

1. Overall Project Summary and Approach

The City of Hartford, Connecticut (hereafter, “Hartford”) is applying for funding through the Environmental Protection Agency’s Climate Pollution Reduction Grants Program for a wide-ranging, cross-sector approach to address the impacts of climate change in the City: the Hartford “Air Aware” program. Hartford stands as a shining example of sustainable urban development and environmental stewardship. Even with limited financial resources, the City has utilized innovative policies, community engagement, and targeted investment in renewable energy infrastructure to emerge as a leader in fostering a greener, more resilient future. Hartford’s leadership is committed to taking bold action to combat climate change and protect the environment for current and future generations, as well as to address environmental justice and President Biden’s Justice40 initiative. Hartford has already undertaken an extensive GHG reduction and sustainability planning process and begun to invest in the needs identified. By securing funding through the Environmental Protection Agency’s Climate Pollution Reduction Grants Program, Hartford will be able to significantly accelerate its efforts to reduce greenhouse gas emissions, promote energy efficiency, expand renewable energy, enhance transportation options, raise community awareness of sustainability efforts, and build a more resilient community.

1.a. Description of GHG Reduction Measures

In alignment with the recently published Priority Climate Action Plan (PCAP) for Hartford, East Hartford and Middletown¹, Hartford’s Office of Sustainability has designed a multi-faceted GHG reduction effort that includes interventions in **energy generation, transportation, and rehabilitation/retrofitting of public buildings**. The sections below detail each proposed GHG reduction measure to be undertaken, the related PCAP priority measures, the reason(s) for selection and the timelines, milestones, and potential risks for each measure. Each of the interventions described below is fully implementation-ready, and Hartford and its contractor and community partners are prepared to move forward with these projects immediately upon grant award. Each intervention is also directly aligned with the stated goals of the Climate Pollution Reduction Grants Program to implement ambitious measures that will achieve significant cumulative GHG reductions by 2030 and beyond, and to pursue innovative policies and programs that are replicable and can be “scaled up” across multiple jurisdictions.

1.a.1 Energy Generation

According to the above-referenced PCAP², municipality-owned properties present a strong opportunity for installing rooftop or canopy solar. These buildings often have low barriers to implementation and can be developed at a large scale, with a near-immediate reduction in GHG emissions and significant reduced electricity cost for the municipality. In addition, establishing emissions-free renewable electricity provides a further opportunity as heating oil and natural gas are phased out and replaced with electric-powered heating systems, powering these systems with renewable rooftop solar will eliminate emissions from this sector entirely. To that end, Hartford proposes to **install solar panels and add battery storage on two buildings/properties owned by the municipality, and to conduct a microgrid feasibility study (PCAP measure E2.)**

As part of the PCAP development, Hartford conducted a thorough review of City-owned properties and determined that **two buildings belonging to the Department of Public Works** were immediate and priority candidates for installation of solar panels. These facilities have easily accessible and sizeable roofing, while also being large consumers of electricity. At the same time, they were strategically

¹ <https://crcog.org/regional-planning-and-development/regional-climate-action-plan/>

² <https://crcog.org/regional-planning-and-development/regional-climate-action-plan/>

selected because these buildings house the administrative functions of the Department of Public Works and Capital City Command Center (real time crime response center): in times of emergency, it is critical that these facilities are operational, even when there may be power loss to the City. The two selected projects are:

- 40 Jennings Street, Hartford, CT: install a 35kWh system
- 50 Jennings Street, Hartford, CT: install a 70kWh system

For these installations, the timeline and milestones are seen in the table below. The timeline assumes an October 2024 award and a January 2025 kickoff of activities. This timeline can be easily adjusted upon grant award. Hartford does not anticipate any major delays in this straightforward project, however it is possible that weather or supply chain issues/materials shortage could cause some minor delay in final delivery.

Solar Installation	
Timeline	Milestone
Complete	Project Planning and Feasibility
January 2025	RFP design
February 2025	Release RFP
Mid-February 2025	Developer walkdowns and questions period
March 2025	Developer RFP responses due
Mid-March 2025	Bridge to complete analysis and recommendation
April 2025	Developer selection and negotiations
April 2025	Contract Signing
Summer 2025	Project Construction
October-November 2025	Inspection
November 2025	Training and Commissioning
December 2025	Project Closeout

In addition to the solar installation, Hartford proposes to **conduct a microgrid feasibility study** with the goal of finding the best options for Hartford's further GHG reduction, enhanced energy resilience and emergency preparedness, grid modernization and infrastructure improvement, and cost savings.

For the feasibility study, the timeline and milestones are seen in the table seen in the table below. The timeline assumes an October 2024 award and a January 2025 kickoff of activities. Hartford does not anticipate any major delays in this straightforward project, however community engagement and trust-building can sometimes take longer than anticipated. The Hartford Office of Sustainability has strong community ties itself, and community-based partner Our Piece of the Pie has been engaged in this program design to ensure that engagement with the community is as easy, smooth and constructive as possible.

Microgrid Feasibility Study	
Anticipated Date of Completion	Milestone
Complete	Project Scoping and Stakeholder Identification
January 2026	Identify and Hire Consultant
March-July 2026	Task 1: Vulnerability Assessment

July-December 2026	Task 2: Information Gathering Community Outreach and Engagement
October 2026-March 2027	Task 3: Existing Conditions Analysis
March-May 2027	Task 4: Project Selection and Community Presentation
June-November 2027	Task 5: Alternatives Analysis and Community Presentation
December 2027	Project Closeout

1.a.2 Transportation

According to research for the PCAP³, transportation is the second leading sector of emissions, accounting for over half the statistical area's 8,665,585 MTCO_{2e} of emissions. For this reason, Hartford has made interventions in the transportation sector a top priority in this proposal, including: **A) converting municipal fleets to hybrids and installing municipal charging infrastructure (PCAP measure T1); and B) encouraging mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users (PCAP measure T6.)**

1.a.2.A. Fleet conversion

As part of the PCAP development, Hartford reviewed its municipal fleet and is prepared to conduct immediate replacement of high emission vehicles. Ideally, the City would replace the vehicles with EV versions, but the EV infrastructure simply is not yet in place in Hartford and significant GHG reductions can be achieved with an immediate switch to lower-emissions vehicles even as EV infrastructure is built in parallel. In addition to physical infrastructure, most of the City's mechanics are not yet qualified to work on EV fleets; the transition to a prepared workforce will involve some years of training, union negotiations and the like which are currently in Hartford's medium term decarbonization plans.

