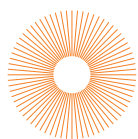


2017 Update

Climate Forward:

A New Road Map for Wisconsin's
Climate and Energy Future

An Wisconsin Initiatives Program Report of the Wisconsin Academy of Sciences, Arts & Letters



wisconsin academy
of sciences arts & letters

About the Wisconsin Academy of Sciences, Arts & Letters

The Wisconsin Academy brings people together at the intersection of the sciences, arts, and letters to inspire discovery, illuminate creative work, and foster civil dialogue on important issues. In this way, we connect Wisconsin people and ideas for a better world. Our signature publication is *Wisconsin People & Ideas*, the quarterly magazine of Wisconsin thought and culture; programs include the James Watrous Gallery in Overture Center for the Arts, which showcases contemporary art from Wisconsin; Academy Talks, a series of public lectures and discussion forums; Wisconsin Initiatives, exploring major sustainability issues and solutions; and a Fellows Program, which recognizes accomplished individuals with a lifelong commitment to intellectual discourse and public service. The Wisconsin Academy also supports the Wisconsin Poet Laureate Commission and many other endeavors that elevate Wisconsin thought and culture. For more information, visit wisconsinacademy.org.

About Our 2014 Climate Forward Report

The Wisconsin Academy of Sciences, Arts & Letters has a significant history of gathering thoughtful leaders from multiple perspectives to provide insight and shared wisdom on major challenges that affect our state and the world. In mid-2012, the Wisconsin Academy initiated a project to examine Wisconsin's climate and energy future. The fruit of this project is *Climate Forward: A New Road Map for Wisconsin's Climate and Energy Future*, a report that identifies five "pathways to progress" to reduce Wisconsin's dependence on fossil fuels, support sustainable energy sources, create jobs, and increase investment in the new 21st century economy. The report also profiles Wisconsin businesses, communities, and individuals in the vanguard of energy innovation and other sustainability practices, and outlines dozens of options for action at many scales, from establishing goals for incremental progress in improving energy efficiency across the state each year to expanding renewable energy sources such as solar, wind, and bioenergy to levels comparable to neighboring states. Learn more at wisconsinacademy.org/climateforward.

About the Climate & Energy Initiative

The Wisconsin Academy's Initiatives engage experts, stakeholders, and community leaders across diverse sectors to find solutions to statewide problems. Through the Climate & Energy Initiative, the Academy seeks to understand and address Wisconsin's role in global climate change and explore diverse, sustainable energy choices.

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Introduction

In 2012 the Wisconsin Academy of Sciences, Arts & Letters initiated a project to examine Wisconsin's climate and energy future. The Wisconsin Academy brought together thoughtful leaders with multiple perspectives to provide insight and shared wisdom on how to address Wisconsin's role in global climate change and explore diverse, sustainable energy choices for our communities. The result of this project was [*Climate Forward: A New Road Map for Wisconsin's Climate and Energy Future*](#). Published in 2014, *Climate Forward* provided an assessment of where we were three years ago along with a practical vision for how to build on Wisconsin values and our citizens' creativity and imagination to shape a future that is healthy for our environment and our economy.

The *Climate Forward: 2017 Update* summarizes progress since the *Climate Forward* report was issued in 2014. Many notable developments concerning climate and energy have unfolded during the past three years in Wisconsin, and this update acknowledges progress, flags where our state is falling behind neighboring states, and highlights emerging opportunities.

The *2017 Update* is organized around the "Pathways for Progress" sections of the original report: Conservation & Efficiency, Renewable Energy, and Transportation, as well as other identified opportunities such as Utility Leadership, Putting a Price on Carbon, and Research & Public Education. Though not an exhaustive accounting of the many recent developments in these areas, this update serves to highlight key examples that are shaping overarching trends on energy and climate change in our state.

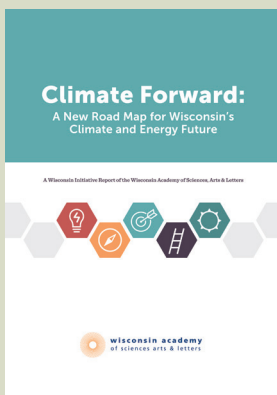
The four significant takeaways for Wisconsin concerning climate and energy over the past few years are summarized below.

- 1. Local governments are leading the way:** Municipalities, counties, and citizen-led initiatives across the state are making a difference, taking practical steps to implement energy efficiency in operations and services, weatherization projects in commercial buildings and homes that conserve energy, and renewable energy investments—particularly in rooftop solar installations and community solar arrays. These bottom-up solutions are scalable and replicable for other communities, and local governments are moving ahead—despite regulatory challenges at state and federal levels—in response to practical needs, such as keeping electrical bills down, as well as consumer interest in renewable energy.
- 2. Businesses and utilities are planning for a low carbon future:** With or without federal policies such as the (currently suspended) Clean Power Plan, many prominent Wisconsin businesses are reducing their greenhouse gas (GHG) emissions because of global marketplace trends, as well as energy cost savings. Similarly, all major Wisconsin utilities have articulated goals for reducing GHG emissions through shifting to cleaner fuels and/or increasing their capacity to generate electricity from solar or wind sources.

- 3. Solar is taking off:** As the cost of solar technologies continues to go down, new installations are mushrooming in Wisconsin, from household and commercial rooftops to urban and rural community solar arrays that serve many households. More solar energy systems were installed in Wisconsin in 2016 than in all previous years combined. Renewable energy has shifted from “alternative” to mainstream, and this trend shows no sign of slowing.
- 4. Wisconsin is falling behind our neighbors** in adopting policies and making investments that support efficiency and renewable energy, a more diversified transportation system, innovative and affordable utility models, long-term planning, and cutting-edge research and education. However, by building on the many scalable achievements across the state and capturing their momentum, Wisconsin can bolster its competitive capacity while building a just and sustainable future for its communities.

Climate Forward Resources

Today more than ever we need constructive conversations about the future of our changing climate. Through our Wisconsin Initiatives, the Wisconsin Academy hopes to provide citizens with resources and tools to help preserve and protect our people, lands, and waters.



Climate Forward Report & Web Portal

In 2014 Wisconsin Academy published *Climate Forward: A New Roadmap for Wisconsin's Climate & Energy Future*, a report that provides a practical vision for how we can build on Wisconsin values and our citizens' ingenuity to shape a future that is good for our environment and our economy. In order to increase public access to the report, we developed an interactive web portal that offers core content as well as additional resources for businesses, policy-makers, municipal and local governments, and community leaders who wish to learn more about Wisconsin's potential for a clean energy future. You can access the Wisconsin Academy's Climate Forward Web Portal and download printable PDF copies of the report at wisconsinacademy.org/climateforward.

