CITY OF MADISON

REQUEST FOR PROPOSALS

RFP #: 12036-0-2023-BG

Title: Integration and Automation Platform for Grid-Interactive Efficient Buildlings (GEB)

City Agency: Engineering

Due Date: June 29, 2023
2:00 PM CST

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1 NOTICE TO PROPOSERS

1.1 Summary

The City of Madison Engineering ("City") is soliciting Proposals from qualified vendors for Integration and Automation Platform for Grid-Interactive Efficient Buildlings (GEB). Vendors submitting Proposals ("Proposers") are required to read this Request for Proposals ("RFP") in its entirety and follow the instructions contained herein.

1.2 Important Dates

Deliver Proposals no later than the due time and date indicated below. The City will reject late Proposals:

Issue Date:	May 25, 2023
Questions Due Date:	June 15, 2023
Answers Posted Date:	June 23, 2023
Due Date:	June 29, 2023, 2:00 PM CST

1.3 Format

Submit Technical and Cost Proposals (Form D) in separate, distinct parts within the proposal package.

Electronic Proposal:	One (1) complete copy. Cost and Technical Proposals should be separate files.

The City will not consider illegible Proposals.

Elaborate proposals (i.e., expensive artwork) beyond that sufficient to present a complete and effective proposal, are not necessary or desired.

Complete and return Forms A through E to City of Madison Purchasing Services by June 29, 2023, 2:00 PM CST.

1.4 Labeling

All proposals must be clearly labeled:	Proposer's Name and Address RFP #: 12036-0-2023-BG Title: Integration and Automation Platform for Grid-Interactive Efficient Buildlings (GEB) Due: June 29, 2023, 2:00 PM CST

All email correspondence must include RFP #12036-0-2023-BG in the subject line.

1.5 Delivery of Proposals

Delivery of electronic copy to: via email to bids@cityofmadison.com

Proposals must be delivered as instructed. Deliveries to other City departments and/or locations may result in disqualification.

Note: When mailing your response via a third party delivery service, the outside of the packaging MUST be clearly marked with the RFP name and number. This ensures that the bid can be delivered to the correct purchasing agent without having to open the bid.

1.6 Appendix A: Standard Terms & Conditions

Proposers are responsible for reviewing Appendix A, the Standard Terms and Conditions, prior to submission of their Proposals. Appendix A applies to the submission of proposals and in the absence of a signed contract becomes part of the contract terms. Part I of Appendix A provides legal terms relevant only to the submission of proposals. Part II of Appendix A provides legal terms that would apply *only in the absence of a signed contract.*

1.7 Appendices B1 and B2: Sample Contract for Purchase of Services for Software/Technology and Addendum to Software License Agreement

Proposers are responsible for reviewing the sample contracts in Appendix B prior to submission of their Proposals.

Appendix B1: A contract similar to the Sample Contract for Purchase of Services for Software/Technology shall will serve as the basis for all service contract(s) resulting from this RFP. For proposals that include a SaaS, PaaS or IaaS solution, the City reserves the right to negotiate additional appropriate legal terms governing that technology.

Appendix B2: The sample "Addendum to Software License Agreement" provides mandatory legal terms to be included in any stand-alone license agreement for any on premise software.

By submitting a proposal, Proposers affirm their willingness to enter into contract(s) containing the terms found in Appendix B. The resulting contract will control over any different legal terms in this RFP, including Appendix A, or your Proposal.

While the City strives to provide the most appropriate sample contracts for this RFP, the City reserves the right to modify the sample(s) as needed. For example, different terms may be required depending on the nature of the technology solution proposed by the vendor.

1.8 Appendix C: Information Technology Department Software Acquisition Questionnaire

Appendix C is provided as a reference. Finalists and the selected vendor will be required to complete these questions to the satisfaction of the City's IT Department. Please review Appendix C to become familiar with these requirements.

1.9 Affirmative Action Notice

If Contractor employs 15 or more employees and does aggregate annual business with the City of $50,000 or more for the calendar year in which the PO and/or Contract is in effect, Contractor shall file, within thirty (30) days from the PO/Contract effective date and BEFORE RELEASE OF PAYMENT, an Affirmative Action Plan designed to ensure that the Contractor provides equal employment opportunity to all and takes affirmative action in its utilization of applicants and employees who are women, minorities and/or persons with disabilities. A sample affirmative action plan, Request for Exemption forms, and instructions are available at: www.cityofmadison.com/civil-rights/contract-compliance/vendors-suppliers/forms or by contacting a Contract Compliance Specialist at the City of Madison Affirmative Action Division at (608) 266-4910. Vendors must register for an account to complete the required forms online, here: https://elam.cityofmadison.com/citizenaccess

Contractor shall also allow maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this PO/Contract.

Job postings: All contractors who employ 15 or more employees (regardless of the dollar amount of this contract or their annual aggregate business with the City) must notify the City of all external job openings at locations in Dane County, Wisconsin, and agree to interview candidates referred by the City or its designated organization. Job posting information is available at: http://www.cityofmadison.com/civil-

rights/programs/referrals-and-interviews-for-sustainable-employment-raise-program. Instructions for contractors: http://www.cityofmadison.com/civil-rights/documents/RaISE_Job_Posting_Instructions.pdf

The complete set of Affirmative Action requirements for this purchase can be found in **paragraph 20 of Appendix A – Standard Terms and Conditions** and, in **Section 13 of Appendix B – Sample Contract for Purchase of Services**.

1.10 Multiple Proposals

Multiple Proposals from Proposers are permitted; however, each must fully conform to the requirements for submission. Proposers must sequentially label (e.g., Proposal #1, Proposal #2) and separately package each Proposal. Proposers may submit alternate pricing schemes without having to submit multiple Proposals.

1.11 City of Madison Contact Information

The City of Madison Engineering is the procuring agency:	Jon Evans City of Madison Engineering PH: (608) 245-5893 jevans@cityofmadison.com
The City of Madison Purchasing Services administers the procurement function:	Brittany Garcia Purchasing Services City-County Bldg, Room 407 210 Martin Luther King, Jr. Blvd. Madison, WI 53703-3346 PH: (608) 243-0529 FAX: (608) 266-5948 bids@cityofmadison.com
For questions regarding Affirmative Action Plans please contact:	Contract Compliance Department of Civil Rights City-County Bldg., Room 523 210 Martin Luther King, Jr. Blvd. Madison, WI 53703 PH: (608) 266-4910 dcr@cityofmadison.com

The City employs spam filtering that occasionally blocks legitimate emails, holding them in ‘quarantine” for four calendar days. The contacts listed in this RFP will acknowledge all emails received. Proposers not receiving acknowledgement within twenty-four hours shall follow-up via phone with specific information identifying the originating email address for message recovery.

1.12 Inquiries and Clarifications

Proposers are to raise any questions they have about the RFP document without delay. Direct all questions, ***in writing,*** to the Purchasing Services administrator listed in Section 1.11.

Proposers finding any significant ambiguity, error, conflict, discrepancy, omission, or other deficiency in this RFP document shall immediately notify the Buyer and request clarification. In the event that it is necessary to provide additional clarification or revision to the RFP, the City will post addenda – see 1.13 below. Proposers are strongly encouraged to check for addenda regularly.

Proposals should be as responsive as possible to the provisions stated herein. Exceptions are not permitted. The City of Madison reserves the right to disqualify any and all bids that are non-responsive or that include exceptions.

1.13 Addenda

In the event that it is necessary to provide additional clarification or revision to the RFP, the City will post addenda to its Proposals distribution websites – see 1.14 below. It is the Proposers responsibility to regularly monitor the websites for any such postings. Proposers must acknowledge the receipt of any addenda on Form B. Failure to retrieve addenda and include their provisions may result in disqualification.