The **conversion of the fleet** under this EPA grant will consist of the **replacement of both light- and heavy-duty vehicles with the highest usage and/or emissions**. These vehicles include:

- Department of Development Services, 8 light duty vehicle units
- Hartford Fire Department, 8 light duty vehicle units
- Emergency Service and Telecommunication, 1 light duty vehicle unit
- Department of Health and Human Services, 3 light duty vehicle units
- Department of Family, Children, Youth, and Recreation, 1 light duty vehicle unit
- Finance Department, 1 light duty vehicle unit
- Department of Public Works, 4 light duty vehicle units, 9 heavy duty vehicle units

All light duty vehicles to be replaced are Ford models (Taurus, Escape, Crown Victoria, Fusion) with model years ranging from 2007-2011. These vehicles will be replaced with a mix of Toyota Prius and Ford Escape Hybrid in the newest model year at the time of procurement. To support the converted light-duty fleet, two municipal charging stations will be built: one at the 40 Jennings Street facility and one at Hartford Fire Department at 253 High Street.

In addition to the light-duty vehicles, nine diesel trash trucks from the Department of Public Works will be replaced with a low emission CNG-powered Labrie Automizer. In planning for this proposal, Hartford examined the possibility of procuring electric trash trucks, however the above-noted mechanic skills issue and mechanic role determined by union contracts created a significant challenge, and, even more importantly, the technology is not yet appropriate for the Hartford climate. In fact, other cities in

³ <https://croc.org/regional-planning-and-development/regional-climate-action-plan/>

Connecticut recently procured electric-powered trash trucks as a pilot and found that the batteries for these vehicles were unable to perform in the cold winters. After lengthy analysis, it was determined that procurement of CNG trash trucks would provide immediate and significant GHG reductions, while also providing immediate and noticeable improvement of air quality for Hartford communities since they come into direct contact with the City's trash trucks on a very frequent basis as they make their residential rounds. A spreadsheet detailing this fleet conversion is found as an attachment to this application.

For the fleet conversion, the timeline and milestones are seen in the table below. The timeline assumes an October 2024 award and a January 2025 kickoff of activities. This timeline can be easily adjusted upon grant award. Hartford does not anticipate any major delays in this procurement; however, the timing of grant funding availability will determine how quickly the vehicle procurements can be completed as the City must ensure availability of vehicles according to the State of Connecticut contract, or adhere to a strict bidding process if vehicles are not within the State contract. For the EV charging station construction, weather and supply chain disruptions could cause some minor delays, but the timeline indicated below allows for some material delays.

Municipal Fleet Conversion	
Anticipated Date of Completion	Milestone
Complete	Identification of highest-emission vehicles for replacement
Complete	Identification of optimal new model vehicles
July 2025 (2026 Fiscal Year budget season)	All Toyota Prius vehicles procured
July 2025 (2026 Fiscal Year budget season)	All Ford Escape vehicles procured
July 2025 (2026 Fiscal Year budget season)	All Labrie Automizer trash trucks procured
December 2025	Responsible disposition of replaced vehicles

Municipal EV Charging	
Anticipated Date of Completion	Milestone
Complete	Determine optimal locations for municipal EV charging
November 2025	RFP design and release
December 2025	Vendor procurement processes
January 2026	Vendors selected
February 2026	Design and engineering of EV infrastructure initiated
March 2026	Complete CEPA and SHPO review of installation projects
September 2026	Charging stations installation and electric hookup
October 2026	Inspection of infrastructure locations completed
November 2026	Create outreach content, usage guidance, and other engagement materials
November 2026	Begin operation and periodic maintenance, as required
December 2026-2031	Award ongoing EV infrastructure operations

1.A.2.B. Transportation Mode Shift

As noted in the PCAP, mode shift projects, such as construction of “sidewalks, bike lanes, and other complete streets elements, can encourage people to leave their cars and switch to active transportation and transit. These types of projects provide a plethora of benefits including individual health, neighborhood beautification, and regional environmental benefits.” In order to ***encourage mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users (PCAP measure T6)***, Hartford proposes to invest in two main efforts: ***traffic signal projects and streetscapes***.

As one Hartford official recently put it “our signal system goes back to horse and buggy days.” While that may be an exaggeration, it is true that Hartford’s signal system is vastly outdated and almost entirely analog. The City owns over 160 signals, almost none of which can be managed, maintained, or even monitored virtually. The only way for the signal management team to know of a non-working signal is if someone reports it directly; in times of power outages, which are increasingly frequent, the hazard presented is increased exponentially, a multiple signals are likely to be down and yet city management has little ability to prioritize without real-time information. The antiquated system actually contributes directly to air pollution as it is incapable of optimizing car movement. The signal infrastructure itself is in poor condition with poles falling down more than occasionally. In addition, the poor signals (and streetscape challenges) cause a danger to residents—in the past three years alone, Hartford has had 51 pedestrian and bicycle incidents categorized as severe or fatal.

Today’s signal technology is extremely advanced. With EPA funding, Hartford proposes to **modernize the signals at nine key intersections**, improving traffic flow, reducing GHG emissions, enhancing public safety, and encouraging transportation mode shift. This construction project will allow Hartford to begin to convert its signal system to one that is not only state-of-the-art for today, but also easily updateable as the latest technologies and traffic management systems become available. (The current signal system is not capable of being updated with new technologies.) The nine intersections were selected because they are on main thoroughfares into and out of the City, and also control access to hospitals and emergency facilities. At each intersection, Hartford will install a new traffic signal, signal controller, pole, pedestrian signage, ADA compliant crosswalks and associated markings. The selected intersections are:

- Prospect Street at Bob Steele
- Market Street at Talcott Street
- Trumbull Street at Pearl Street
- Park Street at Washington Street
- Main Street at Church Street
- Main Street at Pratt Street
- West Boulevard at Sisson Avenue & I-84 Ramps
- Washington Street at Webster Street, New Britain Avenue, and Barnard Street
- Market Street at Pleasant Street

The timeline and milestones for this signal replacement effort, which is highly dependent upon weather as well as supply shortages/delays, assumes an October 2024 award and a January 2025 kickoff of all grant activities. This timeline can be easily adjusted upon grant award.

