COMMUNITY-LED CLEAN ENERGY

THE ENERGY FAIR – JUNE 15, 2018

MICHAEL VICKERMAN – RENEW WISCONSIN

RENEW WISCONSIN

ABOUT MICHAEL VICKERMAN

- Program and Policy Director, RENEW Wisconsin
- Member, Sustainable Madison Committee

Where I Live

OUTLINE OF PRESENTATION

- State energy policy supports local actions
  - Renewables taking over
  - Local action v. utility actions
- Local initiatives
    - Madison
    - Dane County, Middleton, Fitchburg
    - Chequamegon Bay area
- Solar group purchase programs
- Innovative arrangements – forward purchase of RE credits (MSN)

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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 **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.

SET CLEAN ENERGY GOALS FOR GOVT. BODY

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

Issues:

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

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IMPORTANT STEPS

- **Determine City/County's Resource Baseline**
- **Determine Utility's Resource Baseline and Trend Line**

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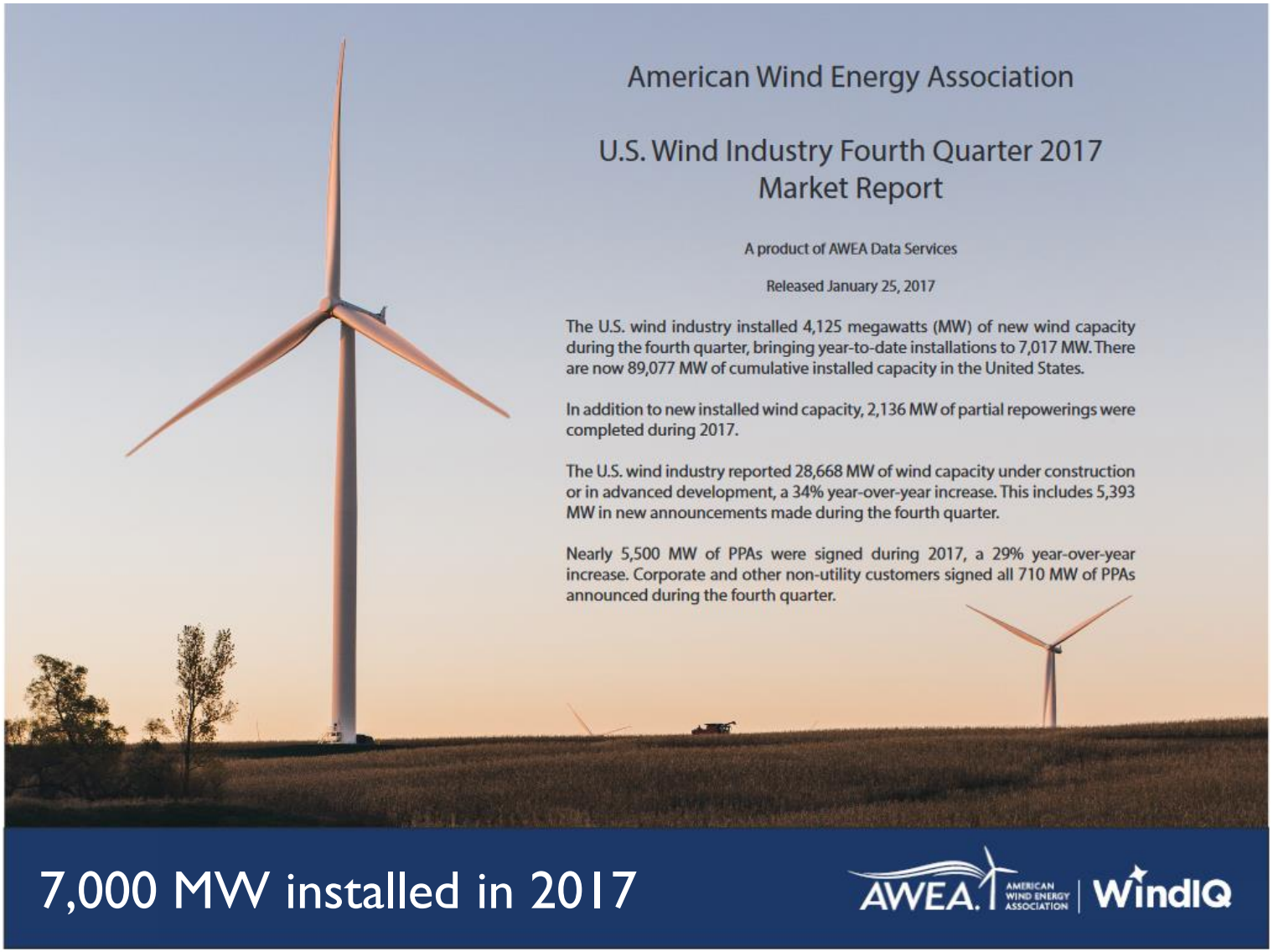
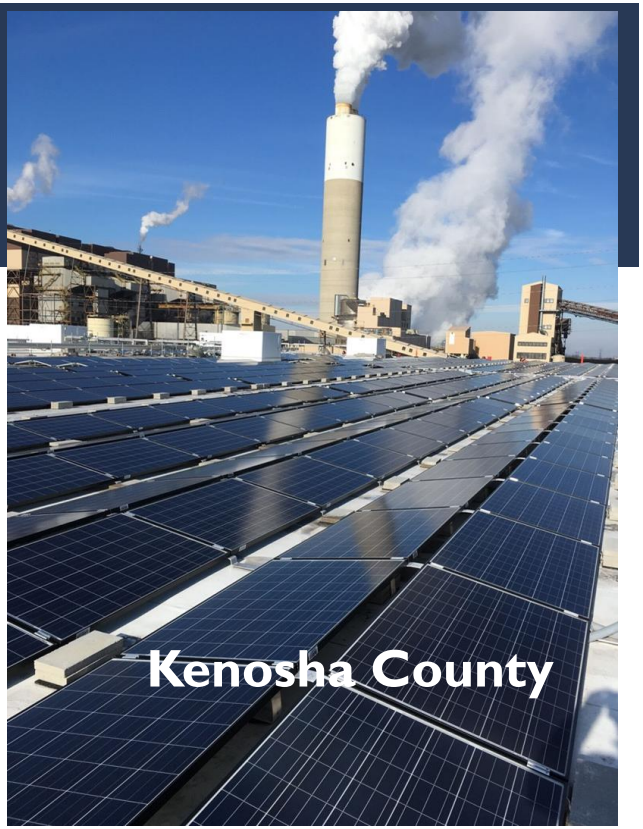

