

COMMUNITY-LED CLEAN ENERGY

THE ENERGY FAIR – JUNE 21, 2019

MICHAEL VICKERMAN – RENEW WISCONSIN





Member Sustainable Madison Committee



ABOUT MICHAEL VICKERMAN



Policy Director

OUTLINE OF PRESENTATION

State energy policy supports local actions

- Renewables muscle into the mainstream
- Setting the stage for local action
- Local initiatives
 - Madison/Middleton/Chequamegon Bay area
- Solar group purchase programs
- Forward purchase of RE credits (MSN)
- Challenges to achieving net zero carbon (environmental, political and engineering)



WIS. STATS. 1.12 - STATE ENERGY POLICY

(5) MEETING ENERGY DEMANDS.

(a) In designing all new and replacement energy projects, a state agency or local governmental unit shall rely to the greatest extent feasible on energy efficiency improvements and renewable energy resources, if the energy efficiency improvements and renewable energy resources are cost-effective and technically feasible and do not have unacceptable environmental impacts.

WIS. STATS. 1.12 - STATE ENERGY POLICY

(b) To the greatest extent cost-effective and technically feasible, a state agency <u>or local governmental unit</u> <u>shall design</u> all new and replacement energy projects following the priorities listed in sub. (4).

- (a) Energy conservation and efficiency
- (b) Noncombustible renewable energy resources.
- (c) Combustible renewable energy resources.
- (cm) Advanced nuclear energy
- (d) Nonrenewable combustible energy resources

The conclusion is clear: There are no external barriers to local pursuit of clean energy actions, so long as:

- The actions undertaken can be justified on the basis of cost and feasibility; and
- The actions are consistent with Wisconsin public utility law.



THE FEDERAL GOVERNMENT MAY BE PARALYZED, BUT THE TRANSITION IS UNDERWAY AND GATHERING MOMENTUM IN MANY POCKETS OF U.S. SOCIETY



"I hear wind turbines cause cancer"



"Idiotic!"



100% renewable energy by 2030

Rep. Alexandria

Ocasio-Cortez

"Dingbat idea of the century!"



Stephen Moore

NATIONAL AND STATE PICTURE SOLAR AND WIND

WIND

Wind to Surpass Hydro as No. 1 US Renewable Power Source in 2019

Meanwhile, coal will keep losing.

JULIAN SPECTOR JANUARY 15, 2019





PSC Approves 5-fold Solar Expansion in Wisconsin

by Tyler Huebner | Apr 11, 2019 | Public Service Commission, Renewables, Solar, Utilities

Today at its Open Meeting, the Wisconsin Public Service Commission approved five interrelated cases that will lead to a five-fold expansion of solar energy in Wisconsin.



300 kW solar parking canopy - Milwaukee

U.S. Annual and Cumulative Wind Power Capacity Growth



Note: Utility-scale wind capacity includes installations of wind turbines larger than 100-kW for the purpose of the AWEA U.S. Wind Industry Quarterly Market Reports. Annual capacity additions and cumulative capacity may not always add up due to decommissioned and repowered wind capacity. Wind capacity data for each year is continuously updated as information changes. AWEA did not track quarterly activity prior to 2008.

American Wind Energy Association | U.S. Wind Industry First Quarter 2019 Market Report | AWEA Member Version



There are now 64.2 GW of installed solar capacity in the U.S. - enough to power more than 12.3 million homes





#Solar accounted for 29% of all NEW electric capacity installed in 2018





WIND: **V66**%



SOLAR: ▼ 85%



Sisters of St. Agnes Solar Array Fond du Lac, WI

Wind and solar is cost-effective in WI

PERMITS ISSUED FOR 500 MW OF UTILITY-SCALE SOLAR POWER



April 11 · ② · 🚱



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Badger Hollow Permit Approved

April 11

Thank you Badger Hollow Solar Farm advocates. Our application was unanimously approved by the Public Service Commission of Wisconsin 2-0 today. We couldn't have done it without your support and enthusiasm.