1.14 Bid Distribution Networks

The City of Madison posts all Request for Proposals, addenda, tabulations, awards and related announcements on two distribution networks – VendorNet and DemandStar. The aforementioned documents are available **exclusively** from these websites. It is the Proposers responsibility to regularly monitor the bid distribution network for any such postings. Proposers failure to retrieve such addenda and incorporate their appropriate provisions in their response may result in disqualification. Both sites offer free registration to City Proposers.

State of Wisconsin VendorNet System:	State of Wisconsin and local agencies bid network. Registration is free. http://vendornet.state.wi.us/vendornet
DemandStar by Onvia:	National bid network – Free subscription is available to access Proposals from the City of Madison and other Wisconsin agencies, participating in the Wisconsin Association of Public Purchasers (WAPP). A fee is required if subscribing to multiple agencies that are not included in WAPP.
Bid Opportunities:	www.cityofmadison.com/finance/purchasing/bidDemandStar.cfm
Home Page:	www.demandstar.com
To Register:	https://www.demandstar.com/app/registration Please note when registering: Pick the **Wisconsin Association of Public Procurement (WAPP)** to select all current Wisconsin government agencies.

1.15 Local Vendor Preference

The City of Madison has adopted a local preference purchasing policy granting a scoring preference to local suppliers. Only suppliers registered as of the bid's due date will receive preference. Learn more and register at the City of Madison website: www.cityofmadison.com/business/localPurchasing.

1.16 Oral Presentations/Site Visits/Meetings

Proposers may be asked to attend meetings, make oral presentations, inspect City locations or make their facilities available for a site inspection as part of this RFP process. Such presentations, meetings or site visits will be at the Proposers expense.

1.17 Acceptance/Rejection of Proposals

The City reserves the right to accept or reject any or all proposals submitted, in whole or in part, and to waive any informalities or technicalities, which at the City's discretion is determined to be in the best interests of the City. Further, the City makes no representations that a contract will be awarded to any proposer responding to this request. The City expressly reserves the right to reject any and all proposals responding to this invitation without indicating any reasons for such rejection(s).

The City reserves the right to postpone due dates and openings for its own convenience and to withdraw this solicitation at any time without prior notice.

1.18 Withdrawal or Revision of Proposals

Proposers may, without prejudice, withdraw Proposals submitted prior to the date and time specified for receipt of Proposals by requesting such withdrawal before the due time and date of the submission of Proposals. After the due date of submission of Proposals, no Proposals may be withdrawn for a period of 90 days or as otherwise specified or provided by law. Proposers may modify their Proposals at any time prior to opening of Proposals.

1.19 Non-Material and Material Variances

The City reserves the right to waive or permit cure of nonmaterial variances in the offer if, in the judgment of the City, it is in the City's best interest to do so. The determination of materiality is in the sole discretion of the City.

1.20 Public Records

Proposers are hereby notified that all information submitted in response to this RFP may be made available for public inspection according to the Public Records Law of the State of Wisconsin or other applicable public record laws. Information qualifying as a "trade secret"—defined in State of Wisconsin Statutes—may be held confidential.

Proposers shall seal separately and clearly identify all information they deem to be "trade secrets," as defined in the State of Wisconsin Statutes. Do not duplicate or co-mingle information, deemed confidential and sealed, elsewhere in your response.

> S. 19.36(5)
> (5) TRADE SECRETS. An authority may withhold access to any record or portion of a record containing information qualifying as a trade secret as defined in s. 134.90(1)(c).
>
> s. 134.90(1)(c)
> (c) "Trade secret" means information, including a formula, pattern, compilation, program, device, method, technique or process to which all of the following apply:
> 1. The information derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use.
> 2. The information is the subject of efforts to maintain its secrecy that are reasonable under the circumstances.

The City cannot ensure that information will not be subject to release if a request is made under applicable public records laws. The City cannot consider the following confidential: a bid in its entirety, price information, or the entire contents of any resulting contract. The City will not provide advance notice to Proposers prior to release of any requested record.

To the extent permitted by such laws, it is the intention of the City to withhold the contents of Proposals from public view—until such times as competitive or bargaining reasons no longer require non-disclosure, in the City's opinion. At that time, all Proposals will be available for review in accordance with such laws.

1.21 Usage Reports

Annually, the successful Proposers shall furnish to City Purchasing usage reports summarizing the ordering history for each department served during the previous contract year. The report, at a minimum, must include each and every item or service ordered during the period, its total quantities and dollars by item/service and in total. The City reserves the right to request usage reports at any time and request additional information, if required, when reviewing contract activity.

1.22 Partial Award

Unless otherwise noted, it will be assumed that Proposers will accept an order for all or part of the items/services priced.

1.23 Tax Exempt

The City of Madison as a municipality is exempt from payment of federal excise taxes (Registration Number 008-1020421147-08) and State of Wisconsin taxes per Wisconsin statute 77.54(9a). Federal Tax ID #39-6005507. A completed Wisconsin Department of Revenue Form S-211 (R.2-00) can be found on the City website. Our tax-exempt number is ES 42916.

1.24 Cooperative Purchasing

Bidders may choose to extend prices offered on bids to other municipalities. Under Wisconsin Statutes, a municipality is defined as a county; city; village; town; school district; board of school directors; sewer district; drainage district; vocational, technical and adult education district; or any other public or quasi-public corporation, officer, board or other body having the authority to award public contracts. This is known as “cooperative” or “piggyback” purchasing, a practice common amongst units of government. The City is not responsible for any contract resulting from a cooperative purchase using this RFB as a basis; they are made solely between the bidders and third party unit of government.

1.25 Proposers Responsibility

Proposers shall examine this RFP and shall exercise their judgment as to the nature and scope of the work required. No plea of ignorance concerning conditions or difficulties that exist or may hereafter arise in the execution of the work under the resulting contract, as a consequence of failure to make necessary examinations and investigations, shall be accepted as an excuse for any failure or omission on the part of the Proposers to fulfill the requirements of the resulting contract.

2 DESCRIPTION OF SERVICES/COMMODITIES

2.1 Background

Grid-interactive efficient buildings (GEBs) offer an integrated approach to coordinating building energy loads for cost savings, continuous demand management, and to optimize energy use for additional grid services. Advanced controls enable flexibility regarding when and how building electrical and thermal loads are operated. In an optimized manner, GEBs can mitigate peak demand challenges, enhance grid reliability/energy resiliency, and balance the supply of renewable energy generation. Buildings offer a unique opportunity for cost-effective demand-side management because they are the nation's primary users of electricity and building energy use drives a comparable share of peak power demand.

However, many of these loads are flexible to some degree; with proper communications and controls, loads can be managed to draw electricity at specific times and at different levels, while still meeting occupant productivity and comfort requirements. The US Department of Energy's (DOE) Building Technologies Office has been seeking to build on existing energy efficiency efforts to optimize the interplay among energy efficiency, demand response, behind-the-meter generation and energy storage to increase the flexibility of demand-side management, all enabled through smart controls. This results in a lower, "flatter," more flexible energy load profile, which in turn delivers a more resilient and productive building, optimizes capital investments, reduces operating costs, and provides access to new revenue. (Rocky Mountain Institute, Grid-Interactive Efficient Buildings (GEBS) - RMI)

The DOE is deploying and testing the GEB concept through their Connected Communities funding program, and the City of Madison and local utility Madison Gas and Electric (MGE) have been selected to receive funding as participants. This program will demonstrate not just one but groups of buildings combined with other types of distributed energy resources (DERs), such as electric vehicle (EV) charging and photovoltaic (PV) generation to reliably and cost-effectively serve as grid assets by strategically deploying efficiency and demand flexibility. Implementing partners on the DOE project include the City, MGE, Slipstream, RMI, ACEEE, and bluEvolution.