American Wind Energy Association
U.S. Wind Industry Fourth Quarter 2017 Market Report
A product of AWEA Data Services
Released January 25, 2017
The U.S. wind industry installed 4,125 megawatts (MW) of new wind capacity during the fourth quarter, bringing year-to-date installations to 7,017 MW. There are now 89,077 MW of cumulative installed capacity in the United States.
In addition to new installed wind capacity, 2,136 MW of partial repowerings were completed during 2017.
The U.S. wind industry reported 28,668 MW of wind capacity under construction or in advanced development, a 34% year-over-year increase. This includes 5,393 MW in new announcements made during the fourth quarter.
Nearly 5,500 MW of PPAs were signed during 2017, a 29% year-over-year increase. Corporate and other non-utility customers signed all 710 MW of PPAs announced during the fourth quarter.
7,000 MW installed in 2017
AWEA
AMERICAN WIND ENERGY ASSOCIATION
WindIQ

WIND AND SOLAR ARE BOOMING



WIND & SOLAR ARE ON THE HORIZON IN WISCONSIN

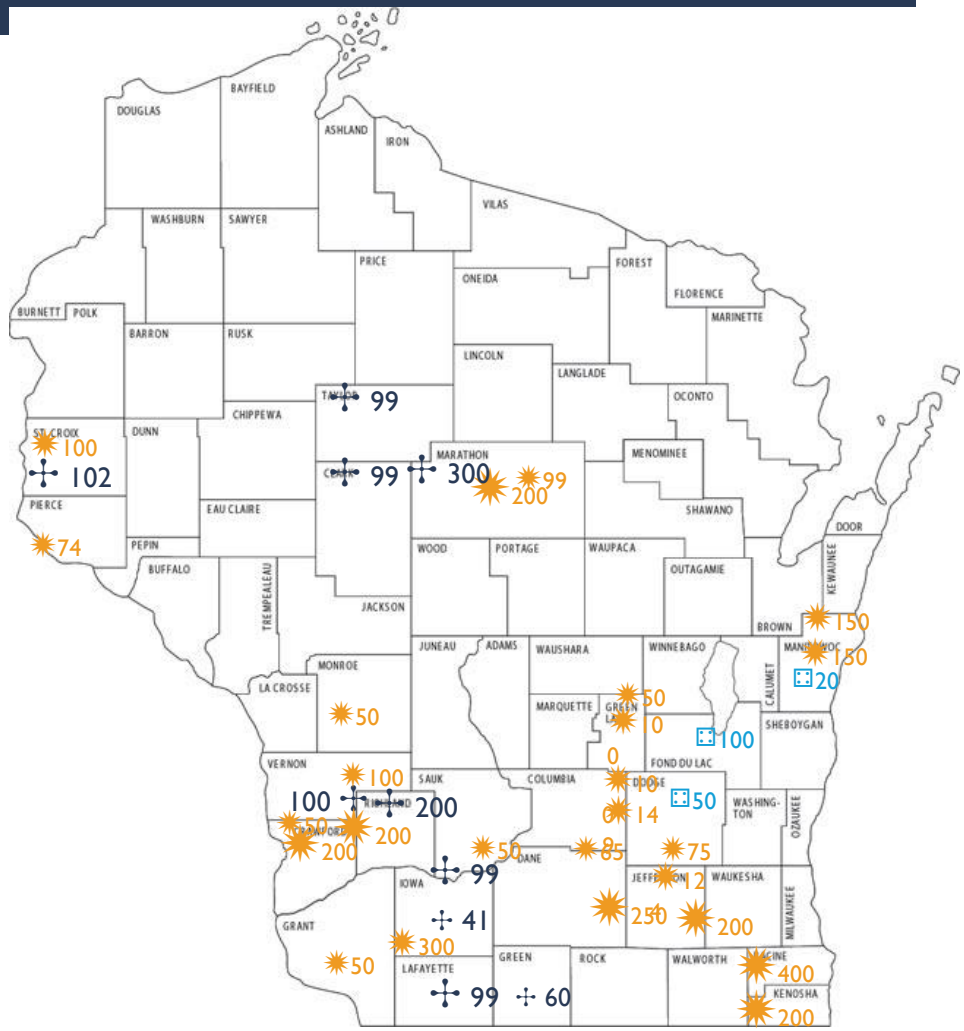
Wisconsin Solar & Wind in April 2018 MISO Queue:

3,460 MW Solar

1,300 MW Wind

170 MW Battery

Numbers in map denote project size in megawatts



If all this were built:

7.6% Solar

+6.7% Wind

23% Total Renewables

$19 million to local governments and ~$25 million to landowners annually

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Business

DOW 24,415.84 ▼ 251.94 S&P 500 2,705.27 ▼ 18.74 NASDAQ 7,442.12 ▼ 20.34 10-YEAR T-NOTE 2.86 ▲ 0.01 CRUDE OIL $67.04 ▼ $1.17 GOLD $1,300.10 ▼ $1.40

Utilities to invest in solar power

$390 million project would provide enough electricity for 70,000 customers

Guy Boulton Milwaukee Journal Sentinel
USA TODAY NETWORK – WISCONSIN

