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**CPRG IMPLEMENTATION GRANTS COMPETITION
COVER PAGE FOR APPLICATION**

APPLICANT INFORMATION

Organization

Primary Contact Name

Phone Number

Email Address

TYPE OF APPLICATION Individual Applicant Lead Applicant for a Coalition

If lead applicant for a coalition, provide a list of the coalition members below.

FUNDING REQUESTED: *Provide total EPA CPRG Implementation Grant funding requested.*

APPLICATION TITLE: *Provide the title of your proposed project.*

BRIEF DESCRIPTION OF GHG MEASURES: *Describe each GHG reduction measure contained in the application (1-2 sentences each).*

SECTORS: *Identify the sector(s) associated with the GHG reduction measures included in the application.*

Industry	Commercial and Residential Buildings
Electricity Generation	Agriculture/Natural and Working Lands
Transportation	Waste and Materials Management
Other (please describe)	

EXPECTED TOTAL CUMULATIVE GHG EMISSION REDUCTIONS

For all proposed measures combined, provide the estimated cumulative GHG reductions:

Estimated cumulative GHG reductions for 2025-2030 (in metric tons)

Estimated cumulative GHG reductions from 2025-2050 (in metric tons)

LOCATIONS: *List the primary location(s) where the proposed measures will be implemented*

City

State; Territory; Federally recognized Tribe

APPLICABLE PRIORITY CLIMATE ACTION PLAN(S) (PCAP) ON WHICH MEASURES ARE BASED

PCAP Lead Organization(s):

PCAP Title(s):

PCAP Website link(s) (if applicable):

List of GHG reduction measures and PCAP page reference for each measure:

OVERALL PROJECT SUMMARY AND APPROACH

The City of Dayton is designated as an EPA Inflation Reduction Act (IRA) Disadvantaged Community. The VPP and Local Green Fund project will provide benefit to 49 census tracts, of which 44 are categorized as disadvantaged by the Climate and Environmental Justice Screening Tool (CEJST) and 60% of residents are at or below the 200% federal poverty level.

A significant amount of low-income residential cost-burden can be attributed to energy costs. In the City of Dayton, 26,332 households experience a high energy burden of 6% or greater. The census tracts experiencing this level of burden contain the City's priority redlined neighborhoods that are also challenged with poor health outcomes, poor financial stability, and lower levels of education achievement; all a result of historic underinvestment and environmental injustice.

Lowering residential energy costs is a significant way to reduce financial burdens for low-income residents. The use of renewable energy not only lowers GHG emissions and improves air quality, but also is an effective way of lowering household energy costs. At present, Ohio regulations do not allow for traditional community solar participation, which can be an effective way to reduce energy costs by developing large scale solar for the collective benefit of a community. Improving home energy efficiency for low-income residents is another effective measure to reduce both energy burden, permanent GHG emissions, and improve overall home health and comfort that reduces the impacts of climate change on vulnerable populations.

This request seeks CPRG funding to implement the **Miami Valley Photovoltaic Ownership, Workforce Enhancements, and Revitalization Project (MV POWER)** that proposes an allowable alternative to community solar in Ohio by deploying large scale distributed renewable energy with community choice electric aggregation programs and a subsidized responsive and proactive home energy efficiency retrofit program in low-income priority neighborhoods to permanently reduce GHG emissions, improve air quality, reduce energy burden, improve neighborhoods blight, and create sustainable pathways to quality jobs.

DESCRIPTION OF EACH MEASURE

MAJOR FEATURES

Measure 1: Virtual Power Plant

The virtual power plant (VPP) will construct and deploy solar on separate sites within Dayton, Ohio city limits. The three arrays' cumulative total will include 31.82 MW generating 39,972 MWh a year of clean, renewable energy for Dayton, Ohio residents. The solar assets will be owned by Sustainable Ohio Public Energy Council (SOPEC), a regional council of governments that manages the City of Dayton's residential electric aggregation program that serves more than 31,000 households and small businesses that use nearly 300,000,000 KWh of energy per year.

SOPEC and the City have worked to develop the proposed Virtual Power Plant (VPP) concept that offers an alternative pathway to achieving the benefits of community solar by using electric aggregation to realize the benefits of distributed renewable generation to residents. Using the aggregation model and competitive procurement processes will allow SOPEC utilize renewable generation to offset the City's annual energy needs which will clean the electricity system and offer a lower rate for residents. The generation from VPP is expected to offset the City's need for market purchased electric supply by nearly 40,000,000 annually, equating to the total energy use of 4,000 homes and reducing emissions between 2025-2030 by 54,281 mtCO₂e, the equivalent to removing 11,796 gas-powered vehicles off the road.

VPP SITE 1: VALLEYCREST LANDFILL

Site 1 will construct a 23MW array at the former North Sanitary Landfill site, also known as Valleycrest Landfill. The 102-acre site, located at 200 Valleycrest Drive, Dayton, Ohio 45404; a designated Superfund site that was added to the United States [EPA National Priorities List](#) in 1994. The Valleycrest Superfund site sits adjacent to McCook Field, the region's largest concentration of industrial use facilities which includes the oil terminals that supply gas for the entire region, an industrial laundry facility, a car crushing facility, a former industrial plating facility, and a demolition debris landfill. Both the Valleycrest Landfill site and McCook Field are in Dayton's 45404 zip code, home to 15,000 Dayton residents in the Climate and Economic Justice Screening Tool's (CEJST) 99th national percentile for proximity to a Superfund site.

The Valleycrest Superfund site underwent remediation as part of the U.S. EPA's Superfund Removal Program between 1998-2003. In October 2018, the United States District Court for the Southern District of Ohio approved a consent decree requiring potentially responsible parties (PRPs) to complete a \$35 million cleanup of the site which was completed in October 2023 with a multi-layer cap covering over 70 acres of the site. The site is now ready for reuse and designed to accommodate solar to reflect input from area residents who expressed solar as a priority for site reuse.

The Old North Dayton and McCook Field neighborhoods immediately adjacent to the Valleycrest Landfill site have a long history of environmental injustice and underinvestment and are in the 95th and 92nd low-income percentile, respectively. Residents in this neighborhood suffer from chronic poverty and face additional health, economic, and energy burdens as a result of Superfund site proximity. The VPP model will include an additional rate reduction for residents in the impacted 45404 zip code to lower energy costs for impacted households.

The Valleycrest Landfill array will be the largest of the three VPP sites and fill the entire 70 acres capped and available for reuse. It will generate 28,314 MWh annually.

VPP SITE 2: LIBERTY

Site 2 will construct a 7.84MW array on 39.2 acres of City property behind the former YMCA located at 4401 Dayton-Liberty Rd, Dayton, OH 45417. The site has been vacant since the construction of US-35 through the area many decades ago. A YMCA located adjacent to the site closed in 1999, causing further neglect of the area which has attracted illegal dumping and created an eyesore and health hazard for the surrounding community.

The construction of US-35 in the 1960s was a result of racist policy that aimed to isolate low-income and Black communities. The construction of the roadway exacerbated neighborhood redlining and disinvestment within the West Dayton community and caused the departure of many businesses, non-profits, and other establishments, including the YMCA that provided many community services and programs. The Dayton Liberty site sits at the highway boundary and is filled with gravel and debris making it unsuitable for housing, business, or other economic development purposes.

The property is located in the Fairlane neighborhood that lies in the 97th percentile for poverty and 89th percentile for unemployment. The neighborhood is primarily African American with statistically higher health and energy burdens experienced by residents who have experienced historical underinvestment and past and present environmental injustice.

The Dayton Liberty array will produce 10,427MWh a year of clean and renewable energy.

VPP SITE 3: DAYTON STEEL

Site 3 will construct a 0.98MW array on the 4.9 acre former Dayton Steel site located at 1421 Miami Chapel Road, Dayton, Ohio 45417. The Dayton Steel site is a brownfield that has completed ESA I and ESA II.

Residents of the surrounding Edgemont neighborhood fall into CEJST's 96% percentile for poverty, 98% percentile for superfund proximity, and 95% percentile for low-life expectancy. The area was highly industrial in the early twentieth century and by 1960, the majority of the population of Edgemont was middle-class African-American homeowners. The decline of manufacturing in Dayton has caused companies to close and resulted in high unemployment leading to neglected brownfields and disinvestment and abandonment of the area. Despite this hardship, a recent resurgence of resurgence of resident leadership with the creation of the Greater Edgemont Community Coalition is improving the area with a push for greater sustainability initiatives benefitting the neighborhood, including the development of solar. The City of Dayton identified the Dayton Steel site and residents are supportive of this initiative. The Dayton Steel array will be the smallest of the three VPP sites and generate 1,231MWh a year.

The VPP will feature a dynamic rate structure providing the ability for SOPEC to shelter Dayton residents from market volatility and adjust the rate to maintain reduced community energy burden. The net income from the renewable generation produced at the three sites after deducting fixed costs, will contribute to the Local Green Fund supporting community efforts and programs reducing emissions and energy burden for low-income residents.

Measure 2: Revolving Green Fund

The Local Green Fund aims to decarbonize and improve residential and neighborhood building stock with enhanced weatherization and electrification retrofits that will systematically reduce emissions and lower energy burden in Dayton's low-income neighborhoods. The Fund will fully subsidize insulation and electrification upgrades and improvements to homes and residential scale neighborhood-based businesses for income-qualified residents and emphasize priority neighborhoods in Dayton that have been redlined and experienced historical underinvestment and environmental injustice.

A 2021 Housing Needs Assessment performed by the Miami Valley Nonprofit Housing Coalition, estimated there to be 57,134 residential buildings in Dayton with the majority of renter and owner-occupied dwellings being built before 1970. Dayton's 2022 median household income was \$34,457, with 29.6% of the population living in poverty. More than 30,000 low-income households in Dayton have an average energy burden of 12.7%. These challenges equate to 44% of households being classified as cost-burdened and being unable to perform routine maintenance, let alone upgrades and improvements that could improve efficiency and lower costs. This paired with many residents living in older homes has created an urgent opportunity to dramatically improve LIDAC residents throughout Dayton with the Local Green Fund investment in home energy efficiency retrofits.

The program will invest CPRG Implementation funds to implement a 5-year program targeting upgrades and improvements that create the greatest impact in producing permanent reductions in household and small building emissions. Using research and modeling tools produced by the National Renewable Energy Laboratory (NREL), the Local Green Fund program will work with local implementation partners to complete the enhanced whole home weatherization as well as electrification including electrical upgrades

and repairs, Energy Star electric appliances, heat pump or mini-split installation, and labor needs at or above prevailing wage.

The Local Green Fund implementation partners include Clean Energy for All (dba Dayton Energy Collaborative) and the Dayton Home Repair Network, a collective of partnering agencies and organizations performing low-income home repairs and improvements in Dayton's low-income priority neighborhoods.

Dayton Energy Collaborative (DEC): Founded in 2012 as CleanEnergy4All, rebranded in 2021 as Dayton Energy Collaborative to focus on a collaborative home repair and weatherization program that reduces energy burdens for residents. The organization began to coordinate with neighborhoods and community-based organizations to develop a low-income neighborhood model focused on energy equity and improving housing quality.

Dayton Home Repair Network (DHRN): In 2021, DEC brought together local home repair and weatherization programs serving Dayton LMI households as a means of removing traditional program barriers for residents. The partners of the DHRN include Miami Valley Community Action Partnership, Dayton Habitat for Humanity, Rebuild Together Dayton, County Corp, and YouthBuild Dayton. These partner organizations administer federal, state, and local funds for critical home repairs and YouthBuild Dayton is a Department of Labor funded workforce training program for opportunity youth. The DHRN also closely engages with other community stakeholders and regularly work with East End Community Services, Greater Edgemont Community Coalition, Twin Towers Neighborhood Association, Five Rivers Health Center, and Dayton Children's Hospital. The collaboration of members and stakeholders has produced a streamlined one-stop-shop model that has improved benefit delivery to residents and low-income neighborhoods of Dayton.

DEC and DHRN partners focus efforts neighborhood-to-neighborhood, working with residents and neighborhood groups to coordinate engagement, education, and program activity. This offers a unique opportunity to develop systems and processes for the Local Green Fund that maximize efficiency, economies of scale with procurement of materials, improved scheduling of labor, and reduced neighborhood service disruption and inconvenience from improved coordination of deliveries, closures, and services.

Many of the priority neighborhoods receiving Local Green Fund investment as older city neighborhoods with multi-generational locally-owned businesses housed within homes or small neighborhood commercial structures that are important neighborhood anchors. These buildings and businesses are often too small or without the capacity to pursue energy efficiency project funding or financing from traditional commercial programs and resources which leaves them without the ability to pursue building upgrades and improvements. Local Green Fund resources will look to fill this existing gap for micro and small businesses in making them eligible for program participation.

The Local Green Fund will benefit from an existing programmatic implementation model that was launched by Dayton Energy Collaborative and Dayton Home Repair Network in 2023 allowing for efficient and effective implementation of the Local Green Fund Home Retrofit program. The proven model includes neighborhood engagement, household recruitment, building assessment and application support, home work plan development, retrofit implementation management, verification of improvements, and impact monitoring.

The Revolving Green Fund will establish a Steering and Oversight Committee to ensure that the program is designed and delivered in a manner that allows for successful and effective implementation and that Local Green Funds are utilized and invested properly and responsibly. The initial Local Green Fund investment from CPRG Implementation funds will be held by in earnest in a restricted account by SOPEC and will be released to the Steering and Oversight Committee to directly distribute to implementation partners performing approved weatherization and electrification improvements and upgrades. SOPEC currently manages Community Grant Funds on behalf of its members and has organizational processes, procedures, protocols, and protections in place for the holding and managing community benefit funds and is prepared and willing to perform the same services for the Local Green Fund.

The proposed Local Green Fund program looks to make a dramatic impact in permanent emissions reductions with concentrated investment of CPRG Implementation funds between 2025-2030. At the conclusion of the grant performance period, the Local Green Fund will shift from CPRG Implementation funding to net income derived from the three VPP solar arrays proposed as Measure 1 in this application. This annual source of revenue for the Local Green Fund will allow the impact of the CPRG program to continue from future gains in energy efficiency and reduced emissions and energy burden as more and more buildings are decarbonized with Local Green Fund investment.

