

Accelerating Emissions Reduction at Delaware Wastewater Treatment Plants

The Delaware Department of Natural Resources and Environmental Control (DNREC) is applying for U.S. Environmental Protection Agency (EPA) Climate Pollution Reduction Grant (CPRG) implementation funding to pass through to county and municipal governments to reduce energy-related and non-energy related emissions at wastewater treatment facilities across the State. The largest facility in the State, the City of Wilmington Wastewater Treatment Plant (WWTP), is seeking funding for improvements to two treatment processes that would reduce methane emissions and energy consumption (Measures 1 and 2 respectively). The success of these two projects will be proof-of-concept for a statewide program (Measure 3) to spur adoption of innovative technology and increase energy efficiency at facilities throughout Delaware.

1. OVERALL PROJECT SUMMARY AND APPROACH

There are 31 publicly owned wastewater collection systems in Delaware. Of those 31, 21 include water treatment and 10 are collection-only systems. The 21 public wastewater treatment plants (WWTPs) provide centralized collection and treatment for the entire State of Delaware. More than half of the systems with centralized collection are serviced at the Wilmington WWTP, which is the largest in Delaware and provides secondary treatment before discharge to surface waters. The average daily flow at the Wilmington WWTP is 68.7 MGD with a design capacity of 165 MGD. According to the Delaware Wastewater Needs Assessment¹ The other six treatment plants in New Castle County handle a total average daily flow of 3.4 MGD. The 14 public treatment plants in Kent and Sussex counties have average daily flows of 14.0 and 13.6 MGD, respectively. Due to its size and population served, taking steps to decarbonize operations at Wilmington WWTP presents the biggest opportunity in this sector in Delaware.

Wastewater treatment processes, while essential for clean water and human health, can also be sources of air pollutants. Wilmington WWTP treatment processes include screening, grit removal, primary clarification, conventional secondary aeration, final clarification, open air tertiary ponds, and chlorination to remove bacteria and pathogens prior to effluent release back into the natural environment. The Wilmington WWTP solids process is equipped with gravity thickeners, gravity belt thickeners (GBT), GBT holding tanks, anaerobic digesters, centrifuges, and a dryer. Anaerobic digestion uses a reduced oxygen environment to break down the organic matter in wastewater. This is an efficient solids stabilization process which produces biogas, a type of methane-rich gas that can be used for energy. Wilmington WWTP produces biogas for reuse on site in sludge heaters, hot oil boilers, and generators that send power to the WWTP. However, anaerobic digestion also creates methane (CH₄), a high global warming potential, short-lived greenhouse gas (GHG). When methane escapes into the atmosphere from anaerobic digestion, it contributes significantly to climate change. In addition to CH₄, anaerobic digestion also produces GHGs carbon dioxide (CO₂) and nitrous oxide (N₂O). Other pollutants such as volatile organic compounds (VOCs), particulate matter (PM), nitrogen oxides (NO_x), sulfur oxides (SO_x), and ammonia (NH₃) can have significant impacts on environmental air quality and human health. These pollutants are released when fossil energy is combusted to power WWTP operations. Both

¹ URL: <chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://documents.dnrec.delaware.gov/fab/Documents/DE-WWTP-Needs-Assessment-4-10-20.pdf>

improvement in the anaerobic digestion process and energy efficiency upgrades that reduce the need for gas or electric energy consumption reduce the carbon “footprint” of plant operations and result in air quality and human health improvements.

Wastewater accounts for about 1.5% of global emissions², just below the climate harm caused by the global aviation industry. Yet wastewater can be part of climate solutions. With investment from the U.S. EPA Climate Pollution Reduction Grant (CPRG) Implementation opportunity, City of Wilmington can more efficiently operate and generate biogas for reuse on site to reduce emissions while providing a proof of concept for other, smaller WWTPs statewide to accelerate emissions reduction. According to the 2020 Delaware Greenhouse Gas Inventory, emissions from wastewater treatment account for 1.2% of total state GHG emissions³. Table 1 shows GHG emissions from wastewater treatment CH₄ and N₂O emissions.