Two of the state's largest utilities plan to invest a total of $390 million in two solar power projects that would be the first of their size in the state.

Wisconsin Public Service, a subsidiary of Milwaukee-based WEC Energy Group, and Madison Gas and Electric, as well as the developers of the projects, filed applications for approval with state regulators Thursday.

The two solar projects would generate a total of 300 megawatts — enough electricity for more than 70,000 residential customers — and indicate the changing economics of large-scale solar projects.

As recently as the end of 2015, the state generated a total of 25 megawatts from solar power.

"Alternative energy is not really alternative anymore," said Dan Litchfield, a director of project development for Invenergy, the developer of one of the two projects.

The projects would be built in Iowa County, near the villages of Montfort and Cobb, about 12 miles west of Dodgeville, in southwestern Wisconsin, and in the Town of Two Creeks and the city of Two Rivers, near the Point Beach nuclear power plant in northeastern Wisconsin, WPS and MGE said in a news release.

The project in Iowa County is being developed by Invenergy, a Chicago firm that develops wind and solar projects.

The project in Manitowoc and Kewaunee counties would be developed by NextEra Energy, based in Juno

See SOLAR, Page 11A

MGE will add to solar projects

'Badger Hollow' would be largest solar farm in entire Midwest

JUDY NEWMAN
jdnewman@madison.com

Madison Gas & Electric and Wisconsin Public Service, of Green Bay, say they will be partners in purchasing two solar energy projects that would be the biggest solar installations not only in Wisconsin, but throughout the Midwest.

