City of Milwaukee
Comprehensive Energy Plan

Developing a Plan to Advance Energy Efficiency and Resiliency in City Milwaukee Buildings and Municipal Fleet

The City of Milwaukee is applying for the 2018 Energy Innovation Grant Program under Planning category (Comprehensive Energy Plans). Funding from the Office of Energy Innovation will help the City develop a comprehensive energy plan to help the City achieve its energy efficiency goals and serve as a model for other Wisconsin communities.

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The following is the narrative of the City of Milwaukee's application, with section headings that align with the Public Service Commission/Office of Energy Innovation Request for Proposal (RFP) dated May 2, 2018.

3.2.1Eligibility

The City of Milwaukee is a Wisconsin municipal corporation that was incorporated in 1846. It is Wisconsin's largest city and is eligible under section 1.2.2.1 of the RFP. The City' principle business address is 200 E Wells Street, Milwaukee, WI 53202. The Employer Identification Number is 39-6005532.

3.2.2 Description

The City of Milwaukee, in collaboration with Edison Energy, is pleased to submit this proposal to the Public Service Commission of Wisconsin (PSCW), Office of Energy Innovation (OEI), for consideration of the Energy Innovation Grant Program, planning category.

Since 2009, the City of Milwaukee has been an innovator on energy policy and programs in Wisconsin. In 2005, Mayor Barrett established a goal of reducing energy use in municipal operations. In 2012, the City of Milwaukee joined the national Better Buildings Challenge to set a new goal of cutting energy by 20% from the 2009 baseline. In addition to energy efficiency goals, the City of Milwaukee has a renewable energy goal. Milwaukee's Common Council issued a resolution (#091066) supporting the "25 x 25" goals, which was promulgated by the State of Wisconsin Office of Energy Innovation (formerly Office of Energy Independence). The goal called for generating 25 percent of the City's electricity and 25 percent of its transportation fuels from renewable sources by 2025.

The City of Milwaukee's energy efficiency goals include reducing energy use in municipal operations 20% by 2020, and for generating 25% of the City's electricity and 25% of its transportation fuels from renewable sources by 2025.

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With the Energy Innovation Grant, the City will complete a **Comprehensive Energy Plan** for municipal **facilities** and vehicle **fleet**

To work toward achieving these goals, the City of Milwaukee has established an Energy Reduction Team chaired by the City of Milwaukee Environmental Collaboration Office (ECO) and comprised of facility managers from various City departments including the Department of Public Works, Fire Department, Police Department, Health Department, and Port of Milwaukee. The Energy Reduction Team follows a six-step process for reducing the City's energy use:

1. **Set Goals** (Better Buildings Challenge and 25x25 goals)
2. **Measure** City energy use using the ENERGY STAR® *Portfolio Manager*® tool
3. **Prioritize** Buildings for Energy Improvements
4. **Identify** Energy-Saving Projects
5. **Implement** Projects
6. **Perform** On-going Monitoring and Continuous Improvement

The Energy Reduction Team has met regularly since 2010 and generally uses this process. The City has allocated capital funds for energy efficiency projects which the team has used to implement numerous lighting and other efficiency projects. In the last three years, the Energy Reduction Team has worked with Edison Energy® to perform Retro-commissioning (RCx) and Express Building Tune Ups (EBTU) on 50 of city-owned buildings. On July 31st, 2018, City is expected to get Common Council approval to install over 1MW of solar power on six city-owned facilities (resolution #180457). The City of Milwaukee also has an excellent track record of deploying federal funds towards energy efficiency efforts. The Environmental Collaboration Office (formerly Office of Environmental Sustainability), implemented $5.8 million worth of American Recovery and Reinvestment Act (ARRA) funds through the Energy Efficiency and Conservation Block grant program over eight different activities between 2010 and 2014. While some of those funds were used for energy audits of particular buildings, the City did not create a Comprehensive Energy Plan at the time. Considering recent advances in LED and energy efficiency technologies and major cost reductions in renewable energy the City feels that there are opportunities to improve energy efficiency of the municipal buildings and fleet vehicles to help the City achieve its energy efficiency and renewable energy goals. Therefore, using the Energy Innovation Grant to support comprehensive energy planning at the City will be both timely and an effective use of resources to catalyze further investments in energy efficiency.