2.2 Introduction to City of Madison Pilot

Through this Grid-interactive Efficient Building pilot, GEB platforms will first be deployed in City buildings and then, if successful, to local businesses through an MGE program. The City is soliciting fully fixed-priced responses to this request for proposal from qualified companies with building operating systems/solutions that incorporate functionalities of Energy Management Information Systems (EMIS), Demand/Peak Load Management and Grid-interactive Efficient Building (GEB) platforms. In the context of this pilot, the awarded vendor's solution will deploy across several City-owned buildings, information for which is provided in later sections of the RFP document. The ideal platform would interface with, monitor, and control the following behind-the-meter distributed energy resources (DER) including: building automation systems (BAS), networked lighting systems, electric vehicle supply equipment (EVSE), photovoltaic (PV) inverters, and battery energy storage systems (BESS.)

2.3 Scope of Work

The purpose of this Request for Proposal (RFP) is to solicit proposals from qualified vendors to provide a turnkey Energy Management Information System (EMIS) solution for the optimization of building performance and automation of electric demand savings. This project is in alignment with the U.S. Department of Energy's National Labs research on energy management systems and Grid-interconnected Efficient Buildings, which emphasizes the role of these technologies in managing grid-wide electricity demand curves and contributing to a more resilient and efficient power grid.

The term "turnkey" in this context means that the selected vendor will deliver all necessary software and hardware components for the EMIS to function with existing building and Distributed Energy Resources (DER) systems, complete installation or delivery as a service of those components, design and implement

all required strategies to execute load shedding and load shifting, write and enable programming with existing building systems such as BAS, lighting, and metering, predict building peak demand, and control DERs to the extent necessary to implement their strategies for demand management and Automated Demand Response (ADR).

The proposed solution must seamlessly integrate with the existing BAS and be capable of incorporating data from third-party sources, such as weather data and building-installed sensors. Furthermore, the solution should have the ability to interface with grid services and MGE (the local utility) or other third-party signal provider, including receiving and sending demand response signals (such as ADR 2.0) from and to utilities, grid operators, or Demand Response (DR) / Distributed Energy Resources (DER) aggregators. This capability is essential, as the U.S. Department of Energy's National Labs have highlighted the importance of energy management systems and Grid-Interactive Efficient Buildings in facilitating more dynamic interactions with the grid to optimize electricity demand management and support grid stability.

The vendor is required to provide a comprehensive solution, including any necessary subcontracting for aspects of the project that they cannot self-perform. All subcontractor costs must be included in the vendor's final, fixed price proposal. The selected vendor will be responsible for the implementation, integration, and ongoing support of the EMIS solution, ensuring that it meets the project's objectives and requirements.

The ideal platform must interface with various behind-the-meter systems, demand response technologies, and distributed energy resources, including but not limited to HVAC equipment, networked lighting systems, electric vehicle supply equipment (EVSE), photovoltaic (PV) inverters, and battery energy storage systems (BESS). The platform should enable monitoring and visualization of system data, provide analytics (including peak demand prediction), and facilitate automated supervisory control of system functions based on the analytics. Furthermore, the solution shall use advanced algorithmic based programming such as machine learning to automate strategies integral to core GEB objectives, which including demand limiting, demand response, load shifting, and DER optimization. The successful vendor will collaborate closely with the client to ensure that the proposed EMIS solution meets these objectives and can adapt to future requirements or changes in the building's systems or infrastructure.

The remainder of this section states the desired energy and grid outcomes associated with each DER and GEB element in the City’s pilot. Part 4 of this RFP describes where these systems exist and detailed information on each for each specific facility in the pilot.

2.3.1 HVAC Equipment

Energy efficiency. Electricity and natural gas savings will be realized through improving existing HVAC control sequences via system analytics, fault detection, and basic retrocommissioning informed by visualization from the EMIS.

Load shed. Demand reduction will occur during demand response events (i.e. next weekday from 2 to 4 pm) via an ADR signal. An ADR signal will be sent to the HVAC system. HVAC load shed sequences defined during GEB implementation will be implemented during the demand response event, reducing the electric power demand of the buildings’ fans, pumps, chillers, cooling compressors, and cooling towers.

2.3.2 Networked Lighting Systems

Load shed. The same ADR signal will also be sent to the NLC systems. During the demand response events, pre-defined lighting control sequences including reductions in light levels will be implemented, thereby reducing the electric power demand of the lighting.

2.3.3 Holistic DER Management

Continuous Demand Management. An Energy Management Information System with Automated System Optimization will be deployed. This system will be capable of managing electric power across

multiple DERs. This system will predict near-future conditions that are likely to set a new peak demand for the building in each billing period. It will then implement controls across the controlled DERs to minimize or eliminate any increase in monthly peak demand.

2.3.4 Electric Vehicle Supply Equipment

Load shift. Electric vehicle managed charging will shift existing EV charging from periods of high electricity costs to periods of low electricity costs, while ensuring that EVs are sufficiently charged according to their typically scheduled usage.

Load shed. To the extent that other assets are not sufficient to meet demand response requirements, short-term cessation of EV charging in response to an ADR signal may be an option.

2.3.5 Battery Energy Storage Systems

Load shift. Behind-the-meter BESS will be installed and operated to charge and discharge to minimize utility bill costs or carbon emissions. A minimum amount of charge should always be maintained to provide resiliency. BESS inverters may also be capable of providing some smart inverter functionality.

Load shed. Where other assets are not sufficient to meet demand response requirement, the BESS can be charged and/or discharged in response to an ADR signal to reduce the net load of a given building.

2.3.6 Solar PV Smart Inverters

Data access. The existing SolarEdge inverters are all CA Rule 21 compliant. The project team is in the process of defining the specific smart inverter functionality that will be demonstrated as a part of this project, however it is anticipated that all functions will be autonomous or implemented through utility or aggregator control. Thus, it is not expected that vendors would need to command inverters; however, the ability to read inverter power production in real time is required to support the other GEB functionality.

2.4 Criteria for Selection

The evaluation of each response to this RFP will be based on its demonstrated competence, compliance, format, and organization. The purpose of this RFP is to identify those suppliers that have the interest, technical capability, demonstrable experience, and acceptable pricing to deliver on an EMIS/GEB solution for the City's project.

Proposals will be scored as indicated in Section 3 below by a small team of subject matter experts including but not limited to: City Engineering, City IT, Madison Gas and Electric, Slipstream and bluEvolution. If after scoring the proposals, there is a clear top scoring team a selection will be made. If several proposals score highly, an interview process for the finalists, along with a second round of scoring, would be used to select the winning proposal.

Scoring is as follows:

30% Cost (lowest total cost proposal gets full points. Prorated for proposals with higher cost)
5% Local Vendor Preference (all or nothing)
40% Technical Question Response (scored by subject matter experts)
25% Capabilities (scored by subject matter experts)

2.5 Facilities included

Table 1 and Table 2 summarize the different DER and GEB elements applicable to a given facility. Table 1 covers facilities where full EMIS integration with building systems (e.g. HVAC, etc.) will be necessary; Table 2 covers facilities where more targeted DER-only integration may suffice to save on effort and cost (though if full EMIS integration is just as easy, that is fine). Part 4 of this RFP describes significantly more detail on all these facilities.

Table 1: DER and GEB elements by facility; full-building EMIS integration with building systems.

