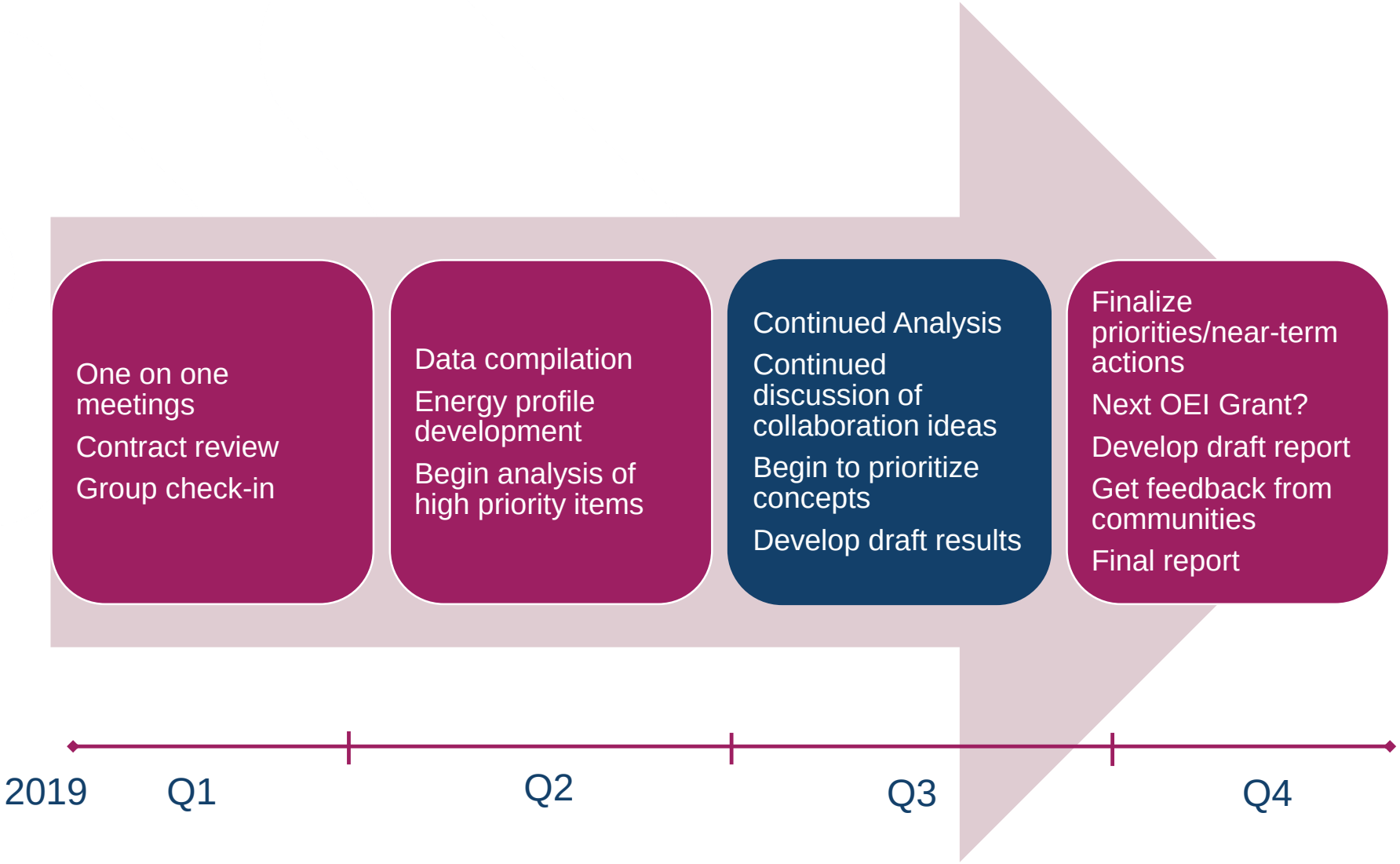
Municipal Planning Joint Meeting

10/02/19

slipstream

Today’s Agenda

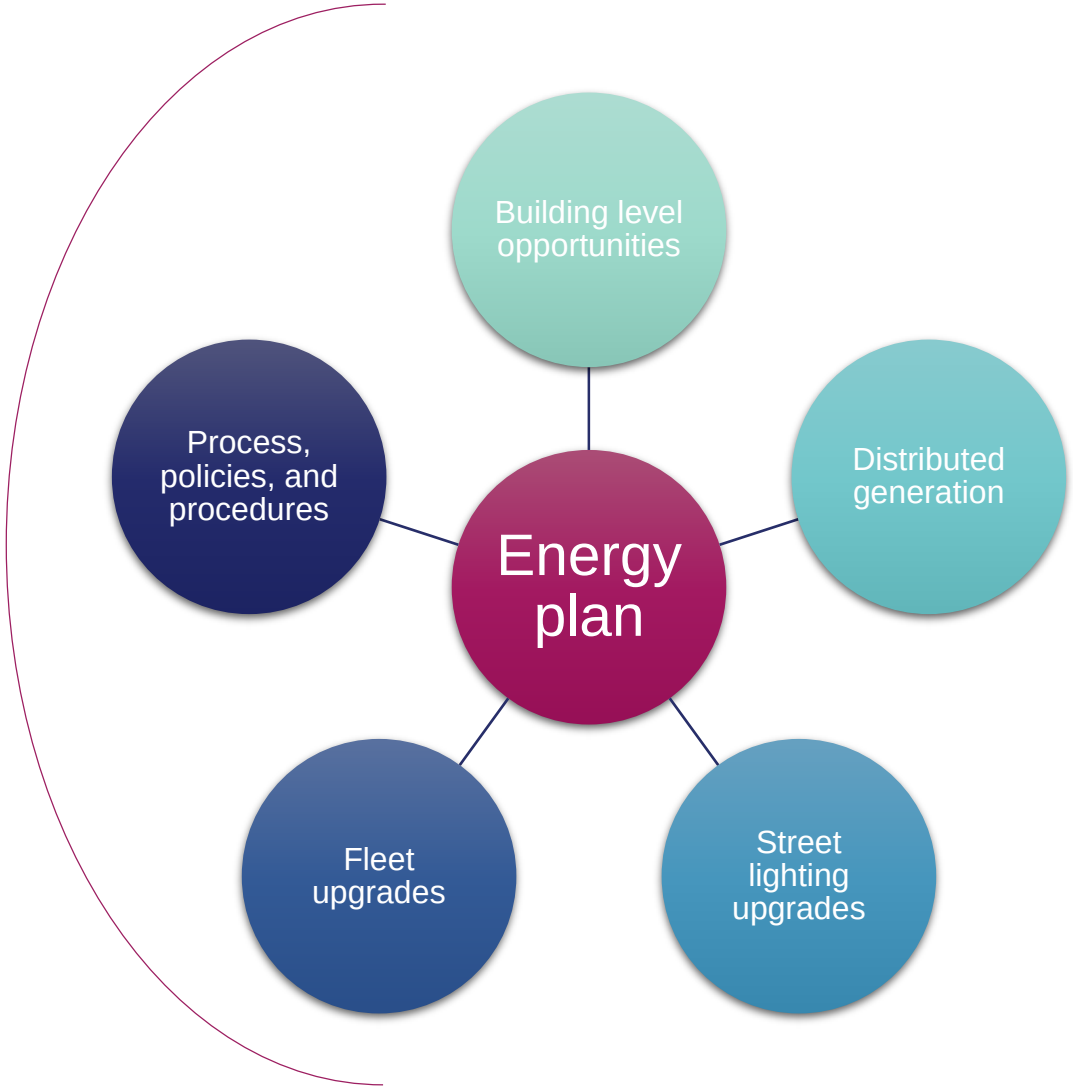
- Timeline check-in
- Overview and discussion of initial recommendations
- Policy and process discussion
- Summary of analysis, if time allows
  - Community comparisons of energy profile
  - Building level energy efficiency
  - Fleet upgrades
  - Streetlighting upgrades
  - Solar investments
- Next steps



Note: next quarterly update is due October 15. Send Jeannette progress tracking spreadsheet by Oct 11

Overview of energy planning

Lessons learned



Summary of initial recommendations

Building level efficiency

- LED upgrades
- Lighting controls
- HVAC controls
- Specific community level investments

Streetlighting

- LED lighting upgrades

Fleet

- Police Hybrids
- Light-duty electric vehicles

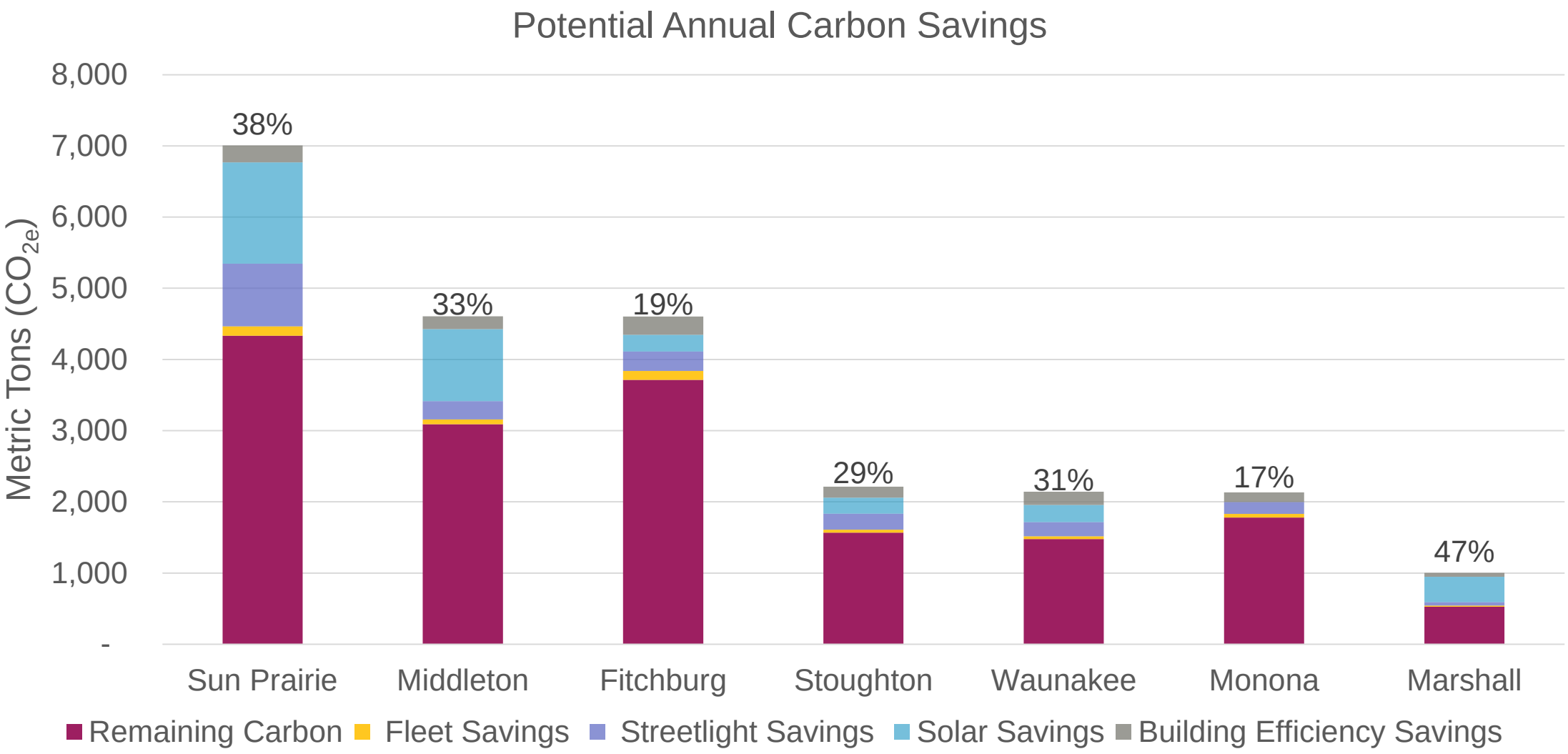
Solar

- Consider both economics and engagement benefits
- Plan phased installations to optimize rebates
- Establish consistent policy for purchased renewable

