

Financing Solar Generation: A Municipal Perspective

**Presentation to
Madison Common Council
June 20, 2017**

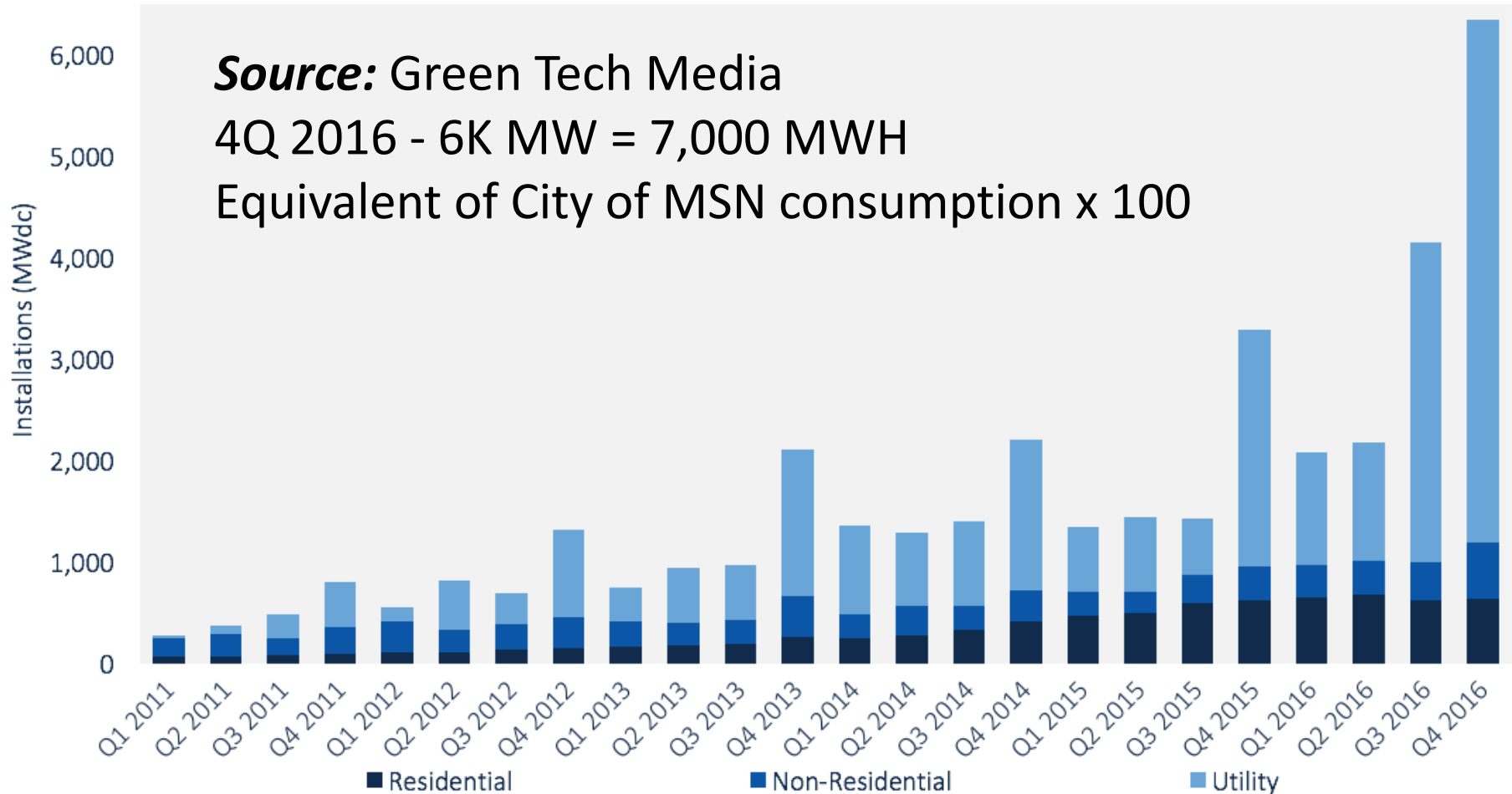
By Michael Vickerman, Member, Sustainable Committee

