATED PIER CAP



SELF PROPELLED MODULAR TRANSPORTERS MOVING A BRIDGE

Per Wisconsin legislation, the Design-Bid-Build (DBB) project delivery method has been the only method allowed for state-funded transportation projects. However, recent legislation allowed for 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.

Several policies and standard practices help make Wisconsin bridges more durable, especially with regards to heavy deicing salt usage. Epoxy-coated reinforcement is standard on all bridge decks and substructures exposed to deicing chemicals. The select use of stainless-steel deck reinforcement is used on structures with significantly high re-decking cost. Specifying the use of high-performance concrete in large, costly structures improves freeze-thaw durability, prolonging deck life.

The use of polymer overlays in Wisconsin has become more prevalent as a preventive maintenance activity. The practice of preventative polymer overlay application is intended to protect the bridge deck surface from chloride infiltration while at the same time increasing friction on the riding surface.



RECOMMENDATIONS TO RAISE THE GRADE

On average, the typical bridge in Wisconsin is at or near the end of its design life. Recent efforts by state decision makers have stalled in trying to come up with both short- and long-term solutions to address the transportation funding need, including funding for bridges. If Wisconsin continues to delay this decision and not take immediate action, conditions will only worsen. Therefore, we recommend the following to raise the bridge grade:

- **Address the short-term funding needs by looking for proactive ways to raise funding that are also benchmarked with inflation for sustainable management of Wisconsin's bridges.**
- **For long-term funding, continue to study and pilot mileage-based user fees and toll roads needs caused by a stagnant motor vehicle fuel tax.**
- **Continue to develop and utilize alternative project delivery methods to achieve cost savings and quicker repairs or replacement of bridges.**
- **Continue use of advanced materials for bridge rehabilitation and for new bridges. These include high-performance concrete, epoxy coated and stainless-steel reinforcement.**
- **Utilize the state's asset management system to increase bridge preservation efforts.**



SOURCES

Wisconsin Department of Transportation Wisconsin Bridge Manual, Chapters 7 & 41

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

Transportation Finance Issues - How does Wisconsin fund transportation? Wisconsin Department of Transportation 2015 Report

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American Road and Transportation Builders Association (ARTBA) Wisconsin 2019 Bridge Profile

https://artbabridgereport.org/reports/state/ARTBA_Bridge_Profile_2019_WI.pdf

<https://www.wpr.org/lawmakers-budget-falls-short-long-term-road-funding-solution>

<https://wisconsindot.gov/Pages/about-wisdot/newsroom/news-rel/050619NowIsTheTime.aspx>



DAMS



BLACK RIVER FALLS DAM IN BLACK RIVER FALLS, WISCONSIN



DAMS
GRADE: C+

EXECUTIVE SUMMARY

Dams in Wisconsin provide recreational areas, fish and other wildlife habitat, hydroelectric power, a water source for agricultural operations, navigation, wetland restoration, and flood control. Wisconsin has approximately 3,900 dams in the Wisconsin Department of Natural Resources (DNR) database. Nearly 200 dams are considered “high hazard” meaning loss of life would be probable should the dam fail. The annual budget for dam safety is approximately \$750,000 per year which allows for 6.25 Full Time Equivalent Staff. Wisconsin spends \$200 more per regulated dam than the national average. However, increased resources are needed to ensure public safety and minimize economic impact from future dam failures. To improve safety and strengthen Wisconsin’s dam infrastructure, the state should educate the public about the location of the dams and the safety risks and hazards, and inform public officials on the growing need for maintenance and rehabilitation funding. The state of Wisconsin should also increase its share of funding and secure additional federal funding to improve regular dam inspections, improve state dam safety programs, and provide for repair and removal grants. Additionally, the state should update Emergency Action Plans for all “high hazard” and “significant hazard” dams.

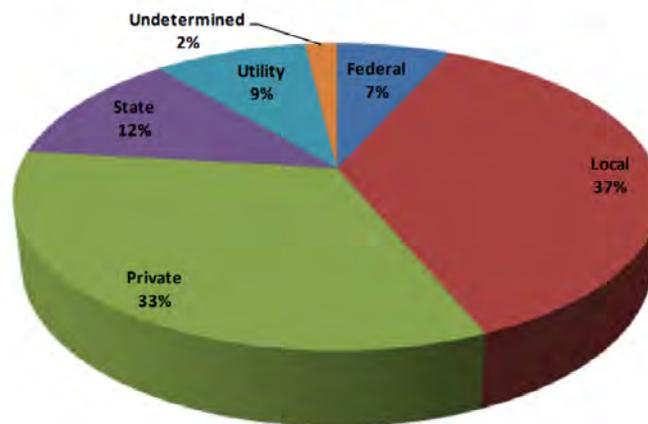
CONDITION & CAPACITY

The Dam Safety and Floodplain Section of the Wisconsin DNR is the regulatory agency responsible for most of the dams in the State of Wisconsin. DNR maintains a database of approximately 3,900 dams, including over 120 dams that generate hydropower and fall under the regulatory jurisdiction of the Federal Energy Regulatory Agency (FERC).

The National Inventory of Dams (NID), maintained by the U.S. Army Corps of Engineers (USACE), is a national dam database and lists 1,065 dams in their inventory for Wisconsin. The ownership breakdown of the 1,065 NID dams is as follows:

In general, 44% of dams in Wisconsin are owned by utility companies, private individuals, or have undetermined ownership. Local municipalities, such as townships and county governments, own 37% of dams; the state of Wisconsin owns 12 percent; the remaining 7% of the state's dams are federally owned.

Dam Ownership



Sources: Association of State Dam Safety Officials, Wisconsin Performance Report

A large dam is classified as a dam that has one or more of the following: a structural height of over 6 feet and impounds a minimum of 50 acre-feet, or has a minimum structural height of 25 feet and impounds more than 15 acre-feet. Per this definition, there are 1,160 large dams in Wisconsin's jurisdiction. The Wisconsin DNR's database contains more dams than the NID since the threshold for dam size included in the Wisconsin DNR database is lower than the threshold required for the NID. Large dams have mandatory inspection and design requirements due to their greater potential to impact downstream areas in the event of failure.

The NID classifies dam hazard based on the downstream impact of a dam failure. Hazard potential is not an indication of the dam's condition, but an indication of what would be impacted if the dam were to fail. Of the 1,065 Wisconsin dams listed on the NID, 198 are classified as High Hazard potential dams (about 5% of the total dams in Wisconsin), 102 are classified as Significant Hazard dams (2.6% of the total dams in Wisconsin), and the remaining 765 dams in the NID are classified as Low Hazard dams (>19% of the total dams in Wisconsin). Based on the NID condition assessment field, 73 HHP dams have a Satisfactory rating, 85 Fair, 19 Poor, 1 Unsatisfactory and 20 are Not Rated.

Additionally, 143 state-regulated dams are classified as High Hazard potential dams (about 4% of Wisconsin’s total dams), and as of 2019, 94% of these have Emergency Action Plans (EAP), compared to national average of 77%.

RED indicates high-hazard potential dams, typically defined as a dam whose failure or mis-operation will cause loss of human life and significant property destruction.

YELLOW indicates significant-hazard potential dams, typically defined as a dam whose failure or mis-operation will cause significant property destruction.

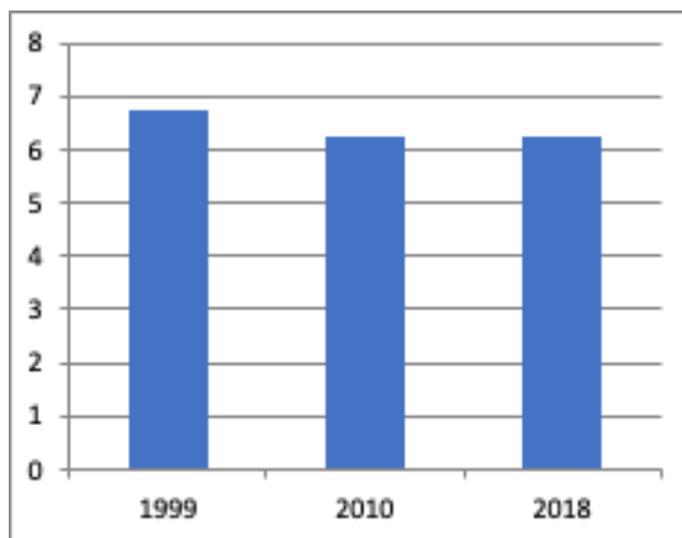
BLACK indicates low-hazard potential dams, typically defined as a dam whose failure or mis-operation will cause minimal property destruction



FUNDING

The state of Wisconsin funds a Dam Removal Grant Program that provides funds to assist both public and private dam owners to remove unwanted dams. This program has approximately \$500,000 allocated for dam removal in the current biennial budget with a maximum of \$50,000 allowed to any one project. In addition, the state also funds a Municipal Dam Grant program with approximately \$3.5 million available for work on municipally owned dams. As an example, this program helped fund the City of Janesville’s Monterey Dam removal project in 2018.

STATE STAFFING (FULL TIME EQUIVALENT) FOR DAM SAFETY

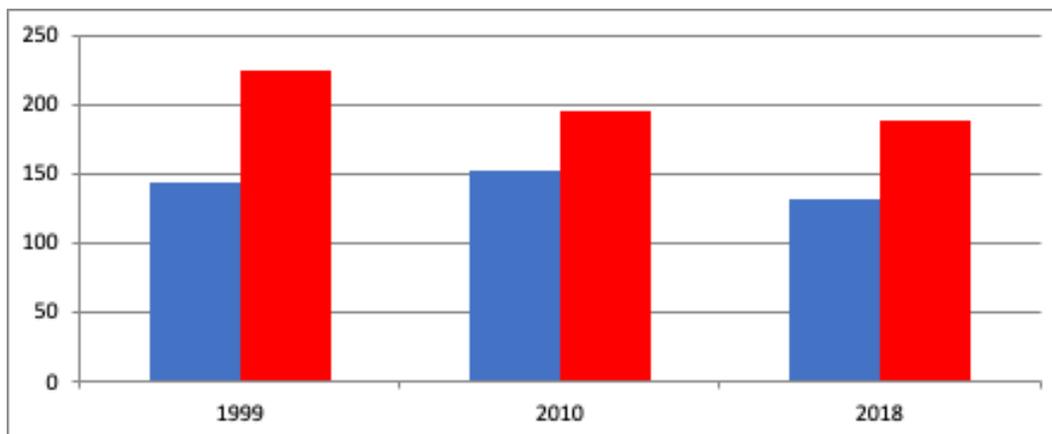


Sources: Association of State Dam Safety Officials, Wisconsin Performance Report

According to the Association of State Dam Safety Officials, Wisconsin budgets 6.25 Full Time Equivalent (FTE) staffing positions for dam safety each year.

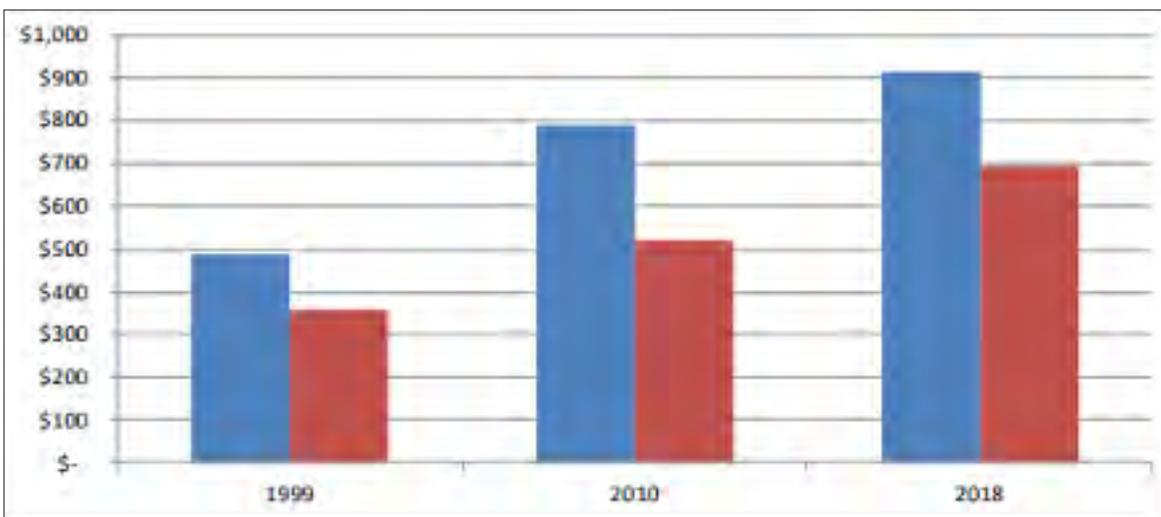
Wisconsin also budgets approximately \$750,000 a year for dam safety. When looking at the budget per state regulated dam compared to the national average, Wisconsin averages \$200 per dam higher than the national average as of 2015.

STATE REGULATED DAMS PER FTE (BLUE) & NATIONAL AVERAGE (RED)



Sources: Association of State Dam Safety Officials, Wisconsin Performance Report

DAM SAFETY STATE BUDGET PER REGULATED DAM (BLUE) & NATIONAL AVERAGE (RED)



Sources: Association of State Dam Safety Officials, Wisconsin Performance Report

FUTURE NEEDS AND RESILIENCE

The average annual precipitation in Wisconsin has increased by 10% or 3 inches since 1950. These changes in precipitation put additional stresses and pressure on dams, which could lead to failure. As a result, these dams will need more frequent inspections and analysis, requiring additional staff and increased funding by the state or federal governments. Increased funding is needed to review the remaining EAPs for High Hazard and Significant Hazard dams and to provide the public with more education materials about Wisconsin dams.

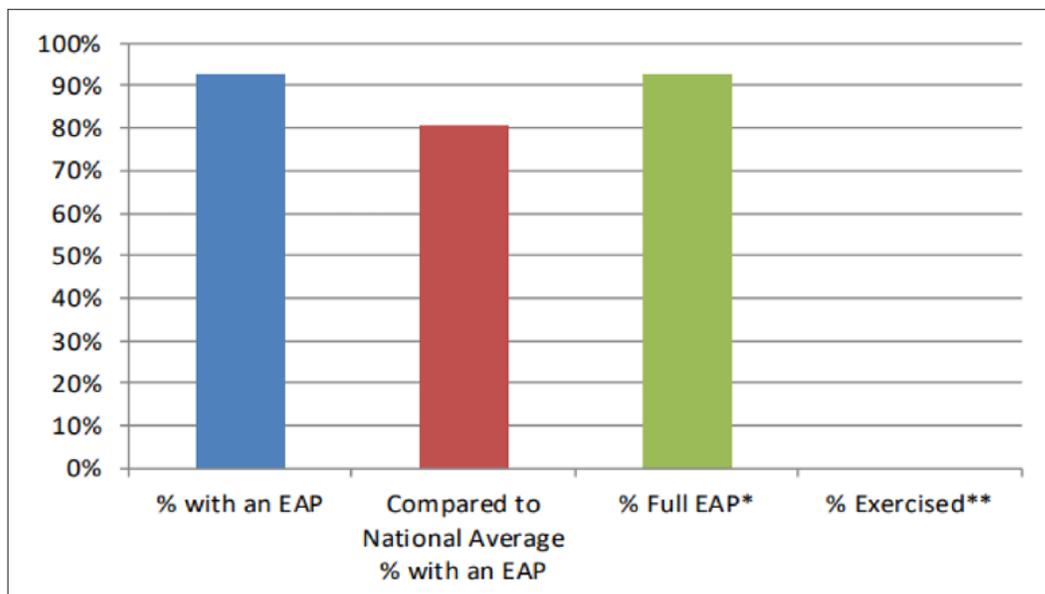
ASCE’s definition of resilience refers to the infrastructure’s “capability to mitigate against significant all-hazards risks and incidents and to expeditiously recover and reconstitute critical services”. Regarding dams, this means avoiding a complete dam breach or dangerous erosion event and having an EAP in place in case it happens. Failure of a high hazard dam can be catastrophic for neighboring communities. Therefore, finding and addressing issues early is important by conducting regular inspections and considering projects which repair, reinforce, or improve the resilience of spillways. These projects should incorporate larger rainfall events and other local consequences of a changing climate. A dam’s EAP can serve as a key tool to increase resilience. These plans include among other items, inundation maps showing areas that may need evacuation, what events trigger emergency actions, and a communication plan.

PUBLIC SAFETY AND OPERATION AND MAINTENANCE

A Wisconsin statute instructs officials to inspect Low Hazard dams at least once every 10 years. High Hazard dams are to be inspected every two years or at least five times in that same 10-year timeframe. Significant Hazard dams need to be inspected every three to four years or at least three times in the previously mentioned 10-year timeframe. In 2017 the Wisconsin DNR budgeted for the inspection of 85 High Hazard dams and completed 71 (>83% completion rate); whereas, in 2018, 72 High Hazard dams were scheduled to be inspected and 65 were completed (>90% completion rate). In general, the State of Wisconsin has an average of 23 High Hazard dams per FTE compared to the national average of 28.

Emergency Action Plans enable the public to learn about the risks dams pose, what the plan is if a dam were to fail, and what actions need to be taken to make sure everyone stays safe. The state of Wisconsin distributes quarterly dam safety newsletters to those that sign-up, attend public meetings as requested, and set up booths at conferences. With the failure of a dam, many areas of public safety can be affected from roads to bridges to critical care facilities or whole communities. Therefore, the education of the public for the hazards, risk, location, and action plans are important. EAPs have been completed for nearly 60% of the NID dams (633 out of 1,065) and 94% of the High Hazard state-regulated dams.

2018 EMERGENCY ACTION PLAN DATA FOR STATE-REGULATED HIGH HAZARD POTENTIAL DAMS



Sources: Association of State Dam Safety Officials, Wisconsin Performance Report

INNOVATION

Seventy-six dams have been removed in Wisconsin in the past 20 years. In many cases, these dams were low head, a structure that spans across a river blocking the waterway with a maximum water depth of 25ft, and had either outlived their purpose or were in such a state of disrepair that removing the dam was less expensive than its rehabilitation. Dam removal can improve water quality, expand wildlife habitat and alleviate the use of resources for inspecting and maintaining the dam. For example, the removal of four dams on the Baraboo River from 1997 to 2001 was initiated due to safety concerns about the dams. The subsequent removals have resulted in better recreational fishing, habitat restoration and savings for the City of Baraboo.





RECOMMENDATIONS TO RAISE THE GRADE

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

- **Educate the public about the location of the dams and the safety risk and hazards associated with the dams.**
- **Educate government officials on the increased need for maintenance and rehabilitation funding.**
- **Provide and increase state and federal funding and staffing for regular dam inspections, state dam safety programs, and repair & removal grants.**
- **Update EAPs for all High and Significant Hazard dams.**

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DRINKING WATER



DRINKING WATER

GRADE: C-

EXECUTIVE SUMMARY

Wisconsin has more than 11,000 public water systems to serve residents, which is among the largest amount in the nation. More than 80 percent of these are located in areas where people do not remain for long periods, such as campgrounds or gas stations, while five percent of these systems serve more than 4 million residents. In general, municipalities and water utilities are encountering a number of natural and manmade water quality issues and must contend with aging water treatment and distribution systems to serve their communities in the future. Lead, bacteria, nitrates, Per- and Polyfluoroalkyl Substance, arsenic, and radium are some of the water quality concerns that have come to light in recent years. It is estimated that \$8.6 billion will be needed to address infrastructure deficiencies over the next two decades and this value is expected to grow over time unless immediately addressed. Increased investment in drinking water infrastructure is needed to ensure customers have better access to safe and reliable water supply for future generations.

CAPACITY

At the end of 2018, Wisconsin had nearly 11,600 public water systems (PWSs) serving nearly 4.26 million people. This number of PWSs is among the highest of any state. Each of these PWSs is regulated by the Wisconsin Department of Natural Resources (WDNR). WDNR defines a PWS as a system that either provides water for human consumption to at least 15 service connections or regularly serves at least 25 people for at least 60 days a year. Table 1 shows a breakdown of Wisconsin PWSs and population served.

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	610	4,044,432	5.3	95.0
Other-Than-Municipal Water System ²	443	60,688	3.8	1.4
Non-Transient Non-Community Water System ³	946	137,089	8.2	3.2
Transient Non-Community Water System ⁴	9,590	16,412	82.7	0.4
Total	11,589	4,258,621	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.

Two-thirds of the population and more than 99 percent of the PWSs in Wisconsin obtain drinking water from groundwater pumped from wells. Fifty-six PWSs use surface water from Wisconsin lakes. This group includes some of the largest municipalities such as Milwaukee and Green Bay. 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, over-pumpage in the Central Sands area in the middle of Wisconsin is potentially causing a decrease in groundwater and lake levels and an increase in groundwater contaminants. Evaluation of lake level effects is currently being performed under 2017 Wisconsin Act 10.

In addition to being regulated by the WDNR, some 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 one investor-owned, two small-private, and 574 municipal 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 2018 PSCW Annual Report data, Wisconsin water utilities produced 186.7 billion gallons of water but sold 152.2 billion gallons. The approximately 34.5 billion gallons of nonrevenue water represents approximately 18.5% of the total amount of water produced. Utilities estimate that approximately 26.6 billion gallons, or 14.2% 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

The age of the 20,100 miles of water main within Wisconsin spans a wide range. As reported at the end of 2018, 1.3% of the mains were installed before 1900, 12.6% were installed between 1901 and 1940, 23.1% were installed between 1941 and 1970, 39.0% were installed between 1971 and 2000, and 24.0% were installed after 2001.

Between 2008 and 2018, approximately 1,028 miles of new pipe were added to municipal water systems. During that same period, an average of 0.5% of mains were retired each year, with 140 miles, or 0.6% of the total length of mains, being retired in 2018. 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 operation and maintenance 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 main.