Table 1. GHG Emissions from the Waste Management Sector by Source and Year (MMTCO₂e)

Source	1990	2005	2018	2019	2020
Wastewater Treatment	0.12	0.16	0.22	0.20	0.19

A challenge in the wastewater treatment sector is that emissions are inextricably linked to population. As population increases, so does human waste and the need for wastewater treatment. GHG emission projections in the waste management sector show an increase of 88.0%, or 0.5 MMTCO₂e, between 2020 and 2050. Taking action to reduce emissions via technological and energy efficiency upgrades in this sector is critical to Delaware meeting the goals outlined in the Climate Change Solutions Act of 2023⁴ a 50% net reduction of GHG emission by 2030, and net-zero GHG emissions by 2050. As Delaware is already experiencing harmful impacts from the effects of climate change, it is critical to continue to reduce GHG emissions by implementing policies and programs outlined in Delaware’s Climate Action Plan. Delaware’s Climate Action Plan calls for action to incrementally increase the efficiency of industrial processes and reduce methane emissions through expanded methane capture. The demonstration projects at Wilmington WWTP outlined in Measures 1 and 2 and the statewide program outlined in Measure 3 accelerates Delaware progress toward the strategies Delaware’s Climate Action Plan and aligns with measures in the Delaware Climate Pollution Reduction Plan related to reducing methane emissions and industrial energy efficiency.

Description of GHG Reduction Measures

Reduction Measure 1: Reducing methane leakage during anaerobic digestion at Wilmington WWTP

The City of Wilmington maintains a GHG inventory (Appendix B) tracking emissions from city operations dating back to 2010. The most recent of which is the 2022 GHG Inventory, in which total Wilmington

² URL: <https://www.unep.org/news-and-stories/press-release/down-drain-lies-promising-climate-and-nature-solution-un-report>

³ URL: <https://www.epa.gov/system/files/documents/2024-03/dnrec-cprp.pdf>

⁴ URL: <https://dnrec.delaware.gov/climate-plan/>

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government GHG emissions was 28,791 metric tons of CO₂ equivalent (MTCO₂e), compared to the 2010 baseline year 42,206 MTCO₂e (a 32% reduction). WWTP operations account for the majority (53.9%, or 19,075 MTCO₂e) of these emissions. The inventory includes GHG emissions from the following categories; City Buildings, Street Lights and Traffic Signals, Vehicle Fleet, and Water and WWTP Operations. Wilmington's WWTP is the largest in the State and provides wastewater treatment services to customers within its municipal boundaries (approximately 70,000 customers) and to one wholesale customer, New Castle County (approximately 550,000 customers in northern New Castle County and two townships in Southeast Pennsylvania).

The WWTP is a conventional, activated sludge plant with a peak primary design capacity of 340 MGD and a peak secondary design capacity of 168 MGD. The backbone of the City's wastewater treatment system was built in the 1950s with the construction of intercepting sewers and a treatment plant providing the equivalent of primary treatment and digestion of primary sludge. The secondary treatment processes (activated sludge process and electrical equipment) were constructed in 1971 and expanded in 1993. While the primary sources of energy related GHG emissions at the Wilmington WWTP are purchased electricity and natural gas, significant non-energy related GHG emissions are generated in anaerobic digestion (process CH₄ from digestate) and when nitrogen in plant discharge is converted to nitrogen dioxide in the natural environment (process N₂O in effluent discharge).

The City's Renewable Energy and Biosolids Facility (REBF) is the only of its kind in the State which captures biogas derived from anaerobic digestion to generate electric power for beneficial reuse onsite. Wilmington is targeting high impact measures to further reduce process emissions from anaerobic digestion. While the facility is already capturing methane gas from the plant's anaerobic digester and from the neighboring Cherry Island Landfill to generate electricity in their two, 2-megawatt (MW) engines, the Wilmington WWTP's aging infrastructure is a source of GHG emissions. Wilmington WWTP is seeking funds to replace one of five anaerobic digester floating steel covers with a new, fixed steel cover and appurtenances. Wilmington WWTP also proposes to recoat and seal the concrete structure of the same digester. Both the aging floating, steel cover and aging concrete structure are sources of methane leakage which when rehabilitated, will more effectively trap gases for reuse in the REBF. Reducing methane leakage during anaerobic digestion processes at Wilmington WWTP can result in 3,037 MTCO₂e by 2030, as outlined Technical Appendix A.