U.S. Solar Market Has Achieved Lift-Off

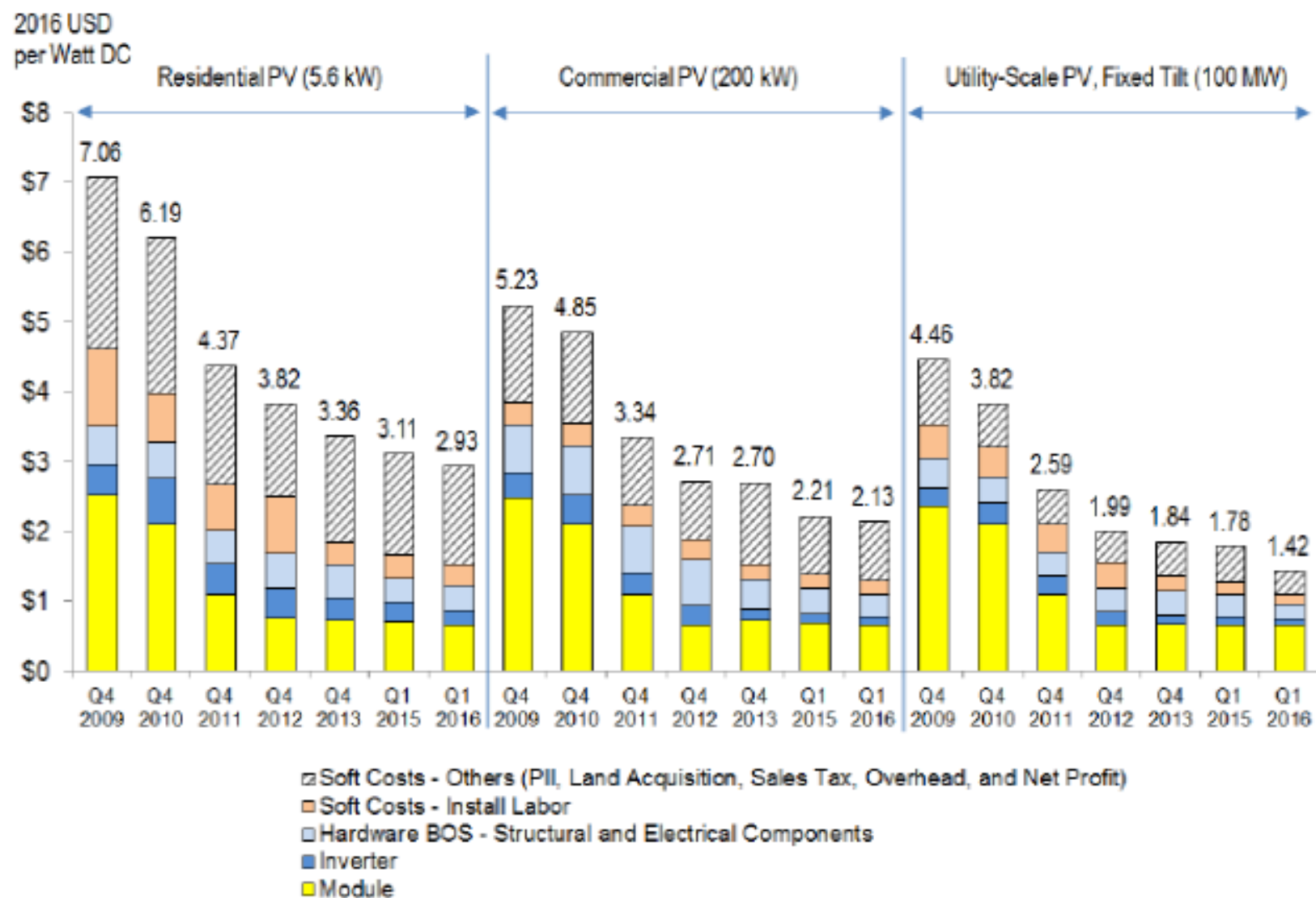
Source: Green Tech Media

4Q 2016 - 6K MW = 7,000 MWH

Equivalent of City of MSN consumption x 100



Solar project costs reductions in 2009-2016



Source: NREL's 'US solar photovoltaic system cost benchmark Q1 2016 Report.' (September 2016)

Drivers for PV Growth

Commercial + Utility Markets

- Lower installation costs
- Ramp-up in corporate purchasing
 - (IKEA, Walmart, Target)
- Federal tax policy
 - (30% investment tax credit)

About the Solar Investment Tax Credit (ITC)

- Covers 30% of total installed cost of solar generation through 2019
- ITC begins ramping down in 2020 and settles at 10% by 2022
- Must be a taxable entity to use it – governments, schools, etc. are not eligible. This includes **City of Madison**.

Important Terms and Statistics

Kilowatts (kW) measure maximum system capacity and kilowatt-hours (kWh) measure system output. One kW produces about 1,200-1,250 kWh annually.

The City of Madison consumes about 70 million kWh/year. What the City added in 2016 will account for about 0.1% of that total in 2017.

It would require about 55,000 kW of solar capacity to produce 100% of the electricity consumed by the City of Madison.

Solar Powering Municipal Operations, City of Madison

Police Training



Golf Course



Community Center



Traffic Engineering



Municipal Well



2016 Installations

Location	Capacity (in kW)
Warner Park Community Center	16.2
Yahara Hills Golf Course	18.6
Traffic Engineering Building C	8.7
MSN Police Training	19.1
Municipal Well #9	5.7
Total	68.3

These five systems will produce about 80,000 kWh/year

Madison's Solar Apprenticeship Program



***Targets unemployed/
underemployed residents.
Three more arrays
planned for 2017.***



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

The consultant to be hired by the City will examine multiple solar financing/ownership pathways for attaining its goal of 100% renewable energy/net zero carbon for its operations.