Summary of Progress, Missed Opportunities, and New Options for Action

	Sub-Category	→ Moving Forward
CONSERVATION & EFFICIENCY	Property Assessed Clean Energy (PACE)	Commercial PACE
	Focus on Energy	Good ROI
	Building Codes	
	State Energy Policy	
RENEWABLE ENERGY	Commitment to Expanding Renewables	140+ Energy-independent Communities Madison's 100% renewable goal
	New Installations	Community solar 2016 banner year for solar First WI utility-scale wind project since 2011 underway Residential solar group-buys
	Removal of Barriers / Creation of Incentives	Green collar jobs Rebates approved Bio-digester funding
	Other	
TRANSPORTATION	Spending Priorities / Local Transportation Infrastructure	Milwaukee streetcar Volkswagen settlement Some highway expansion curtailed
	More Efficient Freight	More business leadership
	Electric Vehicles	Charging infrastructure Zero emission vehicle sales
	Regional Transit	
	Other	
UTILITY LEADERSHIP	Plans for GHG Emission Reductions	Utilities plan to decrease emissions
	Structural Barriers	
PUTTING A PRICE ON CARBON	Pricing Options	Middleton supports carbon price Companies consider carbon price
RESEARCH & PUBLIC EDUCATION	Energy Education and Environmental Literacy	Green schools Curriculum Outdoor Heritage Resolution
	Research and Data Analysis	Bioenergy and electricity systems Midwest Energy Research Consortium (M-WERC)
	Moving Away from Science & Public Educational Resources	

in Wisconsin

	← Falling Behind	↑ New Opportunities
		Uniform commercial PACE standards Residential PACE
	\$7 million cut Broadband instead of efficiency	
	Residential 2009 Commercial 2009	
	Neighbors adopted policy	Neighboring state models
	RPS flat	
	Neighbors outpacing WI's renewable capacity Net metering "true-up"	Low-cost offshore wind
		Renewable costs down Decarbonizing electricity
		Lower rates Storage Local electrons Faith community installations
	Highways dominate	
	Deteriorating roads	Improving food distribution systems Better urban living
	No new RTAs	
		Less driver demand Transportation equity Attracting talent Transit-oriented development
	Clean Power Plan	
	Regulatory uncertainty Fixed charges High rates	Distributed Energy Resources (DERs) More ambitious long-term goals
	Other entities consider carbon price Clean Power Plan	More WI companies consider carbon price Local leadership Partner in carbon market
	Science standards Cuts to environmental education	Support environmental education
	Funding cuts	
	DNR deletes climate info	

Conservation & Efficiency

Conservation means that we use less energy. *Efficiency* means that we use energy in ways that get the “biggest bang for the buck” and avoid waste. Combined, conservation and efficiency are the most practical and effective ways to reduce GHG emissions and save money.

The 2014 *Climate Forward* report highlighted Options for Action to strengthen energy efficiency and conservation through increasing funding for the Focus on Energy program, expanding the pace and scale of energy retrofits, encouraging energy benchmarking, updating energy codes to match the International Energy Conservation Code, and requiring all new state buildings to meet the most recent efficiency standards. Some of the most notable changes in recent years are as follows.

PACE

Over the last three years, [Property Assessed Clean Energy](#) (PACE) has emerged as a significant new tool for advancing conservation and efficiency in Wisconsin. Enacted in 2009 (Wis. Stat. 66.0627), PACE allows cities, towns, villages, and counties to treat loan repayments for energy efficiency, water conservation, or renewable energy improvements on residential, commercial, or residential properties as a special charge that can be transferred to the next property owner if the property is sold.

PACE enables property owners to obtain low-cost, long-term loans for energy efficiency, renewable energy, and water conservation improvements. This eliminates the need for a large upfront payment, which is a significant barrier to investing in efficiency projects. PACE can also generate a cash flow positive transaction, meaning that the savings on energy bills from the improvements equals or exceeds the loan repayment. In addition, PACE can eliminate the “split incentive” that discourages investment in efficiency improvements. A split incentive exists in many leased commercial and industrial spaces because the property owner must pay the cost of the efficiency improvements while the lessee (renter) gets the benefit of the energy bill savings. PACE eliminates the split incentive by enabling the building owner to pass the costs of the efficiency improvements onto the building tenants who get the benefit of the energy bill savings.

The term of PACE Financing may extend to the useful life of the improvement, which may be as long as twenty years or more, and can result in cost savings that exceed the amount of the PACE Financing. The result is improved business profitability, an increase in property value, and enhanced sustainability.

A compelling element of PACE is that it can be implemented at little or no cost to municipalities, as PACE programs are typically fully funded through project development and loan transaction fees.

→ Moving Forward

Commercial PACE

In 2013, the City of Milwaukee was the first Wisconsin municipality to adopt commercial PACE (the ME2 program). ME2 has funded over \$12 million of PACE Financing, which has helped leverage millions more in project financing over the past four years. PACE-

supported projects are achieving long-term energy conservation and efficiency benefits and reducing carbon emissions.

↑ New Opportunities

Commercial PACE

A statewide Commercial PACE program has been developed to establish uniform standards, documents, and best practices applied consistently across Wisconsin. This single PACE program can promote scalability by simplifying participation for stakeholders (financial institutions, contractors, project developers, and building owners). With the support of the Wisconsin Counties Association, League of Wisconsin Municipalities, and Wisconsin Office of Energy Innovation, Wisconsin local governments have established the Wisconsin PACE Commission. Membership is expanding across the state. To date, nineteen counties have opted to join the PACE Commission (Ashland, Bayfield, Chippewa, Dane, Douglas, Dunn, Eau Claire, Fond du Lac, Iowa, Jefferson, La Crosse, Manitowoc, Marathon, Ozaukee, Racine, Sheboygan, St. Croix, Washington, and Wood), covering 36% of Wisconsin's population (46% with the inclusion of the City of Milwaukee PACE program). The PACE Commission held its first meeting in October 2016 and is expected to begin receiving PACE project applications within the calendar year.

Residential PACE

Since the initial *Climate Forward* report was issued, implementation of Residential PACE has stalled throughout the country due to objections raised by Fannie Mae and Freddie Mac, backers of the majority of residential mortgages. In response to these objections, California created a state-backed, loan-loss reserve intended to enable local governments to move forward with Residential PACE, and several cities did so. A small number of cities in other states implemented a form of Residential PACE despite the Fannie Mae/Freddie Mac objections. However, on July 19, 2016, President Obama announced guidelines outlining how FHA-insured mortgages could be used to purchase and finance homes with PACE loans. These guidelines addressed the Fannie Mae/Freddie Mac objections and thereby created an opportunity for Wisconsin local governments to consider implementing Residential PACE. Nevertheless, adequate consumer protections have become another hot button issue for the Residential PACE program.

