

SECTION 1: OVERALL PROJECT SUMMARY AND APPROACH

a. Description of GHG Reduction Measures

The City of Grand Rapids (City) proposes to leverage a remediated EPA Superfund site adjacent to its downtown as a model project for solar development that can have a direct, concurrent, and immediate impact on GHG and air quality within Grand Rapids, while providing financial benefits to LIDAC communities and, more broadly, to taxpayers in the city. The proposed project is composed of three measures for the development of solar energy generation at the Butterworth site. This project is divided into three measures based upon the electrical loads they will serve and the benefits they are anticipated to provide:

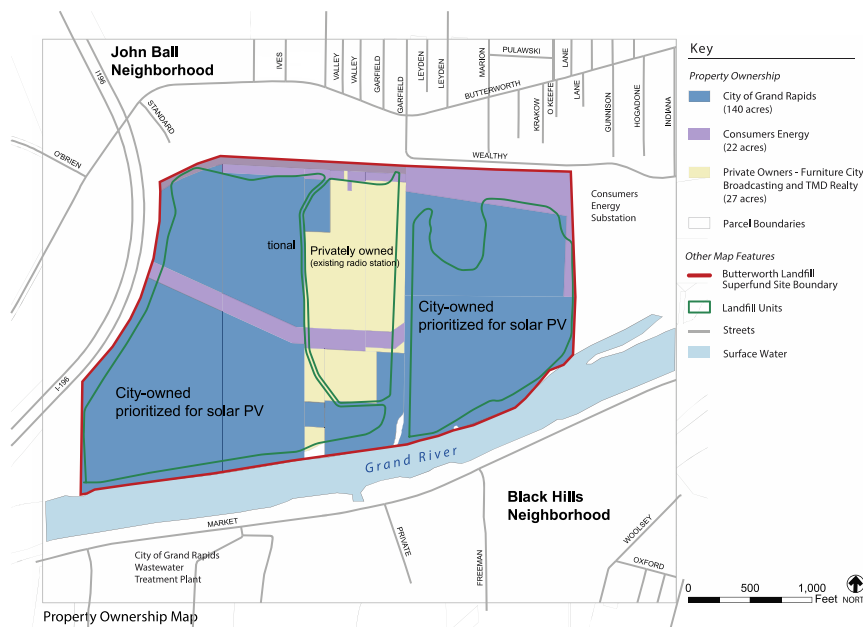
- Measure 1: Provide a direct, behind-the-meter solar connection to approximately 120 City-owned facilities as well as the City's 18,000 streetlights and traffic signals.
- Measure 2: Incorporate community solar, consistent with current state law, that will reduce power bills for as many as 5,000 LIDAC households, many of which lie near the project site. Partner with local pre-college and college programs, technical education centers, trade associations and workforce development agencies to provide skills training and pathways to employment in green building and energy careers.
- Measure 3: Begin to decarbonize some of the hardest-to-address buildings in older urban communities by addressing local GHG emissions through decarbonization of the local district energy/steam utility. As you will see further in this project description, the City has already made notable progress toward each of the three infrastructure components contemplated in this proposal and are ready to begin implementation upon award, with both preliminary engineering and vendor/partner selection underway.

The Butterworth Landfill (the Site) occupies about 190 acres along the southwest edge of downtown Grand Rapids and has been contemplated for a variety of uses since its closure in the early 1970s. The site contains a former landfill that was placed on the EPA's Superfund National Priorities List in 1986. A final consent decree was issued in 1999 and the Site was fully remediated in 2000 with the primary remediation consisting of a four-foot clay cap and groundwater monitoring wells sited primarily along the perimeter of the capped areas. The Site has been maintained as an open grass area with walking paths along the perimeter and an access road through the center providing access to the Grand River for public safety agencies. Any future development must be fully consistent with the Site's remedial features and institutional controls to ensure long-term access to and protection of the Site's remedies.

The Site is directly adjacent to the Grand River on the south and east sides and the John Ball Neighborhood on the north side. John Ball Neighborhood is one of Grand Rapids' neighborhoods of focus – defined as census tracts with the highest percent of Black, Indigenous, and People of Color (BIPOC) residents and the greatest disparities across all quality-of-life indicators (education, wealth, jobs, etc.). The Michigan Environmental Justice Score for the census tract where the Site is located is the 84th percentile based on the MIEJ Screening Tool. The census tract immediately to the south (Black Hills Neighborhood) is also adjacent to the Site and has a Score Percentile of 91 (the second worst score in Grand Rapids).

Since its remediation, there have been several beneficial reuse scenarios contemplated for the Site and in 2013, the City partnered with the EPA on a solar reuse assessment. Based on those recommendations, the City has committed to maximizing solar development on the site, estimated to support upwards of approximately 16 megawatts across 60 acres. The development is subdivided into three discrete sections (see below) of solar photovoltaic arrays that support three independent loads for specific uses that can maximize the local benefit of the site for the City of Grand Rapids. The City of Grand Rapids is home to nearly 200,000 residents and 89,065 households. Thirteen percent (13%) of households (11,326) are low-income (LI), defined as earning less than 80% of Area Median Income (AMI) (US Census

Bureau, 2020 ACS, Table S2001). The White House Climate and Economic Justice Screening Tool (CEJST)



identified 28 census tracts in Grand Rapids as disadvantaged communities (DAC). These DAC contain 48% of Grand Rapids' households (42,328) and most the city's LI households (74% or 8,336 out of total 11,326 LI households). The State of Michigan's PCAP details the goal to "drive clean energy deployment including improving siting for renewable energy and energy storage across Michigan, including on brownfields and former industrial sites and emphasizing equitable access for Michigan's LIDACs." The measures that make up our proposed project accomplish that goal in its entirety. By siting

the solar array on a former Superfund Site, we are utilizing unusable space to produce renewable energy with a focus on creating equitable access to the benefits of renewable energy for LIDAC communities.

Measure 1 – Primary Circuit

The City first plans to develop the optimal amount of solar-powered electricity at the site behind-the-meter to the City-owned and operated Primary Circuit (PC). The City will maximize direct benefits to the Grand Rapids community through emissions reductions, air pollution reduction, affordability, electrification, jobs, etc. and demonstrate innovative approaches to the deployment of solar in conjunction with interpretive/educational uses. The City intends to deploy up to a 2MW solar array to support the Primary Circuit. The PC is a 12,470/7200-volt electrical distribution system that the City owns and operates. The PC received 19,285,000 kilowatt hours of electricity from Consumers Energy in 2022 and distributed it to 18,000 streetlights, traffic signals, and approximately 120 facilities. Using the FY 2022 substation SCADA Data, the average daytime power requirement of the present PC is approximately 1.09MW, with a minimum of 0.77MW and maximum of 1.63MW. The average nighttime power requirement is approximately 2.95MW, with a maximum of 3.6MW. The City's agreement with Consumers Energy for purchasing power is capped at 5 Mega Volt Amps (MVA).

The main PC connection is located approximately three miles from Butterworth Landfill with an interconnection location within one mile of the Site that has been deemed "adjacent" for purposes of behind-the-meter solar generation. It is important to note that the PC serves many critical pieces of infrastructure that are needed for public safety and emergency response purposes. Some of these components include street lighting, traffic signals, fire stations, parking facilities and other public facilities. It is important that uninterrupted electricity is supplied to these facilities – especially during emergency response situations. With the goal to develop the entire Butterworth Site, the City also has a desire to implement a solution that might effectively supply renewable energy to the PC 24 hours a day in the future, through on-site and/or distributed BESS. Given uncertainties on potential site limitations, as well as the shorter capital lifecycle of BESS, the City has not included that component in this application.

The project's behind-the-meter component will support the City of Grand Rapids' Strategic Goals to:

- Supply municipal operations with 100% renewable energy by FY2025 and annually thereafter.
- Reduce greenhouse gas emissions generated from municipal operations by 85% by 2030 (as compared to a 2008 baseline) and achieve carbon neutrality by 2040.
- Reduce year-over-year energy consumption by City facilities, utilities (including the Primary Circuit) and fleet.
- Achieve a community-wide science-based target of 62.8% per capita greenhouse gas emissions reductions by 2030 (as compared to a 2019 baseline) and 100% by 2050.

The City has already initiated and completed the RFI/RFQ phase of this component and has 10 qualified solar developers participating in workshopping of next steps toward a formal RFP in late Spring/early Summer. In addition, the City's Engineering Department is currently at 30% design for the PC extension required to connect the array.

Measure 2 – 5MW LIDAC Community Solar

The Community Solar component of this project is designed to provide 3,520MWh of solar electricity annually to low income and disadvantaged communities within the city of Grand Rapids via a 5MW array with a 30-year life expectancy. This component of the project is estimated to cost \$14.7 million, with \$12.5 million accounting for capital costs associated with constructing 5MW of solar. The remaining amount of requested funding for this component supports hiring a full time solar specialist (this person will manage all three measures of the grant), a subaward with a qualified non-profit that will manage household participation in the program, a subaward with community partners to create and facilitate a Solar Justice Team, funding for the development of a Grand Rapids-based solar career development program, and enrollment costs for 30 people to participate in the training program.

Michigan currently has no enabling legislation for privately developed community solar. However, the Michigan Public Service Commission (MPSC) approved the Solar Gardens Sunrise program within Consumers Energy's (CE) Voluntary Green Pricing program. The Solar Gardens Sunrise program is open to all organizations with a non-profit status that serve low-income residential customers or schools. Under that program, an eligible low-income customer is one whose household income does not exceed 200% of the federal poverty guidelines, or who receives food stamps, Medicaid, or supplemental security income or low-income assistance through the Department of Human Services.