3.2.2.1 Phases

The City has hired Edison Energy to conduct a Phase 1 assessment of buildings and **seeks the OEI grant to broadly and importantly expand the scope of this work into Phase 2.**

The proposed project includes three phases including: 1) a Preliminary Building Energy Reduction Study for City-owned buildings, 2) a long term *Comprehensive Energy Plan* for City-owned buildings plus a vehicle fleet audit; and 3) feasibility study for a resiliency & energy efficiency showcase project.

The program description and outcome for Phase 1 includes a *Preliminary Building Energy Reduction Study* for which planning is underway and will be funded by the City of Milwaukee. The goal of the preliminary study is to create a short term and immediate energy reduction strategy that can provide recommendations of measures the City can implement toward achieving the 2020 energy reduction goal of 20%. The preliminary study will be funded by the City of Milwaukee and will performed and prepared by Edison Energy. The cost of the *Preliminary Building Energy Reduction Study* is $19,600.

The description and outcome for Phase 2 is a longer-term *Comprehensive Energy Plan* (investment grade audit) that includes buildings and vehicle fleet. This report would build off of the findings and recommendations from the Phase 1 *Preliminary Building Energy Reduction Plan* and would provide the foundation of a shared vision between City staff and the Mayor. The plan would outline a phased and achievable approach with defined strategies and tactics, and would be used to inform the budgeting process as it relates to implementation of energy reduction measures and recommendations. Additionally, the Plan would be shared with the community on the City of Milwaukee - Environmental Collaboration Office webpage. The benchmarking tool that is used to track energy usage in City-owned buildings is Energy Star Portfolio Manager and the energy reduction metric is 20% energy reduction in City-owned buildings based using adjusted source EUI when it is available, otherwise weather normalized source EUI.

The City of Milwaukee would partner with Edison Energy to perform the work outlined in Phase 2 for which Edison is uniquely qualified. Edison Energy has been performing RCx and ETBU work on the City-owned facilities for over two years. Additionally, Edison Energy will be preparing the *Preliminary Building Energy Reduction Study* and will be able to build off of this body of work along with their knowledge of the City facilities, mechanicals, and staff and will be able to leverage this knowledge.

3.2.2 General Description of OEI funded-portion of the project (Continued)

The City of Milwaukee proposes to use funds from the OEI to

Edison Energy: A Partner in Planning

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Edison Energy has been a partner with the City of Milwaukee on Energy Efficiency. The company has retro-commissioned and tuned-up 50 City owned buildings and is currently conducting a preliminary building energy reduction study. With an office in Madison, Edison Energy is uniquely qualified to assess both capital and operational efficiency opportunities. Edison Energy's experience ranges from renewable energy procurement strategies to traditional building and energy systems, with our solutions focusing on the domains of building HVAC, controls, and lighting, new energy technologies, renewable energy, energy procurement, real-time analytics and energy monitoring, and energy awareness and education.

EDISON energy

complete Phase 2, using Edison Energy to complete a *Comprehensive Energy Plan* for municipal buildings and vehicle fleet.

The City of Milwaukee through its Energy Reduction Team will partner with Edison Energy to execute a city wide Comprehensive Master Plan to create a clear pathway to achieve the City's energy reduction and renewable energy goals for municipal buildings and fleet. Edison Energy's team will include their in-house energy and engineering staff, and will partner with Clean Fuels Consulting (CFC) to assist with planning on the fleet (collectively the Edison Team).

The Plan and Assessment include:

1. Conduct a Discovery/Planning Session with Key Stakeholders: The Edison Team will facilitate the creation of a formal vision for all of the Energy Reduction Team and other stakeholders to fully understand the City's current situation, and energy objectives and identify critical issues and risks and align energy goals with other facility and government goals.