Over the past 4 years, the average number of water main breaks for all Wisconsin water systems was nearly 3,700 breaks each year, or about 18 breaks per 100 miles of pipe, which is similar to national benchmarking values. Milwaukee alone reported nearly 450 breaks a year, or more than 1 break per day. Locating and repairing water main breaks is expensive from both a financial and labor perspective. Repairing a 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 AND FUNDING

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. If a water utility decides to raise its water rates, review and approval through the PSCW is required. According to the PSCW Wisconsin Water Rates Dashboard tool and based on November 2019 water rates, the median monthly drinking water bill for a residential customer that uses 4,000 gallons is \$34.05, which includes a public fire protection charge. When compared to ASCE's 2017 Infrastructure Report Card, this value lands in the middle of the average monthly water bill range of the nation's largest 50 cities. However, most large water utilities are able to enjoy economies of scale, and the actual average monthly water bill would likely be in a higher range if all utilities were taken into account. A recent Chicago Tribune article from October 2017 compares water rates of Wisconsin and Illinois utilities that both draw from Lake Michigan. The article states that "water bills in Wisconsin communities that withdraw or purchase Lake Michigan water are more consistent than those in Illinois" and "the [Wisconsin] bills are generally much lower as well."

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 main when the overlying roadway gets replaced. Water utilities should be performing a risk-based infrastructure assessment (asset management) that includes a capital improvement plan that incorporates planned 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 and Janesville, have integrated long-term main replacement costs into their water tariffs using an expense depreciation mechanism to cash-fund annual water main replacements. This relatively new funding mechanism allows the utilities to pay for main replacement without bonding or borrowing funds, thereby reducing total costs in the long run by avoiding interest on debt.

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). In recent years, there have been more loan funds available than requested; however, this is not the case every year. 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 and steel materials, which may deter some utilities from using this program.

FUTURE NEED

The 2015 USEPA Drinking Water Infrastructure Needs Survey and Assessment (DWINSA) identified nearly \$8.6 billion in total Wisconsin project costs needed between January 1, 2015 and December 31, 2034 to address infrastructure deficiencies. The results of the DWINSA survey form the basis for allotting DWSRF funds to state agencies. Wisconsin costs have been increasing: in 2007 the total need was \$7.8 billion, and in 2011 it was \$8.0 billion. It should be noted these costs include only DWSRF-eligible projects and do not include projects related primarily to meet the needs associated with population growth or fire protection.

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, 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.

PUBLIC SAFETY

During 2018, 99.1% 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. Of the 101 systems that experienced an MCL violation, the most common contaminants present were bacteria (37), nitrate/nitrite (36), arsenic (12), and radium (12). According to a 2018 legislative report from the state's Groundwater Coordinating Council, nitrate is Wisconsin's most widespread groundwater contaminant and is increasing in extent and severity.

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 2018, there were 22 public water systems that exceeded the lead action level of 15 parts per billion. Additionally, according to the Wisconsin Department of Health Services, the state ranks among the top ten states for percentage of children found to have lead poisoning.

At the time of this writing, there are proposed revisions to the national USEPA Lead and Copper Rule. These revisions include mandatory full lead service line replacement. However, the proposals do not include a funding mechanism, 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 the LSL.

In early 2020, Wisconsin began the process of permanent rulemaking for establishing standards for PFAS, specifically PFOA and PFOS, in public drinking water after several communities reported levels of PFAS in its drinking water in 2018. 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.

RESILIENCE AND INNOVATION

The integrity of a water system and safety of consumers' drinking water can be threatened by a myriad of factors, including aging infrastructure, malicious acts, accidental or nonpoint source pollution, extreme weather, poor financial management, lack of monitoring practices, and cybersecurity threats. Proper planning, including conservation and utility efficiency, is needed to make sure that utilities can meet future demands. The USEPA recognized this issue, and on October 23, 2018, America's Water Infrastructure Act (AWIA) was signed into law. Section 2013 requires drinking water systems serving more than 3,300 people to develop or update risk assessments and emergency response plans. Utilities must comply with these requirements by the end of 2021 and must provide a certified letter to the USEPA.

As part of the PSCW-required annual reports, utilities are required to submit information regarding non-revenue water, as defined by the American Water Works Association (AWWA). Although utilities are 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 technologies 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.**
- **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 and strengthen the SDWLP, increase principal forgiveness/private lead service line funding and opportunities, and streamline/reduce federal requirements to encourage participation.**
- **Increase and expand funding for replacement of lead services.**
- **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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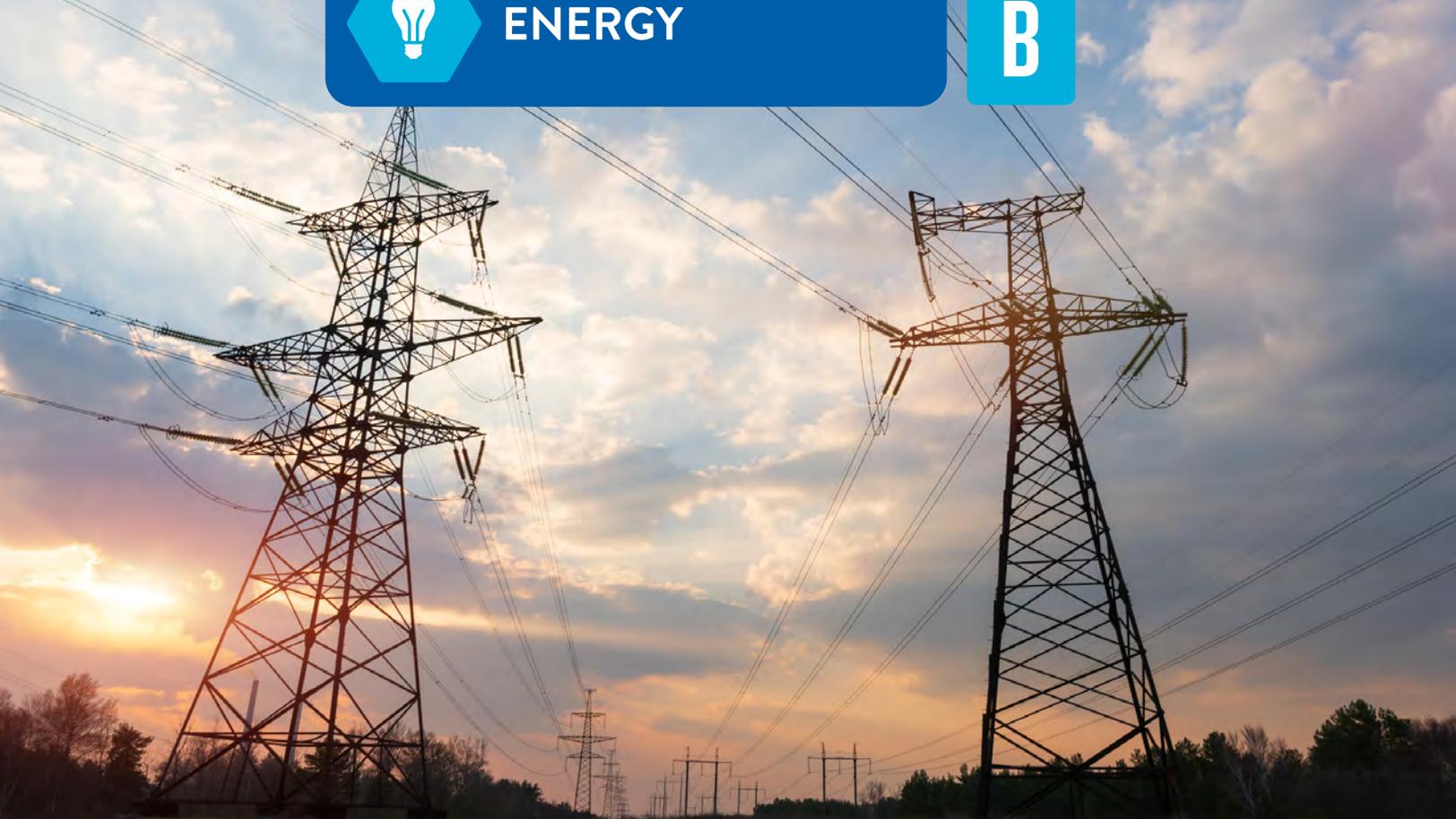
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ENERGY



ENERGY GRADE: B

EXECUTIVE SUMMARY

Wisconsin's utilities provide energy to commercial, industrial, and residential ratepayers throughout the state. The mix of electrical power generation continues to evolve with new gas-fired plants, wind power, and utility scale solar power compensating for the retirement of coal-powered plants. In general, Wisconsin's energy needs will be met through 2024. Energy shortages are unlikely but could occur if plans for additional transmission and generation needs are not fulfilled in the future. Rate increases are common in Wisconsin and the current average retail electricity rate was 10.58 cents per kilowatt hour (KWH), higher than the Midwest and national averages per KWH. However, this additional funding is directed towards needed capital projects for generation, distribution and transmission. Utilities and government agencies are working to develop consensus greenhouse gas emission goals and the required infrastructure to attain them. Plans for power generation must consider future demand as well as public concern for the environment.

BACKGROUND

Wisconsin’s energy industry is providing for the state’s energy needs while addressing important challenges of generation, grid modernization, security, and resiliency.

Electricity sales in Wisconsin and across the nation are relatively flat which is attributed to energy-efficiency improvements. The mix of Wisconsin’s electric power generation continues to evolve. New gas-fired generation, wind power, and utility scale solar projects are compensating for the retirement of old coal generation plants. Currently adequate capacity is projected through the 2024 planning horizon. Capacity shortages are unlikely, but could occur if plans for additional transmission and generation are not fulfilled.

The Midwest Independent System Operator’s (MISO) locational marginal pricing market has improved the utilization of the electric transmission system. Likewise, natural gas transmission capacity has increased to meet gas market demands, including electric generation.

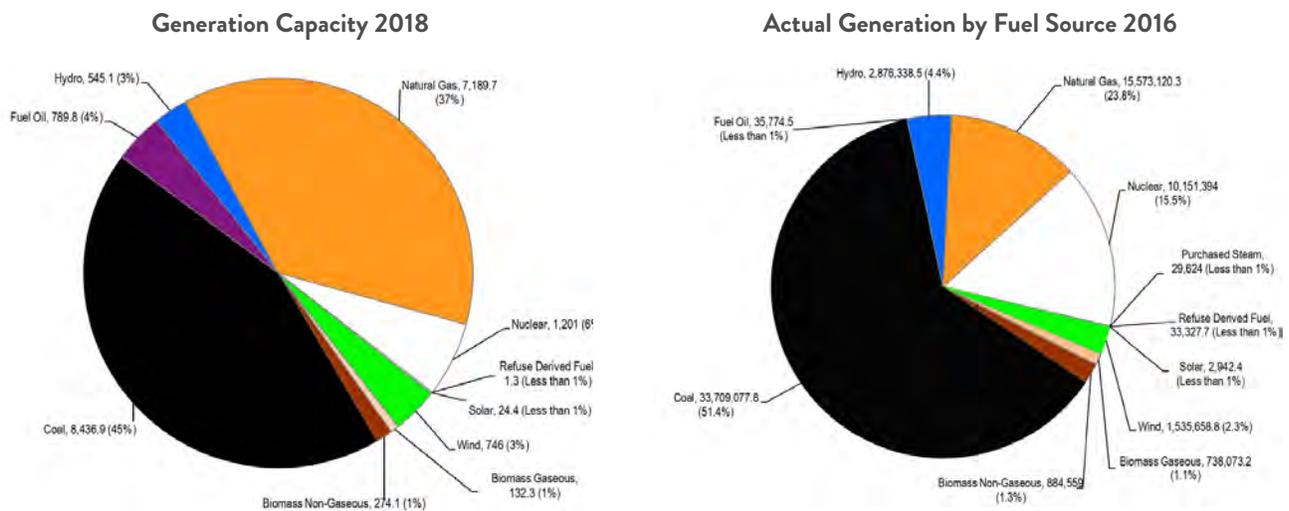
The political pressure to reduce greenhouse gas emissions will likely grow. Future plans for power generation will need to consider the public concern for climate change. Wisconsin utilities so far have exceeded targeted greenhouse gas reductions; however, this issue may be the greatest risk to the pricing and stability of our energy markets in the future.

On August 16, 2019, Governor Tony Evers announced executive order 38 establishing the Office of Sustainable & Clean Energy with a target of net zero greenhouse gas emissions by 2050. Wisconsin utilities have expressed slightly less aggressive goals. Discussions are necessary to develop consensus on the goals, create workable plans, develop the required infrastructure, and meet goals at acceptable rates for consumers.

Wisconsin must have enough energy to serve its economic interests while also protecting the environment.

The graphs below show that while natural gas power plants have greatly increased the total generating capacity, most power is still generated by coal, natural gas, and nuclear.

WISCONSIN GENERATION



From the PSCW SEA 2018-2024

CAPACITY

Electric Generation

Wisconsin’s planning reserve margins are expected to remain above requirements and exceeded the 7.8% planning reserve requirement set by MISO for the 2017-2018 planning year. Wisconsin’s electric utilities estimate that they will retire approximately 2,100 megawatt (MW) of existing electric generation by 2024. Approximately 796 MW of new generation is expected to be added from 2018 – 2024 and another 550 MW of capacity from the Nemadji Trail Energy Center in 2025.

The table below is taken from the Public Service Commission of Wisconsin (PSCW) Strategic Energy Assessment 2018-2024 (SEA), a thorough study updated every two years by the staff of the PSC of Wisconsin. Wisconsin had greatly exceeded the required reserve capacity for electricity until 2019. The outlook after 2019 is to run above, but closer to the required 7.8% reserve margin.

PSCW SEA FORECAST PLANNING RESERVE MARGINS (%)

Planning Year	Final SEA 2000	Final SEA 2002	Final SEA 2004	Final SEA 2006	Final SEA 2008	Final SEA 2010	Final SEA 2012	Final SEA 2014	Final SEA 2016	Final SEA 2018
2001	18.0									
2002	17.4									
2003		19.1								
2004		20.9	18.3							
2005			17.4							
2006			15.0							
2007			16.1	18.2						
2008			12.8	18.9	30.9					
2009			10.0	16.4	16.3	11.7				
2010			11.0	17.5	18.7	24.1				
2011				17.2	20.9	26.1	6.6			
2012				17.4	18.5	25.8	7.3			
2013					14.4	24.9	21.9			
2014					11.0	20.1	15.8	20.5		
2015						18.7	15.8	18.9		
2016						15.1	13.0	17.3	16.9	
2017							11.6	15.3	13.9	
2018							13.3	13.7	13.7	12.0
2019								14.3	16.4	5.9
2020								13.8	15.5	8.2
2021									14.7	9.0
2022									13.6	9.2
2023										7.8
2024										6.4

Work is underway to improve transmission access to the MISO market regionally with the growth of wind generation sources.

Fuel Supply and Diversity

Wisconsin utilities presently use a broad mix of fuels to generate electricity. In 2016, Wisconsin's primary fuel for generation was coal (51.4%), followed by natural gas (23.8%) and nuclear (15.5%). The remaining 9.3% was made up of hydro, wind, biomass, refuse derived fuel, solar and purchased steam. Nuclear energy continues to offer an efficient and environmentally friendly source of power. Wisconsin law preventing additional nuclear power generation was repealed, but no new nuclear capacity is under consideration.

Wisconsin has 545 MW of small hydroelectric power capacity. Some dams will need to be relicensed in the next 20 years, which may result in lost capacity if the licenses are not renewed. As of January 2018, Wisconsin had 746 MW of wind power capacity with additional wind and solar capacity under development.

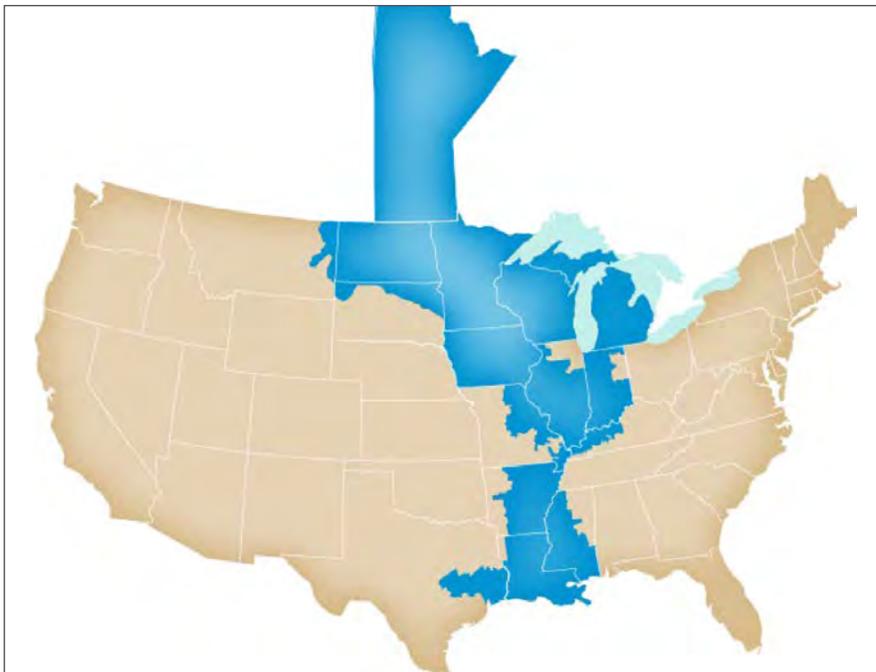
Transportation of Natural Gas and Electricity

The supply of natural gas into Wisconsin is limited by the capacity of the pipeline system. Plans include continued maintenance and expansion of natural gas pipelines to meet demand.

Wisconsin currently depends on some power purchased from out-of-state for electric capacity needs. There are regional transmission improvements underway that will increase out-of-state renewable energy supply to Wisconsin.

The MISO reliability footprint consists of 15 states and one Canadian province. The Federal Energy Regulatory Commission (FERC) requires coordination with neighboring regions. The American Transmission Company (ATC) and state utilities fully participate in the regional processes and studies for needed transmission upgrades and new construction in Wisconsin. The MISO transmission planning process contains 354 new projects totaling \$2.7 billion in transmission facilities. On the 10-year planning horizon, MISO anticipates 6,129 miles of new or upgraded transmission lines.

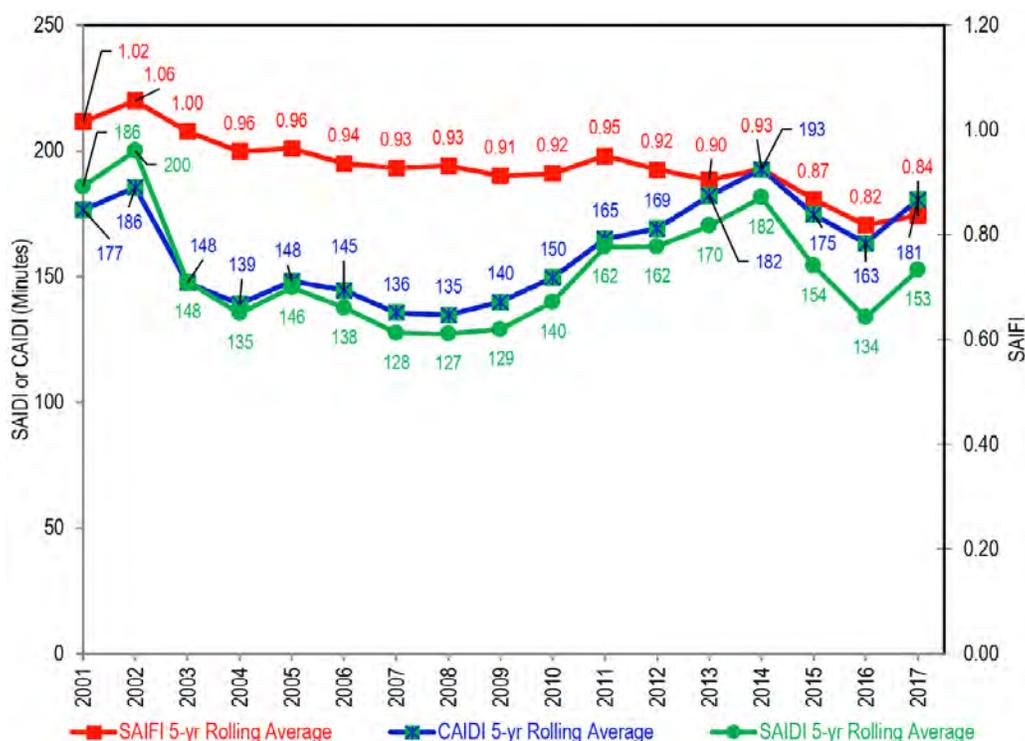
THE MIDCONTINENT INDEPENDENT SYSTEM OPERATOR (MISO) REGION



Electric Distribution

Since 2017 the PSCW has focused distribution reliability on 5 grid modernization priorities; distributed energy resources, customers' expectations, advanced metering, safety and reliability and increased electrification. Electric distribution investment has increased at an average annual rate of 4.4% for the past 8 years. Electric distribution reliability on the local scale is measured by SAIFI (System Average Interruption Frequency Index), SAIDI (System Average Interruption Duration Index, and CAIDI (Customer Average Interruption Duration Index). While severe weather events cause annual variability, a general improvement can be seen especially for SAIFI since 2001.

STATEWIDE SAIFI, SAIDI, AND CAIDI WPSA SEA 2018-2024



Other Forms of Energy

Both natural gas and LPG (liquefied petroleum gas) are used as fuel for homes and businesses. The increased demand for natural gas for electricity production has resulted in an increased supply of natural gas, and prices for both natural gas and LPG have remained stable.

Gasoline and diesel fuel are major energy sources for transportation in Wisconsin, and supplies are stable. Prices have been competitive, and the number of electric vehicles is projected to grow as Wisconsin plans to build electric vehicle charging stations to stimulate use of electric vehicles.