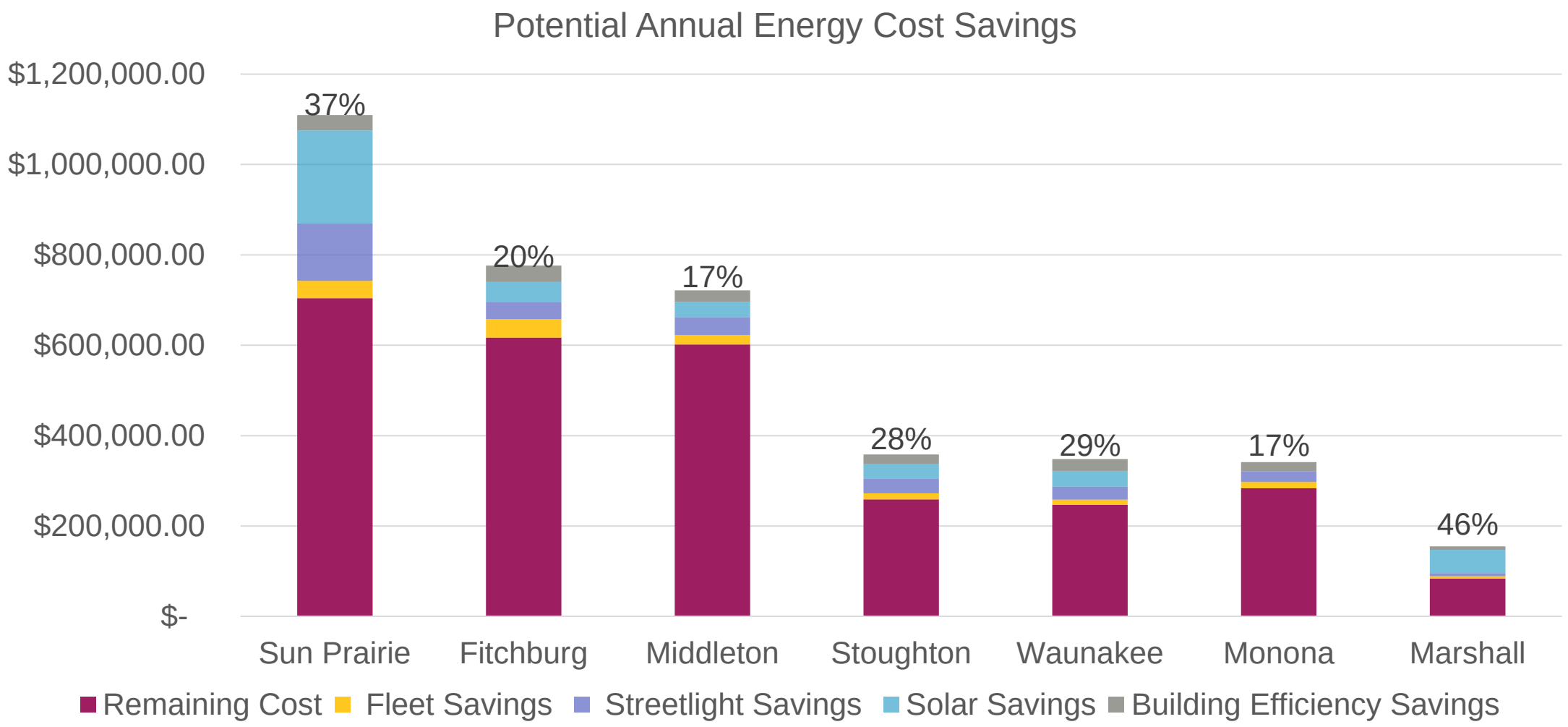
Policies / Process

- Institutionalized data collection
- City policies
- Community policies

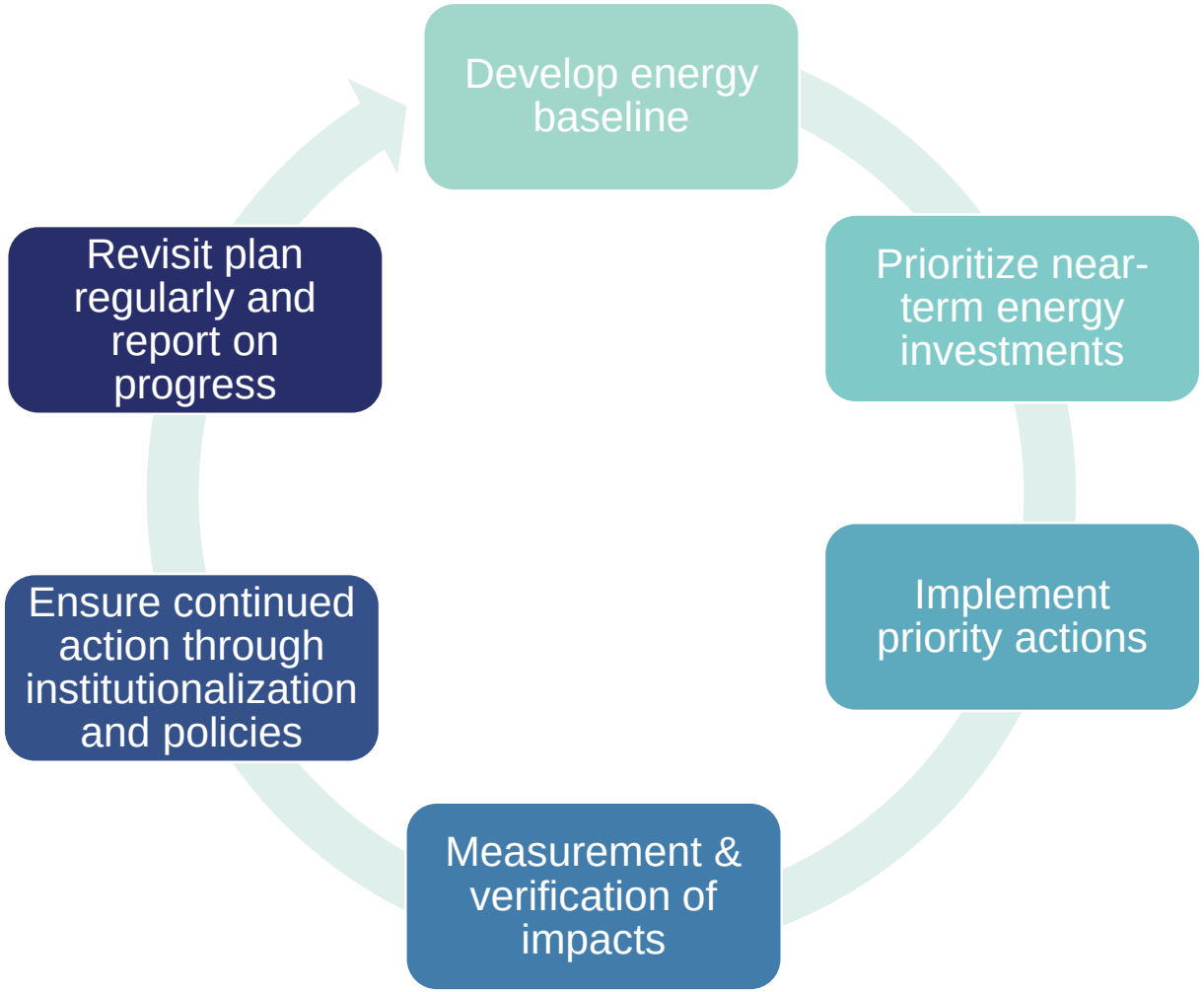
Summary of Potential Opportunities



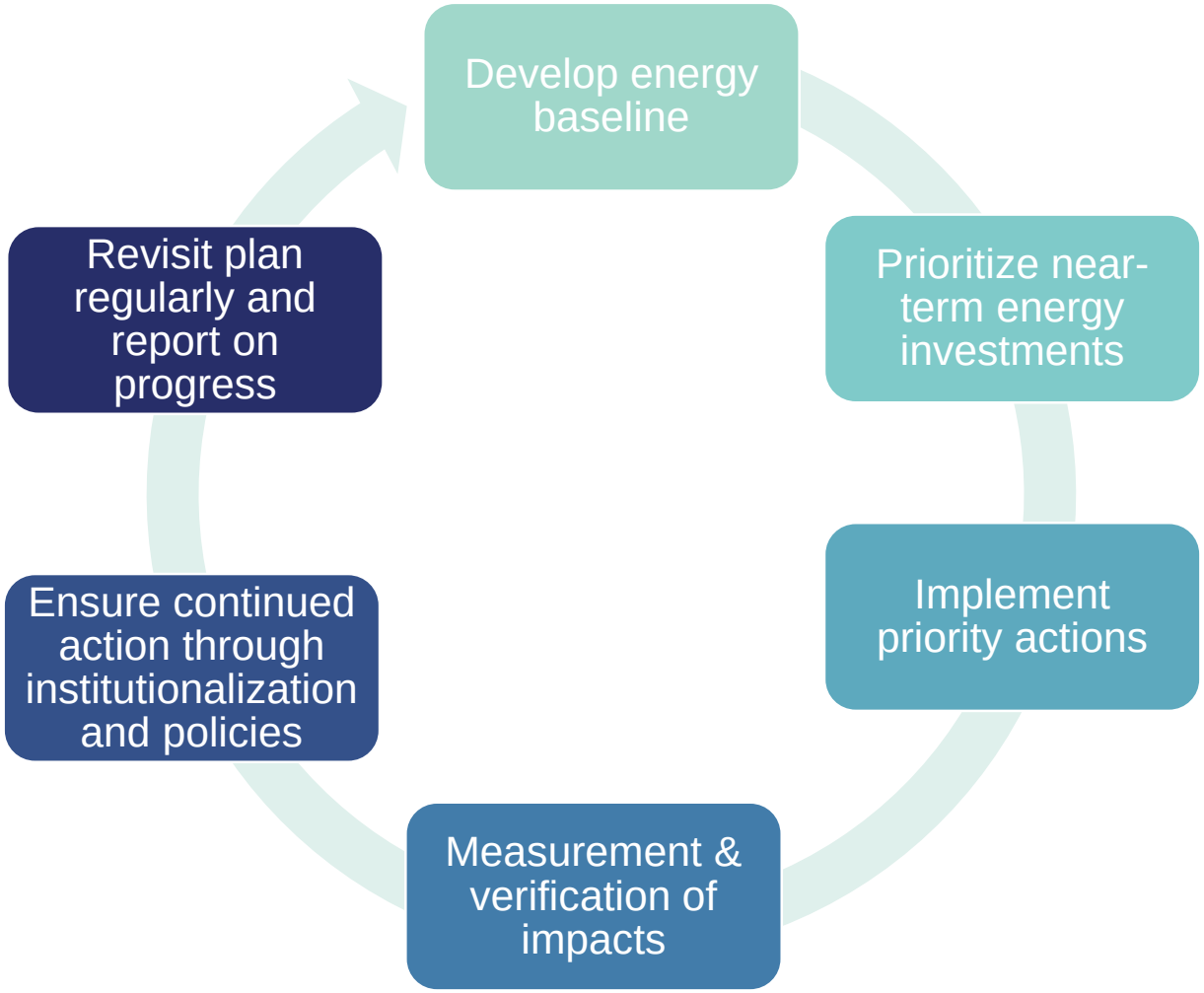
Summary of Potential Opportunities



What's next?


Develop energy baseline
Prioritize near-term energy investments
Implement priority actions
Measurement & verification of impacts
Ensure continued action through institutionalization and policies
Revisit plan regularly and report on progress

What's next?



- What are your highest priorities for 2020?
- Where do you see the biggest challenges to implementation?
- What does success look like to you?

Policy and process

Common policies for ensuring longevity of the plan

Institutionalized data collection

- Data tracking and regular M&V
- Benchmarking policy for buildings – e.g. through Portfolio Manager (free), EnergyCAP (fee-based)

City-specific policies

- Operational policies for building systems (e.g. setbacks)
- Purchasing policies for appliances, computers, and HVAC
- Building performance targets
- Net-zero new construction policy for municipal buildings
- Renewable energy commitment
- Resiliency plan and policy

Community – focused initiatives

- Siting for EV charging stations – public & commercial/multifamily
- Renewable energy development
- Carbon disclosure project

Data tracking to understand impact and convey results

Baseline metrics

- This energy plan is starting point

Developing process for collecting data

- Who will collect data
- Where will it be tracked
- When or how often?
- How will data be processed?

Developing process for reporting and taking actions

Data tracking to understand impact and convey results

Baseline metrics

- This energy plan is starting point

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Developing process for reporting and taking actions

Data Collection: Portfolio Manager

Free online tool

Benchmarked buildings see 2.4% average annual energy savings

Set up a Portfolio Manager Account

- Create a user profile
- Review training materials

Collect required data on municipal buildings

- Inventory all buildings
- Identify where energy data exists
- Gather all data

Enter building characteristics and data

- Add property data & building characteristics
- Add energy data in a batch upload

Evaluate results and QC

- Review EUI and Energy Star Score
- Confirm all information entered is correct

Data Collection: Fleet data

Challenges

- Non centralized data sources
- Typical tracking prioritizes costs but not energy/efficiency data (i.e. miles driven, gallons consumed)

Opportunities

- Fleet cards offer info on odometer reading, gallons of gas filled, and other details
- Other options are automotive information modules
- More information can identify where operational efficiencies can be gained

Data Collection: Fleet data

Community	Data Available
Fitchburg	Gallons of use by department + vehicle list + some mileage/mpg data
Marshall	Gallons of use by vehicle
Middleton	List of vehicles
Monona	Gallons of use by department + vehicle list + some mileage/mpg data
Stoughton	Miles driven + mpg by vehicle
Sun Prairie	Fuel cost by department + vehicle list
Waunakee	List of vehicles