Signal Projects	
Anticipated Date of Completion	Milestone
Complete	Identify most impactful intersections for signal replacement

June 2025	Advertise project for bids
August 2025	Retain Contractor
September 2025	Begin Project Organization Phase
April 2026	Begin Project Construction Phase
December 2027	Construction Completion
July 2026-December 2027	Training and commissioning

Alongside the signal projects, Hartford proposes a significant investment in streetscapes. Hartford currently has numerous “shovel-ready” streetscapes projects—the culmination of over 15 years of study and design as to how to make the City more friendly and safer for walkers, bikers and those using other forms of climate-friendly transport (i.e. scooters.) With EPA funding, Hartford intends to **undertake two priority streetscapes projects**, each of which include enhanced pedestrian facilities and dedicated bike lanes, dozens of new trees, refuge islands, ADA-compliant features, and an overall reduction of impervious surfaces. The two streetscapes proposed are part of a larger plan to connect the City from north to south with safe and alternative transportation-friendly routes. They are:

1. N. Main Streetscape⁴: Phase 2 construction between Tower Avenue and the town line
2. Reimagining Main Street Streetscape⁵: Phase 1 construction between Wyllys and Charter Oak Avenue

The timeline and milestones for the two streetscape projects are seen in the table below. These projects have the highest potential for delays given the breadth and depth of construction activities which are highly dependent upon weather as well as supply shortages/delays. The timeline assumes an October 2024 grant award and a January 2025 kickoff of all grant activities, and can be easily adjusted upon award.

Streetscapes: Reimagining Main Street	
Anticipated Date of Completion	Milestone
Complete	Community-informed preliminary design and feasibility study
Complete	Semi-final design
November 2024	Final analysis, response, and coordination with utilities and traffic (Nov 2024)
November 2024	Final design substantially complete (Nov 2024)
July 2025	ROW / Permitting Phase – 8 months (TBD based on funding)
September 2025	Bid Phase – 2 months (TBD based on funding)
Summer 2028	Construction – Up to 36 months (TBD based on funding)
Streetscapes: North Main Street	
Complete	Community-informed preliminary design and feasibility study
Complete	Semi-final design
March - July 2024	NEPA Documentation – 4 months (end July 2024)

⁴ Main Street North Streetscape Design – City of Hartford (hartfordct.gov)

⁵ https://www.hartfordct.gov/files/assets/public/v/1/development-services/planning-zoning/pz-documents/cs-projects/reimagining_main_st_final_report.pdf

July 2024 - Mid-March 2025	Final Design – 8 months (concurrent with NEPA phase) (end March 2025)
April 2025	Revise Project Limits
	Final Test Pits
	Final Design Modifications/Outreach
	OSTA approval
December 2025	ROW/Permitting Phase – 5 months (end December 2025)
February 2026	Bid Phase
Summer 2025-2027	Construction – Up to 36 months (Begin Summer 2025, end Summer 2027)
Summer 2025-2027	Community awareness campaigns

1.a.2.C. Municipal Building Upgrades

Hartford will ***undertake efficiency upgrades of eight municipal facilities*** (four public school facilities and four other public buildings.) This initiative is ***aligned with PCAP measure B2***. According to research for the PCAP, buildings were the largest sector of GHG emissions in the statistical area. The **eight buildings to be upgraded** are listed below. They were selected as each of these aging facilities houses a critical service for the City and its residents. Where the schools are concerned, the City is in the midst of renovating 12 schools utilizing State of Connecticut funding. The remaining 30 schools would not have the potential to received State funding for at least 10 more years, and the buildings selected for this project are in the most disadvantage neighborhoods and in the most desperate need of repair. Each has such heavy usage that upgrading will return the greatest GHG reduction as well as provide immediate quality of life benefits to students and workers alike. Several of the buildings are protected under historical preservation regulations. Upgrades will vary depending on the needs of a particular building, but are likely to include such improvements as: LED lighting retrofit; HVAC system upgrades, building envelope improvements (insulation, windows and doors, etc.); smart thermostats and building automation; energy efficient appliances; and water conservation measures.

1. Public School Maintenance Building
2. Public High School
3. Lewis Fox School
4. Classic High School
5. Colt Maintenance Office Shop
6. Maintenance Building #1 40 Jennings Street
7. Maintenance Building #2 4 Jennings Street
8. Fire Station # 16

The timeline and milestones for the eight municipal building upgrade projects are seen in the table below. These projects also have the highest potential for delays as they are highly dependent upon weather as well as supply shortages and permitting delays. This timeline assumes an October 2024 award and January 2025 kickoff of all grant activities, and can be easily adjusted upon award.

Building Rehabilitation	
Anticipated Date of Completion	Milestone
February 2025	Community-Informed Preliminary Design and Feasibility Study is complete
Mid-February 2025	Semi-final design is complete

March 2025	Final analysis, response, and coordination with utilities and traffic
Mid-March 2025	Final design is substantially complete
Summer 2025	ROW / Permitting Phase – up to 8 months
Summer 2025	Bid Phase – up to 2 months
Summer 2027	Construction – Up to 36 months

1.b. Demonstration of Funding Need

The climate of the City of Hartford, like that of the rest of the world, is rapidly changing. Of particular note, while all of the United States has warmed over the last century, Connecticut has warmed twice as much as the average of the rest of the contiguous 48 states⁶. In 2017, the City of Hartford launched its Climate Action Plan, one of the first in the State of Connecticut. The plan is centered on understanding and mitigating the warmer, wetter winters, the hotter, drier summers, and extreme flooding events. It focuses on health impacts of pollution and climate change as well, including the fact that Hartford has an adult asthma rate nearly three times as high (16%) as wealthier towns in Connecticut, and an asthma hospitalization rate that is 3.4 times higher than that of the State.⁷ It also takes into account Hartford's aging infrastructure, which exacerbates environmental challenges as outdated systems contribute to pollution, inefficiency, and vulnerability to climate impacts. All strategies were developed with a focus on the disproportionate impact of these changes on BIPOC and low-income residents of the City.