2. Develop a Comprehensive Energy Plan that will provide the foundation for all activities related to efficiency, optimization, transportation, sustainability, renewables, procurement and cultural transformation for the City Portfolio. Specific items to be included in the Plan will include:
    a. A complete investment grade audits of high energy consuming buildings and sites for optimization
    b. Complete assessment of the City's vehicle fleet portfolio for alternative fuel and vehicle/efficiency. The fleet audit will identify additional potential energy saving improvements by using clean vehicle technologies, optimizing policies and procedures and identifying specialized vehicle technologies which can reduce total fuel use and decrease greenhouse gas emissions.
    c. Assessment for onsite renewable opportunities
    d. Risk, price and execution strategy for onsite and offsite renewable energy procurement
    e. An outline to develop the underpinnings of a "Set of Guiding Principles" for Energy Practices and Cultural Distinctions for Conservation

3. Energy purchasing assessment including an overview and options for green energy procurement as a cost-effective means to achieve carbon neutrality

4. Feasibility / Assessment of new and alternative energy technologies that may be incorporated into the operations at the sites. Technologies to be evaluated will including solar, wind, geothermal, and other renewable energy options. The study will also examine

the feasibility of battery storage for resilience and demand response.

5. Development of the thinking and philosophy for the Cultural Action Plan for Social Responsibility and Outreach.
    a. While the curriculum, syllabus, and content will be developed as a separate initiative during our discovery session, this evolution will allow us to ensure that a plan will be in alignment to, and not in conflict with, the overall philosophy and plan for the City and subsequent dissemination to the community

The Edison team is the optimum partner to help craft and realize our bold vision – to explore not only the most valuable pragmatic fundamental infrastructure systems and cutting-edge technologies of tomorrow, but to evaluate and develop them into the most meaningful scenarios, using analytics to evaluate true triple bottom line, risk mitigation for future exposure, diversity contributions, and smart integration of City of Milwaukee constituents. We are excited to partner with the Edison Team to help us execute a portfolio wide Comprehensive Energy and Fleet Master Plan and support the achievement of our immediate and future energy and sustainability goals. We believe should our team be granted this opportunity, this will truly be the launching pad to ensure the City of Milwaukee continues down the path to becoming a leader among leaders in what is to become the future of sustainable cities.

1 Solar Panels on Milwaukee's Central Library

3.2.3 Budget

The proposed budget is listed below. The City of Milwaukee requests $295,436 to complete this scope of work.

City of Milwaukee Comprehensive Energy Plan Budget				
Category	**Grant Request ($)**	**Match ($)**	**Total**	**Notes**
Personnel	$20,025	$20,025	$40,050	City of Milwaukee Energy Efficiency Program Coordinator
Fringe	$9,011	$9,011	$18,022	45% of salaries as established by City Comptroller
Travel				
Supplies	$500		$500	Printing costs of plan
Equipment				
Professional Services:				
Facility Energy Plan	$126,400	$19,600	$146,000	Edison Energy. The match share is being paid in 2018 for Phase 1
Fleet Audit	$34,500		$34,500	Edison Energy sub Clean Fuels Consulting
Other				
Total direct costs	$190,436	$48,636	$239,072	
Indirect				
Total Year One Budget	**$190,436**	**$48,636**	**$239,072**	

Please note that the matching funds for the Facility Energy Plan is currently under contract, and a portion of those funds may be expended prior to the grant award. Edison Energy has provided a firm price proposal for the Facility Energy Master Plan and the Fleet Audit.

The budget includes funding to support the Energy Efficiency Program Coordinator position. The annual city budget requires the Environmental Collaboration Office to offset a portion of its salaries through grants. The hourly rate for this position is $28.11. The City of Milwaukee Comptroller has established an estimated employee fringe benefit rate for 2019 of 45% of salaries.

3.2.4 Match

The City of Milwaukee has hired Edison Energy to conduct a Preliminary Building Energy Reduction Phase 1 Study to identify energy conservation measures for $19,600. This project is currently underway in 2018. The budget also includes matching funds for City personnel to oversee and participate in the project, including the Energy Efficiency Program Coordinator and Environmental Sustainability Director.