Tasks and Milestones

In addition to regularly scheduled progress meetings with City of Wilmington Staff, DNREC proposes the following tentative major task and milestone dates related to engineering design, equipment ordering, and construction;

1. Engineering Planning and Design - DNREC and the City of Wilmington will complete the design for the project in appropriate increments. Necessary permits will be obtained from all appropriate local, state, and federal agencies for construction activity and environmental quality reviews.
2. Equipment Order - DNREC and the City of Wilmington will procure necessary equipment for the mitigation measure in compliance with 2 CFR Part 200, 2 CFR Part 1500, and 40 CFR Part 33. Equipment procurement will occur immediately after design to ensure the timely arrival of equipment.
3. Construction Bid and Award - DNREC and the City of Wilmington will undergo procurement for construction services in compliance with 2 CFR 200.

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4. Equipment Delivery - Equipment will be delivered on site by the identified date to ensure construction can occur promptly.
5. Construction and Installation - This will include any necessary site preparation and mobilization and installation of identified mitigation measures.
6. System Testing and Integration - After installation of mitigation measures, the system will be tested to ensure proper integration.

Potential Risks

Risks associated with these projects are minor and limited to risks associated with all capital improvement projects. Risks that could lead to delays or interruptions in this measure's development or implementation include permitting delays. The city must obtain a City of Wilmington construction permit and DNREC construction permit for this measure's implementation. Other impediments may include administrative delays in pass-through dollars and/or delays in materials procurement. GHG emissions reductions calculated for this measure would be affected, delayed until later in the performance period.

Coalition Participation

This is not a coalition application. DNREC is the lead applicant.

Delaware Carbon Pollution Reduction Plan Measure

This GHG reduction measure falls within the bounds of the Delaware Climate Pollution Reduction Plan, GHG reduction Measure 5: Reduce methane emissions across Delaware. This measure focuses on assessing opportunities for reducing methane emissions in the State and facilitating these reductions, through the reduction of methane from landfills through methane capture and waste diversion and leak reductions from utility gas lines. The measure also includes opportunities to capture and beneficially use methane (e.g., from WWTPs) for renewable gas production. This measure specifically calls for action to assess and implement strategies for improving collection efficiencies of sources of methane (e.g., landfill gas, wastewater treatment), as well as assess opportunities to support anaerobic digestion processes that generate biogas from wastewater treatment processes.

Improving methane-reducing technologies, system controls, monitoring, and expanding capture is key to reducing methane, carbon dioxide, and traces of other 'contaminant' gases such as nitrous oxide from wastewater treatment operations. Wastewater treatment facilities can upgrade parts of their treatment processes such as aerobic, anaerobic digestion, and flaring to capture and harvest biogas as a fuel source in combined heat and power gas engines or upgraded to natural gas-quality biomethane for on or offsite use. Furthermore, the nutrient-rich digestate, a byproduct of this process, can also be dried and transported offsite for used as fertilizer which further reduces waste and vehicle trips off site. Such process improvements reduce methane leakage, produce biogas for reuse, and can even reduce operating costs when paired with energy efficiency enhancements (see Reduction Measure 2) to process blowers, pumps, and motors.

Reduction Measure 2: Reducing energy-related emissions at Wilmington WWTP

The City of Wilmington is currently developing an Energy Management and Greenhouse Gas Reduction Plan with the goal of achieving the city commitment to a 50% GHG reduction from 2010 baseline levels by 2030. This goal matches the Delaware Climate Change Solutions Act of 2023, calling for a 50% GHG reduction from 2005 baseline levels by 2030 and net-zero by 2050. In preparing the Energy

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Management and Greenhouse Reduction Plan, the City of Wilmington partnered with the University of Delaware, Industrial Assessment Center in 2022 to complete an energy baseline assessment (Appendix D). The University of Delaware Industrial Assessment Center provides free energy, productivity, and waste assessments to small and medium-sized industrial facilities through funding provided by the U.S. Department of Energy. A major pathway to reducing GHGs at industrial facilities is by reducing energy use. Reducing energy use means less fuel needed to generate electricity and less GHGs and other air pollution emitted. Projects such as adding variable frequency drives (VFDs) to aeration blowers can reduce energy use by giving more granular control over the speed of the equipment to adapt to different process flow needs. By replacing blowers alone, the Wilmington WWTP can reduce 19,205 MTCO₂e by 2030, as outlined in Technical Appendix A.