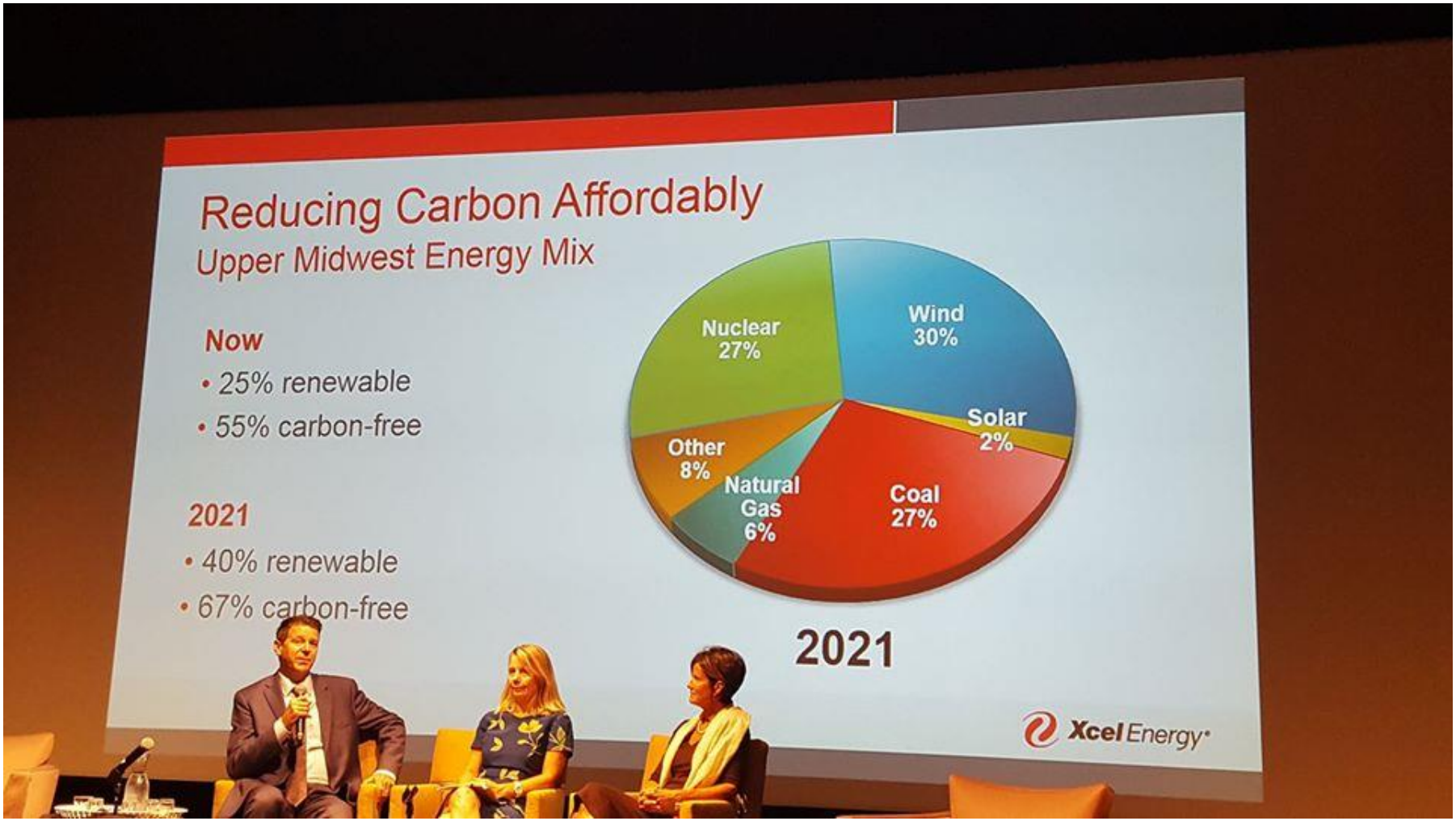
WISCONSIN STATE

DRAMA KING

LeBron James pours in 51 to lead Cavaliers into overtime, but Warriors pull away 124-114 in Game 1

PARTLY TO MOSTLY SUNNY 76 • 52 FORECAST, A

SPORTS, B



Now = 2016

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

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MidAmerican Energy Aims for 100 Percent Renewable Generation