Data collection: Benchmarking and M&V

01
Allocate usage

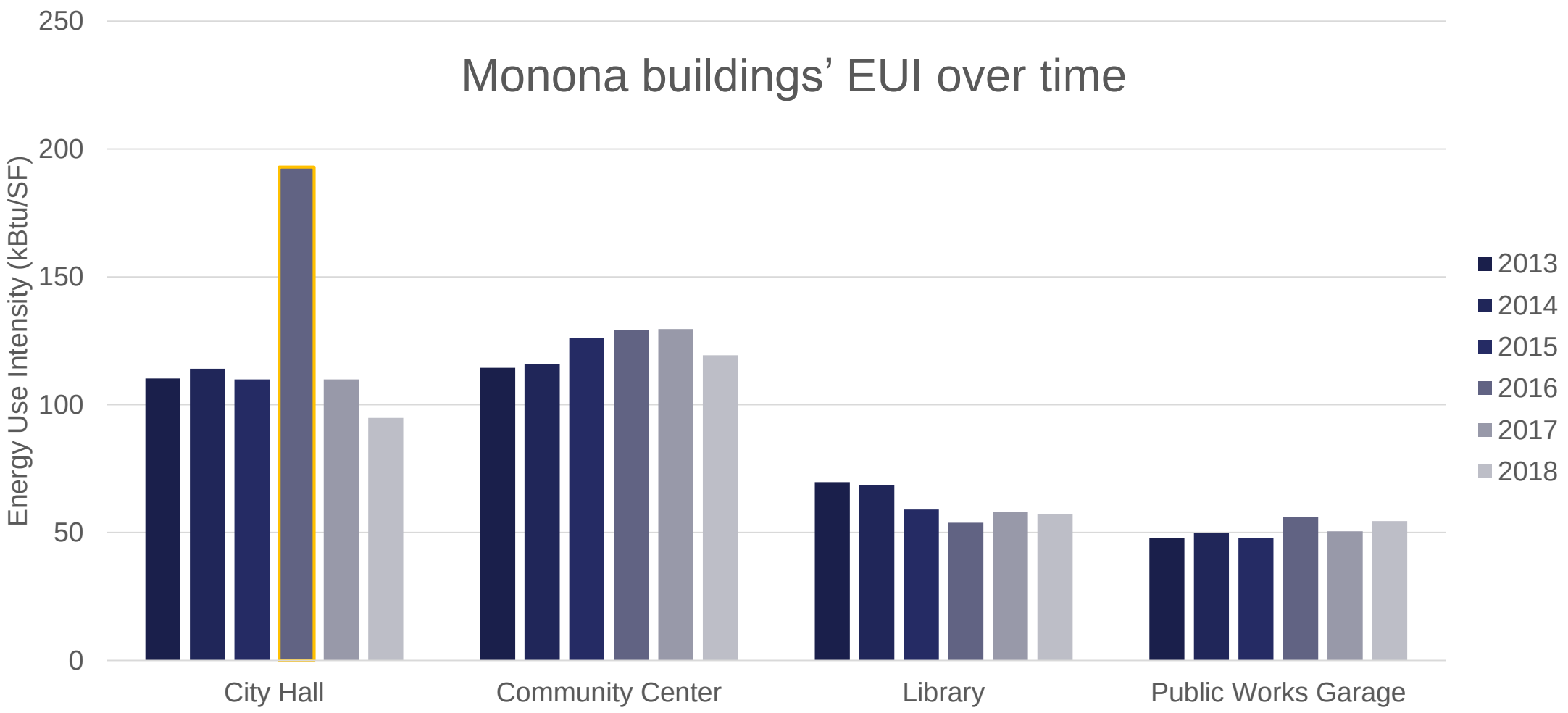
02
Benchmark systems

03
Identify inefficiencies

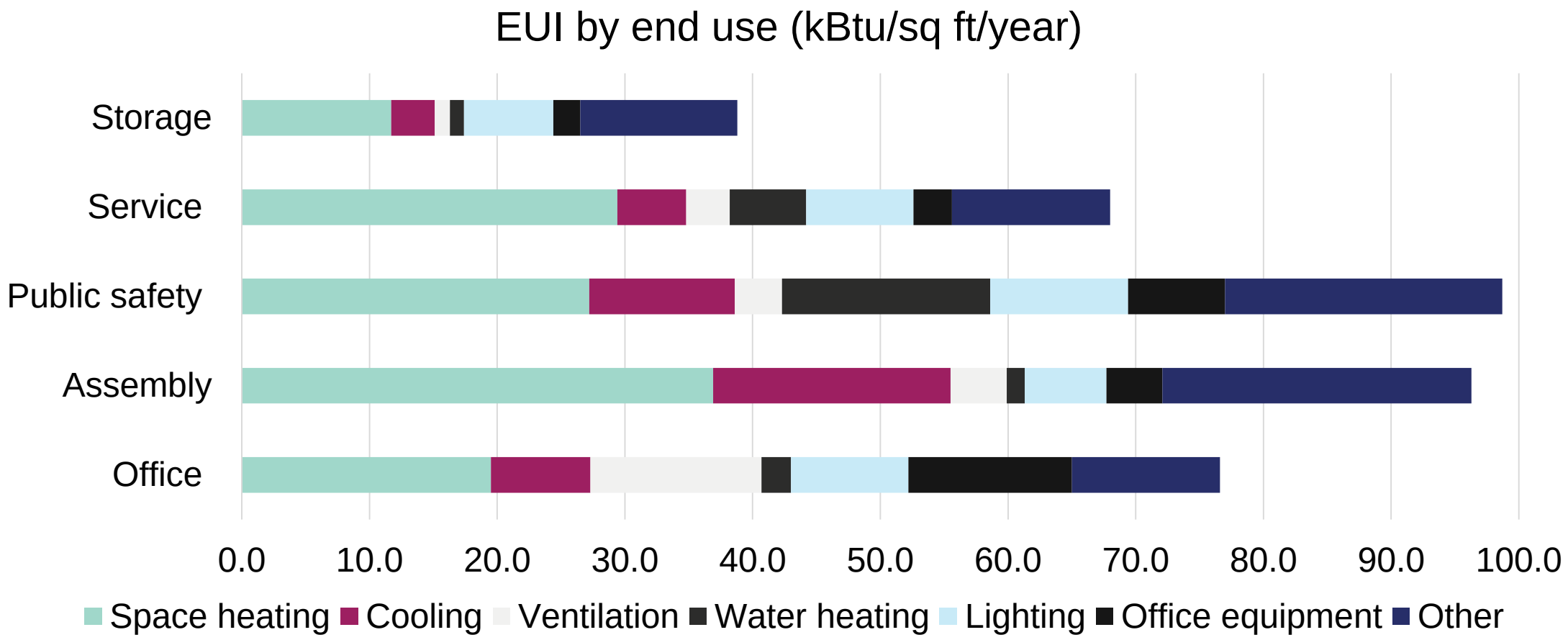
04
Verify savings

05
Detect malfunctions

Data collection: Benchmarking and M&V

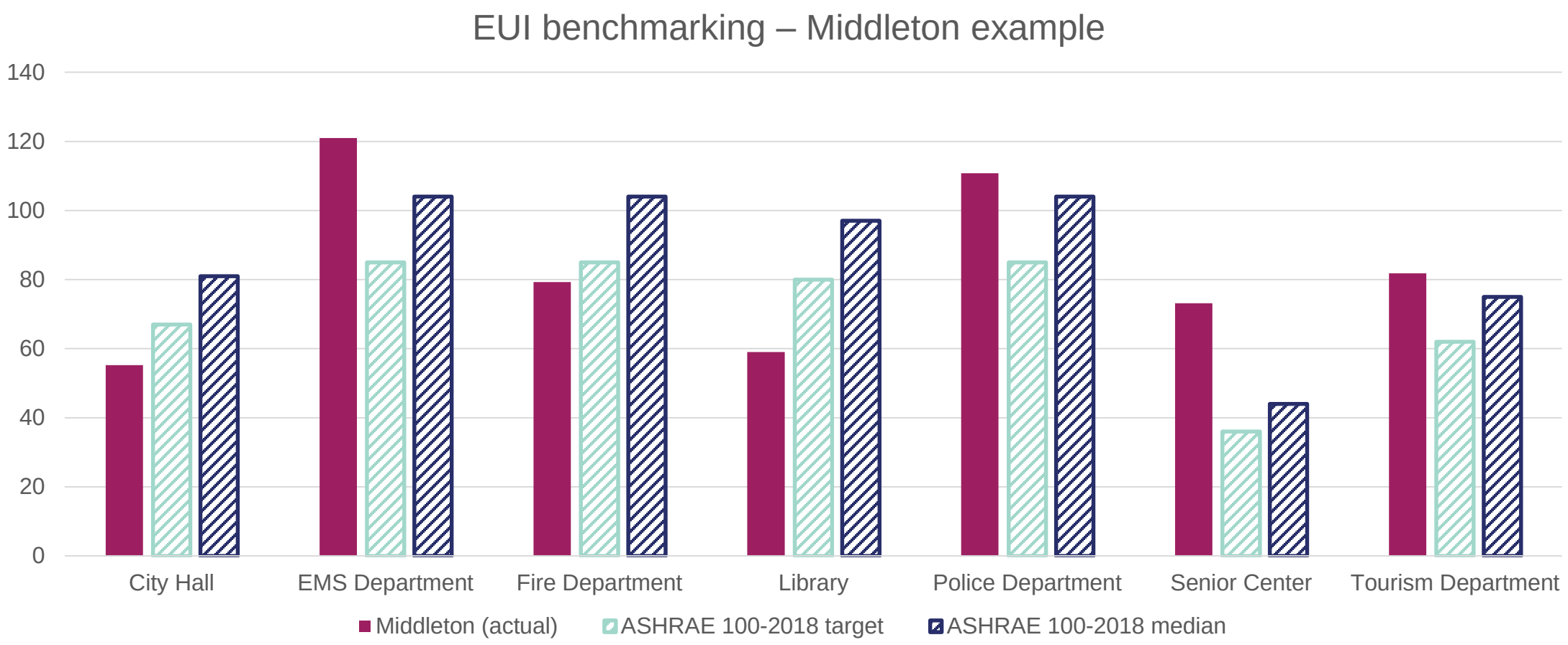


Data collection: Benchmarking and M&V



Source: CBECS 2012 (EIA)

Develop building performance targets



Develop building performance targets

Performance Guideline
Design all structures to minimize environmental impacts. These include energy use, greenhouse gas emissions, and embodied effects from materials. Design all structures to produce a healthy indoor environment for occupants.

In the recommended approach, projects should strive to meet one of the following guidelines or rating systems:

- LEED-NC (Silver)
- Minnesota B3 Guidelines (SB2030)
- Living Building Challenge
- Green Globes
- Green Communities (Affordable Housing)

In addition, projects should strive to meet a specific set of performance targets for energy use, greenhouse gas emissions, water use, stormwater management, construction waste, and indoor environmental quality. To further emphasize healthy building standards, each project may also meet one of the following:

- Well Building Standard
- Active Design Standard

Rochester Destination Medical Center District Design Guidelines
https://dmc.mn/wp-content/uploads/2015/08/20170605-Design-Guidelines-Book_FINAL.pdf

Net Zero Energy Building Policy

Steps in Creating Policy

- Build support
- Set interim EUI targets for new municipal construction
- Set a target year for all municipal construction to be net zero
- Expand targets to include all new construction in the community
- Set energy efficiency targets after "trigger" events (e.g. sale, renovation)

Suggested EUI Targets (kBtu/sf/year)*

Building Type	1A	1B	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	5C	6A	6B	7	8
Primary School	26	25	26	25	27	23	21	27	24	24	28	25	24	29	26	30	39
Low-Rise Apartment	20	21	19	20	21	19	17	21	20	20	24	21	20	24	23	27	31
Medium Office	24	24	23	23	23	21	17	22	20	20	24	21	20	25	23	22	27
Small Office	19	20	18	19	18	18	16	17	18	17	18	17	16	18	18	20	24
Secondary School	29	29	26	27	26	25	22	24	26	26	25	29	23	24	24	25	35
Public Assembly	27	28	27	27	28	26	24	28	26	26	30	28	27	31	29	34	40
Standalone Retail[21]	27	30	26	28	25	26	21	25	26	26	26	28	26	27	26	29	35
Mid-Rise Apartment	22	23	21	22	23	21	19	24	22	22	26	23	23	27	25	30	34
Strip Mall[21]	30	33	31	32	33	29	25	34	29	31	39	34	33	41	37	46	60
High-Rise Apartment[21]	28	28	27	27	28	26	22	29	27	27	33	29	27	33	30	37	43
Warehouse	5	8	6	8	7	7	7	9	8	8	11	9	9	11	10	15	16
Small Hotel[21]	36	35	35	35	35	34	32	36	34	34	38	35	34	39	37	41	47
Fire Station[22]	29	30	29	29	30	28	25	30	28	28	33	30	29	33	31	36	43

* Pre-renewable targets

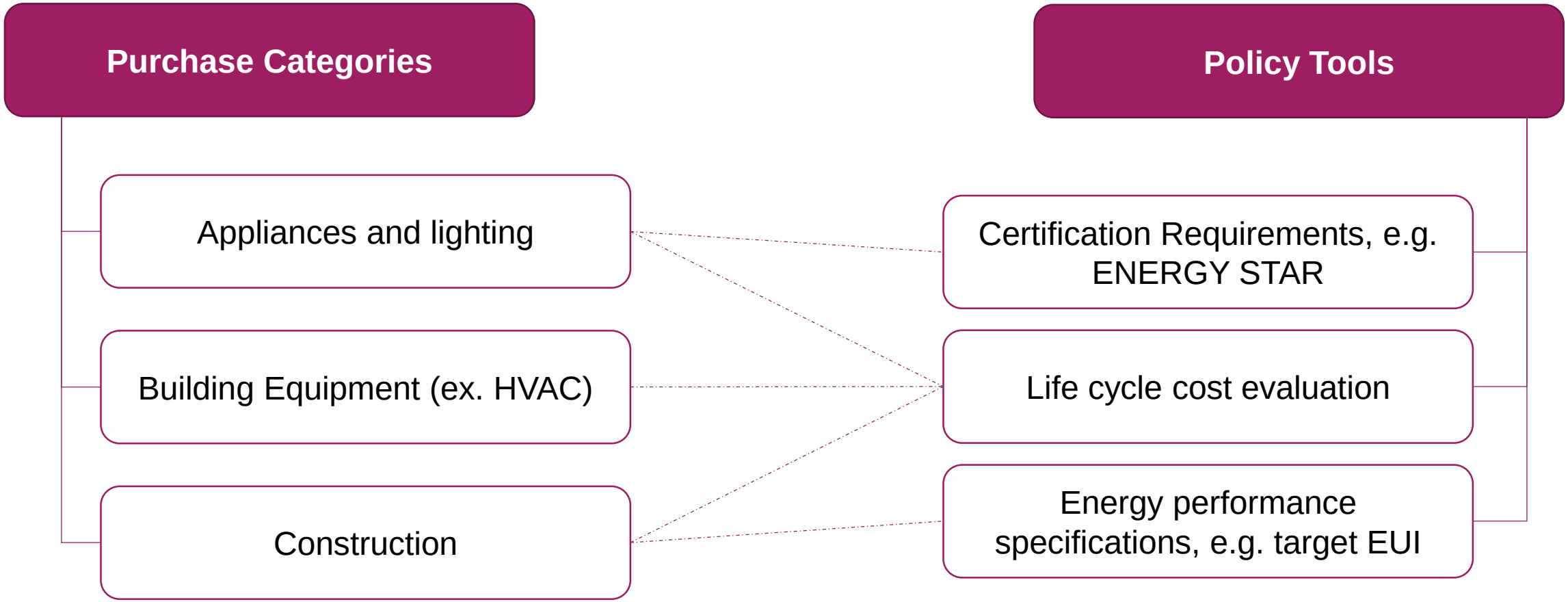
https://newbuildings.org/wp-content/uploads/2019/09/EUI_TargetsReport2019.pdf
https://rmi.org/insight/the-carbon-free-city-handbook/

Operational Policies - sample

Sample Operational Policy

Temperature Setpoints and Natural Ventilation	Plug Loads	Lighting	Staff awareness recommendations & policies
• Occupied Temperatures: 76°F (summer) and 69°F (winter) • Unoccupied Temperatures: 80°F (summer) and 55°F (winter) • Doors and operable windows may only be opened only when the thermostat for that area reads between 70°F and 75°F	• Computers, printers and miscellaneous office equipment shall use networked energy saving settings and shall be turned off when not in use • Office equipment and appliances must be Energy Star rated or equivalent, and Energy Star settings shall be enabled in this equipment • Refrigerator coils must have adequate airflow and shall be cleaned annually	• Lighting shall be turned off or dimmed when sufficient daylight available or the area is not in use • Fluorescent or LED task lighting should be used in place of overhead lighting where possible • Incandescent lights should be replaced with CFL or LED bulbs • Staff may request lighting level adjustments	• Adjust blinds or curtains for sunlight and heat gain • Dress in appropriate clothing and layers • Fan of less than 8" allowed as needed • 100W Foot warmers available from facilities, no plug-in space heaters Orientations for newly hired staff shall include a review of this policy.

Purchasing Policies



Renewable Energy Policies

Municipal Buildings	Community*
Solar opportunity analysis requirement	Definition and inclusion of solar in zoning
Solar-ready design requirement	Solar ready ordinance
Grid-supplied renewable energy purchase policy	Solar access ordinance
SolSmart Certification	
Renewable energy commitment	

*See SolSmart Toolkit for more planning, zoning, and code policy ideas that support solar: https://www.solsmart.org/solar-energy-a-toolkit-for-local-governments/

Resiliency Plans & Policies

Key Process

Identify threats

↓

Assess vulnerable assets

↓

Identify potential solutions

↓

Prioritize and plan

Key Considerations

Emergency departments

- E.g. Back-up power: generator vs. battery storage

Facility/Infrastructure

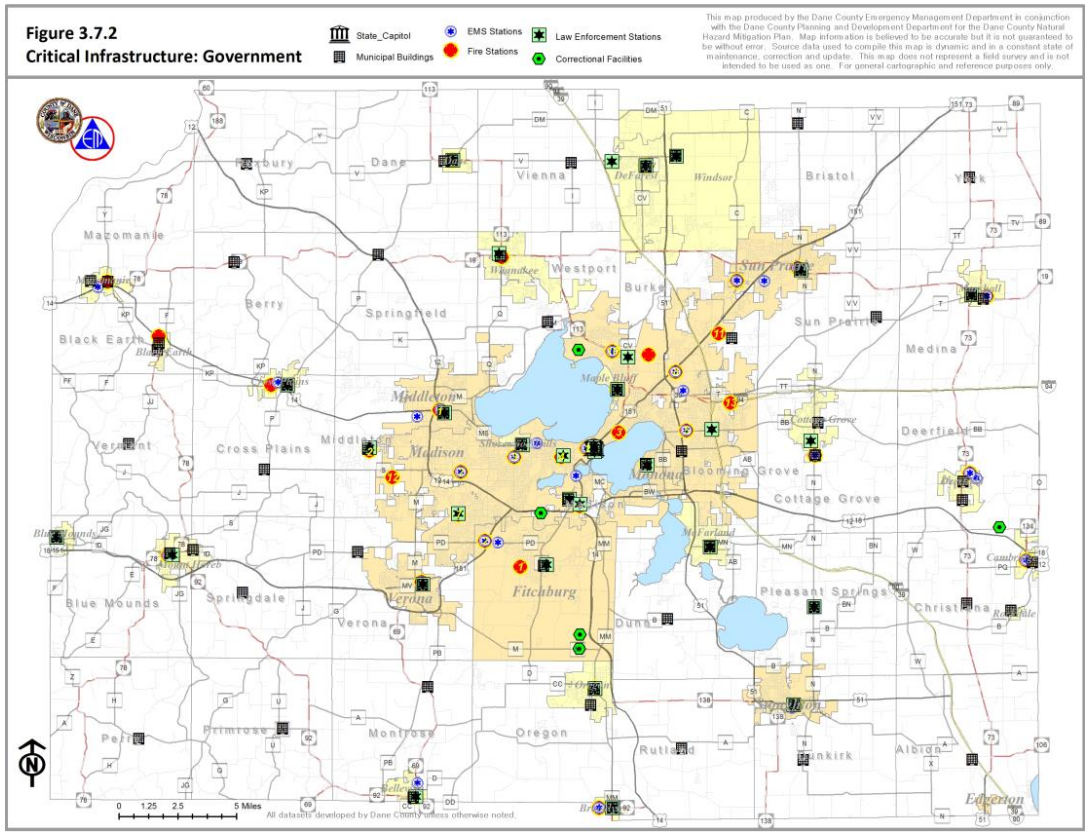
- E.g. Building cooling strategies

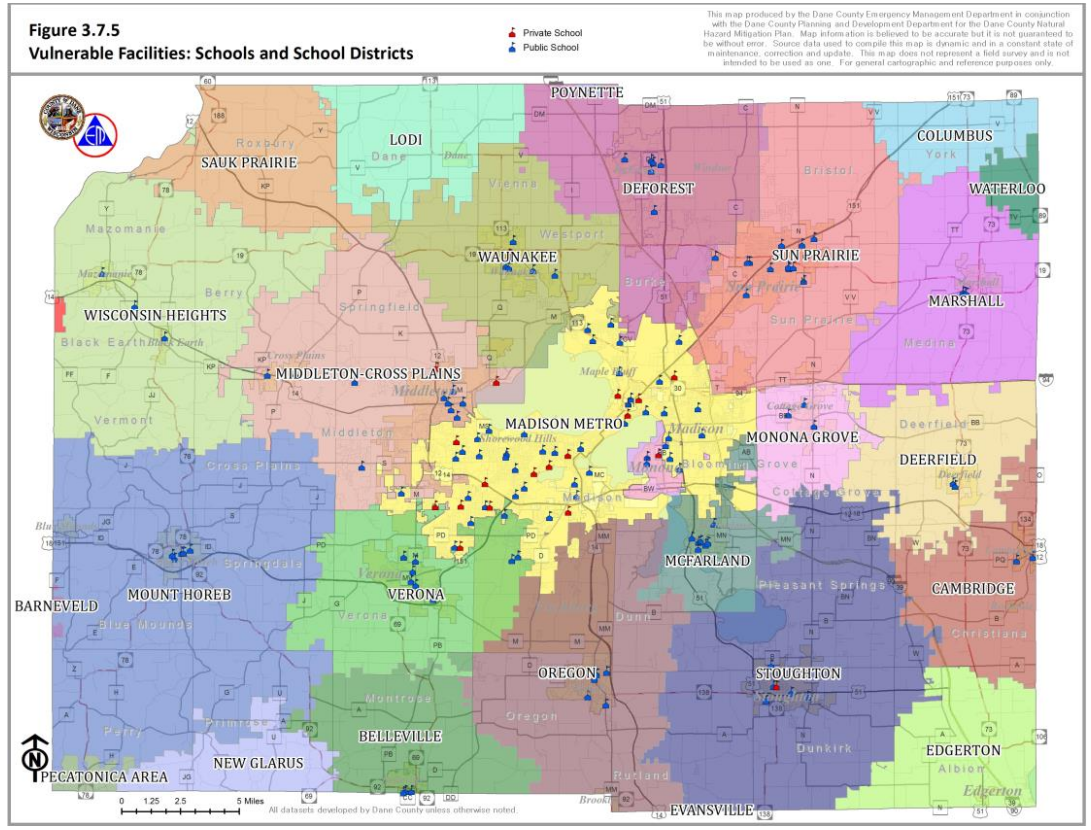
Community-wide resilience

- E.g. Flood plans; cooling center options

Example Plans:
Austin, Texas
Cleveland, Ohio
Pittsburg, Pennsylvania

Dane County Critical and Vulnerable Facilities





Benefits of Resilience Strategies

From: *Maximizing Benefits: Strategies for Community Resilience.* https://www.c2es.org/site/assets/uploads/2018/12/strategies-for-community-resilience.pdf