Each component of the five-goal plan is intended to contribute to improved public health, the promotion of social, racial and ethnic equity, and the advancement of local economy. In 2023, the Metropolitan Statistical Area (MSA) that includes Hartford, East Hartford and Middletown developed a Priority Climate Action Plan with funding from the Environmental Protection Agency. The planning process showed that Hartford's GHG emissions are the highest in the MSA. This is problematic not just for Hartford, but for its neighbors as its pollutions extends beyond municipal borders. Hartford's pollution also impacts many additional residents of the State of Connecticut as it is the state capitol and also hosts three hospitals and a major insurance industry—in other words, large numbers of people commute into Hartford for a variety of reasons and are impacted by the pollution. The PCAP process unveiled these issues, helped to identify new priority areas, and allowed Hartford to build upon its Climate Action Plan with updated data, timelines and technology availability.

While Hartford has demonstrated its strong dedication to advancing sustainability initiatives, local financial resources are severely limited, and the scope of the challenges faced exceeds the capacity to address them adequately. In fact, the City of Hartford is considered to be a distressed municipality⁸ making the whole of Hartford an underserved community. Hartford's population includes 38.7% Black/African American, 43.4% Hispanic/Latinx (of any race) and 15% White residents.⁹ While the State of Connecticut enjoys the sixth highest average median income in the nation¹⁰, in Hartford, a stunning 30.5% of all residents live below the Federal Poverty Level.¹¹ The city's budget constraints and competing priorities make it challenging to allocate sufficient funds for comprehensive sustainability

⁶ <https://www.hartfordct.gov/Government/Departments/Mayors-Office/Mayor-Initiatives/Sustainability#section-2>

⁷ <https://www.lung.org/research/sota/city-rankings/states/connecticut/hartford>

⁸ https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/02_Review_Publications/Distressed-Municipalities

⁹ www.census.gov

¹⁰ www.census.gov

¹¹ <https://talkpoverty.org/state-year-report/connecticut-2020-report/>

projects and programs. Federal assistance is essential to supplementing local efforts, particularly where upgrading and modernizing infrastructure to enhance energy efficiency, reduce emissions and improve resilience. Federal investments in Hartford's sustainable infrastructure will not only serve to mitigate climate risks, but also improve job quality, stimulate economic growth, and enhance quality of life, particularly for structurally excluded populations.

To date, Hartford has received a modicum of state and federal dollars to fund its sustainability initiatives, including the first phase of one major streetscape project. It has also invested significant resources in getting all of the projects proposed for this grant "shovel-ready." In addition, in the fall of 2023, Hartford secured a tree canopy grant from the U.S. Department of Agriculture, and implementation has just begun on that initiative. The City is currently reviewing grant opportunities to support other projects that it has prepared for implementation as part of its 2017 Climate Action Plan and more recent regional PCAP.

1.c. Transformative Impact

Hartford has carefully selected the projects proposed for the Air Aware program because they have the potential to be most transformative for the City and its residents. Each proposed initiative has multi-faceted benefits, and taken together this GHG reduction effort will:

- Improve public health by reducing municipal vehicle emissions, providing and promoting cleaner energy sources, encouraging active transportation modes, and enhancing the environment and air quality in work and school buildings. These measures are expected to mitigate air pollution related health issues such as asthma, respiratory diseases and cardiovascular problems.
- Provide cost savings to the City by transitioning to renewable energy sources and improving energy efficiency. Lowering energy bills for municipal building and fleet fueling costs will free up resources for other essential services and investments, enhancing the overall quality of life for Hartford residents.
- Improve equity and social justice as the projects are concentrated in high-poverty, marginalized communities and are focused first and foremost on enhancing health and quality of life for those residents who have been structurally excluded. In addition, the community engagement elements of this proposal involve stakeholders from the City who have not historically had much voice in the City's planning and investments.

In terms of the potential for large scale policy and practice change, this proposal is offered at a perfect time to take Hartford's sustainability efforts to date to a much more sophisticated level. As a municipality, Hartford has taken some critical steps to begin documenting its GHG emissions within the Capital Improvements Program, a multi-year plan that identifies capital needs which will benefit Hartford residents. The projects are listed as proposed for the upcoming fiscal year and come from recommendations and assistance of multiple City departments. Until recently, Hartford simply did not have the capability to calculate GHG emissions; now that that capability is in place, the City can begin to require reporting through the Wegowise and Watchwire utility benchmarking software that it has just put into place in early 2024. Now that the calculation capability and tracking software are in place, all large municipal buildings are required to report their energy usage, and the City is beginning to roll-out an expectation of self-reporting across departments, the Board of Education, and will eventually extend to privately owned entities. The EPA grant presents the opportunity to regularly and transparently report on municipal GHG emissions, leading by example and then encouraging private sector players in the City, particularly hotels and large businesses, to follow suit.

2. Impact of GHG Reduction Measures

2.a. Magnitude of GHG Reductions from 2025 through 2030

Total GHG reductions from 2025-2030 = 2,265 MTCO₂e. In terms of durability and longevity of the projects and emissions reduction, most of the projects are expected to deliver emissions reductions for 20-25 years at a minimum. The biggest concern with achieving these emissions from years 2025-30 would be ensuring the project timeline falls in line with expectations. If projects become delayed for any reason, the GHG reductions for years 2025-30 could be drastically reduced. Overall, all projects included for grant submission have exceptional durability in years 2025-30.

2.b. Magnitude of GHG Reductions from 2025 through 2050

Total GHG reductions from 2025-2050 = 14,096 MTCO₂e. Projects with onsite generation assets such as solar and microgrid will have approximately a 20-year lifetime. With optimization and battery replacement, hybrid EVs could see life expectancy of 25 years given the minimal mileage put on the vehicles. The trash trucks are expected to last 15 years in operation. Street lighting benefit is indefinite, likely 25+ years along with complete streets projects. This does not consider general maintenance concerns. The biggest risk with complete streets projects in terms of durability of emissions reductions would be, if for instance, trees do not survive through the years for several reasons: traffic accidents, storms, disease, etc. Efficiency projects have an anticipated span of 25+ years as well.