The University of Delaware audit measured actual power draw for major equipment processes including sludge transfer pumps and blowers. The assessment identified that the Wilmington WWTP existing single-speed centrifugal blowers are a major energy consumer in the plant's energy portfolio. There are 14 existing aeration blowers, which provide air to the aeration basins in the secondary treatment process. Replacing those existing, single-speed centrifugal blowers with modern blowers with VFDs will significantly reduce energy use at the WWTP (Technical Appendix A). This project also necessitates upgrades to power supply, instrumentation, and air piping that will eliminate air leakage, another inefficiency in Wilmington WWTP's aging secondary treatment process infrastructure.

Measures such as these that involve upgrading aging infrastructure with new innovative, energy-efficient technology are simple and replicable throughout the State. While other county and municipal governments that were engaged as a part of the development of the Delaware's Climate Pollution Reduction Plan were not as far along as the City of Wilmington in assessing their baseline energy use, there was much interest in completing baseline assessments such as the U.S. Department of Energy (DOE) assessment that the City of Wilmington pursued. In Measure 3, DNREC proposes replicating Wilmington WWTP's process to make similar upgrades to pumps, blowers, and other aging mechanical equipment at WWTPs throughout the State.

Tasks and Milestones

In addition to regularly scheduled progress meetings with City of Wilmington staff, DNREC proposes the following tentative major task and milestone dates related to engineering design, equipment ordering, construction, and monitoring;

1. Engineering Planning and Design - DNREC and the City of Wilmington will complete the design for the project in appropriate increments. Necessary permits will be obtained for construction activities and environmental reviews.
2. Equipment Order - DNREC and the City of Wilmington will procure necessary equipment for the mitigation measure in compliance with 2 CFR Part 200, 2 CFR Part 1500, and 40 CFR Part 33. Equipment procurement will occur immediately after design to ensure the timely arrival of equipment.
3. Construction Bid and Award - DNREC and the City of Wilmington will undergo procurement for construction services in compliance with 2 CFR 200.
4. Equipment Delivery - Equipment will be delivered on site by the identified date to ensure construction can occur promptly.
5. Construction and Installation - This will include any necessary site preparation and mobilization and installation of identified mitigation measures.

6. System Testing and Integration - After installation of mitigation measures, the system will be tested to ensure proper integration.

Potential Risks

Risks associated with these projects are minor and limited to risks associated with all capital improvement projects. Risks that could lead to delays or interruptions in this measure's development or implementation include permitting delays. The city must obtain a City of Wilmington construction permit and DNREC construction permit for this measure's implementation. Other impediments may include administrative delays in pass-through dollars and/or delays in materials procurement. GHG emissions reductions calculated for this measure would be affected, delayed until later in the performance period.

Coalition Participation

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Delaware Carbon Pollution Reduction Plan Measure

Throughout Delaware Climate Pollution Reduction Plan engagement, DNREC heard from multiple local and municipal government entities that increasing energy efficiency from wastewater treatment facilities throughout the State were a priority and high impact GHG reduction measure. There are 21 publicly owned WWTPs in Delaware that provide centralized collection and treatment to Delaware's one million residents. WWTPs are significant contributors to the State's overall GHG emissions, particularly in the form of methane, but also due to the large energy requirements for the treatment process. Implementing energy efficiency measures and expanding renewable energy production at WWTPs, an element of industrial-style energy efficiency, presents a significant opportunity to reduce energy demand in the State and achieve substantial GHG reduction.

This GHG reduction measure is most closely related to the Delaware Climate Pollution Reduction Plan Measure Four: Provide assistance and support for industrial decarbonization. This measure focuses on facilitating emission reductions in industrial operations, with a focus on energy efficiency for energy-intensive industries and resulting transition of these emissions and energy-intensive sectors to lower emissions operations. This measure specifically calls for action to improve industrial energy efficiency by expanding energy efficiency incentive programs to promote more frequent energy efficiency upgrades targeting the 10 highest energy users in Delaware, including municipal operations at water and wastewater treatment plants.

Reduction Measure 3: A statewide program to baseline and reduce energy-related emissions at wastewater treatment facilities throughout Delaware

Improving energy efficiency in wastewater treatment facilities throughout Delaware – and not just at Wilmington WWTP - is essential not only for reducing GHGs but also reducing operating costs for counties and municipalities. Since these facilities can be significant consumers of energy - due to the intensive processes involved in moving water through the treatment process - enhancing energy efficiency offers many benefits. Strategies to reducing energy consumption at WWTPs include the following measures:

1. Optimizing aeration - Aeration is one of the most energy-intensive processes in wastewater treatment and is used to provide oxygen to bacteria that break down organic matter in the

secondary treatment process. Advanced system controls adjust oxygen supply to demand, reducing energy use in the treatment process.