TABLE 1: Comparing Co-Benefits of Resilience Strategies

	BENEFITS											RESILIENCE BENEFITS				
	ENERGY SAVINGS	ECONOMIC DEVELOPMENT	AVOIDED DAMAGES & INVESTMENT	PUBLIC HEALTH/SAFETY	WATER QUALITY	ECOLOGICAL	RECREATIONAL	SEQUESTRATION/ GHG MITIGATION	EQUITY	PUBLIC AWARENESS	CONTINUOUS POWER	HEAT RESILIENCE	FLOOD RESILIENCE	DROUGHT RESILIENCE	WILDFIRE RESILIENCE	POWER OUTAGE RESILIENCE
Cool Pavement	●		▲	▲	▲	▲	▲		▲			★	▲			▲
Cool Roofs	●		▲	●		▲		▲	▲			★				▲
Street Trees	●	▲	●	●	●	●	▲	●	▲			★	★	▲		
Permeable Pavement	●		●	●	●	●	▲	▲	▲			▲	★	▲		
Bioretention	▲	▲	▲	▲	●	●	▲	▲	▲			●	★	●		
Rain Barrels	▲		▲	▲	●	▲				▲			★	●		
Green Roofs	●				▲	▲		▲	▲			●	★	▲		
Detention													★	▲		
Wetlands		▲	●	▲	●	●	▲	▲					★	▲		
Water Conservation	●	▲	●	▲	▲	●	▲	●	▲	▲		▲	▲	★		
Regional Water Conservation	▲	▲	▲	▲	▲	▲	▲	▲	▲				▲	★		
Water Reuse	▲		▲	▲	●	▲	▲	▲						★		

Electric Vehicle Supply Equipment (EVSE) Policies

Develop policies to enable private market adoption of EVs

Build Infrastructure to enable municipal fleet transition

Siting Questions	
Who needs to charge?	• Employees • Residents • Customers • Public
How long will people stay at the EVSE site?	• Overnight • Workday • Shopping • Refueling

How will users pay for electricity?	• Complimentary service
	• Automated interface
	  • Pass through cost
	  • Incentivized
	  • Profit-seeking

Data Collection: Carbon Disclosure Project

What?	Why?

• A free and voluntary platform to record carbon/energy data
• Includes ability to record information on:
  • City energy use and emissions
  • Food and waste
  • Water security
  • Adaptation
• 625 cities; 7,000 companies & 120 states and regions
	• Demonstrate commitment to carbon reductions
	• Institutionalize environmental data collection and reporting
	• Benchmark & learn from other cities
	• Gain guidance on areas of opportunities
	• Access webinars, tools, etc.

Policy review – which ones resonate with you?

Institutionalized data collection

- Data tracking and regular M&V
- Benchmarking policy for buildings - Portfolio Manager

City-specific policies

- Operational policies for building systems (e.g. setbacks)
- Purchasing policies for appliances, computers, and HVAC
- Net-zero new construction policy for municipal buildings
- Renewable energy commitment
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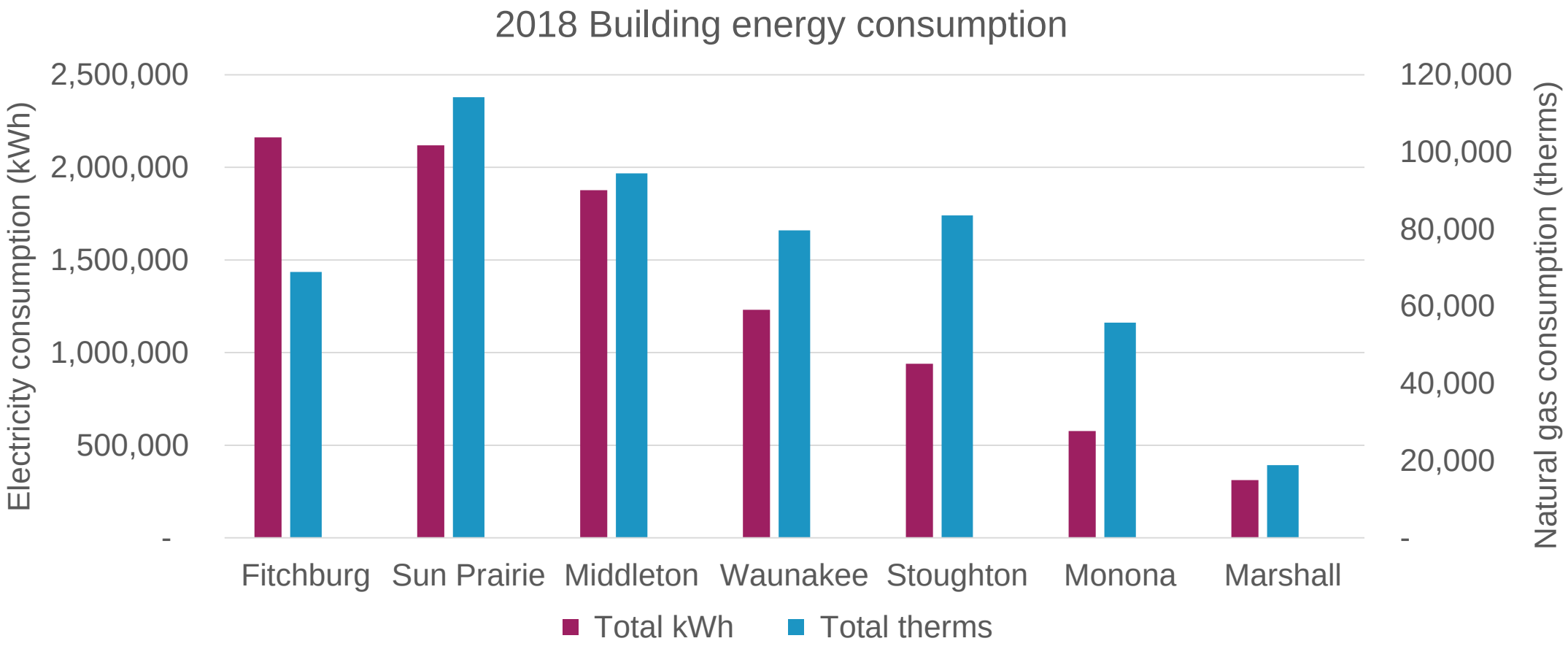
Community – focused initiatives

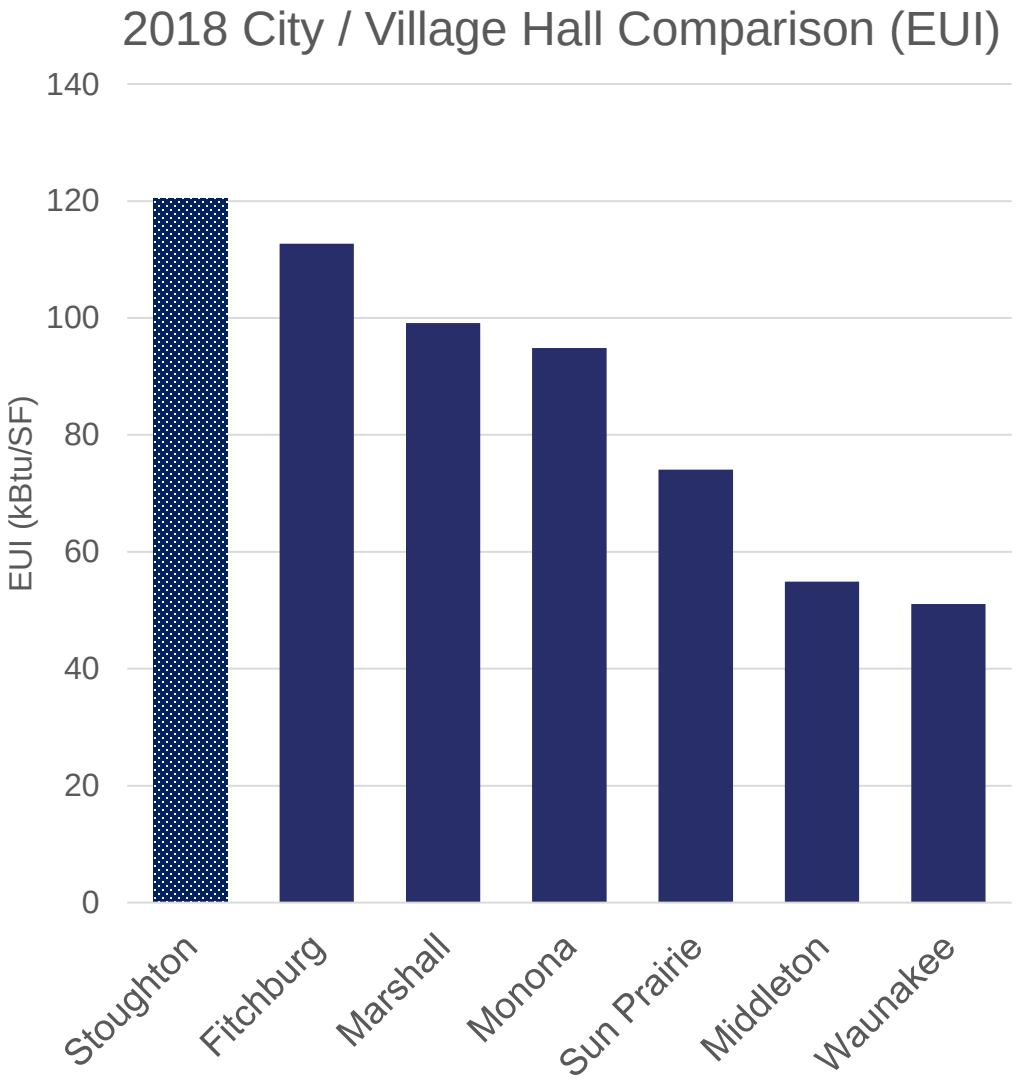
- Siting for EV charging stations – public & commercial/multifamily
- Renewable energy development
- Carbon disclosure project