2.c. Cost Effectiveness of GHG Reductions

The table below lists \$/MTCO₂e associated with each group of projects. Projects which target electrical generation, efficiency, and EV charging capabilities show significantly higher impacts in terms of emissions reductions. The benefit of energy efficiency and generation projects is typically strictly carbon emissions and budget reduction. With other projects such as complete streets and traffic lights, there is a major factor of carbon emission reduction incorporated, however much of the cost of these types of projects is associated with benefits outside of emissions reductions. Attributes such as local air quality, safety, well-being, and economic development all roll into streetscapes and traffic signal projects. Conversion of the fleet, notably the trash trucks will also provide long-term localized health benefits in terms of local pollutant reduction and noise reduction.

Project Name	Total Cost	MTCO₂e Reduction (2025-2030)	\$/MTCO₂e Reduced
(E2) Electric Generation	\$535,000	107.35	\$ 4,984
(T1) Fleet Conversion	\$5,318,172	511.24	\$ 10,402
(T1)Municipal EV Charging Infrastructure	\$759,692	53.39	\$ 14,229
(T6) Signal Projects	\$7,650,024	309.00	\$ 24,757
(T6) Streetscapes	\$20,134,818	24.89	\$ 808,952
(B2) Energy Efficiency Muni Buildings	\$15,576,941	1,259.99	\$ 12,363
Total	\$49,974,647	2,265.86	\$ 22,055

2.d. Documentation of GHG Reduction Assumptions

See the chart of assumptions and methodologies on the next pages. Please see the attachments for the supplemental technical appendix and GHG Calculations workbook for more detailed information.

Assumptions	
<u>Project</u>	<u>Assumptions</u>
Microgrid kWh Reduction	800 kW Bloom fuel cell - 92% uptime - Carbon savings calculated based on grid demand impact on reduction of Peaker plants on peak load days for ISO NE. % runtime impact on grid demand is calculated based on the frequency of “peaker plant” activity in 2022 in CT.
50 Jennings 70kw system	Annual production calculated from PV Watts. Assumes 5-degree tilt, 180-degree azimuth, 1.2 DC/AC inverter ratio. GHG emissions reductions calculated based on CT grid mix and EPA eGrid emissions intensity factors.
40 Jennings 35kw system	Annual production calculated from PV Watts. Assumes 5-degree tilt, 180-degree azimuth, 1.2 DC/AC inverter ratio. GHG emissions reductions calculated based on CT grid mix and EPA eGrid emissions intensity factors.
Hybrid Fleet Transition	A calculator was used to determine the difference in fuel economy between the older vehicle models and the newer hybrid EV models, not including the fuel economy impact of the battery. Battery impact is calculated based on charger impact of grid mix emissions vs gasoline emissions of equal ‘energy content’ value. This impact (MPG) was then overlayed with miles traveled per vehicle to calculate gallon of gasoline equivalent reductions. EPA fuel emissions factors were used to convert gallons of gasoline to emissions reduction.
Trash Truck Replacement	The fuel economy of existing trucks was compared to fuel economy of new trucks. CNG economy was translated into gallons of gasoline equivalent for an equal comparison. This was overlayed with miles traveled per truck to calculate gallons of gas equivalent reduced. EPA fuel emissions factors were used to convert gallons of gasoline to emissions reduction.
Level Two Chargers	Level two chargers will initially charge hybrid EV fleet for city only vehicles. To calculate GHG reduction from charging batteries vs burning gasoline, the size of the battery capacity was determined for each make and model in terms of kWh energy storage capability and travel distance capability. The grid emissions factor was applied to daily kWh charge of 95% battery capacity and compared to emissions equivalent from burning gasoline. Reductions are calculated as gas emissions – kWh emissions.
Street Signals	Estimated Cars per day impacted through CT DOT traffic monitoring site. Data available on vehicles crossing intersection per day. Assumptions about the number and time vehicles will be stopped at red lights came from a small sample of intersection observations (R7). Comparing fuel and emissions use for intersection study was used to determine average fuel economy in the city and impact on mileage to stopped traffic. A google study on AI optimization has suggested that AI incorporation to streetlight software would increase traffic flow and reduce emissions at stoplights by 10%. Based on all this information, we were able to determine the amount of gasoline currently burned at the intersections in question and overlay assumptions on 10% reduction at these sites with this technology.

Complete Streets	Impacted population is estimated to be 10% of the motorists traveling that road per day. This accounts for 90% transiting motorists would not realistically have capabilities to mode shift due to proximity of home or destination. We estimate 10% of the cars traveling to be local enough to see impact of complete streets projects. A University of Maryland study concludes 3.5% on average of the impacted population would participate in mode shift upon complete streets implementation. Traffic data was gathered from CT DOT traffic monitoring. (see technical appendix for more details)
Upgrades to Municipal Buildings	The kWh reduction impact was determined by engineers completing feasibility studies of these projects. kWh reduction from the projects were overlayed with CT grid emissions factors to calculate emissions reductions.

3. Environmental Results – Outputs, Outcomes, and Performance Measures

3. a. Expected Outputs and Outcomes

Hartford anticipates observed GHG emissions reductions to be within 10% of the calculated GHG reduction expectations, given that the scope of the projects does not change significantly. Measuring emissions reductions will vary in difficulty and accuracy for all projects upon implementation. For onsite generation and efficiency projects, calculations based on electric production/reduction and fuel consumption data will near 100% accuracy. The City will be able to compare carbon intensity of each generating asset implemented versus the carbon intensity of the Connecticut grid to calculate GHG avoidance (reduction vs baseline).

For the projects related to fleet transition and EV charging, this will also be easy to capture once implemented. By monitoring fuel consumption of vehicles in terms of gallons of gasoline and diesel and kWh battery charged, Hartford will be able to compare to historical consumption volume, or at a minimum, miles traveled overlayed with fuel economy of older vehicles in the fleet. The difference would allow a conversion and calculation of GHG reductions of the transition to hybrids and CNG trash trucks.

The streetscapes will be difficult to measure carbon impact upon implementation. It is nearly impossible to measure actual carbon absorption through trees without intensive research practices and isolated environments. A baseline is established for motorized vehicles traveling the road provided by the Connecticut Department of Transportation. This will allow an estimation of reduction of motor travel after implementation, however it will be difficult to isolate that the variable resulting in change is the complete streets projects. Many factors could impact mode shift through a community alternative to complete streets projects. A solid baseline and estimates about other impacting factors can help to calculate very close estimates going forward, however is not directly “measurable”. The estimates for complete streets in the GHG calculations are conservative estimates.