3.2.5 Energy Innovation Grant Impact on the Project

Impact of Grant on Building Efficiency

While the City is committed to continuing the work of the Energy Reduction Team, the scope and approach of the energy efficiency work they can achieve will be impacted by whether the City is awarded Energy Innovation Grant funding. The *Preliminary Building Energy Plan* is a looking for energy saving opportunities for buildings in which Edison Energy has already done retro-commissioning. With OEI funding, the City can move to a *Comprehensive Energy Plan* that will help make the case for additional city investments in energy efficiency and create a clear roadmap to meeting the energy efficiency, renewable energy, and resiliency goals. This long-term energy reduction planning will leverage and build off of the short-term energy plan providing the foundation for all activities related to efficiency, optimization, transportation, sustainability, renewables, procurement and cultural transformation for the City portfolio. Additionally, it would help the City to prioritize energy reduction projects based on professional derived analyses – anticipated energy savings, cost, payback, etc.

The City of Milwaukee is also planning to install 1.1 MW of solar power on six municipal facilities. By undertaking a Comprehensive Energy Plan, the City can study how to potentially use these systems as a basis for controlling demand costs and adding to our resiliency efforts.

If the City is not awarded the Energy Innovation Grant, it is likely that the City of Milwaukee Environmental Collaboration Office would propose funding for a *Comprehensive Energy Plan* in a future City budgeting cycle, however, the prioritization of allocated funding for a comprehensive energy plan is hard to predict as it is dependent on the other competing priorities for limited City funding. These limits are compounded by property tax limits and

spending caps that the State of Wisconsin has placed on municipalities and other units of local government.

Impact of Grant on Fleet Management

The City of Milwaukee's Department of Public Works manages are large fleet of both heavy equipment and passenger vehicles. This includes 198 packers for garbage and recycling collection and snow removal and over 500 police vehicles. In the first quarter of 2018 alone, the Department of Public Works spent over $1 million on vehicle fuel for 119,000 gallons of gasoline, 270,000 gallons of diesel, 2,600 gallons of liquid propane, and 76,000 gallons of compressed natural gas. The City has periodically purchased hybrid electric passenger vehicles and uses compressed natural gas for a portion of its fleet. However, no formal fleet planning has been done over the last six years with attention toward maximizing the energy efficiency of the fleet.

Through funding from Energy Innovation Grant, the City will work with Edison Energy's affiliate Clean Fuels Consulting to develop a plan for increasing fuel efficiency of the fleet. This work simply would not happen without the Energy Innovation Grant.

Additional Non-match Sources of Funds

City of Milwaukee has employed a variety of strategies to fund energy efficiency and renewable energy despite the City's overall fiscal constraints; these are listed below:

Capital Funding: In addition to the funding strategy outlined in section 3.2.3, the City of Milwaukee has remaining capital funds of approximately $300,000 to implement energy efficiency projects identified through this planning effort.

Solar Services Agreement: Subject to Common Council approval on July 31, 2018, the Environmental Collaboration Office plans to implement a project that will add about 1.1 MW of solar on six municipal facilities through a Solar Services Agreement in which the city will be a co-owner of the solar system along with its development partner. The total project will cost approximately $1.8 million. This includes $100,000 in City capital funds, $211,882 from the Focus on Energy RECIP program. The City will then pay the difference to its development partner out of its operating budget as it realizes utility savings. Through Comprehensive Energy Planning, the City and its development partner are interested in exploring battery

storage as a future component for both on-site backup of critical facilities as well as demand response.

Energy Saving Performance Contract: In spring of 2018, the Milwaukee Public Library issued a request for proposals to conduct an Energy Savings Performance Contract on Central Library and three neighborhood libraries. The City selected Johnson Controls, Inc. to begin an industrial grade energy assessment of its building and start the process for developing an agreement. This could leverage up to $1.8 million in additional funds to do energy efficiency work. The City is approaching this process with great care and attention to detail. Working with Edison Energy and Comprehensive Energy Plan in conjunction with this process will add valuable third-party guidance on whether this process should be used at other facilities as well. ECO is working to align the Measurement and Verification of the proposed Energy Saving Performance Contract with energy use outputs as identified in ENERGY STAR® Portfolio Manager®.