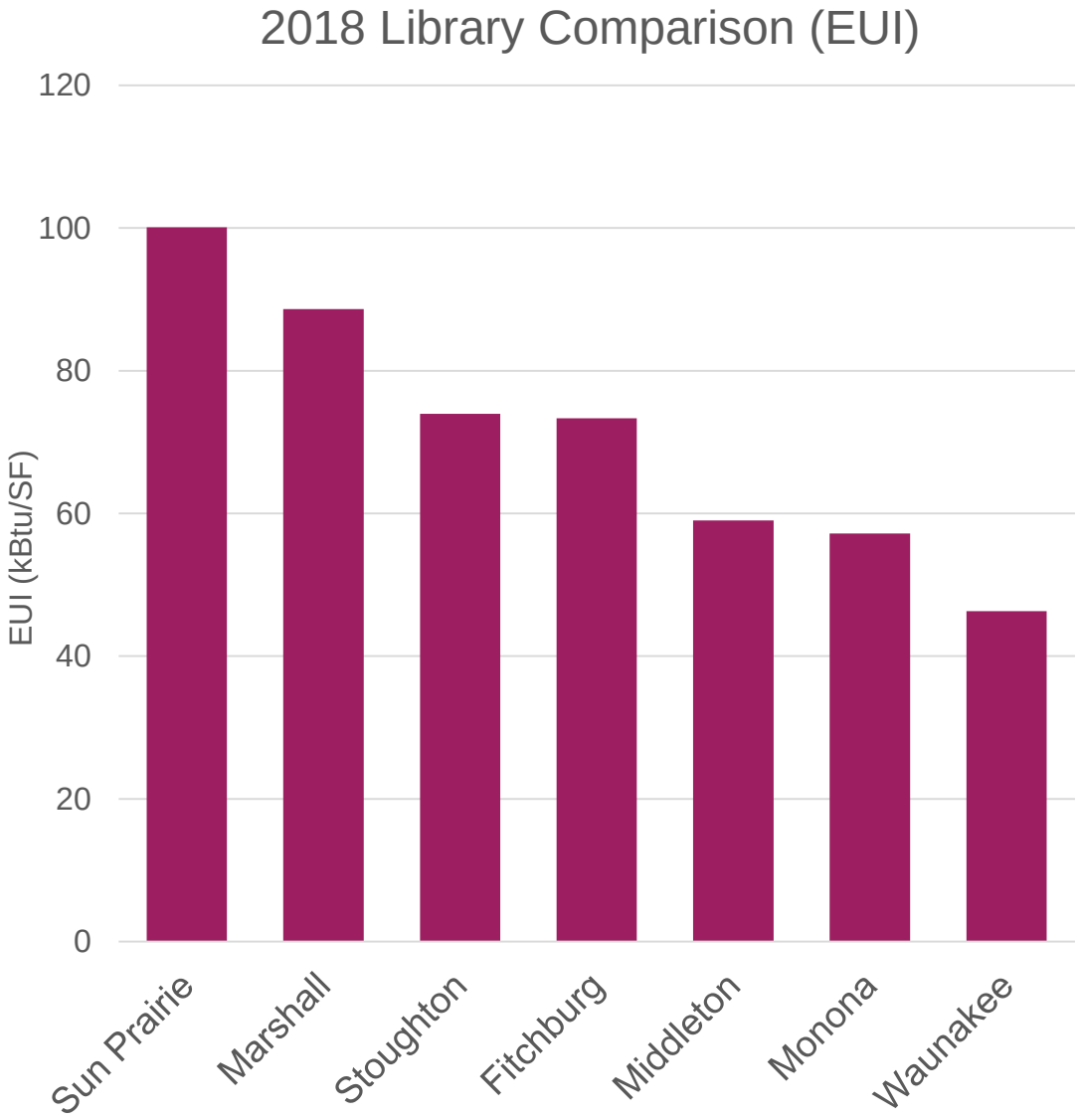
Community energy summary

Building Energy Use Comparison



Comparisons – building EUI





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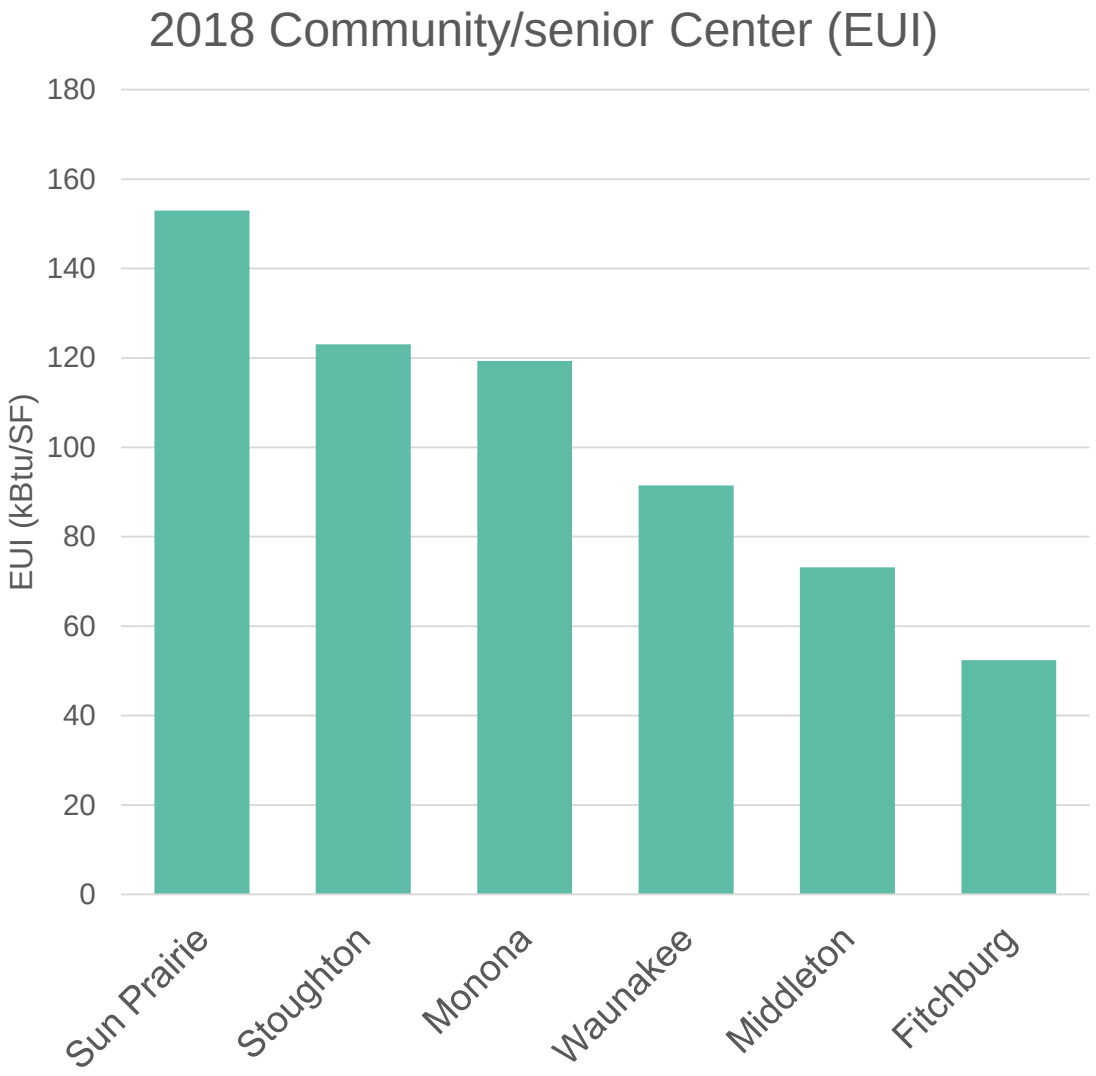
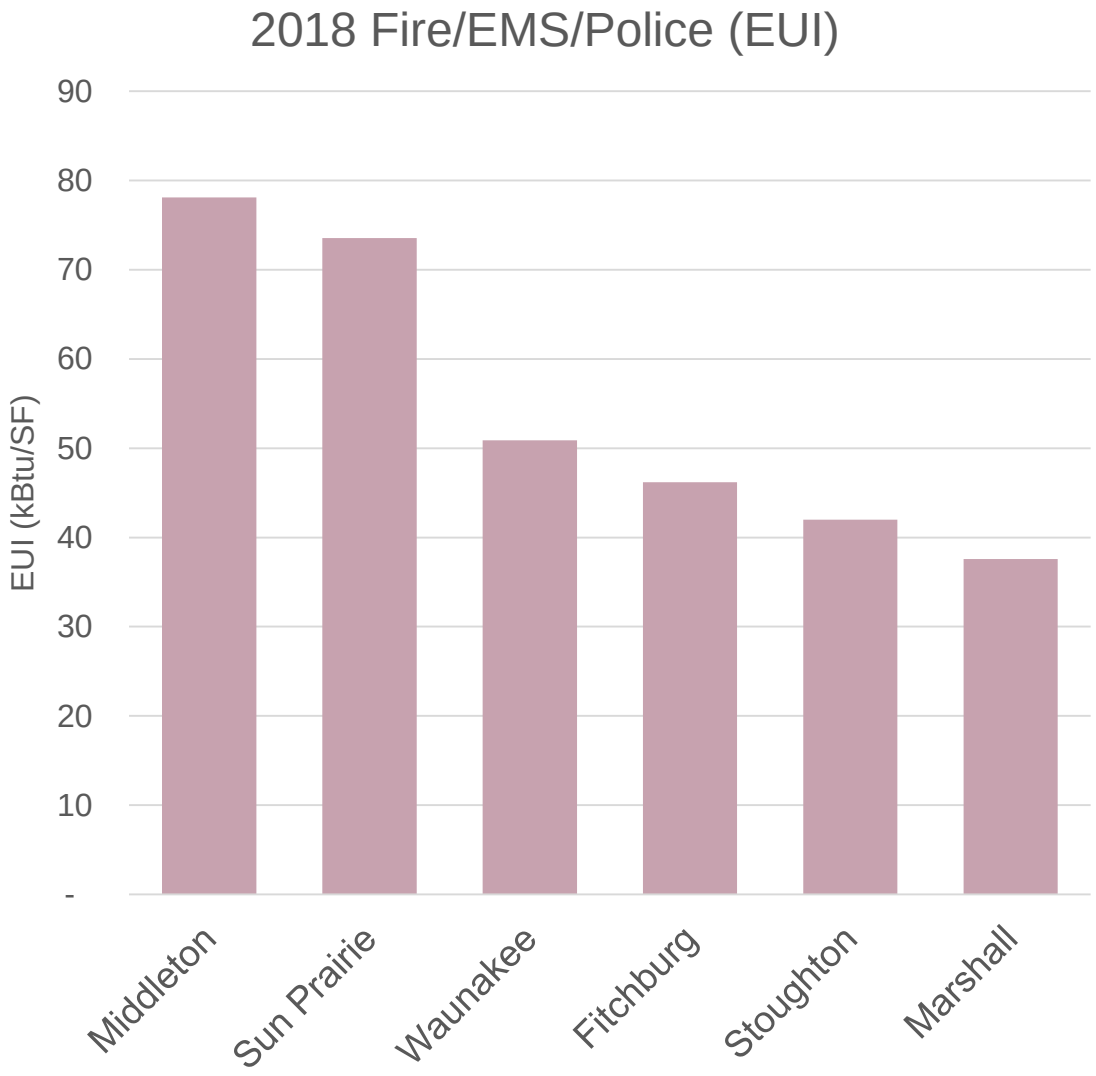
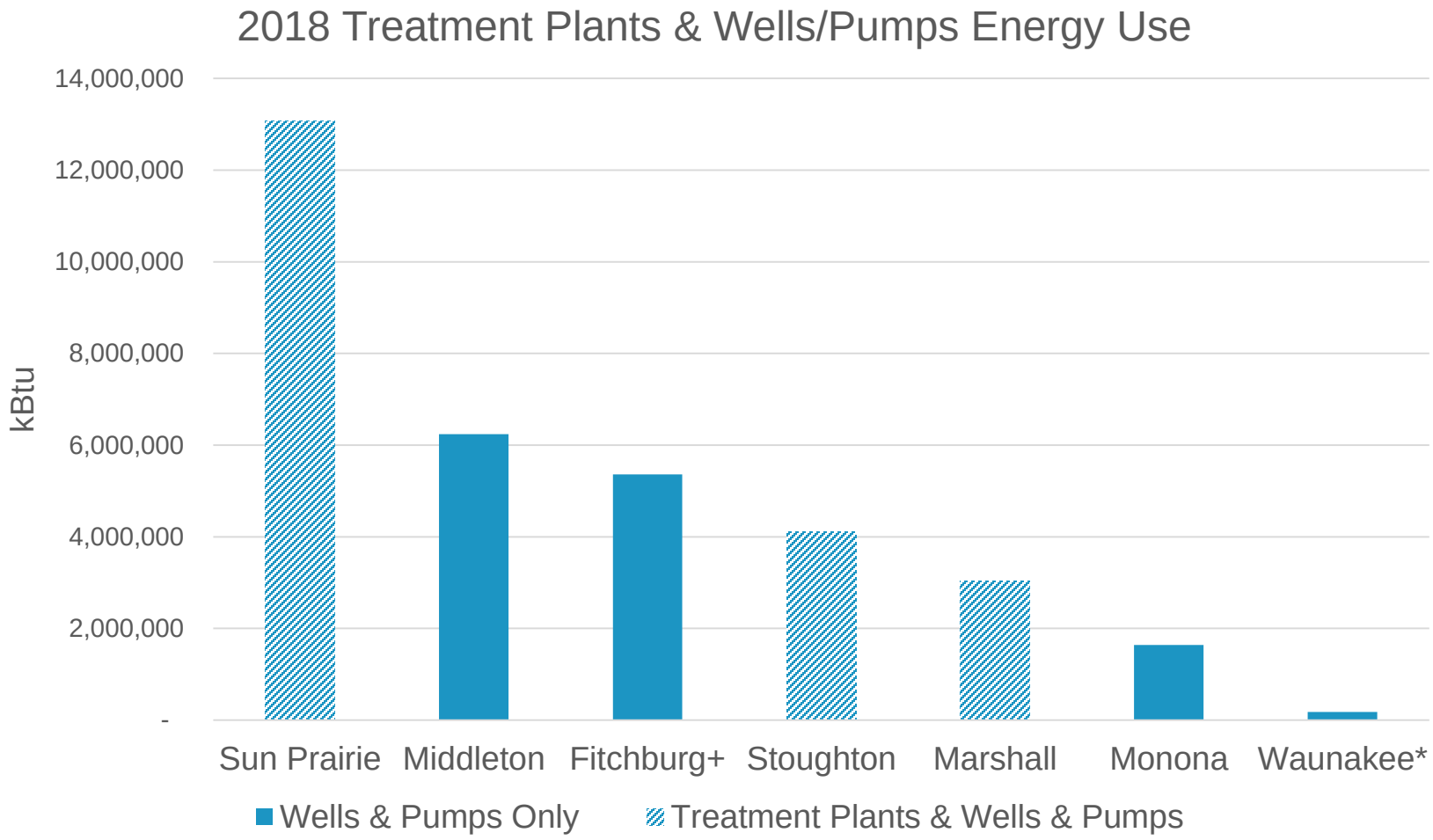


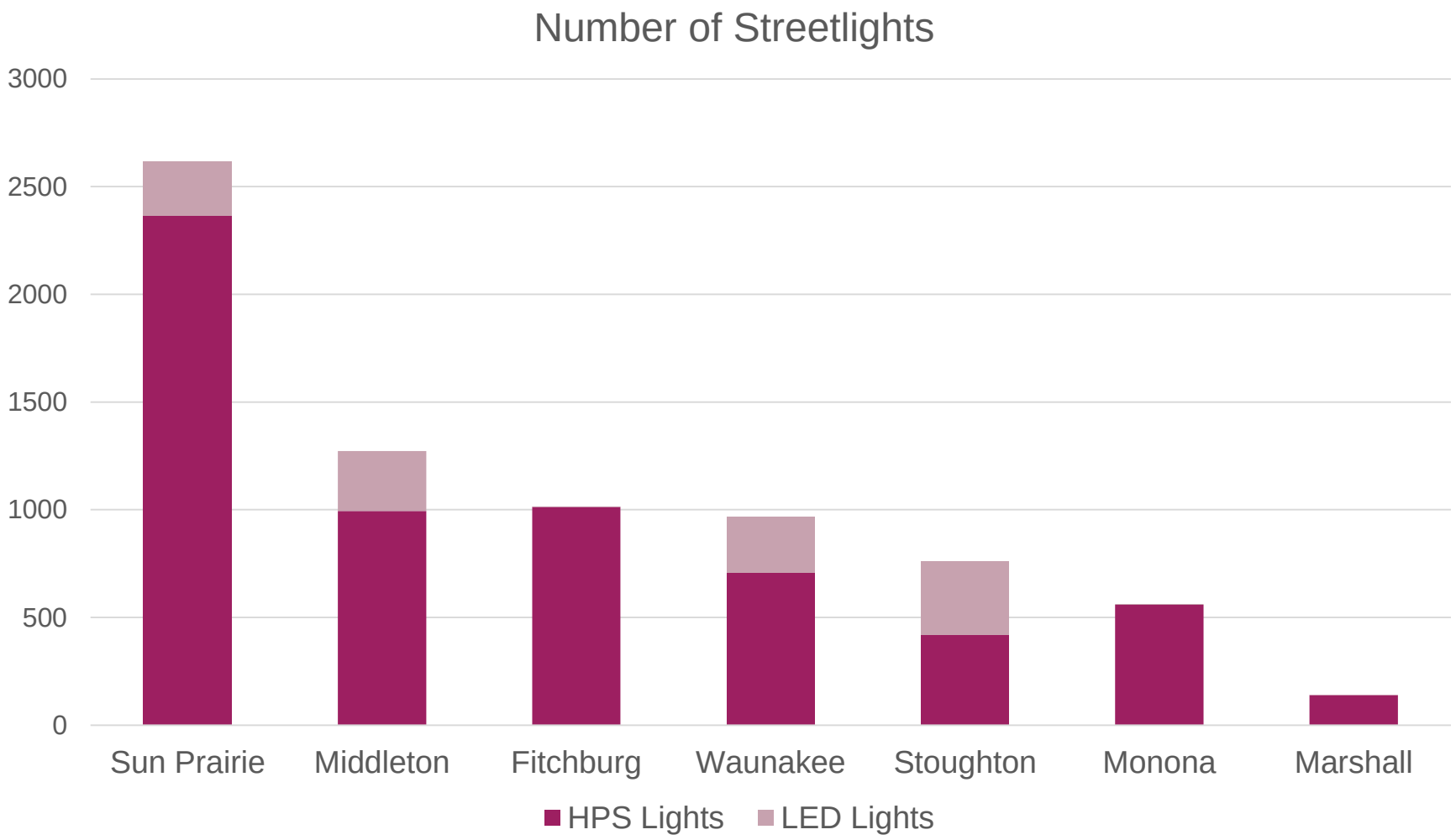


Comparisons – Treatment plants and wells/pumps



+Only kWh data
*Only therm data

Comparisons - streetlights



+ Only includes utility-owned streetlights
* Only includes city-owned streetlights

Comparisons – fleet vehicles by type

	Total vehicles	Light Duty	Police	Fire / EMS	Pickups	Heavy Duty	Other*
Marshall	15	-	3	-	4	5	3
Middleton	113	7	21	3	27	18	37
Stoughton	94	1	11	7 / 3	29	26	17
Sun Prairie	179	18	28	12 / 4	45	23	49
Waunakee	116	1	10	-	21	12	72

	Total Vehicles	Admin	Police	Fire/ EMS	Parks & Rec	Public Works	Utilities
Fitchburg	90	6	21	16	16	20	11
Monona	59	4	12	8	5	30	-

*Number/type of vehicles included in other varied based on what communities provided

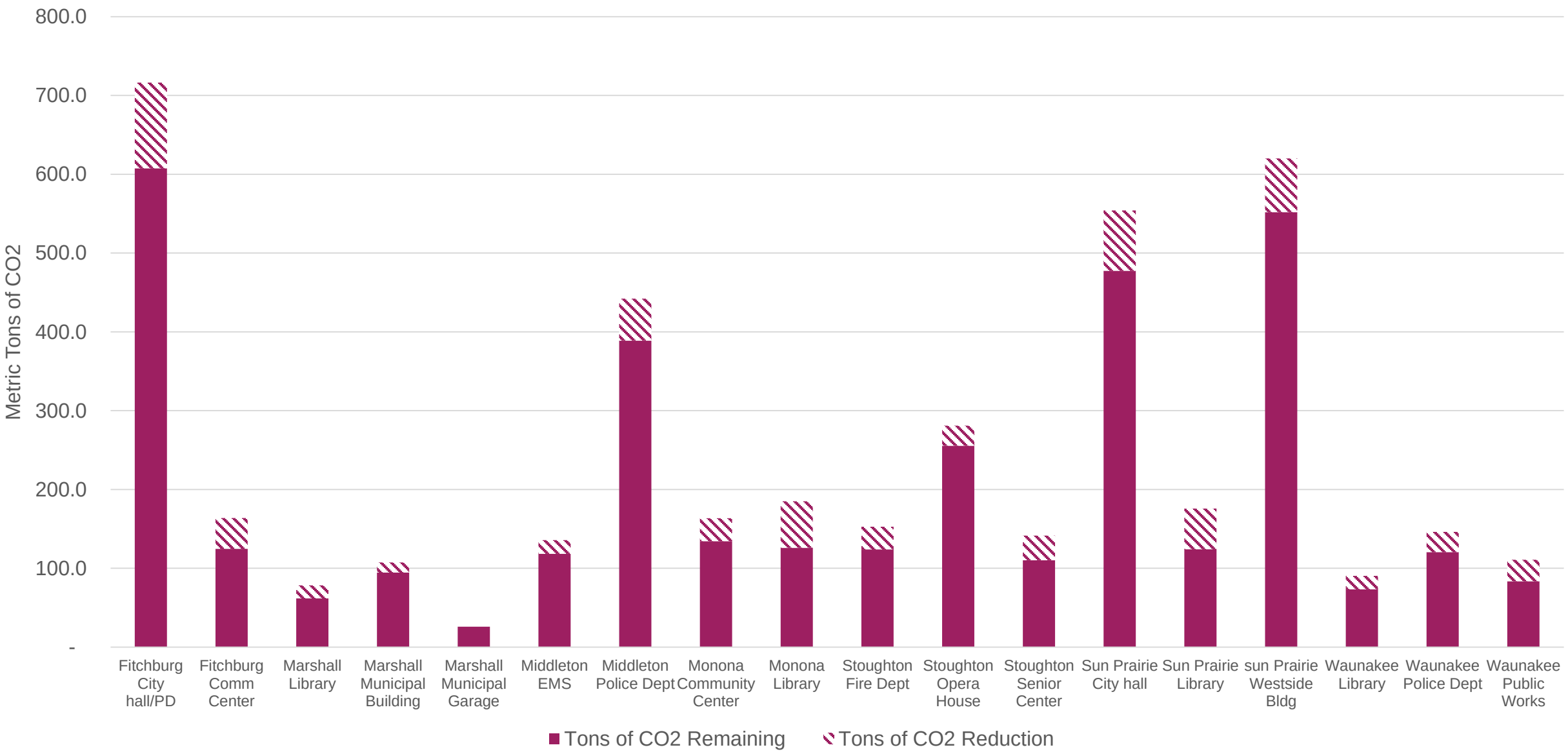
Fleet comparisons – data available

Community	Data Available
Fitchburg	Gallons of use by department + vehicle list + some mileage/mpg data
Marshall	Gallons of use by vehicle
Middleton	List of vehicles
Monona	Gallons of use by department + vehicle list + some mileage/mpg data
Stoughton	Miles driven + mpg by vehicle
Sun Prairie	Fuel cost by department + vehicle list
Waunakee	List of vehicles