Focus on Energy

→ Moving Forward

Focus on Energy projects have continued to perform at an exceedingly high level. The benefit-to-cost ratio of the overall Focus program has risen steadily each year to a peak in

2015 of 3.41-to-1. This means that for every dollar invested in the program customers see \$3.41 in value, most of which is direct savings on their energy bills.

← Falling Behind

In 2016, the Wisconsin Legislature changed the statutory requirement determining the way utilities fund Focus on Energy. Previously, utilities paid into the program based on a percentage (1.2%) of all their electricity sales, both retail (sales directly to electric customers) and wholesale (sales to other utilities). Since the 2016 policy change, the requirement applies only to retail sales. The net result is a \$7 million decrease in funding for Focus on Energy every year going forward.

The Public Service Commission (PSC) manages the program and in 2015 initiated a shift away from renewable energy system incentives (rebates) in favor of a revolving loan program. However, in fall 2016, only a year later, the PSC suspended the loan program and returned to funding at levels similar to previous ones for renewable incentives (annual rebates of about \$3.5 million).

In fall 2016, the PSC also dedicated \$26 million of collected but unallocated Focus funding to “new rural programs” that incorporate broadband and energy efficiency. This was in response to a docket (PSC REF# 290951) the PSC released to investigate “improving access to the statewide energy efficiency and renewable resource programs in rural areas of the state that are underserved by broadband service providers ... and to promote rural economic development in these areas, through greater deployment of broadband.” While a worthy and necessary investment, promoting broadband access is an indirect and tenuous means of achieving energy efficiency, which has raised questions about the appropriateness of using these funds for broadband instead of investing them in programs with a direct impact on energy efficiency.

Building Codes

← Falling Behind

Even though international building codes set a higher bar in 2015 for energy conservation and efficiency, Wisconsin residential and commercial building codes [remain at 2009 levels](#).

State Energy Policy

← Falling Behind

Neighboring states, Illinois and Michigan, [recently adopted](#) positive energy efficiency commitments. Michigan’s energy policy heavily promotes waste reduction, while Illinois’ policy creates new incentives and standards for utility energy efficiency.

↑ New Opportunities

Wisconsin has the opportunity to learn from neighboring states and set new goals, standards, and incentives.

Renewable Energy

With decreasing costs and increasing employment opportunities, renewable energy is well positioned to take on a more significant role in Wisconsin. Increasingly, pursuing renewable energy installations makes good economic and environmental sense. That's why, regardless of an uncertain state and federal regulatory climate, it appears that renewables will continue to charge ahead as robust contenders in the mainstream energy industry.

Our 2014 Options for Action centered on Wisconsin expanding renewable energy through setting goals, removing barriers, creating incentives, and taking advantage of existing grid structures to integrate renewable sources. Key updates are noted below.

Commitment to Expanding Renewables

→ Moving Forward

Local Leaders Adopting Renewable Goals

Currently, [over 140 Energy Independent Communities in Wisconsin](#) have voluntarily agreed to adopt the goal of “generating 25% of Wisconsin’s electricity and transportation fuels from renewable resources by 2025.”

Driven by the citizen-led Sustainable Madison Committee, in March 2017 the City of Madison’s Common Council voted unanimously to approve [a resolution](#) establishing a goal of 100% renewable energy use and net zero carbon emissions for municipal operations and the broader community, becoming the first municipality in Wisconsin (and joining 23 others in the United States) to make such a commitment.

← Falling Behind

Renewable Portfolio Standards

Wisconsin’s [Renewable Portfolio Standard](#) (RPS) requires the state to source 10% of its electricity from renewable energy sources by 2015 and not to decrease this percentage thereafter. While we achieved this goal in 2013—two years early—no more ambitious goals have been adopted. Meanwhile, our neighboring Midwest states are striving for loftier goals: Minnesota requires 25–26.5% by 2025; Illinois requires 25% by 2025–2026; Ohio requires 25% by 2026 (and a freeze on the standard was not implemented); Michigan requires 15% by 2021 and has a goal of 35% by 2025.

New Installations

→ Moving Forward

Community Solar

This program, popular with utility customers, has grown significantly over the past three years in Wisconsin. It allows households without solar access, due to location or ownership, to participate in a community solar energy system. Wisconsin's rural electric cooperatives, municipal electrical utilities, and investor-owned utilities collectively offer [nineteen community solar projects](#) that have been completed or are under construction. The first three projects were completed in 2014, five were completed in 2015, one was added in 2016. Another ten will be placed into service or are under construction as of 2017. An affordable price point (largely due to decreasing solar costs and economies of scale) and flexibility for customers/members have made this model successful.

In recent years, Wisconsin's electric cooperatives have marked a strong entry into the community solar arena. Of Wisconsin's 24 co-ops, seven have community solar projects up and running, and seven more projects are in advanced stages of development as of the publication of this update. Utilities that are accountable to their members and customers, such as the rural electric co-ops, are installing renewable technologies.

Utility-Scale Solar

The Dairyland Power Cooperative has nearly finished construction on fourteen Wisconsin-based solar arrays providing twenty megawatts of solar capacity—nearly doubling the state's solar capacity when they were announced in 2016. This momentum is continuing, with plans underway to bring more renewable capacity to Wisconsin. For instance, WPPI Energy and NextEra Energy Resources [announced in February 2017](#) an agreement to build a 100-megawatt solar energy project, which will become the largest solar installation in the state when it is completed in 2020.

Utility-Scale Wind

Construction of the first utility-scale wind project in Wisconsin since 2011 is nearing completion. [A 98-megawatt wind farm in Lafayette County](#), owned and operated by EDP Renewables North America, is expected to be finished later this year, and will provide electricity for Dairyland Power Cooperative's members. In addition, the PSC approved a 102.5-megawatt Highland Wind project in St. Croix County, and MG&E has proposed the 66-megawatt Saratoga wind project in northeast Iowa to the PSC of Wisconsin. All these projects all can deliver very inexpensive electricity.

Residential Solar Group-Purchasing Programs

Since 2014, Milwaukee, Racine, Eau Claire, and Madison have instituted either city-led or volunteer-led programs to help residential customers purchase solar energy together as a group. This leads to a discounted price for the group. To attract additional customers, program organizers provide education sessions and marketing, saving the solar contractors money on customer acquisition. In 2016, 145 households participated in these four programs, collectively installing 637 kilowatts of solar.

← Falling Behind

Renewable Capacity Additions

While the number of new solar projects represents considerable progress in Wisconsin, our neighboring states are adding renewable capacity even faster.

Installed wind capacity in Wisconsin is currently 648 megawatts. This places us at [25th in the nation](#) for installed wind capacity. From 2011 through 2015, [Wisconsin added just 17 megawatts](#), while our neighboring states added 1,890 (Iowa), 1,154 (Michigan), 1,100 (Illinois), 555 (Indiana), and 517 (Minnesota) in that time frame.

