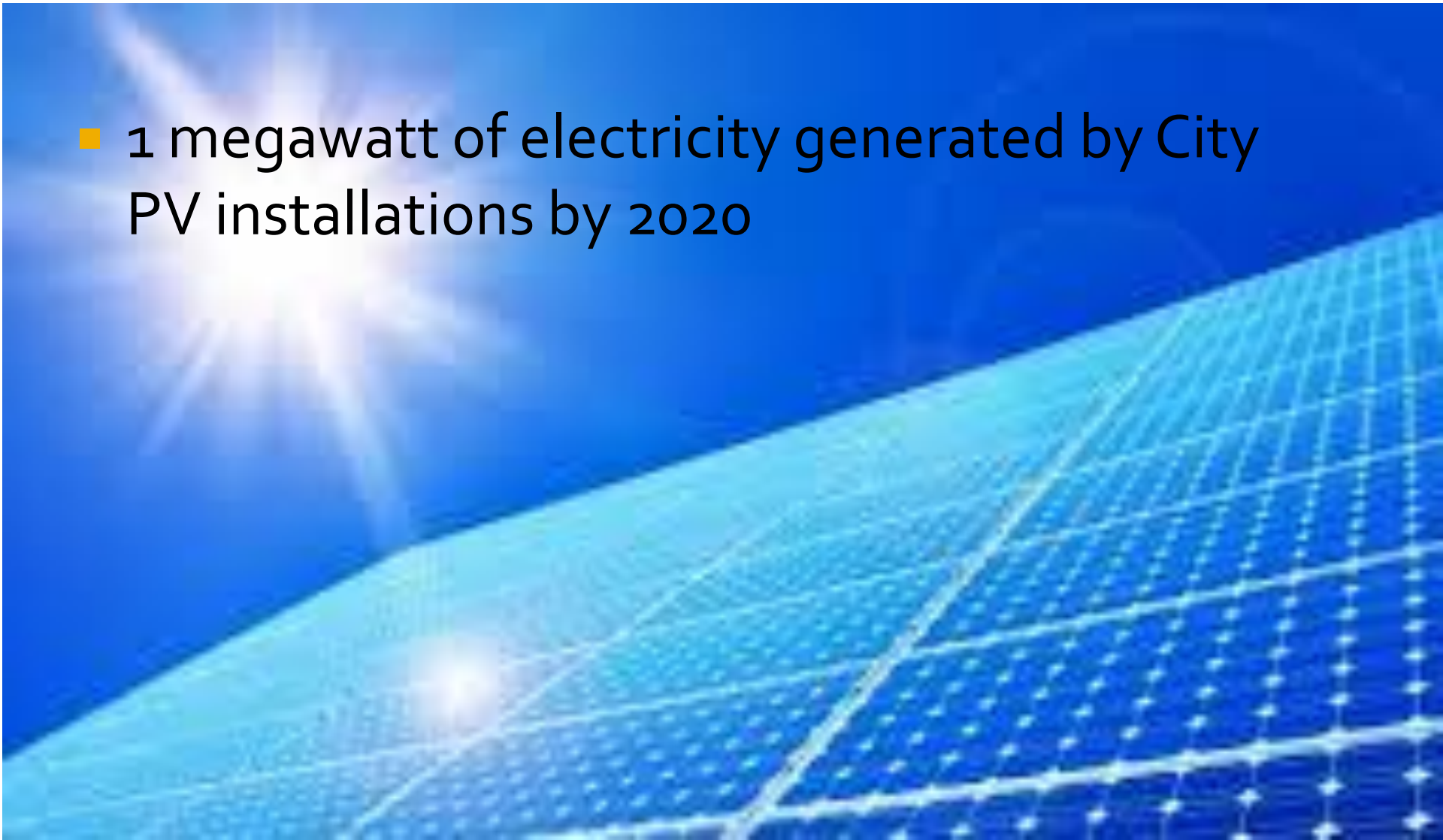
MADISON MEGAWATT

2020

Background

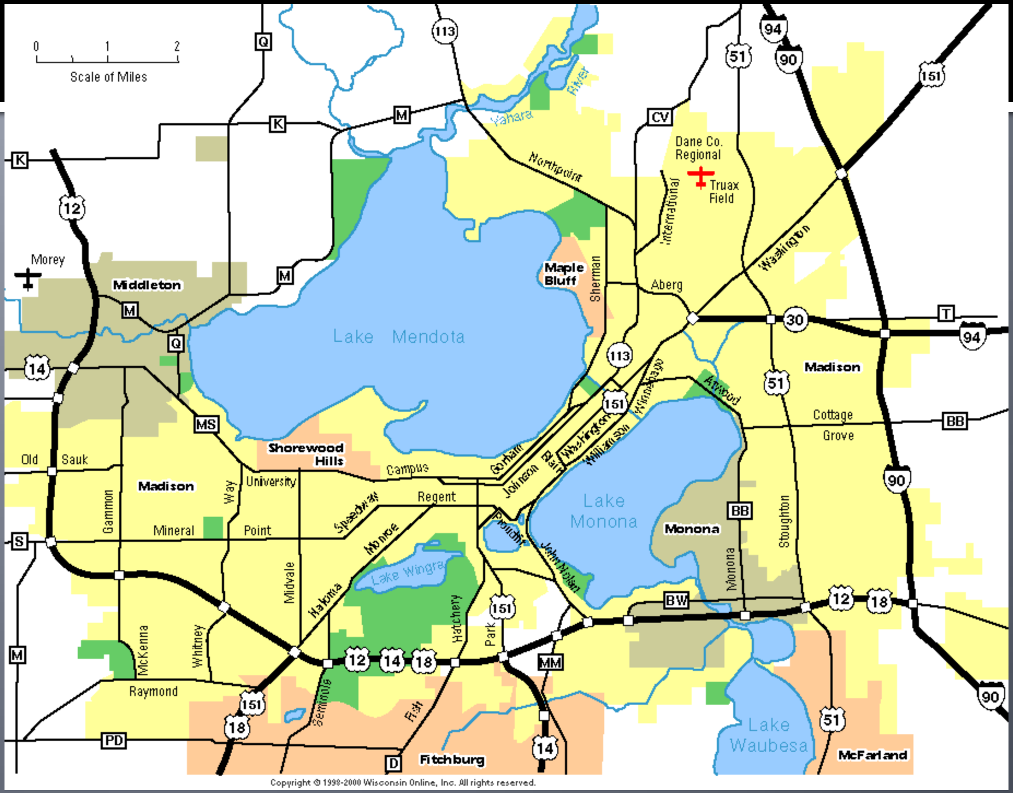
- As part of its Sustainability Plan the City has participated in MG&Es Green Power Tomorrow Program since 2007
- In 2014 the City opted out of this program
- Funds previously allocated for the Green Power Program will be targeted to renewable energy installations at City facilities.

Goal



- 1 megawatt of electricity generated by City PV installations by 2020

Where We Are



Scale of Miles
Lake Mendota
Lake Monona
Lake Waubesa
Lake Wingra
Middleton
Madison
Maple Bluff
Shorewood Hills
Monona
Fitchburg
McFarland
Cottage Grove
Dane Co. Regional
Truax Field
Morey
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Existing PV Systems