May 1, 2017 https://www.power-eng.com/articles/2017/05/midamerican-energy-aims-for-100-percent-renewable-generation.html

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
July 2018	City approves timetable for reaching 100% RE/net zero carbon

MIDWEST ENERGY NEWS

http://midwestenergynews.com/2017/03/24/wisconsins-capital-city-sets-a-high-bar-with-ambitious-renewable-energy-goal/

Wisconsin's capital city sets a high bar with ambitious renewable energy goal

Written By
Kari Lydersen
March 24, 2017

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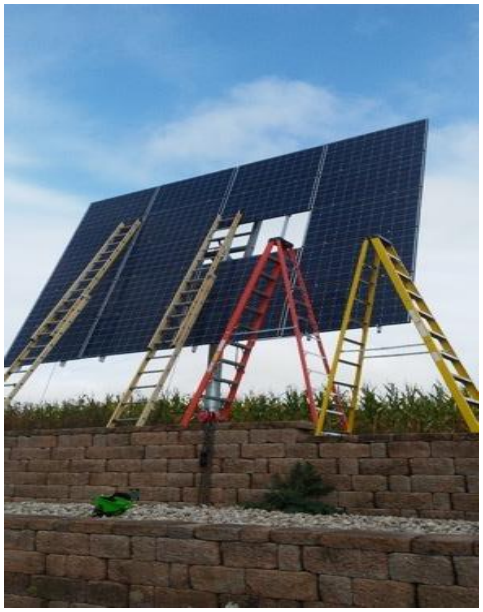
Solar Powering Municipal Operations, City of Madison

City of Madison Solar Training 2017



Location	Capacity (in kilowatts)
Streets West	99
Well #26	21.6
Fire Station #12	18.9
Total	***139.5***

Self-supply: City owns 332 kW of PV today

MADISON'S GREEN POWER APPRENTICES – 2018
180 KW OF NEW PV CAPACITY PLANNED

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BUT MADISON CAN'T GET TO 100% RE STRICTLY THROUGH SELF-GENERATION

Clearly, Madison will need to scale up solar going forward.

The City's consultant, Sustainable Engineering Group, is examining multiple solar financing/ ownership pathways for achieving its goal of 100% renewable energy/net zero carbon for its operations.

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PATHWAYS FOR 100% RENEWABLE ELECTRICITY

- Self-supply (behind the meter)
- Purchase output from an off-site renewable project through a utility tariff (e.g. MGE's Renewable Energy Rider)
- Purchase green power provided by the local utility (e.g. MGE's Middleton shared solar project)
- Purchase RECs - renewable energy certificates (a form of project financing (from RE project owners)

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

First WI utility foray into solar energy

MGE Shared Solar Project

Middleton Operations Center

552 kW DC

Energized January 2017

Shared Solar

mge®

Madison Gas and Electric

Middleton Police Dept.

97 kW DC

MIDDLETON

The Good Neighbor City

SOLAR

WHAT OTHER DANE COUNTY MUNICIPALITIES ARE DOING

Middleton
Use TIF financing to advance solar

Fitchburg
Solarizing municipal operations

Dane County eyes solar expansion

Thirty acres of panels could be installed at Dane County Regional Airport

LOGAN WROGE
lwroge@madison.com

Dane County will explore th
sibility of installing 30 acres o
panels at the Dane County Re
Airport.

The airport will partner with
to look into a project that coul
erate more than 6 megawatts o
tricity. After exploring the pot
for the project, the firm would c
solar developers to submit prop
The project would add to Dane
ty's growing profile of renewab
ergy sources.

"The future is now when it comes generating clean, renewable, home-grown energy, and I'm committed to Dane County leading the way," County Executive Joe Parisi said in a statement Thursday. "A project of this scale will

Center and the Dane County Job Center.

Even without the planned additions, the county produced almost as much power from its existing solar operations and bio-gas generators

Dane County received 5 proposals for installing up to 8 MW of solar PV airport property. Selection forthcoming.