This solar project will bring the Badger State a brighter future for years to come. Thank you to all of those who wrote letters of support, attended informational meetings, and like our page. Keep following us for updates during the next phase of the project!





HOMEGROWN ENERGY

Chances are you know someone who is working to advance Wisconsin's clean energy landscape. Tim Parker, a member of Operating Engineers Local 139, operated a bulldozer during construction of the Quilt Block Wind Farm in Southwest Wisconsin.

Wisconsin's clean energy industry employs more than 75,000 workers – more than all the waiters, waitresses, computer programmers, lawyers and web developers in the state combined. Renewable energy boosts local economies and creates jobs with homegrown energy made right here in Wisconsin.

RENEWABLE ENERGY HOMEGROWN • HEALTHY • SMART



For more information, visit www.renewwisconsin.org



SMART ENERGY

Did you know the cost of installing solar has dropped by more than 70% since 2010? That's why citizens, businesses, nonprofits and power companies all across Wisconsin are making the smart choice to switch to solar power.

RENEWABLE ENERGY HOMEGROWN • HEALTHY • SMART



Learn more at www.renewwisconsin.org



HOMEGROWN ENERGY

Chances are you know someone who is working to advance Wisconsin's clean energy landscape. Brodie Dockendorf worked construction for eight years, including masonry and servicing forklifts and cranes. Now he manages operation of the Quilt Block wind farm in Southwest Wisconsin.

Wisconsin's clean energy industry employs more than 75,000 workers – more than all the waiters, waitresses, computer programmers, lawyers and web developers in the state combined. Renewable energy boosts local economies and creates jobs with homegrown energy made right here in Wisconsin.

RENEWABLE ENERGY HOMEGROWN • HEALTHY • SMART



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Clean energy is a job creation engine!

ENGAGING YOUR COMMUNITY



Escuela Verde, December 2018 Milwaukee



Inside/Outside Approach



SET CLEAN ENERGY GOALS FOR GOVT. BODY

X% RE by 20___, or zero net energy by 20___

Issues:

- City operations, communitywide or both?
- Electricity only or
 - Electricity + transportation + heating?





IMPORTANT STEPS

Determine City/County's Resource Baseline

Determine Utility's Resource Baseline and Trend Line





Now = 2018

Xcel has set its own timetable for expanding its reliance on renewables and decarbonizing its generation portfolio.



MIDWEST ENERGY NEWS

LOCAL GOVERNMENT

By Kari Lydersen March 24, 2017

Wisconsin's capital city sets a high bar with ambitious renewable energy goal – 100% RE by 2030



Madison, Wisconsin committed to getting **100 percent of its energy from clean, renewable sources** in a resolution passed unanimously by the City Council on Tuesday. It became the **24th city** to make such a promise.



Note: Covers City of Madison operations, including transportation and heating.

City of Madison's Story

June 2014	MGE proposes radical rate restructuring; municipalities (e.g., Madison) intervene in rate case; Repower Madison forms
April 2015	Sustainable Madison Committee (SMC) forms working group to craft energy plan for City
June 2016	Common Council adopts SMC-developed energy workplan; SMC initiates review of City's energy goals
Dec. 2016	SMC advances revised energy goals; alders sponsor 100% RE/net zero carbon resolution for City operations + MSN community
March 2017	City adopts 100% RE/net zero carbon resolution; allocates \$250K to hire consultant (SEG) to recommend timetables for City operations + MSN community; authorizes MOU between City + MGE
Sept. 2017	City approves Memorandum of Understanding with MGE
March 2019	City approves timetable for reaching 100% RE/net zero carbon (2030)

OTHER LOCAL GOVTS.WITH CLEAN ENERGY GOALS

- City of Eau Claire
- City of Fitchburg
- City of Middleton
- City of Monona
- County of Eau Claire



PURPOSE OF MEMORANDUM OF UNDERSTANDING W/ LOCAL UTILITY

Municipality's perspective: Achieve its clean energy/climate goals more quickly and more broadly

Utility's perspective: Obtain municipality support and collaboration to increase probability of achieving its own clean energy/resource diversification goals