The LIDAC Community Solar component is anticipated to serve approximately 1,513 households over each 10-year subscription period, and 4,539 households over its 30-year lifetime, saving those participants approximately \$1.36 million in energy costs over the life of the project. The array is expected to eliminate 1,753 MTCO_{2e} in the first full year of operation. Addressing GHG emissions generated by the residential sector is critical to the city's ability to meet its communitywide science-based target of 62.8% per capita reduction by 2030 as total residential emissions accounted for 28% of all Grand Rapids' 2019 emissions.

Should the legislative landscape change during this project, there may be an opportunity to implement a more traditional community solar component that would comprise both community ownership and community benefit. While legislation has been filed, it has not yet moved forward and is not likely to do so in this calendar year. The City has already initiated and completed the RFI/RFQ phase of this component and has 10 qualified solar developers participating in workshopping of next steps toward a formal RFP. At least six of those developers have demonstrated community solar experience in their portfolios.

Measure 3 – Vicinity Energy eSteam

The third component of the project is installation of an 8MW solar array that would serve the City's district energy/steam district. The persistent challenge across the globe in electrifying steam/district energy systems has been twofold. First, the capital costs of reinvesting in and retrofitting existing plants can be challenging. The second – and perhaps greater – challenge is the fuel cost differential between traditional natural gas and electricity, which can be 6x-10x. Fortunately, Vicinity has made a commitment to investments on the former, while this public-private PV partnership can help to address the latter. Vicinity Energy (Vicinity) owns and operates the district energy system in Grand Rapids and serves approximately 120 buildings in the downtown core. It operates under a franchise tariff with the City of Grand Rapids as its regulating authority. The system provides gas-fueled steam heating for over 10 million square feet of space, including residential buildings, hospitals, colleges/ universities, municipal and commercial office buildings, the arena, convention center, hotels, churches, non-profits, restaurants, and retail facilities.

In West Michigan, it is estimated that heating and cooling is approximately 60% of a building's total carbon footprint. Therefore, Vicinity has the potential to impact a large portion of the city's commercial building carbon footprint by diverting its steam generation from natural gas to renewable energy. In contrast with many traditional solar initiatives, using local renewable energy on a local district energy system provides immediate local GHG and air quality impacts. It also shifts a major portion of the electrification burden away from individual property owners where the age, condition, or scale of the buildings (most often downtown) can serve as disincentives to electrify. To our knowledge, no other community in the United States has yet to pursue such an approach.

Vicinity, working in collaboration with the City, Kent County and Consumers Energy, has evaluated a series of potential projects that could impact the environmental sustainability of our community. The determination of the team has been to proceed in phases of development and prioritize projects that will result in the greatest environmental impacts in the shortest amount of time. Phased electrification of Vicinity's boiler system is one of those priorities.

As a sign of their commitment, Vicinity has already purchased its first electric boiler to be ready for implementation and has been collaborating with Consumers Energy since mid-2023 to design necessary upgrades and interconnection to be shovel ready. Once in service, this boiler has the potential to be supplied with electricity generated by the new solar currently under development by the City of Grand Rapids on the Butterworth landfill site. The new electric boiler directly displaces the need for combustion of natural gas and can generate between 3,500 – 30,000 lbs. of steam per hour, the equivalent of 1-9 MW of electricity. This boiler will directly convert renewably generated electricity into steam that will be sent to individual buildings through 7 miles of underground distribution infrastructure currently providing service to Grand Rapids. This will have the benefit of decarbonizing hospitals, residential buildings, municipal buildings, hotels, churches, police and fire stations, and other community facilities.

Major Features

The solar field will have the following major features:

- **15 MW of Solar Generation**
 - 2MW supporting the City's primary circuit – Directly benefiting municipal infrastructure.
 - 5MW of community solar – providing material impact to up to 5,000 low-income homes.
 - 8Mw of eSteam – directly displacing natural gas use for the heating of approximately 120 buildings downtown, thus reducing the carbon footprint of 10 million square feet of space.

- **Local generation and local use** – this project will be built inside the City of Grand Rapids, and the benefits of the project will directly benefit the local community, both environmentally and economically.
- **Beneficial re-use of an EPA Superfund site** – The redevelopment of an EPA superfund site for the benefit of the local community will reduce greenhouse gas emissions while also reducing the energy cost burden for low-income and disadvantaged households.
- **Modeling “clean steam” as a decarbonization multiplier** – Leveraging CPRG for a demonstration project that could scale to other communities struggling to decarbonize large, older buildings and infrastructure in urban settings.

Tasks

A preliminary study and evaluation of the district energy system has been completed along with initial design and concept-level budgeting. The first step, once grant funding is awarded, will be the final design work necessary for permitting, procurement and construction. Following the design phase, the team will move to a competitive procurement for installation services and materials supply.

The project will be managed by the City’s Engineering Department personnel who will oversee and manage the final design and permitting, construction implementation and, ultimately, commissioning. The foundation of the City’s management approach is through tiered structures with project development, procurement and financial management conducted by front line employees (i.e., project managers, procurement managers, and business/ finance managers), then reporting to department/ functional leads (i.e., Lead project Manager, Technical Lead and Project accountant) for oversight and QA/QC, and finally to senior leadership (i.e., the City Manager and staff).

The project shall have routine weekly and monthly meetings and corresponding reporting to track schedule, budget, and performance of the project as it develops through the process. Engineering and technical development work shall report to, and be overseen by, the Technical Lead for the project who will be responsible for ensuring the scope of the project is maintained. Construction contractors will work directly with field supervision on a day-to-day basis, and have oversight by environmental, health and safety management.

Reporting will be provided to the Lead Project Manager for all service scopes. The Lead Project Manager will be responsible for tracking and driving the project schedule to ensure commitments are made and the project stays on the critical path as outlined in the project schedule. The Lead Project Manager shall report to the City Manager’s staff at a minimum of every two weeks. Invoicing and financial related matters will be conducted monthly, at a minimum, by the Finance Manager and Project Accountant, and report to the City Manager’s staff. The City Manager shall collect and consolidate all reporting and be responsible for communications with all external stakeholders for project reporting purposes.

Milestones

The proposed project and its three sub-sections are anticipated to be developed over the next few years assuming adequate funding is acquired. The following are the anticipated implementation milestones:

- Grant Award & Finalize Project Funding
- Project Procurement
 - Complete bid packages
 - Advertise and issue bid packages.
 - Receive proposals.
 - Bid reviews, interview, BAFO and selection.
- Project Implementation

- Project kickoff
- Long lead item orders released.
- Site preparation
- Construction of primary circuit interconnect
- Construction of solar arrays for each project section
- Construction of eSteam interconnect and generation infrastructure
- Project completion and startup date
- Project Operation
 - Project In-Service Date
 - Annual Reporting and Measurement and validation period (each year for the 30-year anticipated lifespan)

Potential Risks

Measure 1: Primary Circuit - The Primary Circuit is a 12,470/7200-volt electrical distribution system that the City owns and operates. Balance of load, generation and interconnection with the existing primary circuit is a potential risk.

- Mitigation: The Primary Circuit received 19,285 Megawatt hours of electricity from Consumers Energy in 2022. The proposed field would generate only a small fraction of this power need, estimated at 3,500 MWhrs, or about 18% of the total need of the system.

Measure 2: Community Solar - Michigan currently has no enabling legislation for privately developed community solar.

- Mitigation: The Michigan Public Service Commission (MPSC) approved the Solar Gardens Sunrise program within Consumers Energy's (CE) Voluntary Green Pricing program. The Solar Gardens Sunrise program is open to all organizations with a non-profit status that serve low-income residential customers or schools. Under that program, an eligible low-income customer means a utility customer who has not had more than one default condition on the SPP in the last twelve months and whose household income does not exceed 200% of the federal poverty guidelines as published by the United States Department of Health and Human Services, or who receives supplemental security income or low-income assistance through the Department of Human Services or successor agency, food stamps, or Medicaid.

Measure 3: Vicinity eSteam – The current electrical service infrastructure from Consumers Energy is only sufficient to provide up to 6MW of electricity to Vicinity. Without investment, Vicinity may need to limit the production of eSteam to 6MW vs. project 8MW.

- Mitigation: There is currently a 10-year master plan by Consumers to upgrade the adjacent substation infrastructure that would supply solar to the generation facility. It is anticipated that this upgrade will be advanced in Consumers' capital schedule should this project move forward. If not, the eSteam generation would be limited for several years until necessary upgrades are completed.

Priority PCAP Measures & CPRG Goals

All three GHG reduction measures in the Butterworth Solar Development meet the core goals of the CPRG program in the [State of Michigan Priority Climate Action Plan](#) (PCAP) under reduction measure #1: electricity generation.

Electricity Generation: Reduction Measure #1 - Drive clean energy deployment including improving siting for renewable energy and energy storage across Michigan, including on brownfields and former industrial sites and emphasizing equitable access for Michigan's LIDACs.