CONDITION AND OPERATION AND MAINTENANCE

Generation and transmission line maintenance continue to meet industry standards. Older generation facilities are being retired, resulting in reduced maintenance and risk.

In Wisconsin, grid modernization's focus is on ensuring the electric system continues to be safe and reliable while adaptable to changing technologies and customer expectations. The PSCW is working collaboratively with energy providers and stakeholders to identify areas of consensus on grid modernization projects, particularly in the areas of safety and reliability, innovative rate design, advanced metering, and the interconnection of distributed energy sources.

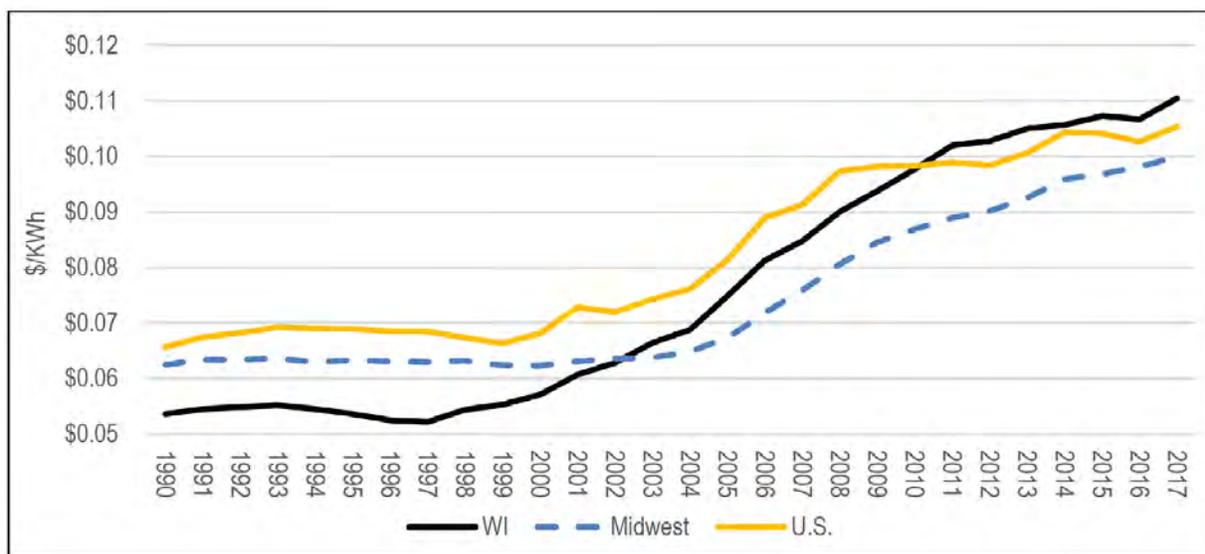
The greatest threat to electric reliability has been storm damage, which is best managed by tree trimming in the area of distribution lines. If neglected for even a short time the consequences can easily strain utility budgets. With weather events becoming more frequent and more severe, distribution and transmission design standards must weigh the potential of worsening storms.

FUNDING

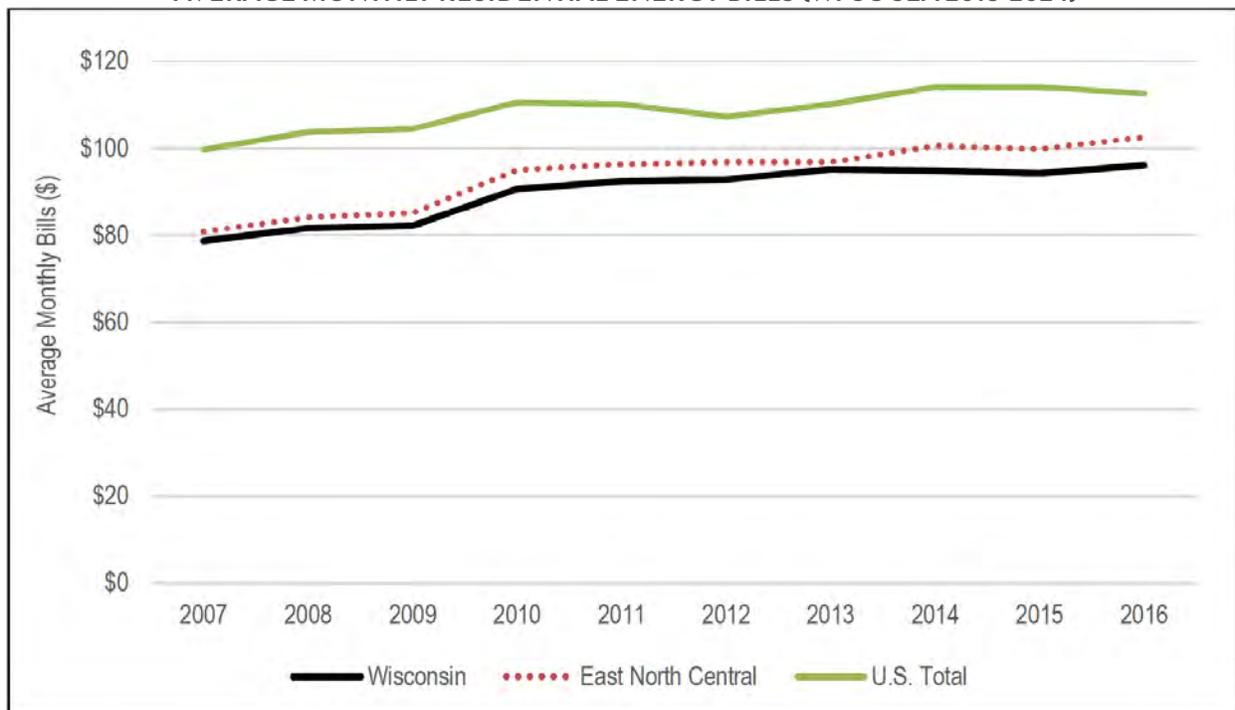
In the area of funding, energy infrastructure has always had a distinct and significant advantage over most other categories of infrastructure. The PSCW rate case process has provided stable, regulated funding of necessary energy infrastructure for generation, transmission and distribution. Elected representatives are not required to vote to increase taxation to provide for utility improvements and utility investment does not need to compete against social needs for tax dollars. This has resulted in adequate electric supplies and very high reliabilities. This is the main reason that energy infrastructure in Wisconsin continues to receive a high grade.

The average retail electricity rate in Wisconsin was 10.58 cents per KWH according to the most recent data from the U.S. Energy Information Administration. The rates in neighboring states range from 8.92 (Iowa) to 11.4 (Michigan). Comparable rates range from around 8 cents to 18 cents per KWH in the lower 48 states. Wisconsin's rates by class are higher than the Midwest and the national average rates per KWH, but because of lower residential usage by Wisconsinites the average monthly bills in Wisconsin are consistently below the regional and national averages. The reasons for Wisconsin's faster increase in rates is because of increased capital requirement for generation, distribution and transmission.

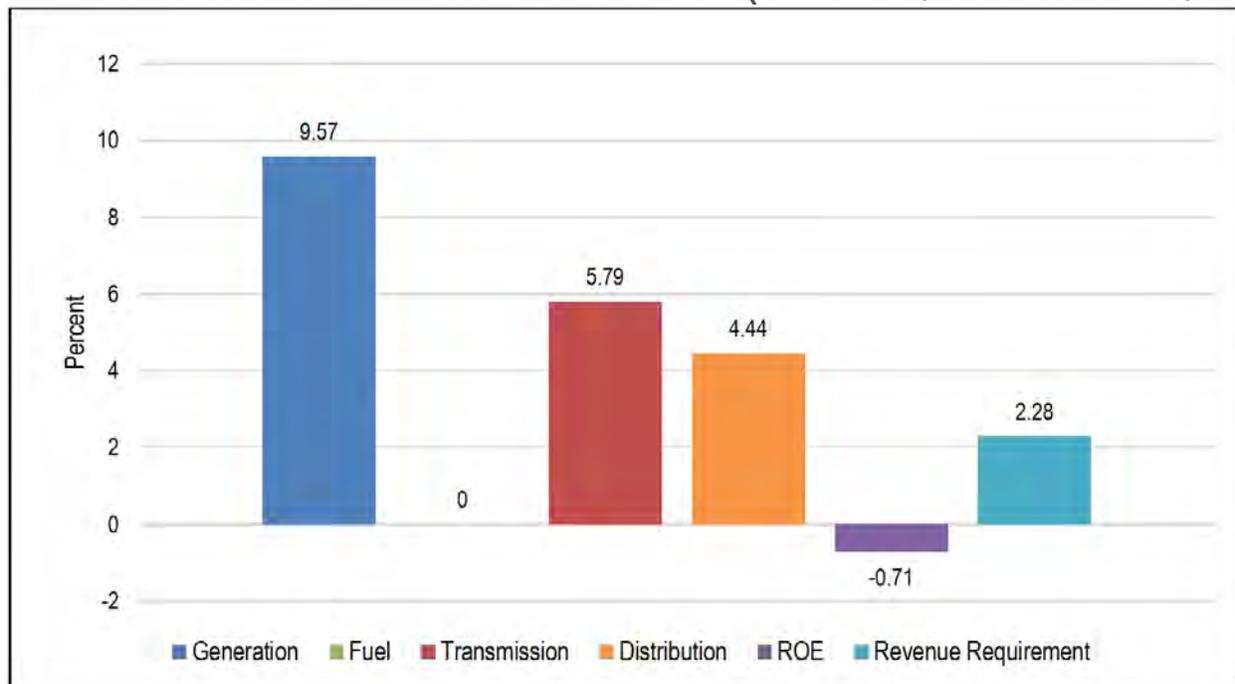
AVERAGE RESIDENTIAL UTILITY RATES (Wpsc SEA 2018-2024)



AVERAGE MONTHLY RESIDENTIAL ENERGY BILLS (Wpsc SEA 2018-2024)



EIGHT YEAR ANNUAL GROWTH RATE OF REVENUE REQUIREMENTS (Wpsc SEA 2018-2024)



FUTURE NEED

It will be imperative that the proposed power generation additions are completed to offset the planned retirement of generation facilities. Monitoring of the electric generation reserve margins will be a higher priority since Wisconsin is projected to be much closer to minimum reserve requirements in the coming years. Transmission and distribution facilities must continue to be upgraded as this infrastructure continues to age.

The governor's goal of executive order 38 is that all energy consumed in Wisconsin should be 100% carbon-free by 2050, and stakeholders of Wisconsin's energy future must work together to determine a coordinated energy future.

The industry must continue to improve its ability to manage and deter escalating cyber-threats.

PUBLIC SAFETY AND RESILIENCE

Security measures at Wisconsin's major energy infrastructure sites have increased since the events of September 11, 2001 (9/11). The petroleum pipeline industry manages these issues privately. To address the threat posed by breaches in cybersecurity, the PSCW, the North American Energy Reliability Corporation (NERC), FERC, the Wisconsin Department of Military Affairs and other agencies conduct large-scale, multi-state, and multi-disciplinary exercises to practice emergency responses to a wide-scale disruption of electric power and communications systems.

INNOVATION

Balance Between Energy and the Environment

Electricity production can profoundly affect the environment. Wisconsin's Renewable Portfolio Standard required that approximately 10% of all electricity sales in Wisconsin come from renewable resources by 2015. Sales exceeded 10% in 2013. Executive order 38 proposed new goals for 2050. The participation of all stakeholders is required to design and build Wisconsin's energy future.

Conservation of Energy

As of 2017, all of Wisconsin's investor-owned utilities and municipal electric utilities participate in Focus on Energy (Focus), Wisconsin's energy efficiency program financed by the utilities for the purpose of energy conservation. The program also benefits the 13 Wisconsin electrical cooperatives by offering energy-efficient support through multiple programs. In 2016, Focus created net economic benefits of \$348 million and achieved \$4.32 in benefits for every \$1.00 in costs.

Renewable Energy

The availability of renewable energy continues to grow in Wisconsin and neighboring states. Improvements in high-voltage transmission enable more efficient transmission of power over longer distances. Wind continues to be the fastest-growing renewable energy source. The first utility-scale solar energy projects are advancing in the state of Wisconsin. Increases in intermittent renewable energy projects would benefit from the development of energy storage options like the pumped storage facility in Michigan.

Rates, Tariffs, and Customer Information Systems (CIS)

Some innovative rates are being considered. Along with advanced CIS, these rates will have the potential to increase conservation, and shift energy uses from peak to off-peak hours.



ENERGY



RECOMMENDATIONS TO RAISE THE GRADE

Wisconsin must continue to pursue a strong energy policy that serves economic needs and preserves the environment. We recommend the following to raise the Energy grade:

- **Add renewable electric generation and modernize existing generation plants. Ensure that energy efficiency, conservation and renewable energy are attractive, economically viable alternatives for Wisconsin’s energy needs.**
- **Continue to reduce greenhouse gas production through conservation, renewables, nuclear, and lower CO2 producing fuels like natural gas. Continue to research and develop clean coal, energy storage, and carbon capture technologies.**
- **Continue to broaden the diversity of future fuel sources.**
- **Work with all stakeholders to create a workable 2050 plan for greenhouse gas reductions, including commitments to defined milestone objectives along the way.**
- **Improve transmission and distribution infrastructure to support the changes in generation sources and increasing demands. Harden the transmission and distribution infrastructure to combat extreme weather events.**
- **Increase the funding of Focus on Energy to take advantage of the proven savings from this program.**
- **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 of directed cyber intrusions.**
- **Assure the reliability of imported energy supplies contractually, and by transmission reliability and redundancy.**
- **Support transportation fuel efficiency by improving electric vehicle charging convenience and providing incentives for efficient vehicles.**



ENERGY



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HAZARDOUS WASTE



PIKE RIVER IS A TRIBUTARY OF THE MENOMINEE RIVER AND FLOWS THROUGH MARINETTE COUNTY, WISCONSIN



HAZARDOUS WASTE

GRADE: B-

EXECUTIVE SUMMARY

Wisconsin has been a leader in hazardous waste clean-up, brownfields, and emerging contaminant issues. The partnership between the Wisconsin Department of Natural Resources (DNR) and the U.S. Environmental Protection Agency (EPA) ensures cleanup of contamination from hazardous waste and polychlorinated biphenyls through the One Cleanup Program. Of the EPA's 1,178 National Priority List sites, 36 (3.1 percent) are located in Wisconsin. More than three-quarters of those 36 sites (28) are progressing toward being delisted. The state of Wisconsin has been proactive to protect and preserve the environment from hazardous waste. Establishing and maintaining funding along with prioritizing sites with the highest risk to the health and safety of the public are the primary concerns regarding hazardous waste sites in Wisconsin. To improve its grade, Wisconsin should establish a process to identify the remaining hazardous waste sites with highest risk to prioritize remedial action and guide the level of response. Additionally, the state should consider increased funding for state-led sites, explore additional resources to decrease backlogged claims for the Dry Cleaner Environmental Response Fund, establish a state trust fund to support loans for Brownfields projects, and implement recommendations from a 2015 Brownfields Study Group.

CONDITION & CAPACITY

The DNR Remediation and Redevelopment (RR) Program implements the state's hazardous substance cleanup programs and the federal programs in cooperation with the EPA. The DNR and the EPA coordinate their efforts covering cleanup of contamination from hazardous waste and polychlorinated biphenyls (PCBs) through the federal One Cleanup Program.

Superfund

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) was passed by the U.S. Congress in 1980. This program, commonly referred to as Superfund, provided Federal authority to respond to potential impacts to human health and the environment as a result of releases of hazardous substances. Wisconsin currently has 36 Superfund sites that are listed on the National Priorities List (NPL). Remedial actions have been taken at 34 of the sites, one is in the RI/FS (remedial investigation/feasibility study) phase, and one site is in the RD/RA (remedial design/remedial action) phase. Of the 34 sites currently in the remedial action phase, 28 are working towards reaching the SWRAU (Sitewide Ready for Anticipated Use) performance measure and delisting.

State and Federal Brownfields

Brownfields are abandoned or underused properties with perceived or actual contamination which hinders potential redevelopment. The DNR's RR Program provides a variety of financial and liability clarification resources for parties involved in brownfields redevelopment. DNR and the Wisconsin Economic Development Corporation (WEDC) have staff and resources to educate users and facilitate access to these funds. There have been 39 Wisconsin recipients of Federal 104(k) Brownfields Grants between 2003 and 2018. In addition, Wisconsin Assessment Monies, funded by a 104(k) assessment grant to the Wisconsin DNR, are available for environmental site assessments. The Ready for Reuse Loan and Grant program, funded by a 104(k) revolving loan grant to the Wisconsin DNR, provides monies that can be used for site cleanup. The Brownfields Study Group, an external advisory board created in 1998, provides recommendations on current and future initiatives related to contaminated land remediation and redevelopment. In 2015, the Brownfields Study Group produced a report providing recommendations on liability, financing, tools for local governments, emerging technology, and waterfront brownfield redevelopment. The full report and recommendations are available online: "Investigating in Wisconsin, Reducing Risk, Maximizing Return." Wisconsin's well-designed and integrated Brownfields programs are used as a model by other states.

State Hazardous Waste Sites

Every year the state receives hundreds of reports of contamination as required by law. The NR700 rule series governs the process of site investigation and clean up. The state maintains an online database of contaminated and cleaned up sites called "BRRTS (Bureau for Remediation and Redevelopment Tracking System) on the Web" (BOTW). The number of new reports per year has dropped from over 1,000 in the late 1990's to between 200-300 in the 2010's. In addition, every year there are hundreds of sites that complete cleanups approved by the DNR. Between 1994 and 2018, the DNR approved cleanups at more than 24,000 sites.

Leaking Underground Storage Tank (LUST) Program

The Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP) has responsibility for regulation and enforcement of storage tank standards and financial responsibility requirements in the UST (Underground Storage Tank) program in Wisconsin. There is a total of approximately 184,900 tanks in the UST program under DATCP, of which 50,200 are in-use and 11,900 are federally regulated as part of the LUST (Leaking Underground Storage Tank) program. The DNR oversees cleanups that are a result of petroleum products being released into the soil and groundwater. All LUST sites are regulated under the NR700 rule series. The DNR also administers the Petroleum Environmental Cleanup Fund Award (PECFA), which has a sunset date of June 30, 2020.

OPERATION AND MAINTENANCE, FUNDING & FUTURE NEED

The Wisconsin Legislative Fiscal Bureau summarizes the status of funding programs used for cleanup of contaminated sites in Wisconsin. The most recent report was completed in January 2019. Funding in Wisconsin is used to support administration of contaminated land and brownfields cleanup programs, and to directly pay, assist, or incentivize cleanup at contaminated sites.

The DNR is the primary administrator of the federal and state cleanup programs, and in 2018-19 the DNR had 114.5 staff and appropriations of \$11.9 million to administer this work. This funding came from federal funds (Superfund, LUST, brownfields, and hazardous waste programs) (\$3.5M), and the state's general purpose revenues (\$0.97 million), environmental management account (primarily landfill tipping fees) (\$2.2M), petroleum inspection fees (\$3.6 million), dry cleaner fees (\$0.23 million), and program revenues (\$1.28 million).

Actual cleanup costs are generally paid by responsible parties (RPs), but Wisconsin leverages other funding sources to encourage remediation of contaminated properties. The following funding sources are geared toward Superfund sites, brownfields redevelopment, petroleum contaminated sites, dry cleaners, and state-lead sites (i.e. sites without a viable responsible party that have been prioritized for cleanup using state funds).

- **Brownfields:** Wisconsin has local, state, and federal funding programs to incentivize redevelopment of Brownfields. As of 2015, a total of \$162 million was expended on redevelopment from these brownfields-specific programs. Approximately 7% came from local tax incentives and funds, 75% came from the State Brownfields grants and funds, and 18% came from federal programs (e.g., revolving loan fund, brownfield grants to localities, and Wisconsin Assessment Monies for Phase I/II work). With respect to the revolving loan fund, EPA has awarded DNR \$12.5 million since 2004, and as of June 30, 2018, DNR had awarded 38 grants for a total of \$9 million and seven loans for a total of \$5 million, and had received \$3 million in loan repayments, which the agency uses for additional grants and loans.
- **Petroleum Contaminated Sites:** PECFA was created in Wisconsin over 30 years ago and is funded through a portion of the state's \$0.02/gallon gasoline tax. PECFA covers eligible costs associated with investigation and clean-up of releases from petroleum underground storage tanks. The current biennial budget for PECFA is \$15M. Over 16,000 sites entered PECFA and 449 still require additional work as of June 2019. No new sites can enter PECFA and the program is scheduled to end on June 30, 2020.
- **Dry Cleaners:** The Dry Cleaner Environmental Response Fund (DERF) was created in 1997 and is funded by a license fee for dry cleaners and a fee on the sale of dry-cleaning solvents. The program covers eligible costs associated with investigation and clean-up of contamination caused by releases of dry-cleaning solvents. No new sites can enter DERF. The Fund has provided more than \$20 million to 168 of the eligible 230 dry cleaner facilities, and more than 100 of those facilities have completed cleanup. DERF is experiencing a revenue shortfall due to the contraction of the dry-cleaning industry. Revenues no longer cover cleanup expenses and there is over a five-year backlog to pay current claims. This backlog is expected to increase in the future.
- **State-Lead Sites:** The state has monies in the Environmental Management Account that are used to support investigation and cleanup of contaminated sites that do not have a viable responsible party or funding mechanism, but which have been prioritized because of risk to human health or the environment. The account is primarily funded through landfill tipping fees, which are expected to remain stable over the next 3 years and be sufficient to fund the \$2 - \$4 million per year budgeted for the investigation and cleanup of state-lead sites.