TASKS AND MILESTONES

Measure 1: Virtual Power Plant

Milestone: Complete community-wide education plan

Tasks: (a) Create an RFP to hire a community educator to consultant and create a community education plan, (b) Create materials and a platform for residents to get updates on the solar projects, (c) Work to send out mailers to residents that live adjacent to solar sites to give updates

Milestone: Complete VPP Site Development

Tasks: (a). Complete data collection and environmental due diligence, (b). Complete environmental site assessments, (c). Complete drinking water impact assessment, (d). Complete zoning and discretionary permitting, (e). Finish detailed system design, (f). Obtain utility interconnection approval, (g). zoning, permitting, design adjustments if needed

Milestone: Select VPP vendors for construction

Tasks: (a). Develop requirements and release RFP for the three VPP sites, (b). Review and score RFP responses, (c). Make vendor selections, (d). Finalize vendor contracts

Milestone: Complete VPP Engineering

Tasks: (a). Complete Civil and environmental engineering design, (b). Complete Electrical engineering design, (c). Complete Final environmental and construction permitting

Milestone: Procure VPP Equipment

Tasks: (a). Finalize equipment needs and order: PV modules, AC & DC electrical equipment, Racking and foundation, Conduit, conductors, and additional wire management

Milestone: Complete VPP Construction

Tasks: (a). Mobilization and safety, (b). Installation and quality assurance, (c). Commissioning and testing, (d). System starts up

Milestone: System goes online and generates power for the City of Dayton electric aggregation program

Tasks: (a.) Ongoing performance optimization, (b). System monitoring, (c). Preventative maintenance, (d). Education and curriculum integration Management of generation sale and use for aggregation program and local green fund revenue

Measure 2: Local Green Fund

Milestone: Establish Local Green Fund Steering and Oversight Committee

Tasks: (a). Define member roles, responsibilities, expectations, and purpose of committee, (b). Identify and meet with community partners to confirm committee commitment

Milestone: Finalize Local Green Fund processes and procedures

Tasks: (a). Collect input and feedback on program delivery from implementation partners, (b). Committee to review input and dial in program offerings, participation requirements, processes, and monitoring methods

Milestone: Develop priority map with scheduled benchmark targets for program investment

Tasks: (a). Working with implementation partners, identify and prioritize neighborhoods and residents for program investment, (b). Publicly announce areas of emphasis and goals of targeted investment

Milestone: Begin weatherization and electrification upgrade and improvement work

Tasks: (a). Review and approve funding requests from implementation partners performing programmatic supported upgrades and improvements

Milestone: Weatherization and Electrification work completed on 685 houses by end of 2029

Tasks: (a). Perform home retrofits in low-income neighborhoods working to meet annual goals established for the program each year, (b). Evaluate program and ensure processes and procedures are effective and make adjustments if needed to meet 5 year retrofit goal of 685 homes

ENSURING SUCCESS

Strategies to ensure the success of the VPP and Local Green fund that will be implemented include, but will not be limited to:

Project Management: Establishment of a strong project management team that will be responsible for overseeing all aspects of project implementation, monitoring progress, and mitigating any potential risks.

Structure of Accountability: Mutually agreed upon roles and responsibilities for all project partners and stakeholders with structures for accountability and transparency established among all parties.

Plan for Change Management: Creation of a plans, processes, and procedures to manage any changes that may occur during the implementation and management of the projects to prevent delays, disruptions, or prevent impacts to the success of the measures.

Monitoring and Evaluation: Using the Performance Measures and tracking methods defined in this application, monitor VPP and Local Green Fund progress and impact and report these results to the community, funders, and other stakeholders.

Transparency and Communication: Maintain open communication with stakeholders throughout the project lifecycle. Regularly share project updates, performance data, and lessons learned to foster transparency and build trust.

Community Engagement and Education: Creation of a robust, comprehensive, and inclusive model to deploy meaningful community engagement and education throughout the development, implementation and ongoing operation and management of the projects.

UNDERLYING ASSUMPTIONS

Measure 1: VPP

The VPP reduces GHG emissions by displacing carbon-based electricity with renewable and clean solar energy on the PJM / West grid, where Dayton is located. Projections of emissions and electricity generation for this region from the EIA's Annual Energy Outlook 2023 from 2025-2050 were used to determine the metric tons of carbon emitted per MWh of electricity generated. It is assumed that the solar energy generated from the VPP would displace an equal amount of grid electricity that would otherwise have been produced from the broader generation mix in PJM / West, thus avoiding the associated carbon emissions of grid electricity.

Assumptions of potential solar energy generation from the VPP are based on preliminary design work for the Valleycrest solar project, as well as estimated capacity for Liberty and Dayton Steel which was provided by consultants at Rocky Mountain Institute (RMI).

Because of the challenges associated with brownfield sites, it is assumed that the solar arrays would not be built under business as usual. Therefore, all of the generation from the arrays is additional and displaces power that would otherwise be generated by the PJM / West grid. It is also assumed IRA Investment Tax Credit will be available for SOPEC to utilize direct pay for these projects and scaled CPRG-related emissions reductions according to the formula provided on page 34 of the NOFO.

Measure 2: Local Green Fund

The Local Green Fund reduces GHG emissions by reducing natural gas consumption and more efficiently using grid electricity in low-income households. Because the program will target low-income residents without financial means, it is assumed that the enhanced weatherization and electrification work described in this application would not occur without CPRG funding. It is assumed that partner organizations performing home repair program work will continue existing weatherization work and CPRG funding will allow this work to be scaled up during the grant period. Organizational capacity was collected from partners to determine an appropriate retrofit goal based on current and proposed capacity with CPRG.

It is assumed the target population of housing stock is similar to the population described in the NREL ResStock database. Specifically, the dataset compiled by Brossman et al was used to select household energy usage and savings characteristics for housing units in Ohio, Climate Zone 5A, Single-Family Detached, and 0-80% AMI. Using data from Brossman et al., the amount of energy savings as direct result of CPRG program support was calculated separately from the typical energy savings of partners' existing HWAP activities. Emissions reductions from the additional electricity and natural gas savings that result from enhanced weatherization and electrification supported by CPRG funds was calculated according to their respective emissions rates per unit of energy consumption.

RISKS

1. Community pushback or public outcry regarding solar development.
Mitigation: Robust community engagement and education, transparency and communication from SOPEC, the City, and other key stakeholders and stakeholder participation and leadership in engagement efforts.
2. Delays in the approval of interconnection and/or permitting for the VPP sites that could delay the start of construction of VPP solar sites.

Mitigation: Clear and frequent communication with the local utility, effective project management to reduce controllable delays and engagement of SOPEC's outside regulatory counsel if needed.

3. Supply chain delays or availability of needed equipment and materials for VPP solar sites.
Mitigation: Vendor selection with strong procurement relationships, benefits of multi-site development for large scale orders, and being able to stagger construction of sites as materials are available to keep the project from stalling.
4. Labor strikes that could delay or impact the construction of VPP solar sites or reduce available technicians to perform retrofit work.
Mitigation: Selection of a vendor with a strong track record for labor relations. Contracts will provide full protections and contingencies for all such possibilities.
5. Improper use of energy efficiency technologies in homes receiving retrofits resulting in higher costs for low-income residents.
Mitigation: Resident education (at home with technology), education sessions promoting benefits of energy efficiency, lifestyle choices and methods for reducing increasing comfort and reducing use (community based), resident follow ups and check ins at 6 and 12 months after retrofit, tracking usage of retrofit homes to identify any homes that may not be experiencing full benefits from upgrades and improvements to do additional follow ups as needed.
6. Energy savings not able to be realized by renters due to landlord arrangements or properties and equipment not being maintained by the landlord after retrofit which causes technologies to not perform properly.
Mitigation: The Local Green Fund Steering and Oversight Committee and select community stakeholders will develop and implement strategies and requirements to ensure that renters benefit from energy savings from retrofits and that properties and technologies are maintained after the retrofit is complete. The final determination of these requirements will be determined by stakeholders that are experienced and aware of these potential challenges in order to create effective measures that guarantee benefits are being received by the intended recipient.
7. Supply chain shortages or labor availability issues to perform retrofit upgrades and improvements.
Mitigation: Systematic retrofit planning and implementation in a neighborhood-by-neighborhood fashion will assist an early procurement process for needed materials and supplies and allow for contingency planning if there are challenges and the ability to schedule labor needs well in advance so that contractors and vendors performing work can plan accordingly and assign the needed workforce.
8. Changes in partnerships or agreements associated with the VPP or the Local Green Fund retrofit program that could disrupt operations.
Mitigation: Development of partnership MOUs/contracts and change management strategies that will provide a roadmap for navigating any changes that occur in order to create minimal disruption. Contracts will provide full protections and contingencies for all such possibilities.
9. Changes in Ohio policy that would impact community choice aggregation and remove the ability to use residential aggregation programs to deliver the benefits of the VPP to residents.

Mitigation: Power could be sold via a power purchase agreement (PPA) with a different off-taker or sold on the open market, renewable energy certificates (RECs) could be sold with net revenues placed in the Local Green fund for greater amounts of low-income energy efficiency measures in Dayton.

MIAMI VALLEY PRIORITY CLIMATE ACTION PLAN ALIGNMENT (PCAP)

The GHG reduction measures proposed in this application align with the Miami Valley PCAP representing the Dayton-Kettering MSA by supporting reducing emissions in the region's largest contributing sector, residential, and the largest source, electricity usage. According to the CEJST and the Miami Valley PCAP, most of the region's multiple-burdened census tracts are located in the City of Dayton, with these communities exceeding 7 out of 8 the CEJST categories including: climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development.

Measure 1: VPP

The Miami Valley PCAP identifies for transitioning the electricity system as a top priority for permanently reducing emissions in the region, as it will cut total GHG emission in half. Additionally, the PCAP highlights that focusing on the electricity sector, "*will not only generate new employment opportunities, but also improve the quality of housing and affordability of housing across the region.*" Establishing a VPP in the City of Dayton to lower the need for carbon-based fuel sources to support the community's energy needs will clean the electricity system, provide affordable clean and renewable energy for residents to reduce costs, create high quality job opportunity and improve living conditions for residents.

Measure 2: Local Green Fund

The Local Green Fund program plans to perform energy efficiency retrofits to low-income housing stock which will improve affordability and quality of neighborhoods across the region. As identified in the PCAP, building retrofits results in overall net benefits lowering costs for households and small businesses which can be reinvested to finance additional improvements to their homes and in the community. Many households in the City of Dayton are not properly insulated and do not have air conditioning, making homes colder on cold days and hotter on hot days and extremely inefficient. This places vulnerable populations at higher risk of serious health events associated with impacts of climate change. The Local Green Fund program will reduce overall residential building emissions, tackle energy burden for the largest LIDAC community within the Dayton-Kettering MSA, reduce health risks from climate change impacts, and offer a replicable model for other regional and state communities to positively impact low-income residents and neighborhoods.

CPRG PROGRAM ALIGNMENT

The proposed GHG measures in this application strongly align with the goals of the Climate Pollution Reduction Grant program in the following ways:

Measure 1: VPP

1. The multi-site virtual power plant model creates immediate and long term permanent cumulative GHG reductions between 2025-2030 and well into the future with plans to expand with additional solar arrays within Dayton and through model replication in other regional and state communities. As the model is scaled, a greater amount of clean and renewable generation will be produced, further permanently reducing emissions and creating an increasingly lesser demand for energy procured from carbon-based grid sources.

2. The virtual power plant will produce clean, renewable energy lowering the amount of power procured from carbon-based grid sources, a dynamic rate structure for selling the VPP generation will allow better rate control that will lower energy costs for residents participating in Dayton's aggregation program. Additionally, a further reduced rate will be put in place for the 45404 zip code surrounding the Valleycrest Superfund site to combat a long history of impact from environmental injustice.
3. The three proposed virtual power plant sites are located within the City of Dayton, a disadvantaged community and are all located in close proximity to low-income priority neighborhoods. The redevelopment of a remediated Superfund site and repurpose of neglected property owned by the City allowing for functional use reduces neighborhood blight.
4. The current IRA tax incentives provide the opportunity to dramatically reduce the cost of constructing the virtual power plant to permanently reduce emissions and reduce community energy costs. As a council of governments, SOPEC is eligible for direct pay with the Investment Tax Credit for all three VPP sites.
5. The VPP model proposed is an innovative alternative solution to community solar. The state of Ohio does not currently allow for residents to subscribe to traditional community solar models, this project will create a blueprint for other communities who wish to pursue deployment of solar to reduce emissions and energy costs for their residents.

Measure 2: Revolving Green Fund

1. The Local Green Fund will leverage the federally funded Home Weatherization Assistance Program (HWAP) as an initial investment and will use CPRG funding to subsidize the costs of enhanced home weatherization upgrades and improvements that fall beyond the scope of the HWAP program and heat pump installation and electrification upgrades in eligible homes.
2. The State of Ohio will be using IRA State Rebate Program formula dollars to fund low-income home electrification rebates. This program is anticipated to begin late 2024/early 2025 and if available, will be utilized to offset the electrification package costs of the Local Green Fund program.
3. The City of Dayton was recently awarded the Bloomberg American Sustainable Cities award, in which the city will receive three staff positions to work on City projects lowering overall carbon emissions. The City will use the Local Green Fund project as one of the two projects purposed for utilizing the additional capacity from the Bloomberg program.
4. The Local Green Fund also aligns for future IRA funding opportunities, including the Solar for All program. The City of Dayton was included in two applications, the state of Ohio and a Rust Belt Multi-State proposal. These applications include low-income residential solar programs that can be supported and leveraged through home retrofit work being performed with the Local Green Fund as residents will qualify for participation in both programs.

DEMONSTRATION OF FUNDING NEED

The responsibilities and unique maintenance and liabilities that come with a Superfund site make this project challenging, and likely impossible to fund through traditional financing methods. The community and environmental benefits of this VPP project cannot be fully monetized in a financial analysis and CPRG

funding offers the only opportunity for the project and benefits to be realized. The Superfund site cannot serve any other developmental or use purpose beyond what has been proposed, CPRG funding allows a positive reuse scenario and future opportunity for a location that previously caused significant negative environmental impact and harm.

The Dayton Steel and Dayton Liberty VPP sites have been vacant since 1972 and 1962 respectively and are likely to remain vacant causing neighborhood blight for decades longer. The City does not have available resources to repurpose these sites and grant funding will be needed for beneficial reuse opportunity. The community and environmental benefits resulting from the redevelopment of the three VPP sites are significant to improving the lives of residents in low-income priority neighborhoods in Dayton.