AREAS OF COLLABORATION

Expansion of solar

- Electric vehicles (municipal fleets + buses)
- ✓Energy efficiency (help with benchmarking)



PATHWAYS FOR 100% RENEWABLE ELECTRICITY

- Self-supply (behind the meter)
- Purchase output from an off-site solar project and have it flow into your facilities (e.g., MGE's Renewable Energy Rider service)
- Subscribe to the output of an off-site solar project that provides power to the utility grid (e.g. MGE's Shared Solar service)
- Purchase RECs renewable energy certificates (a form of project financing (from RE project owners)

Solar Powering Municipal Operations, City of Madison





Traffic Engineering

Municipal Well

New solar panels placed on top of Beaver Dam city hall

CHRIS HIGGINS chiggins@wiscnews.com Oct 25, 2018 🔍 0



Solar panels installed at Beaver Dam police station

CHRIS HIGGINS chiggins@wiscnews.com May 15, 2019 🔍 0



MGE Announces Plans to Expand Innovative Shared Solar Program

Second array opens community solar program to more customers, advances clean energy goals.

Shared Solar Expansion

MGE proposing expansion of innovative Shared Solar program.

New project would be a 5-megawatt array at Middleton's Morey Field.

Shared Solar subscribers obtain up to 50% of their annual electric needs from local solar generation.

Voluntary program to serve residential and business electric customers.

Middleton solar array would also supply:

- City of Middleton
- Middleton-Cross Plains School District

What other Dane County municipalities are doing



Middleton Use TIF financing to advance solar

Fitchburg Solarizing municipal operations



Dedication ceremony, Vernon Electric Cooperative community solar array June 26, 2014



First WI utility foray into solar energy

2018 Wisconsin Solar Group Buys





Wisconsin Solar Group Buys 2018





Program	Participants	Signed contracts	Aggregate capacity (in kW)
MadiSUN	Cities of Madison/Full Spectrum Solar/Midwest Solar Power/RENEW Wisconsin	21	98
Glacial Heritage Solar	MREA, Heart of the City, Sustain Jefferson, Full Spectrum Solar	18	139
Cheq Bay Renewables Solar Group Buy	Cheq Bay Renewables, Nex Energy Solution	85	552
Solar Central Wisconsin	MREA, Mid-State Technical College, North Wind Renewable Energy Co-op	32	177
Solar Sauk County	MREA, Sauk County Climate Awareness and Action, Eagle Point Solar, All-Sky Energy	67	448
Solar SE Wisconsin	Great Lakes Community Conservation Corp., Arch Electric	12	88
Sierra Club Group Buy	Sierra Club-John Muir Chapter, SunVest	21	154
Total		256	1,651







Solar Group Buy Field Day at Highland Valley Farm • Bayfield

June 10. 2018



2018 Wisconsin Solar Group Buys





CHEQUAMEGON BAY RENEWABLES

Washburn Solar Project www.cheqbayrenewables.org





energy.gov/sunshot



Bayfield Solar Garden – 300 kW

Iron River, WI Energized 10/2016

CBR was the lead organizer of this project!





PLANNING AND FEASIBILITY ANALYSIS MUNICIPAL SOLAR PROJECTS

- Initial participants (2017): City of Washburn, Bayfield County, City of Washburn, Washburn School District, and Bayfield County Housing Authority
- New participants, (Jan. 2018)): City of Bayfield, Bayfield School District, and the Greater Bayfield Waste Water Treatment Plant. Preliminary feasibility studies were also undertaken for the tribes of Red Cliff and Bad River in separate projects.
- This project will demonstrate how local investors can cost-effectively finance solar energy so there is no upfront cost to these government entities. The model developed from this pilot project will inform other municipalities, schools, or tribes looking to go solar. Bayfield Housing Authority, and the Washburn School District to incorporate solar PV for approximately 18 municipal sites.
- Construction to begin summer 2019.





ORGANIC VALLEY: WISCONSIN'S NO. 1 PURCHASER OF RENEWABLE ENERGY CERTIFICATES – 12 MW

Organic Valley distribution center, Cashton, WI



What: A proposal to the City of Madison to finance the construction of 14 MWdc of solar generation in western Wisconsin.