Net Metering Policies

Net metering is a foundational policy for customers who want to generate some of their own electricity yet remain connected to the grid. When a customer generates more on-site electricity than is needed to meet their demand, this electricity flows into the grid; the customer's utility credits them for supplying the excess electricity. The electricity meter effectively runs backward to provide a credit to offset later use when the customer's generation falls below demand and electricity needs to be drawn from the grid. Customers are billed for the net energy use, or the difference between the energy drawn from, and supplied to, the grid. This policy has been contested across the country since 2013. One example is that three major utilities have switched from annual to monthly "true-up" calculations, which can result in lost revenue for those producing surplus energy. For example, energy generated in sunny months, when solar power can displace more expensive utility peak power, can't be used to offset energy costs during low production months.

↑ New Opportunities

Offshore Wind

Though Wisconsin's [inland wind resource](#) is considered marginal (in contrast to that of neighbors like Iowa and Minnesota), sites along the shore of Lake Michigan are rated good, excel-

lent, or outstanding, and thus represent valuable options for nearshore or offshore wind development. One opportunity is to consider connecting offshore wind turbines into the existing transmission infrastructure left from the shutdown of the Kewaunee nuclear plant.

Removal of Barriers / Creation of Incentives

→ Moving Forward

Green Collar Jobs

According to The Solar Foundation's annual "[Solar Jobs Census](#)," there are currently [2,813 workers](#) employed in Wisconsin's solar industry. This includes jobs in installation, manufacturing, sales and distribution, project development, and other roles. While this represents a 45% increase from 2015, Wisconsin still ranks 26th in the nation, for both the total number of solar jobs in the state and the number per capita. However, [Wisconsin is a leader](#) in the wind manufacturing industry, with at least 26 facilities in the state manufacturing components for the wind industry.

Rebates

The [PSC approved \\$8.6 million in rebates](#) for 2017–2018 for residential, business, and non-profit customers of eligible utilities to install renewable energy projects.

Bio-digesters

In a nod toward renewable energy and water quality, the PSC, which manages the Focus on Energy program, dedicated a collected-but-unallocated \$20 million to funding new bio-digester projects. (Proposals are due in July 2017, and selected projects are expected to be announced in fall 2017.)

↑ New Opportunities

Energy Price Trends

[A recent study conducted by Lazard](#) shows that the levelized cost of energy (which allows an apples-to-apples comparison across different types of power plants) for utility-scale wind and solar is now comparable to or lower than the cost of energy derived from conventional coal- and gas-fired plants. The cost of energy storage continues to decline as well and may present additional opportunities for renewable energy and utilities in the years ahead.

Decarbonizing Electricity

According to the [U.S. Energy Information Administration](#), in 2015, about 56% of Wisconsin's electricity generation came from coal. While the percentage of coal in the state's electricity mix is decreasing, the demand is largely being met by increasing the share of natural gas, predomi-

nately due to low natural gas prices. The trend in Wisconsin (as well as nationally and internationally) is shifting away from the long-dominant, coal-fired plants to natural gas plants. Burning natural gas emits about half as much CO₂ as burning coal, and this shift represents possible short-term greenhouse gas reductions. However, this shift locks in existing fossil fuel infrastructure, which can make long-term and deeper emission reductions challenging, and may forgo alternatives like replacing retiring power plants with renewables. In addition, much of this natural gas comes from hydraulic fracturing (fracking), which has the potential to emit large amounts of methane, a potent greenhouse gas. Moreover, building new natural gas-fired plants may run contrary to the [stated GHG emissions goals of the Paris Agreement](#).

Other

↑ New Opportunities

More Affordable Electricity

Considering Wisconsin's high electricity rates, increasing the number of inexpensive sources like wind and solar can offer a sensible economic approach to diversifying our electricity mix and managing costs for consumers.

Better Storage

The intermittent nature of renewable energy sources like solar and wind can make meeting base electricity demand challenging for utilities, particularly once renewables reach a significant share of the electrical fuel mix. However, it is difficult to mitigate this very real challenge without more significant investments in energy storage technologies that improve cost and efficiency. Storage allows power producers to better control the timing of the distribution of their electric resource. That is, they can sell power to the grid during more favorable times for pricing, [creating revenue](#) which can in turn help offset or exceed the costs of the storage system. Improved energy storage also offers additional benefits to utilities by providing more consistent and reliable peak and baseload energy.

Local Electrons

While Wisconsin lacks fossil fuel resources and relies on imports, renewable energy resources are available in the state, and generating electricity locally can contribute to employment and economic opportunity.

Faith Communities

There is great and growing interest in renewable energy among Wisconsin congregations. In a 2017 survey of 79 congregations in the state, the Wisconsin Council of Churches (WCC) found that about half had made some investments in clean energy. Most were energy efficiency measures, but a dozen had installed solar panels, mostly in the 10–20 kW range. Two

congregations use geothermal energy, and the Racine Dominicans' Eco-Justice Center has a 10 kW wind generator. (These represent only the tip of the iceberg; in 2014, RENEW Wisconsin compiled a list of 43 customer-owned renewable electric systems installed between 2006 and 2014 that serve houses of worship and religious schools.)

Two prominent recent examples are the large solar arrays that have been constructed by Catholic women religious communities. The Sisters of St. Francis of the Holy Cross in Green Bay installed a 400-panel, 112-kW solar array in 2014. The array at the Congregation of Sisters of St. Agnes in Fond du Lac, installed in 2015, comprises 880 solar panels, supplying 50% of the Motherhouse's electricity needs. Both communities offer self-guided tours of the installations to educate the public and showcase the sisters' commitment to environmental stewardship.

Ten of the congregations responding to the WCC survey indicated they plan to make new or additional investments in solar energy, and 66 expressed interest in financial incentives for more clean energy investments. Several had received financial support from Focus on Energy or their utility.

Further evidence of growing interest is the Wisconsin Faith and Solar Initiative, co-led by Wisconsin Green Muslims and RENEW Wisconsin, which has provided solar educational presentations reaching over five hundred people of diverse religions and spiritualities (Baptist, Bahá'í, Buddhist, Catholic, Episcopalian, Evangelical Christian, Friends/Quaker, Hindu, Jewish, Latter-day Saints/Mormon, Lutheran, Methodist, Muslim, Native American, Presbyterian, Sikh, United Church of Christ, Unitarian Universalist). To date, twelve congregations have signed up for free computerized solar assessments, and three of them received free on-site assessments for solar systems.