	Size (ft^2)	Building Automation System	HVAC: Efficiency	HVAC: Load Shed	Lighting: Load Shed	EVSE: Load Shift/shed	BESS: Load Shift/shed	Cont. Demand Management	SolarEdge Smart Inverters – data access
Madison Muni Building	82,592	Honeywell Tridium N4	X	X	X	X		X	X
Engineering Operations	13,265*	Honeywell Tridium N4	X	X	X	X	X	X	X
Fleet Headquarters	13,269**	Honeywell Tridium N4				X	X		X
Midtown Police District	31,071	Honeywell Tridium N4	X	X				X	X
Warner Park Rec Center	31,200	Honeywell Tridium N4	X	X				X	X

*Square footage of fully conditioned and automated building space shown; total area is 68,265 when including vehicle garage.

**Square footage of fully conditioned and automated building space shown; total area is 117,946 when including vehicle maintenance bays.

Table 2: DER elements by facility; for more targeted DER-level integration.

	Size (ft^2)	Building Automation System	HVAC: Efficiency	HVAC: Load Shed	Lighting: Load Shed	EVSE: Load Shift/shed	BESS: Load Shift/shed	Cont. Demand Management	SolarEdge Smart Inverters – data access
Streets West	10,937*	Honeywell Tridium N4			X		X		X
Fire Station 14	21,829	Honeywell Tridium N4					X		X

*Square footage of fully conditioned and automated building space shown; total area is 75,922 when including vehicle garage.

A note on BESS: The City does not currently have any BESS, and the project team is in the process of procuring BESS as part of this pilot. Vendors may provide feedback on vendors or requirements for a BESS to support the City in meeting the goals of this project.

A note on lighting: The project team is in the process of procuring new lighting systems for efficiency as part of this pilot. Vendors may provide feedback on vendors or requirements for a Network Lighting System to support the City in meeting the goals of this project.

2.6 Terms of work

The installation and commissioning of the EMIS system runs from November 2023 thru April 2024. Additional lighting and battery hardware will be installed later in 2024 and the EMIS will be integrated with those new systems at that time. The other project partners will then monitor system performance from May 2024 thru January 2026.

Installation for all telecommunications and ICT cabling should follow ANSI/BICSI N1-2019

https://www.bicsi.org/standards/available-standards-store/single-purchase/ansi-bicsi-n1-2019-installation-practices-for-telecommunications-and-ict-cabling-and-related-cabling-infrastructure

To get access to systems owned and managed by the City of Madison, all relevant City IT policies and guidelines must be adhered to and are required to be followed in relation to any work performed under this RFP. The following documents contain the official policy of the City regarding the appropriate use of City networks and a directory of technology standards. Reference Administrative Procedure Memorandum No. 3-9, 3-20, and Network Connection Agreement:

https://www.cityofmadison.com/mayor/apm/3-9.pdf

https://www.cityofmadison.com/mayor/apm/3-20.pdf

https://www.cityofmadison.com/attorney/documents/posNetworkConnection.doc

All relevant City of Madison IT policies and guidance can be accessed here: https://www.cityofmadison.com/employeenet/information-technology/policies-standards

Vendor will verify with the City of Madison and their building automation provider (South Town Refrigeration dba ControlWorks) that any programming that negates or interrupts existing programming is acceptable.

Contact is Marquis Harding
mharding@controlworks-bas.com
608-347-6108

Finally, state your assumptions of the volume and level of effort of any control sequence programming required to reach the *Project outcomes* above.

2.7 Site Walkthrough and Virtual Tour

If vendors need to tour the facilities in question before providing their bid, two options are available for further information gathering.

First, an optional walkthrough can be provided on Wednesday June 7, 2023 at 10a-12p at 215 Martin Luther King Jr Blvd (Madison Municipal Building as a sample building)

And second, a two-hour virtual tour can provided on Thursday June 8, 2023 at 10a-12p in which we will provide a tour of just the digital interfaces for each facility that are currently available for remote access (includes BAS, current EVSE management, Solar Inverters and Lighting Control at Madison Municipal Building)

3 REQUIRED INFORMATION AND CONTENT OF PROPOSALS

3.1 Cost (30%)

See Form D. Submitted separately.

3.2 Local Vendor Preference (5%)

See Section 1.15

3.3 Technical Questions (40%)

The responses to the questions below count for 40% of the scoring. Weighting for each is listed.

1. (5%) Describe and/or insert a diagram to show your methods and architecture for integrating your solution with the City's building automation systems as described in the *Background* section.

2. (5%) Describe and/or insert a diagram to show your methods and architecture for integrating your solution with the City's EVSE and battery energy storage systems as described in the *Background* section. For battery energy storage systems, state how you'd propose the project determine optimal charge and discharge operations, using your solution as applicable.

3. (5%) Describe who will perform the following tasks on the project:
    a. Integration of your solution with the BAS
    b. Fault detection (if applicable) algorithm development/selection
    c. Controls programming for any energy efficiency measures identified by the solution
    d. Development of algorithms for continuous demand management and load shed for building systems such as HVAC and lighting
    e. Development of algorithms for continuous demand management, load shed, and load shift for DERs such as EVs and BESS
    f. Programming those algorithms into controls

4. (5%) Please provide as attachments lists and descriptions of previous project(s) that your solution has been applied to that have similarities to the City's pilot projects. Please provide at least two references that can be called upon to provide testimonial to your company's work.

5. (5%) Explain your methodology for developing algorithms for continuous demand management and load shedding for building systems. Please provide case studies or examples of previous projects where your algorithms have successfully managed demand and achieved energy savings.

6. (5%) Describe your process for developing algorithms for continuous demand management, load shedding, and load shifting for Distributed Energy Resources (DERs). Provide examples of how your algorithms have been successfully implemented in previous projects and the impact on energy demand and savings.

7. (5%) This pilot could lead to scaling across 1) dozens of City facilities or 2) a number of Madison Gas and Electric utility customers. Describe how much your solution implementation gets streamlined once it is scaled, including how you'd consider economies of scale in reducing pricing for a larger number of buildings. Also describe ability to interface with different types and manufacturers of building automation systems, lighting control systems, inverters, EVSE and BESS.

8. (5%) Can your solution currently communicate via OpenADR with end users? If not, describe the specific development steps it would take to get there. Also, list any other external signals (IEEE 2030.5, SCADA, DNP3, APIs) you are able to take as input.

Capabilities (25%)

For each capability below, state whether your solution complies in its current form or not, or a date at which it will be able to comply. Required capabilities will be needed within the project timeline discussed above.

	Criteria	Description	Complies (Yes, No, or future development date)
SYSTEMS INTEGRATION	**Building Control Systems Integration**	The EMIS vendor must have the ability to set up an IoT gateway device (or utilize a Niagara framework driver to integrate the existing Honeywell JACE 8000 appliances) in each building within scope. An IoT gateway device must integrate with a variety of operations technology (OT) networks such as HVAC controls, networked lighting, electrical metering, The offered solution should be able to communicate with industry standards open protocols, including BACnet and Modbus)	
	DER Systems Integration	The EMIS vendor must have the ability to interface with Distributed Energy Resources (DERs) including EVSE, PV inverters, or BESS via the buildings local area network (LAN). The interface or gateway must be capable of reading on 1-minute intervals all required OT equipment I/O sensor or output data points via third party protocols such as Open API and/or industry standard software protocols (e.g. BACnet, Modbus, DNP3, and/or OCPP).	
	Accessibility	Available for access through a non-proprietary thin client, over a wide area network, or available on a cloud instance of the software by end-users 24x7x365 during non-maintenance windows. Ability to be supported locally and remotely.	
	SOO Storage	Store Sequence of Operations (SOO) in text format for reference and should also provide capability to download SOOs in text or PDF format.	
	SSO & User Authentication	Capable of Single Sign On (SSO) and multi-factor authentication or provide their authentication options.	
	Scalability	Scalable to include all assets with the portfolio. This could potentially scale to multiple different portfolios of buildings in MG&E territory.	
	User Roles	Provide the ability to assign dashboard views by the defined user groups based on organization role. Provide the ability to customize user groups in terms of access levels and which buildings can be accessed. Provide the ability to set expiration dates on access. The minimum number of user groups would be: Superuser (administrative access), Management user, read-only	