3.b. Performance Measures and Plan

The below list of metrics are to be measured upon project implementation:

Metrics	
Project	Metrics to Measure Upon Implementation
Microgrid kWh Reduction	kWh production; natural gas consumption
50 Jennings 70kw system	kWh production

40 Jennings 35kw system	kWh production
Hybrid Fleet Transition	Gasoline consumption; miles traveled
Trash Truck Replacement	CNG used; miles traveled
Level Two Chargers	battery charges per day; battery capacity used
Street Signals	Cycles per day; updated traffic flow models
Complete Streets	% or # of population participating in mode shift; frequency of mode shift; size and number of trees planted
Upgrades to Municipal Buildings	kWh reductions

3.c. Authorities, Implementation Timeline, and Milestones

The lead applicant for this project is the City of Hartford, Office of Sustainability. The Office of Sustainability is responsible for providing general oversight for program operations including: partner communication; project management; grant management; required GHG reporting; technical assistance (where needed); development and implementation of strategies that lead to long-term success throughout the life of the grant; coordinating the involvement of essential community organizations, residents, and City departments.

The following organizations and agencies are key implementing partners for this effort, and each has the expertise and the authority to carry out each proposed measure listed in their respective sections. To ensure smooth communication, planning and accountability, each organization list below also has at least one representative dedicated to the Steering Committee described in Section 6 below.

- **Department of Capital Improvements and Operations:** The Department of Capital Improvement and Operations implements the Capital Improvement Plan (CIP), a five-year blueprint for planning the City of Hartford’s physical capital improvements to public facilities and infrastructure. The CIP outlines the capital expenditures, financial capacity, and physical development activities of the City and, as a result, it is one of the most important responsibilities of local government officials. Role and responsibilities: The Department of Capital Improvements and Operations will serve as a project implementor to execute the following proposed GHG reduction measures:
 - Sector: Energy Efficiency/Commercial Buildings
 - PCAP Measure B2: Undertake Efficiency Upgrades to Municipal Buildings
 - Projects: 4 Board of Education buildings and 4 city-owned buildings
 - Sector: Transportation
 - PCAP Measure T1: Convert Light Duty Municipal Fleets to EV/ Hybrids and Install Municipal Charging Infrastructure
 - Projects: Fleet conversion and construction of EV changing station
- **Bridge Energy Services (BES):** Bridge Energy Services is a leading independent energy management and consulting firm. Bridge's unique portfolio management approach delivers sustainable, diversified, and cost-effective operations through innovative energy strategies. BES serves as an on-call consultant for the City of Hartford’s Department of Capital Improvements & Operations and Office of Sustainability. Role and responsibilities: BES will serve as a project implementor to execute the following proposed GHG reduction measures:
 - Sector: Electricity Generation
 - PCAP Measure E2: Install solar panels, add battery storage and develop microgrids on buildings and properties owned by municipalities
 - Projects: Solar arrays, microgrid study
 - Grant activities: GHG calculation and reporting

- City of Hartford Department of Public Works (DPW):** The mission of Public Works is to create a safe and healthy environment through the implementation of infrastructure maintenance and enhancements of parks, roadways, traffic systems, municipal buildings, vehicles/equipment, flood control systems and the collection of solid waste and recyclables. Role and responsibilities: The DPW will serve as a project implementor to execute the following proposed GHG reduction measures:
 - Sector: Transportation
 - PCAP Measure T6: Encourage mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users.
 - Projects: 9 signal projects
- City of Hartford Department of Development Services (DDS):** The Department of Development Services is charged with helping to craft an action plan for new and prospective businesses within the City that is consistent with the Mayor’s vision for future infrastructure improvements and job development opportunities. They are comprised of five divisions that collectively provide services related to economic development, job growth, urban planning, housing, code enforcement and zoning, blight remediation, and cultural & special events. Role and responsibilities: The DDS will serve as a project advisor, and work closely with DPW to execute the following proposed GHG reduction measures:
 - Sector: Transportation
 - PCAP Measure T6: Encourage mode shift across the region with complete streets projects that make it safer and easier to bike and walk for all users
 - Projects (streetscapes): N Main Streetscape, Reimagining MainStreet Streetscape.

The specific milestones for each project are detailed in Section 1 above. The below timeline illustrates the overall program timeline by individual project.

Project/Timeline	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12
Solar Installation		X	X	X								
Microgrid Study					X	X	X	X				
Fleet Conversion			X	X	X							
EV Charging Stations				X	X							
Signal Projects			X	X								
Streetscapes	X	X	X	X	X	X	X	X	X	X	X	X
Municipal Building Upgrades		X	X	X	X	X	X	X	X	X	X	X

4. Low-Income and Disadvantaged Communities

4.a. Community Benefits

Hartford is a town of 121,054 residents, 87% of whom are people of color. Fifty-four percent of Hartford’s households are considered to be cost-burdened, spending at least 30% of their total income on housing costs. The median income of City residents is just \$37,477, and 26% of Hartford’s adults have

not achieved a high school diploma.¹² According to Climate and Economic Justice Screening Tool¹³, almost every single Hartford census tract is disadvantaged; the only exceptions are the most central census tract, which houses the Connecticut State Capitol and is the location of the wealthiest businesses, and a couple of residential tracts in on the very northern or western edges of the City. With a widely-disadvantaged city and population, Hartford has endeavored in its planning process to identify the neighborhoods most affected by environmental injustices. Some of the projects proposed to the EPA here are located in the HUD-designated Promise Zone and thus deliver the greatest benefit to those communities.

As discussed in Section 1.c above, the proposed GHG reduction measures have the potential to deliver significant benefits to low-income, disadvantaged, vulnerable and linguistically-excluded communities. These benefits include, but are not limited to: improved public health (reduced asthma rates, reduced heart disease and diabetes due to shift in transportation modes and safer streets/signal project), energy cost savings for the City (freeing up funds for resident services), energy resilience/reduced electricity disruption (due to microgrid work and solar installations), reduced noise and air pollution (fleet conversion), new green space (streetscapes), reduced transportation costs (streetscapes, signal project), and safer/healthier workspaces/schools (municipal building upgrades. Hartford contains a total of 41 census tracts, and the ones expected to see the most transformative impact from this program are found in the attachments section of this proposal.