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DANE COUNTY COUNCIL ON CLIMATE CHANGE

Participants include

Municipalities	MMSD (Sewage)
Electric utilities	UW Health
Enviro. groups	MSN Chamber
UW-Madison	Clean Energy Co.'s

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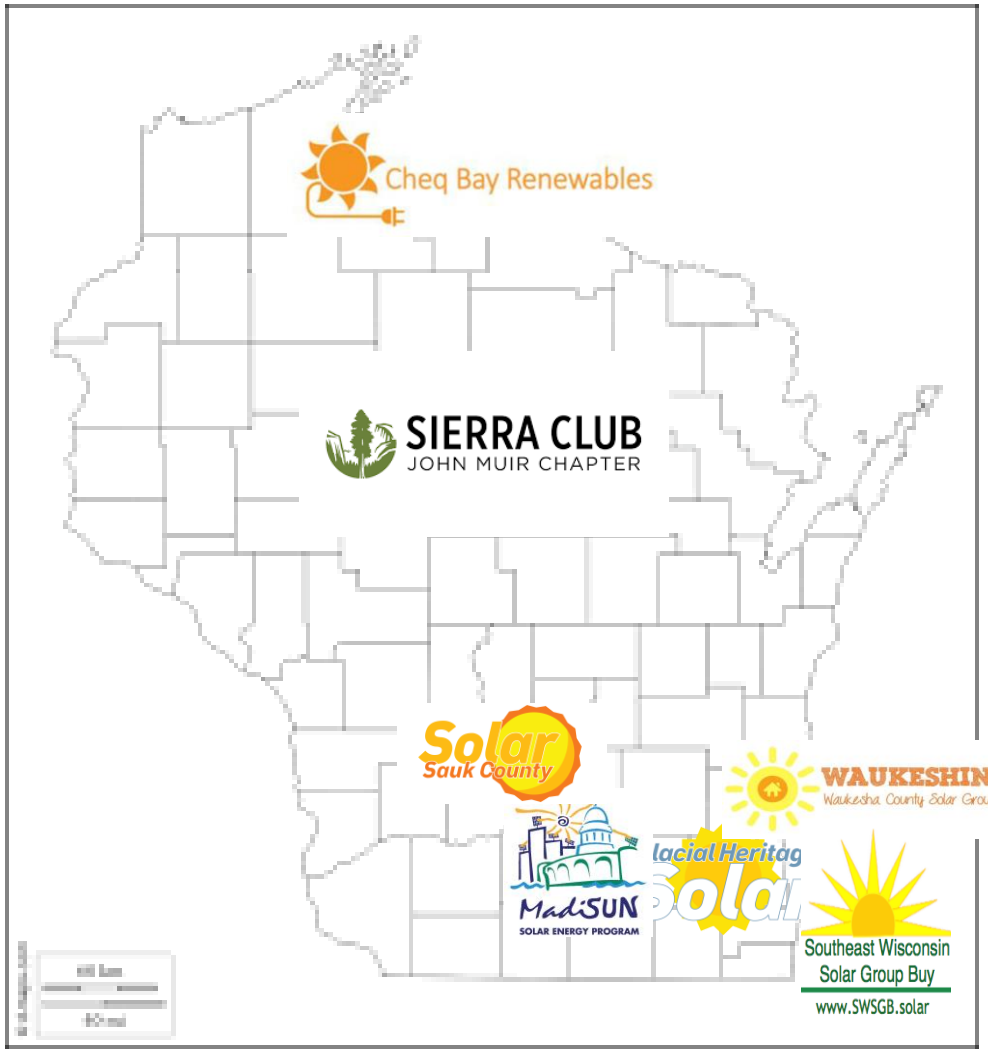
COMMUNITY - MADISON'S SOLAR GROUP BUY PROGRAM

WISCONSIN SOLAR GROUP BUYS – 2017

Program	Participants	Signed contracts	Aggregate capacity (in kW)
Solar Milwaukee/ Solar Tosa	Cities of Milwaukee and Wauwatosa/ SunVest Solar/MREA	24	121
MadiSUN	Cities of Madison and Middleton/ Full Spectrum Solar/ Midwest Solar Power/RENEW Wisconsin	38	208
Solar Central Wisconsin	Cities of Stevens Point and Wisconsin Rapids; Mid-State Tech College; North Wind Renewable Energy	46	335
Solar Iowa County	Driftless Area Land Conservancy; Solar Iowa County; UW-Extension; Eagle Point Solar	32	240
Solar Southeastern Wisconsin	Greening Greater Racine; Arch Electric	24	147
Total		**164**	**1,051**

2018 Wisconsin Solar Group Buys



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CITY OF MILWAUKEE ISSUES SOLAR RFP