3.3 Merit Review Criteria

3.3.1 Eligibility Determination and Ability to Achieve Objectives

The City of Milwaukee is a municipal local government and is clearly eligible based on the section 1.2.2.1 of the Request for proposals, bullet 1, which indicates that "City, Village, Town, County, and Tribal Governments" are Eligible Applicants.

This application is being submitted by the City's Environmental Collaboration Office (ECO) which is a division of the City's Department of Administration. Our website is City.Milwaukee.Gov/ECO. ECO has a strong track record of energy innovation and delivering results:

1. ECO is responsible for the City's energy policy and coordinates the City's Energy Reduction Team. ECO developed implemented over $5.8 million of energy efficiency projects through the American Recovery and Reinvestment Act. This included 8 activities including energy efficiency projects in municipal buildings, energy audits in select city buildings; a wind turbine at the Port of Milwaukee which has generated 980,000 kwh of electricity to date; the City's first Bublr bike share station, the Me² home energy efficiency program which has retrofitted over 1,300 homes; energy efficiency grants to manufacturing companies; the ME3 industrial energy efficiency program; 4 electric vehicle charging stations; hybrid electric vehicles and one electric vehicle for the City's fleet.

2. ECO developed Wisconsin's first commercial Property Assessed Clean Energy (PACE) financing program which has financed over $13 million of worth of energy efficiency projects on eight commercial buildings. In partnership with the US Department of Energy and 9 partners, ECO operates the Better Buildings Challenge, a comprehensive energy program for commercial buildings that provides free energy assessments, assistance with benchmarking, PACE financing, connections to the Focus on Energy program, workforce development pathways, and technology integration. The program has enrolled 102 participants with more than 10 million square feet of buildings into the program.

3. ECO's *Milwaukee Shines* program has a solid track record of advancing the solar energy industry in Milwaukee. SolSmart, a program funded by the U.S. Department of Energy SunShot Initiative, awarded a Gold designation to recognize Milwaukee as a national leader in advancing solar energy., Milwaukee received this designation for adopting programs and practices that make it faster, easier, and cheaper to go solar. A SolSmart designation is a signal that Milwaukee "open for solar business," helping to attract solar industry investment and generate economic development and local jobs. Milwaukee took steps to reduce solar "soft costs," which are non-hardware costs that can increase the time and money it takes to install a solar energy system. Examples of soft costs include planning and zoning; permitting; financing; customer acquisition; and installation labor. Milwaukee Shines also makes loans available for homeowners, has implemented a "Group Buy" program through which 170 homes have installed 616kw of solar. In 2018, Milwaukee Shines is implementing a plan to install over 1MW of solar on six municipal buildings as outlined in this story.

The ECO team for the City of Milwaukee will be led by Erick Shambarger (Director of Environmental Sustainability), Jamie Ferschinger (Environmental Sustainability Program Coordinator for energy efficiency) and Elizabeth Hittman (Environmental Sustainability Program Coordinator for renewable energy.) ECO will also work directly with key staff from the Department of Public Works including the City's Fleet Manager, Jeff Tews.

As an eligible applicant, the City of Milwaukee intends to partner with Edison Energy from the private sector experts to develop the *Comprehensive Energy Plan*. Edison Energy's team will be led by their Regional Manager, Farhan Khatri. Farhan has direct knowledge of City buildings from his work on retro-commissioning city buildings.

With an office in Madison and local municipal buildings experience with the cities of Madison and Milwaukee, the City's energy and engineering partner, Edison Energy, is uniquely qualified to assess both capital and operational efficiency opportunities, including energy efficiency, energy retrofits and conservations. Edison Energy's experience ranges from

renewable energy procurement strategies to traditional building and energy systems, with our solutions focusing on the domains of building HVAC, controls, and lighting, new energy technologies, renewable energy, energy procurement, real-time analytics and energy monitoring, and energy awareness and education.