As part of this proposed program, Hartford will regularly assess whether the most disadvantaged communities are receiving the planned benefits. A **Qualitative Analysis of Community Benefits** will consist of:

- Data Collection: GHG emissions, co-pollutants, socio-economic indicators, and demographic characteristics
- Quantitative Assessment: assess the GHG reductions resulting from this program implementation and estimate the associated economic and health benefits for the target communities
- Stakeholder Engagement: meetings and focus groups with community members and local organizations to ensure that quantitative analysis is reflective of their experience and the initiatives under implementation continue to be aligned with community priorities
- Reporting and Transparency: a comprehensive report documenting the findings of the quantitative analysis and stakeholder engagements, with the report easily accessible to the public through community meetings, City of Hartford website and other outreach efforts

4.b. Community Engagement

Hartford has a longstanding history of community engagement on planning and programs. Whenever the City has construction projects underway, it holds canvassing events with the impacted communities. These meetings are multilingual, and often conducted with a community partner that has the requisite cultural knowledge to ensure that the City representatives comprehend any nuances of the exchange and for all-over better mutual understanding of the parties. Where sustainability specifically is concerned, extensive community stakeholder meetings were held in the development of the 2017 Hartford Climate Action Plan and for the recent regional PCAP, over 15 different stakeholder gatherings were held and input received was incorporated throughout the plan. In planning for this proposal, extensive outreach was undertaken regarding the streetscapes and school upgrade projects to gain

¹² https://ctdatahaven.org/sites/ctdatahaven/files/hartford_equity_2023.pdf

¹³ <https://screeningtool.geoplatform.gov/en/#12.93/41.7865/-72.63065>

community feedback. Our Piece of the Pie, a community-based organization, regularly gathers community input and participates in all sustainability Steering Committee meetings, ensuring alignment of activities with community needs and expectations. In addition, the City's Office of Community Engagement participates in all Neighborhood Revitalization Zone meetings. The City will keep residents aware of the efforts through a broad and multilingual campaign dubbed "Love Hartford, Live Air Aware" which will highlight and expound upon the positive health impacts of GHG emission reductions and the association of these benefits to the sector projects described in this proposal. The City will also make project information in multiple languages available through its website, community meetings/gatherings, mailers and newsletters. A budget for community engagement is included in each of the proposed projects.



The table below shows a variety of ways that Hartford intends to conduct outreach and receive input from the community as the proposed projects get underway.

Sector and Project	Stakeholder and Community Engagement
Electricity Generation	
Solar Array	Outreach will take place internally since solar arrays are located on municipal-owned buildings.
Microgrid	Performed through the Office of Community Engagement, Our Piece of the Pie, and procured Outreach Consultant.
Transportation	
Signal Projects	Office of Community Engagement (311 newsletter)
Streetscapes	Through the Office of Community Engagement, Department of Developments Services (Safe Streets newsletter), Our Piece of the Pie, and procured Outreach Consultant.
Municipal Fleet and EV Charging Infrastructure	Outreach will take place internally since EV charging stations are located on municipal-owned property.
Commercial/Residential Building	
4 schools	Performed through the Office of Community Engagement, Our Piece of the Pie, and procured Outreach Consultant.
4 municipal buildings	Outreach will take place internally since energy efficiency upgrades are located within municipal-owned buildings.

5. Job Quality

While the proposed interventions do include a number of construction projects, this program is not anticipated as a major permanent jobs creation effort. In fact, the City alone has over 200 unfilled jobs at the current moment. Rather, the program will enhance job quality for many workers in Hartford in a host of ways including:

- More comfortable, safer work spaces for many hundreds of workers in the municipal buildings and schools that are upgraded

- More efficient, pleasant and varied modes of transportation to workplaces
- More energy stability, security and related safety across workplaces in the City once the microgrid is implemented
- More workers that understand the importance of GHG reductions as they experience the direct benefit of the program interventions
- More workers utilizing modern vehicles with top safety standards and better vehicle air quality

6. Programmatic Capability and Past Performance

6.a. Past Performance

The following are assistance agreements that the applicant is performing or has performed within the last three years. Please note that The Office of Sustainability was vacant from early-2021 to mid-2022. The current applicant's tenure spans from mid-2022 to present; therefore, relevant/available past performance or reporting ability is somewhat limited. Additionally, the Office of Sustainability only has one personnel, the Director, and two longstanding vacancies, limiting the quantity of relevant/available past performance or reporting opportunities.

1. Project Title: Capital Stewardship Initiative

- Assistance agreement number 10.664
- Federal funding agency: United States Department of Agriculture and assistance listing number (if applicable).
- Brief description: The Capital Stewardship Initiative will address the health and vitality of its urban canopy in both public and private spaces. The grant will support the City's sustainability goals of 35% tree cover by 2070.
- Contact from organization:
 - Ari Okun, Resource Assistant, Forest Service, Urban & Community Forestry Program
 - ari.okun@usda.gov
- Include a discussion of whether and, if so, how the applicant was able to successfully complete and manage the listed agreements.
 - The applicant is in the rescope process and is on track to execute the listed agreement.

2. Project Title: Tree Hazard Mitigation Project

- Assistance agreement number: 97.039
- Federal funding agency: Federal Emergency Management Agency (FEMA) BRIC (Building Resilient Infrastructure and Communities) grant program (EMB-2020-BR-001-0010) through the State of Connecticut's Department of Emergency Services and Public Protection Division of Emergency Management and Homeland Security (DESPP/DEMHS).
- Brief description: This project will set the stage to preserve and assure the continuity and resilience of the canopy acquired with technical assistance of a consultant who will establish the baseline of existing trees, determine the cost-effectiveness of a hazard tree mitigation program, and, create a strategic implementation plan.
- Contact from organization that funded the assistance agreement.
- Include a discussion of whether and, if so, how the applicant was able to successfully complete and manage the listed agreements.
 - The agreement was completed in partnership with the City's Department of Public Works that houses the Forestry Division who implemented projects utilizing the funds.