The energy sector inventory is Michigan's largest emitting sector, with the burning of fossil fuels to produce electricity as a major contributor to energy derived emissions. As other energy subsectors, such as transportation and heating for buildings increasingly electrify, the resource mix for generating electricity will play a transformational role in meeting Michigan's decarbonization goals. The Butterworth Solar Development's generation of solar energy will eliminate the purchase of fossil-fuel generated electricity currently purchased from the electric utility. This project will directly support the State's goals to clean the electric grid, repurpose a brownfield for renewable energy, and emphasize equitable access to renewable energy for LIDAC communities. Each measure also addresses additional PCAP reduction measures:

Measure 1: Primary Circuit

Reduction Measure #5 - Decarbonize government and nonprofit facilities and infrastructure, with an emphasis on LIDACs, by reducing energy waste, investing in decarbonization solutions, and reducing emissions from fossil fuel combustion.

Reduction Measure #6 - Electrify state government, municipal, tribal, and other public fleets, prioritizing equitable access for Michigan's LIDACs.

The solar energy provided to the City's Primary Circuit will provide power to a variety of City facilities including parking facilities, where the City is working to increase the presence of EV chargers to support the City's goals of electrifying the City's fleet. The City is working with solar developers on incorporating at least 10 acres of solar-overparking that will include EV charging stations where the parking will support the needs of downtown service workers and venues. These EV charging stations could supply a variety of end users, including the City fleet, The Rapid's public transit vehicles, private fleets and/or the public generally.

Measure 2: Community Solar & Measure 3: Vicinity Energy eSteam

Reduction Measure #3 - Drive building electrification and fuel-switching in existing buildings including an emphasis on LIDACs and electrifying households that currently rely on delivered fuels such as propane and home heating oil.

Community Solar and eSteam will provide clean energy to homes and businesses, respectively, through renewable electricity and renewable derived steam for heating, impacting hundreds of properties in the city from single family homes to the largest buildings in downtown Grand Rapids. The community solar component focuses on LIDAC communities, while eSteam provides an innovative solution that can be replicated in other jurisdictions to achieve significant GHG reductions.

b. Demonstration of Funding Need

Put simply, none of the three components of this project is feasible without a supplemental funding source. The City is currently pursuing additional funding sources noted below, but none provide full funding for all three Measures. As we have navigated the RFI/RFQ process with our solar developers, we have made it clear with all that we intend to fully leverage available Federal tax incentives.

To date, the City has made several attempts to secure additional funding for the project. The following additional funding sources have been applied for:

- Michigan Public Service Commission – Renewable Energy and Electrification Infrastructure Enhancement and Development Grant – Requested \$8.4 million for the Measure 1 – 2MW Primary Circuit Solar & Infrastructure.
- EPA GHG Reduction Fund Solar For All – participating as a Non-Lead Coalition Member in Growth Opportunity Partners’ the Industrial Heartland Solar Coalition’s Application. \$5 million is earmarked in the application for the City of Grand Rapids, which will support installing community solar at Butterworth Landfill.
- FY2025 Appropriations Requests submitted to U.S. Senators Stabenow and Peters as well as U.S. Congresswoman Scholten for \$5 million for Measure 1 – 2MW Primary Circuit Solar & Infrastructure.
- Michigan Public Service Commission – Renewable Energy and Electrification Infrastructure Enhancement and Development Grant – Requested \$4.27 million for a portion of Measure 3 – eSteam.

Measure 1: Primary Circuit

Butterworth has been a focus for solar development to supply the City’s primary circuit for more than a decade, championed by both Mayor George Heartwell and current Mayor Rosalynn Bliss. Community organizations like the Sierra Club and WMEAC continue to press to see the project become a reality. The economics, though, are challenging to say the least. The costs of development (which are higher due to the site characteristics and Superfund designation) make it prohibitive to do this project without assistance. The City has examined the financial ROI for installation serving its primary circuit with local engineering firm GeoTech in 2022 and have found that the 20-year energy cost savings account for approximately 24% of the 20-year project cost, with an 83-year simple payback. Incorporating a 30% ITC on the capital expense, cost savings account for 30.6% of the project costs with a 65-year simple payback.

Butterworth is particularly unique and important in the City’s decarbonization goals because it is the only appropriately sized property that could reasonably power the City’s primary circuit due to requirements around adjacency to our existing infrastructure. Rooftop solar would only amount to a fraction of the capacity at Butterworth.

Measure 2: Community Solar

As mentioned, there is no current enabling legislation for privately developed community solar in Michigan. Because the City wishes to include direct community benefit in the project, this has required collaborating over the past two years with Consumers Energy to develop cost estimates for such a development. Those estimates have ranged from \$16-20 million in development costs for a program that would provide only \$1.6 million in direct energy cost savings over 30 years to subscribing low-income households. In the Spring of 2023, the City concluded that pursuing this course wasn’t feasible without enabling donors or grant funding sources and suspended these discussions while concurrently advocating for community solar legislation at the state level. Community solar has been a cornerstone expectation for our local environmental justice advocates and organizations, led by the [Community Collaboration on Climate Change \(C4\)](#).

Measure 3: Vicinity Energy eSteam

The decarbonization of the steam district comes down to economics. By keeping subscribers on the district energy system, the City realizes GHG efficiencies by consolidating what would otherwise be more than 100 independent commercial gas heating systems throughout the City. Subscribers realize

savings in avoidance of operation and management costs associated with those systems. Fuel costs are the key driver in moving from natural gas to electrification, as the current kWh equivalent rate is 6x-10x for electricity vs. natural gas. Combined with private capital costs (which would also be passed on to ratepayers) the net impact would be migration of subscribers away from the district and back to standalone, gas-fueled heating systems throughout the urban core.

The only means to successfully move the district away from natural gas is to seek support from opportunities seeking to invest in the innovated infrastructure for the capital expense of solar development so that the incremental increase in rates is isolated to transmission costs to the regulated power utility. While still an increase vs. natural gas, Vicinity is confident that it has subscribers that would pay that smaller margin to meet their own sustainability goals. As referenced, Vicinity has made a commitment to fund the capital expenses required at the generation plant (\$2-3 million) provided we can be successful in developing the associated source of solar power.

c. Transformative Impact

Through this application, the City has sought to imagine how a point of environmental concern could be transformed into a point of environmental pride, as well as a demonstration to others of how to maximize the potential benefits of an asset like Butterworth. While the simplest and most direct approach might have been to simply build grid-connected solar on the site and claim “theoretical” environmental benefit, we’re pursuing options that can keep the actual GHG, air quality and economic benefits right here in Grand Rapids. We’ve sought to do this by leveraging our unique assets: Butterworth’s downtown proximity, the City’s primary circuit, and the City’s regulatory relationship with Vicinity Energy.

We envision leveraging the City’s PC portion of the project as a launching point toward a broader goal of electrifying the PC with renewables 24/7 through a combination of rooftop/facility solar and distributed energy storage – all with Butterworth as the backbone supplier of renewable energy to a municipal microgrid. Having that baseline of renewable energy then allows us to experiment and grow incrementally as both funding and technology allows without overcommitting to a single or monolithic solution. Butterworth is effectively the beginning for us, and not the end game. It has impacts for taxpayers, for the environment, and for our operational resiliency.

Separately, the City hopes to be the first in the nation to successfully begin electrifying their district energy system with 100% local, renewable energy. This addresses two of the most challenging-to-abate sectors we face: gas-fueled district energy systems and large (often older) urban commercial buildings where electrification can be daunting. It shows how a single action can have an impact at scale.

In short, the City of Grand Rapids has viewed this as an opportunity come full-circle with the EPA on one of its projects in a unique and transformative way – a way that provides long-term and sustainable returns to our residents.

Transformative Impact Summary

- Pioneering, replicable, and scalable policies or programs to increase the deployment of existing GHG emission reduction technologies or mitigation approaches:
 - Reimagining an EPA Superfund site that has immediate local impact as a driver for environmentally curative measures that can also have immediate local impact.
 - Renewable electrification of the City’s Primary Circuit sets a foundation for the City’s broader vision to power its facilities 24/7 with renewables via distributed solar and storage. This project provides a foundation for future connectivity, BESS, and expansion.
 - Community Solar via Consumers Energy’s Solar Garden program will increase deployment of existing GHG emission reduction technology. Our hope is that it will also pave the way to more meaningful enabling legislation in the future based on customer experience and demand.

- Powering a steam district with renewable energy has not been achieved in the United States, but it is possible, and we seek to use this opportunity to demonstrate that for other communities struggling with many of the same challenges.
- GHG emission reductions from hard-to-abate sectors where GHG emission reduction measures are not widely adopted:
 - The opportunity to address two hard-to-abate sectors concurrently through solar electrification of the steam district is both unique and replicable. If we can address a point source generator that affects more than 100 older, urban commercial buildings, you can gain immediate scale that could otherwise take decades.

SECTION 2: IMPACT OF GHG REDUCTION MEASURES

a. Magnitude of GHG Reductions from 2025 through 2030

The City issued an RFI/RFQ for the Butterworth Landfill Solar Photovoltaic Project in November 2023. Based on the RFI/RFQ responses received from solar developers, the City is estimating one megawatt of solar installed at the Butterworth Landfill will generate 1.76 GWh annually. This project includes three different solar arrays: a 2MW array that will directly supply the City's Primary, a 5MW community solar array and an 8MW array that will directly supply Vicinity Energy for the purposes of generating and distributing eSteam.

The City is using 0.49797 MTCO₂e/MWh for the carbon emissions factor for electric generation based on the U.S. EIA's Michigan Electricity Profile for 2022 ([EIA](#)) and the U.S. EIA's 0.0531 MTCO₂e/MMBtu for natural gas consumption ([EIA](#)). Finally, the City also included a 0.6% annual solar panel degradation factor based on NREL's statement that solar panel degradation is less than 1% per year ([NREL](#)).