PUBLIC SAFETY & INNOVATION

DNR addresses emerging issues, which include previously unclassified or newly determined contaminants or pathways that pose a risk to human health or the environment. These emerging issues require research, public outreach, and new policy to mitigate risks to public health. Two recent focus areas have been the vapor intrusion risk pathway and per- and polyfluoroalkyl substances (PFAS). Vapor intrusion is the migration of chemical vapors from an underground source into structures such as homes, businesses, or schools (EPA, 2015). Wisconsin has been a leader amongst the states in developing guidance and conducting trainings to ensure vapor intrusion is addressed using sound science and best practices. DNR continues to fund a vapor intrusion leadership position and maintains a website that provides the public easy access to guidance and training materials.

Wisconsin is currently addressing a new class of contaminants - PFAS. In 2019, the DNR formed the PFAS Technical Advisory Work Group and funded two positions to develop and facilitate cross-program collaboration and provide technical expertise related to PFAS. The DNR is working to set groundwater standards for PFAS compounds based on recommendations from the Wisconsin Department of Health Services (DHS), and to expedite policies that will protect public health using best available science. The DNR is collecting PFAS samples and is asking industry, municipalities, and water treatment facilities to begin sampling for PFAS.

DNR allows for innovative remediation approaches that are more sustainable. DNR has guidance documents to support green remediation. In addition, DNR has published the Wisconsin Initiative for Sustainable Remediation and Redevelopment (WISRR) Guidance Document which reviews a few specific sites that serve as examples for more sustainable remediation alternatives.



**HAZARDOUS
WASTE**



RECOMMENDATIONS TO RAISE THE GRADE

Establishing and maintaining funding and prioritizing sites with the highest risk to the health and safety of the public are the primary concerns regarding Hazardous Waste sites in Wisconsin. ASCE supports the following recommendations to raise the grade:

- **Establish a process to identify sites with highest risk to prioritize remedial action and guide the level of response.**
- **Provide Responsible Parties access to fund(s) to support cleanup at contaminated sites based on a suite of factors such as financial need, records of O&M, and risk prioritization.**
- **Increase funding for State-lead sites.**
- **Look for additional resources to decrease the backlogged claims for the Dry Cleaner Environmental Response Fund.**
- **Establish State Trust Fund as a mechanism from which to fund loans for Brownfields Projects.**
- **Implement the 2015 Recommendations of the Brownfields Study Group.**



**HAZARDOUS
WASTE**



SOURCES

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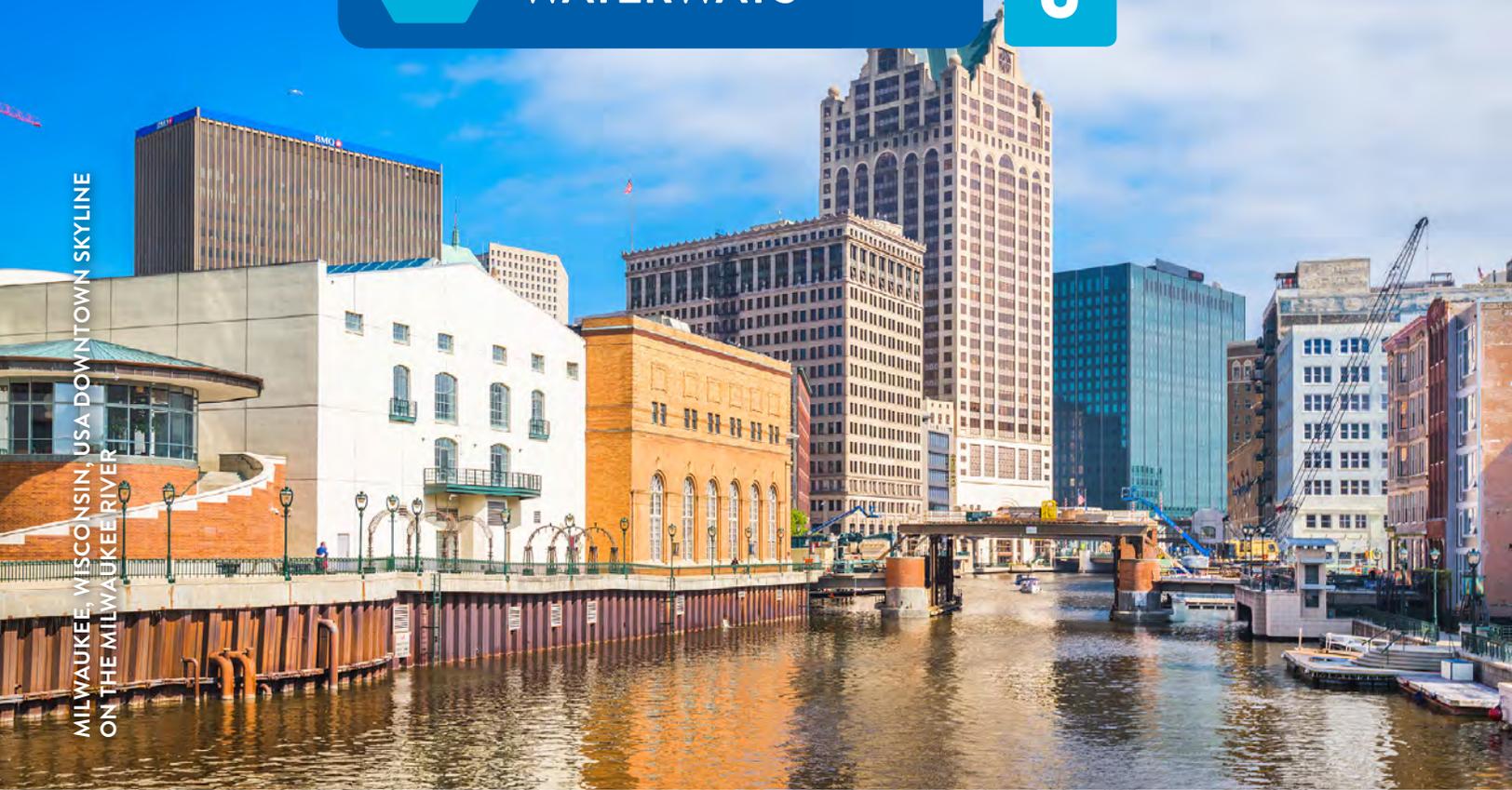
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INLAND WATERWAYS



MILWAUKEE, WISCONSIN, USA DOWNTOWN SKYLINE ON THE MILWAUKEE RIVER



INLAND WATERWAYS

GRADE: C-

EXECUTIVE SUMMARY

Inland waterways consist of the navigation channels and associated structures that support commercial transport of materials between ports, terminals, or other locations. The major inland waterway in Wisconsin is the Mississippi River, consisting of 213 miles of navigation channels. In 2017, 25.8 million tons of cargo was transported over barges on this “freight highway,” consisting primarily of iron ore, steel scraps, and food products. Wisconsin’s locks and dams along the inland waterways are beyond the intended end of their design life. Targeted funding allowing component replacement has kept the locks and dams functional for the time being. However, increased frequency of scheduled and unscheduled maintenance has contributed to decreased system performance and major rehabilitation of these structures is needed to ensure long-term durability. Since 2011, the percentage of vessels experiencing delay has increased from 6 percent to 35 percent and the average delay per lockage increased from 20 to 70 minutes. Fortunately, additional revenue sources including public-private partnerships are being considered to support investments to inland waterway infrastructure in Wisconsin.

INTRODUCTION

Inland waterways consist of the navigation channels and associated structures, including locks, dams, training structures and navigational aids, that support commercial transport of materials between ports, terminals or other locations. Barge transport can provide the most 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. Nationally, 60% of grain exports and 20% of the coal used to generate electricity are moved on inland waterways. In Wisconsin, 25.8 million tons of cargo were transported along the Mississippi River in 2017, consisting primarily of iron ore, steel scraps, and food products. [6]

In Wisconsin, although the Great Lakes represent a prominent shipping corridor, this water-based trade thoroughfare will be considered in the Ports. Instead, the Mississippi River is the only significant commercial inland waterway currently operating in Wisconsin. The U.S. Army Corps of Engineers (USACE) operates and maintains 213 miles [1] of the Mississippi River in Wisconsin as a “water highway” for freight. This waterway includes 9 locks and dams [2] operated by the St. Paul District USACE and Lock and Dam #11 (Dubuque) operated by the Rock Island District USACE. Prior to 2004 [3], the Detroit District USACE operated 9 locks [4] along the Fox River entering Green Bay, but that waterway has not been operational since 2015 when the Menasha lock was closed to prevent the spread of round goby, an invasive fish. The five locks at Kaukauna have been closed since 2019, and will remain closed until the bridge at Kaukauna Lock 1 is repaired, though there are no dates of their expected return to normal operations. [5]

CAPACITY

Freight traffic on the Mississippi River waterway in Wisconsin, north of lock and dam 11, has declined since usage peaked at over 10,500 barges carrying approximately 18.4 million tons in the late 1990s. However, barge use has recently increased, in part due to increased transport of corn and soybean harvests; in 2016 and 2017 an average of 9,000 barges passed through the locks, representing 15.8 million tons of freight. Assuming the historical numbers represent the system capabilities, usage is currently about 85% of capacity.

However, delays at locks due to heavy traffic, condition improvements, and/or routine maintenance closures increase the delays and costs of shipping goods along the waterways. Between 2011 and 2017 the percentage of vessels experiencing delay has increased from 6% to 35% and the average delay per lockage increased from 20 to 70 minutes. Some locks saw over 50% of vessels delayed. [7]

CONDITION

Most of the locks and dams along the Mississippi River were built in the 1930s with an expected 50-year lifespan. Six of the ten locks and dams were refurbished in the early 2000s, while the rest were refurbished in the 1990s. While refurbishment is not equivalent to reconstruction, these efforts extend the useful life of the infrastructure. However, the most recent renovation, Lock & Dam 8, was completed 16 years ago which means that many locks require extensive conditional improvements/overhaul. [9] Targeted funding allowing component replacement has temporarily kept the locks and dams functional, but major rehabilitation is needed to ensure long term durability and extended facility life. [8] [10] The current state of the Mississippi River locks and dams has increased delays and wait periods for barges. All of the locks and dams have continued to increase wait periods and number of tows delayed [7] The lack of funding prevents dredging practices at the frequency that USACE recommends. [11] 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 (AS OF 2017)

Lock and Dam	Date of Refurbishment	Condition based on percent of tows delayed
3	1991	Fair
4	1994	Good
5A	2000	Poor
5	1998	Poor
6	1999	Poor
7	2002	Fair
8	2003	Poor
9	2003	Poor
10	2000 ^b	Very Poor
11	2000 ^b	Very Poor

A – From USACE “Public lock reports: Public lock commodity, public lock unavailability, public lock usage, public lock report glossary.” Good = <20%; Fair = >20%, <30%; Poor = >30%, <40%; Very Poor = >40%. NOTE: L&D 10 and 11 had >50% ships delayed.

b – Date not provided by USACE

FUNDING

Inland waterways construction and rehabilitation costs, including locks, are shared by the federal government through general funds and by users through the Inland Waterways Trust Fund (IWTF) on a 50-50 basis. 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 9 cents for the first time since 1995 upon the urging of the Inland Waterways Users Board, a group comprised of industry representatives that monitors the use of the IWTF, in order to increase potential investment in the system. Federal projects are authorized through Water Resource Development Acts and Federal funding comes through annual appropriations. Operation and maintenance costs for inland waterways are covered in full by the federal government.

The USACE also receives annual funding from the Upper Mississippi Restoration Program. The USACE uses the Water Infrastructure Finance and Innovation Act through the EPA, and the Corps Water Infrastructure Financing Program. [11] They have also initiated the Civil Works Public Private Partnerships Pilot Program to investigate the viability of new delivery methods that significantly reduce the cost and duration of project delivery “by providing significant upfront funding, leveraging appropriations while optimizing local participation and promoting risk sharing in project delivery” [12].

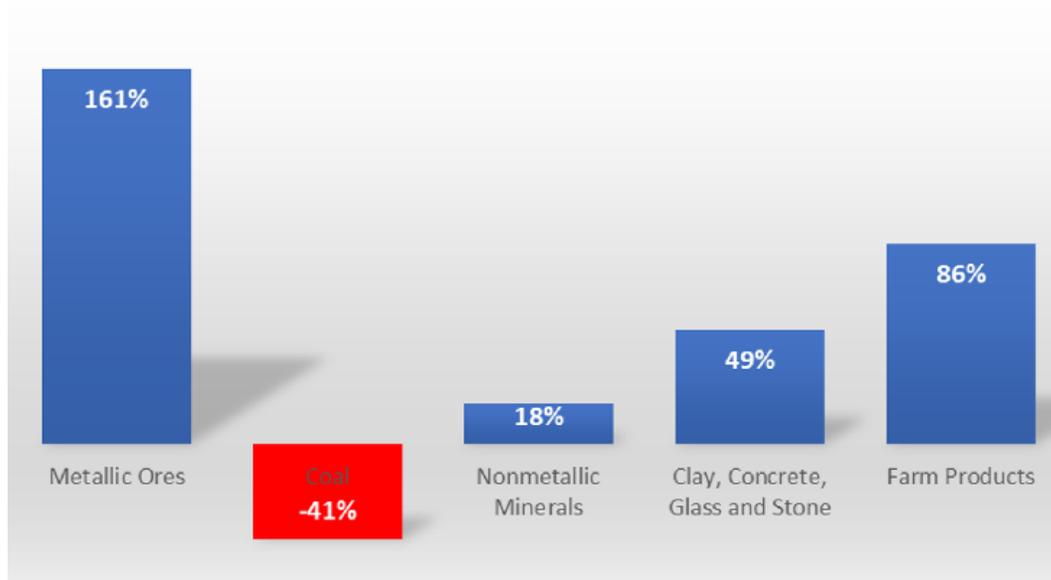
Additional funds (\$1.5M, pushing total lock funds to 45% of budget) [13] were dedicated to improvements at Locks 2, 4, 5, and 5A. A 2018 federal award allowed for the fabrication of new miter gates that will be installed at locks 5A, 8, and 10. The new gates are planned for installation during the fiscal years of 2021, 2022, and 2023 respectively. [14]

Funding for repairs depends on an appropriations process that can result in variable or erratic funding levels from year to year. The lack of consistent, reliable funding affects the operations and maintenance as well as the implementation of major rehabilitation needed to keep the Mississippi River operating at an acceptable level of performance. [8]

FUTURE NEEDS

Overall, the Wisconsin Department of Transportation foresees changes in the waterborne transport of several commodities by 2040 as shown in Figure 1.

FIGURE 1. PROJECTED GROWTH IN WISCONSIN WATERBORNE FREIGHT BY 2040 (WISDOT 2018)



The impacts of these changes on inland waterway transport is not clear, as a large portion of this transport would occur at Great Lakes ports. However, it is reasonable to infer that these trends signal an expected increase in demand for barge transit in Wisconsin in the future.

Several component replacement projects that already have established funding are scheduled to occur within the next 5 years. However, according to the USACE, operation and maintenance (O&M) and major rehabilitation budgets do not sufficiently cover all the expenses necessary to “ensure the navigation system operates at an acceptable level of performance.”

While no new locks or dams are planned for this system, increased funding will be required for rehabilitation to extend the life expectancy of the existing structures. [8]

OPERATION AND MAINTENANCE

Operation and maintenance includes actions at the lock and dam structures and channel dredging to maintain the 9-foot channel depth. [13] The USACE St. Paul District Work Plan for Fiscal Year (FY) 2019 allotted \$31.8M for O&M and channel improvement along its portion of the Mississippi River, and \$40M for gate improvements, river dredging, and surveys. Many channels are not dredged as often as the USACE recommends. [10]

Upgrades and improvements were also undertaken at four of the ten locks along the Wisconsin segment of the Mississippi River during FY2019, and gate replacement is scheduled to occur for three additional locks during fiscal years 2021, 2022, and 2023. [14] Several interested parties have allocated private funding for O&M works in addition to the funding provided by USACE. [15] [16]

Note that the USACE allocated more than \$4.2M in FY 2019 for O&M along the Fox River waterway system. Fox River is no longer used commercially, but recreational use continues; USACE has turned control of the locks over to the Fox River Navigational System Authority. [3] [13]

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 increases the need for road repairs and the incidence of accidents on roadways in Wisconsin and elsewhere. Furthermore, due to relative efficiency of inland waterway cargo transportation as compared to trucks, failures along the waterway would reduce the efficiency of transport and increase costs and CO² emissions.

Because inland waterways are run-of-river structures, risks due to extreme weather and/or catastrophic structural failures result in threats to the system's ability to maintain appropriate water level elevations. If water level elevation decreased, the ecosystem functions may be impacted and communities may experience recognizably lower summer and fall water levels.

RESILIENCE & INNOVATION

The USACE budgeting process considers the risk to project performance when prioritizing repair and improvement projects to the nation's waterway system. In March 2016 the USACE issued the report entitled *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. [17]



**INLAND
WATERWAYS**



RECOMMENDATIONS TO RAISE THE GRADE

- **Consider allowing USACE contract authority for projects or some other appropriate mechanism to avoid the stop-and-start of construction currently happening because of the appropriations process.**
- **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 increase the funding of operations and maintenance of the inland waterways each year.**
- **Utilize alternative financing and delivery methods, such as public-private partnerships, when appropriate.**
- **Develop and implement a standardized measurement for delays on the system.**

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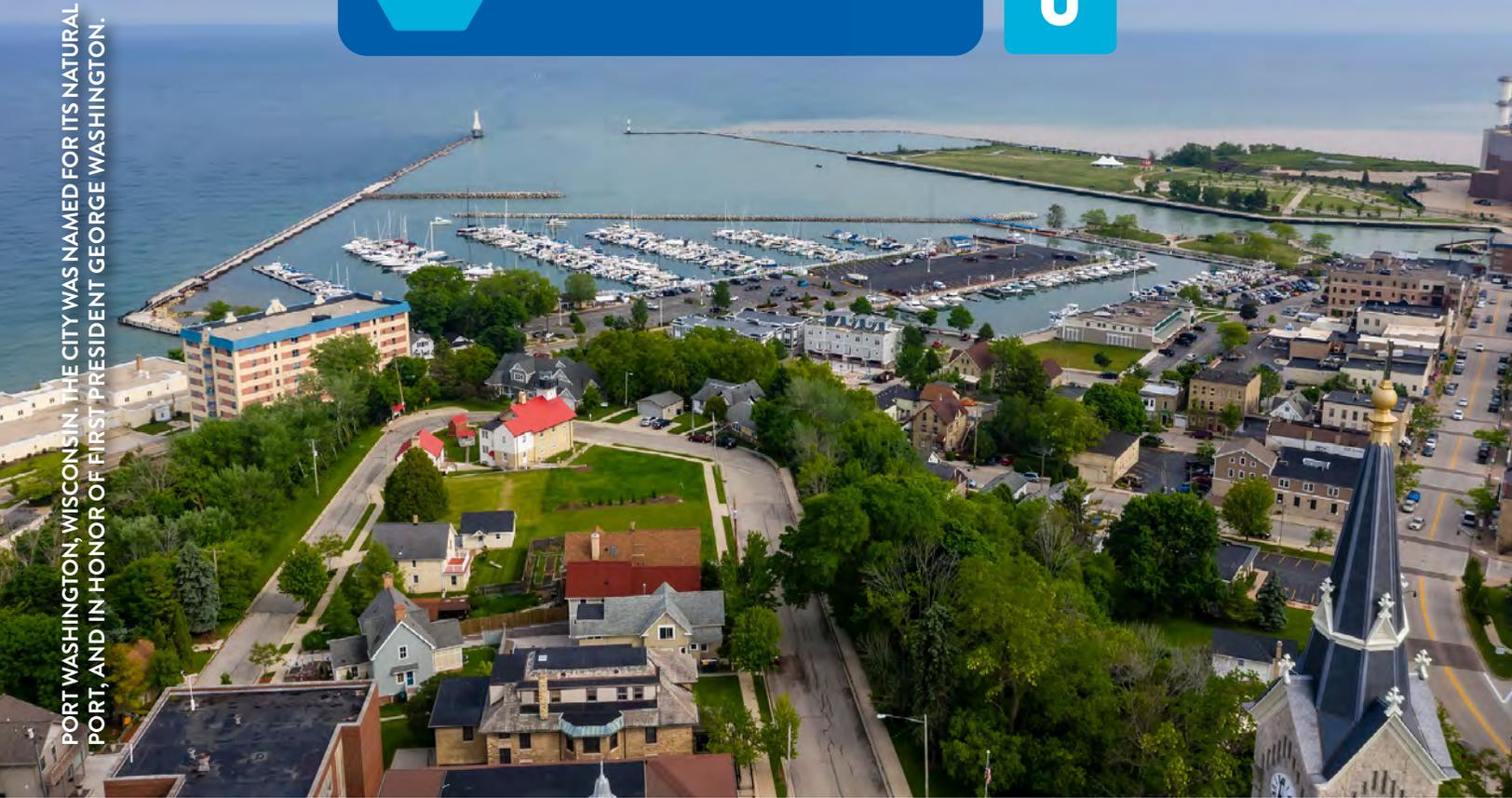
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PORTS



PORT WASHINGTON, WISCONSIN. THE CITY WAS NAMED FOR ITS NATURAL PORT, AND IN HONOR OF FIRST PRESIDENT GEORGE WASHINGTON.



PORTS GRADE: C+

EXECUTIVE SUMMARY

Wisconsin’s port facilities range from simple harbors to multi-modal distribution hubs with transport using Great Lakes, rivers, roads, rail, and air routes. Wisconsin is home to 20 harbors, including eight major ports, including the shared Superior, WI-Duluth, MN Port. The ports of Wisconsin support approximately 10,000 jobs and generate more than \$1.6 billion annually in economic activity. The overall condition of Wisconsin’s major ports is adequate for the demands currently placed on the state, but facilities will require adequate funding to install, replace, or maintain safe infrastructure. Numerous actions are required to improve Wisconsin’s ports, which include updating the general port infrastructure to meet realities of extreme changes in water levels and working to complete dredging activities. Multi-modal options to the ports should be considered including access for land-based transportation, such as rail and road transportation. Additional priorities to improve the port systems include preparing to accommodate the newest generation of ships, enhancing utilization of federal grants, and streamlining the project permitting process.