The self-supply option (behind the meter)

Offsetting energy use at the retail energy rate

- **City owns system - finances via debt issuance**
 - **Advantage #1: Exploits City's excellent bond rating**
 - **Advantage #2: City saves on electricity expenses**
 - **Advantage #3: Systems provide job training opportunities**
 - **Drawback # 1: Forfeit ITC – higher project price**
 - **Drawback # 2: This approach is constrained by the facility's specific load and net metering limitations. A city can never reach 100% RE this way.**

Self-supply

Epic Systems, Verona. At 1.8 megawatts (1,800 kW), this installation is the largest solar array operating in Dane County

A for-profit company, Epic took advantage of the 30% ITC.



Should Madison Add More City-Owned Solar Arrays?

OK, in cases where:

- Installation size is less than or equal to 100 kW
- Solar capacity is rolled into new construction or a major remodel
- Installations integrated into job training program

Problematic, in cases where:

- The solar system is larger than 100 kW
- The solar system is not a piece of a larger building project (e.g., Central Library)

Beyond a certain project size, the money left on the table by forfeiting federal tax credits becomes a serious financial disincentive to cities pursuing solar energy.

Q. How can a city overcome its inability to access of federal tax credits?

A. Partner with a third-party source of financing.

Recent Solar Projects Involving 3rd Party Investors

Project	Location	Nonprofit customer type	Capacity (in kW)	Year
Mole Lake Chippewa	Mole Lake (near Crandon)	Native American community	878	2016
Housing Initiatives	Madison	Housing for the homeless	21	2016
Zion Lutheran	Oshkosh	Faith	19	2016
Darlington School District	Darlington	Schools	156	2015/6
Forest County Potawatomi	Milwaukee, Crandon	Native American community	923	2015
City of Monona (four locations)	Monona	Local govt.	156	2013



Darlington Community School District Ribbon-cutting June 2016 156 kW, 510 panels

**Supplies 20% of district's
electricity consumption**



**Co-owned by school district
and outside investors**





MGE Shared Solar Project
Middleton Operations Center
552 kW DC



Middleton Police Dept.
97 kW DC



**MGE owns PV system
on police station.
Middleton has option
to purchase array at
some point in future.**

City of Fitchburg Solar RFP

(February 2017)

Fitchburg is looking to put solar on city properties (e.g., West Fire Station) at best possible price.

- Elements of arrangement:
 - City antes in, owns a portion of the project
 - Tax sponsor owns remainder of project
 - LLC is formed; contract specifies services to host properties, fixes monthly payments
 - Years 1-6: Host facilities receive electricity from solar systems under this co-ownership arrangement
 - Year 7: City has option to buy out tax sponsor--own the system outright--at fair market value

Madison can lead the way

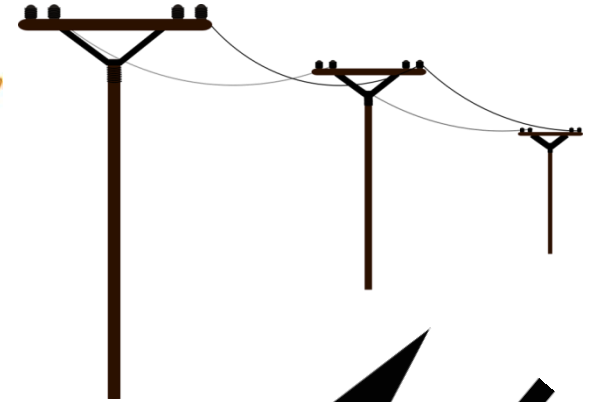
Renewable energy options available to a city that does not have its own electric utility and is located in a rate-regulated state

- **Municipal operations** (city as consumer working with MGE)
 - ❖ Off-site generation (utility shared solar project)
- **Tariffed Services**
 - ❖ Off-site generation (PPA involving generator and local utility – e.g., Renewable Energy Rider)
- **Other**
 - ❖ Customized arrangements (possible new approaches with MGE specific to future projects)
 - ❖ MGE or other entity procuring SREC's for the City of Madison

Customer



Electric grid



New solar array

**Solar Renewable
Energy Credits (SRECs)
– An Illustration**

CORPORATE RENEWABLE ENERGY BUYERS' PRINCIPLES: INCREASING ACCESS TO RENEWABLE ENERGY



SREC's from off-site solar arrays are enabling companies like Google to reach their 100% renewable energy goals.

Solar Energy Financing Guide



<http://energyonwi.uwex.edu/sites/energyonwi/files/SolarEnergyFinancing.pdf>

Questions?

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