The below table identifies the total estimated MWh of electricity estimated to be produced as well as the GHG reductions for all three measures individually as well as cumulatively for solar development at Butterworth Landfill (15MW; *see also GHGcalcs_CityofGrandRapids*). The cumulative GHG emissions reductions across all measures expected to be achieved between 2025 – 2030 is 29,606 MTCO₂e.

Measure 1 is expected to be fully operational at the beginning of year 3 (2027); the community solar array is expected to be fully operational at the beginning of year 4 (2028); and the Vicinity eSteam array is expected to be fully operational mid-way through year 3 (2027).

The Vicinity system currently utilizes a high efficiency natural gas driven boiler plant to meet the downtown Grand Rapids heating energy needs. This plant operates at an annual efficiency of 91.7% (2022). The eSteam system proposed would directly displace the combustion of natural gas, and instead use electricity to generate steam that would then be distributed throughout the City. The projected efficiency of the eSteam boiler is 99%. The consumption of solar produced electricity will eliminate all GHGs emitted from fossil fuel-based electricity and steam generation.

b. Magnitude of GHG Reductions from 2025 through 2050

All three measures for the Butterworth Solar project will continue to be in place through 2050. Estimating GHG reductions from this project builds upon the estimates created for 2025-2030. The City continued to use a 0.6% annual solar panel degradation factor through 2050. The carbon emissions factor associated with fossil fuel produced electricity generation will fluctuate over the years as electric utilities continue to bring on more renewables and adjust their generating operations as needed. For purposes of this application, the City is not able to forecast what the carbon emissions factor will be for electric generation through 2050 and therefore used the same 0.49797 MTCO₂e/MWh from 2025 – 2050.

Each individual measure's cumulative GHG emissions reduction for 2025 – 2050 is estimated to be:

- Measure 1: City's Primary Circuit (2MW): 39,290 MTCO₂e
- Measure 2: Community Solar (5MW): 94,408 MTCO₂e
- Measure 3: Vicinity eSteam (8MW): 60,713 MTCO₂e

In total, 194,410 MTCO₂e are estimated to be eliminated between 2025-2030 for all three measures of the Butterworth Solar project. See the *GHGcalcs_CityofGrandRapids* attachment for annual calculations by measure.

c. Cost Effectiveness of GHG Reductions

There are three key items that have an impact on the cost effectiveness of this project that merit additional explanation. First, this project is being proposed on a closed and fully remediated U.S. EPA Superfund site. Remediation under the consent decree includes a four-foot clay cap and groundwater monitoring wells sited primarily along the perimeter of the capped areas. Any future development must be fully consistent with the Site's remedial features and institutional controls to ensure long-term access to and protection of the Site's remedies. Ballasted solar or other solar designs that will not implicate the cap are required and increase the cost of the project. Furthermore, due to this being a regulated Superfund site, there are additional risks present that are not present on other landfills or greenfields, which also increases the cost estimates. Second, without legislation enabling privately developed community solar options Consumers Energy's Solar Gardens program is the only option available, limiting market options and cost effectiveness. Third, the third measure included in this grant request is an 8MW solar array that will supply electricity to the Vicinity Steam plant located in the urban core of Grand Rapids. The steam plant currently burns natural gas to generate steam for the heating of approximately 120 buildings downtown, around 10 million square feet of space. Most of the steam customers are very old and large commercial buildings, including several City of Grand Rapids municipal properties, with elaborate heating systems integrated throughout the entire building. Electrifying these old buildings is not cost effective and would likely generate more lifetime GHGs than it would offset. While electrifying the steam plant increases the cost of measure three of this project, the City is confident it is much cheaper than attempting to retrofit these old buildings with all electric systems or tearing down these buildings and replacing them with new all electric buildings. Cost effectiveness of GHG reductions: \$1,493/MTCO₂e = (Requested CPRG funding - \$44.2M) / (Sum of Quantified GHG reductions from CPRG funding from 2025-2030 – 29,606 MTCO₂e)

d. Documentation of GHG Reduction Assumptions

As detailed in the technical Appendix and supporting GHG Calculation spreadsheet, the City of Grand Rapids has utilized engineering estimates to develop the GHG reductions that are presented in this grant application. These have been developed by its internal team supported by third party engineers assisting in the development of the project. [NREL research](#) has shown that solar panels have a median degradation rate of about 0.5% per year but the rate could be higher in hotter climates and for rooftop systems. A degradation rate of 0.5% implies that production from a solar panel will decrease at a rate of 0.5% per year. The following is a breakdown of the estimates, input data and calculations that assumes an annual decrease in generation of 0.6% contributed to average PV system degradation:

Measure 1: An electrical distribution system that serves various city and municipal loads throughout Grand Rapids, importing electricity generated from solar will offset the associated GHG emissions.

- Primary Circuit Load Profile: 19,285,000 kilowatt hours for 2022
- Installed capacity at Butterworth Landfill powering Primary Circuit: 2MW.
- Estimated solar generation consumed by Primary Circuit: 3,500MWhr.

- Current GHG emissions per MWhr of Consumers Grid: 0.49797 MT GHG/MWhr
 - Fisher, Sheehan, & Colton, 2019, [Home Energy Affordability Gap, Michigan 2019](#)
 - Section A Emissions reduction = Solar Generation * GHG Emission Rate
 - $3,500\text{MWhr} * 0.49797\text{GHG/MWhr} = \text{Annual Reduction } 1,743 \text{ Tons GHG}$
 - 5-year GHG tons offset: 8659
 - 25-year GHG tons offset: 41034.46736

Measure 2: Butterworth landfill will house 5MW solar generation to provide electricity for low income and disadvantaged communities in Grand Rapids via Consumers Energy Solar Gardens Program.

- Installed capacity of “Community Solar” at Butterworth landfill: 5MW
- Estimated solar generation of “Community Solar”: 8,800 MWhr
- Current GHG emissions per MWhr of Consumers Grid: .49797 MT GHG/MWhr
 - Fisher, Sheehan, & Colton, 2019, [Home Energy Affordability Gap, Michigan 2019](#)
 - Section A Emissions reduction = Solar Generation * GHG Emission Rate
 - $8,800\text{MWhr} * 0.49797\text{GHG/MWhr} = \text{Annual Reduction } 4382 \text{ Tons GHGs}$
 - 5-year GHG tons offset: 21650
 - 25-year GHG tons offset: 100866.5839

Measure 3: Vicinity Energy is a district steam energy system that serves 120 existing facilities through Grand Rapids downtown urban core. These facilities include municipal complexes, hospitals, residential buildings, civic infrastructure, churches, non-profit organizations, museums, commercial office buildings, etc. Electricity generated at Butterworth Landfill to generate steam at Vicinity Energy Plant will directly offset the need of Vicinity to utilize natural gas to produce steam that serves these facilities.

- Installed capacity at Butterworth landfill to serve Vicinity Energy: 8MW.
- Estimated electric generation by the proposed field: 13,500 MWhr.
- Electric Boiler efficiency: 98%
- eSteam generation: 39,945 Mlbs
- Natural Gas consumption to provide equivalent Steam: 53,038 MMBTU
- GHG Emission of Natural Gas: 117 lbs/ MMBTU or 0.0531 MTCO₂/ MMBTU
- GHG Savings = Natural Gas Consumption * Natural Gas Emission Rate
 - $53,038\text{MMBTU} * .0531\text{GHG/MMBTU} = \text{Annual Reduction } 2,815 \text{ Tons of GHGs}$
 - 5-year GHG tons offset: 13934.95199
 - 25-year GHG tons offset: 66310.00322

The team developed its GHG reduction estimates using engineering modeling. Contributors include Vicinity Energy, Foresight Engineering, USGBC as well as information provided by 10 independent solar installation contractors that provided responses to a competitive bid process. Data used in the development of this application was developed and obtained by the City of Grand Rapids from its internal staff, third party developer partners, competitive bid processes and publicly available information with references provided to primary data sources. The following is a list of primary data references:

- US Energy Information Administration – Michigan Energy Profile 2022: [Michigan Electricity Profile 2022 - U.S. Energy Information Administration \(EIA\)](#)
- [AR5 Synthesis Report - Climate Change 2014 \(ipcc.ch\)](#)
- EGLE, 2023, [Partnering to Reduce Energy Burden](#)
- Housing Next, 2022, [Housing Needs Assessment](#)
- Fisher, Sheehan, & Colton, 2019, [Home Energy Affordability Gap, Michigan 2019](#)
- IREC, 2022, [12th Annual National Solar Jobs Census](#)

- [City Strategic Plan](#)
- [Distributed Generation | Consumers Energy, Net Metering.pdf \(michigan.gov\)](#)
- [Distributed Generation | Consumers Energy](#)
- U.S. Census Bureau, 2020
- [Home Energy Affordability Gap, Michigan 2019](#)

SECTION 3: ENVIRONMENTAL RESULTS

a. Expected Outputs and Outcomes

The following are the expected outputs and outcomes for each of the three GHG reduction measures proposed as components of this project.