The Local Green Fund program model can only generate a high level of impact to permanent emissions reductions and lowered energy burden of LIDAC residents with a significant investment of CPRG funds. The program will have continued support after 2030 with income from the VPP, but the potential number of houses and related emissions and burden reduction is significantly less over a much longer period of time. CPRG funding allows for more benefit to be felt by a greater number of low-income residents and for the more immediate improvements from permanently reduced emissions resulting from increased home energy efficiency in the City's lowest income priority neighborhoods.

The maximum benefit of this application is derived and delivered from the interdependency the two measures have on each other. The ability to have both measures implemented simultaneously with CPRG funding creates a connective tissue supporting local synergy, collaboration and partnership to dramatically reduce GHG emissions, reduce low-income energy burden, and improve opportunity and the quality of life for Dayton LIDAC residents through deployment of clean energy and improved building efficiency.

LEVERAGED & COMPLEMENTARY SOURCES OF FUNDING

Measure 1: Virtual Power Plant

As a regional council of governments, SOPEC can use IRA incentives like the solar Investment Tax Credit (ITC) and Direct Pay for the VPP. This application's CPRG funding request amount takes these incentives into account. The three VPP sites qualify for a total of \$26,927,348.00 in ITC funds, reducing the cost of the project by 41%.

Measure 2: Local Green Fund

The Local Green Fund will leverage the federally funded Home Weatherization Assistance Program (HWAP) as an initial investment and will use CPRG funding to fully subsidize the costs of enhanced home weatherization upgrades and improvements that fall beyond the scope of the HWAP program and heat pump installation and electrification upgrades in eligible homes.

The State of Ohio Department of Development will be using IRA State Rebate Program formula dollars to fund low-income home electrification rebates. This program is anticipated to begin in late 2024/early 2025 and if available, will be utilized to offset the electrification package costs of the Local Green Fund program. Savings from rebates will extend the ability of the fund to perform energy efficiency upgrades and improvements in a greater number of low-income homes.

Additionally, two pending and future IRA funding opportunities, including the Greenhouse Gas Reduction Fund's Solar for All program, will support low-income solar for residents in Dayton if they are funded and the Local Green Fund program will be able to complement and support those efforts for residents through the home retrofit process.

TRANSFORMATIVE IMPACT

POTENTIAL FOR TRANSFORMATIVE OPPORTUNITIES AND IMPACTS

The proposed GHG measures in this application have high potential for scalability and replication to create impact that penetrates through many layers of community challenges such as emissions, energy burden, poverty, indoor health, improved building stock, and workforce. The truly transformative piece is how these two measures work together to create a connective tissue that promotes synergy to improve the delivery of resources to community members and create pathways for meaningful partnerships that better deploy program benefits.

If funded, this project will create a virtual power plant blueprint for other communities that wish to deploy the benefits of clean and renewable distributed energy for their communities and residents. Currently, there is no existing frameworks for community solar in investor-owned-utilities, though many communities have electric aggregation programs adopted. As a council of governments managing electrical aggregation programs for communities of all sizes throughout Ohio, SOPEC has a unique opportunity to implement the VPP model in other member communities, with several already having expressed interest of developing such a project for their residential aggregation program on available brownfields, neglected properties and public building rooftops.

Beyond the proposed GHG measures, scalability and replicability is possible with the workforce development partnership model proposed in this application. YouthBuild has eight programs across the state and Ohio has a large network of community colleges and training programs that could support workforce development needs of low-income energy efficiency retrofits and solar array construction and maintenance needs of a VPP.

IMPACT OF GHG REDUCTION MEASURES

The following sections present the magnitude of both near-term and long-term cumulative GHG emission reductions, the relative cost-effectiveness of those reductions, and the reasonableness and quality of the assumptions and calculations used to determine these values.

MAGNITUDE OF GHG REDUCTIONS FROM 2025 THROUGH 2030

The following table presents the cumulative magnitude of estimated metric tons of CO₂-equivalent emission reductions resulting from each measure proposed in this workplan as well as the sum total of GHG reductions for the near-term period from 2025 through 2030.

	2025-2030 GHG Reductions
Measure 1 - VPP	47,100 mtCO ₂ e
Measure 2 – Local Green Fund	7,181 mtCO ₂ e
Sum Total Quantified Emissions	54,281 mtCO₂e

Measure 1 – VPP

GHG emission reductions are durable and permanent over this near-term period as long as the arrays in the VPP continue to operate as originally intended since continued operations will displace carbon-based electricity production on the connected PJM grid.

Measure 2 – Local Green Fund

GHG emission reductions are durable and permanent over this near-term period because energy use is reduced rather than displaced. Furthermore, at 15+ years, the longevity of the improvements proposed in this measure surpass the extent of this near-term time period.

MAGNITUDE OF GHG REDUCTIONS FROM 2025 THROUGH 2050

	2025-2050 Cumulative GHG Reductions
Measure 1 - VPP	230,972 mtCO ₂ e
Measure 2 – Local Green Fund	48,142 mtCO ₂ e
Sum Total	279,114 mtCO₂e

Measure 1 – VPP

GHG emission reductions are durable and permanent over this long-term period as long as the arrays in the VPP continue to operate as originally intended since continued operations will displace carbon-based electricity production on the connected PJM grid. Beyond this period, there is the intention to continue operating this VPP, to upgrade the array with more efficient generating technology, or to retire the arrays in lieu of another yet more efficient renewable technology. Any panels, equipment, or materials retired from service in the VPP will be decommissioned with environmental responsibility focusing on reuse and/or recycling efforts.

Maintaining VPP operations will require consistent monitoring and maintenance over the entire period. Contingency plans will be made in anticipation of potential equipment malfunctions and end-of-life failures.

Measure 2 – Local Green Fund

GHG emission reductions are durable and permanent over this long-term period because energy use is reduced rather than displaced. Durable improvements in building insulation have an expected performance effectiveness matching that of the building. Electrification upgrades are permanent. HVAC and water heating equipment can be expected to lose some efficiency over their lifespan of 5-15 years, but not by a significant amount. Given the gains in efficiency and improvements in these technologies over the past decade+, similar gains can be hoped for over the next 10-30 years and beyond. Any replacement equipment will likely be of similar or higher efficiencies, thus the GHG reductions are considered durable and permanent.

The Local Green Fund is expected to be a long-term program. The cumulative number of homes served after 2030 is expected to continue to grow even though this growth was not accounted for in the calculations.

COST EFFECTIVENESS OF GHG REDUCTIONS

The cost effectiveness of the GHG reductions anticipated from the measures proposed in this workplan, as specified in Criterion 2.a are calculated as *The Cost effectiveness of GHG reductions = (Requested CPRG funding) / (Sum of Quantified GHG reductions from CPRG funding from 2025-2030)*. The denominator is calculated as *The Sum of Quantified GHG reductions from CPRG funding from 2025-2030 = [(Requested*

$CPRG \text{ funding} / (Total \text{ funding to implement measure}) \times (Total \text{ estimated GHG reductions of measure})$.
The results of these calculations are presented in the following table.

	VPP	Green Fund	Total
Requested CPRG funding	\$51,928,604.69	\$32,220,258.03	\$84,148,862.72
Total funding to implement measure	\$26,927,348.00	-	\$26,927,348.00
GHG reduction scaling ratio	66%	100%	76%
Magnitude of GHG reductions 2025 – 2030	47,100 mtCO₂e	7,181 mtCO₂e	54,281 mtCO₂e
Magnitude of GHG reductions 2025 – 2050	230,972 mtCO₂e	48,142 mtCO₂e	279,114 mtCO₂e
Cost effectiveness of GHG reductions	\$1,103 /mtCO₂e	\$4,487 /mtCO₂e	\$1,550 /mtCO₂e

Factors Affecting Cost-Effectiveness

During the development period of the VPP, several factors might impact its cost effectiveness. Technological advancements like more efficient panels and potentially new cell technologies could bring down costs, though this is not likely to be significant at this scale in the next couple years when panels would be purchased. Policy and permitting decisions may also impact project timelines and available incentives. The stability of the supply chain, especially if the policy environment becomes more uncertain, can impact pricing, availability, and construction timelines. Additionally, availability of qualified local labor and contractors may be limited, which may increase pricing.

During the near-term period of the Local Green Fund, several factors might impact its cost effectiveness. The specific improvements made in each home and the types of electric appliances locally available will ultimately determine implementation costs and savings. Additionally, advancements in HVAC equipment and appliance efficiency and technologies could increase cost effectiveness.

DOCUMENTATION OF GHG REDUCTION ASSUMPTIONS

Appendix C. Technical Appendix

A Technical Appendix has been provided in support of the workplan, with the aim of explaining and demonstrating the reasonableness of the methodologies and assumptions used to calculate the GHG reductions and cost-effectiveness for each proposed Measure.

GHG Emission Reduction Calculations Spreadsheet

A calculation Excel workbook is provided with this workplan in Appendix C: Technical Appendix

ENVIRONMENTAL RESULTS, OUTPUTS/OUTCOMES & PERFORMANCE MEASURES

Measure 2: Virtual Power Plant

Outputs	Outcomes
Construction of an initial virtual power plant solar array consisting of three separate sites in the City of Dayton totaling 31.82MW producing clean and renewable electricity	Lower electricity rates and energy burden for electric aggregation program participants

Creation and implementation of a model for using renewable generation as part of a community choice aggregation program serving residential and small commercial customers	Reduced reliance on fossil fuels that will lower emissions immediately, and over time, improve overall air quality
Quality job creation with direct job placement for two successful community training and workforce programs	Redevelopment of neglected property within the City of Dayton, including remediation and positive reuse of a Superfund site within city limits that is in immediate proximity to established residential neighborhoods
Creation of regulatory pathways to deploy the benefits of community solar within Ohio where traditional community solar participation is not permitted	Total cumulative permanent GHG emissions reduction of 47,100 mtCO ₂ e between 2025-2030
Scalable model that will serve as a blueprint development of additional solar arrays in the future on other city sites, regional locations, and Ohio communities.	Greater opportunity and potential for underrepresented populations and LIDAC residents from targeted recruitment efforts of workforce development partnerships

Measure 2: Local Green Fund

Outputs	Outcomes
Creation of a fund supporting residential energy efficiency improvements	Reduced energy consumption across the City's greatest emissions contributing sector
Increased energy efficiency and lower energy consumption across residential building sector	Sustained need for a highly skilled workforce, creating greater access to opportunity for underrepresented population groups
Improved and increased tracking of residential energy efficiency data	Improved building comfort and health – particularly for vulnerable populations more significantly impacted by climate change
Increased awareness of the impact of energy efficiency from targeted community engagement and education	Improved property values and reduced neighborhood blight
Increased participation in energy efficiency	Economic growth from support of local businesses for program related work
Improvements due to increased availability and accessibility of resources for low-income households and small businesses that don't currently qualify for existing Federal and State assistance programs	Reduced emissions from improved energy efficiency and lower energy usage in low-income homes and neighborhood buildings
	Increased accessibility to resources for energy efficiency upgrades and improvements for low-income residents
	Strong community partnerships from program-related pathways for collaboration

PERFORMANCE MEASURES

Measure 1: VPP

Performance Measure: Function and Output

- Using the amount of energy generation at each site and the total generation across the entire VPP system, SOPEC will monitor the individual and total outputs of the VPP sites to determine if the system is producing the anticipated generation by comparing actual versus anticipated output.

- Using the number of Local Green Fund home retrofits performed annually, Dayton Energy Collaborative will track the performance of retrofits against the target goals each year and evaluate variables that could be positively or negatively impacting the rate of retrofit completing to inform programmatic adjustments.

Performance Measure: Effectiveness

- Using the total annual energy load procured for the Dayton electric aggregation program, SOPEC will track and monitor how much power needs to be procured from carbon-based grid sources to determine if the VPP system remains continually effective at reducing fossil fuel dependency.
- Comparing the energy usage of a home before and after a Local Green Fund home retrofit, Dayton Energy Collaborative will track the effectiveness of the weatherization and electrification improvements on residential energy usage and costs.

Performance Measure: Impact

- Using the amount of energy savings generated as a result of VPP renewable generation, SOPEC will determine the volume of energy burden reduction by comparing Dayton aggregation program energy rates compared to the Standard Service Offering to ensure residents are seeing a consistent and steady reduction in energy costs.
- Using the number of jobs created and retained as a result of the construction and ongoing maintenance of the VPP sites and the Local Green Fund Retrofit Program, SOPEC will track and monitor the impact of the proposed measure on the local high quality job market.

AUTHORITIES, IMPLEMENTATION TIMELINE, & MILESTONES

AUTHORITIES

Measure 1: VPP

- *SOPEC*: Approval of bid process and vendor selection, contract management and oversight, management of any legal or regulatory activities, authority of purchasing power, management and oversight of dynamic rate structure for generation, operation and maintenance of VPP sites, tracking and monitoring performance
- *AC Power*: Valleycrest Array - secure interconnection agreement and Notice to Proceed, management of bid process for site engineering, construction, and procurement contracts, ownership of Superfund site
- *Solar Developer for Liberty and Dayton Steel VPP arrays*: complete development milestones through Notice to Proceed, management of bid process for site engineering, construction, and procurement contracts
- *City of Dayton*: ownership of Liberty and Dayton Steel sites, community engagement and education
- *AES Ohio*: Regulatory approval to interconnect into the grid, interconnection upgrades
- *Public Utilities Commission of Ohio*: Approving interconnection

Measure 2: Local Green Fund

- *SOPEC*: managing sale of generated power to contribute revenue to the Local Green Fund, safe holding and management of funds, distribution of funds to retrofit partners to complete home upgrades, oversight of proper and efficient fund distribution, reporting on fund status and holdings to stakeholders

- *City of Dayton*: Oversight over the Local Green Fund Steering and Oversight Committee to ensure accountability, community engagement and education
- *Dayton Energy Collaborative (DEC)*: recruitment for retrofit participation, home assessment and retrofit planning, coordination of retrofit implementation partners, resident services, neighborhood and resident engagement and education
- *DEC Partners*: management and performance of retrofits
- *Green Fund Steering and Oversight Committee*: development of programmatic processes and procedures to ensure maximum impact and program performance, review and approval of funding requests, tracking and monitoring program performance, community engagement and education

MILESTONES AND IMPLEMENTATION TIMELINE

Measure 1: VPP

Milestone	Implementation Timeline
Complete Valleycrest Site Development	M1-M6
Release VPP Vendor RFP and Select Vendors	M4-M6
Engage and Host Info Sessions in VPP Neighborhoods	M4-M10
Complete Dayton Steel and Dayton Liberty Site Development	M1-M24
Finalize Valleycrest Engineering	M7-M9
Procure Equipment for all VPP Sites	M10-M15
Valleycrest Construction	M17-M29
Finalize Dayton Steel and Dayton Liberty Engineering	M25-M28
Valleycrest Operational	M30
Dayton Steel Construction	M34-M40
Dayton Liberty Construction	M34-M43
Dayton Steel Operational	M41
Dayton Liberty Operational	M44