CONDITION AND CAPACITY

Ports are a unique type of infrastructure. They are managed locally by the port and the applicable port district, but the impact of competitive importation and exportation of necessary goods reaches the economy of the entire state. For this reason, Wisconsin’s ports play a significant role in our economy.

Wisconsin has over 20 harbors in the state with commercial and recreational activities. There are eight major ports handling freight, 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 (Superior).

Wisconsin ports typically handle a diverse array of cargo such as raw materials and metals, coal, fertilizer, grain, machinery, limestone, passenger and commercial vehicles, petroleum products, wind turbine towers and parts, wood, and more. The ports of Wisconsin support approximately 10,000 jobs and generate more than \$1.6 billion in economic activity along Lake Michigan, Lake Superior, and the Mississippi River.

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. Additional maritime activity would also help reduce highway congestion and increase the capacity of the transportation network in Wisconsin.

CONDITION & CAPACITY

The table below lists the eight (8) ports that were evaluated for this report card. The ports were characterized by their annual net tonnage and percent contribution to total tonnage.

PORT	NET TONS ⁽¹⁾	PERCENTAGE
Duluth	17,950,000 ⁽²⁾	76.04 % (2)
Milwaukee	2,394,000	10.14 %
Green Bay	1,614,508	6.84 %
La Crosse	662,100	2.80 %
Prairie Du Chien	505,221	2.14 %
Manitowoc	301,060	1.28 %
Marinette	176,000	0.75 %
Sturgeon Bay	3,812	0.02%
TOTAL	23,606,701	100 %

¹ Provided in metric tons; tonnage obtained from most recent available documentation for each port ranging from 2014-2019.

² 2018 tonnage total for Duluth-Superior Port was 35,900,000. The United States Army Corps of Engineers harbor fact sheet for Duluth-Superior states that annual tonnages are almost equally split between Duluth and Superior entries.



The majority of port commerce occurs at the Superior-Duluth port, 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. This port, in addition to the seven others evaluated, was identified as having sufficient condition and capacity. Some ports (e.g., Marinette and Sturgeon Bay) have less than adequate rail and highway access, where others have several options. Expansion would be difficult at some ports, due to increasing property costs associated with the revitalization of port-adjacent residential and commercial real estate. Great Lakes cruise ship tourism is also increasing, bringing new and different ships to Wisconsin's ports. These trends, in addition to an increase in maritime innovations, may require individual ports to evaluate the sufficiency of their infrastructure.



The Great Lakes freighter Stewart J. Cort passes through the Port of Milwaukee in 2017. Photo captured by the Port of Milwaukee.

OPERATION AND MAINTENANCE, FUNDING AND FUTURE NEED

Port owners/operators implement a range of operation and maintenance plans. Some plans are robust, and others are nominal. Maintenance and inspection schedules also vary based on the responsible party's level of activity. All of the ports evaluated in this report see regular dredging performed by the U.S. Army Corps of Engineers (USACE) to maintain federal channels.

A significant source of Wisconsin's port maintenance and improvement funding is through grants provided under the Harbor Assistance Program (HAP). This program, administered by the Wisconsin Department of Transportation (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, the program has provided 114 grants worth over \$147 million since its start in 1980.

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 state infrastructure projects including harbor projects. The stated purpose of the program is to help attract business to setup in the state or entice existing business 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 sources, the program has provided 367 grants worth over \$111 million since its start in 1987 with only one port related project funded in 2002.

The state of Wisconsin also provides low interest loans for infrastructure improvement projects through the Wisconsin State Infrastructure Bank (SIB). Federal grant dollars have been accessed for port infrastructure projects. As an example, in 2017 the SS Badger Car-ferry operating in Manitowoc Harbor successfully received FAST Act funding for dock facility improvements.

Port investment of revenues into expansion, modernization, and repair projects does occur. For example, Port of Milwaukee uses its annual revenues to fund operation and maintenance projects. Overall, Wisconsin has a robust level of state support and funding established for port operation, maintenance, and improvement projects. Some federal dollars are used as well as local port authorities.

Overall, funding for maintenance and improvement of Wisconsin ports, provided through a mix of state, federal, and local sources, is considered adequate for current needs. One improvement that could be made, is to streamline permitting and associated funding to expedite necessary infrastructure projects.

PUBLIC SAFETY

The majority of Wisconsin's commercial ports have minimal public interaction. However, the public utilizes the port in Manitowoc, where the SS Badger car-ferry operates, and in Milwaukee, where the Lake Express car-ferry operates. The safety of the public is paramount, so efforts to secure access points, from land and from the water, should always be routinely evaluated, maintained, and improved to ensure the public's safety.

Additionally, in an indirect way, the public's safety depends upon the safe, efficient delivery of critical cargo handled in Wisconsin's ports, particularly road salt. Without the supply of road salt through the Port of Milwaukee, a significant portion of southeastern Wisconsin would be impacted, significantly affecting public safety due to supply chain interruptions in salt to treat winter road conditions.

RESILIENCE

The primary environmental factors having potential to affect Wisconsin port infrastructure include extremes in lake elevations, storm driven wind/wave events, and extreme low temperatures with associated ice loading. Wisconsin ports vary in their susceptibility to these environmental factors as well as their approaches for being prepared, withstanding, and recovering from these conditions. Arguably, the most important environmental factor affecting port operations is extremely low water levels.

Lake Michigan experienced a record low lake level in 2013 which exacerbated dredging and dock repair needs. Some adjustment to port operations, like reduced loading and draft of freight vessels, was required to continue operation until dredging could be performed. Extreme low lake levels also contribute to deterioration of dock support structures like timber piling and cribbing, which when remaining submersed can remain structurally sound for many years but which quickly deteriorate when exposed as a result of low lake levels. Many docks along Lake Michigan had experienced increased deterioration as a result of low lake levels in 2013. Larger ports like Duluth and Milwaukee with more robust dredging programs and greater level of federal funding for dredging and maintenance of federal channels and structures exhibited greater resilience against low lake level elevations than their smaller counterparts such as the port of Manitowoc. However, even in the larger ports, there are private dock frontages not included in federal dredging and or structure repair jurisdiction that need to be dredged. Wisconsin's robust state harbor funding program described below is the first line of support to these private entities for resiliency projects to address dredging and dock repair needs resulting from extreme low lake levels. High lake levels also impact port operation and maintenance needs by causing damage to breakwater and in-port structures.

INNOVATION

The ports evaluated in Wisconsin provide the basic level of service for the state, so there is little immediate demand for innovation. However, minor innovative upgrades at facilities do exist and include corrosion protection for steel dock structures. If substantial funding were to be obtained, it would be advantageous to incorporate innovation to possibly increase productivity or lengthen their design life.

One issue that contributes to the dredging backlog at many of the ports, is contamination in sediments. Contaminated sediments are costly to dredge and/or manage appropriately. Innovative material management plans are encouraged by the Wisconsin Department of Natural Resources and the United States Environmental Protection Agency to resourcefully use dredge materials that have contaminated sediments.



PORTS



RECOMMENDATIONS TO RAISE THE GRADE

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

- Update general port infrastructure to meet the demands of extreme water levels.
- Work to complete dredging activities, including contaminated sediment dredging, to ensure the port is not limited in growth or in periods of low water levels.
- Increase multi-modal options to the ports, particularly access for land transportation, including but not limited to, rail and road transportation.
- Preparing for ports, harbors, and inland waterways to accommodate the newest generation of ships, particularly as more “smart” features are developed.
- Enhance Wisconsin’s utilization of federal grant programs, such as Infrastructure for Rebuilding America (INFRA), Better Utilizing Investments to Leverage Development (BUILD), and the Harbor Maintenance Trust Fund.
- Streamlining the project permitting process for port infrastructure improvements.



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ROADS



ROADS GRADE: D+

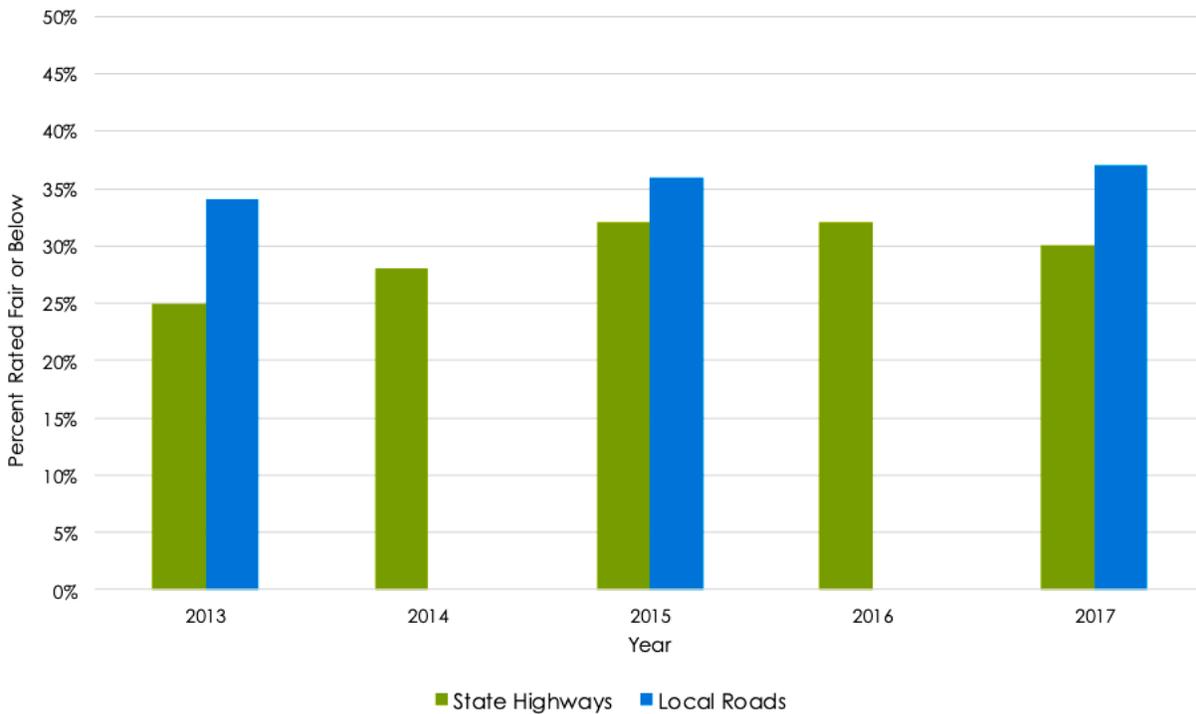
EXECUTIVE SUMMARY

Wisconsin encompasses more than 115,000 miles of drivable roadways. More than one-third of these roads are in fair or below condition and deterioration is likely to continue over the next 10 years. If additional funding is not provided, 50 percent of the roads may experience increasing pavements rated at poor or below. More than two-thirds of major roads, concentrated in urban areas, were rated as fair or below in roadway condition. Deficient roads cost drivers \$6 billion annually due to wear and tear on vehicles, wasted fuel due to congestion, and the overall cost of crashes on roadways. There is an estimated \$13 billion shortfall over the next decade if roadway improvements are not funded. Roadway features in Wisconsin are likely a contributing factor in approximately one-third of fatal traffic crashes. This is tremendously significant to drivers on rural roadways throughout the state where the fatality rate doubles the national average.

CONDITION AND CAPACITY

According to roadway condition analysis conducted by the Wisconsin Department of Transportation (WisDOT) using the Pavement Condition Index (PCI) method on approximately 14,000 miles of state highways and county highway departments using the Pavement Surface Evaluation and Rating (PASER) method on approximately 93,000 miles of local roadways, the conditions of the roadways within the State of Wisconsin have worsened since 2013 (See Figure 1). It should be noted that the PCI method takes into consideration the entire pavement structure while the PASER method only evaluates the roadway surface. Therefore, the PASER method could provide some misleading results due to the “band aid” approach to road repairs that has been used in recent years to make short term improvements with resurfacing projects when a total reconstruction may have been warranted. This strategy may lead to vast failures of pavement structures in the near future, drastically increasing the amount of roadway miles in poor condition.

FIGURE 1: RATINGS OF FAIR AND BELOW FOR WISCONSIN HIGHWAYS AND LOCAL ROADS



WisDOT has predicted that conditions for state highways will deteriorate over the next 10 years increasing pavements rated poor or below by as much as 50% if additional annual funding is not provided. According to TRIP (National Transportation Research Group), in 2016, the condition of approximately 67% of major roads in Wisconsin were rated in fair or below condition with 31% rated in poor condition and 55% of major urban roads rated in poor condition. The 2018 TRIP Report also states that 19% of rural roads were rated in poor condition (16th highest in the nation). TRIP states that deficient roads cost Wisconsin drivers \$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 Madison and Milwaukee is estimated at more than \$2,000 per year.

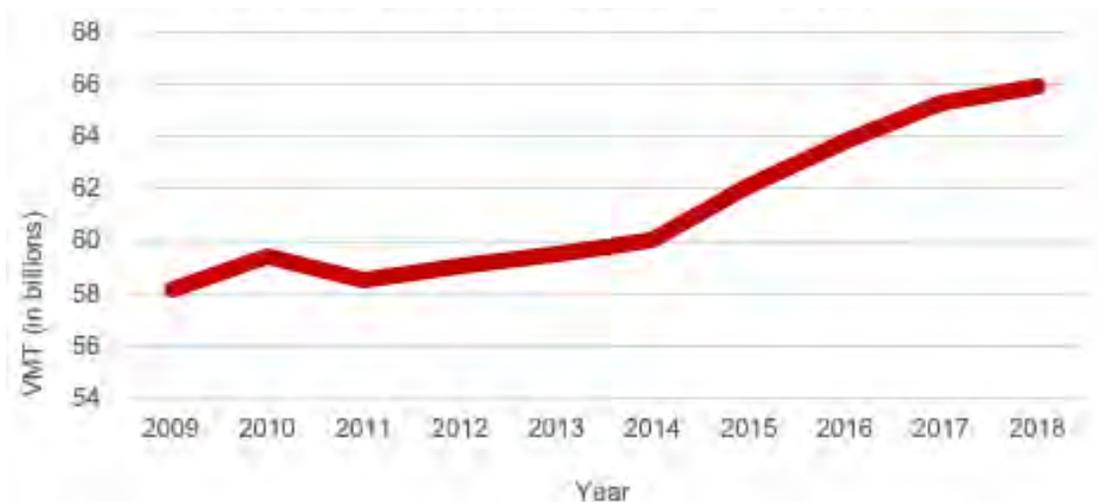
Increasing levels of traffic congestion in Wisconsin have a tremendous impact on commuters, businesses, shippers, and manufacturers. High congestion levels can also result in prospective businesses to look at other states when considering expansion or relocation. TRIP estimates the value of lost time and wasted fuel in Wisconsin is approximately \$1.9 billion a year. Table 1 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 1: HOURS LOST TO CONGESTION/ANNUAL COST PER DRIVER

Location	Hours Lost to Congestion	Annual Cost Per Driver
Eau Claire	11	\$ 297
Green Bay-Appleton-Oshkosh	14	\$ 363
Madison	38	\$ 985
Milwaukee	41	\$ 1,067
Wausau	12	\$ 306

There is a total of approximately 115,000 miles of public roadways in Wisconsin. About 14,000 miles of these roadways are interstate and state highways. Vehicle miles traveled in Wisconsin are progressing in an upward trend (see Figure 2) with an increase of over 13% since 2009 while the population grew only 8%. According to TRIP, approximately 29% of Wisconsin’s urban interstates experience congestion during peak hours. Congestion is experienced on 635 miles of state highways and this is expected to increase to 776 miles by 2023 under current trends. This congestion is expected to have an adverse impact on the \$510 billion worth of commodities that are shipped annually using Wisconsin highways. Wisconsin has been ranked low for transportation infrastructure on a national basis by publications such as the Reason Foundation (38th, 2019) and US News & World Report (32nd, 2019).

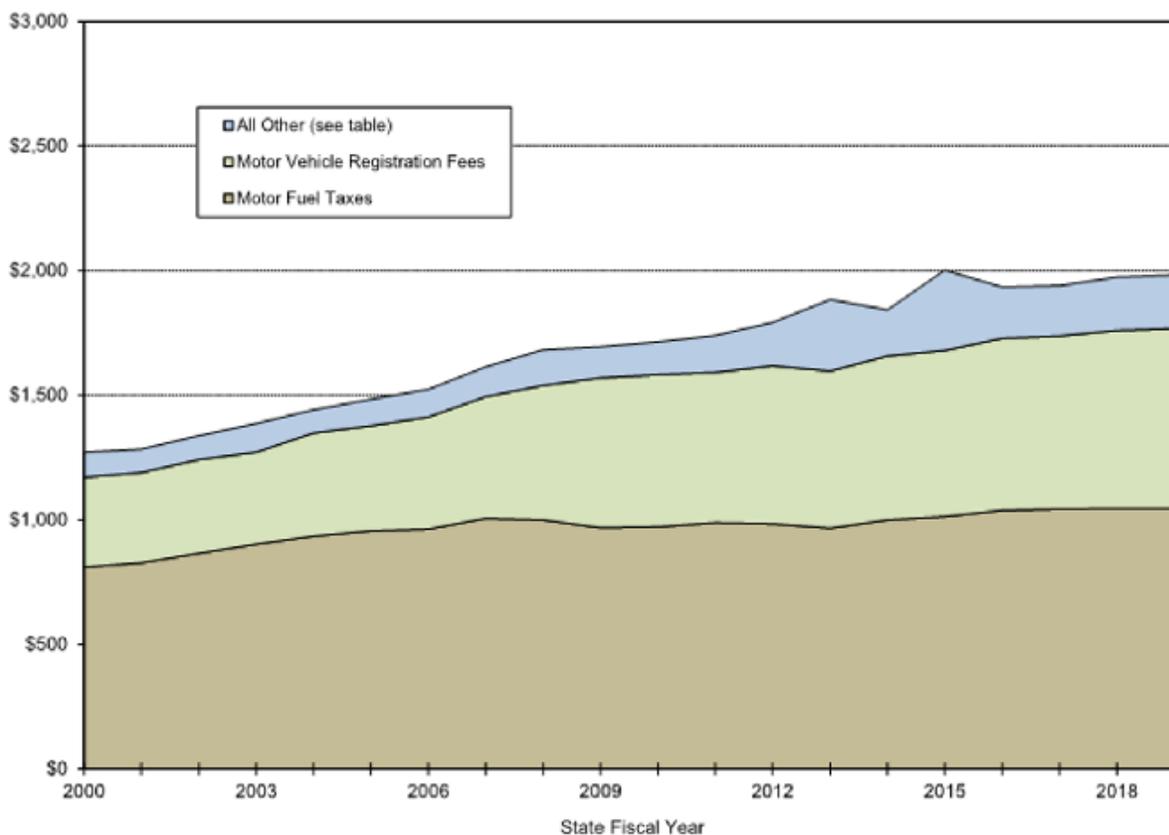
FIGURE 2: WISCONSIN VEHICLE MILES TRAVELED (VMT) OVER TIME



FUNDING AND FUTURE NEED

According to the study conducted by the Wisconsin Transportation Finance and Policy Commission (WTFPC) in 2012/2013 and the scenarios developed, Wisconsin has been in a disinvestment mode since 2014 with little to no increase in transportation revenue (see Figure 3). This results in deterioration of the state transportation network with planned major highway projects delayed for several years. Many design efforts for major highway projects have been canceled or put on hold in recent years. There is an estimated \$13 billion shortfall over 10 years when comparing this scenario with another scenario that maintains current levels of transportation services, conditions and congestion. Obviously, a scenario that actually improves transportation conditions would produce an even larger funding gap.