Transportation

Investments in Wisconsin's transportation sector continue to focus on highway projects favoring gas- and diesel-powered vehicles, at the expense of deteriorating local roads and support for local transit options. However, we are seeing some gains in freight efficiency and leadership, and progress in building infrastructure to support greater penetration of electric vehicles in the marketplace. There are ample opportunities to meet increasing demand for diversifying transportation options in our state.

Our 2014 *Climate Forward* report Options for Action suggested directing more state transportation revenues for city and town transportation infrastructure and less for new highways, supporting options for freight (including marine and rail transport), creating regional transit authorities (RTAs), and developing incentives for hybrid and all-electric vehicles. What follows are some recent changes to the Wisconsin's transportation sector.

Spending Priorities / Local Transportation Infrastructure

→ Moving Forward

Milwaukee Streetcar

Construction is beginning on [the Milwaukee Streetcar system](#), with service expected to begin downtown in 2018. The [energy-efficient, electric streetcar](#) has the potential to be powered with renewable sources and will provide an additional public transit mode as an alternative to private vehicles.

Volkswagen settlement

Wisconsin's share of the 2016 VW settlement of \$2.7 billion is \$63.5 million, intended to fund projects reducing nitrogen oxide emissions. \$26 million will help [purchase new buses](#) in Milwaukee County. (The use of the remaining funds is yet to be determined at the time of this update.)

Highway Expansion Curtailed

The Wisconsin Department of Transportation has halted some potential highway expansion plans. Expansion locks in infrastructure that favors gas- and diesel-powered personal vehicles and diminishes resources for other transportation options.

← Falling Behind

Prioritizing Highway Expansion

Although some projects have been halted, transportation investments in Wisconsin have focused largely on highway expansion projects, leaving little funding for infrastructure repair, transit, and alternative (non-auto) modes of transport. [Over the past fifteen years](#), highway construction and expansion spending has increased by 50%, local road maintenance has decreased by 30%, and public transit has remained relatively flat despite growing demand.

More Efficient Freight

As our region urbanizes, we can invest in moving people and freight more efficiently to serve population centers. Sometimes it is more efficient to move the people to places, such as commuting to work or busing to school. Other times, especially with food, it is more efficient to move freight from places (e.g. farm fields) to the people where they live and shop.

Freight moves in roughly three segments: the “first mile,” where products move from point of production to point of shipment; “over-the-road,” where shippers move products long distances to wholesale buyers; and “last mile,” where wholesalers move products to retail outlets. There is opportunity in each of these segments to improve fuel efficiency and reduce GHG emissions.

Wisconsin roads are important for freight shipments between the east and west coasts, and especially for moving agricultural freight to urban centers and international ports. In fact, Wisconsin's highways are central to food movement nationally, and road condition has an impact on the movement of food throughout the United States.

→ Moving Forward

A number of businesses are committed to improving fuel efficiency when moving freight. Kwik Trip is continuing to invest in alternative fuels for its regional fleet—trucks that move fuel to gas stations and food to convenience stores. Schneider Trucking continues to invest heavily in logistics services to improve freight movement efficiency for its clients, including Walmart.

Moving food produced regionally to regional markets reduces GHG emissions but only when shippers are able to develop regular routes with full trucks. Companies such as Organic Valley and Alsum Produce are moving Wisconsin food to the Chicago area more efficiently, shipping the necessary volume to wholesale buyers.

← Falling Behind

Extreme weather and heavy use are taking a toll on Wisconsin roads. First-mile movement of farm products to points of shipment relies on small rural roads that are past due for repairs. The increase of heavy rainfall events, especially in the hilly Driftless Region, is further damaging roads. Larger highways in the state are central to freight movements across the country and to international ports, and they need repair as well.

↑ New Opportunities

Food distribution system improvements in Wisconsin may undergird the national food flow, reduce the miles that food moves to market, and increase access to market for midsize farmers, independent grocers, and restaurants. They may also make it possible to switch from “jack of all trades” trucks that waste fuel by moving freight in any area—rural, urban, congested traffic—to specialized trucks that are able to take advantage of engineering innovations tailored to different driving conditions.

Electric Vehicles

→ Moving Forward

According to the [U.S. Department of Energy's Alternative Fuels Data Center](#), at the time of writing, there are 259 public electric charging stations and 426 public charging outlets in Wisconsin as well as 35 private stations and 52 private outlets.

In 2016, [REV UP Wisconsin](#), the state's first electric vehicle group buy program, helped reduce the cost of purchasing a Nissan Leaf. Partnering utilities are [supporting infrastructure investments](#): MG&E has opened [27 electric charging stations](#) to date, Alliant Energy has expanded a program offering rebates for charging stations, and We Energies helped [raise awareness about electric vehicles](#).

Zero emission vehicle [sales are increasing](#), and Wisconsin ranked 18th in sales in 2016.

↑ New Opportunities

Cities Could Reap Huge Benefits from Next Generation Transportation Vehicles

While the United States is still in the early stages of electric vehicle use, the transportation sector is showing signs of fundamental change. According to the U.S. Department of Energy, Americans bought more than double the number of electric vehicles in 2015 as they did in 2012, despite low gasoline prices at the time. Urban areas will see the greatest environmental benefit from the transition to next generation mobility. Public-private battery research partnerships are also projected to drive down prices and increase electric vehicle deployment.

Regional Transit

← Falling Behind

Since Wisconsin turned down federal funds in 2010 for high-speed passenger rail, no new proposals have been made for connecting major population centers in Wisconsin and neighboring states. Moreover, several attempts to establish regional transit authorities failed to gain approval.

Other

↑ New Opportunities

Shifting Demographics

[Demographic trends that favor less driving continue](#). As more and more Baby-Boomers retire, they no longer drive to work. Millennials, who place high value on non-driving transport options, are driving less than prior generations. The increased demand for transport alternatives creates an opportunity to invest in a more balanced transportation system to serve our communities.

Transportation Equity

Transportation is vital to daily life in Wisconsin, and our citizens—regardless of income, age, or race—should have [equal opportunities for mobility](#). The age 65 and older demographic (the

fastest-growing segment of Wisconsin's population) requires more non-driving alternatives to maintain mobility. Low-income and disabled citizens also rely on diverse transportation options to access work, school, and health care, and to meet other daily needs.

Fighting Brain Drain & Attracting Talent

Having transportation options that are not car-dependent may make Wisconsin's college graduates [more likely to stay in the state after graduation](#) and retain homegrown talent. Increased investment in bike paths, sidewalks, and public transit can also help attract and retain businesses and young professionals in our communities.

Transit-Oriented Development

Land use planners should consider transit-oriented development when designing or re-designing communities. Mixed-use development in walkable neighborhoods with public transportation access is one of many transit-oriented development strategies that can improve access to amenities and help support local economies.

For example, [studies have found](#) that walkable retail areas attract more customers and provide a "place dividend" through a unique local identity that can drive economic performance. The presence of walkable shopping also significantly increases nearby housing values.