The Edison Team considers municipal and government facilities key sectors of our core businesses. Our ability to provide the optimum services needed to deliver the best solution to the City is grounded in that we all understand the context of the municipal facility function and operation. The Edison Team's diverse background and expertise across varying facility types found municipal organizations enables us to handle the challenges and nuances associated with multiple facilities + energy users, complex plants, integrated building systems, remote monitoring of central systems and large central utility systems. Edison has provided master utility and energy plans, retro-commissioning optimization master plans, technology and energy assessments, and energy program design, development and implementation hundreds of millions of square feet of facilities saving billions of dollars in avoided energy costs, while reducing energy and carbon GHG risks and other operational improvements for clients similar to the City of Milwaukee.

Additionally, the City team has selected a specialty sustainable transportation consultant to assist with the municipal and community fleet and vehicle evaluation for the project. As an expert with alternative fuels and vehicular applications, Clean Fuels Consulting (CFC) a certified women owned business, has assisted in the planning of large clean fuel vehicle projects, station design and costing and deployment of low emission vehicles. The sub-consultant has performed a number of fleet systems studies to determine the best applications for alternative fuels in municipal fleets in cold weather locations, along with outlining the costs for the fuels in comparison to traditional diesel and gasoline, and the costs for construction of new infrastructure and the vehicles themselves. Staffed with highly tenured professional engineers, certified energy managers, energy risk, market and procurement analysts, renewable energy, new technology, transportation specialists, and design and construction professionals, the Edison team is uniquely qualified to provide the services delineated in the aforementioned proposed scope of work. Currently, the Edison team staff holds the following licenses and certifications from accredited industry workgroups elucidating their commitment to ongoing development:

- ✓ National Futures Association (NFA)
- ✓ Series 7 Certification
- ✓ Professional Engineering
- ✓ Certified Energy Manager – AEE
- ✓ Certified Energy Auditor – AEE
- ✓ Certified Demand Side Management Professional
- ✓ Qualified Commissioning Agent Certification from UW-Madison (QCxP)

- ✓ LEED Accredited Professional – USGBC
- ✓ LEED Green Associate – USGBC
- ✓ NEBB Certification
- ✓ PMP: Project Management Professional
- ✓ Lean Six Sigma
- ✓ Existing Building Commissioning Professional
- ✓ Certified Building Commissioning Professional
- ✓ Certified Building Energy Simulation Analyst – AEE
- ✓ Certified Lighting Efficiency Professional (CLEP)
- ✓ Healthcare Facility Design Professional – AEE
- ✓ Building Performance Institute Certified Professionals – BPI

3.3.2 Energy Savings

As the State of Wisconsin's largest City government, the City of Milwaukee uses a significant amount of energy even with recent efforts to reduce it. While this planning grant application does not directly save energy as a compared to an implementation project, it will create a roadmap for achieving the rough goals outlined below. As part of the project, the consultant will refine the rough planning numbers outlined below.

Buildings: City buildings use about 35 million kWh of electricity, 1.1 million therms of natural gas, and 65 million kBtus of district steam. To achieve an overall 20% energy reduction in Portfolio Manager, the City is targeting a 15% reduction in site energy use on buildings, or 5.2 million kWh. While natural gas and steam also present savings opportunities, the City's Energy Reduction team to date has been targeting electrical savings as the best path for meeting the overall Better Buildings Challenge goals. Electrical savings are weighted more heavily in EPA's Portfolio Manager tool, and can reduce demand charges (kW) in addition to energy kWh). However, if the City begins to electrify its vehicle fleet to save on imported fuels, electrical use for vehicles could increase and offset some of these savings. The City will not have a comprehensive picture of how renewable energy, energy efficiency, and vehicle electrification will work together until the plan is done.

Vehicles: City vehicles use around 1.8 million gallons of gasoline and diesel annually, with other vehicles utilizing compressed natural gas or liquid propane. Again, it's difficult to predict the energy savings before the fleet assessment is conducted. If a ten percent improvement is assumed, the project could create a roadmap for eventually saving 180,000 gallons of gasoline and diesel annually.