Measure 1 – 2MW Primary Circuit Array & Infrastructure

- Reduction in cumulative metric tons of GHG emissions:
 - From 2025 through calendar year 2030
 - From 2025 through calendar year 2050
- MW of solar energy installed.
- MWh of renewable solar electricity is generated annually.
- Contribution to City of Grand Rapids 100% renewable energy goal
- Contribution to City of Grand Rapids 85% GHG reduction goal
- Contribution to city of Grand Rapids communitywide GHG emissions per capita
- Acres of U.S. Superfund site repurposed with the beneficial reuse of solar generation.
- Reduced exposure to air pollution

Measure 2 – 5MW LIDAC Community Solar

- Reduction in cumulative metric tons of GHG emissions:
 - From 2025 through calendar year 2030
 - From 2025 through calendar year 2050
- MW of solar energy installed.
- MWh of renewable solar electricity is generated annually.
- Contribution to city of Grand Rapids communitywide GHG emissions per capita
- # of total and # of LIDAC households participating as subscribers
- Average annual household electricity bill credit
- Total average annual electricity bill credits for all participating households
- Average annual kWh of solar supplied to subscribing households.
- Acres of U.S. Superfund site repurposed with the beneficial reuse of solar generation.
- Development of a Grand Rapids-based clean energy career development program focused on LIDAC.
- Total # of hours of clean energy education offered.
- Total unique individuals engaged in clean energy programming and this project.
- Hire a solar specialist to manage this project.
- Reduced exposure to air pollution

Measure 3 – 8MW Vicinity eSteam Array & Infrastructure

- Reduction in cumulative metric tons of GHG emissions:
 - From 2025 through calendar year 2030
 - From 2025 through calendar year 2050
- MW of solar energy installed.

- MWh of renewable solar electricity is generated annually.
- Contribution to City of Grand Rapids 100% renewable energy goal
- Contribution to City of Grand Rapids 85% GHG reduction goal
- Contribution to city of Grand Rapids communitywide GHG emissions per capita
- Reduced exposure to locally produced air pollution from the combustion of natural gas
- Acres of U.S. Superfund site repurposed with the beneficial reuse of solar generation.
- Industrial equipment electrified.
- Generation of eSteam supplied by solar produced electricity from this project.

b. Performance Measures and Plan

Below are the proposed performance measures for each of the three GHG reduction measures proposed as components of this project, including the plan for tracking, and measuring progress and the approach to quantifying and disclosing.

All solar developers commissioned for any of the three solar components at the Butterworth Landfill will be required under contract to report to the City the following at the time of commissioning the array: total MW of solar installed (both AC and DC), total acreage supporting both solar panels as well as solar supporting components (access roads, fencing, etc.), estimated annual MWh produced across the lifetime of the project, estimated annual and cumulative GHG emissions eliminated from 2025 – 2030 and 2025-2050, and estimated quantities of reduced air pollution achieved and for whom due to the creation of solar energy. In addition, the solar developers will be required by contract to create, maintain, and make publicly available a solar performance dashboard that will collect and report on actual real-time and average annual MWh produced as well as real-time (at a minimum hourly) energy demand.

The City will contract with an organization to complete an updated communitywide GHG emissions inventory, which will include calculating GHG emissions reduced from this project as well as estimated future reductions through 2050, and will use the approach and methods provided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (Community Protocol) and the Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions (LGO Protocol). The City contracted with ICLEI to complete a 2019 Communitywide GHG Emissions Inventory ([GR GHG Inventory](#)). The City will also calculate GHG reductions on an annual basis using total kWh generated from the solar dashboard and applying the U.S. Energy Information Administration's established GHG emissions factors for Grand Rapids. The City has a web site dedicated to the Butterworth Solar project ([Butterworth Solar](#)) where updated information will be shared.

The City currently partners with JustAir, a business of accessible [air quality monitoring platforms](#), to expand the air quality monitoring network to residents and community groups across the city. There are seven JustAir monitors across Grand Rapids with several focused in the downtown and LIDAC communities. All the monitors are tracking the same pollutants/compounds: PM 2.5, PM 10, NO2, and Ozone. The City will use JustAir's platform for quantitative analysis of co-pollution reduction.

Under Consumers Energy's Solar Gardens – Sunrise program, a qualified non-profit will contract with Consumers Energy for the purpose of administering the Sunrise program. Under this partnership, the non-profit will be required to collect, measure and report on the following measures in partnership with Consumers Energy: households participating as subscribers, average solar electricity attributed to households, and actual annual and cumulative bill credits applied to each participating household.

The City will subcontract with an entity to manage the clean energy career development plan and pilot. Under that contract, the entity will be required to track, measure and report on engagement performance measures such as number of youths engaged in green technologies with paid apprenticeship programs, number of mentorship opportunities created, number of trainings hosted, numbers of hours

of clean energy education offered and total unique individuals trained in clean energy programming. Vicinity Energy will collect, measure and report on the amount of eSteam generated and natural gas combustion eliminated. In addition, the expected outputs and outcomes detailed above will be measured and tracked.

c. Authorities, Implementation Timeline, and Milestones

Authorities: **All measures:** City of Grand Rapids (authority over Butterworth Landfill; regulate Vicinity Energy; Commission budget approval), Selected Solar Developer(s), Geotech for PC Infrastructure, Butterworth Site Group – PRPs, U.S. EPA – consent decree.

Measure 1: Geotech for PC Infrastructure & Consumers Energy (interconnect)

Measure 2: Consumers Energy (MPSC authority to administer Solar Gardens – Sunrise program), Solar Justice Team, Non-profit partnering with Consumers Energy for Solar Gardens – Sunrise program, Sub-contractor for Clean Energy Career Development Plan and Program

Measure 3: Vicinity Energy, Consumers Energy (interconnect; distribution system), Grand Rapids 2030 District (collecting, tracking, and reporting on steam consumption by customer).

Timeline for all measures

- Coordinate and receive approval from BSG.
- Coordinate and receive approval from EPA.
- Request and receive approval from City Commission

Timeline for Measure 1

Year 1

- Preparation and solicitation of bids
- Award of contracts
- Construction of PC Connection begins.
- Site preparation for array

Year 2

- Construction of solar array
- Construction of PC connection completed.
- Startup & Commissioning

Timeline for Measure 2

Within the first couple of months of the award the City will facilitate a contract with Consumers Energy and the non-profit dictating completion within 5 years. Although Consumers Energy will be managing the installation of the solar array here is an estimation of when milestones for this measure will occur:

Year 1

- Begin working with Consumers Energy on Solar Gardens program (Consumers Energy will begin conducting a competitive bid process; build/own/operate array)
- Establish Solar Justice Team and the Team's Executive Committee, operational and decision-making format, and select a partner to manage the Clean Energy Development Training Plan
- Establish Green Career Task Force and Start work on Clean Energy Career Development Training Plan

Year 2

- Select and contract with non-profit that will administer Solar Gardens – Sunrise program.

- Solar Justice Team to provide feedback on preferred community engagement and outreach methods, eligibility criteria for households, and application and intake process.
- Non-profit subcontractor to begin marketing, outreach, and application intake.
- Complete Clean Energy Career Development Training Plan
- Enroll participants in clean energy career training program.
- Consumers Energy to finalize bid selection, enter into contract to begin construction.

Year 3

- Implement Clean Energy Career Development Training Program Pilot (Y3-Y5)
- Solar Justice Team to work with non-profit partner on creating support structure processes for households participating in program.
- Construct and commission community solar array

Year 4

- Select and contract for pollinator and native plantings on Butterworth solar site and surrounding trails.
- Solar Justice Team to design or select an equity framework to measure performance of community solar program.
- Seek additional funding sources for fiscal sustainability over thirty-year program lifespan.

Timeline for Measure 3

Year 1

- Preparation and solicitation of bids
- Award of contracts
- Site preparation
- Construction of primary circuit interconnect

Year 1 through 3

- Construction of solar arrays for each project section
- Construction of eSteam interconnect and generation infrastructure

SECTION 4: LOW-INCOME AND DISADVANTAGED COMMUNITIES

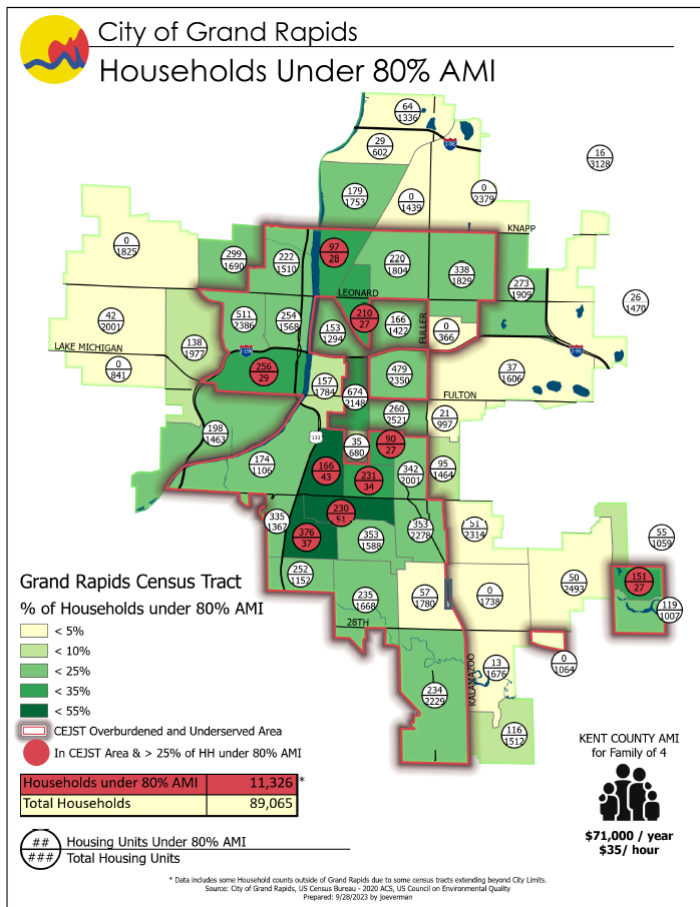
a. Community Benefits

Grand Rapids is home to a diverse group of nearly 200,000 people, with 42.5% of residents self-identifying racially or ethnically as persons of color (18.4% Black or African American; 16.5% as Hispanic or Latinx; 2.3% as Asian alone; 0.3% as American Indian or Alaskan Native alone and 4.6% as two or more races) (U.S. Census Bureau, 2020 Decennial, Table P1). While the community is racially and ethnically diverse, Grand Rapids is like many other American cities in that racial and ethnic segregation are still very prominent. The Climate and Economic Justice Screening Tool (CEJST) identified 25 census tracts as qualifying LIDAC areas within the city of Grand Rapids as seen in the attached *Area_CityofGrandRapids*.