	Criteria	Description	Complies (Yes, No, or future development date)
		user.	
	Operating system	If an on-premises solution is proposed, the software solution(s) must be compatible with MS Windows OS systems.	
	Hosting	If deployed through a cloud hosted (SaaS) solution, the system will have a production environment and a test environment.	
	Upgrades	Deployed technology must be upgradable to stay current with software and hardware compatibility.	
	Custom Reports	Ability to provide users to create and save custom reports (pdf, word, excel, etc.) based on user defined time ranges for selected data as defined in a dashboard. Other options would be considered as well.	
DATA NORMALIZATION & INTEGRATION	**Integration Layer**	Act as a system integration and data normalization layer for all integrated systems. Also known as an independent data layer (IDL).	
	Database Connectivity	Allow for cloud-based database connectivity, including support for SQL-compatible databases and time series databases.	
	API Connectivity	Provide open APIs for integration enablement with third party software applications. Allow for integration with SOAP/REST APIs.	
	Data Tagging and Ontology	Support utilization of a standard naming and tagging convention (e.g. Haystack or Brick Schema ideally) and utilize standardized ontologies for data modeling (e.g., Digital Twin Definition Language).	
	Integrated Data	Does the system provide an integrated programming interface (ideally utilize block programming) or a rules engine and allow an event in one subsystem to trigger an action sequence in a secondary subsystem?	
	Integrated System	Integrate with following systems using open protocols or REST APIs for data normalization, command and control (with exceptions), monitoring, alarming and reporting: BAS, lighting controls, utility meters and sub-meters, energy management systems, occupancy counting/sensing platforms, EVSE, PV inverters, and BESS.	
	Cloud Backend API	Platform provides a backend rest API service to export data telemetry data via authorized web requests. System to provide flexibility to allow data to exported in batches per building per equipment type. API services include: oBIX, XML, JSON, SOAP, MQTT, API, SNMP, OPC, LonTalk	
USER INTER	**Graphics**	Utilize graphics with Responsive Web Design (RWD), with HTML 5 preferred. System application is accessible through HTML 5 browser (Chrome or Edge). System is	

	Criteria	Description	Complies (Yes, No, or future development date)
		optimized for Mobile or Tablet applications.	
	Graphic User Interface	Ability to configure dashboard views and information displayed in each view. Ability to build and configure unique dashboards without requiring custom programming or vendor dependence.	
	Key Performance Indicators	Ability to generate performance indicators and provide visualization of performance in dashboard or simplified indicators. Ability for users with elevated rights to independently create unique KPIs without requiring custom programming or additional support from vendor. See Table 2 for a list of likely KPIs.	
	Views	City-Wide or Portfolio-level view Confirm if it would include building list, portfolio energy consumption and real time electric demand, alerts for new peaks, total PV output, critical alarms. Confirm if these views roll-up and are visible at the City-Wide Portfolio level Building-level view Confirm if it would include real time energy usage, alarms, real time weather, predicted demand, KPIs, actual demand, view of PV, battery storage and car charging metrics where applicable. System-level view Confirm if it would include the ability to see waterfall of relevant data for PV, battery storage and car charging stations for those sites that have them.	
	Alarm Summary	Must provide the ability to review ey alarms, sort by category (e.g. priority, equipment type, date, etc.) and track number of occurrences using a parent/child hierarchy.	
	Visualization	Visualizations should include: energy usage by hour and day, predicted or baseline kW load profile, actual real-time kW load profile in a time series with adjustable time scale for past, more granular, forecast of peak demand each day, portfolio summaries that roll up multiple buildings demand and/or other points.	
	User Group Data Points	Confirm if it would provide the ability to viewpoint data by User Group. Data elements for each alarm include but are not limited to: Building, Building System (heating, cooling, central plant), Equipment Type, Point Type, Point Name, and System Tag.	
DATA STORAGE	**Data Policies**	Meet or exceed data policies, including data privacy, storage, retention, destruction, and usage per City Tech Standards.	
	Aggregation	Allow the ability to collect data from disparate intelligent building systems and place in a single data repository that	

	Criteria	Description	Complies (Yes, No, or future development date)
		can be accessed and used by other integrated systems and software	
	Data Storage	Provide ability to scale and increase the amount of data points stored to support integration with selected buildings	
	Data Trending	Provide the ability for users to select data stored and trended including but not limited to points, values, point name, timeframe, and sampling rate. Ability to store up to 5 years of data for primary equipment to monitor asset KPIs (e.g., kW per ton for chillers, load profile, or damper position for min OA to monitor potential fouling on air flow stations, etc.) Ability to chart in different sets of trend data together to identify corollaries.	
REPORTING	**Reporting**	The solution can provide [year-over-year, month-over-month, week-over-week, or day-by-day] [energy, cost, and/or equipment health and performance reports] in a format specified by or acceptable to the owner	
	User Rights	System can assign rights to the reports tool, access to reports, and provide an audit log of changes made by each user.	
	Active Sites	System provides a list of active sites that are live and connected and a list of sites that are having data update issues.	
	Formats	System provides reports in multiple file formats (xls, word, csv, sql, and other accepted database formats, etc.)	
	Graphics	System allows ability to create graphics within reports.	
	Exporting	System provides the ability to export raw data.	
	Public Dashboard	Public dashboard for reporting aggregated energy-savings and emissions reductions metrics to building occupants	
	Scheduling	System can schedule report distributions.	
	Automatic Generation	System can automatically generate reports.	
	Overrides	System can provide current list of equipment or setpoints in override status. (I.E., building operator overriding BACnet HVAC equipment on BACnet priority 8 via the BAS)	
	Notifications	The solution can provide customizable notification schemes including: [work order generation, e-mail, phone, text message, to individual and/or group recipients] for data quality alerting, anomaly detection, and fault detection	
E N	**Data Availability**	Provide time stamp, demand (kW), usage (kWh) and	

	Criteria	Description	Complies (Yes, No, or future development date)
		temperature (F) and comparisons to historical values. Ability to identify the highest monthly peak demand window (5 to 15 minute window depending upon utility rate structure).	
	Energy Usage Intensity (EUI)	Provide EUI values based on existing meter data and provide comparison to past EUI performance.	
	ENERGY STAR rating	Confirm if the system can use EUI data and based on ASHRAE climate zone provide comparison to equivalent ENERGY STAR rating (e.g. 25th percentile of energy usage for similar building stock)	
	Greenhouse Gas Emissions	Provide GHG emissions based on meter data, and be able to bring in real-time, day-ahead grid carbon intensity data from sites like: https://www.watttime.org/ or https://www.wattcarbon.com/	
	Utility Rate Tracking	System can use utility rate information to identify the cost impacts of demand and usage including on-peak and off-peak or other similar rate structures.	
	Fault Detection and Diagnostics	Ability to analyze system function, primarily HVAC but possibly other systems, and automatically identify faults for improved energy and maintenance performance as defined by Table 3.	
DEMAND MANAGEMENT	**Advanced Analytics for Building Automation Performance**	Ability to make consistently accurate (+/- 5%) predictions on the time and magnitude of a building's daily peak demand.	
	Automated Adjustments of Control Systems	Ability to affect adjustments to the building control systems (e.g. BAS and lighting) to conserve energy.	
	Automated Demand Management	Ability to leverage predictions on peak demand or planned load shed such that real time, automated adjustments to building control systems, EVSEs, and BESS will be implemented to achieve target reductions.	
	Automated Demand Response	Ability to receive DNP3, IEEE 2030.5, or OpenADR (including integration to OpenADR top node) and implement pre-defined load shed of building control systems, EVSEs and BESS	
	Utility Program Integration	Experience integrating the product into utility demand response or utility energy efficiency programs.	
INTEGRATION WITH DERS	**PV Integration**	Ability to interface with local inverters using SunSpec Modbus, API, and/or IEEE 2030.5. Must support at minimum SolarEdge, Fronius, and SMA inverters.	
	BESS Integration	Ability to interface with local BESS using one or more of SunSpec Modbus, API, IEEE 2030.5, DNP3 and/or MQTT .	