By leveraging local planning, construction, and market development to improve Main Street, we can make our communities more pleasant and resilient places to live and shop.

Utility Leadership

Despite regulatory uncertainty, utilities are taking steps to plan for a low-carbon future. Although a number of barriers concerning rate structure and high prices persist, opportunities for more innovative utility models are emerging.

The 2014 *Climate Forward* report's Options for Action to move utility leadership forward included reforms that encourage conservation and distributed, renewable energy; development of a strategy to retire the oldest and dirtiest coal-fired power plants and replace them with low- or no-carbon fuels; identification of structural or grid barriers to renewable energy development, and implementation of carbon reductions for power plants. A number of updates since 2014 are noted below.

Plans for GHG Emission Reductions

→ Moving Forward

Every major electrical-generating utility in the state has plans to reduce its GHG emissions over the next twenty to thirty years.

← Falling Behind

Clean Power Plan

The Environmental Protection Agency’s Clean Power Plan (CPP), which required a nationwide 32% reduction of carbon pollution from fossil fuel power plants by 2030, was finalized in August 2015 and published (became law) in October 2015. The law required Wisconsin utilities to achieve a 34% reduction. Wisconsin utilities, and many other stakeholders, had engaged with the EPA throughout the drafting process, while at the same time modeling the requirements and working with stakeholders and the EPA to come up with least-cost compliance pathways. In February 2016, the Supreme Court issued an unprecedented “stay,” suspending the requirements of the CPP in response to a law suit filed by coal companies, coal-producing states (West Virginia was the lead plaintiff), and other states, including Wisconsin. Weeks after the court stay, Governor Walker issued an [executive order](#) “prohibiting” any state agency from “developing or promoting the development of a state plan” in response to the CPP rule. Just a year before, the utilities, in a joint hearing of the legislature, had expressed interest in seeing the State of Wisconsin move forward with developing a CPP state implementation plan.

Regardless of the lawsuit and the governor’s directive, nearly all of the utilities have now developed carbon pollution reduction targets consistent with the CPP and plan to pursue those targets, with or without the CPP. In March 2017, President Trump signed an executive order undoing President Obama’s Climate Action Plan and other executive actions addressing climate change, but he stopped short of pulling back the CPP (which remains in the courts as of publication of this update). In June 2017, President Trump announced that he will withdraw the United States from the Paris Agreement, an action which, due to [a provision in the Agreement](#), would take effect at the earliest in November 2020. As for the CPP, eventually either the courts will rule on the merits of the legal challenge to the plan or the EPA under the Trump Administration will have to draft a new plan.

Structural Barriers

← Falling Behind

Planning Under Regulatory Uncertainty

Lacking a clear regulatory signal and a long-term energy plan for Wisconsin, utilities find it challenging to make informed and strategic investments in infrastructure and to sign long-term contracts.

Fixed Charge Increases

With the PSC’s approval, Wisconsin’s investor-owned utilities have been increasing fixed charges for electricity customers while lowering variable energy rates (\$/kWh). Increasing

this fixed charge can undermine energy efficiency incentives, since low energy users will pay a bigger percentage increase than high users, and the payback period can increase on investments such as solar panels. The structure also disproportionately affects low- and fixed-income citizens. [Other states](#) are rejecting increases or allowing only modest ones, whereas in Wisconsin fees are being roughly doubled. According to RENEW Wisconsin, since 2014, [the increase](#) in investor-owned utilities' fixed charges has averaged 14% across the United States but 83% in Wisconsin. Several utilities serving Wisconsin filed for fixed-rate increases in the last few years: Alliant Energy (2016); Wisconsin Public Service and Xcel Energy (2015); and We Energies, Madison Gas & Electric, and WPS (2014).

High Electricity Rates

According to [U.S. Energy Information Administration data](#), Wisconsin's retail residential electricity rates are currently the second highest in the Midwest (at 14.34 cents per kWh as of February 2017) and have continued to increase gradually each year over the last decade. This raises concerns over affordability, particularly for low- and fixed-income communities.

High electricity rates adversely affect Wisconsin industry as well. For example, in October 2016, the Wisconsin Industrial Energy Group and the Wisconsin Paper Council launched complaints about the state's industrial electricity rates. These industry associations claimed that industrial electric rates have increased 78% from 2001 to 2015. Although Wisconsin has been the top paper-producing state in the United States for more than fifty years, the Paper Council argued that rising industrial electricity rates were placing the industry at a competitive disadvantage.

↑ New Opportunities

Distributed Energy Resources

A combination of distributed energy resources (DERs)—such as demand response, energy storage, distributed solar panels, and microgrids—can together constitute local energy management systems with improved control over energy supply and demand. DERs create a new paradigm enabling greater flexibility in how and when energy is used, while incorporating diversified clean energy sources. For example, implementing demand response software and smart technology can shift energy use (such as air conditioning, water heating, and electric vehicle charging) to times of day when the energy load is lower and electricity is cheaper. Similarly, storing solar energy generated through a rooftop solar system can later be discharged at a time when energy costs might be higher and demand might otherwise draw upon traditional baseload sources like coal and natural gas generation. Enabling such flexibility to move supply and demand can make energy use cheaper and cleaner, and reduce energy use overall. By integrating DERs into their business models, utilities can realize cost savings and better service.

Deeper, Long-Term Goals and Planning

Utilities could consider more ambitious, longer-term plans that rely less on a shift from coal to gas and instead on incorporation of renewables (paired with storage), conservation, and load management.

Putting a Price on Carbon

Establishing a price on carbon emissions is widely seen among economists and those developing strategies for reducing carbon emissions as one of the most effective ways to limit global warming. Typically this price is expressed as dollars per ton of carbon dioxide-equivalent (\$/tonCO₂e). The logic behind pricing carbon is based on the fact that the full cost of burning fossil fuels is not currently paid for by the companies that produce and use the fuels. Nor is it reflected in the price they charge consumers for their goods and services. In economic terms, this is considered an “externality”—that is, carbon dioxide and other GHG emissions that drive climate change have negative economic (and other) impacts on society that are not currently accounted for in our free market. This market failure can be corrected by attributing an appropriate cost to carbon—effectively internalizing this externality—so the price consumers pay reflects the full cost to society of using fossil fuels. There are a number of ways to embed this correction in the price of energy services. The two primary carbon pricing mechanisms are carbon taxes or fees and cap-and-trade programs that target specific fossil fuels (such as coal burned in power plants).

Increasingly, states, regions, countries, and corporations are placing a price on carbon. Leaders are already figuring out what a price on carbon means, because it is prudent to do so before one is required. A handful of Wisconsin-based companies are incorporating this price into planning, but largely this is an area where Wisconsin is falling behind its peers.