2. Adopting high-efficiency equipment and innovative process controls - replacing aging mechanical equipment such as pumps, blowers, and motors with high-efficiency models can lead to substantial energy savings.
3. Recovering energy from waste products - Through processes like anaerobic digestion, facilities can convert organic waste into biogas, a renewable energy source. This biogas can be used for cogeneration on site with electricity or heat, offsetting energy consumption.
4. Pairing renewable energy - Installing solar panels, wind turbines, or hydroelectric systems can provide a sustainable and cost-effective energy supply for wastewater treatment operations, reducing reliance on fossil energy sources.
5. Upgrading buildings lighting and HVAC systems - Replacing conventional lighting with energy-efficient LED lighting and upgrading heating, ventilation, and air conditioning (HVAC) systems with all electric heat pumps where applicable can reduce energy usage in facility buildings.
6. Building envelope and design improvements - Enhancing the insulation of pipes and buildings and adopting energy-efficient building designs can minimize energy loss.

By implementing these strategies, wastewater treatment facilities can enhance their energy efficiency, reduce operating costs, and contribute to improved air quality in the region they serve. Conducting a baseline energy audit and assessment is an excellent first step for facilities such as these because it identifies areas for improvement, allows facility operators to track the progress of measures, and highlights opportunities for further savings.

It is apparent in the Delaware Wastewater Needs Assessment that most wastewater service providers throughout the State are constrained by limited funds. Wastewater system owners and operators juggle treating increasing flows with sustainably and maintaining compliance with water regulations.

Delaware's Water Pollution Control Revolving Fund⁵ (SRF), also called Delaware Water Pollution Control Revolving Fund, provides low-interest loans and can facilitate solutions by working with county and municipal operators to encourage communities to reevaluate the plant capacities, growth projections, and the cost/benefit analysis of efficiencies. The SRF is set up in accordance with the requirements of Title VI of the federal Water Pollution Control Act and administered by DNREC's Environmental Finance Office. Through a competitive process, funds are allocated to promote water quality improvements for municipal wastewater treatment projects, nonpoint source pollution abatement projects, watershed protection, restoration, and estuary management projects. Only 10 percent of the annual federal funding must qualify as "Green Project Reserve," which are projects with short- and long-term goals aimed at water, energy efficiency, green infrastructure, and utilizing environmentally innovative technologies. While the SRF does cover WWTP improvements, energy efficiency is not the highest priority. Furthermore, the SRF issues loans which are not as easily deployed as grants for local governments. Delaware municipalities can be constrained by match requirements. Direct pass-through grants via the CPRG would accelerate these efficiency upgrades and lead to shorter-term emissions reduction than if Delaware waited for these projects to be funded by the counties, municipalities, and SRF alone.

The Delaware Wastewater Needs Assessment states that total capital project costs reported for 2020-2025 for the State of Delaware are \$1.134 Billion. These estimates are based on reported capital

⁵ URL: <https://dnrec.delaware.gov/environmental-finance/revolving-fund/>

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improvement plans of \$836.4M, \$47.3M, and \$250.5M for public wastewater systems in New Castle, Kent, and Sussex counties, respectively. Absent SRF funding, projects are funded by county and municipalities via general obligation funds, water, and sewer bill revenue. This represents the portion of work underfunded to advance wastewater decarbonization and the benefit of having a direct grant program to complement the SRF.

This statewide program will mirror engagement and major milestones in the SRF process. The first step will be an energy assessment for the counties and municipalities in the SRF Priority Project listing. An assessment includes selecting an audit team, preparing a site walk through, and collecting energy bills and other data for a preliminary analysis of the primary energy consuming equipment on site. Audit execution involves development of an inventory and energy baseline, analyzing energy use patterns, financial analysis, and developing recommendations. An audit report will be prepared with project recommendations along with an action plan for project implementation. WWTP systems such as fan, blower, and pump systems, electric or gas motor systems, heating, and lighting systems will be assessed. The assessment usually includes a cost-benefit and pay-off period for the life cycle of efficiency upgrades adopted.