109.75 kW currently installed

25 kW Under Construction – Fire Station 13

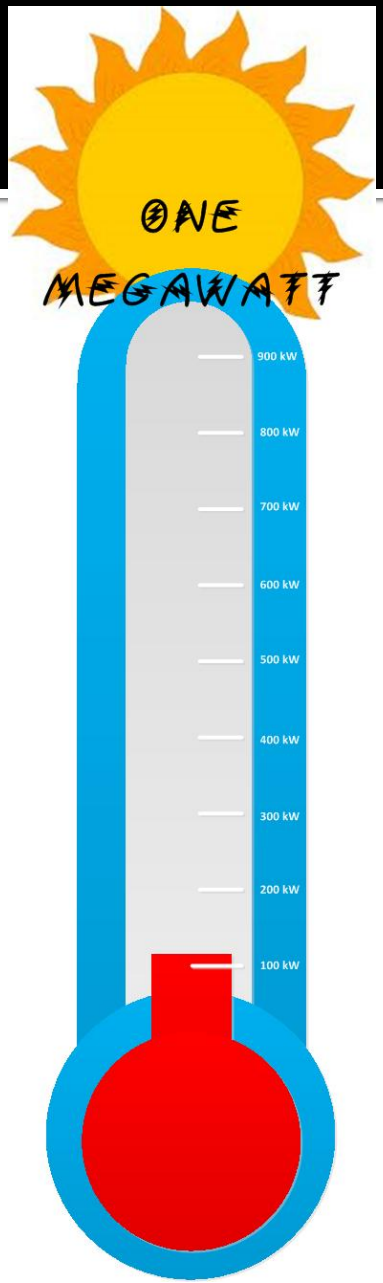
Madison Fire Station 13
Madison, Wisconsin

View of Fire Station 13 from
Town Center Drive looking Northwest

Where We're Going

Where We're Going

- 1megawatt by 2020
- 865.75 kW to go



How We Get There

Logistics

- Average cost of installation $5.00/kW
- $620,000 annual spending required to cover construction costs
- Does not include structural or electrical engineering analysis; design; inspection costs
- Existing building issues to be addressed - electrical integration problems with buildings that had old electrical systems, structural limitations, etc.

Low Hanging Fruit

- Currently reviewing sites and approved projects to prioritize, assess suitability and schedule installations
- Start with "low hanging fruit"
  - Most obvious opportunities
  - More readily achievable
  - Minimize effort required

Priority 1 – New Construction

- Most cost effective time to design and install PV systems.
- PV incorporated into design process
  - Building orientation on site
  - Roof footprint
  - Structural
  - Electrical distribution system

Priority 2 – Major Remodel/Renovation Projects

- Installing PV systems on existing facilities can be challenging and in some cases not economically feasible.
- Structural Condition
  - analysis required to determine if the existing building superstructure can handle additional load
  - Requires access to superstructure
  - Finished ceilings, duct work, conduit, etc. present obstacles to visual inspection
  - Deconstruction and reconstruction may be necessary for installation.

Priority 2 – Major Remodel/Renovation Projects

- Electrical distribution systems
  - Analysis required
  - May need to be ugraded or replaced to accommodate PV.
  - PV installations should be incorporated into major remodel projects.
- Roof condition
  - Roof-mounted PV systems should be installed only on roofs with remaining life expectancy matching or exceeding that of PV system

Priority 3 - Roof Replacement

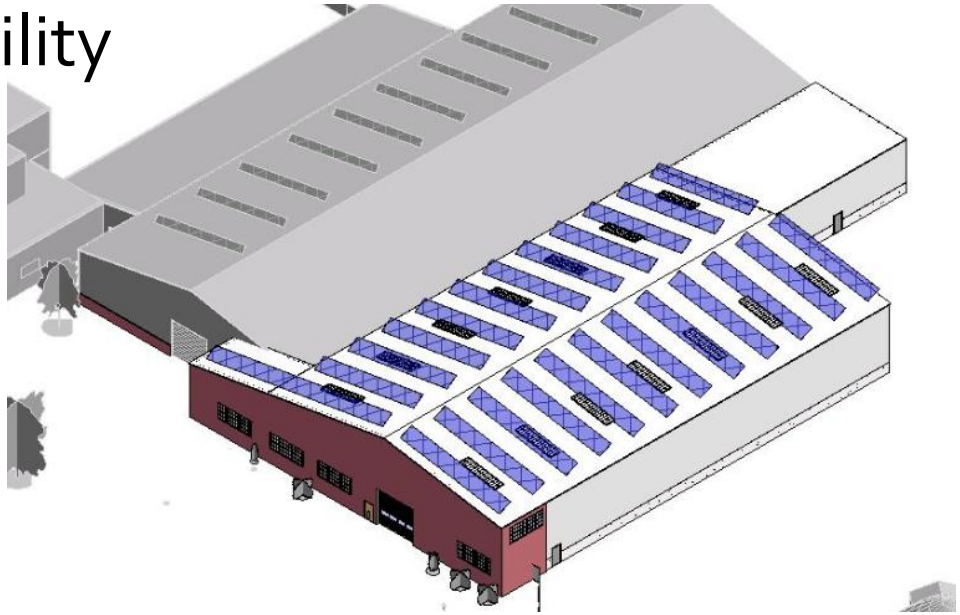
- Another opportunity for retrofitting existing facilities with PV systems is during roof replacements.
- Access for structural analysis can be made more difficult by finished ceilings but is doable.
- An electrical engineer will need to review and evaluate existing electrical distribution systems to identify any upgrades or replacements necessary to incorporate PV into the system.
- Any structural reinforcement and/or electrical upgrade necessary can be incorporated into the design and contract for roof replacement along with the PV installation.