The 2014 *Climate Forward* report notes a number of ways that Wisconsin could explore carbon pricing, such as support for research on monetizing carbon, reconsideration of a regional GHG market, and consideration of a revenue-neutral carbon tax. Updates on carbon pricing are as follows:

→ Moving Forward

Municipal

In November 2016, City of Middleton voters passed a referendum to support a federal price on carbon, becoming the first city in the country to endorse a federal carbon fee and dividend system.

Private Sector

An increasing number of U.S. and global companies report that they are adopting an internal price on carbon. According to the Carbon Disclosure Project (CDP), in 2016 [over 1,200 com-](#)

[panies worldwide](#) (210 in the U.S.) use internal pricing or plan to do so in the next two years. Companies that have embedded a carbon price into decision-making structures report that doing so has shifted investments toward energy efficiency measures and other low-carbon initiatives, including energy purchases and development of low-carbon product offerings.

Wisconsin-based companies that [reported having an internal carbon price](#) are the WEC Energy Group and WECC (Wisconsin Energy Conservation Corporation); other companies not headquartered in Wisconsin but with a presence here include General Electric, Hormel, EMC Corporation, Stanley, Black & Decker, Waste Management, Xcel Energy, Molson Coors (MillerCoors), and Delta Airlines.

← Falling Behind

Others States, Regions, and Countries are Considering a Carbon Price

The Social Cost of Carbon is used by the EPA and other federal agencies to estimate the climate benefits of rulemaking. However, a recent [executive order](#) is challenging its use. Nonetheless, some states are moving ahead in planning for or implementing a price on carbon. In 2013, California implemented [a cap-and-trade system](#), which now covers electricity generation and large industrial sources as well as distributors of transportation fuel, natural gas, and others fuels. Washington [announced an emissions cap](#) in September 2016. In Oregon, carbon pricing bills were proposed but not passed last year.

The [Regional Greenhouse Gas Initiative](#) (RGGI) was introduced in 2009 and currently includes nine northeast states. RGGI was the first regional cap-and-trade program in the United States.

Canada established a national price on carbon emissions in 2016, and individual provinces are following suit. Quebec linked to the California cap-and-trade program in 2013. Other [Western Climate Initiative](#) partners (British Columbia, Manitoba, and Ontario) are considering linking in the future. British Columbia has had a revenue-neutral carbon tax in place since 2008.

According to the World Bank, as of this year, [46 carbon pricing initiatives](#) have been implemented or are scheduled for implementation. This includes (mostly subnational) emissions trading systems and (primarily national) carbon taxes and covers 15% of global GHG emissions. The success of these programs in achieving carbon emission reductions while maintaining jobs and healthy economies puts pressure on American states and regions that refuse to address climate change. The Paris Agreement, which includes signatories from many of these countries, adds to this pressure.

Wisconsin is not currently planning for a price on carbon.

Clean Power Plan

Both cap-and-trade and carbon taxes or fees were allowed as options for complying with the Clean Power Plan. In addition, regional trading programs were encouraged by the EPA as a strategy for compliance. However, the current uncertainty about the CPP rules undermines any carbon pricing mechanisms that might be implemented by Wisconsin or other Midwest states.

↑ New Opportunities

Private Sector

Individual businesses and organizations in Wisconsin could establish a credible internal price for carbon and incorporate it in their decision-making process. This would enhance their brand and mitigate risk, thereby improving their industry competitiveness and long-term sustainability.

Local Leadership

State, local, and county entities could incorporate a social cost of carbon framework into their operational decision-making as well as their policy-making deliberations.

Planning for Collaboration and Investment

Wisconsin could begin now to assess the options for participating in a regional or national offset trading framework as part of its carbon reduction strategy. The state has more coal in its electricity fuel mix than other regions in the country, which means that investments in Wisconsin carbon reduction projects will yield comparatively higher emission reductions. Wisconsin's participation in a regional or national cap-and-trade platform could draw significant investment from outside the state and help us achieve compliance more quickly and cost effectively than would be possible without a trading system.

Like California and some Canadian provinces that have linked cap-and-trade programs, Wisconsin and other Midwest states could develop a carbon pricing mechanism that is compatible with established markets.

Research & Public Education

The climate and energy landscape is changing rapidly, with new findings, technologies, and opportunities emerging all the time. Therefore, continued support for research, data analysis, and education around these issues is imperative for informed and effective decision making.

Our 2014 *Climate Forward* report's Options for Action in this area included investments in public and private research on wind, bioenergy, natural carbon storage, and education for energy consumers. A number of changes have occurred since 2014 and are as follows.

Energy Education and Environmental Literacy

→ Moving Forward

Green Schools

Since 2012, sixteen Wisconsin schools and four school districts have been recognized by the U.S. Department of Education's Green Ribbon Schools program—more than 10% of districts recognized nationally. (An additional two schools and one district are currently [under consideration](#).) These schools are reducing waste (saving energy on buildings, transportation, etc.) and improving health and wellness, which reduces sick days and increases learning.

More than three hundred Wisconsin PK–12 schools have signed up for the Green & Healthy Schools Wisconsin program. Administered through a partnership between the Wisconsin Department of Public Instruction, Department of Natural Resources (DNR), and Wisconsin Center for Environmental Education, this initiative provides information, resources, and recognition for public and private schools working to reduce environmental impacts and costs, improve health and wellness, and increase environmental and sustainability literacy.

School Curriculum Development

Many districts, schools, and individual teachers are proactive in integrating environmental, climate, energy, and sustainability education into classrooms across the state. They are supported by numerous community programs and nonprofit educational organizations that provide curriculum, programming, outdoor education opportunities, lesson plans, teacher trainings, and other resources designed to incorporate environmental education into classrooms at all levels.

Wisconsin Children's Outdoor Heritage Resolution

[Joint Assembly Resolution 27](#) (the Wisconsin Children's Outdoor Heritage Resolution) was passed in 2016. While there is no binding legislation attached, this resolution recognizes Wisconsin's rich natural resources and long-standing commitment to passing on this natural heritage to future generations. The resolution states, among other things, that members of the Wisconsin legislature recognize that every Wisconsin child should continue to have the opportunity to “breathe clean air and drink clean water; ... play in the dirt, plant a tree, and grow a garden; and explore and connect with Wisconsin's natural spaces and wild places.”

← Falling Behind

Updating Science Standards

Currently, Wisconsin's official standards for science education are the Wisconsin Model Academic Standards for Science (developed in 1998). However, the Next Generation Science Standards (NGSS) are a national-level K–12 science content, practices, and skills framework developed in support of scientific and technological literacy. NGSS emphasize inquiry and skills development in science, with a focus on cross-disciplinary approaches to understanding complex ideas and investigating solutions to 21st-century societal problems.