Funds will be used for implementing recommendations in the energy assessment findings and awarded based on criteria in this grant opportunity including cost effectiveness, durability of emissions reduction to 2030, 2050 and shovel-readiness.

Tasks and Milestones

In addition to regularly scheduled progress meetings with the staff identified in DNREC's project team (Section 6), DNREC proposes the following tentative, major tasks and milestone dates related to creating a statewide program:

1. Engagement with DNREC Office of Finance, Water Infrastructure Advisory Council staff on 2024 Priority Projects on the Delaware Clean Water State Revolving Fund queue.
2. Host meetings with counties and municipalities seeking funding through the SRF to discuss mechanical equipment and buildings upgrades proposed in the State Wastewater Need Assessment.
3. Bid, award, formal procurement of professional services for industrial energy efficiency audits for counties and municipalities seeking energy efficiency assessments to prioritize efficiency measures at their facilities.
4. Conduct audits and complete energy efficiency assessments. Host debrief meetings with county and municipal staff. Meetings will include educational components for staff on audit methodology, the benefits of measures proposed, and verification and measurement post-installation. Prioritize energy efficiency measures with highest energy and bill saving potential.
5. Work with Water Infrastructure Advisory Council and DNREC Office of Finance staff to pass-through funds to selected entities. Track and manage project execution milestones associated with efficiency projects.
6. Equipment Order - Procure necessary equipment for the mitigation measure in compliance with 2 CFR Part 200, 2 CFR Part 1500, and 40 CFR Part 33. Equipment procurement will occur immediately after design to ensure the timely arrival of equipment.
7. Construction Bid and Award - County or municipality will procure for construction services in compliance with 2 CFR 200.
8. Equipment Delivery - Equipment will be delivered on site by the identified date to ensure construction can occur promptly.

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9. Construction and Installation - This will include any necessary site preparation and mobilization and installation of identified mitigation measures.
10. System Testing and Integration - After installation of mitigation measures, the system will be tested to ensure proper integration.

Potential Risks

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Coalition Participation

This is not a coalition application. DNREC is the lead applicant

Delaware Carbon Pollution Reduction Plan Measure

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Demonstration of Funding Need

This is the only funding source for which DNREC has applied for GHG reduction at wastewater treatment facilities.

Despite the large opportunity to reduce GHGs quickly and cost-effectively via methane capture and energy efficiency at WWTPs, there are no existing grant programs targeted toward this sector. This application is for two discrete pilot projects by the City of Wilmington and a statewide program to accelerate energy efficiency at WWTPs throughout the state. This funding will provide a formative opportunity to build partnerships on projects with no dedicated funding source. Funding sources currently available for wastewater treatment projects come from the county or municipality general funds, bill revenue, or general obligation bonds - government-issued bonds that are repaid from state or local general funds or a dedicated tax. WWTPs in Delaware can also apply for SRF loans and other grant opportunities as they become available however these sources have been inadequate in the past.

Delaware does manage the Energy Efficiency Investment Fund (EEIF), which provides financial incentives to commercial and industrial facilities to reduce their energy use. However, there are currently gaps in eligibility of industrial entities for EEIF grants. The EEIF Program is available to all non-residential, commercial, and industrial buildings in Delaware and is funded by the Delaware Public Utility Tax (PUT), which is paid by certain non-residential consumers on their electric and/or natural gas utility bills.

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Currently, customers who do not pay the PUT are not eligible. Implementing projects that support industrial decarbonization of municipal operations such as drinking water, stormwater, and wastewater treatment are examples of energy-intensive industrial processes that have historically been ineligible. Furthermore, competitive SRF are loaned funds, not grants, and are limited in what they can allow in terms of innovative technologies that reduce GHG emissions. This is why DNREC seeks federal funding to implement Measures 1 and 2. These projects, if sufficiently funded, will serve as proof-of-concept for other municipalities to reduce energy and non-energy-related emissions in their operations (Measure 3). These projects are replicable across the State and could serve as justification for expanding EEIF eligibility.