	Criteria	Description	Complies (Yes, No, or future development date)
	EVSE Integration	Ability to interface with local EVSE using OCPP, OpenADR, API, or IEEE 2030.5. Must support at minimum EnelX chargers with JuiceNet.	
	Receive GEB Signals	Ability to receive and respond to OpenADR and/or IEEE 2030.5 signals.	
	Access Real-Time Market Data	Ability to read, via API, weather, wholesale market prices, real-time emissions rates, etc.	
	Record and Report Data DR Events	Ability to record data as specified by utilities, grid operators, and/or aggregators for the purposes of verifying participation in mandatory demand response tests and events.	
ADDITIONAL CAPABILITIES	**Maintenance Management**	Ability of the solution to integrate with a work order management system. Ability to automatically push faults and pull data.	
	Integration with Lighting Control systems	Experience (not just ability) integrating with common lighting control platforms to integrate lighting control data and analysis into EMIS. The default or standard system in City buildings is Lutron Vive.	
	Ability to Integrate 3rd Party Data Sets	Ability to be deployed using an integrated data layer provided by a separate entity.	
	Ability to Integrate 3rd Party Data Sets Ability to Integrate 3rd Party Data Sets	Would integrating with this data layer impact your solution's ability to push automated changes to building control systems?	

4 BACKGROUND ON CITY OF MADISON FACILITIES

This section provides an overview of the buildings and existing systems that will be affected by this project. Note that all buildings are in MGE service territory and are therefore in Climate Zone 6A.[1] These buildings are all owned and operated by City of Madison staff.

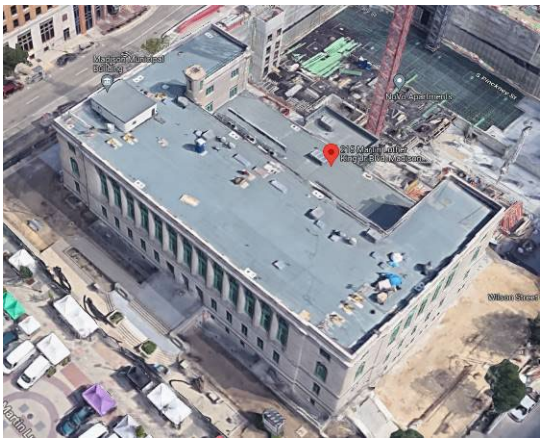
4.1 Madison Municipal Building

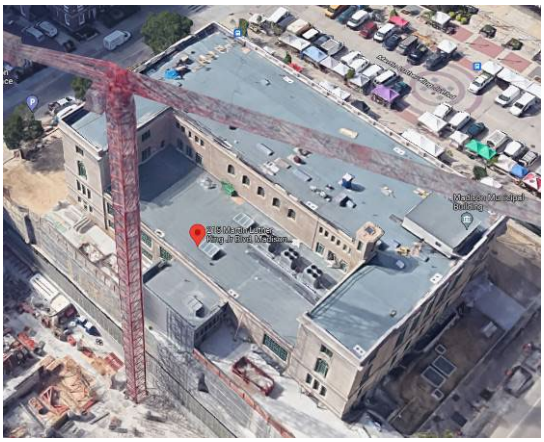
215 Martin Luther King Jr Boulevard
Madison, WI 53703

The Madison Municipal Building (MMB) is 82,592 square foot office building. It was originally built in 1927 and had a near total system renovation in 2018. These retrofits were designed to comply with IECC 2012 and with the building's designation as a historic structure. The building is occupied Monday thru Friday from 7 am to 5 pm with weekday evening meetings thru 9 pm.

Figure 1: Madison Municipal Building main entrance and southwest façade.

Figure 2: Madison Municipal Building aerial imagery (taken during renovation).





[1] ASHRAE Standard 169-2013

The building's HVAC systems include 4 air handling units (AHU) with energy recovery ventilators (ERV). The air distribution is variable air volume (VAV) with hot water (HW) reheat. Cooling is provided by 3 air-cooled chillers with an efficiency of 12 EER. Chilled water (CHW) is distributed to cooling coils in the AHUs by 3 primary and 2 secondary, variable speed CHW pumps. Heating is provided by 2 natural-gas fired boilers with an efficiency of 90%+. HW is distributed to heating coils in the AHUs, reheat coils in the VAV boxes, and perimeter radiators by 2 variable speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 65 °F. The BAS is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. There are 2 JACES onsite connecting to the N4 virtual server.

The building's lighting system is entirely LED with networked lighting controls including occupancy and photocontrol. The lighting controls are Lutron Vive.

The building has a 28.8 kW DC behind-the-meter photovoltaic array served by SolarEdge inverters.

The parking structure adjacent to MMB has 10 EnelX JuiceBox Premium EV chargers. At 212 V and a current limit of 16 A, the chargers total approximate electric demand is 34 kW. Note that since these chargers are in an adjacent parking structure, they are not on the MMB electric meter.

The building's electric demand, energy and power quality are measured with a SquareD/Schneider Electric PM5000 meter.

4.2 Engineering Operations

1600 Emil Street
Madison, WI 53713

Engineering Operations is a 68,265 square foot building with significant office (13,265 square feet) and vehicle garage (55,000 square feet) areas. It was originally built in 2006 with multiple additions and renovations since. These retrofits were designed to comply with IECC 2012. The building is occupied Monday thru Friday from 6 am to 4 pm.

Figure 3: Engineering Operations main entrance and south facade.

Figure 4: Engineering Operations aerial imagery.

The office's HVAC systems include 1 AHUs. The air distribution is VAV with HW reheat. Cooling is provided by direct expansion within the AHUs with an efficiency of 12 EER. Heating is provided by 2 natural-gas fired boiler with an efficiency of 90%+. HW is distributed to heating coils in the AHUs, reheat coils in the VAV boxes, 2 variable speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 65 °F. The Building Automation System (BAS) is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. There are 2 JACES onsite connecting to the N4 virtual server. The vehicle garage is heating-only. Heating and ventilation is provided by gas-fired makeup air units.

The office's lighting system is approximately half LED and half fluorescent T-8s. The LEDs are manually controlled with continuous dimming. The fluorescent T-8s have zone-based occupancy and daylighting controls provided by Leviton. The vehicle garage's lighting is fluorescent T-8 with manual controls.

The building has three separate behind-the-meter PV arrays totaling 109 kW DC. They are served by Fronius, SMA and SolarEdge inverters. An additional 35.4 kW DC array is being added to the building, also using SolarEdge inverters. For the demonstration, integration with the SolarEdge inverters is prioritized.