While the Grand Rapids Solar Justice Program geographically can potentially encompass all residents within these CEJST census tracts, the program will intentionally focus efforts on the lowest-income residents and disadvantaged communities (DAC). Area Median Income in Kent County for a family of four is \$71,000 per year or \$35 per hour, with 80% being \$56,800 per year or \$28 per hour. (U.S. Census Bureau, 2020 ACS). The map below overlays census tracts with higher percentages of low-income households (the darker the green the greater the percentage of low-income households) and those identified as DAC in the Climate and Economic Justice Tool (CEJST; census tracts outlined in red). As depicted in the map, the following describes Grand Rapids:

- 13% of all households in the city are low-income (11,326 out of 89,065)
- 25 of 46 census tracts are defined as DAC by the CEJST

- 48% of all households are in the DAC tracts (42,328)
- 74% of households in DAC are low-income (8,336)
- 9 census tracts are both DAC and between 25-55% of households are low-income.



Based on this data, the City will first prioritize households in these nine census tracts to ensure the most disadvantaged in the community are served. Second, the City will prioritize households that are both located in the DAC and a census tract where 25-55% of the households are low-income.

In 2021 the EPA report, [Climate Change and Social Vulnerability in the United States](#), showed in the U.S. the most severe harms from climate change fall disproportionately upon underserved communities who are the least able to prepare for, and recover from, heat waves, poor air quality, flooding, and other impacts. EPA's analysis indicated that communities of color are particularly vulnerable to the greatest impacts of climate change.

To identify climate impacts locally the City partnered with Great Lakes Integrated Sciences and Assessments (GLISA) to create a summary of historic as well as projected changes in climate specific to Grand Rapids. The main takeaways are an increase in temperature, precipitation, and extreme weather events.

Increasing Temperature

- Average air temperature is projected to rise 3°F to 5°F by the mid-21st century, with summer having the greatest increases of 4°F to 7°F.
- Historically Grand Rapids had on average 7.9 days per year over 90°F; by mid-century this is projected to rise from 20-38 days per year over 90°F.

Increasing Precipitation

- Total annual precipitation has increased by 16%.
- Average annual precipitation in Grand Rapids is projected to increase by up to 3 inches by mid-century and by up to 7 inches by the end of the century, though types of precipitation will vary (i.e., more winter precipitation in the form of rain).

Increase in Extreme Weather Events

- The total volume of rainfall in extreme events (heaviest 1% of storms) has increased by 52%.
- Grand Rapids is projected to experience an increase of up to 1.7 days of heavy precipitation (days with over 1" of rainfall) per year by mid-century and by up to 3 days per year by end of century.

Essentially, Grand Rapids will see warmer days in the winters and more days over 90°F in the summer that could cause an increase in extreme heat days. Residents and institutions can expect higher costs to maintain comfortable temperatures during the summertime. Those unable to bear these costs will suffer harder seasons at best, adverse health impacts at worst, including extreme responses such as heat stroke. Hotter summer temperatures can lead to more ground-level ozone and other air pollutants collecting in and around the city. This pollution, in turn, affects everyone, but especially people suffering from asthma and other respiratory conditions. In 2019, the asthma rate for Grand Rapids was 17.1% compared to 16.4% for Michigan and 14.9% for the United States. Using race/ethnicity data from 2017-2019, the asthma rate for Black residents was 19.4% compared to 18.1% for Hispanic residents and 14.6% for white residents in Kent County (GRAAHI, 2021, [Health Equity Report](#)). Climate change has the potential to exacerbate an already established health disparity. Direct impacts to health could include carbon monoxide poisoning from using things like generators during power outages. Indirect health impacts could include stress and anxiety from lost work due to school or business closures. These outcomes disproportionately impact low-income residents as they are more likely to realize economic losses from missed days of work, and the costs of relocation caused by loss of power are more difficult to shoulder.

Local examples are provided in local CBO [LINC UP's Neighborhood Environmental Action Report: Health, Environment and Race in Grand Rapids](#). In 2019 extreme weather in summer created inconveniences for the affluent, but life-threatening scenarios for the disadvantaged. Public feedback details a documented hunger crisis due to the failure of emergency needs providers to plan for extreme storms and an increase in emergency room visits during a prolonged summer heat wave. School closures for unseasonably late summer heat forced childcare issues that resulted in lost income.

Grand Rapids will also experience more rain and extreme weather events in shorter bursts that could cause an increase in flooding and droughts. It is crucial to note that, in recent years, the city has experienced two “100-year storms.” One in April 2013 and the other in February 2018. The Grand River overflowed seriously in both instances. Higher-intensity rain events—defined as more than one inch of rain in any 24-hour period—are a predicted effect of climate change already impacting many communities. While the City of Grand Rapids has eliminated unwanted sewage discharges by investing in infrastructure and on-site storm-runoff-management initiatives, these sudden rains can still put local waterways at risk through toxic runoff and litter, concentrating pollution in the Grand River and its tributaries, including Plaster Creek. The 49507-zip code through which much of Plaster Creek travels within the city limits has a population that is predominantly LIDAC. Direct impacts to health could include injury from flooding, exposure to contaminants or waterborne diseases when streams and streets flood, and surface water quality issues from runoff. Indirect health impacts could include financial strain from recurring flooding or damage to homes or businesses, exposure to mold or other contaminants where proper cleanup is physically or financially difficult and disrupted local food systems.

An investment in accessible renewable energy and greenhouse gas reduction through the Butterworth Solar Development could help reduce the impacts climate change is already making and will continue to make if investments are not made.

Measure 1: Primary Circuit

In addition to the positive impacts of greenhouse gas reduction, a direct supply of renewable energy to the primary circuit will help provide resilience benefits to community. The use of renewable energy increases City services energy resilience in the face of extreme weather events; the City’s Fire Department, Street and Traffic Lighting will be more resilient to power failures improving safety across the city.

Measure 2: LIDAC 5MW Community Solar

The City has structured the Grand Rapids Solar Justice Program to provide 100% of the upfront cost for all households to participate. While cost up front is a step forward, the City acknowledges this

does not create wealth generation. One potential negative impact identified for this community solar proposal was that no current legislative avenue exists for an ownership option for solar by LIDAC communities. However, should this change by the time of the award we would consider an alternative route if legislation was enabled.

Consumers Energy provided data on LIDAC in Grand Rapids and indicated that on average these households were paying \$1,350 annually in electricity bills, however many households are experiencing much higher electricity bills due to energy burden. In 2019 across Kent County, all households at or below 200% federal poverty limit (80% AMI; estimated around 70,000 households) spent between 6.9% and 33.2% of their annual income on home energy bills meaning that many of our low-income residents are significantly energy burdened (Fisher, Sheehan, & Colton, 2019, Home Energy Affordability Gap, Michigan 2019). In addition, we know, based on a 2020 survey conducted by the Urban Core Collective, NAACP of West Michigan, and other trusted community-based organizations with 120 participants from our disadvantaged communities (58% renters, 70% Black or African American), that the greatest area of program interest is in financial assistance (69 survey responses) with energy efficiency second (60 survey responses) and home rehabilitation third (56 responses).

Consumers Energy also shared with us that in an average year in Grand Rapids, 4,000 LIDAC households experience an average five-day electricity shut-off due to an average invoice due of \$400. In addition, 1,856 households from Grand Rapids participated in their utility offered assistance programs. Based on 2019 ACS data for Grand Rapids, Black or African American households' median income was 45% less than White, no Hispanic or Latino households and Hispanic or Latino households' median income was 31% less than White, no Hispanic or Latino households. One potential negative impact identified in the program was the issue of homeownership for the community solar program. If a program is based on the property, savings would be attributed to landlord as opposed to a resident. The program circumnavigates this issue by instead focusing on a customer basis – where a customer will maintain bill reduction even if they move. Reducing electric bill costs and energy burden for eligible low-income homeowners and renters is an important benefit, as every bit saved is important to families and helps the environment. The Grand Rapids Solar Justice Program anticipates serving approximately 1,513 households for a 10-year period, and 4,539 households over its 30-year lifetime. The array is expected to eliminate 1,753 MTCO_{2e} in the first full year of operation and would save each household participating approximately \$300 each year. The City will work with Consumers Energy and the non-profit partner to cultivate quantitative community benefit reports, which could include cost savings of each household, energy burden reduction, and cumulative GHG emission reduction.