Measure 2: Local Green Fund

Milestone	Implementation Timeline
Establish Local Green Fund Steering and Oversight Committee	M1-M2
Determine and Define Implementation Roles and Responsibilities of Program Partners and Stakeholders	M2-M3
Finalize Program Design, Processes, Procedures and Methods for Performance Monitoring	M3-M5
Contract with Community Education and Engagement Experts	M3
Develop Community Education and Engagement Plan and Conduct Stakeholder Trainings	M3-M6
Begin Community Education and Engagement	M6 onward
Begin Local Green Fund Retrofit Program	M6

LOW-INCOME & DISADVANTAGES COMMUNITIES

COMMUNITY BENEFITS

Measure 1 Benefits: VPP

Direct	Indirect
Remediation and reuse of superfund site	Improved public perception of the Old North Dayton neighborhoods (surrounding Valleycrest superfund site)
Redevelopment of neglected city property	Improved energy rate control from decreased amount of power needed to be purchased from wholesale markets
Clean electricity generation	Environmental Justice for historically marginalized communities
Reduced dependency of fossil fuels	Increased neighborhood engagement in Old North Dayton
Improved local grid efficiency	Opportunity to raise awareness and educate the public on the benefits of renewable energy, improving public opinion around renewable energy projects that will aid future VPP expansion on other city sites
Lower energy bills and reduced energy burden	Replicability of the model can increase the impact if implemented in other communities
Quality job creation and economic benefit	

Measure 2 Benefits: Local Green Fund

Direct	Indirect
Improved energy efficiency to the Dayton residential and commercial building stock	Increased awareness and knowledge on the benefits of energy efficiency among residents and business owners
Lower bills and reduced energy burden	Improved data collection of energy efficiency efforts and residential and commercial building stock condition in Dayton
Increased property values and reduced neighborhood blight	Stronger community partnership and collaboration among community-based organizations, non-profits, city leadership, businesses, neighborhoods and residents
Increased energy efficiency participation within low-income population that does not qualify for federal assistance programs	Replicability of the program model can increase the impact if implemented in other communities
Improved health and comfort of the indoor environment	
Quality job creation	

GHG Measure Potential Disbenefits

VPP	Local Green Fund
Disruption and inconveniences to Old North Dayton neighborhoods surrounding the VPP location site due to construction and maintenance the system may need in the future	Disruption to residents and surrounding area when home and building upgrades and improvements are being completed

Potential aesthetic concerns of homes with visibility of the VPP	Potential initial increased energy bills due to electrification of homes (or due to installed technologies being incorrectly used)
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Disbenefit Reduction Strategies

VPP	Local Green Fund
Meaningful and regular neighborhood communication and engagement about the project and throughout construction	Advanced coordination and scheduling of materials procurement and labor needs
Responsiveness to neighborhood and community concerns	Develop and deliver community education strategies and offerings that aim to engage and educate about the Green Fund program offerings, energy efficient technologies and practices, and pathways for feedback and additional support
Community input regarding aesthetic and visual design options of the site (such as trees, screens, and signage)	
Neighborhood coordination during construction to reduce inconveniences as much as possible	
Transparency and ongoing communications with the neighborhood and community about any changes with the site or maintenance when it happens in the future	

COMMUNITY ENGAGEMENT

Community engagement and support have proven many times over to be the utmost important factors in the successful implementation of public and visible projects within the City of Dayton. The City has established a [Community Engagement Strategy \(CES\)](#) that is designed to foster relationships, encourage collaboration, and provide input and feedback on a range of issues affecting the daily lives of our residents. This system of active engagement generates ideas and addresses solutions to common problems through collaboration with the shared community goal of improving the quality of life for Dayton residents.

The CES is comprised of four major components:

- Neighborhood-Focused Outcomes
- Leadership Development and Training
- Active Community Engagement
- Enhanced Communication

The City of Dayton has a designated staff for each city neighborhood that implement this community engagement strategy. The appointed staff attend all neighborhood meetings, canvas the neighborhood about upcoming events, and build a deep level of trust building a strong relationship between residents and the City of Dayton. These staff members reside in the neighborhoods they serve which significantly contributes to the success of engagement efforts.

The City worked with the EPA in 2014 to host a community engagement session to discuss remediation status and reuse of the Valleycrest superfund site. At this meeting, neighbors expressed significant support for solar as the priority for site redevelopment. In 2019, The City's Sustainability Office started

subcommittee for Environmental Action Committee around the reuse of Valleycrest for solar development.

The Community Advisory Group (CAG) for the Behr Dayton, Valleycrest and Valley Pike Superfund Sites was established in 2020 to educate, empower, and engage residents and ensures they are well informed and involved in the decision-making process for projects and development around their neighborhood and the sites. The City of Dayton's Sustainability Manager was a founding member and a City Community Engagement Team member also participates with the group.

In partnership with the CAG and EPA, the City has assisted in hosting 6 community meetings since 2020 regarding the superfund sites, and received an Environmental Justice mini-grant to do outreach and work with community partners on a master plan for the neighborhoods impacted by Superfund sites. The City Community Engagement Staff have been active with the Edgemont and Fairlane neighborhoods, the other two VPP sites, by attending neighborhood meeting, assisting with neighborhood sustainability projects and engaging in meaningful dialogue about solar development.

Additionally, Dayton Energy Collaborative has ongoing deep engagement with priority neighborhoods that will be impacted by the VPP site and targeted with the Local Green Fund Retrofit program. Their coordination of community benefit organizations and agencies performing low-income residential programs provide a structure and stakeholder network that will provide as a useful foundation for further community engagement and education.

This application, if funded, also will seek to engage experts in Environmental Justice and community and neighborhood engagement, education, and program delivery to work with City Community Engagement Staff and a large variety of stakeholders to develop a customized plan, delivery methods, and implementation training to effectively and meaningfully engage the Dayton community with VPP project and Local Green Fund program.

An additional measure for Community Engagement and Education will include Montgomery County's Dayton Regional Green program which manages the Bring Your Green online platform to the VPP and Local Green Fund efforts as a tool for sustainability education as a tracking tool for residents to earn 'points' for making choices and taking actions that reduce emissions and improve energy efficiency. The Bring Your Green platform is web-based and adaptable to the needs of the programs and will be a delivery method for content, information, and community communications to those who sign up to participate.

As part of regional community engagement associated with this application, SOPEC and the City of Dayton collected 27 letters of support.

JOB QUALITY

This application aims to address poverty and economic challenges in Dayton by creating quality job opportunities in the green energy sector by building on successful existing programs and leveraging collaboration between Sinclair Community College (SCC) and YouthBuild Dayton to target unemployed and underemployed residents.

Sinclair Community College

Sinclair Community College (SCC) is an open-access, comprehensive public two-year college offering over 1,500 courses and 300 associate degree and certificate programs and a strong tradition of recruiting underemployed and unemployed citizens into careers that require a technical education to address local and regional labor shortages.

SCC established an Energy Efficiency Lab in 2008 which has allowed SCC to engage in community education and awareness of dwindling global energy resources and climate change and the development of energy-related curriculum, courses, and modules. The Built Environment department at SCC offers five associate degrees and seven certificates as well as non-credit training. Embedded industry credentials include OSHA and EPA certifications and assists students with registered apprenticeship program placement.

SCC will start a multi-year U.S. Department of Energy grant funded program in April 2024 that will address a growing demand for highly-skilled technicians to perform energy efficiency related work. A focus of the program will be targeted recruitment of underrepresented populations and underserved communities, supporting this application's goal of elevating and providing opportunity to neighborhoods and residents that have experienced environmental injustice and struggle with challenges resulting from underinvestment. High quality jobs with both the VPP and Local Green Fund will offer placement for a trained workforce resulting from this program.

YouthBuild Dayton

Administered by the Office of Workforce Investment's Division of Youth Services, YouthBuild serves more than 5,000 youth in approximately 200 YouthBuild programs in more than 40 states. YouthBuild Dayton started in 2012 and offers three pathways for opportunity youth who have dropped out of high school to receive training and certification that will provide quality job opportunities after graduation. The Skilled Trades pathway that will be the emphasis of this application's workforce development partnership focuses on skills needed to earn industry credentials including OSH-10 certifications for careers in construction. In addition to these certifications, students in Dayton are certified in blower door testing and home weatherization. The program enrolls 10-20 students a year and graduates 15-16 certified students a year that receive an immediate job placement. The program follows and supports students for a year after graduation to ensure their success.

YouthBuild Dayton is a core member of the Dayton Home Repair Network and began working with Miami Valley Community Action Partnership in early 2024 to place graduated students trained and certified in weatherization and construction in jobs performing low-income home upgrade and improvement work.

In addition blower door and weatherization certifications received by graduates, CPRG funding will add the PVIV (solar installation) certification for students to fulfill the labor needs of the VPP and Local Green Fund energy home retrofits, providing greater high quality job potential and options for LIDAC students and graduates.

The workforce development efforts will specifically target underrepresented populations and underserved communities, addressing environmental injustice and economic disparities. Specific strategies will include:

- Workforce development partnerships that provide access to in-demand skills and credentials to support quality green jobs
- Targeted recruitment and outreach for workforce development programs within LIDAC neighborhoods and underrepresented populations
- Wrap around services model to ensure workforce development program participants successfully complete training and credentialing for high quality job placement
- Local hiring agreements for contracted work to provide residents with quality job opportunities created from the VPP and Local Green Fund workforce needs
- Incorporation and assistance with registered apprenticeship programs for workforce development program participants

PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

GRANT HISTORY / PAST PERFORMANCE/REPORTING REQUIREMENTS

SOPEC has a successful history of past performance executing federal grant agreements. In the last three years, SOPEC has managed and completed three federal grants with the United States Department of Agriculture (USDA) and has three grants currently in process, two with the USDA and one with the U.S. Joint Office of Energy and Transportation.

The following three federal grants agreements have been fully and successfully executed by SOPEC, who has managed the Ohio's USDA Renewable Energy Assistance Program (REAP) program since 2016, and was recently awarded the grant again for the 2024-2025 program year. The program works with rural small businesses and agricultural producers statewide to evaluate solar for their business or facility and conducts free comprehensive solar assessments for program participants that contains all the information needed to pursue the energy efficiency project.

Project Title	Solar Feasibility Assistance program (May 2019-April 2021)
Assistance Assessment No.	RDBCP-REAP-EA-REDA-2019
Federal Agency and Assistance Listing No.	10.868 (USDA)
Agency Contact	Randel Monhemius, Business Program Director Ohio State Office, Rural Development - USDA

Project Title	Solar Access Pathways (May 2021 – April 2023) – <i>same program, updated program title</i>
Assistance Assessment No.	RDBCP-REAP-EA-REDA-2021
Federal Agency and Assistance Listing No.	10.868 (USDA)
Agency Contact	Randel Monhemius, Business Program Director Ohio State Office, Rural Development - USDA

Project Title	Solar Access Pathways (May 2023 – April 2024)
Assistance Assessment No.	RDBCP-REAP-EA-REDA-2023
Federal Agency and Assistance Listing No.	10.868 (USDA)
Agency Contact	Randel Monhemius, Business Program Director Ohio State Office, Rural Development - USDA

SOPEC completed the requirements of these agreements, including timely performance reporting and reimbursement requests throughout the performance period and in the submission of a comprehensive final report at the conclusion of each agreement. This reliability and effectiveness in managing and administering federal programs has resulted in SOPEC receiving renewed and continued funding for the program with each cycle since 2016.

At present, SOPEC also has two federally funded programs in active performance periods, and one federally funded grant project in the grant agreement negotiation phase of the process.

STAFF EXPERTISE

SOPEC is a public service organization with 36 members across 30 counties in the State of Ohio. As a regional council of governments under Chapter 167 of the Ohio Revised Code, SOPEC is subject to Ohio's Sunshine Laws, public records requests, and audits. The SOPEC mission is to provide simple, valuable, and reliable public energy programs that help our communities/public subdivisions achieve local energy and sustainability goals. SOPEC programs include Community and Customer Choice through opt-out governmental electric aggregation, public-sector opt-in aggregation, and technical services supporting energy efficiency and renewable energy development.

SOPEC has extensive experience in evaluating retail electricity supply products for opt-out and opt-in customers and renewable energy certificate (RECs) procurement. Additionally, for supply contract creation and renewals, SOPEC analyzes the PJM wholesale electricity market conditions, advises communities and community stakeholders on when to execute supply contracts, reviews applicable policies, laws, and procedures that affect electricity and natural gas supply, price components of supply products, and rate forecasts.

Luke Sulfridge, SOPEC's Executive Director leads organizational development and membership support strategy. Mr. Sulfridge works directly with the SOPEC Board of Directors and the General Assembly to execute sustainable energy goals and projects for members. He has a BA in political science from Berea College, an MA in political science from Appalachian State University, and an MS in Safety, Security, and Emergency Management from Eastern Kentucky University. Mr. Sulfridge will serve as chief administrator for the CPRG program, providing leadership and implementing policies and programs to carry out the project. Mr. Sulfridge will have overall strategic and operational responsibility for CPRG project related staff and execution of the project.

Philip Leppla serves as the Deputy Director and In-House Counsel. As Deputy Director, Mr. Leppla assists in supervising SOPEC staff and overseeing the daily functions of the organization. He coordinates with SOPEC's Executive Director in preparing long-term strategies to achieve organizational goals. Mr. Leppla has earned a BA in political science from The Ohio State University and a JD with an environmental law and governmental relations concentration from Capital University. Mr. Leppla will assist in overseeing the daily functions of the CPRG project related staff and advise on legal matters and needs related to the project, such as but not limited to, contracts and agreements, designing and implementing policies and procedures, ensuring legal compliance, and management of project third-parties.

Melissa Dalton serves as SOPEC's Director of Administration. Ms. Dalton serves as the Records Custodian and oversees and manages day-to-day functions of the organization. Ms. Dalton oversees all personnel, employee relations, equal employment functions, and all human resources systems and functions. She has a Bachelor of Arts in Anthropology from Ohio University, and Master of Arts in Public History from

Wright State University, and a Master of Library and Information Science from Kent State University. For CPRG, Ms. Dalton will work in conjunction with the executive team and grants team to maintain and safeguard the financial and administrative records of the grant and ensure compliance with all federal and state regulations.