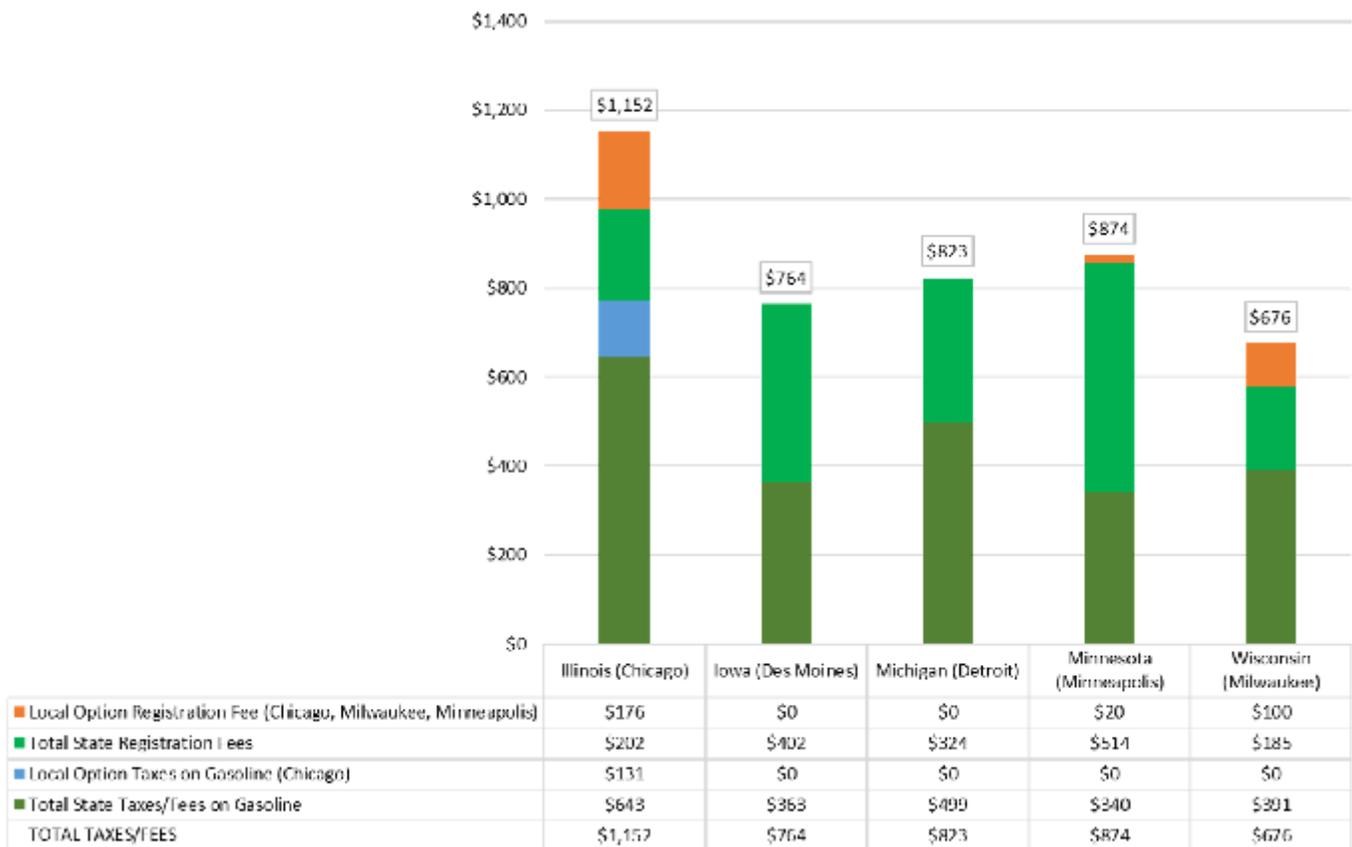
FIGURE 3: STATE OF WISCONSIN TRANSPORTATION REVENUE SOURCES AND FUNDING



Investment in transportation infrastructure has not been increased to meet needs or even to match inflation since 2006 when gas tax indexing to inflation was abolished by the State legislature. Due to lack of funds, WisDOT has had to resort to resurfacing most non-interstate roadways just to make them remain usable. This has most likely resulted in higher than expected condition ratings, but as mentioned earlier, it is not sustainable. Since 2006 the Construction Cost Index increased 48%, and fuel tax purchasing power decreased 20%. State transportation revenue increased 30% during this period, but so did bonding to finance needed investment, which increased debt service resulting in a net increase in transportation revenue of just 13%.

A one-time transportation funding increase of \$465 million has been approved by the Governor and legislature for the biennium of 2020-2021. This is good news for a stagnant transportation budget in recent years, but it falls well short of the funding called for by the WTFPC. WisDOT has reported that a \$180 million annual increase over the next 10 years would be required to maintain our current pavement conditions. Wisconsin has a narrow transportation funding base, relying primarily on gas taxes along with title and registration fees. Due to this, the state gas tax seems high for the Midwest, but because other states utilize additional funding sources, such as, their general fund and wheel taxes, the overall transportation costs per driver in Wisconsin is much lower than surrounding states (see Figure 4).

FIGURE 4: MIDWEST TRANSPORTATION REVENUE SOURCES/FUNDING



PUBLIC SAFETY

A total of 2,836 people died on Wisconsin highways from 2013 through 2017. There were 613 traffic fatalities in 2017. This appears to be in an upward trend since 2014 when 506 fatalities occurred. Wisconsin’s traffic fatality rate of 0.94 fatalities per 100 million vehicle miles of travel is lower than the national average of 1.16. However, the fatality rate on the state’s rural non-interstate roads of 1.38 fatalities per 100 million miles of travel is more than twice the national average of 0.63.

Traffic crashes also impose a tremendous economic cost to Wisconsin. In 2016 alone, the cost resulting from traffic crashes in which roadway features were likely a contributing factor totaled \$1.8 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 2 below represents the average fatalities and cost per driver between 2014 and 2016.

TABLE 2: 2014-2016 FATALITIES/COSTS

Location	Average Fatalities 2014-2016	Safety Cost
Eau Claire	11	\$ 257
Green Bay-Appleton-Oshkosh	38	\$ 277
Madison	32	\$ 244
Milwaukee	74	\$ 311
Wausau	11	\$ 325
Wisconsin Statewide	560	\$1.8 Billion

OPERATION AND MAINTENANCE

In Wisconsin, while municipalities maintain the local transportation network, the Wisconsin County Highway Association (WCHA) has a unique relationship with the WisDOT in that WisDOT contracts with the county highway departments to perform much of the maintenance of the state highway system.

Performance based Maintenance (PbM) contracts are utilized to seal coat and crack fill the state highways, while also allowing the county highway departments to maintain the shoulders as well as perform bridge maintenance. Additionally, Routine Maintenance Agreements (RMA’s) are utilized for mowing and controlling invasive species & brush along the roadsides, while Traffic Maintenance Agreements (TMA’s) are used to maintain roadway signs and pavement markings.

During Winter operations, salt brine is being utilized more and more in order to anti-ice, pre-wet (salt), and de-ice. In fact, some county highway departments are implementing liquid-only plow routes. Doing so cuts down on salt use which in turn is better for the environment and reduces Winter maintenance costs.

WisDOT has been trying to maintain pavements in good to fair condition by implementing a pavement preservation initiative utilizing pulverizing, milling, and overlay techniques. However, while highway maintenance allocations increased by 1.7% in 2020, they still fall nearly 26% short of the demand generated by the level of service model.

INNOVATION AND RESILIENCE

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

- The Division of Transportation Systems Development (DTSD) has developed a program to foster innovative ideas in the areas of construction management, design development, data collection, maintenance, and asset management. Their success has won an award from the FHWA as part of their “Every Day Counts” program. Some of their implemented innovations have included field use of iPads for CEI and bridge inspections, continual movement to a paperless environment, and expanded use of Infracore to name a few.
- 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; providing consistent marking can enhance motorist safety and will result in the most efficient usage 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 that 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 with many resulting in fatalities. This results in billions of dollars of increased expenses to motorists due to lost time, repairs to vehicles and health care costs. Steps can be taken to remedy some of these issues such as the following:

- **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.**
- **Create an integrated multi-modal transportation system, especially in urban areas, to help improve congestion and provide more transportation opportunities.**
- **Increase the federal government investment while pursuing a more efficient and sustainable funding system at the State level.**
- **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. Wisconsin's maintenance spending per lane-mile is relatively low, while capital and administrative spending per lane-mile are quite high.**



ROADS



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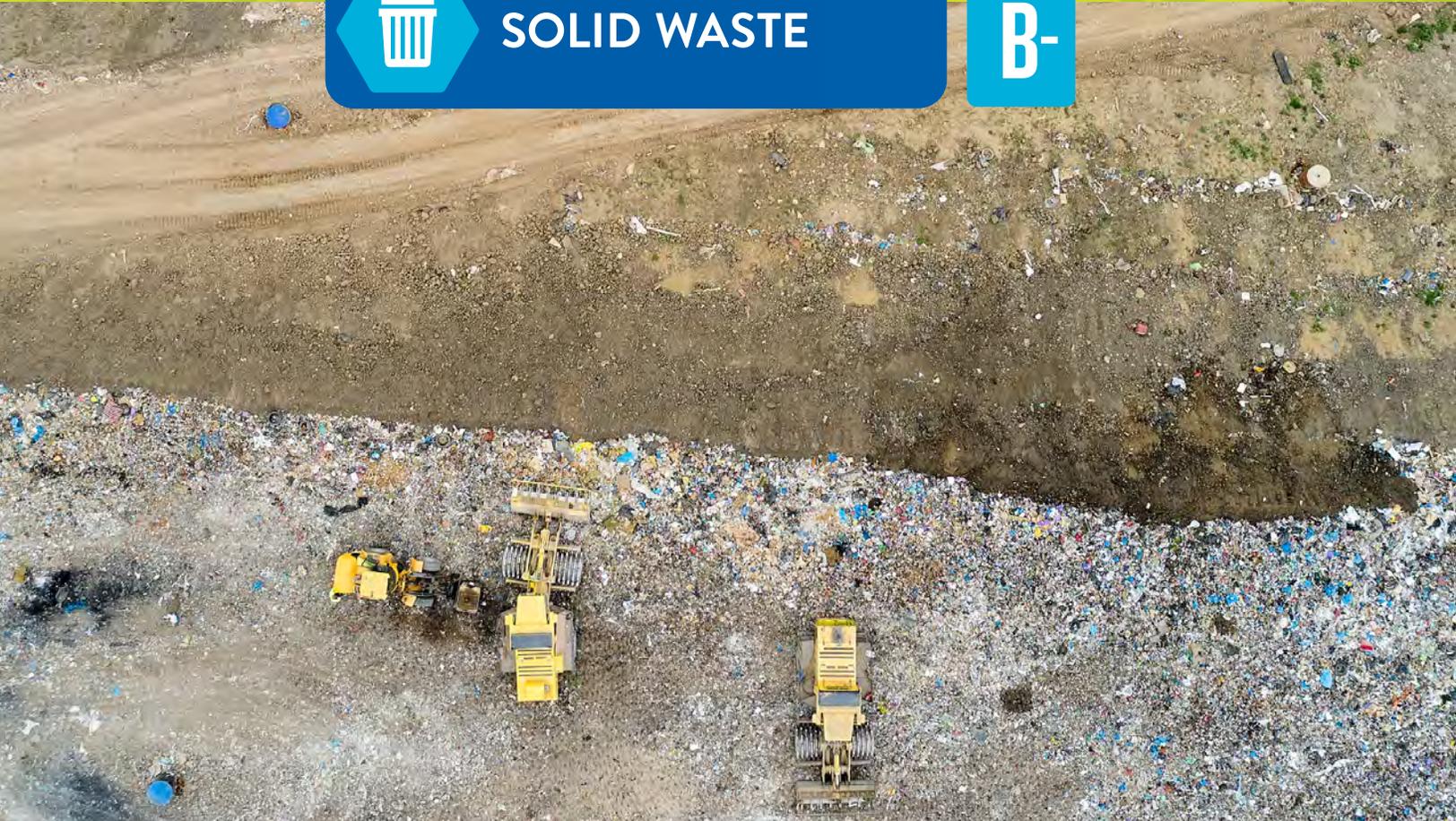
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SOLID WASTE



SOLID WASTE

GRADE: B-

EXECUTIVE SUMMARY

Municipal solid waste is generated by Wisconsin households, businesses, and other institutions. The amount of municipal solid waste generated per person in Wisconsin is consistent with the national average rate of approximately 5 pounds per person per day. The predominant method for managing municipal solid waste in the state is landfilling. Landfills generally have sufficient capacity and are in good condition, a result of robust state regulatory oversight. Combined recycling and composting rates in the state are comparable to national averages, at approximately one-third of waste generated. Recycling programs rely on revenue from the sale of recyclables, prices of which are driven by volatile international markets that are currently at historically low values. Recycling rates have stagnated in recent years and municipal recycling programs could benefit from increased state funding. A balance between economic, social, and environmental impacts is needed for all solid waste management efforts to succeed in the future.

INTRODUCTION

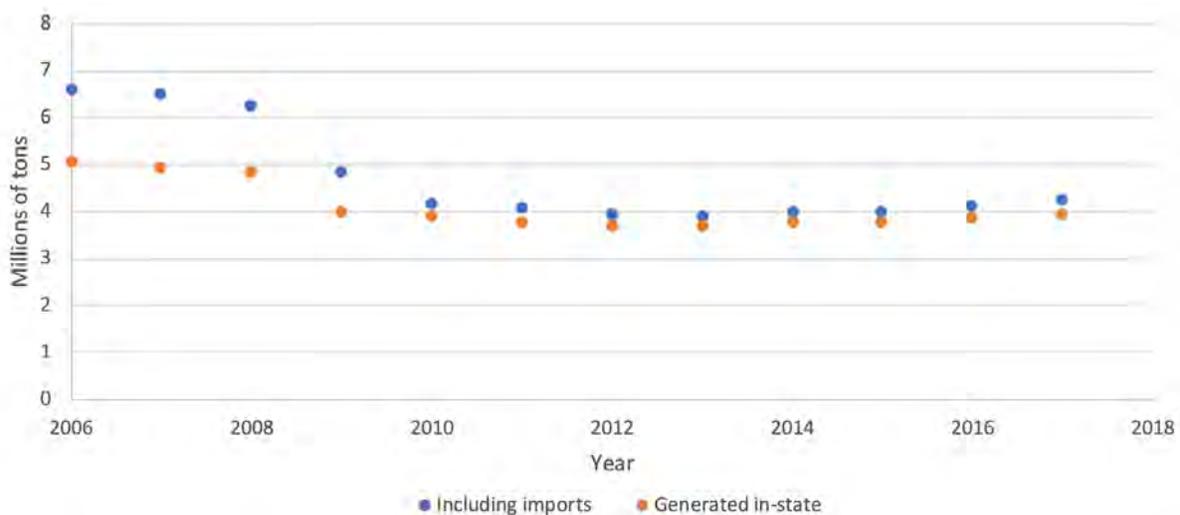
Municipal solid waste in Wisconsin includes wastes generated by households, businesses and institutions. Other categories of solid waste such as industrial process waste, construction and demolition debris, sewage sludge, air pollution control system residue and agricultural waste are not the focus of this report. The amount of municipal solid waste generated per person in Wisconsin is consistent with the national average rate of approximately 5 pounds per person per day. The predominant method for managing municipal solid waste in the state is landfilling (64% of waste generated), with the remainder being recycled and composted (33%) or incinerated with energy recovery (3%). However, the infrastructure for municipal solid waste management also includes systems for storage, collection, transfer and transportation. Less “visible” aspects of this infrastructure are laws and regulations, regulatory agencies, market conditions, and planning activities. A hierarchy exists for preferable solid waste management: 1) reduce waste production at the source, 2) reuse waste products if possible, 3) recycle the maximum amount feasible, 4) obtain energy from the waste, and 5) dispose of waste in landfills. The solid waste infrastructure of Wisconsin is a complex system involving both public and private entities.

CONDITION AND CAPACITY

Landfills in Wisconsin are generally in good condition as a result of robust state regulatory oversight. Landfill facilities that are currently in operation are regulated by state-issued permits that require landfills to be constructed with liners to prevent groundwater contamination, leachate collection systems to manage landfill leachate (liquid), gas extraction and treatment systems, as well as groundwater monitoring. Increased regulation and economic pressures have resulted in fewer, but larger and more advanced landfills across the state.

Landfill capacity in the state is sufficient. The development of new landfill capacity (volume) is driven primarily by market forces. Recent increases in capacity have been accomplished primarily through the expansion of existing landfills. No “greenfield” landfills (new sites that are not adjacent to existing facilities) have been constructed in the state since 1996. Out-of-state municipal solid waste quantities landfilled in Wisconsin have dramatically decreased from 1.4 million tons in 2008 to 270,000 tons in 2017, driven largely by the imposition of a tipping fee surcharge of \$13 per ton in 2009 on all wastes disposed in Wisconsin landfills. Since 2013 the amount of waste landfilled in the state has increased (Figure 1) likely in response to a relatively strong economy following the 2008-2010 recession.

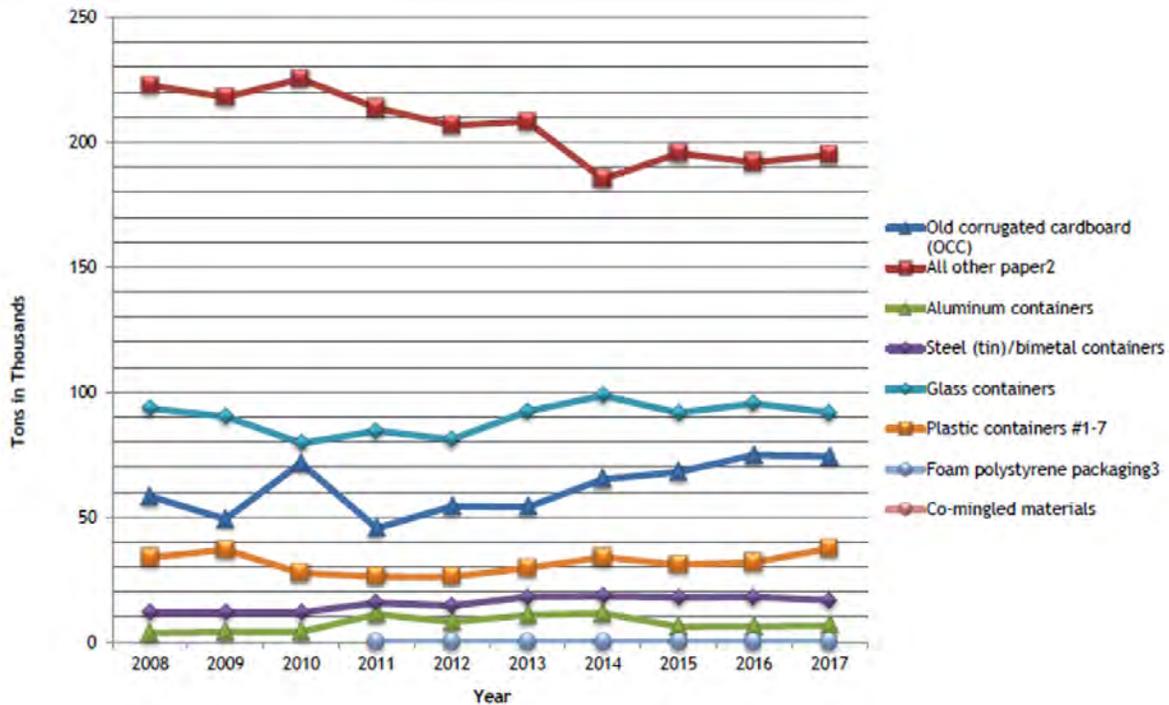
FIGURE 1: MUNICIPAL SOLID WASTE LANDFILLED IN WISCONSIN



Source WDNR Landfill Tonnage and Out of State Waste Reports.

The tonnage of various recyclables collected by communities has been relatively constant over the last ten years, with the exception of paper which has steadily decreased and cardboard which has increased (Figure 2).

FIGURE 2: TONNAGE OF RECYCLED COMMODITIES COLLECTED IN WISCONSIN COMMUNITIES



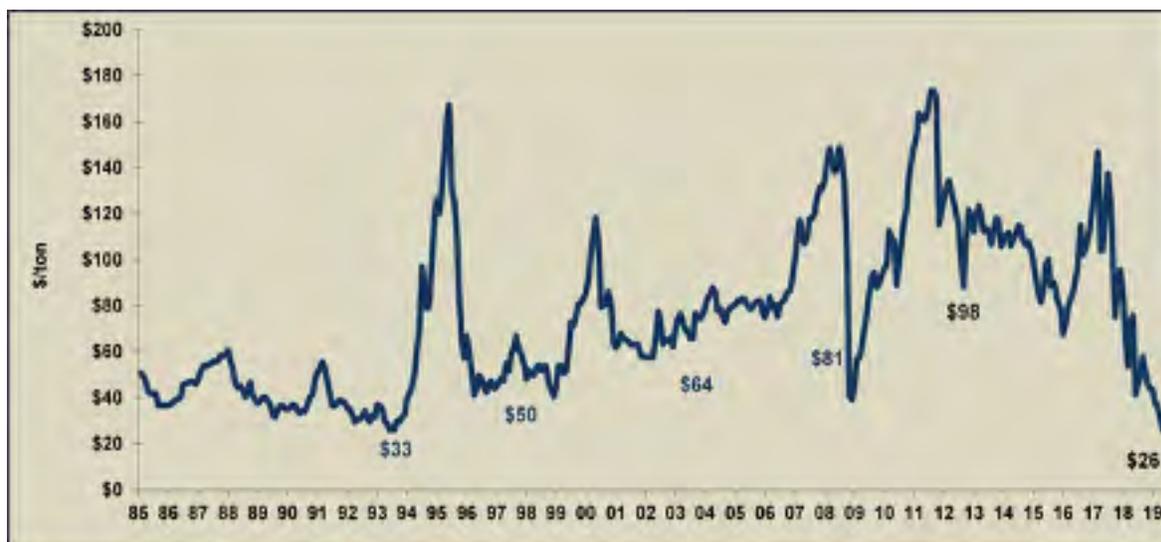
Source: WI DNR Bureau of Waste and Materials Management.

FUNDING

Unlike the state or federal allocations that fund other infrastructure sectors, funding for solid waste facilities and programs is primarily driven by the market values of materials being produced. Both publicly and privately-owned facilities and operations are managed to balance revenues and expenses at either a local, county or regional scale. Landfill operations derive revenue from disposal tipping fees and in some cases the sale of energy obtained from landfill gas.

While landfilling is primarily a regional enterprise, recycling oftentimes operates on an international stage. Nearly one-third of the nation’s recycled materials are processed overseas. Recycling markets have historically been volatile, which presents significant challenges for this sector (Figure 3). Recent changes in international markets have dramatically reduced demand, and subsequently market prices for recycled materials. The composite value of a ton of mixed municipal recyclables has fallen from \$70 - \$90 in 2017 to \$30 - \$50 in 2019.

FIGURE 3: HISTORICAL VARIATIONS IN AVERAGE PRICE FOR CURBSIDE RECYCLABLES



Source: Sound Resource Management Group. <http://zerowaste.com/recycling-markets/>

Wisconsin law bans landfilling or incinerating many components of the municipal solid waste stream. Examples include lead batteries, #1 and #2 plastics, office paper, aluminum containers, glass, appliances, and electronics. Recycling rates for these components are variable and generally consistent with national averages. Collection, processing and transportation of these recycled components may cost more than revenues generated from the sale of the recycled items, especially when market values decrease. A \$13 per ton surcharge on landfilled waste in Wisconsin provides funding to support several waste management programs. Recycling programs in Wisconsin receive approximately \$20 million annually from this fund.

FUTURE NEED

As stated above, permitted landfill and recycling capacity in the state is driven largely by local and regional demands. The market volatility for recycled materials is expected to pose ongoing challenges to recycling success. However, recycling markets are not solely a state issue because of the national and international scale of markets.

