COMMUNITY-LED CLEAN ENERGY

THE ENERGY FAIR – JUNE 21, 2019

MICHAEL VICKERMAN – RENEW WISCONSIN
ABOUT ME

- Member
- Sustainable Madison Committee

**WHERE I LIVE**

ABOUT MICHAEL VICKERMAN

**Where I live**

Member
Sustainable Madison Committee

**Where I live**

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)
(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.
(b) To the greatest extent cost-effective and technically feasible, a state agency or local governmental unit shall design 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

“Dingbat idea of the century!”

Rep. Alexandria Ocasio-Cortez

Stephen Moore
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.
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 & solar costs have decreased dramatically since 2009.

**Wind: ▼ 66%**

Quilt Block Wind Farm
Darlington, WI

**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

Badger Hollow Solar Farm
April 11

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!
CLEAN ENERGY

Clean energy is a job creation engine!

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.

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.

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

For more information, visit www.renewwisconsin.org

Learn more at www.renewwisconsin.org

Clean energy is a job creation engine!
ENGAGING YOUR COMMUNITY

Escuela Verde, December 2018
Milwaukee
Inside/Outside Approach

Legislative body sets policy + budgets

Staff guides and implements policy

Administrative staff

Legislative body (sustainability committee)

Constituent pressure determines level of priority for action

Community groups

Volunteers from community assist staff
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?
Local clean energy hot spots

**Ashland/Bayfield**

**Eau Claire (city + county)**

**Dane County (cities of Fitchburg, Madison, Middleton and Monona)**

**Sauk County**
Determine City/County’s Resource Baseline

Determine Utility’s Resource Baseline and Trend Line
Xcel has set its own timetable for expanding its reliance on renewables and decarbonizing its generation portfolio.

Now = 2018

Reducing Carbon Affordably
Upper Midwest Energy Mix

Now
- 25% renewable
- 55% carbon-free

2021
- 40% renewable
- 67% carbon-free

Wind 30%
Solar 2%
Coal 27%
Natural Gas 6%
Other 8%
Nuclear 27%
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.

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

Note: Covers City of Madison operations, including transportation and heating.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2014</td>
<td>MGE proposes radical rate restructuring; municipalities (e.g., Madison) intervene in rate case; Repower Madison forms</td>
</tr>
<tr>
<td>April 2015</td>
<td>Sustainable Madison Committee (SMC) forms working group to craft energy plan for City</td>
</tr>
<tr>
<td>June 2016</td>
<td>Common Council adopts SMC-developed energy workplan; SMC initiates review of City’s energy goals</td>
</tr>
<tr>
<td>Dec. 2016</td>
<td>SMC advances revised energy goals; alders sponsor 100% RE/net zero carbon resolution for City operations + MSN community</td>
</tr>
<tr>
<td>March 2017</td>
<td>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</td>
</tr>
<tr>
<td>Sept. 2017</td>
<td>City approves Memorandum of Understanding with MGE</td>
</tr>
<tr>
<td>March 2019</td>
<td>City approves timetable for reaching 100% RE/net zero carbon (2030)</td>
</tr>
</tbody>
</table>
OTHER LOCAL GOVTS. WITH CLEAN ENERGY GOALS

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

Madison owns 556 kW of PV capacity today.
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

<table>
<thead>
<tr>
<th>Program</th>
<th>Participants</th>
<th>Signed contracts</th>
<th>Aggregate capacity (in kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MadiSUN</td>
<td>Cities of Madison/ Full Spectrum Solar/ Midwest Solar Power/RENEW Wisconsin</td>
<td>21</td>
<td>98</td>
</tr>
<tr>
<td>Glacial Heritage Solar</td>
<td>MREA, Heart of the City, Sustain Jefferson, Full Spectrum Solar</td>
<td>18</td>
<td>139</td>
</tr>
<tr>
<td>Cheq Bay Renewables Solar Group Buy</td>
<td>Cheq Bay Renewables, Nex Energy Solution</td>
<td><strong>85</strong></td>
<td><strong>552</strong></td>
</tr>
<tr>
<td>Solar Central Wisconsin</td>
<td>MREA, Mid-State Technical College, North Wind Renewable Energy Co-op</td>
<td>32</td>
<td>177</td>
</tr>
<tr>
<td>Solar Sauk County</td>
<td>MREA, Sauk County Climate Awareness and Action, Eagle Point Solar, All-Sky Energy</td>
<td>67</td>
<td>448</td>
</tr>
<tr>
<td>Solar SE Wisconsin</td>
<td>Great Lakes Community Conservation Corp., Arch Electric</td>
<td>12</td>
<td>88</td>
</tr>
<tr>
<td>Sierra Club Group Buy</td>
<td>Sierra Club-John Muir Chapter, SunVest</td>
<td>21</td>
<td>154</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>256</strong></td>
<td><strong>1,651</strong></td>
</tr>
</tbody>
</table>
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
Bayfield Solar Garden – 300 kW

Iron River, WI
Energized
10/2016

CBR was the lead organizer of this project!
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 within 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 MWdc
Estimated output (Year 1) 20,910 MWH
Estimated output (Year 25) 18,540 MWH\(^1\)
Total output after 25 years 493,450 MWH

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

\(^1\)Assumes a degradation rate of 0.5%/year
# ARRAY LOCATIONS

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Capacity</th>
<th>Nearest Coal Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argyle</td>
<td>1.1 MW</td>
<td>Columbia</td>
</tr>
<tr>
<td>Cumberland</td>
<td>3.4 MW</td>
<td>A.S. King</td>
</tr>
<tr>
<td>Elroy</td>
<td>2.0 MW</td>
<td>Columbia</td>
</tr>
<tr>
<td>Fennimore</td>
<td>4.1 MW</td>
<td>Columbia</td>
</tr>
<tr>
<td>New Lisbon</td>
<td>3.4 MW</td>
<td>Columbia</td>
</tr>
</tbody>
</table>

![Map showing locations](image)
Five arrays → five up-front purchases for 25 years of RECs
Contracts staggered → one per year starting in 2019
Total cost of contracts with OneEnergy → $1,396,000
Nominal cost of RECs → $4.75/MWH (0.47 cents/kWh)
Levelized cost of RECs\(^1\) → $2.83/MWH (0.28 cents/kWh)

\(^1\)Assumes 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 Municipalities Purchasing REC’s

<table>
<thead>
<tr>
<th>Municipality</th>
<th>Percent of RE Use from REC’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Montgomery County (MD)</td>
<td>100%</td>
</tr>
<tr>
<td>Portland (OR)</td>
<td>92%</td>
</tr>
<tr>
<td>Forest County Potawatomi (WI)</td>
<td>99%</td>
</tr>
<tr>
<td>Columbus (OH)</td>
<td>77%</td>
</tr>
<tr>
<td>Boston (MA)</td>
<td>100%</td>
</tr>
</tbody>
</table>
The Environmental Challenge, in a Nutshell

1) The global economy still runs on CO2-rich fossil fuels.

2) We have hugely overshot the atmosphere’s capacity to absorb CO2, humanity’s No. 1 waste product by weight.

William Rees: “Climate change is fundamentally a waste management issue.”

Wroclaw, Poland - May 2019
Reddy Kilowatt has a response to local governments -- let’s electrify everything and put that renewable energy to work!

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

Epic Systems, Verona

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)

Tesla dealership
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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