The Participants

Developer/Owner: OneEnergy Renewables

Financing Entity #1:

Five WI municipal utilities

Financing Entity #2:

City of Madison



The Arrangement

- OneEnergy Renewables has contracts with five municipal electric utilities to supply them with electricity from new solar arrays w/in their service boundaries
- Agreed-upon price is ~90% of what's needed to fully finance the projects and start construction
- The remainder of the financing can be supplied through a forward purchase of unbundled renewable energy credits (REC's)
- ➢Under this arrangement, the first project financing entity receives 100% of the physical product and the second project financing entity receives 100% of the unbundled REC's



Project Performance

Aggregate capacity:14 MWdcEstimated output (Year 1)20,910 MWHEstimated output (Year 25)18,540 MWH1Total output after 25 years493,450 MWH

Percentage on average of City's annual use: 37.2%

Assumes a degradation rate of 0.5%/year



Solar Project Financing Proposal - Sustainable Madison Committee



ARRAY LOCATIONS

	Municipality	Capacity	Nearest Coal Plant	
	Argyle	I.I MW	Columbia	
	Cumberland	3.4 MW	A.S. King	
	Elroy	2.0 MW	Columbia	
	Fennimore	4.1 MW	Columbia	
	New Lisbon	3.4 MW	Columbia	
	Cumberland New Lisbon	Luth Byledd Carlos Carl	A.S. Power Escanabal Murke Sturgeon Bay Kewaune Tho Rivers Colum Ener Com	King ^ Plant nbia rgy ter
NSIN	Elroy Fennimore Waverby Argyle	Ula Crocco Ston Uroqua Decorah Praintega	Bend D Norton St auwatosa Milwaukee Kenosha North Chicago	

CONTRACT TERMS AND PRICING

Five arrays \rightarrow five up-front purchases for 25 years of RECs Contracts staggered \rightarrow one per year starting in 2019 Total cost of contracts with OneEnergy \rightarrow \$1,396,000 Nominal cost of RECs \rightarrow \$4.75/MWH (0.47 cents/kWh) Levelized cost of RECs¹ \rightarrow \$2.83/MWH (0.28 cents/kWh)

¹Assumes a 6% discount rate



VALUE TO CITY

QUICKEST way to acquire new renewable sources of electricity

Supports rural WI communities

Very cost-effective arrangement for larger-scale commitments to renewables



Other Muncipalities Purchasing REC's

<u>Municipality</u>	Percent of RE Use from REC's
Montgomery County (MD)	100%
Portland (OR)	92%
Forest County Potawatomi (W	/I) 99%
Columbus (OH)	77%
Boston (MA)	100%

Solar Project Financing Proposal - Sustainable Madison Committee

The Environmental Challenge, in a Nutshell

- The global economy still runs on CO2-rich fossil fuels.
- We have hugely overshot the atmosphere's capacity to absorb CO2, humanity's No. 1 waste product by weight.





Wroclaw, Poland - May 2019



Reddy Kilowatt has a response to local governments -- let's electrify everything and put that





renewable

energy to

work!

Epic Systems, Verona

Examples: Streetcars (above) Electric heating and cooling for buildings using geothermal systems (left and below)



Largest district geothermal system in Wisconsin

Renewably powered transportation the U.S. is way behind

Electric transport in **Berlin** (April 2019)









Electric transport in **Chicago** (April 2019)



Believe it or not, reaching 100 % renewable electricity is the easy part

Challenges to achieving net zero carbon emissions

- Global aviation
- Long-haul freight transportation
- Heating buildings--especially houses--in wintry climates
- Industrial agriculture

Something to chew on: the internet is projected to consume 1/5th of the world's electricity by 2025

Final Thoughts





Walnut Way/Alice's Garden solar ribbon-cutting, April 2019, Milwaukee

Dane County biodigester ribbon-cutting, April 2019, Madison

What do these celebrations have in common besides renewable energy? Local governments made them happen. For those wishing to take meaningful action on climate change, start by lighting a fire under your local government.

Questions?

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