Electronic wastes (e-wastes) are a growing concern resulting from the increased use of personal devices and sensors for “smart” homes, businesses and industries. While e-wastes are banned from landfills, the collection and recycling of these items remains challenging for a variety of logistical and economic reasons.

Alternatives to landfilling are local and regional decisions. If continued expansion of landfill capacity is not desired, alternatives must be evaluated and long-term management plans must be developed.

OPERATIONS AND MAINTENANCE

The operations and maintenance of solid waste facilities are subject to oversight by state regulatory agencies requiring reporting and site inspections. All municipal solid waste landfills are inspected by Department of Natural Resources (DNR) engineers twice per year. There is a high level of compliance with landfill code requirements, and the DNR has the authority to take enforcement actions to bring a site into compliance.

PUBLIC SAFETY

Unlike the unregulated and unlined landfills of the past, current landfills protect public safety due to design requirements for liners and leachate removal. Monitoring requirements for groundwater and air quality provide an additional measure of safety.

RESILIENCE

A diversified statewide municipal solid waste management system comprised of both public and private facilities is less susceptible to disruption because the robust system enables efficient communication among stakeholders and provides various options for end users.

Possible areas having an ongoing effect on the state's level of resilience include the recycling system's dependence on the ever-changing international markets, and the future challenges posed by emerging contaminants such as PFAS within leachate and the incoming waste stream.

INNOVATION

The practical lifespan of a new landfill cell is 10 - 15 years, a value that differs from much of the rest of the state's infrastructure portfolio with design lives of 50 years or more. This relatively short lifespan facilitates a continuous evolution of designs for new landfill cells which utilize state-of-the-art technologies. Other innovations are market driven, such as technological improvements for separating and sorting mixed recyclables, or locally driven solutions such as food waste collection and composting.

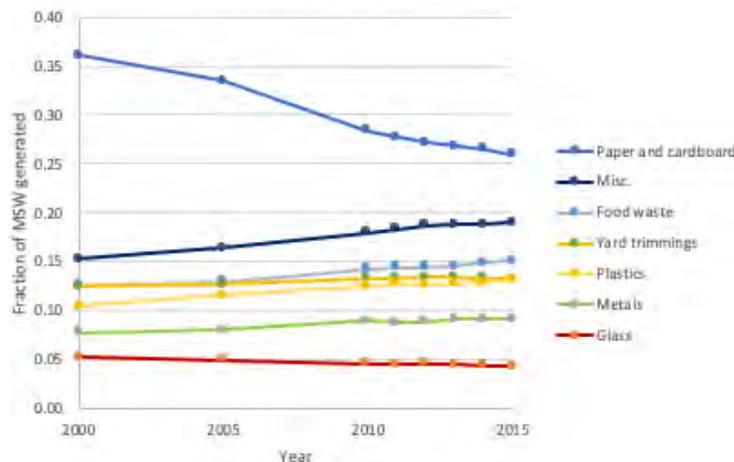


RECOMMENDATIONS TO RAISE THE GRADE

The complex and diverse nature of wastes, waste generators and waste management options, coupled with a mixture of public and private involvement presents significant challenges to gathering reliable data. Wisconsin should increase efforts to collect, analyze and openly distribute key municipal solid waste statistics (waste generated per person, recycling as a percentage of waste generated, and waste disposition (percentage that is landfilled, recycled, composted and combusted)) following the US Environmental Protection Agency ‘Facts and Figures’ approach. This data is needed to educate the public, track progress and shape future decisions.

The state should perform a statewide waste characterization study to follow up on previous studies in 2000, 2003 and 2009. Waste composition is rapidly changing in the US (Figure 4). Future waste management diversion decisions require knowledge of composition since various components of the waste stream are candidates for different management options (e.g. composting, recycling).

FIGURE 4: CHANGES IN THE COMPOSITION OF MUNICIPAL SOLID WASTE IN THE US SINCE 2000.



Source: EPA Materials Generated in the U.S. Municipal Waste Stream, 1960 to 2015



RECOMMENDATIONS TO RAISE THE GRADE (CONT.)

Municipal and County Recycling Grant appropriations in the state have remained at approximately \$20 million annually since 2012. This level of funding is less than the approximate \$30 million appropriated annually from the mid-1990s through 2010. Recycling programs are experiencing declining revenues due to decreased market value of recyclables. These trends, coupled with increased expenditures for collection and processing, indicate that recycling programs would benefit from increased program funding.

Waste reduction efforts by all generators (residential, commercial, institutional and industrial) will result in less stress on the overall infrastructure and less impact on the environment. Reduction is at the top of the waste management hierarchy. If waste is not generated, it does not require management.

Combined recycling and composting rates in the state have stagnated for several years at an estimated rate of approximately one-third of total waste generated which is consistent with national averages. Continued efforts to increase the collection efficiency of recyclable materials (especially those with higher market values such as aluminum containers and #1 and #2 plastics) and to avoid landfilling such materials will provide many benefits. The estimated value of disposed (i.e. non-recycled) recyclables exceeds \$100 million annually. It is estimated that less than one-half of many easily recyclable items such as aluminum cans, plastic bottles and steel cans are actually recycled. The establishment of state and/or local recycling goals is encouraged.

Solid waste management infrastructure is largely market driven. As such, decisions are most often made on an economic basis. Increasingly, the desire for sustainable solutions requires an evaluation of economic, environmental and social impacts—often termed the triple bottom line. A balance between these three factors is needed to proceed with sustainable solid waste management in the future.



SOLID WASTE



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STORMWATER



STORMWATER GRADE: C

EXECUTIVE SUMMARY

Stormwater runoff and the subsequent effect of its volume, intensity, and associated pollutant loading continues to challenge Wisconsinites and our way of life. Wisconsin is home to 15,000 inland lakes and impoundments, 53,000 streams, about 200 miles of boundaries on the Mississippi River, nearly 2,700 miles of trout streams, and more than 1,000 miles of Great Lakes coastline including 192 coast beach miles. The quality of these natural resources depends, in large part, on the state's stormwater infrastructure. Presently, 120 Wisconsin municipalities have implemented stormwater utilities to fund their local stormwater programs. Annual utilities generally collect between \$10 and \$150 per year on average from single family homes, with the average payment approximately \$60 per year. Bolstering funding levels of these municipal stormwater utilities is also key to improving our grade. Adequate funding through utilities, grants, and other programs, and effective use of those funds is critical towards the success of all systems. Additionally, the state should closely rate and monitor the condition of natural waterways and utilize data and research to budget effectively and efficiently.

INTRODUCTION

Stormwater runoff is rain and melting snow that flows off building rooftops, driveways, lawns, streets, parking lots, construction sites, and industrial facilities. Urban and Suburban centers areas have a high density of buildings and pavement which prevent water from soaking into the ground. Storm sewer systems are used to collect runoff and safely convey it away from streets, parking lots, and other infrastructure. This stormwater runoff is typically directed into nearby waterways. Historically, this runoff was combined with the effluent water from indoor plumbing systems.

Wisconsin is the home to an excess of 15,000 inland lakes and impoundments, over 53,000 streams and rivers totaling more than 88,000 stream/river miles. Wisconsin boasts approximately 200 miles of boundaries on the Mississippi River, nearly 2,700 miles of trout streams, and over 1,000 miles of Great Lakes coastline including 192 coast beach miles. Furthermore, the Horicon Marsh is the largest freshwater marsh in the United States and has been formally recognized by the United Nations as a Wetland of International Importance. The quality of these natural resources depend, in large part, on the state's stormwater infrastructure.

CAPACITY AND CONDITION

The current capacity of Wisconsin's stormwater infrastructure can be separated into two important components: **quantity** and **quality**.

The **quantity** component is a measure of the amount of runoff; it is used to design safe and efficient conveyance away from its source without damaging surrounding infrastructure. In addition, the condition and capacity of the state's stormwater infrastructure governs how quickly the runoff is released so that natural waterways and constructed drainageways are not overwhelmed with unnaturally large flow rates. Insufficient condition and/or capacity leading to larger volumes and flow rates of stormwater can cause erosion and degradation of rivers, lakes, streams, and wetlands. This devastation can have serious impacts on fishing, waterfowl, and other recreational uses that are critical to Wisconsin environmental health and tourism. Stormwater discharges also impose possible threats to public safety.

Stormwater **quality** is a measure of the amount of pollutants in the water. Stormwater runoff picks up and carries a vast array of chemicals, heavy metals, and other pollutants that can cause serious and lasting damage to our waterways and surrounding ecosystems. Since 2010, the Clean Water Act requires states to publish a list of all waters that are not meeting prescribed water quality standards. The Wisconsin Department of Natural Resources (WDNR) rates our waterways on the scale of 1-5 with 1 and 2 being healthy waters and 4 and 5 being impaired either with or without a cleanup plan. In the most recent 2018 assessment, the majority (82%) of assessed waterbodies in the state are healthy with the remaining 18% assessed as impaired.

Most of the municipalities across Wisconsin have fully implemented sewer separation programs. However, there is little publicly available information on the age of these systems. Wisconsin has the potential to release tens of thousands of gallons of untreated wastewater directly into Lake Michigan and/or Lake Superior for a single major rain event, if the capacity of the combined sewer overflows (CSO) mitigation facilities is insufficient to store and treat the volume of water.

OPERATION AND MAINTENANCE

The most economical way to treat stormwater runoff is at the source. As communities continue to grow in population, develop, and re-develop, updated regulations and public outreach must put the onus of good stewardship on individual property owners. As businesses construct new facilities on previously un-developed properties, local regulation requires those developers to implement proper stormwater best management practices (BMP's) to mitigate the effects of added impervious surfaces. As property is re-developed into newer, improved facilities, similar regulation requires that those stormwater facilities be added or updated to meet current regulation. Private homeowners in urban and suburban centers are encouraged to mitigate runoff volume with small scale best management practices (BMP's), such as rain barrels, rain gardens, and disconnecting downspouts from storm sewers and draining these roofs connections to open, pervious areas whenever practicable. It is *imperative* for owners of these systems to implement the proper care and effort needed to upkeep to ensure their proper function and long-term service life. Many municipalities require certified inspection on a regular basis of these private systems to ensure these BMP's are functioning adequately and designed.

Beyond these frontline systems are municipally owned and operated stormwater systems. Typically, these facilities are owned and operated by a city, town, village, or county with the use of public funds through fees. Since the 1990's, many of these municipal units are regulated under the Wisconsin MS4 (Municipal Separate Storm Sewer System) program per Wis. Adm. Code NR 216. As of December 2017, there were over 244 municipalities regulated under an MS4 permit. Under this program, many regional facilities such as large-scale retention ponds, bio-filtration basins, and underground storage/treatment systems are implemented and maintained. Wisconsin is unique in that it requires MS4 permittees to meet a pollutant reduction standard as part of their performance requirements. From Algoma to Windsor, and everywhere in between, it is everyone's responsibility to clean up our waterways. The smaller upstream systems mitigate the burden on these downstream systems from both a volume of runoff and its associated pollutant loads.

RESILIENCE AND INNOVATION

Wisconsin is one of the states that is leading the charge in innovation towards a more sustainable, resilient stormwater infrastructure. There are many research initiatives in place at local colleges and universities seeking solutions to some of the state's most challenging stormwater issues. The University of Wisconsin – Milwaukee is exploring the potential uses and implications of real-time controls to increase systems capacity. Several municipalities are engaging with the public with leaf management programs to mitigate phosphorous loading that can cause algae blooms and other waterway impairments. In like manner, public engagement is critical regarding mitigation of chloride loading through road de-icing. The Wisconsin Salt Wise Organization in conjunction with Streets and Highway Departments are utilizing brines, pre-wetting, and updating tools and equipment to apply no more deicing agents than necessary to ensure safe travel conditions. Wisconsin has even given rise to stormwater consortiums bringing together champions motivated to find, share, and implement innovative and effective stormwater infrastructure.

FUNDING AND FUTURE NEED

With any infrastructure improvement, programs must designate and adhere to a budget. Beginning in 1998, 120 Wisconsin municipalities have implemented stormwater utilities to fund their local stormwater programs. Annual utilities garner anywhere from \$10-\$150 per parcel per year with an average single family home payment at \$60 per year. These rates are typically assessed based on annual municipal stormwater budgets against any property's amount of impervious area. Any owner can fund, design, and install the most effective BMP's in the world, but if it is *not maintained*, sooner or later those systems will cease to perform in their ability to properly manage quantity and improve quality of stormwater runoff. The neglect of these systems can temporarily alleviate maintenance cost burdens but can cause significantly higher cost when those systems require full re-habilitation, re-construction, or full replacement.

While a state-wide database of information for Wisconsin's stormwater systems does not exist, details are available for several major systems. One example includes the Milwaukee Deep Tunnel, which is beginning to show some significant needs for maintenance and re-habilitation after 25 years of active operation. Regional systems of a similar service life will need significant funding for capital improvements, re-habilitation, or replacement in the very near future. The collection of data pertaining to budgetary needs should be quantified at the local level to report to the state any potential budget shortfalls. Adequate funding through utilities, grants, and other programs, and effective use of those funds is critical towards the success of all systems.





RECOMMENDATIONS TO RAISE THE GRADE

Wisconsin should take the following steps to raise the stormwater grade:

- **Further engage with Wisconsinites through multiple digital media platforms to raise awareness of their impact on stormwater through de-icing, downspout disconnection, and other avenues to improve quality and quantity of our runoff.**
- **Bolster the funding level of municipal stormwater utilities to allow for more sustainable management of our regional BMP's across Wisconsin.**
- **Continue to closely rate and monitor the condition of our natural waterways through condition reports, TMDL studies, and MS4 reports.**
- **Garner data and quantify current budget utilization and forecast for future needs.**



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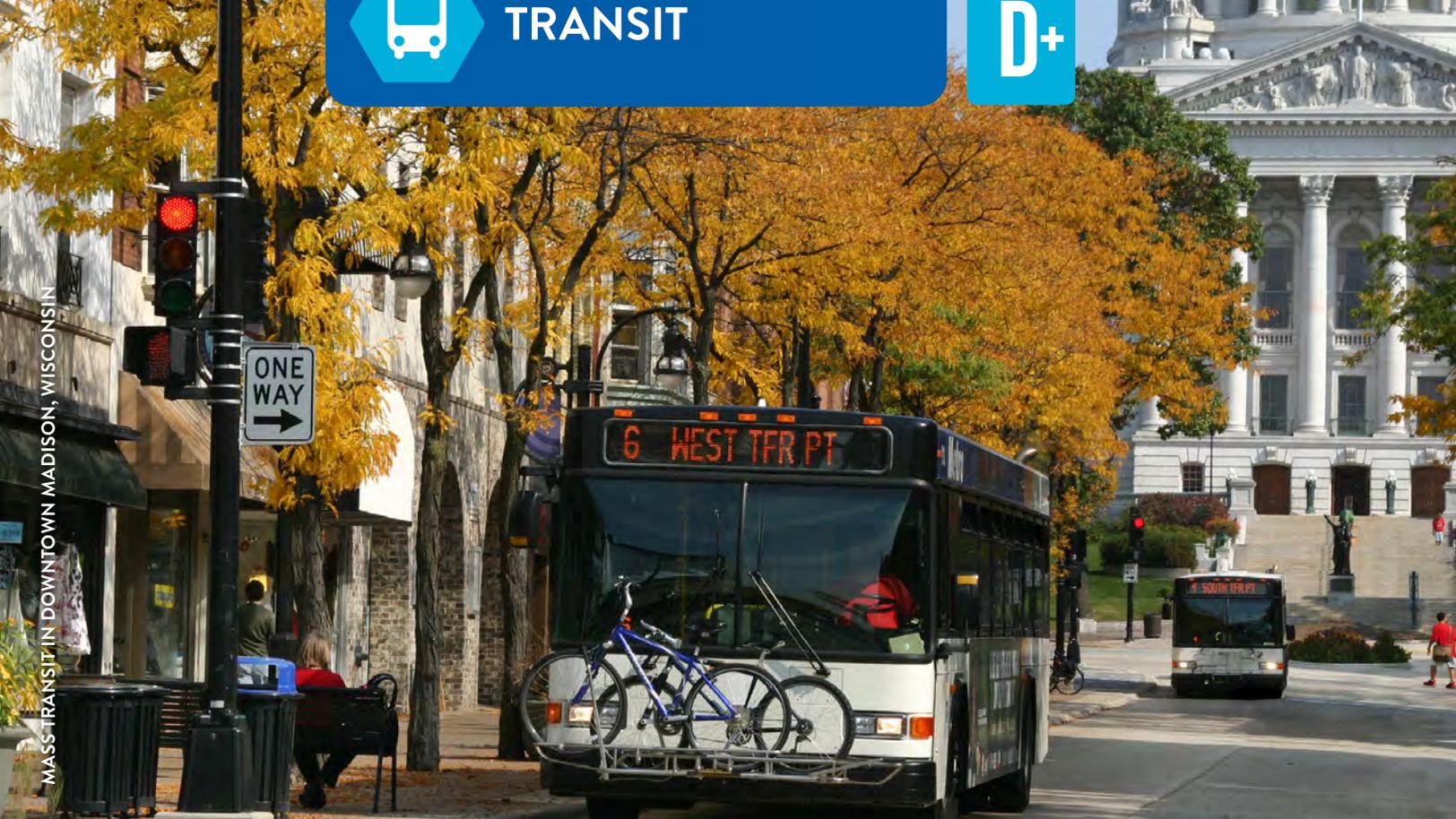
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TRANSIT



MASS TRANSIT IN DOWNTOWN MADISON, WISCONSIN



TRANSIT GRADE: D+

EXECUTIVE SUMMARY

Efficient transit service is a major component of a multi-modal transportation system and a key to public safety, commerce, and easing traffic congestion. In Wisconsin, transit takes on many forms ranging from urban fixed route bus transit systems to rural taxi service. For many, that means alternative means of transportation to work, school, and recreation, filling a critical transportation need for transit-dependent people. Unfortunately, funding challenges from federal, state, and local entities present public transit systems in Wisconsin with tremendous financial hurdles to overcome. Improving our transit begins with Congress reauthorizing the Federal Surface Transportation Program, including creating a stable source of federal funding through an improved Highway Trust Fund. The state needs to provide an increased, dedicated source of transportation funds to defray local transit costs and ease the property tax burden on Wisconsin residents. Additional measures must be taken to improve the low transit grade which includes incorporating transit initiatives into land use and transportation planning, including high-speed bus and rail corridors, and creating regional transit authorities.

CONDITION AND CAPACITY

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 bodies. Map 1 depicts Wisconsin’s Public Transit Systems.

Two large bus transit systems are operated in Milwaukee and Madison, while medium and small bus transit systems are provided in 26 communities across Wisconsin. Eight public intercity bus routes are operated statewide. Shared-ride taxi service, a specialized transit service where public shared ride services are arranged by local jurisdictions through private taxi companies, is provided in 45 small communities. Additional demand responsive services are provided to support the mobility needs of seniors and individuals with disabilities.

Interstate and intercity rail transportation is operated by Amtrak between Milwaukee and Chicago via their Hiawatha Service, and in the Chicago to Portland/Seattle corridor through Milwaukee and Minneapolis via their Empire Builder Service. Additionally, commuter rail service is provided from Kenosha to Chicago by METRA Rail. Connector streetcar service includes the Kenosha Transit Electric Streetcar operated by the City of Kenosha, and The Hop operated by the City of Milwaukee.

Statewide, intercity service is provided by Wisconsin Department of Transportation (WisDOT), and by 11 private service providers. Ferry service is provided at five locations statewide.

Public transit connects people to a variety of destinations, the primary purpose of which is for work. Other trips are made for education, shopping, tourism, recreation and medical reasons.

WISCONSIN PUBLIC TRANSIT SYSTEMS 2020



Transit also meets a critical need for riders who cannot afford or are unable to drive, such as young, elderly, disabled, and low income individuals. WisDOT has established a goal of 55% of statewide population being served by transit. While service coverage reached 56% statewide in 2016, it decreased to 54% in 2018, due in part to decreased number of routes and service areas for several urban fixed-route systems.

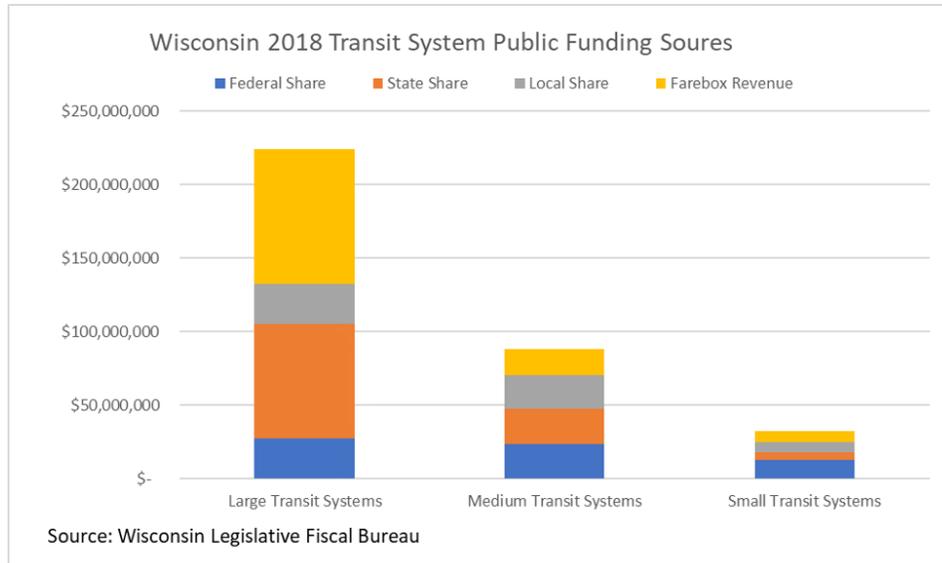
Nationally, transit ridership peaked in 2014 before dropping 6.4% by 2017. Bus ridership on four of the largest transit systems in Wisconsin, including Green Bay Metro, Madison Metro Transit, the Milwaukee County Transit System, and Racine's Belle Urban Systems all dropped at least twice as fast as the national average. A slight increase was seen by the Kenosha area transit system. Most noteworthy, from 2014 to 2016, total transit trips decreased 17.3% in Milwaukee and Madison, as compared to a reduction of 10.1% on other medium and small systems. In 2016, total trips in Milwaukee and Madison totaled 48,418,174 and 14,668,306 on medium and small systems combined. Significant reductions in ridership generate a corresponding reduction in farebox revenues. These declines put additional pressure on upward-trending transit fares needed to generate revenue to support operation. Additionally, if ridership further declines, hours and frequency of service will be impacted and routes and services to sustain system operation may be eliminated.