NGSS have been formally adopted and are being implemented in many states across the United States. In Wisconsin, a review of the NGSS began at the state level but has stalled in the legislature. Although discussions continue, no timeline exists for rolling out updated science standards. Official state approval and adoption of relevant and updated science standards would be useful in providing consistency and support at the state level. Nevertheless, school districts have local control over the standards they adopt and implement. With the support of the Wisconsin Society for Science Teachers, many (but not all) districts across Wisconsin have moved forward with implementing the NGSS.

Wisconsin's Plan to Advance Education for Environmental Literacy and Sustainability in PK–12 Schools was developed in 2011, along with [*Wisconsin's Plan for Environmentally Literate and Sustainable Communities*](#). However, no state environmental literacy plan has been officially adopted, and no statewide environmental education curriculum is prescribed in Wisconsin.

Cuts to Environmental Education

As part of the 2016–2017 state budget, the legislature eliminated the Wisconsin Environmental Education Board (WEEB) effective June 30, 2017. WEEB's four central purposes were: to provide positive leadership, advocacy, and policy making in environmental literacy and education; to support the development of local leaders and citizens to become environmentally aware and concerned; to advocate the development and implementation of interdisciplinary environmentally based curricula at all levels; and to support the continuing professional development of educators to enable them to accomplish needed environmental education goals.

The DNR also eliminated science educator and communications positions. These were important resources for citizens who had questions about specific environmental issues as well as key resources for informal educators (e.g. Scout troop leaders).

↑ New Opportunities

There are ongoing opportunities to discuss and support environmental education resources in state budgets and local programming.

Research and Data Analysis

→ Moving Forward

Bioenergy and Electricity Systems Research

This year marks the ten-year anniversary of the creation of the three federally funded bioenergy research centers (BRCs): the BioEnergy Science Center at the Oak Ridge National Laboratory, the Joint BioEnergy Institute at Lawrence Berkeley National Laboratory, and the Great Lakes Bioenergy Research Center (GLBRC) at the University of Wisconsin–Madison (with Michigan State University as a major partner). The centers were formed to focus on producing biofuels from cellulosic biomass—wood, grasses, and inedible plants—and their hallmarks include multidisciplinary researchers including ecologists, engineers, plant biologists, microbiologists, computational scientists, and chemists. The centers’ research has developed a portfolio of bio-based products, chemicals, fuels, and tools for the biofuel industry. In 2015, the three centers developed over five hundred invention disclosures along with 317 patent applications and 129 intellectual property licenses. BRC research is supported by the U.S. Department of Energy’s Office of Science.

The Wisconsin Energy Institute (WEI), which houses the GLBRC, is located on the UW–Madison campus. WEI focuses research on electricity systems, transportation and fuels, and energy and society. Interdisciplinary research has led to many spin-off or correlated discoveries. For example, research into biomass for fuels and chemicals has led to many discoveries benefitting traditional industry such as the paper and pulp sector. WEI’s work in the electricity systems sector has included partnerships with industries such as Johnson Controls to look at improvements in energy storage and next-generation battery vehicles. The WEI high-bay laboratory is the center for battery storage and microgrid research.

Midwest Energy Research Consortium

Wisconsin may be well positioned to take on leadership in energy technology innovation. The state has several industry leaders in what is called the energy, power, and control (EPC) space. Further, many of these companies are already organized under the Midwest Energy Research Consortium (M–WERC). This group formed in Wisconsin in 2009 to coordinate the existing industry cluster in the EPC space, and it eventually expanded throughout the Midwest. A collaboration of universities and industrial companies, M–WERC began its research and technology focus in the areas of distributed energy resources (DERs) including microgrids, building efficiency, energy storage, biofuels, renewable energy, and the energy-water nexus. M–WERC’s goal is to make the Midwest Region the leader in energy, power, and control; to reach that goal it focuses on four major sectors: generation and transmission, distribution and storage, automation and conversion, and efficiency and conservation. M–WERC is organized around five mission activities and committees, including technology innovation, market and industry expansion, public policy support, workforce development, and organization development and strategic collaboration.

← Falling Behind

Cuts in Funding to Public Universities

In 2015, Governor Walker and the state legislature eliminated \$3.5 million in state funding requested for two years of operations and research at the Wisconsin Energy Institute. Overall budget cuts to the University of Wisconsin System have undermined Wisconsin’s research and leadership capacity, placing the state at a competitive disadvantage in retaining and attracting top faculty and researchers.

Moving Away from Science and Public Educational Resources

← Falling Behind

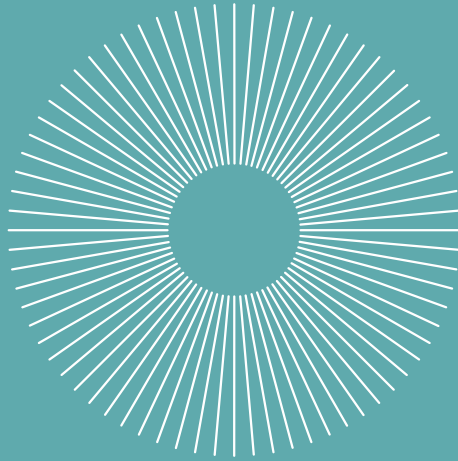
In late 2016, the Wisconsin DNR replaced language on its website describing human-caused climate change with a vague description of a changing earth and natural cycles. In recent years, the state agency has been wary of the topic of climate change. While this latest move is not surprising, it does represent another step away from embracing scientific evidence and educating both state leaders and the public about human-driven climate change.

Conclusions

Our state and world have seen many changes since the *Climate Forward* report was published in 2014. This 2017 update has summarized areas of notable progress, setbacks, and new opportunities over the intervening years.

Local leaders are stepping up to support and implement efficiency improvements and renewable energy installations. While the benefits of these efforts are already being enjoyed by some communities across Wisconsin, these actions can be replicated and expanded in many other areas. Businesses and utilities, too, are planning for a low-carbon future, recognizing that investments in renewable energy can satisfy both customer and bottom line. Implementing a carbon price can aid communities and businesses alike in making informed decisions and anticipating global market trends. The energy industry itself is changing, and energy sources formerly categorized as “alternative”—solar, wind, and bioenergy—are going mainstream. As the cost of solar energy continues to drop, demand for new solar installations will continue to grow across the state.

Despite these developments, Wisconsin is missing a number of opportunities to support policy, investment, and education that could further advance us on our path toward a clean energy future. Through bottom-up leadership, smart planning, increasingly favorable economics, and the drive to build thriving and just communities, we are making significant strides. By seizing further opportunities—public and private, local and state, voluntary and regulated—Wisconsin can make further progress and gain momentum in the coming years, moving ever Forward in building a sustainable future.



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