Aileen Hull serves as the Program Associate for Sustainable Ohio Public Energy Council (SOPEC) and her time is dedicated to serving as the Sustainability and Operations Manager for Dayton Energy Collaborative. Aileen graduated from the University of Dayton with a BA in Sociology and Sustainability. Ms. Hull's time and efforts are assigned to executing low-income energy efficiency work in Dayton through DEC. She has built official and collaborative relationships with local partners and agencies, her experience in developing cooperative pathways for achieving community and performing low-income neighborhood engagement and energy efficiency work along with her leadership of the Dayton Home Repair Network will allow her to be instrumental in successful implementation of CPRG funds for the Local Green Fund.

BUDGET

BUDGET DETAIL

The following table provides a summary level breakout of project and programmatic costs of the MV POWER CPRG Implementation funding request. A fully detailed budget justification narrative is included with application attachments for further review and consideration.

Cost Category	Virtual Power Plant	Local Green Fund
Personnel	\$1,109,609.38	\$1,089,700.13
Fringe Benefits	\$581,284.01	\$579,492.17
Travel	\$48,483.03	\$48,483.03
Equipment	\$16,250,560	0
Construction	\$15,494,720	0
Contractual	\$7,827,912	\$472,361.19
Other	\$7,963,426.19	\$27,107,897.14
Indirect Costs	\$2,785,759.58	\$2,785,759.58
Total Project Cost	\$52,070,504.19	\$32,099,701.24
Leveraged IRA Investment Tax Credit Total	\$ 26, 927,348	
Programmatic Generated Income 2025-2029	\$2,648,438.50	

EXPENDITURE OF FUNDS

If funded, SOPEC will work with internal staff, subawardee staff, and stakeholders to develop and implement transparent processes, procedures, and controls that allow for timely and efficient expenditure of CPRG funds during the grant performance period.

Award Phase

Review of Grant Agreement: SOPEC staff will review and understand all terms and conditions outlined in the grant agreement and share information with all subawardees receiving grant funding that are beholden to the grant requirements.

Account Set-up: SOPEC will establish dedicated bank accounts to manage the grant funds for VPP construction and Local Green Fund activities to facilitate accurate tracking of expenses and transparency.

Kick-Off Meeting: SOPEC will conduct a kick-off meeting with all project stakeholders, including staff, subawardees, and contractors to clarify roles, responsibilities, communication channels, and project timelines.

Post-Award Phase

Project Management: SOPEC will create a project management plan to be shared with all parties contributing the implementation and management of the VPP and Local Green Fund outlining key milestones, timelines, deliverables, and resource allocations

Change Order Management: SOPEC will work with the City of Dayton and Dayton Energy Collaborative to establish a process for managing any necessary changes to the project scope, budget, or timeline and related communications and approvals from EPA grant program staff.

Grant Management Software: SOPEC will utilize Amplifund, a grant lifecycle software, to streamline financial tracking, budgeting, reporting, and project management tasks associated with the VPP construction and Local Green Fund initiatives.

Financial Management:

Invoice and Payment Approval: SOPEC will implement a system for reviewing and approving invoices related to grant expenses to ensure invoices align with contractual agreements and verify proper documentation before requesting grant funding and processing payments.

Timely Reporting: SOPEC will develop a required reporting schedule to remain compliant with financial and performance reporting requirements.

REASONABLENESS OF COSTS

The proposed grant expenditures reflect reasonableness of cost in the following ways:

- All direct costs have been deemed necessary and essential to successfully implementing the VPP and Local Green Fund as measures to significantly permanently reduce GHG emissions.
- Budgeted costs reflect fair market values and competitive bidding process will be implemented for procured goods and services.
- The budget has accommodated incentives and programs, such as IRA Investment Tax Credits to significantly reduce the overall need for CPRG investment to implement GHG measures
- Maximizing community partnerships allows the projects to be implemented cost-effectively through utilization of shared resources and prevention of redundancies.
- The replicability and scalability of the MV POWER project allows greater impact potential for initial CPRG fund investment

Budget Justification Narrative

Southeast Ohio Public Energy Council

Climate Pollution Reduction Grant Implementation Funding Request

PERSONNEL Budget Total \$2,199,309.51

Applicant personnel costs for new and existing positions needed for the development, implementation, and management of the proposed Virtual Power Plant (VPP) and Local Green Fund as measures to significantly reduce GHG emissions. All positions assume an annual 3% cost of living adjustment.

Position	Annual Base Salary	% CPRG Funding	Year 1	Year 2	Year 3	Year 4	Year 5	Total CPRG Funding
CPRG Program Manager	\$110,000.00	100%	\$110,000.00	\$113,300.00	\$116,699.00	\$120,199.97	\$123,805.97	\$584,004.94
VPP Project Manager	\$95,000.00	100%	\$95,000.00	\$97,850.00	\$100,785.50	\$103,809.07	\$106,923.34	\$504,367.90
Local Green Fund Program Manager	\$75,000.00	100%	\$75,000.00	\$77,250.00	\$79,567.50	\$81,954.53	\$84,413.16	\$398,185.19
Grant Manager	\$80,000.00	15%	\$12,000.00	\$12,360.00	\$12,730.80	\$13,112.72	\$13,506.11	\$63,709.63
Director of Admin	\$80,000.00	5%	\$4,000.00	\$4,120.00	\$4,243.60	\$4,370.91	\$4,502.04	\$21,236.54
SW Regional Liaison	\$65,000.00	80%	\$52,000.00	\$53,560.00	\$55,166.80	\$56,821.80	\$58,526.46	\$276,075.06
Deputy Director/Inhouse Counsel	\$120,000.00	10%	\$12,000.00	\$12,360.00	\$12,730.80	\$13,112.72	\$13,506.11	\$63,709.63
Program Associate - Dayton Energy Collaborative	\$65,000.00	25%	\$16,250.00	\$16,737.50	\$17,239.63	\$17,756.81	\$18,289.52	\$86,273.46
Finance Director	\$110,000.00	15%	\$16,500.00	\$16,995.00	\$17,504.85	\$18,030.00	\$18,570.90	\$87,600.74
SW Regional Director	\$95,000.00	10%	\$9,500.00	\$9,785.00	\$10,078.55	\$10,380.91	\$10,692.33	\$50,436.79
Executive Director	\$120,000.00	10%	\$12,000.00	\$12,360.00	\$12,730.80	\$13,112.72	\$13,506.11	\$63,709.63
TOTAL PERSONNEL			\$414,250.00	\$426,677.50	\$439,477.83	\$452,662.16	\$466,242.02	\$2,199,309.51

CPRG Project Manager

The CPRG Project Manager will be responsible for management and implementation of SOPEC's U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Implementation Grant (CPRG). SOPEC's CPRG project will support the deployment of solar arrays to create a regional Virtual Power Plant (VPP) and revolving renewable energy fund (VPP+) (also known as the Local Green Fund) to generate clean energy and fund a program that will provide financial resources to residential, commercial, and community energy efficiency projects. This innovative and transformative project will dramatically reduce emissions, improve low-income energy burden, and improve indoor and outdoor air quality by funding energy and sustainability projects in the power, transportation, and building sectors. The CPRG Project Manager will work with appropriate SOPEC staff to ensure all aspects and activities related to SOPEC's CPRG project are compliant with grant guidelines and requirements. The CPRG Project Manager will serve as the primary point of contact for SOPEC's CPRG project communications (internal and external). The CPRG Project Manager will track and document all CPRG related performance measures, and coordinate any cross departmental activity related to the CPRG. They will also prepare and submit any related grant reporting for the CPRG.

VPP Project Manager

The VPP Project Manager will be responsible for management and implementation of the regional Virtual Power Plant (VPP) created by SOPEC's U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Implementation Grant (CPRG). SOPEC's CPRG project will support the deployment of solar arrays to create a regional Virtual Power Plant (VPP) and revolving renewable energy fund (VPP+) (also known as the Local Green Fund) to generate clean energy and fund a program that will provide financial resources to residential, commercial, and community energy efficiency projects. This innovative and transformative project will dramatically reduce emissions, improve low-income energy burden, and improve indoor and outdoor air quality by funding energy and sustainability projects in the power, transportation, and building sectors. The Virtual Power Plant will construct and deploy solar photovoltaic arrays on three sites within Dayton, Ohio city limits. The clean and renewable generation from all three arrays will produce 10% of the City of Dayton's residential electric aggregation load, reducing the amount of energy that needs to be procured from the wholesale market, lowering energy burden for residents and reducing Greenhouse Gas (GHG) emissions from a reduced need for fossil fuel generated power. The VPP Project Manager will work with appropriate SOPEC staff to ensure all aspects and activities related to SOPEC's VPP project are compliant with grant guidelines and requirements. The VPP Project Manager will serve as the primary point of contact for the VPP project communications (internal and external). The VPP Project Manager will track and document all VPP related performance measures, and coordinate any cross departmental activity related to the VPP. They will also prepare and submit any related grant reporting for the VPP.

Local Green Fund Program Manager

The Local Green Fund Program Manager position will be responsible for management and implementation of the Local Green Fund created by SOPEC's U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Implementation Grant (CPRG). SOPEC's CPRG project will support the deployment of solar arrays to create a regional virtual power plant (VPP) and revolving renewable energy fund (VPP+) (also known as the Local Green Fund) to generate clean energy and fund a program that will provide financial resources to residential, commercial, and community energy efficiency projects. This innovative and transformative project will dramatically reduce emissions, improve low-income energy burden, and improve indoor and outdoor air quality by funding energy and sustainability projects in the power, transportation, and building sectors. The Local Green Fund will fully subsidize enhanced weatherization and electrification for low-income residents to significantly improve energy efficiency, permanently reduce GHG emissions, lower energy burden, and improve indoor air quality, health and comfort for residents of priority neighborhoods. The Local Green Fund Program Manager will work with appropriate SOPEC staff to ensure all aspects and activities related to the Local Green Fund are compliant with grant guidelines and requirements. The Local Green Fund Program Manager will serve as primary point of contact for Local Green Fund communications (internal and external). The Local Green Fund Program Manager will track and document all Local Green Fund related performance measures, and coordinate any cross departmental activity related to the Local Green Fund. They will also prepare and submit any related reporting for the Local Green Fund.

Grant Manager

The Grant Manager is responsible for the creation, preparation, and execution of post-award contracts and agreements, and coordinates with SOPEC staff to ensure all grant requirements are met in how the award and project/program are being administered and implemented. The Grant Manager oversees

programmatic and fiscal compliance throughout the lifecycle of the grant, for SOPEC and any grant-funded partners and subrecipients.

Director of Administration

The Director of Administration manages and oversees SOPEC's day-to-day functions and organizational records, leading internal administrative and office management responsibilities, and maintaining human resources systems. The Director of Administration acts as the Records Custodian to ensure compliance with public records laws and regulations.

Southwest Ohio Regional Liaison

The Southwest Regional Liaison position will primarily be focused on serving SOPEC member communities and political subdivisions throughout Southwest Ohio. The position will assist in continued development of, and growth and service to, SOPEC member communities and political subdivisions in Southwest Ohio. Direct engagement with community members and leaders to listen, empower, and give voice to identified needs and desires will be key to this role. The Southwest Regional Liaison duties include attending governance meetings at least once a quarter or as otherwise determined, and regularly attending local Chamber, Mainstreet, and other community and regional meetings and events. The Southwest Regional Liaison will also engage with SOPEC Board of Directors and General Assembly members from the member communities and political subdivisions, assist community members and local officials, and assist with the SOPEC community grant program. Within the Southwest Ohio member communities and political subdivisions, the Southwest Regional Liaison will help promote and increase participation in SOPEC programs. In addition, the Southwest Regional Liaison will help support and collaborate with the SOPEC grants team, including in the grant application process and the implementation of the resulting programs.

Deputy Director/In House Counsel

The Deputy Director/In-House Counsel serves and engages the SOPEC Board of Directors and General Assembly members from communities and political subdivisions and acts as in-house counsel for SOPEC. The Deputy Director/In-House Counsel identifies and supports the development of SOPEC programs and projects, with a focus on markets with significant capacity gaps for implementing sustainable and resilient operations.

Finance Director

The Director of Finance manages the financial records and accounting systems for SOPEC by developing and analyzing key financial models, financial and fiscal records, data, reports, and budgets, including grant funding, and ensuring compliance with all associated regulations. The Finance Director manages the required audit process for SOPEC and advises on the impact of long-range fiscal planning.

Southwest Regional Director

The Southwest Regional Director supports, promotes, and increases participation in SOPEC programs within member communities and political subdivisions of Southwest Ohio. The SW Regional Director assists and nurtures relationships and partnerships with existing and prospective community members, local officials, and organizations in alignment with SOPEC's guiding mission and vision.

Executive Director

The Executive Director serves as the chief administrator, providing leadership and implementing policies and programs to carry out the work of SOPEC. The Executive Director works collaboratively with the SOPEC Board of Directors and General Assembly, and has strategic and operational responsibility for staff, volunteers, programs, expansion, and execution of SOPEC's mission.

Program Associate – Serving as Dayton Energy Collaborative Sustainability and Operations Manager

The operations coordinator oversees the programming of Dayton Energy Collaborative and leads the facilitation of the Dayton Home Repair Network. They are the primary communicator between the organizations and are involved with the individual projects. They will work closely with the program specialist to assess houses and create house retrofit and electrification plans. They will work with SOPEC, the City of Dayton, and other grant partners to guide the execution of the VPP+ program.

FRINGE BENEFITS – Total Budget \$1,160,776.18

Fringe benefits for SOPEC personnel positions requested in this grant include Ohio Public Employees Retirement System contribution, general benefits package including medical, dental, vision, disability, and life, insurance premium contributions, and an annual education benefit.