Targeted Savings	
Use type	Preliminary Saving Estimate
Buildings	5.2 million kWh
Vehicles	180,000 gallons

3.3.3 Operational and Maintenance Savings

The Operational and Maintenance Savings will be realized as the Facilities Engineers gain advanced knowledge about the systems and mechanicals in the City-owned buildings and modify their behavior accordingly. Additional saving will be realized as recommendations in the *Comprehensive Energy Plan* are implemented. For example, converting to LED lighting in buildings can significantly save on the City's labor costs. LED lights can easily last three times as long as other. This will reduce the amount of time needed for staff to replace bulbs. The same is true for LEDs in buildings. By saving staff time on replacing lamps, maintenance staff can be redirected to work on preventative maintenance (PMs) of HVAC systems, yielding further improved operational performance.

3.3.4 Payback Calculation and Methodology

When allocating funds for energy efficiency projects, the City's Budget and Management Division targets projects with an average payback of **seven years or less.** In recent years, the Energy Reduction Team has embarked on retro-commissioning projects with faster payback periods. However, those projects can be bundled with HVAC upgrade projects that have longer payback periods for the 7 year average.

Energy costs on city buildings can vary widely from around $0.078/kWh on-peak for large buildings to $0.13/kWh for smaller buildings like fire stations.

3.3.5 Existing Planning Efforts Underway or Completed

The City's Sustainability Plan, Refresh Milwaukee, outlines broad energy goals for the City. The plan was adopted by the Common Council in 2013. While the plan outlines energy goals, it does not recommend specific energy conservation measures in specific buildings.

More recently, as noted in section 3.2.2.1 if this application, The City has hired Edison Energy to conduct a Phase 1 assessment of buildings and **seeks the OEI grant to broadly and importantly expand the scope of this work into Phase 2.**

The *Preliminary Building Energy Reduction Study* is underway and will be funded by the City of Milwaukee. The goal of the preliminary study is to create a short term and immediate energy

reduction strategy that can provide recommendations of measures the City can implement toward achieving the 2020 energy reduction goal of 20%. The preliminary study will be funded by the City of Milwaukee and will be prepared by Edison Energy. The Preliminary Building Energy Reduction Study builds on prior retro-commissioning work previously done by Edison Energy.

The City, through its Milwaukee Public Library, is also in the process of working toward an Energy Saving Performance Contract with Johnson Controls, Inc and is using Clean Energy Solutions out of Boston as the owner's representative on the project. The Environmental Collaboration Office and Clean Energy Solutions, and Edison Energy are being diligent in developing a Measurement and Verification Plan for the proposed project that builds off the energy metrics reported publicly through EPA's Portfolio Manager. The Environmental Collaboration Office sees benefits in aligning performance contracts and the Comprehensive Energy Master Plan with performance metrics in Portfolio Manager.

3.3.6 Financial Leverage and Impact

The City of Milwaukee has been investing in energy efficiency and renewable energy in through several means. The City has allocated $600,000 towards energy efficiency projects, with about $300,000 available to implement energy conservation measures. In 2018, the City is also pursuing alternative means of financing energy efficiency. The City is in the process of working towards an energy saving performance contract (ESPC) of $2.4 million at Milwaukee Public Libraries. (The City is aware of the benefits of and potential pitfalls of such arrangements and believes that third-party support is needed to make sure this kind of alternative financing is executed properly. As noted above, the Environmental Collaboration Office is working with Clean Energy Solutions to mitigate risks). If the project is successful, it could be replicated in other facilities. A combination of a successful ESPC at Milwaukee Public Library plus a clear roadmap to future savings from the *Comprehensive Energy Plan* proposed for this grant could allow the City to expand this type of alternative financing to other city facilities to advance energy efficiency.

In July 2018, the Environmental Collaboration Office is also seeking City Council approval to enter into a Solar Services Agreement to install $1.8 million of solar panels on city facilities. The system would be co-owned by the City of Milwaukee and its development partner. The

Comprehensive Energy Plan will help determine if this kind of arrangement can be cost-effectively replicated on other facilities. It will can also examine how battery storage could be used to help improve resilience of City operations and potentially yield demand savings.