Opportunities summary

Energy efficiency opportunities

Building Energy Efficiency Measures – CO_2 reductions



What Communities Are Already Doing

- Conducted Previous Energy Audits
- LED Lighting Retrofits
- High Bay and Garage Lighting Occupancy Sensors
- Condensing Boilers
- Condensing Hot Water Heaters
- Defined room temperature setpoints
- BAS Upgrades

Common Energy Efficiency Measures

LED lighting retrofit – interior	Split system AC (IT room)
LED lighting retrofit – exterior	Summer boilers
Lighting controls – occupancy/vacancy	Demand controlled ventilation
Lighting controls – daylighting	Boiler hot water reset
Lighting controls – exterior timeclock	AHU supply air reset
Lighting controls – garage	Computer power management
RTU upgrade (at end of service)	ENERGY STAR appliances

Common Energy Efficiency Measures

LED lighting retrofit – interior	Split system AC (IT room)
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Highlights of energy efficiency opportunities and lessons learned

Fitchburg	Marshall	Middleton	Monona	Stoughton	Sun Prairie	Waunakee
• Summer boiler vs. electric space heaters	• Radiant floor heating for library (comfort)	• Boiler insulation • City-wide setpoints	• Insulation and fenestration	• Opera house lighting and HVAC • Building management	• Atrium heating and cooling	• Old library upgrades

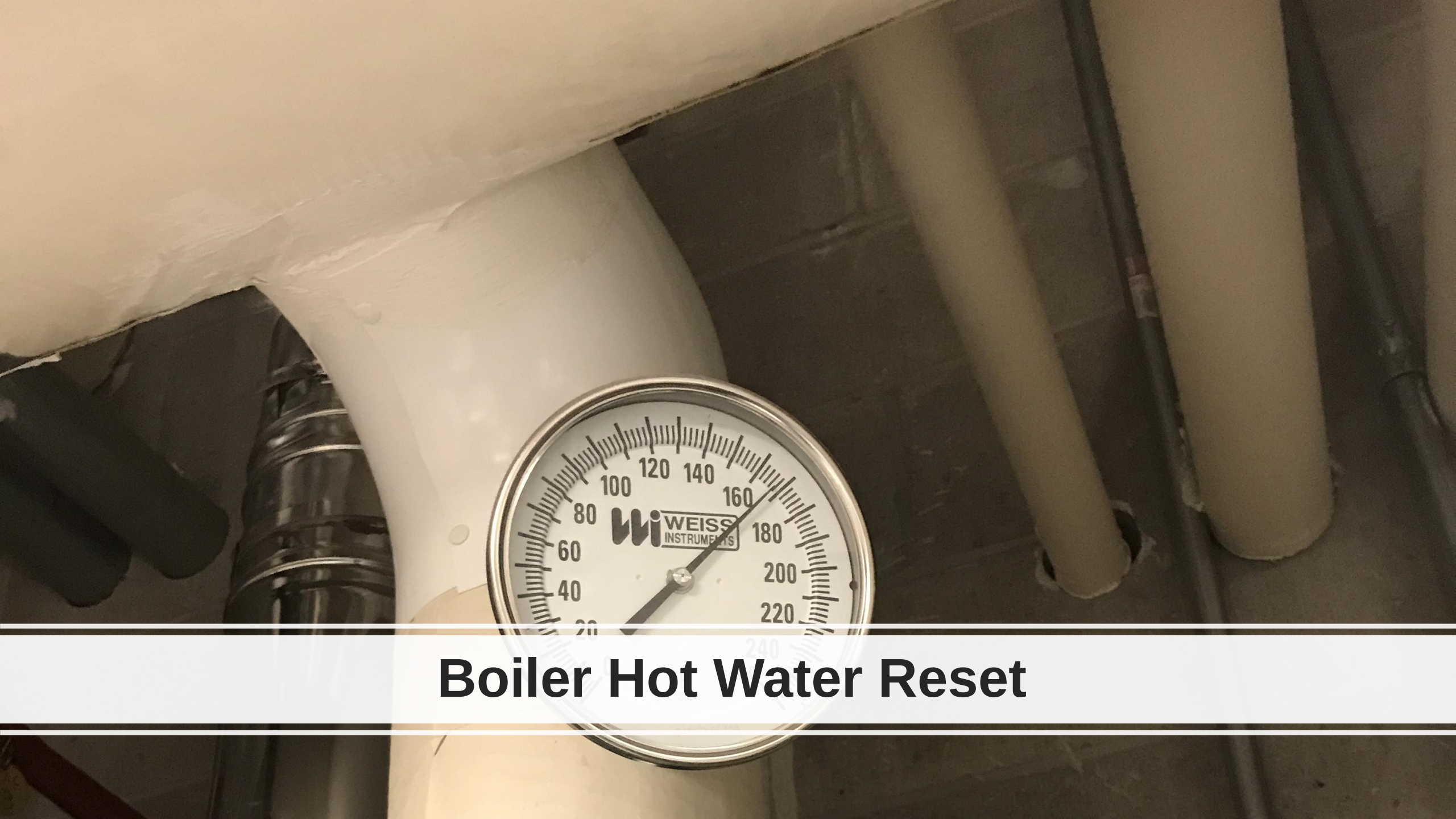
LED Lighting Retrofit

Automatic Lighting Controls

Occupancy / Vacancy Sensors

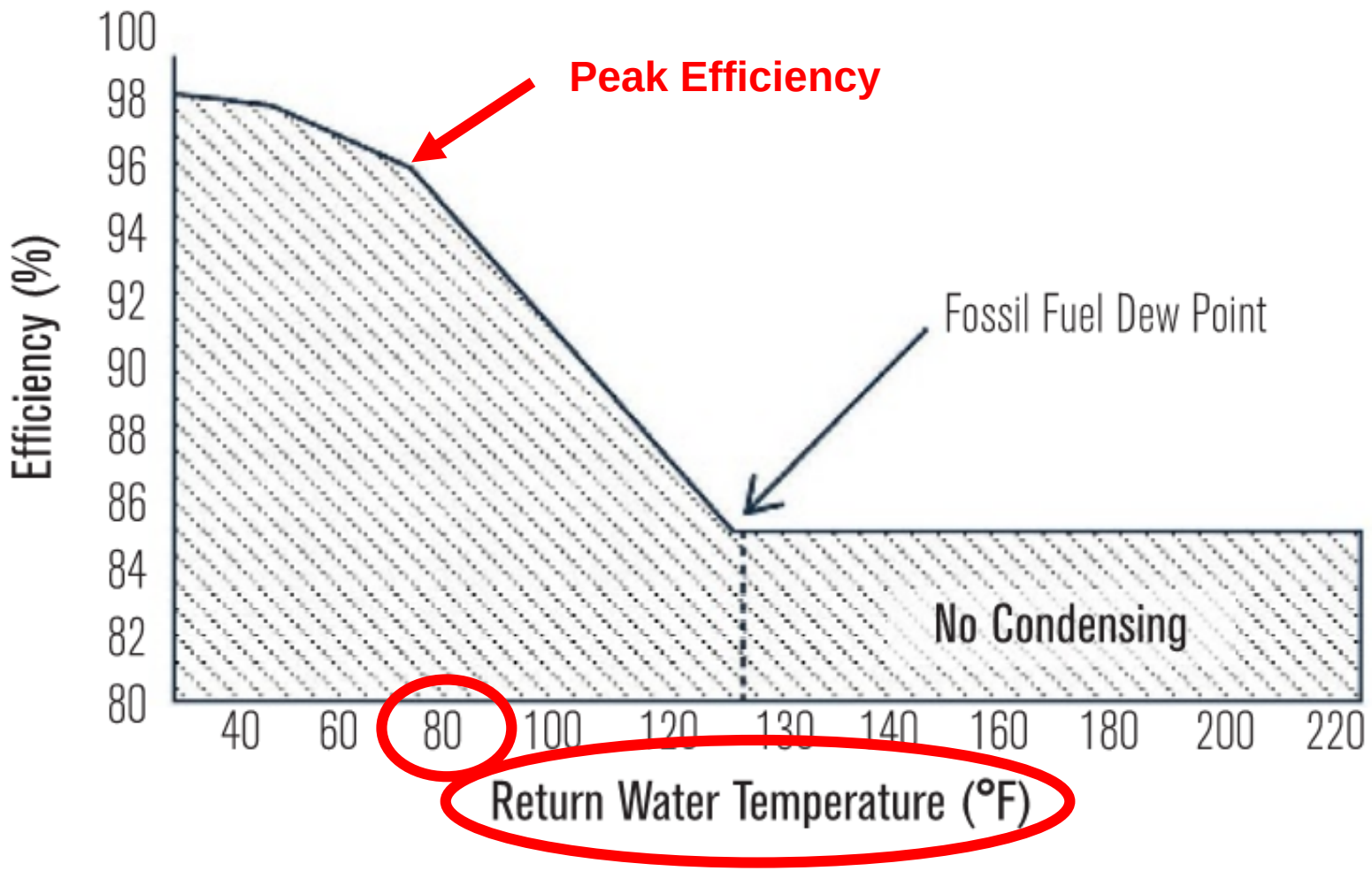
Daylighting and Integrated Lighting Sensors

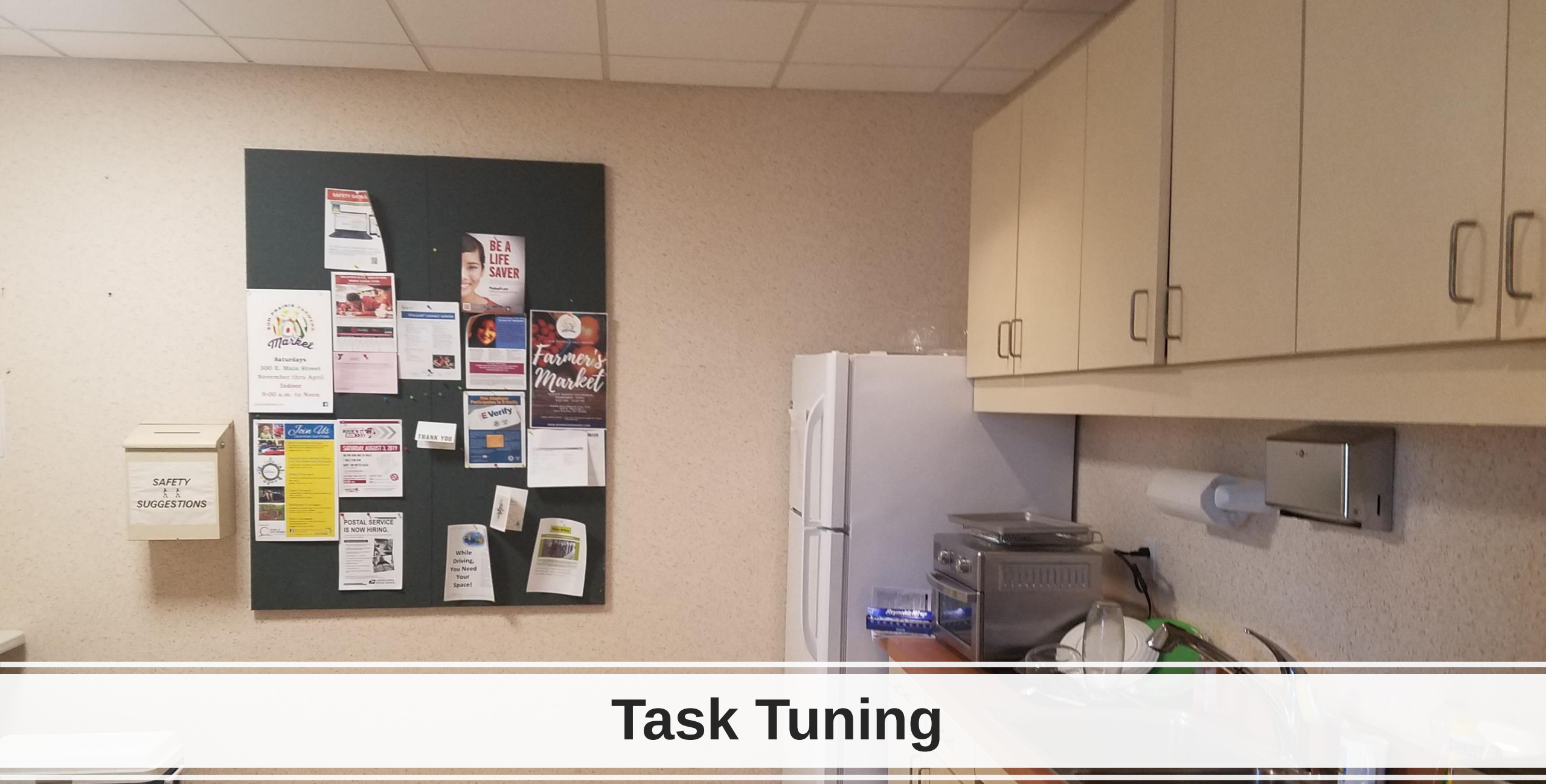
Courtesy of Cree Lighting



Boiler Hot Water Reset

FIGURE 1 Example of flue gas condensation temperature based on the hot water return temperature.