3. Project Title: Energy Equity Challenge, Community Partnership Initiative Grant Round 2
 - Assistance agreement number: N/A
 - Non-federal funding agency: Eversource and assistance listing number (N/A)
 - Brief description: Develop and implement robust community outreach and engagement campaigns to enroll residents and property owners into energy assistance programs.
 - Contact from organization that funded the assistance agreement.
 - Devan Willemsen
 - Marketing Specialist – Community Engagement, Energy Efficiency, Eversource
 - Phone: (860) 665-3572 | Cell: (614) 406-1759
 - Include a discussion of whether and, if so, how the applicant was able to successfully complete and manage the listed agreements.
 - The applicant is in the process of executing this agreement. This is the second of two rounds of awards received from the funding agency.

6.b. Reporting Requirements

The below information details the reporting requirements for the above-listed agreements.

1. Project Title: Capital Stewardship Initiative
 - Reporting requirements are not due for this agreement yet.
2. Project Title: Tree Hazard Mitigation Project
 - Reporting requirements were satisfied for this agreement.
3. Project Title: Energy Equity Challenge, Community Partnership Initiative Grant Round 2
 - Reporting requirements are not due for this agreement yet.

6.c. Staff Expertise

This program will be led by the City of Hartford's Office of Sustainability. The Office of Sustainability's mission is to promote and facilitate sustainable practices, policies, and initiatives to enhance the environmental, social, and economic well-being of Hartford and its residents. The office aims to create a more resilient and equitable Hartford by integrating sustainability principles into decision-making processes, collaborating with stakeholders, and implementing innovative strategies to address environmental challenges. Launched in 2017, the Office of Sustainability has a five-component strategy: 1) Environmental Stewardship; 2) Climate Action and Resilience; 3) Equity and Social Justice; 4) Collaboration and Partnerships; and 5) Education and Engagement. The Office of Sustainability provides leadership for the comprehensive, citywide Climate Action Plan. This plan addresses energy, food, land use, transportation, waste and water. The Office of Sustainability seeks to advance Hartford's economy, improve public health and quality of life, and promote social equity while ensuring that Hartford becomes a global leader in environmental stewardship. Under the guidance of the Office of Sustainability, and in consultation with the PCAP, the partners for this EPA proposal determined the highest priority project that would maximize GHG reductions and quality-of-life improvements for the City's most disadvantaged residents.

Cecelia Drayton is Director of the Office of Sustainability and will serve provide senior-level oversight for the partnership and activities anticipated in this proposal. She holds a Master's of Applied Science in Environmental Policy and Management with a concentration in Energy and Sustainability from the University of Denver and a Bachelor's of Science and Technology in Plant Science from the State

University of New York. Before joining the Office of Sustainability, she served as the Residential Deputy Program Manager at Leidos, implementing energy efficiency programs through 25 Community Action Agencies and low-income households throughout the Ameren Illinois utility territory.

The chart on the next page details all of the key staff for this program and their relevant experience. Resumes for these individuals and a job description for the Program Managers to be hired are found as an attachment to this proposal.

Name	Title	Organization	Relevant Experience
Cecelia Drayton	Director of Sustainability	City of Hartford, Office of the Mayor	MSc in Environmental Policy & Management; 13+ years of program, project, and operations management experience in the energy, retail, construction industries, and municipal government
Janice Castle	Director	City of Hartford, Office of Community Engagement	Master's in Public Administration, 7+ years of experience leading Hartford's community outreach and engagement
Sam DeCarlo	Director, Workforce Initiatives	Our Piece of the Pie	BA Graphic Design/Information, 16+ years of experience with workforce development initiatives
Frank Dellaripa	City Engineer/Assistant Director	City of Hartford, Department of Public Works	MS in Management, MS Ocean Engineering, BS Civil Engineering, 35+ years of engineering experience
Paul Drummey	Director of Capital Projects & Operations	City of Hartford Office of the Chief Operating Officer	BSc in Construction Management, 15+ years experience in construction/construction management
Matthew Keith	Vice President, Energy Projects	Bridge Energy Services	BSc Mechanical Engineering, nearly 10 years' experience managing client energy conservation projects in excess of \$100M annually
Zach Lerner	Energy Systems Analyst	Bridge Energy Services	BSc Mechanical Engineering, 4+ years' experience in civil engineering work
Joseph Marsalisi	Director, Renewable Energy	Bridge Energy Services	BSc Environmental Earth Science, 5 years' work experience in renewable energy
Yousheng Mao	Traffic Engineering Services Manager	City of Hartford, Department of Public Works	MSc Civil Engineering, 18+ years experience in corridor/intersection improvement study, traffic signal timing, traffic signal design, traffic safety study and traffic modeling/simulation.
Kory Mills	Performance Manager	City of Hartford, Office of the Chief Operating Officer	Master's in Public Administration, 7 years in city government and 2 years using data to evaluate efforts and identify opportunities for improvement

			and response to organizational and community needs
Katelyn Pidala	Sustainability and Renewable Energy Analyst	Bridge Energy Services	BS Environmental Studies & Economics, 3+ years' experience in renewable energy
Mark Sassi	Vice President, Operations & Information Systems	Bridge Energy Services	BS Economics-Finance, 10+ years' experience in risk management for energy assets plus 4 years' insurance industry experience
Sebastian Tata	Traffic Operations Engineer	City of Hartford, Department of Public Works	BSc Civil Engineering, BS Construction Management, nearly 30 years' engineering experience

In addition to the above key staff, two program managers will be hired to assist in the management of funds, ensure smooth communication among the partners, conduct program reporting, plan and facilitate meetings, produce program materials and the like. The partners will utilize Microsoft Project to track program activities and progress against milestones.

An Air Aware Steering Committee will be convened to represent a cross-section of all City departments and organizations throughout the life cycle of the grant. The Committee will be balanced to represent each PCAP measure area of electricity generation, transportation and buildings. The Steering Committee will be led by Hartford's Director of Sustainability, and it will include eleven permanent members from the city departments and organizations who are involved with direct project implementation and/or outreach and education (Department of Public Works, Chief Operating Officer, Office of Central Grants, Office of Community Engagement.) Six Air Aware Steering Committee slots will be reserved for nominations from the program partners to be appointed on an annual basis in alignment with the core activities for a given year. The Steering Committee will meet as needed during the initial program launch and then bi-weekly throughout the grant cycle and will cover measures reporting for each project.