Maintaining the State's transit system in a State of Good Repair is essential for providing safe and reliable transit service. Transit systems statewide are facing growing backlogs of high priority capital improvement needs. Several transit vehicle fleets are reaching or exceeding the end of their useful life. Of the 866 buses in Milwaukee and Madison and eight of the other medium transit systems statewide, 197 vehicles, or 23%, exceed their useful life of 12 years. Additionally, the average age of buses exceeds the 12 year useful life in four of the eight medium systems reporting, with one agency reporting 27 of 31 vehicles over 12 years of age. Vehicles remaining in service past their useful lives result in increased maintenance expenses and decreased service dependability. Transit agencies reported a total of 8,647 mechanical failure in 2018, up from a total of 4,276 in 2017. Of these failures, a total of 4,286 major failures occurred in 2018. Continued capital investment is needed to keep vehicle replacement in line with accepted replacement guidelines, and maintain dependable transit service

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. Maintenance of other support facilities in some locations are aging or inadequate to support bus services being provided. In the State's two largest transit systems, three of the four primary maintenance, storage and parking centers include elements rated as marginal or poor. This includes a parking and storage facility in Milwaukee built in 1913 which is in poor condition. Other maintenance, operation and storage facilities in medium and small systems have also been reported as aging or inadequate to support bus services being provided.

OPERATION AND MAINTENANCE, FUNDING AND FUTURE NEED

Funding sources for transit system capital and operating costs are provided through a combination of federal, state, local and farebox revenues. In 2018, Wisconsin received over \$88 million in federal aid through various grant programs. The local funding share of costs are provided primarily through the local property tax levy. In 2018, local funding and farebox revenues provided a total of 50% of all funding for transit operation. This represents the highest proportion of local funding needed to support transit service over the past 10 years.

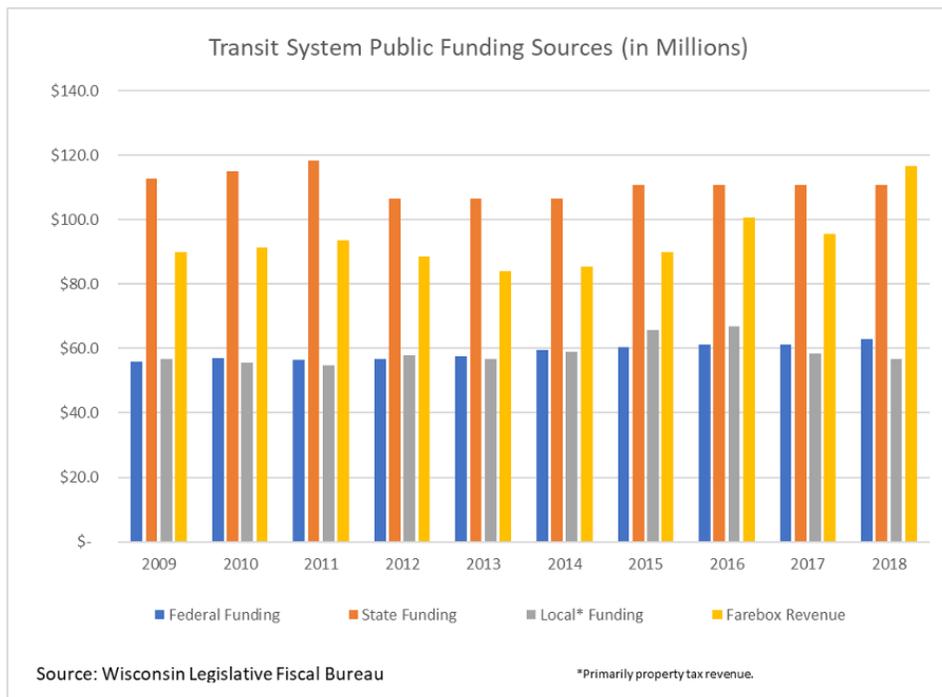


Federal capital assistance is critical to support transit investment in Wisconsin. Most of Wisconsin’s transit systems rely on state and federal funding for capital needs, including vehicles, facilities, equipment and new technology. Since local funding for capital improvements is provided primarily through property tax levies with limits placed on levy increases by state law, transit improvements must compete with other local funding needs and priorities. Reductions in federal capital funding since 2012 now jeopardize transit systems’ ability to provide safe, dependable and cost-effective services. If transit becomes unreliable, fewer people will continue to use it, resulting in lost support from fares, service reductions, and less investment over time in the system. It could then also reduce the availability of transportation options for transit dependent people.

The federal formula-based Bus and Bus Facilities grant program included in the Federal FAST Act only provides \$6.35 million to Wisconsin for capital improvements. As an additional option available for federal transit funding, WisDOT has applied for federal discretionary grants made available in 2016, 2017 and 2018 for urban and rural systems. While awards to Wisconsin have increased annually during this period, a total of \$53 million in discretionary funding was requested in 2018, but only \$17 million in awards were made, leaving an unmet need of \$36 million in projects to be funded under this program alone.

The nation’s current surface transportation program which authorized federal transportation programs for fiscal years 2016 through 2020 will expire on September 30, 2020. Congress will need to reauthorize that program by that time. Reauthorization should include fixing the Highway Trust Fund which is approaching insolvency to provide a consistent and stable source of funding to address current funding shortfalls and future program needs.

Public transit systems in Wisconsin generally provide transportation services in an efficient manner based on operating costs, hours of service, and passenger demand when compared to performance of similar nationwide and statewide systems. Therefore, transit providers do make effective use of available funding.



In 2011, the Wisconsin Legislature reduced 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. While increasing by 4% in 2015, the state aid percentage of total operating costs fell from a 10 year high of 36.6% in 2011 to 31.9% in 2018. In that year, 16.4% of operating costs were provided by local funding, and farebox revenues reached a high of 33.6%. This change is resulting in less frequent service, reduced hours of operation, less accessibility to jobs, and, in some cases, complete elimination of service to areas of low ridership. These affects are also being felt throughout rural areas.

In 2020, a 2% increase for public transit operating assistance has been provided in the Wisconsin 2019-2021 biennium budget. However, further increases in state aids and restoration of other funding mechanisms for local and regional agencies would provide needed revenue.

PUBLIC SAFETY

Nationally, transit continues to provide one of the safest options available for travel. In 2017, transit agencies across the country reported just 13 passenger fatalities across 10.1 billion passenger trips. During that same year, 37,133 motor vehicle deaths were reported nationally.

In Wisconsin, no motor bus, coach or school bus passenger fatalities occurred from 2016 to 2018. Total fatalities in traffic crashes during this 3 year period were 1,758 people killed, including 161 pedestrian and 22 bicyclist fatalities.

Driver and passenger safety and security has been enhanced through equipment installed on transit vehicles. Many buses are equipped with two way radios. On the two large transit systems in Wisconsin, buses are equipped with automatic vehicle locator systems. The Milwaukee County Transit System has also equipped buses with interior and exterior facing cameras.

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. This can be achieved in part by creating efficiencies in hours of service, lower headways, and travel time improvements. Reductions in traffic demand generated by an effective transit system will minimize traffic congestion, reduce fuel consumption and vehicle emissions, and improve safety and efficiency.

The implementation of Regional Transportation Authorities would allow for the development of more complete and vibrant transit systems providing services extending beyond current jurisdictional boundaries. In addition to a dedicated source of funding, these expanded systems would also support development of alternative connections between potential workforce and employment centers, and access to commercial centers, currently not available. Regional Transportation Authorities can be created by action of the Wisconsin Legislature. However, none currently exist.

Implementation of rapid bus transit, express bus services and high-speed rail within congested travel corridors can reduce vehicular travel demand on heavily congested roadways, improve safety, and minimize the need for further highway system expansion. Rapid bus transit systems are currently being advanced in highly congested travel corridors in the Milwaukee and Madison areas. Additionally, express transit service is being used by transit agencies statewide for work and school trips to reduce transit travel times, making transit service more attractive for those trip purposes. However, in 2010, the State of Wisconsin dropped grant funding approving the development of high speed rail service between Milwaukee and Madison under the American Reinvestment and Recovery Act.

INNOVATION

Madison Metro has been awarded a grant to purchase three battery-electric buses in 2020. Further expansion of these types of alternative fuel buses could provide alternatives to the use of fossil fuels, which will result in improved air quality.

Active traffic demand management systems have provided opportunities in several systems for communication between traffic control signals and transit vehicles, creating reductions in transit travel times. Automatic vehicle locator systems have been added in several bus systems statewide, providing real time information to passengers on the arrival of transit vehicles. This currently includes arrival time messages on signage at transit stops and stations, and real time information via web based applications for passengers.

For demand responsive services, improved software applications are being used to better plan and coordinate passenger services. These systems 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 technology, more opportunities will become available for improved vehicle to vehicle and vehicle to traffic control device communications. Improvements in communications will also provide more opportunities for implementation of advanced traveler information systems. As these technologies become available and are implemented, enhancements in transit system performance and safety can be achieved.



TRANSIT



RECOMMENDATIONS TO RAISE THE GRADE

- **Reauthorization of the Federal Surface Transportation Program, including fixing the Highway Trust Fund, to provide a stable source of Federal Funds.**
- **Provide an increased, dedicated source of funds from the state to defray local transit operating costs, stabilize fares, ease property tax burden, and restore the ability to generate supplemental funds to local jurisdictions.**
- **Incorporate transit initiatives into land use and transportation planning, including larger service areas, maximized accessibility, and linkages between jobs and supporting workforces.**
- **Include high speed bus and rail 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.**
- **Create Regional Transit Authorities to overcome barriers to multi-jurisdictional transit service areas.**

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WASTEWATER



ROUND BASSIN WHERE THE WASTED WATER IS BEING FILTERED



WASTEWATER

GRADE: C-

EXECUTIVE SUMMARY

Wisconsin's municipal wastewater utilities are facing challenges due to aging infrastructure, growth, and new wastewater discharge regulations. The estimated future needs for municipal wastewater infrastructure maintenance and upgrades for Wisconsin total \$6.3 billion. Utilities are raising rates to cover necessary costs and to combat dwindling grant funding. In Wisconsin, the average annual rate increase of nearly five percent is higher than the national average; however, the true cost of service is often still not reflective of raised rates. The highest rate increases occur in small rural communities of 1,000 to 2,000 residents. Meanwhile, approximately 25 percent of Wisconsin residents do not have access to sanitary sewers, mainly relying on on-site septic or other treatment systems. Municipalities and wastewater utilities will face significant capital costs to meet new phosphorus water quality standards for lakes, reservoirs, rivers, and streams. Collection and treatment systems are seeing the impacts of increased inflow and infiltration from more intense and frequent storm events due to climate change. Anticipated new regulatory requirements for previously undiscovered compounds like Per- and Polyfluoroalkyl Substances will also add to the financial burden on wastewater treatment facilities and ratepayers.

CONDITION AND CAPACITY

Aging infrastructure, population growth and new wastewater discharge limits are posing challenges to Wisconsin's municipal wastewater utilities. Wisconsin has 592 operational municipal wastewater treatment facilities and 862 operational wastewater collection systems as reported in the 2012 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 30 to 40 years old and need to be replaced or rehabilitated.

According to the CWNS, 4.3 million people in Wisconsin were served by the municipal facilities. In 2018, the state's estimated population was 5,795,483 people. Therefore, approximately 25% of Wisconsin residents do not have access to WWTPs, but mainly relying on on-site systems.

According to the Wisconsin Department of Safety and Professional Services (DSPS), Wisconsin has 756,000 septic systems inventoried. The state has no way of tracking failing systems. There has been significant attention in the last few years to areas in the eastern part of the state, particularly in the Niagara Escarpment area, that have shallow and fractured bedrock. Kewaunee County, located within the Niagara Escarpment, has over 5,300 septic systems. A study by Kewaunee County, found that 29 of 131 wells sampled (22%) tested positive for microorganisms with a human origin due to poor performance of the on-site systems. Due to the rural nature of this area, the cost to provide wastewater collection and treatment is disproportionately high.

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 inundates the capacity causing back-ups, sanitary sewer overflows, and wastewater bypasses at treatment plants. From 2015 through 2018, there were 735 reported wastewater overflow events.

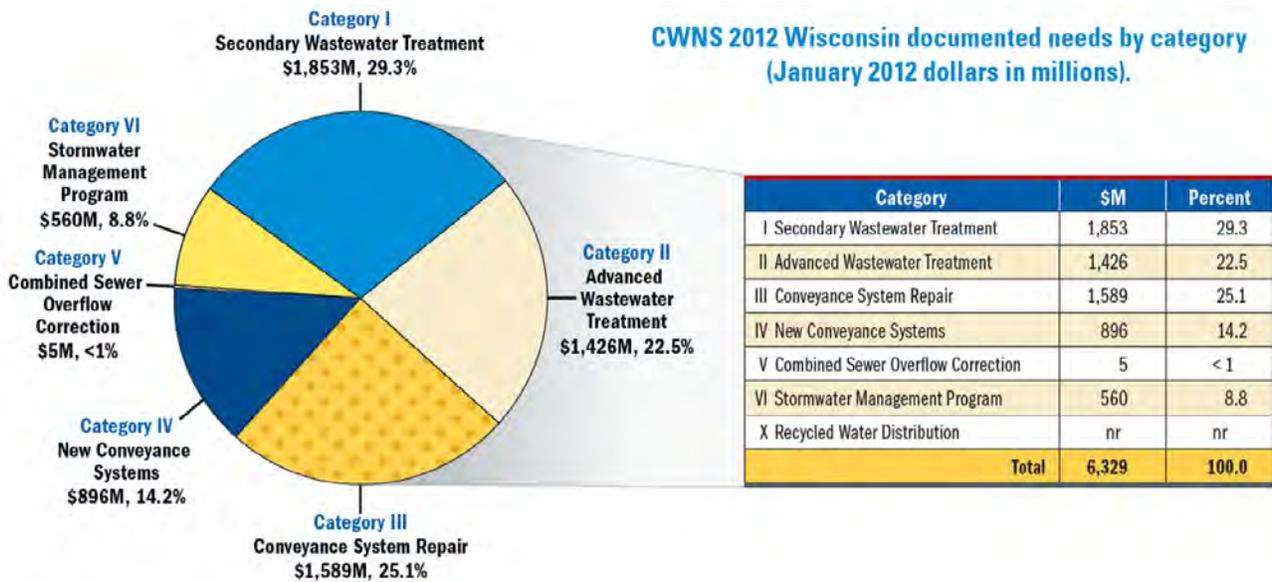
OPERATION AND MAINTENANCE

In 2016, Wisconsin Administrative Code NR 210.23 required that all owners of collection systems develop and implement a Capacity, Management, Operation and Maintenance (CMOM) Program. 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. 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. It appears that the program has helped utilities to perform more operation and maintenance activities based on the survey, but there is little data to prove this is the case. Wastewater treatment plant owners are required to submit a Compliance Maintenance Annual Report (CMAR) to DNR every year. 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. While this data is submitted electronically by permittees, according to correspondence with DNR, the data is not compiled into a centralized database. To review the CMAR data, it would require manually reviewing over 900 individual reports and recording the data.

With interest, the state's total expenditures in the wastewater sector have increased to \$2.5 billion, with an additional \$69.4 million needed annually for operation and maintenance (O&M) costs.

FUNDING AND FUTURE NEED

The 2012 EPA CWNS estimated the municipal wastewater needs for Wisconsin total \$6.3 billion. The needs are categorized and presented in the figure below.



Wisconsin funds wastewater infrastructure through local user fees and federal grants and financing mechanisms. The state's three major sources of grant funding: The United States Department of Agriculture (USDA) Rural Development Program, the Wisconsin Economic Development Corporation (WEDC) Community Development Block Grants, and the NDR 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 \$4.37 billion in loans since its inception in 1991. The state of Wisconsin is required to match 20% of the amount provided through CWF loans.

Since the beginning of the CWF program through the 2019 funding cycle, no application has been denied due to a lack of loan funds. Originally structured as a direct loan program, modifications in 2016 were made to change to a cash flow leveraging structure. In 2017, the state used \$523.7 million of funds within the EPA Clean Water State Revolving Fund (CWSRF) to purchase investments that are projected to provide \$623.3 million in revenue for the CWSRF through May 1, 2033. The funding includes a reserve for green infrastructure projects. Green funding is set aside for projects meeting green project reserve requirements and, to the extent there are sufficient eligible project applications, not less than 10% of the capitalization grant is to be used to fund these types of projects or portions of projects meeting GPR requirements.

FUNDING LIST FOR WISCONSIN'S CLEAN WATER FUND PROGRAM

State Fiscal Year	Requested Amount	Green Amount
2019	\$123,569,276	\$4,826,259
2018	\$149,231,882	\$25,622,776
2017	\$110,231,109	\$10,655,294

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.

The 2019 Survey Report includes data from 326 Wisconsin communities that operate sanitary sewer treatment and collection systems, which represents approximately 41% of the state's publicly owned collection systems.

Statewide average sewer rates have continued to increase at a rate of 4.8% per year from 1996 to 2018, a higher value than the national average of 3.9% recorded between 2017 and 2018. According to the *2018 NACWA Cost of Clean Water Index*, Wisconsin's increased sewer rates come despite a nearly 41% decrease in the average daily potable water usage since 2006, with 14% of the decrease occurring between 2015 to 2018.

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.

The Cost of Clean, 2019 Wisconsin Sewer User Charge Survey Report also showed that the average annual usage charge for wastewater service in 2018 was \$422 per year, a lower value than the annual national average of \$504. (*NACWA survey 2018; 2016 National average \$479*)

RESILIENCE

Wisconsin has seen impacts from fluctuations in storm event intensity and frequency from climate change. Annual precipitation has been above average since 2015 and wide-spread flooding occurred in 2018. Wastewater treatment facilities can be inundated from receiving groundwater and stormwater entering the collection system (I&I) during flood events. Municipalities, therefore, are urged to consider the resilience of their conveyance, collection, and treatment systems.

The state of Wisconsin recommends that all municipal staff complete a series of National Incident Management System training courses (NIMS). While these courses are currently not required by any state, county or local rules, municipal leadership should consider making these trainings a part of their onboarding process; emergency awareness and planning should be incorporated into intermittent training for effective response preparedness.

INNOVATION

In December 2010, Wisconsin became one of the first states in the country to adopt phosphorus water quality standards for lakes, reservoirs, rivers, and streams to address algae growth. The standards established the highest levels of phosphorus that could be allowed in lakes, rivers and the Great Lakes. The water quality standards for phosphorus range from 0.04 to 0.1 mg/L. Prior to the rule update, the effluent phosphorus limit for wastewater treatment facilities was a technology-based limit which ranged between 1.0 to 2.0 mg/L phosphorus, unless the facility discharged less than 150 lbs. of phosphorus per month. These smaller facilities did not receive a phosphorus limit. Municipalities represent the largest affected population of permittees and will face significant capital costs of \$1.6 billion to upgrade systems to meet the new standards.

Some wastewater utilities have begun implementing more economically feasible solutions such as adaptive management or water quality trading to meet their permit requirements. The DNR recognizes adaptive management as a compliance option that allows owners of point and nonpoint sources of phosphorus to work together to improve water quality and to meet water quality standards. For example, in the Madison area, Yahara WINS, has transitioned from a four-year adaptive management pilot effort into a full-scale project that will extend over 20 years. Partnerships with local farmers, municipalities, environmental groups and others have resulted in reducing phosphorus loadings in the region through more cost-effective solutions than expensive treatment plant upgrades.

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. In their February 2019 PFAS Action Plan, the EPA announced they would make a determination on whether or not to set Maximum Contaminant Levels (MCLs) for PFOA and PFOS, individual substances within the PFAS family, a process which can take approximately three years prior to implementation.

The DNR organized a Technical Advisory Group specifically to address concerns related to PFAS. The DNR is proceeding with rule writing to update groundwater standards, and it is unknown what impact these standards will have on wastewater treatment facilities or on biosolids programs. Currently wastewater treatment systems in Wisconsin have been asked to voluntarily test for PFAS to determine what the levels are within the state. Wastewater treatment plants who have high levels of PFAS in their sludge do not currently have a standard to use for treatment and disposal of the biosolids.

Wastewater treatment plants are not the original sources and do not add or remove PFAS during the treatment process. If new regulatory standards are put in place, 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.



WASTEWATER



RECOMMENDATIONS TO RAISE THE GRADE

- **Permit holders may incur significant capital and operating expenses to achieve the water quality-based effluent criteria for phosphorus and microconstituents which are at the practical limits of current technology. Planning is necessary for the physical facilities and financial needs for achieving these limits.**
- **The potential impacts of climate change 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.**
- **Continue to support innovative approaches and regional solutions for meeting permit compliance.**
- **Support efforts for public outreach on the value of water and wastewater services and provide incentives for source reduction. Utility rates should cover the full cost of service including operation, maintenance and capital needs.**
- **The impacts and costs of microconstituents such as PFAS are currently unknown. Advocacy efforts should focus on national standards, source reduction efforts, funding for research on new technology, and phased implementation to reduce the financial burden on wastewater treatment facilities and rate payers.**



WASTEWATER



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