- In May MKE issued RFP for 1.1 megawatts of solar generation on six municipal rooftops by end of 2018
- Developer would own project – initial investment of $1.2 million. City share would be $100,000 + $211,882 in incentives from Focus on Energy
- Milwaukee has an option to buy the system in seven years
- MKE's sustainability plan: (1) 20% reduction in energy use by 2020: (2) increase in renewable energy from 8% to 25% in 2025
- The city's annual electric bill (including MKE Water Works) is ~$13 million

CHEQUAMEGON BAY RENEWABLES

Washburn Solar Project

www.cheqbayrenewables.org

RENEW WISCONSIN

Bayfield Electric Cooperative

Your Touchstone Energy® Cooperative

Bayfield Solar Garden – 300 kW

Iron River, WI
Energized
10/2016

CBR was the lead organizer of this project!

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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

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ORGANIC VALLEY – UMMEG PARTNERSHIP

- Organic Valley had a desire to achieve 100% renewable electricity
- UMMEG utilities were interested in low-cost, local solar that would help to stabilize rates and hedge against electricity price increases
- OneEnergy had a conviction that they could achieve both goals by aggregating smaller 1-6MW projects into a larger portfolio to achieve economies of scale
- 10 projects in WI, SE MN and IA with total capacity of ~30MWdc
  - UMMEG utilities to buy energy and capacity for 25 years
  - OV to buy RECs for ~13MW for 25 years, which will bring them to 100% renewable
  - Remaining 17MW of RECs still available

OneEnergy RENEWABLES

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What: A proposal to the City of Madison to finance the construction of 14 MW 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 MWdc
Estimated output (Year 1)	20,910 MWH
Estimated output (Year 25)	18,540 MWH[1]
Total output after 25 years	493,450 MWH

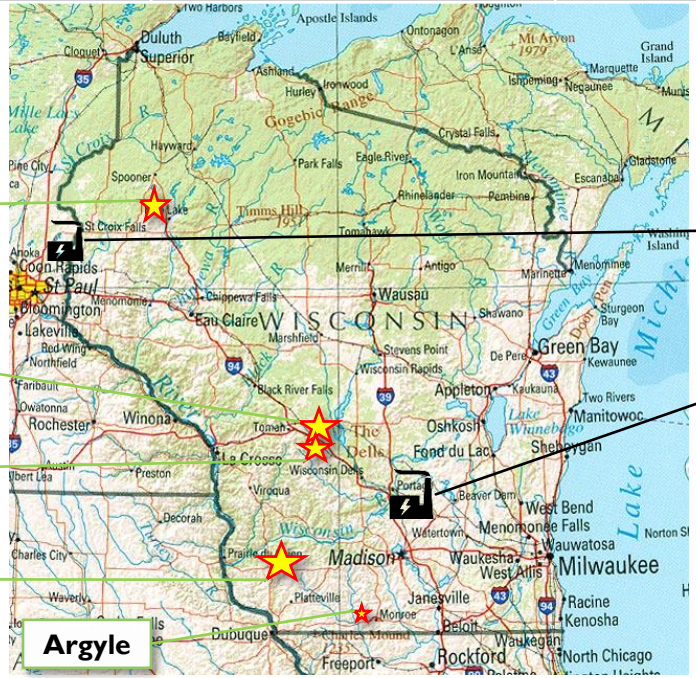
Percentage on average of
City's annual use: 37.2%

[1]Assumes a degradation rate of 0.5%/year

Solar Project Financing Proposal - Sustainable Madison Committee

ARRAY LOCATIONS

Municipality	Capacity	Nearest Coal Plant
Argyle	1.1 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



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CONTRACT TERMS AND PRICING

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

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VALUE TO CITY

- **QUICKEST** way to acquire new renewable sources of renewable electricity
- Supports rural WI communities
- Very cost-effective arrangement for large-scale commitments to renewables

Other Notable Facts

- Increases in-state solar capacity today by 15%
- 40,000 solar panels will produce enough power for 2,500 WI households
- Catalyzes nearly $20 million in clean energy investment for rural Wisconsin
- Establishes 70 acres of pollinator-friendly habitat beneath the solar arrays
- Only solar project in the pipeline right now

Other Muncipalities Purchasing REC's

Municipality	Percent of RE Use from REC's
Montgomery County (MD)	100%
Portland (OR)	92%
Forest County Potawatomi (WI)	99%
Columbus (OH)	77%
Boston (MA)	100%

Questions?

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