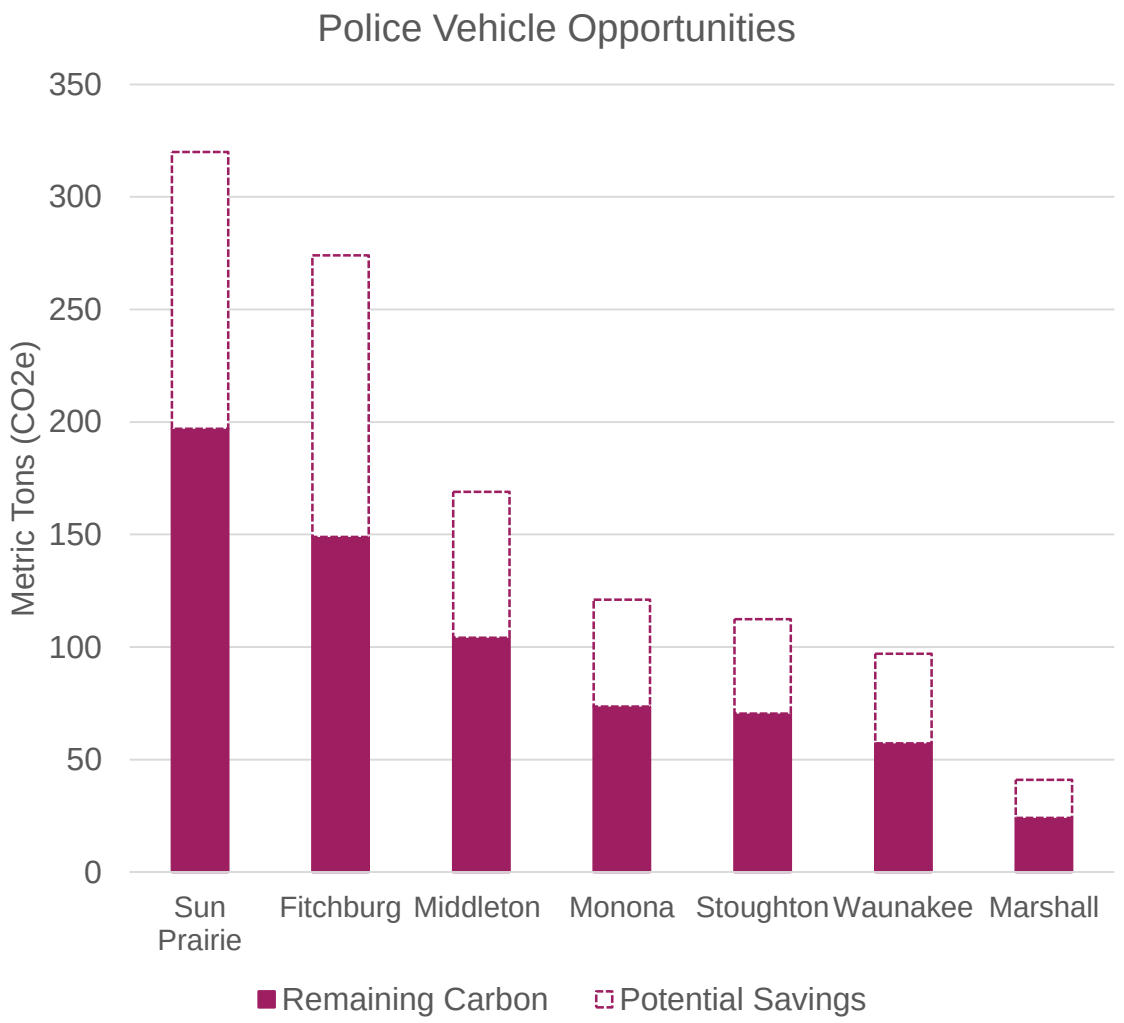

BE A LIFE SAVER
Market
Saturdays
300 E. Main Street
November thru April
Indoor
9:00 a.m. to Noon
Farmer's Market
Join Us
THANK YOU
E Verify
SAFETY SUGGESTIONS
POSTAL SERVICE IS NOW HIRING.
While Driving, You Need Your Space!

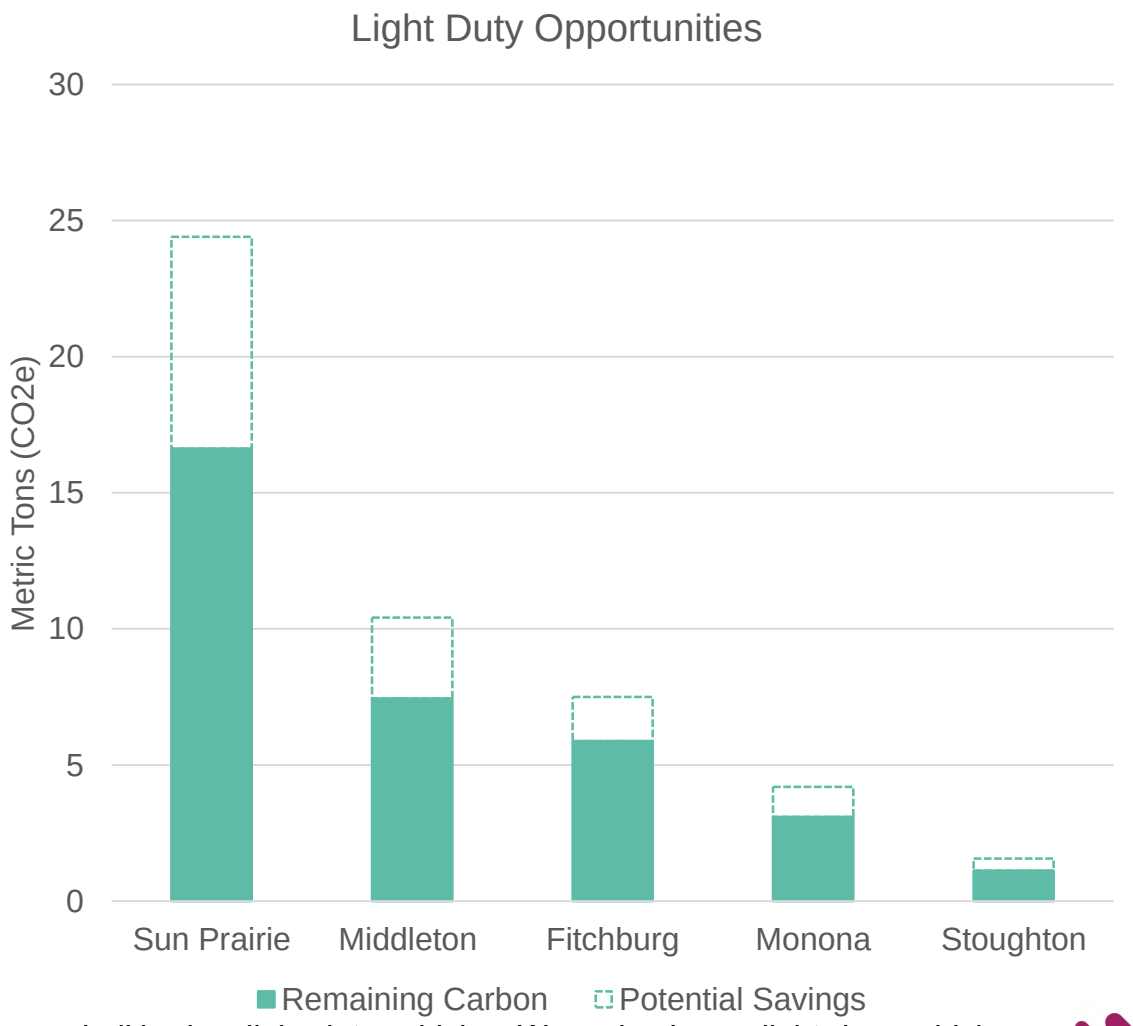
Task Tuning

Demand Controlled Ventilation (DCV)

Fleet & streetlighting opportunities

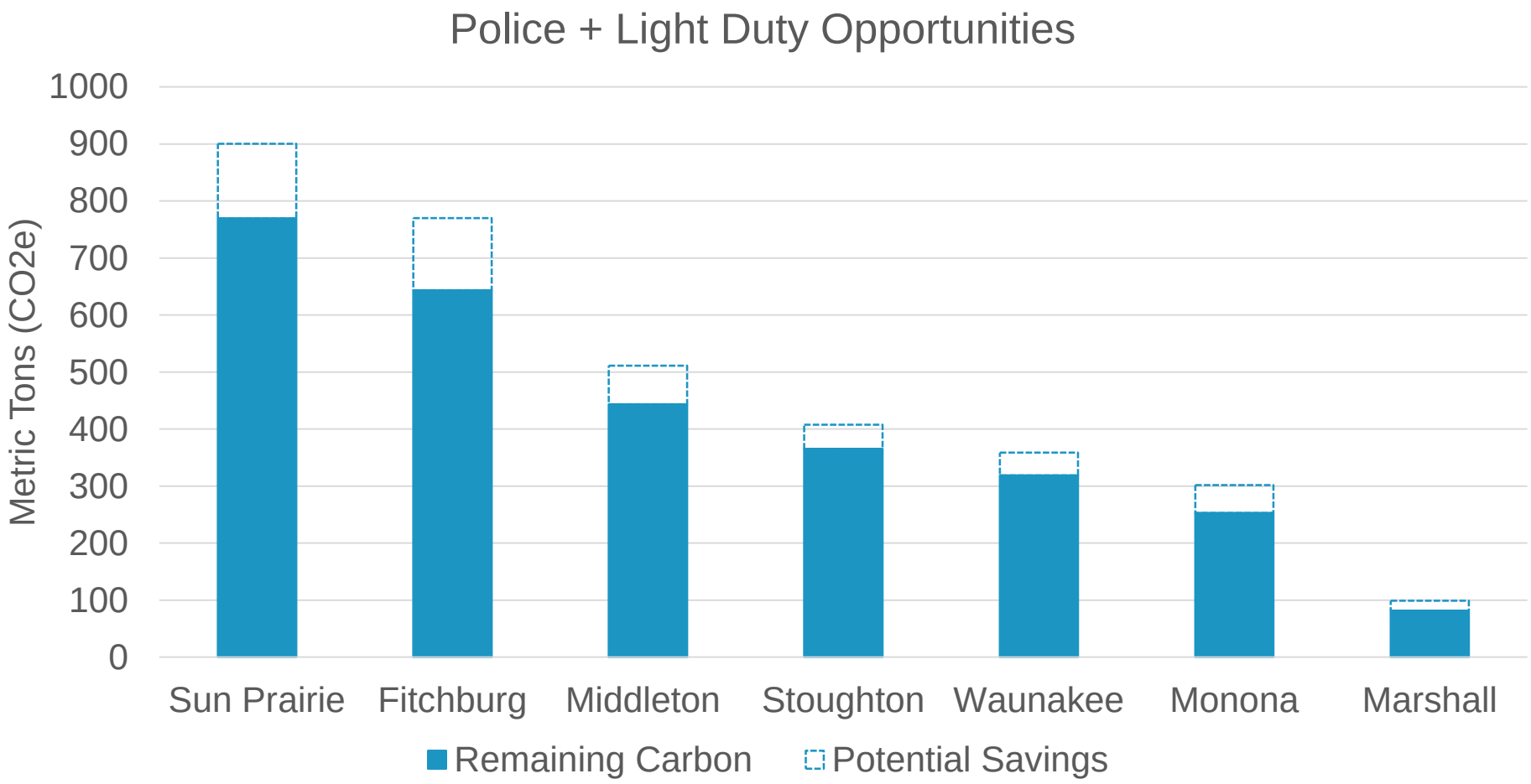
Fleet opportunities



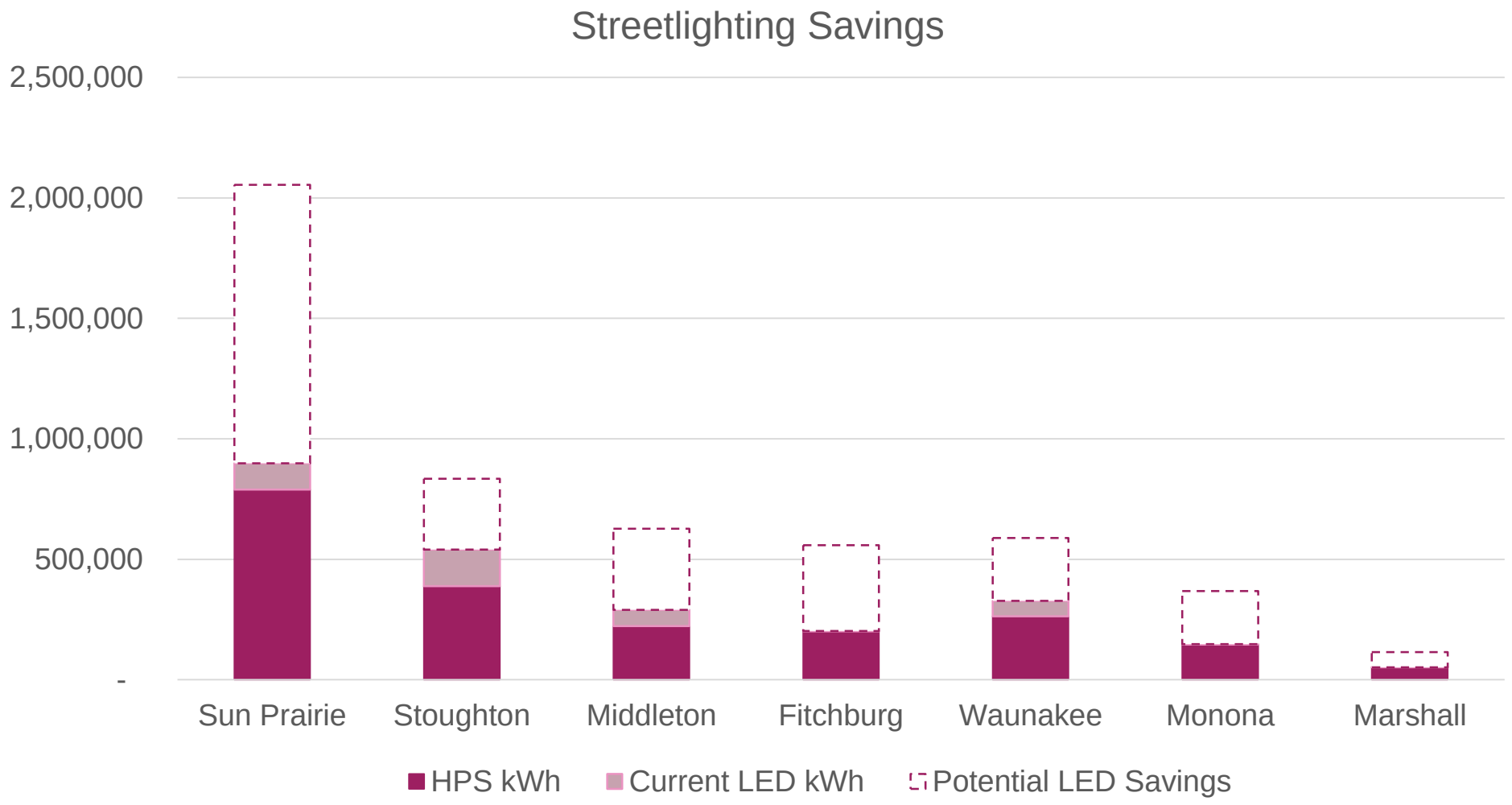


* Marshall had no light-duty vehicles; Waunakee's one light-duty vehicle was electric