The building has 8 EnelX JuiceBox Premium EV chargers. At 207 V and current limits of 20, 28 and 32 A, the chargers approximate total electric demand is 49.7 kW, respectively.

The building does not currently have an electric demand, energy and power quality meter.

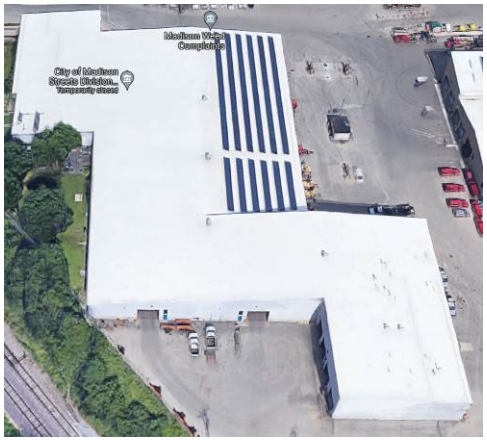
4.3 Streets West

1501 W Badger Rd
Madison, WI 53713

Streets West is a 75,922 square foot building with significant office (10,937 square feet) and vehicle garage (64,985 square feet) areas. It was originally built in 1981 with ongoing renovations. These retrofits will be designed to comply with IECC 2012. The building is occupied Monday thru Friday from 6 am to 4 pm and is particularly active during snow emergencies.

Figure 5: Streets West main entrance and south façade.

Figure 6: Streets West aerial imagery.



The office's HVAC systems includes a multizone AHU and several furnaces. The locker rooms are served by a multizone VAV AHU. The air distribution for the office is CAV with a hot deck/cold deck arrangement. The air distribution for the locker rooms is VAV with reheat. Cooling for all systems is provided by direct expansion within the AHUs and furnaces with an efficiency of 10 EER. Heating is provided by 2 natural-gas fired boiler with an efficiency of 80% or directly in the furnaces at 80-90%. HW is distributed to heating coils in the AHUs by 2 constant speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 60 °F. The BAS is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. Building automation system controls in this facility vary from others in that some pneumatic controls still operate, and some HVAC equipment has not been integrated into the Honeywell BAS. There are 3 JACES onsite connecting to the N4 virtual server. The vehicle garage is heating-only. Heating and ventilation is provided by gas-fired makeup air units.

The building's lighting system is fluorescent T-8s with manual controls.

The building has two separate behind-the-meter PV arrays totaling 299 kW DC. They are served by Fronius and SolarEdge inverters. An additional array is being added to the building, also using SolarEdge inverters. For the demonstration, integration with the SolarEdge inverters is prioritized.

The building has 1 EnelX JuiceBox Pro 32 EV charger. At 207 V and current limit of 16 A, the chargers approximate total electric demand is 3.3 kW.

The building's electric demand, energy and power quality are measured with a SquareD/Schneider Electric PM5000 meter.

4.4 Fleet Headquarters

4151 Nakoosa Trail
Madison, WI 53714

Fleet Headquarters is a 117,946 square foot building with significant vehicle maintenance (92,666 square feet) and minor office (13,269 square feet) areas. It was built in 2019 and designed to comply with IECC 2015. The building is occupied Monday thru Friday from 6 am to 4 pm and with occasional Saturday morning shifts.

Figure 7: Fleet Headquarters main entrance and northwest facade.

Figure 8: Fleet Headquarters aerial imagery (taken during construction).

The office's HVAC systems includes 2 AHUs. The air distribution is VAV with HW reheat. Cooling is provided by direct expansion within the AHUs with an efficiency of 12.3-13 EER. Heating is provided by 2 natural-gas fired boiler with an efficiency of 93%. HW is distributed to heating coils in the AHUs and reheat coils in the VAV boxes by 4 variable speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 65 °F. The vehicle maintenance areas are heating-only. Heating is provided by in-floor hydronic radiation and ventilation is provided by makeup air units with energy recovery ventilation. A solar water heating system provides a portion of the heat used by the radiant floor, reheat, and domestic hot water systems. The BAS is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. There are 2 JACES onsite connecting to the N4 virtual server.

The building's lighting system is LED with occupancy and daylighting controls by Electronic Theatre Controls.

The building has two separate behind-the-meter PV arrays totaling 321 kW DC. They are served by SolarEdge inverters.

The building has 3 EnelX JuiceBox Pro 32 EV chargers. At 212 V and current limits of 16 A, the chargers approximate total electric demand is 10.1 kW. Two additional Juicebox chargers will be added in 2023.

The building's electric demand, energy and power quality are measured with a SquareD/Schneider Electric PM5000 meter.

4.5 Fire Station 14

3201 Dairy Drive
Madison,WI 53718

Fire Station 14 is a 21,829 square foot fire station with vehicle bays, living quarters and meeting spaces. It was built in 2019 and designed to comply with IECC 2012. The building is occupied 24/7.

Figure 9: Fire Station 14 main entrance and west facade.

Figure 10: Fire Station 14 aerial imagery.

The HVAC system includes 1 AHUs with energy recovery ventilation. The air distribution is VAV with no reheat. Cooling and heating is provided by a ground source heat pump with an efficiency of approximately 15 EER. Borefield balancing is provided by 2 natural-gas fired boilers with an efficiency of 93%. HW is also distributed to infloor radiant heating through the facility via 4 variable speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 65 °F. The vehicle bays are heating-only. Heating is provided by in-floor hydronic radiation and ventilation is provided by make-up air units with energy recovery ventilation. A solar water heating system provides a portion of the heat used by the radiant floor and domestic hot water systems. The BAS is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. There is 1 JACE onsite connecting to the N4 virtual server.

The building’s lighting system is LED with occupancy and daylighting controls via line voltage.

The building has two separate behind-the-meter PV arrays totaling 154 kW DC. They are served by SolarEdge inverters.

The building’s electric demand, energy and power quality are measured with a GE AMP1 meter.

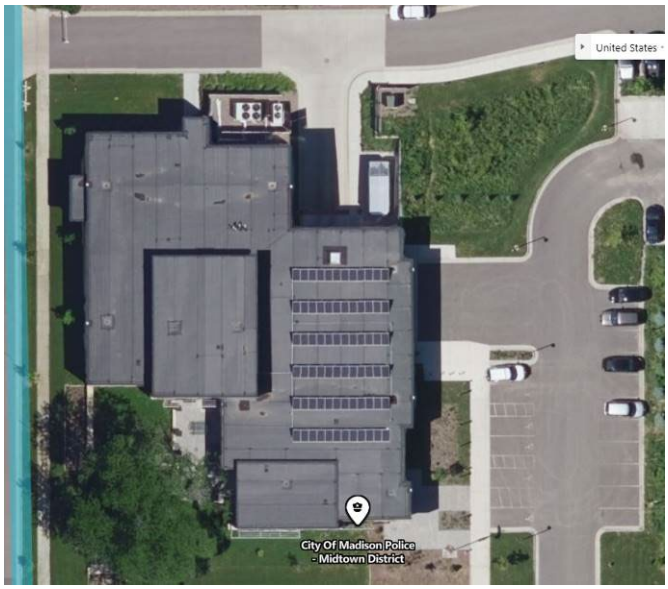
4.6 Midtown Police District

4020 Mineral Point Road
Madison, WI 53705

The Midtown Police District is a 31,071 square foot police station. It is comprised of open office, private office, and conference spaces. It also includes locker rooms, a small detainment area, and enclosed parking garage. It was completed in 2018 and designed to comply with IECC 2012. The building is occupied 24/7. However, it is only sparsely occupied outside of typical office hours since police officers are typically on patrol.

Figure 11: Midtown Police District main entrance and south façade.