One additional benefit to the community is the repurposing and activation of an EPA superfund site thereby increasing access to community green space and amenities. The Butterworth site is located southwest of downtown Grand Rapids, directly adjacent to the John Ball Neighborhood, which is one of Grand Rapids' neighborhoods of focus – defined as census tracts with the highest percent of Black, Indigenous, and People of Color (BIPOC) residents and the greatest disparities across all quality-of-life indicators (education, wealth, jobs, etc.). The Michigan Environmental Justice Score for the census tract where the Site is located is the 84th percentile based on the MIEJ Screening Tool. And the census tract immediately to the south, which is adjacent to the Site, has a Score Percentile of 91 (the second worst score in Grand Rapids). Installing solar at this U.S. Superfund site is a positive reuse of a former contaminated landfill located in the heart of EJ communities in Grand Rapids. The addition of planting pollinators and native plantings under the array and along recreation pathways around the landfill will serve to beautify and encourage recreation and access to greenspace in a positive reuse of a landfill for LIDAC EJ communities.

Measure 3: Vicinity Energy eSteam

Vicinity currently serves a large variety of community services through their steam program including hospitals, residential buildings, municipal buildings, hotels, churches, police and fire stations, shelters for the unhoused, and other community facilities. The community benefits of decarbonizing all buildings across the Vicinity system has the potential to create a positive impact not only for the businesses themselves, but all the residents they serve. Vicinity plans to create a quantitative analysis of co-pollutant emission reductions for the eSteam program. The list of co-pollutants Vicinity plans to assess over the grant cycle and the annual projected emissions reductions (tons/year) from the implementation of the eSteam program include CO 2.42, NO2 2.88, PM10-Primary .22, PM 2.5-Primary .22, SO2 .02, VOC .16, and Ammonia .01.

b. Community Engagement

Over the past several years, the City's Office of Sustainability and Strategy (OSS) has emphasized building relationships with locally trusted community-based organizations (CBOs) working toward climate and environmental justice. The OSS has established community partnerships through current key initiatives where equity is being centered in climate change planning, engagement, and implementation processes. The CBO partners OSS works with are trusted by the community due to their willingness to question and challenge existing institutions, including the City, to be accountable to eliminating disparities and creating a welcoming city where everyone can thrive. Based on these existing relationships and the City's desire to implement participatory governance as a part of the application submission process, the City invited eleven of these environmental and climate justice grassroots activists to advise the City on Measure 2. Sixty-four percent of these partners are people of color and are trusted leaders among their communities. The City hosted four meetings with this group to discuss the strategic approach for the Solar Justice Program as well as how career training, business support and green entrepreneurship efforts will be focused on LIDAC communities. While the exact engagement plan would be decided with the to-be-created Solar Justice Team during the planning year, the process will be influenced by current engagement work and lessons learned.

One key partner organization that consulted on this proposed program is the Community Collaboration on Climate Change (C4), a majority BIPOC-led network of 24 community leaders and local CBOs working towards increasing climate and environmental justice awareness and action. Members of the C4 leadership team include representatives from OSS, environmental action organizations, non-profits working toward social, racial, economic, energy, and food justice, sustainability professionals, neighborhood groups, and local artists and activists. The C4 is currently working with OSS to lead community engagement for the City's forthcoming Climate Action & Adaptation Plan (CAAP). Through the C4, the City has worked to shift power, decision making authority and financial investment into marginalized communities. Fourteen community ambassadors have been hired to be trained on climate justice, share resources, and conduct outreach in their neighborhoods. Leveraging social networks of paid ambassadors can help to reach people not traditionally engaged in community planning processes. Community engagement for the CAAP also includes:

- Free online climate change training, including climate change 101 and how to communicate about climate change. Training on solar and the community solar process will be added to this series.
- A simple three question online survey gathering community feedback on the local impacts of climate change, plan priorities, and visioning a just climate future with a Google Translate option to convert into many languages.
- For the CAAP's Climate Risk and Vulnerability Assessment (CRVA) four focus groups will be held in-person with a focus on a targeted universalism approach ([Othering & Belonging Institute, 2019](#)). Each focus group will represent a different historically marginalized group such as refugees, local tribal members, youth, and Spanish-speaking residents to ensure voices not traditionally heard in planning processes are uplifted.

- Climate Advisory Teams (CAT) were created from local subject matters experts and community advocates to draft strategies for the CAAP based on broad community engagement.
- A second round of CAAP public engagement will occur including 6-8 topic focused community events in LIDAC neighborhoods to respond to potential solutions in consideration for inclusion in the CAAP based upon community survey feedback.
- A third round of CAAP public engagement will allow for the community to review and provide feedback on the draft CAAP before it is finalized at the end of 2024.

The City is currently partnering on a residential renovation pilot that will implement wrap around services for at least ten households at or below 40% AMI as a part of our Equitable, Healthy and Zero Carbon Buildings Program (known as [E.H.Zero](#)). Through this pilot, we have learned that door knocking in LIDAC communities is an effective method to educate and engage households. Flyers were designed with large, easy-to-read fonts, visuals, and options for how to sign up for ease of accessibility. Flyers were printed in different languages at the request of representative CBOs. A local design firm was sought to create a program logo and themed templates for recognizable and consistent branding on marketing, educational, and web-based materials. We will take best practices learned from that pilot and use them as a key strategy to identify and support eligible households applying for the program. In addition to working with established community partners, additional stakeholders or organizations representing historically marginalized groups will be engaged including but not limited to youth, the elderly, immigrants and refugees, AAPI community, local tribes, differently abled, and LGBTQIA+. The CRVA focus groups events are establishing partnerships with some of these groups. As relationships develop, OSS will further engage communities with the Solar Justice Program. Funds have been allocated in the budget for translation and interpretation services. Depending on the needs of the group, information could be brought to organizations in person or on a virtual call, or by joining an organization's existing meeting (e.g., Latino Community Coalition). Information could be presented formally with a slide deck or more casually as a conversation.

Based on the City's experience with participatory governance on climate change and environmental justice initiatives, one of the first actions that will be taken with this funding is the establishment of a Grand Rapids Solar Justice Team. Many of the individuals that partnered with us on the ideation of the program will likely serve on the Solar Justice Team. While the City is outlining key ideas for the participatory governance structure, the Grand Rapids Solar Justice Team will be empowered to make decisions with respect to the formation and operations of the team.

Depending on the Solar Justice Team's decision, it may establish the following guidelines for the team, which are predominantly modeled off the Community Collaboration on Climate Change by-laws:

- The team shall consist of between 9 and 19 people and each team member will have one vote on each matter. At least 50% of the team members must either be from or serve our LIDAC residents and be composed of people with lived experience, clean energy subject matter expertise and/or other identified qualifications.
- The employee hired by the City of Grand Rapids to manage this grant will facilitate and work in collaboration with the team and an executive committee will be established.
- Participants on the Solar Justice Team will be compensated \$25 per hour for up to 20 hours a month for the first year of the grant, the planning period. Team members will be compensated at the same rate for 15 hours a month for the second and fifth years of the program and 10 hours per month for the third and fourth years.
- This team will be empowered to make decisions and/or award subgrants to eligible subgrantees and consultants. They will be creating an operational and decision-making format for the Solar

Justice Team and interviewing and selecting the primary subgrantee that will serve as the program administrator for the community facing components of this program and will be the primary liaison with the City.

- Selecting eligibility criteria for participating households, prioritizing households located in the nine census tracts identified as DAC and with a higher percentage of low-income households.
- Approving marketing and communications materials, strategies, and tools, including language translation and visuals and program application materials for eligible households to complete.
- Providing feedback and direction for the creation of a plan for how households will be supported in completing application materials. Analyzing submitted applications against identified eligibility criteria and selecting participants. Identifying and defining a clean energy career training program, partners, and participants. Creating a support structure and processes for households and individuals participating in funded programs.
- Creating and implementing a robust education, promotion, and community engagement plan.
- Designing and/or selecting an equity framework to apply to the work and measuring performance of the program through the framework. Defining other evaluation and accountability measures for the program, and helping the City select solar developers and other contractors.

Following what has been done with the CAAP and E.H. Zero engagement so far, the Solar Justice Program could be introduced to the community through a series of online and in-person educational events. Online webinars could take place through a virtual meeting platform as well as Facebook Live. Online recordings will be posted on the City's Sustainability website and YouTube for later viewing. The City could work with local CBOs to meet communities where they are and identify well attended community events to table and share the Solar Justice Program information.

Besides collaborating with partner CBOs on engagement, general City outreach methods to share the Solar Justice Program information are: E-newsletters to share information; We Are GR quarterly printed, mailed newsletter that is delivered to all Grand Rapids residents; Press releases; Ask City Commissioners to promote to their residents; City social media pages; Public presentations; Tabling at City events; 311 resource hotline; Neighborhood Association meetings; Library branches; and School networks. As part of meaningful community engagement, periodic public reports on the progress of the GR Solar Justice Program would be scheduled to maintain transparency and accountability.

SECTION 5: JOB QUALITY

The City is dedicated to supporting the creation, retention and growth of businesses that enhance residents' employment opportunities with a special focus on creating access to both entrepreneurship and employment opportunities for historically marginalized communities. This dedication is outlined in the City's Strategic Plan in the *Economic Prosperity and Affordability Priority* and through the City's current Micro-Local Business Enterprise (MLBE) and Inclusion program. ([City Strategic Plan](#)). The City's MLBE program offers strategic consulting dollars to participating partners, contracts with an accountant to assist MLBEs gathering net worth documentation and offers translation services for MLBE registration application. The City recognizes that this endeavor requires both time and leveraging of social capital and seeks to ease the barriers placed on historically marginalized communities.