3.3.7 Rural, Urban, or Underrepresented Areas of the State

City of Milwaukee municipal operations are located within the geographic limits of the City of Milwaukee. Milwaukee is an urban population center with over 10% of Wisconsin's population. Milwaukee has an estimated of population of 595,351, or which 54% are people of color. Median household income in the City of Milwaukee is $36,801, compared to Wisconsin's statewide median household income of $54,610. Milwaukee's poverty rate is 28.4% compared to the Wisconsin's rate of 11.8%. Despite these troubling household economic statistics, the City of Milwaukee is an economic engine for the State of Wisconsin. In 2015, according to the Milwaukee Journal Sentinel, city residents and businesses sent $1.37 billion to Madison in 2015 from all income, sales, utility and other taxes. Support from the State of the Energy Innovation Grant Program will help the City create a roadmap to reduce its energy costs while instead investing in its infrastructure and buildings.

3.3.8 Education

The City of Milwaukee will work closely with Edison Energy throughout the process of producing the *Comprehensive Energy Plan* and education will be achieved both formally and informally. As individuals Energy Reduction Team are engaged and by Edison Energy staff, facility engineers will increase understanding about the mechanicals and systems in the City buildings and how changes in the current operating and maintenance of these systems can be modified to achieve energy reduction, as well as, how individual behavior can be modified to achieve energy reduction. Additionally, the Energy Reduction Team and other facility engineers will meet with the team from Edison Energy to more formally learn from the staff conducting the investment grade audit. Upon completion of the audit, the Edison Energy Staff will host a training session for the Energy Reduction Team and Facility Engineers to ensure that the staff operating the building understands the current systems and the recommendations set forth in the Comprehensive Energy Plan. Lastly, representatives in the City of Milwaukee Environmental Collaboration Office will seek out opportunities to present at least one

conference about the process, outcome, next steps, and lessons learned during the production of the *Comprehensive Energy Reduction Plan*.

3.3.9 Innovation

The City of Milwaukee's Environmental Collaboration Office (ECO) has a proven track record of energy innovation in the State of Wisconsin. For example, the City created the first commercial PACE financing program in Wisconsin, and then worked with the Wisconsin Energy Conservation Corp and other parties to support the launch of the statewide PACE Wisconsin program.

Through this project, ECO will continue innovating in ways that can be potentially replicated in other communities. ECO is working on developing new methods to link its comprehensive energy planning and the Measurement and Verification of proposed energy saving performance contracts with the public energy metrics in EPA's Portfolio Manager tool. By linking energy saving planning with the tool used to publicly report results, the City of Milwaukee hopes to create a framework for holding its vendors accountable for delivering energy savings on projects.

The Plan will also explore how batter storage can potentially be integrated with the City's proposed 1MW solar array to help improve community resilience and control demand costs. This will be an option particular at Milwaukee's Central Library and Central Repair Garage. The Plan will also consider the possibility of converting portions of the City fleet to electric vehicles, and how that could impact the City's broader energy goals.

3.3.10 Energy Resilience

As noted in section 3.3.9, the Plan will explore the economics of integrating battery storage into City facilities with planned solar projects. The Plan will explore how using battery storage can be used for back-up power in the event of temporary electrical outages, and how it can be used to control demand charges at the facilities. As noted in the City of Milwaukee's forthcoming Smart Cities report, a brief decrease in solar output (from changing weather conditions) can cause the instantaneous demand (kW) of the building to increase quickly. The library's on-peak demand is billed monthly by the local utility based on the peak demand measured between the hours of 8am and 8pm. An energy storage system could operate to reduce the number of

demand fluctuations produced by the intermittent nature of the solar PV production. For example, when the solar PV power output drops, the energy storage system would turn on to maintain the demand from breaching a predetermined demand threshold. This demand threshold could be determined by intelligent controllers in the building that ensures that the energy storage system is deployed to maximize the demand reducing capabilities of the battery.