Fringe amount = % of position that is CPRG funded * 0.14 OPERS contribution + % of position that is CPRG funded * 0.3 general benefit package + \$5,250 annual education benefit

Position	% CPRG Funding	Year 1	Year 2	Year 3	Year 4	Year 5	Total CPRG Funding
CPRG Program Manager	100%	\$53,650.00	\$55,259.50	\$56,917.29	\$58,624.80	\$60,383.55	\$284,835.14
VPP Project Manager	100%	\$47,050.00	\$48,461.50	\$49,915.35	\$51,412.81	\$52,955.19	\$249,794.84
Local Green Fund Program Manager	100%	\$38,250.00	\$39,397.50	\$40,579.43	\$41,796.81	\$43,050.71	\$203,074.44
Grant Manager	15%	\$10,530.00	\$10,845.90	\$11,171.28	\$11,506.42	\$11,851.61	\$55,905.20
Director of Admin	5%	\$6,900.00	\$7,107.00	\$7,320.21	\$7,539.82	\$7,766.01	\$36,633.04
SW Regional Liaison	80%	\$27,080.00	\$27,892.40	\$28,729.17	\$29,591.05	\$30,478.78	\$143,771.40
Deputy Director/Inhouse Counsel	10%	\$5,805.00	\$5,979.15	\$6,158.52	\$6,343.28	\$6,533.58	\$30,819.53
Program Associate - Dayton Energy Collaborative	25%	\$8,462.50	\$8,716.38	\$8,977.87	\$9,247.20	\$9,524.62	\$44,928.56
Finance Director	15%	\$8,047.50	\$8,288.93	\$8,537.59	\$8,793.72	\$9,057.53	\$42,725.27
SW Regional Director	10%	\$7,057.50	\$7,269.23	\$7,487.30	\$7,711.92	\$7,943.28	\$37,469.23
Executive Director	10%	\$5,805.00	\$5,979.15	\$6,158.52	\$6,343.28	\$6,533.58	\$30,819.53
TOTAL FRINGE BENEFITS		\$218,637.50	\$225,196.63	\$231,952.52	\$238,911.10	\$246,078.43	\$1,160,776.18

TRAVEL – Total Budget \$96,966.06

Travel allowance for SOPEC based on anticipated staff travel related to VPP and Local Green Fund implementation.

Travel Allowances (assumes 3% annual increase)		
Executive Director	Travel from SE Ohio to Dayton, Ohio for duties related to implementation of CPRG funded projects	1200 miles/month @\$0.67/mile * 60 months + hotel
Dayton SOPEC Staff	Local Travel related to CPRG funded projects	600 miles/month @ \$0.67/mile * 60 months

EQUIPMENT – Total Budget \$16,250,560.00

Equipment costs for the construction of three solar arrays that will create the VPP. The following table reflects the cost per watt for all procured

Equipment	Price/watt	Valleycrest (23MW)	CPRG Request	Liberty (7.84MW)	CPRG Request	Dayton Steel (0.98MW)	CPRG Request	Total CPRG Request
modules	\$0.45	\$10,350,000	\$6,210,000	\$3,528,000	\$2,116,800	\$441,000	\$176,400	\$8,503,200
inverters	\$0.03	\$690,000	\$414,000	\$235,200	\$141,120	\$29,400	\$11,760	\$566,880
racking and foundations	\$0.26	\$5,980,000	\$3,588,000	\$2,038,400	\$1,223,040	\$254,800	\$101,920	\$4,912,960
balance of system	\$0.12	\$2,760,000	\$1,656,000	\$940,800	\$564,480	\$117,600	\$47,040	\$2,267,520

The IRA Investment Tax Credit incentives that are available and applicable to each site are listed below. The total SOPEC will leverage for equipment procurement using direct pay is \$6,567,648.00, with requested CPRG funding covering remaining equipment costs for the VPP project.

IRA Investment Tax Credits applied to VPP Equipment Costs		ITC Total
Valleycrest	30% base + 10% domestic content	\$4,747,200
Liberty	30% base + 10% domestic content	\$1,618,176
Dayton Steel	30% base + 10% domestic content + 20% energy community	\$202,272

SUPPLIES – Total Budget \$24,758.00

Item	Cost	Quantity	Total
laptops for 100% grant funded positions	\$2,500.00	7	\$17,500.00
Flir Thermal Camera to support residential retrofits	\$1,629.00	2	\$3,258.00
Microsoft surface for residential retrofits	\$2,000.00	2	\$4,000.00

CONTRACTUAL – Total Budget \$23,794,993.19

Costs associated with outside contractual agreements to support the development, implementation, and management of the proposed virtual power plant (VPP) and Local Green Fund as measures significantly reduce GHG emissions.

Contracted Support and Services	Rate	Amount	Year 1	Year 2	Year 3	Year 4	Year 5	Total CPRG Funding
Outside Legal Council	\$400/hour	875 hours	\$100,000.00	\$75,000.00	\$75,000.00	\$50,000.00	\$50,000.00	\$350,000.00
VPP Construction Services	\$820/kw	31,820kw	\$2,829,000.00	\$5,658,000.00	\$4,918,360.00	\$2,089,360.00		\$15,494,720.00
VPP Developers Fee	\$150/kw	31,820kw	\$2,452,200.00	\$382,200.00				\$2,834,400.00
VPP Interconnection Upgrades	\$227/kw	31,820kw	\$781,650.00	\$1,563,300.00	\$1,360,046.00	\$578,396.00		\$4,283,392.00
VPP Commissioning	\$20/kw	31,820kw			\$276,000.00	\$101,920.00		\$377,920.00

Community Engagement and Education Contractor	tbd	tbd	\$100,000.00	\$50,000.00	\$50,000.00	\$50,000.00	\$50,000.00	\$300,000.00
Energy Manager to assist with customized home electrification plans for retrofits	\$55/hour	2600 hours	\$26,400.00	\$27,192.00	\$28,007.76	\$28,847.99	\$29,713.43	\$140,161.19
Translation services for residents	\$80/hour	180 hours	\$2,880.00	\$2,880.00	\$2,880.00	\$2,880.00	\$2,880.00	\$14,400.00

Outside legal counsel

Contracted legal counsel to accommodate any needs that may arise during construction and project implementation. This is budgeted as an allowance with anticipated potential usage based on the project activity planned each performance year.

VPP Construction

Inclusive amount for all VPP related costs pertaining to engineering, construction, installation and permitting at all three solar array sites.

VPP Developer

Total costs related to the development and design of all three VPP solar sites. This includes all activities related to getting each site to 'Notice to Proceed' status and managing the bid process for the EPC (Engineering, Procurement, Construction) contract.

VPP Interconnection Upgrades

Anticipated costs for utility upgrades performed by AES Ohio to allow for interconnection of each VPP site.

VPP Commissioning

Anticipated costs for commissioning of all three VPP sites.

Community Engagement and Education Contractor

Estimated contractual amount to engage community engagement and education specialists to work with local neighborhood associations, community benefit organizations, City staff, and other stakeholders to develop a customized community engagement and education plan and conduct stakeholder training to implement developed strategies and delivery methods. This role will be put out for RFP and responding parties will be evaluated, interviewed, reviewed and selected by the Local Green Fund Steering and Oversight Committee and relevant stakeholders. It is anticipated that the engagement will be more intensive during the first year and following years will allow for plan updates and continued training for stakeholders performing community engagement and education activities.

Energy Engineer to assist with energy efficiency home retrofits

Contracting with an energy engineer to develop customized home electrification plans to accommodate unique needs of aging residential building stock in low-income neighborhoods. These plans will ensure

upgrades and improvements will produce for the best efficiency results for the resident and individualized needs.

Translation Services

Contracted translation services to support non-English speaking residents and better facilitate community engagement and education efforts. Several priority neighborhoods that will be the focus for energy efficiency home retrofits have high percentages of immigrant populations and otherwise would not be able to participate in education or engagement sessions.

OTHER – Total Budget \$35,071,323.34

Costs associated with subawards, participant costs and other related costs supporting the development, implementation, and management of the proposed virtual power plant (VPP) and Local Green Fund as measures significantly reduce GHG emissions.

Other	Type	Year 1	Year 2	Year 3	Year 4	Year 5	Total CPRG Funding
VPP Solar Project Contingency (10% project costs)	Contingency	\$6,616,834.00					\$6,616,834.00
City of Dayton	Subaward	\$228,800.00	\$233,376.00	\$238,043.52	\$242,804.39	\$247,660.48	\$1,190,684.39
Montgomery County	Subaward	\$75,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$175,000.00
Sinclair Community College	Participant Costs	\$183,000.00	\$183,000.00	\$183,000.00	\$183,000.00	\$183,000.00	\$915,000.00
YouthBuild Dayton	Participant Costs	\$37,500.00	\$37,500.00	\$37,500.00	\$37,500.00	\$37,500.00	\$187,500.00
Home Retrofit Packages	Participant Costs	\$2,456,250.00	\$3,879,295.00	\$4,690,440.00	\$5,904,855.00	\$7,187,700.00	\$24,118,540.00
CPRG Program Marketing and Promotion	Other	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$15,000.00	\$75,000.00
Community Engagement and Education Activities	Other	\$25,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$25,000.00	\$125,000.00
Training Allowance	Other	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$5,000.00	\$25,000.00
Home Assessment Energy Efficiency Supplies	Participant Costs	\$7,500.00	\$11,500.00	\$13,500.00	\$16,500.00	\$19,500.00	\$68,500.00
Dayton Energy Collaborative	Subaward	\$296,520.00	\$305,415.60	\$314,578.07	\$324,015.41	\$333,735.87	\$1,574,264.95

Solar project contingency

Calculated at 10% of total actual project costs without ITC incentives factored due to the delayed realization of that funding and costs associated with the construction of the VPP sites will be invoiced to the project at cost.

City of Dayton

Two positions within the City's Office of Sustainability to support VPP and Local Green fund implementation and ongoing programmatic needs.

- CPRG Implementation Coordinator – VPP
- CPRG Implementation Coordinator – Local Green Fund

Subaward includes funding both positions as FTE paying \$50/hour for the five-year performance period, indirect costs incurred by the City for these positions and an annual 2% cost of living adjustment,

Dayton Energy Collaborative

Subaward includes funding to support new and existing positions implementing the Local Green Fund Home Energy Efficiency Retrofit program.

- CPRG Program Specialist: The program specialist will be an expert in residential building science and energy. This individual will complete house assessments and create repair and electrification plans for houses. Dayton Energy Collaborative does not currently create electrification plans for all the clients they serve, thus creating the need for a specialist in this area. The program specialist will ensure quality plans that call for appropriate sizing of equipment, strategies for navigating challenging and limited electrical capacities, and a thorough outlook on the house that determines where investment is best returned in emission reductions. This role will ensure quality execution of the proposed VPP+ program. Calculated at FTE paying \$40.62/hour with 3% annual cost of living adjustment
- Intake Specialist Lead: The Intake Specialist Lead will manage the intake process for clients. They will directly manage and assist the two intake specialists with client calls and intake procedures. They will ensure direct coordination with the partner organizations of the Dayton Home Repair Network and clients throughout the project timelines. Calculated at 0.5 FTE paying \$37.50/hour with 3% annual cost of living adjustment
- Finance Manager: The finance director will oversee the financial activities of the organization, ensuring compliance with regulations and providing strategic guidance to optimize financial performance. They will administer and review all financial plans and manage the organization's cash flow and forecasting. Dayton Energy Collaborative has never managed funding as large as the proposed funds in the VPP+ program, therefore requiring a finance director to monitor the funds and provide necessary direction. Calculated at 0.5 FTE paying \$37.50/hour with 3% annual cost of living adjustment
- Intake Specialist (2 positions): The intake specialists serve as the initial point of contact for clients, providing essential support and guidance while ensuring seamless navigation through intake procedures. Often the largest cause of delay for resident projects are the application and administrative tasks. These roles are essential to creating efficiency and effectiveness for Dayton Energy Collaborative and the Dayton Home Repair Network (DHRN), on both the client and organization sides. There will also be a significant increase of applicants coming through Dayton Energy Collaborative through the proposed VPP+ program, creating the need for more intake specialists. Calculated at FTE paying \$31.25/hour with 3% annual cost of living adjustment
- Travel: 500 miles/month calculated at \$0.67/mile, 60 months

Montgomery County

Subaward will fund updating the Bring Your Green online platform to reflect CPRG program needs for community engagement and education and continued annual funding for activities to increase community participation with the Bring Your Green platform as well as its use to assist performance measure tracking.

Sinclair Community College

Participant costs to remove barriers for LIDAC students to enroll and complete sustainable energy training and degree programs at Sinclair Community College that will provide opportunity for high quality job placement upon completion and graduation. Participant costs include:

- \$5,000 Tuition Reimbursement for 15 students per year for those enrolling in the associates degree pathway in the Sustainability and Energy Management Program.
- \$2,000 Child Care Allowance for 36 students per year enrolled in Sustainability and Energy Management degree or certificate programs (child care resource available on site).
- \$1,000 Transportation Allowance for 36 students per year enrolled in Sustainability and Energy Management degree or certificate programs.

YouthBuild Dayton

Participant costs to fund weatherization and PVIV (solar installation) certifications for students enrolled in the construction skill trade training program and wrap around student support to ensure success and quality job placement and supporting CPRG program workforce needs. Participant Costs include:

- \$1000 weatherization certification funding for 15 students per year
- \$1000 PVIV certification funding for 15 students per year
- \$500 student support funding for 15 students per year

Local Green Fund Home Energy Efficiency Retrofit Package Costs

Participant costs for 685 full home retrofits in low-income priority neighborhoods the during grant performance period. The \$32,750 cost of a Home Energy Efficiency Retrofit package includes home weatherization and electrification materials, supplies, labor at or above prevailing wage, electrical upgrades, energy star appliances, heat pump or mini pump installation, and associated administrative costs. An annual 3% increase to accommodate inflation has been factored into costs. The anticipated schedule of annual retrofits is as follows:

Year	# of Home Retrofits	Cost per Retrofit	Annual Total
1	75	\$32,750	\$2,456,250
2	115	\$33,733	\$3,879,238
3	135	\$34,744	\$4,690,504
4	165	\$35,787	\$5,904,824
5	195	\$36,860	\$7,187,781
Total	685		\$24,118,596

Home Assessment Energy Efficiency Supplies

Participant costs for low level energy efficiency supplies that can be installed at time of the pre-retrofit home assessment to provide some immediate efficiency gains while home is awaiting upgrades and improvements. This is calculated at a value of \$100 per house and could include items such as LED lightbulbs, weather stripping, plastic window sealing, door sweep, and other similar items depending on the individual house needs.

INDIRECT COSTS – Budget Total: \$5,556,637.31

Applicant indirect costs calculated by applying the 10% de minimus rate to direct project costs excluding distorting factors.

Cost Categories	Total Direct Costs	Total Excluded Costs	Total CPRG Funded Indirect Costs
Included Costs: Personnel, Fringe Benefits, Travel, Contractual, Other (excluding VPP Project Contingency)	\$55,567,373.10		\$5,556,637.31
Excluded Distorting Factors: Supplies, Equipment, VPP Project Contingency		\$28,602,832.33	

Appendix C. Technical Appendix & GHG Emission Reduction Calculations Spreadsheet

I. Project Summary

This technical appendix explains the methodology and assumptions used for developing the estimated GHG emission reductions for each measure in the workplan.