In 2021, Michigan employed between 3,000-5,000 solar jobs, a growth of 15-20% with a national average of 66% of these jobs focused on installation and project development. 53% were in the residential sector (IREC, 2022, [12th Annual National Solar Jobs Census](#)). Like other comparable industries, the solar industry still has more work to do to meet its goals for diversity, equity, and inclusion. Nationally in 2021, women made up just under 30% of solar employees, well below the 47% of women in the U.S. workforce overall (IREC, 2022, [12th Annual National Solar Jobs Census](#)). Black employees made up 8% of the solar workforce in 2021, which is less than their 12% representation in the national workforce (IREC, 2022, [12th](#)

Annual National Solar Jobs Census). Most solar firms have not developed a strategy to increase the diversity of their workforce. Only 31% of firms reported strategies, policies, or programs to increase the number of female hires, while 26% had a strategy to increase ethnic or racial minority hires, and 8% had a strategy to increase LGBTQ+ hires (IREC, 2022, [12th](#) Annual National Solar Jobs Census).

Investing in jobs and businesses is an area of great importance for this community. However, there are currently no known existing programs for energy waste reduction and clean energy career development. The City included \$50,000 in a subgrant to develop a career development training plan in the first year and \$180,000 over three years for a total investment of \$540,000 to support 30 individuals participating in clean energy training. This support is \$18,000 per person and includes an hourly rate to compensate individuals for their time as well as transportation, food, and childcare.

During the one-year planning process, local partners will be mapped for inclusion, and research will be conducted to create a pilot program during the remaining four years. Potential partners include Grand Rapids Public Schools, Grand Rapids Community College, Thompson M-TEC, GR Urban League, new construction groups, unions if applicable, Vicinity Energy and housing rehabilitation services. The City will also work to evaluate its own MLBE program and determine if/how clean energy can be integrated into it to help drive business opportunities.

Through current Office of Sustainability and Strategy (OSS) stakeholder engagement work, a Commercial Building Climate Advisory Team (C-CAT) was created to recommend priorities for the City to take to reduce carbon emissions from buildings. One of the C-CAT's highest priorities is to support green career development and training given the need for more skilled contractors able to do this work. This priority will be reflected with action items in the City's forthcoming Climate Action and Adaptation Plan to be published in 2024. Several action items have already been drafted to potentially be included in the CAAP that may be implemented by the time the Solar Justice Program would launch. Action items that may be leveraged or created under CPRG include:

- Creating a Green Career Task Force to pair career development and contractor training programs with training curriculums on green technology and trades
- Connecting manufacturers and educational institutions to train youth in green technologies with paid apprenticeship programs (example: Trane Technologies is willing to hire students direct from high school and provide on-the-job training)
- Creating a youth mentorship program pairing youth with skilled mentors (example: Retired Engineers Network)
- Create a local, annual Green Career Fair in partnership with green CBOs and non-profits, educational institutions, contractors, manufacturers, architects, and engineers.
- Develop shadowing opportunities in programs that involve energy audits, energy efficiency upgrades, and green technology.

During the planning year, the team will consider whether to establish a Green Career Task Force (GCTF), which would advise on the development of solar training through one or more Registered Apprenticeship programs, pre-apprenticeship (apprenticeship readiness) programs affiliated with Registered Apprenticeship programs, Labor-Management Training Partnerships or other union-affiliated training programs, and training programs in partnership with local community colleges or Minority Serving Institutions.

City staff and partners have begun initial conversations with stakeholders about connecting green technology curriculums, career development, contractor training, and youth engagement. Among those that may be invited to participate on the GCTF include: West Michigan Construction Institute; Grand Rapids Community College; Ferris State University; Kent Career Tech Center; Grand Rapids Public Schools;

Gerald R. Ford Job Corps Center; Michigan Saves (green bank organization with an electrification certification training and a minority contractor network); Youth Build (youth contractor training program); Trane Technologies (will hire and train high school students); Vicinity Energy; Elevate (has Green Contractor Accelerator Program); U.S. Green Building Council of West Michigan; Green Home Institute (provides education on latest green home technologies, trains auditors); The Source (provides job retainment support); Michigan Energy Workforce Development Consortium; City of Grand Rapids Micro-Local Business Enterprise & Contractor Network; Organizations with home repair programs; Local BIPOC-led business chambers and CBOs.

The Solar Justice Team will select a partner organization to create and manage a clean energy career development program with a focus on solar deployment training programming through CPRG. This partner organization would create curriculums to train individuals on clean energy, with training focuses on uplifting minority contractors in the clean energy field and providing stipends for contractors to train their staff. Mentorship opportunities would be created with local businesses, access given to professional networks for job opportunities, and ongoing technical and professional support provided after completion of the training. A partner organization would also be brought on to support trainees during the program. One potential partner of interest is The Source, which provides navigation support to job seekers and employed persons to help with job retention. The Source has a team of navigators to connect people to resources that address barriers to employment such as housing, utility assistance, transportation, childcare, etc. If The Source does not have capacity to partner at that time, navigation support will be similarly provided through other contracted organizations.

The networks of the GCTF, Solar Justice Team, and existing community-based organization partners mentioned in the community engagement section below will be leveraged for outreach efforts to recruit diverse trainees from historically marginalized groups and similar engagement strategies will be used. The City of Grand Rapids supports the Good Jobs Principles issued by the US Departments of Commerce and Labor through its hiring and employment practices. Qualified applicants are actively recruited through a hiring process that is free from discrimination and promotes equity. Employees are offered competitive wages and salary practices, as well as union representation. The city supports diversity, equity, inclusion, and accessibility and strives to make its practices more open, fair, and inclusive to all. As such, the city will ensure the proposed Solar Justice Specialist will be a high-quality job and meet these standards.

SECTION 6: PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

a. Past Performance

The City of Grand Rapids has benefitted from multiple funding opportunities during the past three years, which have helped us to achieve our goals and support exceptional services to our residents. Two which have been managed by the Engineering Department, as this program will be if awarded, are as follows:

EPA WIIN Reducing Lead in Drinking Water

- Replacing Private Lead Service Lines in Grand Rapids, Michigan
- 00E02968 – 0 – L9
- U.S. Environmental Protection Agency (66.443)
- The agreement assists Grand Rapids, Michigan to develop and implement improvement investments through projects that will reduce lead exposure in drinking water by replacing hundreds of lead service lines in Grand Rapids, Michigan.
- EPA Project Officer:
 - Andrew J. Bielanski
 - Environmental Engineer
 - State Revolving Fund – State & Tribal Programs & Support Branch
 - 77 West Jackson Blvd, WS-15J

Chicago, IL 60604-3507
Bielanski.Andrew@epa.gov

C2R2 Burger Goodwood Neighborhood PFAS Remediation

- Burger Goodwood Neighborhood PFAS Remediation
- C2-001
- Michigan Department of Environment, Great Lakes, and Energy (Consolidation and Contamination Risk Reduction Grant)
- Public water main extension and connection to 255 residences in the Burger and Goodwood Neighborhoods in Cascade Charter Township to the Grand Rapids municipal water system. The project constitutes phase one of a planned multi-phase project.
- EGLE Contact:
Kaitlyn Thrush, Department Analyst
Grants Unit
Water Infrastructure Funding and Financing Section – Finance Division
Michigan Department of Environment, Great Lakes, and Energy
ThrushK1@michigan.gov

b. Reporting Requirements

The City of Grand Rapids has extensive experience managing federal awards. The agreements listed have been managed by the Engineering Department and have grants and project managers assigned to them. These individuals ensure compliance with the grant terms and support the project to ensure benchmarks are achieved. As such, reports have been submitted in a timely manner, consistent with the requirements of the respective programs. Staff communicate with grant managers to answer questions, and address challenges faced during the period of performance.

c. Staff Expertise

The proposed project will be managed by the Engineering Department and supported by the Office of Sustainability and Strategy. The Engineering Department's internal structure supports the award and management of projects of any size. It utilizes a web-based bidding system, Accela for permitting, and Microsoft Project to manage engineering projects. The Department is experienced in managing projects with multiple funding sources, tracks project details, and prevents comingling of funds. Staff tracks time worked by project. Engineering's own accounting staff audits each disbursement by funding source in compliance with OMB Uniform Administrative Requirements (2 CFR 200). Engineering employs 40 staff and performs services for project design, project management, construction inspection, permitting, facilities, vital streets, sidewalks, land surveying, right-of-way management, tech/GIS and data management, private development, grant support, and fiscal and business operations. In the past ten fiscal years, the department has initiated 1,023 capital projects and additionally bid and awarded 647 projects with a total value of \$798,714,905.

City staff involved in the project include Cindy Irving, P.E., Assistant City Engineer, Breese Stam, P.E., M.S., Project Manager, Jeff McCaul, P.E., Assistant City Engineer and Kristin Pfauth, P.E., LEED AP, Project Manager who will manage the project. With over a century of experience in engineering and construction management, they have the expertise necessary to bring this project to fruition. Tracy Hover and will provide financial coordination of grant funds including preparing financial reports, with 25 years of experience. Doug Matthews, Assistant City Manager, is the senior executive who manages the Office of Sustainability and Strategy as well as the Energy, Lighting and Communications Department, which is responsible for directly managing the Primary Circuit. Alison Sutter, JD/MPA, Sustainability and Strategy Officer, will advise on the solar array. Ms. Sutter has over 25 years of experience in the sustainability field.