Fleet opportunities – relative to total carbon



Street lighting opportunities



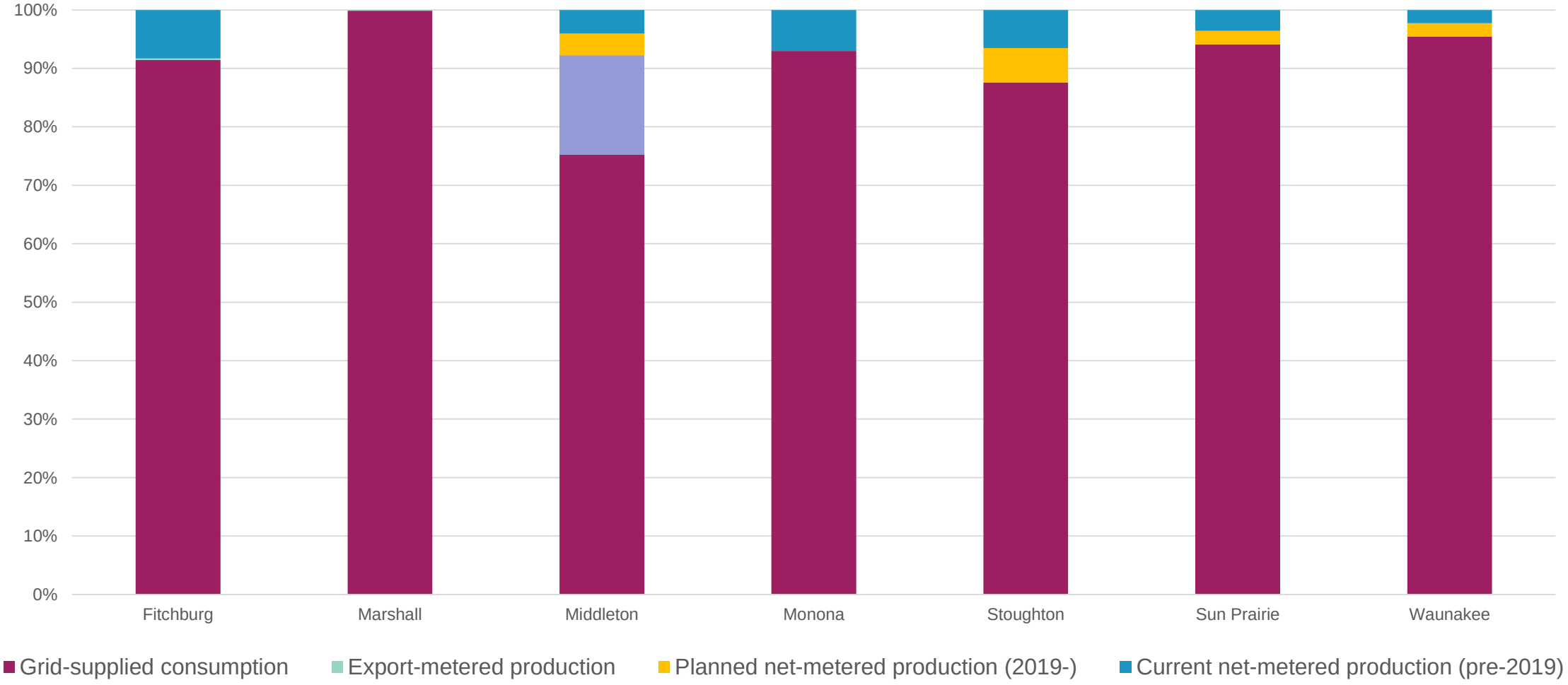
Solar opportunities

Solar Opportunity Overview

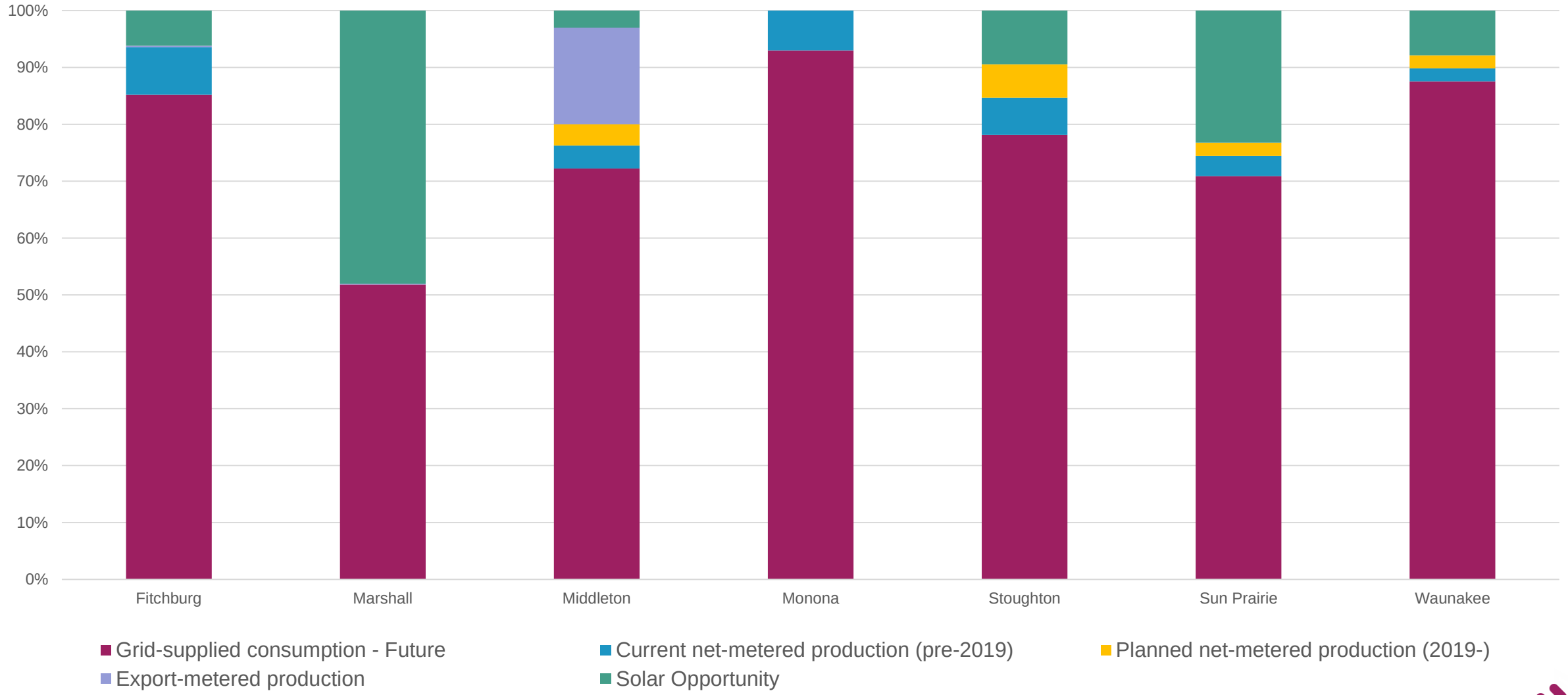
City	Existing Solar (kW)	Planned Solar (kW)	% of total electricity (existing and planned)	Estimated Additional Capacity	% of total electricity (future)
Fitchburg	335		8.6%	223.62	14.8%
Marshall	7.7		0.1%	336.82	48.2%
Middleton	116	144	7.5%	137.11	11.2%
Monona*	156		7.0%	0	7.0%
Stoughton	109.4		6.9%	142.67	17.0%
Sun Prairie	80	130	3.7%	1276.57	27.4%
Waunakee		34	2.3%	117.86	10.4%

*Monona requested a financial analysis of existing solar arrays, in place of assessments of new sites.

Renewables Overview
Electricity Sources - Current and Planned



Renewables Overview
Electricity Sources - Future



Solar Analysis – Trends

- **Limited number of opportunities to fully offset a facility's electricity use**
  - Fire stations
  - Public works buildings
  - Libraries.
- **Identify ground-mounted array opportunities**
  - Wells
  - Wastewater treatment plants
- **Consider both total production and offset opportunity**
  - Effect on municipal energy goals
  - Financial performance of the project
- **Key factors affecting financial performance**
  - Value per kWh
  - Discount rate
  - Inflation assumption
  - Rebate amount available
- **Most payback periods > 10 years (as modeled)**

Solar Analysis – Site Prioritization and Sizing

Determine objective for PV installation at each site

- Offset maximum percentage of current site consumption?
- Offset maximum percentage of current municipal consumption?
- Develop all sites with PV potential?
- Visual confirmation of municipality's commitment to clean energy?
- Optimize financial performance?

Identify non-energy factors affecting potential PV installations

- Impact on neighboring properties
- Development plans for neighboring properties
- Repair and replacement plans for building

Evaluate 'right' size for each site

- Do siting issues further limit array potential?
- How do utility rate capacity limitations affect financial performance?
- How much capital is the municipality able to allocate to the project?
- Do grant/rebate opportunities and amounts affect the right size for the project?

Renewable Energy Collaboration

Renewable Energy Tariffs

- Optimize siting
- Achieve minimum capacity requirement

Municipal Solar Group Buy

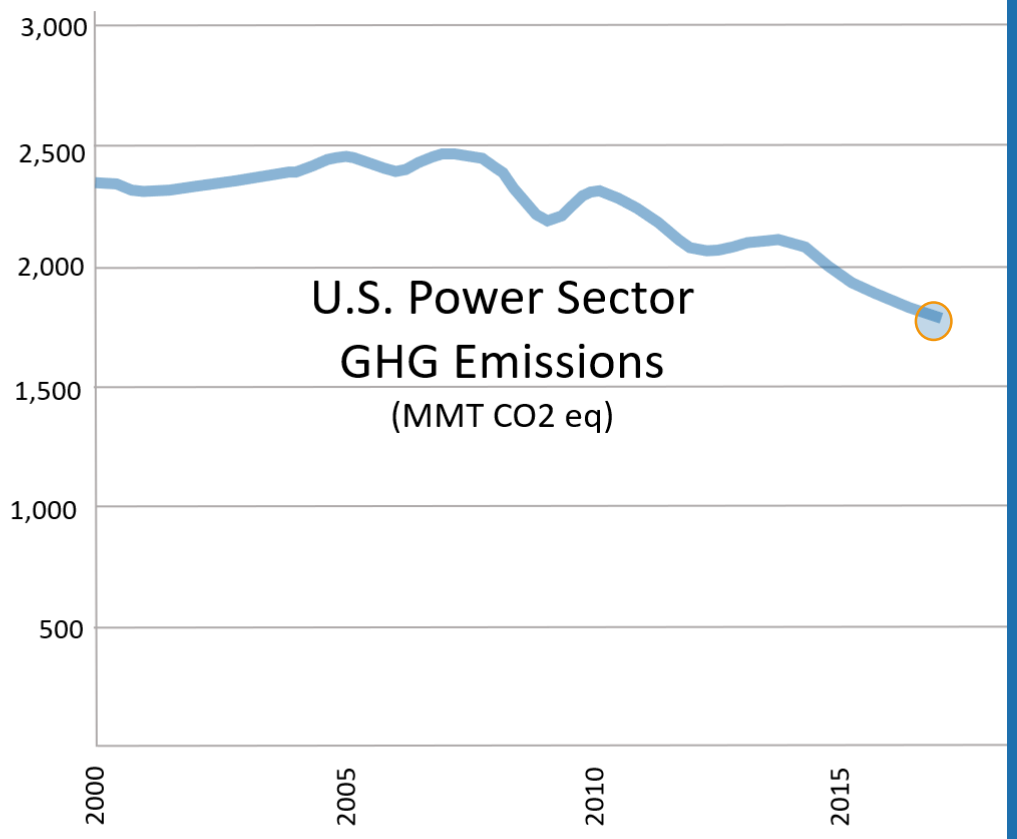
- Seven ground-mounted array opportunities
- Seven 1-2 story flat roof opportunities
- >2 MW combined capacity

Renewable Energy Procurement

- Consistent treatment of grid-purchased renewables
- Consistent strategies and communications

Partnerships with JuiceBox

How clean is your electricity?



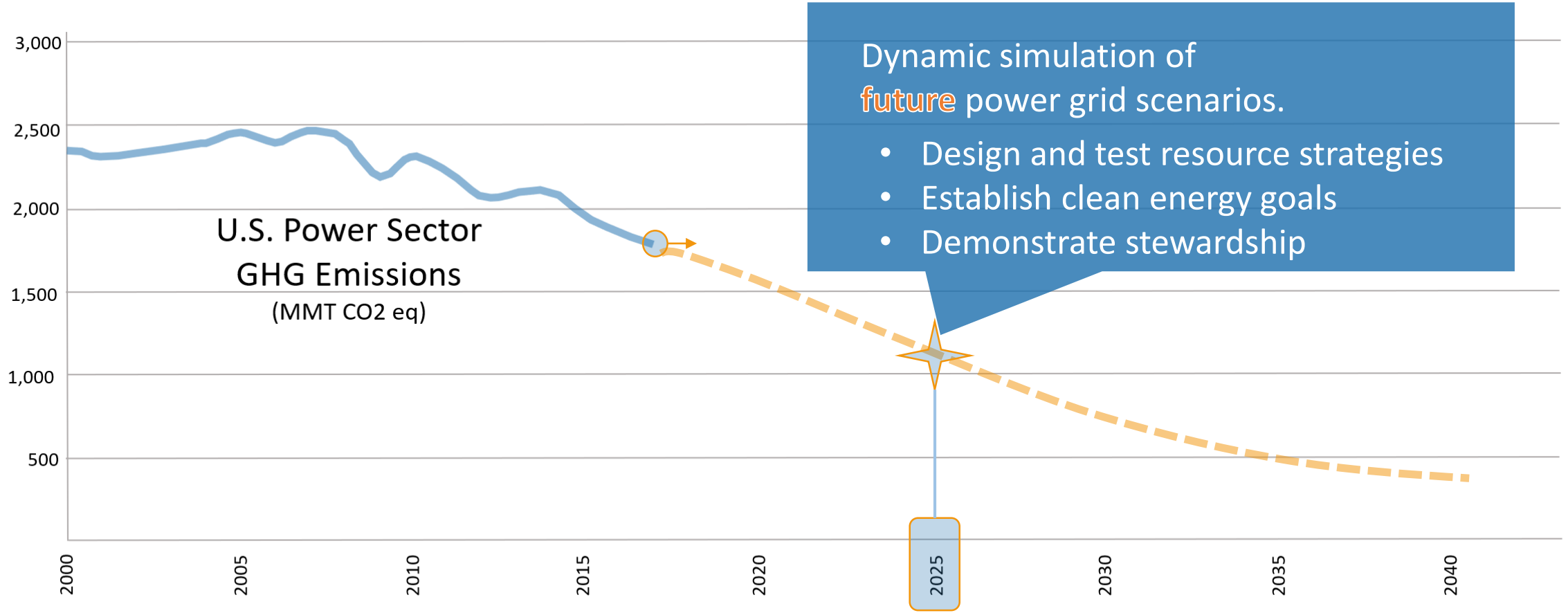
Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2017.

Typically answered using historic data (eGRID).

How clean is your electricity?

future

JuiceBox™
Clean Energy Decision Support



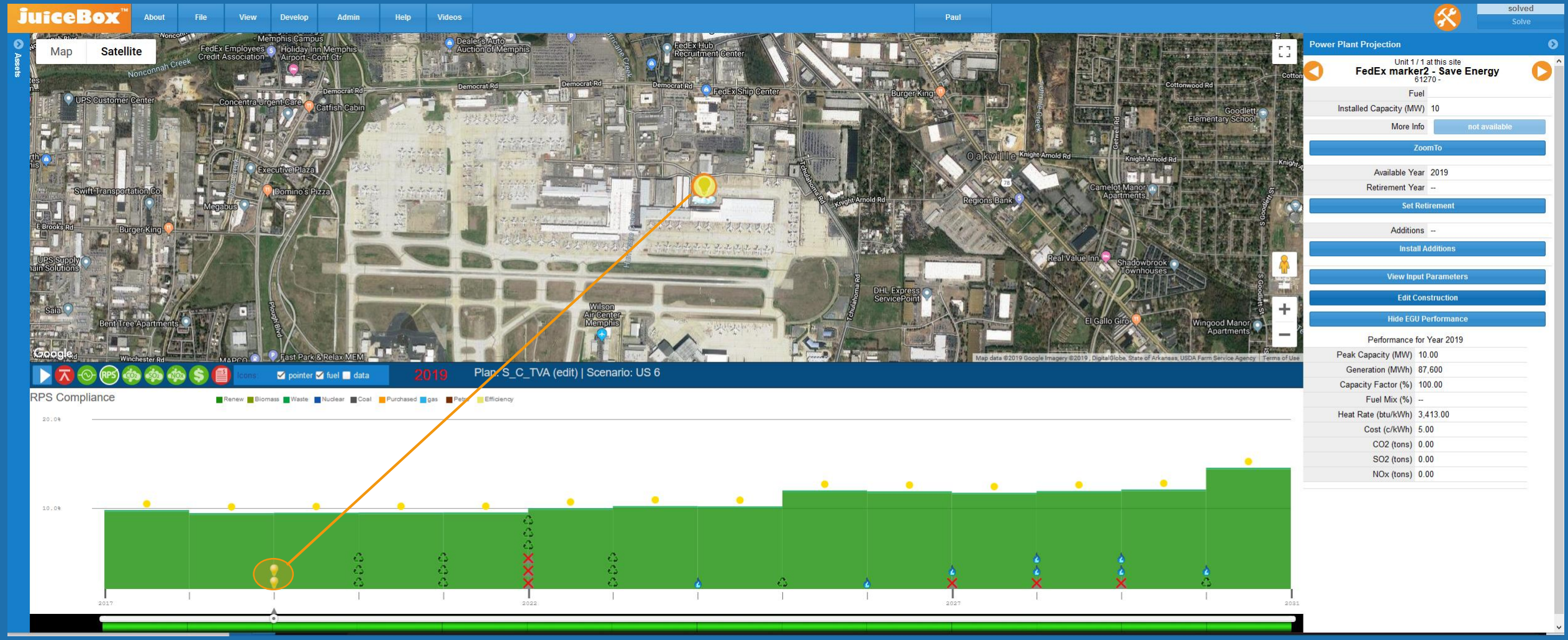
Dynamic simulation of
future power grid scenarios.

- Design and test resource strategies
- Establish clean energy goals
- Demonstrate stewardship

Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2017.

Test local strategies combining regional supply with your own on-site initiatives.

JuiceBox™
Clean Energy Decision Support



Next steps

Next steps

- Continued refinement of analysis
- Follow-up as needed via email/phone
- Final report delivered in December
- Thoughts on meeting in December?
  - Decided to set up a time to meet in January after review of reports