Figure 12: Midtown Police District aerial imagery.



The building's HVAC systems include 1 AHU with ERV. The air distribution is VAV with no reheat. Cooling is provided by 2 external condensing units with a cooling efficiency of approximately 12 EER. Heating is provided by 2 natural-gas fired boilers with an efficiency of 90%+. HW is distributed to perimeter/ceiling radiators by 2 variable speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 65 °F. The BAS is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. There is 1 JACE onsite connecting to the N4 virtual server.

The building's lighting system is entirely LED with zone based, wireless controls including occupancy and photocontrol.

The building has a 22 kW DC behind-the-meter photovoltaic array served by SolarEdge inverters.

The building has 1 EnelX JuiceBox Premium v8.6 EV charger. At 208 V and current limits of 32 A, the chargers approximate total electric demand is 6.7 kW.

The building's electric demand, energy and power quality are measured with a SquareD/Schneider Electric PM5000 meter.

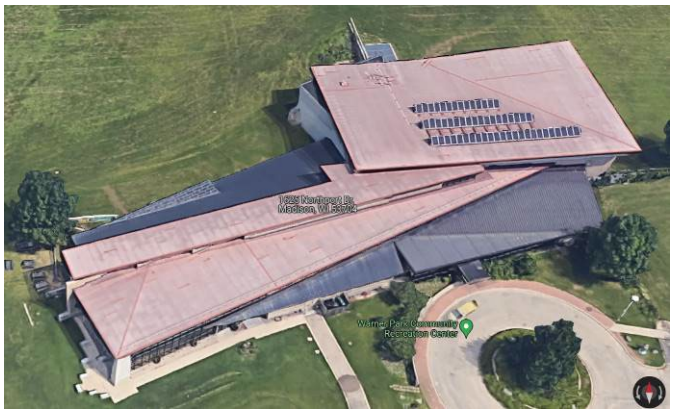
4.7 Warner Park Community Recreation Center

1625 Northport Dr
Madison, WI 53704

The Warner Park Community Recreation Center is a 31,200 square foot community center. It includes open and private offices, meeting and conference spaces, a workout facility, and a gymnasium. It was completed in 1998. An addition including an additional gymnasium is planned for 2024. The building is occupied weekdays from 8 am to 8 pm, Saturdays from 8 am to 6 pm, and Sundays from 11 am to 6 pm. The occupancy levels vary significantly with programming and events.

Figure 13: Warner Park Community Recreation Center main entrance and south façade.

Figure 14: Warner Park Community Recreation Center aerial imagery.



The building's HVAC systems include 2 AHUs. The air distribution is VAV with HW reheat. An additional constant volume AHU serves the gymnasium. Cooling is provided by 1 air-cooled chiller. CHW is distributed to cooling coils in the AHUs by 2 constant speed CHW pumps.

Heating is provided by 2 natural-gas fired boilers with an efficiency of 90%+. HW is distributed heating coils in the AHUs and reheat coils in the VAV boxes by 2 constant speed HW pumps. An air-side economizer provides free cooling at outdoor air drybulb temperatures below 65 °F. The BAS is Honeywell Tridium running Niagara version N4.10. End-point communications utilize BacNET IP. There is 1 JACE onsite connecting to the N4 virtual server.

An addition is planned in Spring 2025. The addition will include a new gymnasium. A new AHU will serve the new gymnasium. The existing chiller, CHW pumps and HW pumps will likely be replaced as part of this project. In addition, the pumps will likely be upgraded to variable speed.

The building's lighting system is entirely LED with zone based, wireless controls including occupancy control.

The building has a 40 kW DC behind-the-meter photovoltaic array served by SolarEdge inverters.

There are currently no electric vehicle chargers at this site.

The building's electric demand, energy and power quality are measured with a SquareD/Schneider Electric PM5000 meter.

4.8 UTILITY RATE STRUCTURES

The CG-2 electric tariff is for commercial buildings with a maximum 15-minute demand in excess 200 kW. Table 3 summarizes the various charges associated with this tariff.

Table 3: MGE CG-2 electric tariff summary.

Unit	Summer	Winter	Description
$/day	$14.5000	$14.5000	service charge
$/kW/day	$0.10600	$0.10600	distribution, demand charge
$/kWh	$0.01470	$0.01470	distribution charge
$/kW/day	$0.47463	$0.39230	electricity, demand charge
$/kWh	$0.06894	$0.06894	base (for all kWh)
$/kWh	$0.02177	$0.02154	on-peak period 1 (in addition to base)
$/kWh	$0.03103	$0.01880	on-peak period 2 (in addition to base)
$/kWh	$0.02587	$0.02294	on-peak period 3 (in addition to base)

Note that the summer period is from June 1 thru September 30. The winter period is for all other months of the year. The on-peak period 1 is weekdays from 10 am to 1 pm, the on-peak period 2 is from 1 pm to 6 pm, and the on-peak period 3 is from 6 pm to 9 pm. Note that on-peak periods do not include holidays (New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas).

The CG-4 electric tariff is for commercial buildings with a maximum 15-minute demand in excess of 20 kW, but no more than 200 kW. Table 4 summarizes the various charges associated with this tariff.

Table 4: MGE CG-4 electric tariff summary.

Unit	Summer	Winter	Description
$/day	$6.31090	$6.31090	service charge
$/kW/day	$0.08480	$0.08480	distribution, demand charge
$/kWh	$0.01590	$0.01590	distribution charge
$/kW/day	$0.42653	$0.34931	electricity, demand charge
$/kWh	$0.06043	$0.06043	base (for all kWh)
$/kWh	$0.01849	$0.01826	on-peak period 1 (in addition to base)
$/kWh	$0.02775	$0.01552	on-peak period 2 (in addition to base)
$/kWh	$0.02259	$0.01966	on-peak period 3 (in addition to base)

The CG-5 electric tariff is for commercial buildings with a maximum 15-minute demand no more than 20 kW. Table 5 summarizes the various charges associated with this tariff.

Table 5: MGE CG-5 electric tariff summary.

Unit	Summer	Winter	Description
$/day	$0.78584	$0.78584	service charge
$/kWh	$0.02947	$0.02947	distribution charge
$/kWh	$0.09648	$0.09648	base (for all kWh)

MGE's GSD-1/FS-1 natural gas tariff is for commercial buildings with less than 25,000 therms in 12 consecutive months. It includes a $0.80/day customer service charge, a $0.196/therm distribution charge, a $0.0144/therm administrative charge, and a $0.8638/therm natural gas service charge.

MGE's GSD-2/FS-1 natural gas tariff is for commercial buildings with who use at least 25,000 therms but less than 200,000 therms in 12 consecutive months. It includes a $3.7196/day customer service charge, a $0.1437/therm distribution charge, a $0.0119/therm administrative charge, and a $0.8638/therm natural gas service charge.

Note that these utility rates are current as of December 2022.

Table 6 summarizes the applicable tariff for each building.

Table 6: Applicable tariff by building.

Site	Electric Tariff	Gas Tariff
Fleet Headquarters	CG-2	GSD-2/FS-1
Madison Municipal Building	CG-4	GSD-2/FS-1
Fire Station 14	CG-4	GSD-1/FS-1
Midtown Police District	CG-4	GSD-1/FS-1
Engineering Operations	CG-4	GSD-2/FS-1
Streets West	CG-4, CG-5	GSD-1/FS-1, GSD-2/FS-1
Warner Park Community Recreation Center	CG-4, CG-5	GSD-1/FS-1

Note that buildings with more than one tariff have multiple meters. A preliminary analysis of electricity charges indicated that demand charges are significant, but not majority, portion of the utility bill.