Measure 1: Virtual Power Plant (VPP) reduces GHG emissions by displacing carbon-based electricity with renewable and clean solar energy on the PJM grid, where Dayton is located.

Measure 2: Local Green Fund reduces GHG emissions by reducing natural gas consumption and more efficiently using grid electricity in low-income households.

Reduction Measure	Quantified GHG Reduction 2025 – 2030	Quantified GHG Reduction 2025 – 2050
Virtual Power Plant	71,523 mtCO ₂ e	350,741 mtCO ₂ e
Local Green Fund	7,181 mtCO ₂ e	48,142 mtCO ₂ e
Total	54,281 mtCO ₂ e	398,883 mtCO ₂ e

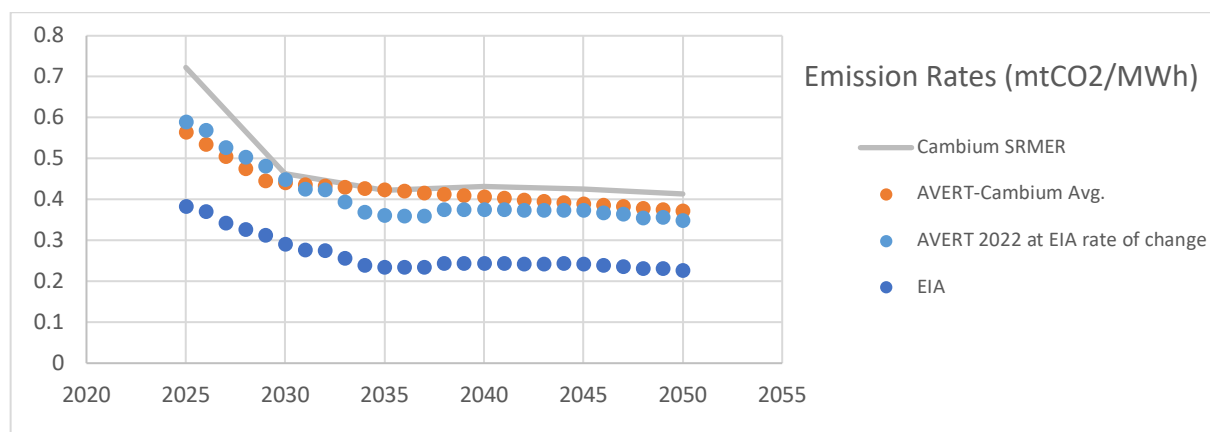
II. Measure Specific Documentation – Virtual Power Plant

The Virtual Power Plant will construct and deploy solar on three sites within Dayton, Ohio city limits. The clean and renewable generation from all three arrays will produce 10% of the City of Dayton's residential electric aggregation load, reducing the amount of energy that needs to be procured from the wholesale market, lowering energy burden for residents, and reducing GHG emissions from a reduced need for fossil fuel generated power.

a. GHG Reduction Estimate Method

The GHG reduction for this measure is based on the assumption that the energy generated by the VPP directly displaces grid energy generated from carbon-based fuels. Thus, the GHG reduction is linearly related to the carbon intensity of the PJM grid, where Dayton is located, and the energy generated by the VPP. The GHG Reduction is calculated annually from 2025-2050 by multiplying the annual VPP output by the projected annual avoided carbon dioxide emissions.

Calculating Avoided Carbon Dioxide Emissions: Projected PJM grid CO₂ emissions for 2025-2050 were calculated using EIA AEO2023 data. Marginal CO₂ estimates from AVERT v4.2 and Cambium 2023 were compared. While marginal values were higher, trends aligned in the near and long terms. Divergence occurred mid-period, with marginal values significantly higher. A modified approach extrapolated the AVERT's 2022 marginal rate for the entire period by following EIA's annual rate of change.



Annual Energy Output of the VPP is the energy generated by the proposed 3-site VPP: Valleycrest Landfill, Liberty, and Dayton Steel. The output estimate for Valleycrest Landfill was provided by the developer. The output of the other arrays was calculated using NREL's PVWatts®.

b. Models/Tools Used

Data projections from the **EIA's Annual Outlook 2023** for the PJM region were obtained to calculate the grid's annual carbon dioxide emissions. These emissions were compared to data found in the Cambien and AVERT tools discussed below.

An **Excel-Based Calculation Tool** was developed by our team to calculate a projected grid carbon intensity and the annual VPP output using the equations presented above. The Excel workbook is attached as part of this Technical Appendix.

NREL's Cambium 2023 Tool and **The EPA's AVERT v4.2 Tool** were used to obtain and compare estimates of marginal carbon dioxide emissions from the PJM grid. These estimates were compared to estimates obtained from the EIA's 2023 Annual Energy Outlook.

NREL's PVWatts® Calculator: The outputs of the Liberty and Dayton Steel arrays were calculated using NREL's PVWatts Calculator (Website Version 8.2.1), which "estimates the energy production of grid-connected photovoltaic (PV) energy systems using hourly solar resource data for locations throughout the world."

c. Measure Implementation Assumptions

VPP Site and System Information and Implementation Assumptions:

Array Information	Valleycrest Landfill	Liberty	Dayton Steel
Site Size	70 acres	39.2 acres	4.9 acres
DC System Size	23 MW-DC Provided by Developer	7.84 MW-DC Provided by RMI	0.98 MW-DC Provided by RMI
System Output (Year 1)	28,314 MWh Provided by Developer	10,302 MWh PVWatts® Calculator	1,288 MWh PVWatts® Calculator
Construction Timeline	2-5 years	2-5 years	2-5 years
First Production Year	2027	2028	2028
Equipment Lifetime	30-35 years	30-35 years	30-35 years

System performance assumptions, PVWatts® defaults, Liberty and Dayton Steel arrays, Year 1:

System Components	Default PVWatts® Calculator Values
Module Type	Standard
Array Type	Fixed (open rack)
System Losses	14.08% (soiling, shading, resistive losses, electrical system losses, etc.)
Array Tilt	20°
Array Azimuth	180°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4
Albedo	From weather file
Bifacial	No (0)
DC Capacity Factor	15.0%

Uncertainties

The above assumptions represent current technology as specified by the developer and by the PVWatts® Calculator. However, various factors introduce uncertainty that can affect the output and GHG reductions

achieved by the VPP. The final design will hinge on specific site details, environmental assessments, technology selections, and actual weather patterns.

Weather: Using a 15% capacity factor equates to 1,314 hours/year of peak sun for the arrays. Data from Lawrence Berkeley National Laboratory's PV Capacity Factors website suggests that in recent years, the fixed-axis capacity factor is closer to 20%, or 1,752 hour/year. If this trend holds, the output of the VPP could be 33% higher than is estimated here. Sunlight availability is likely the primary determinant of output for a given system, so evolving climate patterns over the 25-year period will be influential.

Tracking: System design also affects performance. We assume fixed-tilt arrays, but single-axis tracking systems, with an average capacity factor of 23.1%, are prevalent. Building the VPP as a tracking system could increase output and GHG reductions by more than 50%.

Equipment Degradation Rate: VPP annual output was extrapolated over the entire period 2025-2050 assuming an annual performance degradation rate of 0.5%, which was specified for the Valleycrest Landfill project by the developer. For each subsequent year, VPP output is 99.5% that of the prior year. This rate is assumed to stay constant over the system's lifespan of 30-35 years. However, there is uncertainty surrounding this value, influenced by factors such as the quality of panels, inverters, and other equipment installed, as well as local weather patterns. It's also possible that at the time of panel purchase, average degradation rates may be different. According to a 2021 report by the National Renewable Energy Laboratory (PV Lifetime Project), degradation rates can range from 0.2% to 1.1%.

Monitoring & Maintenance: Regular monitoring and maintenance are crucial for maintaining optimal system performance over its lifetime. This involves cloud-based performance monitoring, routine inspections, cleanings, and readiness for equipment failures, considering the expected inverter lifespan of 10-15 years. Neglecting these aspects will result in decreased performance output and greenhouse gas (GHG) reductions. SOPEC either plans to contract these services for the entire project duration.

Decommissioning: End-of-life decommissioning will first consider the viability of retrofitting the array with more efficient technologies to extend lifespan. All unusable materials will be recycled or repurposed to the fullest extent possible at that time.

d. GHG Reduction Estimate Assumptions

Due to the VPP's peak production likely aligning with peak grid activity, it's expected to displace non-baseload power production. According to the EPA's AVOIDED Emissions and geneRation Tool (AVERT) v4.2, utility-scale solar in AVERT's Mid-Atlantic region can avoid emissions at a marginal rate about 55% higher than that published by the EIA. Over the period through 2030, this is unlikely to change as peak condition power production seems unlikely to change significantly over this period. Marginal emissions are typically higher than the annual average because it assumes the solar enables the modulation of peak load plants and that there is no effect on baseload plant operations. The scale of the VPP will not offset any baseload operations.

Trends in Annual CO₂ Grid Emissions: Projected PJM grid CO₂ emissions for 2025-2050 were calculated using EIA AEO2023 data. Marginal CO₂ estimates from AVERT v4.2 and Cambium 2023 were compared to each other and to the EIA data. While marginal values were higher, rate-of-change trends aligned in the near-term and at the end of the long-term for all three datasets. Divergence occurred mid-period, with marginal values significantly higher than EIA values. A modified approach extrapolated the 2022 AVERT marginal rate of 1,438 lb/MWh following the annual rate of change in the EIA dataset. There is significant uncertainty this calculation method over the long-term period due to market responses to changing policies, advances in technologies, available incentives, and even weather patterns over the course of the long-term period. Over the near-term period, while still inherent of uncertainties, these GHG

reduction projections are backed by the rigorous and peer-reviewed datasets published by the EPA, NREL, and the EIA. (see References)

e. Reference Case Scenario (GHG Emission or Activity Level)

Reference Case Scenario: As outlined in the workplan, construction of this VPP is contingent upon receiving CPRG funding. Given the additional complexities associated with brownfield compared to greenfield sites, securing supplementary funding is imperative. Consequently, under the baseline scenario, these sites will remain undeveloped, resulting in no solar power generation. Reference case scenario grid emissions rates follow the performance of the PJM grid trends as projected in the EIA AEO2023, as discussed previously.

Proposed Scenario: The output generated by the VPP serves to displace carbon-based production on the PJM grid, leading to a decline in emissions at the annual carbon-intensity rates projected in the EIA AEO2023.

f. Measure Specific Activity Data & GHG Emissions Reduced

Year	Activity Data - Electrical Output (MWh)				GHG Emissions Reduced	
	Valleycrest Landfill	Liberty	Dayton Steel	Annual Total	Emissions rate (mtCO ₂ e/MWh)	GHG Reduction (mTCo ₂ e)
2025	-	-	-	-	0.5890	-
2026	-	-	-	-	0.5682	-
2027	28,314	-	-	28,314	0.5266	14,911
2028	28,172	10,302	1,288	39,762	0.5025	19,980
2029	28,032	10,250	1,281	39,563	0.4806	19,016
2030	27,891	10,199	1,275	39,365	0.4475	17,617
2031	27,752	10,148	1,269	39,169	0.4248	16,639
2032	27,613	10,097	1,262	38,973	0.4230	16,486
2033	27,475	10,047	1,256	38,778	0.3938	15,271
2034	27,338	9,997	1,250	38,584	0.3682	14,207
2035	27,201	9,947	1,243	38,391	0.3602	13,828
2036	27,065	9,897	1,237	38,199	0.3592	13,720
2037	26,930	9,847	1,231	38,008	0.3592	13,652
2038	26,795	9,798	1,225	37,818	0.3748	14,174
2039	26,661	9,749	1,219	37,629	0.3741	14,076
2040	26,528	9,700	1,213	37,441	0.3745	14,022
2041	26,395	9,652	1,207	37,254	0.3743	13,945
2042	26,263	9,604	1,200	37,067	0.3729	13,822
2043	26,132	9,556	1,194	36,882	0.3725	13,739
2044	26,001	9,508	1,189	36,698	0.3733	13,698
2045	25,871	9,460	1,183	36,514	0.3725	13,601
2046	25,742	9,413	1,177	36,332	0.3667	13,322
2047	25,613	9,366	1,171	36,150	0.3634	13,136
2048	25,485	9,319	1,165	35,969	0.3546	12,756
2049	25,358	9,273	1,159	35,789	0.3555	12,724
2050	25,231	9,226	1,153	35,610	0.3483	12,402
Total	641,859	224,356	28,045	894,260	-	
Near-Term Period, 2025-2030:						71,523
Long-Term Period, 2025-2050:						350,741

III. Measure-Specific Documentation – Local Green Fund

The Local Green Fund will fully subsidize enhanced weatherization and electrification for low-income residents to significantly improve energy efficiency, permanently reduce GHG emissions, lower energy burden, and improve indoor health and comfort for priority neighborhoods. The City's priority neighborhoods are redlined neighborhoods who have experienced historical underinvestment and environmental injustice.

a. GHG Reduction Estimate Method

The GHG reduction for this measure is based on the expected energy savings from an expansion of existing home weatherization efforts in the City of Dayton. Partner organizations are already engaged in home repair and basic weatherization activities through the Home Weatherization Assistance Program (HWAP) and other state and federal programs, however the funding in Measure 2 would expand these efforts to include deeper home weatherization and electrification retrofits for target households. Existing and proposed program scopes were determined through conversations with partner organization leadership. To avoid double-counting savings from existing programs, we estimated the energy savings from existing HWAP programs and the proposed enhanced weatherization and electrification program separately. Emissions reductions for each type of energy saved (electricity and natural gas) are based on emissions rates per unit of energy as determined from EIA data. Energy savings from existing and proposed scopes are based on publicly available ResStock™ Analysis Tool datasets filtered to match the target population of structures and upgrade package options.

b. Models/Tools Used

Detailed citations can be found at the end of this Appendix in the References section.

Excel-Based Calculation Tool: An excel-based tool was developed by our team to calculate emissions reductions for this measure as described below. The Excel workbook is attached as part of this Technical Appendix.