Potential Projects

2014

- New Construction
  - Engineering Operations Facility Vehicle Storage Expansion
  - Water Operations Facility

Current Madison Water Utility S. Paterson St. operations center



2014

- Major Remodel/Renovation
  - Traffic Engineering Operations Facility – Maintenance Facility

2015

- New Construction
  - Fleet Center
  - To be constructed at former site of Cub Foods on Nakoosa Trail

2015

- Major Remodel/Renovation
  - MMB
  - Police Training Office Remodel
  - Traffic Engineering Operation Facility – Offices

2016

- New Construction
  - Library – New Pinney Branch
  - Penn Park Shelter

2017

- New Construction
  - Metro Transit Facility Expansion
  - Olbrich Botanical Complex

2018

- New Construction
  - Library – Hawthorne Branch
  - Library - Grand View Commons Branch

2018

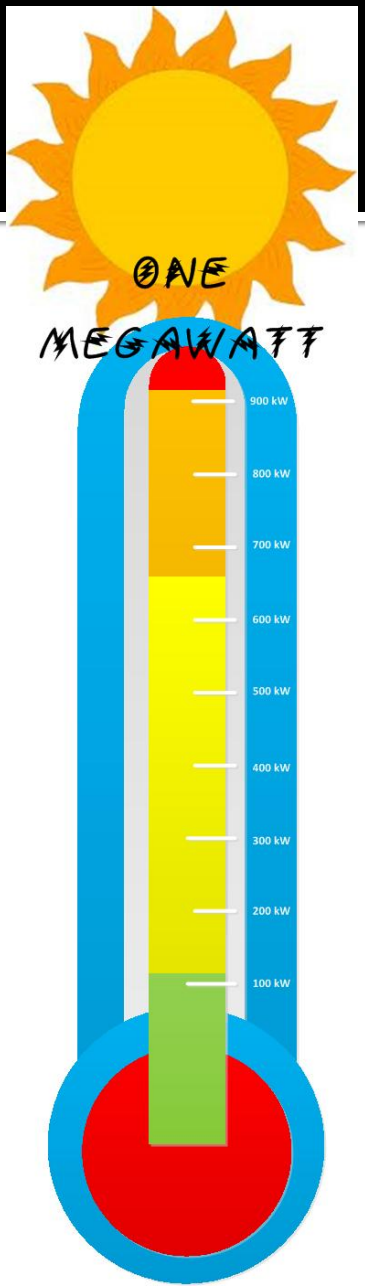
- Major Remodel/Renovation
  - Streets East

2019

- New Construction
  - Police Property & Evidence Complex
- Roof Replacement
  - Fire Station 4 Roof Replacement

Where That Gets Us

- One Megawatt by 2020
- 85 kw – Roof Replacement
- 250 kw – Major Remodel/Renovation
- 550 kw – New Construction
- 135 kw - Existing + Under Construction



Beyond 1 Megawatt

- PV installation is integrated into design process for new facilities construction, existing facility remodel/renovation and roofing replacement project.
- Becomes standard operating procedure
- Inventory and assessment of existing facility provides a map for future projects to include PV

Other Ideas

- Pilot different renewable energy technologies
- In-house training program for PV installation and maintenance