The ResStock™ Analysis Tool - State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis: By Brossman et al. Used to estimate energy baseline consumption and savings for home weatherization and electrification activities. In order to match the characteristics of our target population of houses, we filtered the data set to obtain energy consumption and dwelling unit savings for units in Ohio, Climate Zone 5A, Single-Family Detached, and 0-80% AMI. Every house our program partners work with is unique, especially when emergency repairs are needed, so there is some inherent uncertainty in these calculations. However, we believe using this dataset makes it possible to perform this analysis accurately. It is also a dataset that our program partners have used in past grant applications for similar analyses.

EIA Annual Energy Outlook 2023: We determined the carbon dioxide emissions per unit of electricity generated from 2025-2050 for PJM West, where Dayton is located, under EIA's reference case scenario.

c. Measure Implementation Assumptions

Rate of Implementation

We worked with partner organization leadership to determine the potential scope of work that could be accomplished with the CPRG implementation grant. While their current funding allows them to work with approximately 900 homes per year, these funds are only for critical home repair and weatherization. Approximately 195 of these homes need HVAC updates, but according to the partners, current program funding and structure does not allow them to electrify these HVAC systems or weatherize them beyond a basic level. They also have limited staff and contractor expertise regarding

electrification. Therefore, enhanced weatherization and electrification is only possible with CPRG implementation grant funding and would need to be scaled up over time. Our program partners believe they could completely electrify a maximum of 195 homes per year, based on the total per year that need HVAC repairs, scaling up over time on the following schedule:

Program year	2025	2026	2027	2028	2029
Houses in electrification program	75	115	135	165	195

Measure Lifetime

Emissions reductions from weatherization and electrification are assumed to be permanent through 2050, as it is unrealistic that a homeowner would switch fuels back to gas or that building envelope quality would significantly degrade in the course of 25 years.

Program Costs

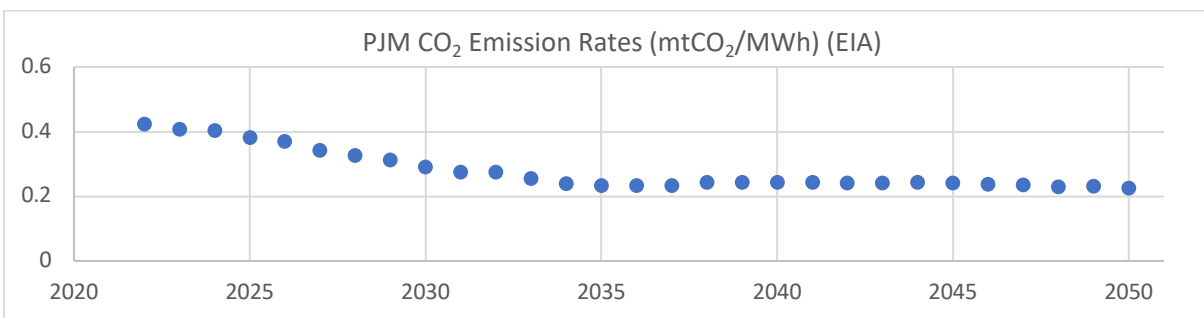
Based on conversations with local partners who manage federal and state HWAP programs, we assume an average cost for the enhanced weatherization and electrification package of \$32,500 per house beginning in 2025, with an escalator of 3% per year to reflect a typical inflation rate. This covers labor, materials, and administrative costs of building an electrification program within the partners' existing scope of services.

A source of uncertainty for this estimate is that it is based solely on combined quotes from various completed projects, as the provider currently does not offer electrification packages for their clients. Consequently, the total cost for whole home electrification could vary depending on the overall package costs for a house. Additionally, the unique nature of each house they work with means that while an average cost per house is estimated, there could be a wide range of actual costs in practice. Discussions with a nationwide consultant suggest that whole home electrification could cost up to \$80,000. While local partners offer valuable insights into local pricing and housing stock needs, their limited experience in electrification warrants acknowledgment that costs per house may be higher than anticipated.

d. GHG Reduction Estimate Assumptions

Natural Gas: We used an emissions rate of 52.91 kg CO₂/MMBtu of natural gas used in the home as published by the Energy Information Administration.

Grid Electricity: We determined the emissions rate of grid electricity based on the EIA Annual Energy Outlook of PJM West, where Dayton is located. The emissions rate is the total CO₂ emissions for the region divided by the total electricity generated for each year. The graph below shows the results of this calculation, and year by year data is available in the calculation spreadsheet. Calculation of this value is discussed in detail in the VPP section. There is always uncertainty in forecasting data on the electric power sector, however, EIA is a highly regarded source and also provided a forecast out to year 2050, which was necessary for our analysis.



In Ohio's deregulated electricity market, Dayton operates a Community Choice Aggregation (CCA) program managed by SOPEC, offering a default option of 100% green energy. Approximately 60% of Dayton's residential customers, including those in our target group for the Local Green Fund, are enrolled in this default program, backed by renewable energy certificates (RECs) and their environmental attributes. Consequently, the equivalent emissions rate for our target households in the SOPEC region is 40% of the emissions rate for the rest of the PJM grid, calculated as $(Carbon\ Intensity, mtCO_2e/MWh)_{SOPEC} = 40\% \times (Carbon\ Intensity, mtCO_2e/MWh)_{PJM}$. Uncertainty exists around customer retention and SOPEC's green rate through 2050, thus the rate is assumed to stay constant.

e. Reference Case Scenario (GHG Emission or Activity Level)

The reference case scenario represents the energy savings and associated emissions reductions that result from current HWAP programs carried out by our partners. The local partners do not currently have the capacity to track energy savings from their weatherization program, however the data presented in Brossman et al. gives us a way to estimate this. This is because the partners' existing weatherization program scope matches that presented in Brossman et al.'s "Package 1 – Basic Enclosure" as follows:

- Reduce infiltration by 30%
- Seal ducts to 10% leakage with R-8 insulation
- Attic insulation to 2021 IECC levels
- Drill and fill wall insulation to R-13 for uninsulated wood stud walls only

Using Brossman et al.'s dataset, filtering for units in Ohio, Climate Zone 5A, Single-Family Detached, and 0-80% AMI, we get the following energy use values for the reference case scenario as well as the calculated new energy consumption under the BAU scenario:

Package 1 – Basic Enclosure	Natural gas (therms)	Electricity (kWh)
Baseline energy use per house (Brossman et al.)	889.89	10,061.32
Energy savings per house (Brossman et al.)	265.00	1,110.00
Energy use per house post Package 1.	624.89	8951.32

f. Measure Specific Activity Data

The measures proposed in this application include adding enhanced weatherization and electrification above the partners' existing HWAP program. The impact of the proposed measures is therefore the energy savings and emissions reductions that occur under the new HWAP and electrification package minus the energy savings and emissions reductions that would already occur in the reference case scenario.

Our partners can begin phasing in an enhanced weatherization and home electrification program on the schedule described above. In addition to the work described in Package 1 – Basic Enclosure (Brossman et al.), the homes would receive the remainder of the work described in Package 10 – Whole-Home Electrification, High Efficiency + Enhanced Enclosure. This scope includes:

- Basic enclosure upgrade - Package 1
- Add R-10 interior insulation to foundation walls and rim joists
- Seal crawlspace vents
- Insulate finished attic and cathedral ceilings to R-30
- High-efficiency heat pump with electric heat backup
- Heat pump water heater
- Ventless heat pump dryer
- Induction range and electric oven

The table below shows the savings per house for this package from Brossman et al. and the new estimated energy consumption, calculated by subtracting the Package 10 energy savings from the original baseline consumption.

Package 10 – Whole-home Electrification, High Efficiency + Enhanced Enclosure	Natural gas (therms)	Electricity (kWh)
Energy savings per house (Brossman et al.)	865.00	-793.00
Energy use per house post Package 10.	24.89	10,854.32

Note that the use of this the dataset for calculations includes some minimal gas consumption even after “whole home electrification.” We believe this is a result of statistical factors in the dataset as we are using average values from a subset of a very large analysis. We do not believe this is significantly detrimental to the analysis, in part because it is possible that some homes may prove too difficult to fully electrify in practice. Keeping this small amount of natural gas consumption in the final analysis preserves a realistic level of uncertainty associated with developing an electrification program that will impact hundreds of unique homes. Note also that the electricity savings for Package 10 are negative, implying an increase in electricity use. This is expected because most houses will need to switch from gas fuel to electric fuel for heating.

g. GHG Emissions Reduced

Using the energy consumption per house for the reference case scenario (after normal HWAP activities) and the proposed scenario (after enhanced weatherization and electrification), we calculated the GHG emissions savings from baseline per house for each year from 2025-2050 for both scenarios. We used the emissions coefficients for natural gas and SOPEC region electricity described previously.

To quantify the emissions reductions resulting from CPRG funding, we subtracted the annual avoided emissions (per house) in the proposed scenario from the annual avoided emissions (per house) in the reference case scenario and multiplied this value by the cumulative number of houses completed by the program in each year, following the schedule discussed above. The GHG emissions reductions from the measure are provided in the table below.

Period	GHG Emissions Reduced (mtCO ₂ e)
Cumulative	
2025-2030	7,181
2025-2050	48,142
Annual	
2025	216
2026	550
2027	947
2028	1,434
2029	2,012
2030	2,023
2031	2,031
2032	2,031
2033	2,041
2034	2,050
2035	2,052
2036	2,053
2037	2,053
2038	2,048
2039	2,048
2040	2,048
2041	2,048
2042	2,048

2043	2,048
2044	2,048
2045	2,048
2046	2,050
2047	2,051
2048	2,054
2049	2,054
2050	2,057

IV. GHG Emissions Reduced (1 page)

The table below lists estimated GHG reductions for all years from 2025-2050, as well as cumulative reductions for the periods 2025-2030 and 2025-2050.

Year	Measure 1: VPP	Measure 2: Green Fund	All measures
2025	-	216	216
2026	-	550	550
2027	14,911	947	15,858
2028	19,980	1,434	21,414
2029	19,016	2,012	21,027
2030	17,617	2,023	19,640
2031	16,639	2,031	18,669
2032	16,486	2,031	18,517
2033	15,271	2,041	17,312
2034	14,207	2,050	16,257
2035	13,828	2,052	15,880
2036	13,720	2,053	15,773
2037	13,652	2,053	15,704
2038	14,174	2,048	16,221
2039	14,076	2,048	16,123
2040	14,022	2,048	16,069
2041	13,945	2,048	15,992
2042	13,822	2,048	15,870
2043	13,739	2,048	15,787
2044	13,698	2,048	15,746
2045	13,601	2,048	15,649
2046	13,322	2,050	15,372
2047	13,136	2,051	15,188
2048	12,756	2,054	14,810
2049	12,724	2,054	14,778
2050	12,402	2,057	14,458
2025-2030	71,523	7,181	78,705
2025-2050	350,741	48,142	398,883

V. GHG Emission Reduction Calculations Spreadsheet

File name: GHGcalcs_SOPEC.xlsx

Worksheet	Description
Contents	Table of Contents with links. Assumptions and sources for data used.

EIA PJM Total	Totalled EIA data for the PJM grid
Grid GHG	Table GridCO2: Annual carbon intensity for PJM/West grid from EIA AEO2023 data.
AVERT	Analyzes AVERT, Cambien, and EIA emissions comparisons for final projection.
Measure1	Calculates GHG reductions for Measure 1: The Virtual Power Plant
ResStock™	Tabulated ResStock values used for energy/home for Baseline scenario.

VI. References

EIA AEO2023: US Energy Information Administration - Annual Energy Outlook 2023: Used to determine avoided emissions from electricity consumption in future years. [Annual Energy Outlook 2023: Table 54 - Electric Power Projections by Electricity Market Module Region, PJM Region](#). Accessed 3/27/2024.

EIA Carbon Dioxide Emissions Coefficients: US Energy Information Administration – Carbon Dioxide Emissions Coefficients: referenced for carbon dioxide emissions coefficient from natural gas; Published September 7, 2023. https://www.eia.gov/environment/emissions/co2_vol_mass.php

EPA's AVERT: Avoided Emissions and Generation Tool. This tool is provided free to the public by the U.S. Environmental Protection Agency. CO₂ marginal emissions for the Mid-Atlantic region (PJM) were obtained using the Main Module v4.2 Excel workbook: <https://www.epa.gov/avert/download-avert>; Downloaded and used on 03/29/2024.

NREL's Cambium 2023 tool: The National Renewable Energy Laboratory ("NREL") provides the Cambium database free to the public via a web-based interface: <https://scenarioviewer.nrel.gov/>. This viewer was used to obtain projected CO₂ emissions for years 2025-2050 and were used for comparison with the AVERT and EIA datasets. It was accessed on 03/29/2024 at 10:00 PM EDT.

NREL's PVWatts® Calculator: The PVWatts® Model ("Model") is provided by the National Renewable Energy Laboratory ("NREL"), which is operated by the Alliance for Sustainable Energy, LLC ("Alliance") for the U.S. Department Of Energy ("DOE") and may be used for any purpose. PVWatts® is a registered trademark by Alliance for Sustainable Energy, LLC in Golden, CO, 80401. Website Version 8.2.1 using PVWatts® API version 8.0. <https://pvwatts.nrel.gov/pvwatts.php>. Accessed 03/26/2024.

PV Capacity Factors: Lawrence Berkeley National Laboratory (LBL): Utility-Scale Solar: Project-Level Performance, Cumulative capacity factor (CF) through 2022 for PV projects over 5 MW-AC in capacity built through 2021, Ohio. <https://emp.lbl.gov/pv-capacity-factors>. Accessed 03/28/2024 20:00 EDT.

PV Lifetime Project. Deline, Chris, Dirk Jordan, Bill Sekulic, Josh Parker, Byron McDanold, and Allan Anderberg. 2022. PV Lifetime Project - 2021 NREL Annual Report. Golden, CO: National Renewable Energy Laboratory. NREL/TP-5K00-81172. <https://www.nrel.gov/docs/fy22osti/81172.pdf>.

Renewable Energy Certificates (RECs): US Environmental Protection Agency, Published January 15, 2024. <https://www.epa.gov/green-power-markets/renewable-energy-certificates-recs>

Rocky Mountain Institute (RMI): Multiple Sites Solar PreScreen and Discussion Dayton, OH; Rocky Mountain Institute, in partnership with Technical Assistance to Brownfields and Kansas State University; February 21, 2024

The ResStock™ Analysis Tool: Brossman, Jes, Lixi Liu, Ben Polly, Elaina Present, Jenny Erwin. 2023. "State Level Residential Building Stock and Energy Efficiency & Electrification Packages Analysis". Tableau Dashboard. Golden, CO: National Renewable Energy Laboratory. <https://resstock.nrel.gov/>