Transformative Impact

GHG reduction measures proposed in this application can create transformative opportunities that can lead to significant, short-term GHG emission reductions in Delaware. When discussing mitigation options, carbon dioxide tends to receive the lion's share of the attention, due to the sheer volume of anthropogenic CO₂ emissions compared to other GHGs. However, methane plays an equally crucial role. Methane comprises 18% of GHG emissions globally and has a disproportionate impact on near-term temperatures. The latest working group report from the Intergovernmental Panel on Climate Change (IPCC) estimates that methane accounts for almost a third of the warming observed to date⁶. This outsized impact is due to methane's high global warming potential (GWP): pound for pound, methane is 28 times more potent than CO₂ at trapping heat. At the same time, methane has a much shorter lifespan in the atmosphere than carbon dioxide, meaning that the effects of methane emission reduction are felt immediately, unlike carbon dioxide which can linger in the atmosphere for decades and in the ocean for centuries. This combination of high GWP and short lifespan makes methane an ideal candidate for rapid near-term mitigation efforts. According to the most recent figures from the Global Methane Budget, waste accounts for 73 Mt of methane emissions globally, or around 21% of anthropogenic methane emissions. The U.N. Environment Programme⁷ estimates that up to 45% of anthropogenic methane emissions could be eliminated using current technology within the decade, leading to 0.3 degrees Celsius of warming averted. Additionally, methane mitigation has immediate public health co-benefits⁸. Methane is a known precursor to tropospheric ozone, which harms human health and can exacerbate respiratory conditions such as emphysema, bronchitis, and asthma.

GHG Reduction Measure 1, reducing methane leakage during anaerobic digestion at the Wilmington WWTP is a scalable project because this project improves methane capture for one of five digesters. This project will show GHG emissions reductions that can be expanded to further reduce methane leakage during the anaerobic digestion process. Methane is a hard-to-abate sector, where GHG emission reduction measures are not widely adopted, and the success of this project can accelerate the deployment and market adoption of emerging GHG emission reduction technologies and explore new

⁶ IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926

⁷ URL:<https://www.iea.org/reports/global-methane-tracker-2022/methane-and-climate-change>

⁸ URL:<https://www.unep.org/news-and-stories/story/methane-emissions-are-driving-climate-change-heres-how-reduce-them>

and innovative monitoring methodologies (Technical Appendix A). With the success of this project, Wilmington may be willing to make improvements to other digesters in their portfolio.

GHG Reduction Measures 2 and 3, reducing energy-related emissions at the Wilmington WWTP and throughout Delaware, is an opportunity to amplify the impact at Wilmington and spur additional innovation statewide. Energy efficiency upgrades to Wilmington WWTP secondary treatment blowers is a replicable and scalable program. Improving energy-related emissions from mechanical equipment at WWTPs such as aeration blowers, pumps, sludge heater and dryers can also be paired with more common energy efficiency buildings upgrades such as LED lighting and HVAC. This investment can transform the market and accelerate deployment and adoption of emerging GHG emission reduction technologies.

2. IMPACT OF GHG REDUCTION MEASURES

Magnitude of GHG Reductions from 2025 through 2030

Reduction Measure 1: Wilmington WWTP - Reducing Methane Leaking During Anaerobic Digestion

It is estimated that for Reduction Measure 1, the cumulative GHG emission reductions will be 3,037 MTCO₂e over the period 2025-2030. These reductions are durable and are not expected to decline over the five-year period as they are realized through replacement of the floating steel cover of Digester 4 with a fixed steel cover. The fixed steel cover will reduce methane leakage from the digester by providing physical containment of the methane gases and maintaining a controlled pressure environment. The cover will also improve efficiency of the digestion process by maintaining anaerobic conditions within the digester and limiting temperature fluctuations. The capture of the methane gas eliminates the release of methane to the environment and allows the gas to be used as an energy resource to power elements of the WWTP.

The design life of the fixed steel cover is assumed to be 30 years based on market research. The efficacy of the cover is not anticipated to measurably decline prior to 2030. It is assumed that if an award is made by October 1, 2024, the measure will be implemented by 2026.

Reduction Measure 1: Reduce Methane Leakage (in MTCO ₂ e)	
Cumulative Reduction 2025-2030	3,037

Reduction Measure 2: Reducing energy-related emissions at Wilmington WWTP

The Wilmington WWTP currently has 14 existing aeration blowers which provide air to the plant's secondary treatment aeration basins. Based on the recommendations of an Industrial Assessment conducted by the University of Delaware, Reduction Measure 2 proposes to replace all 14 of Wilmington WWTP's existing single-speed multi-stage centrifugal blowers with modern blowers and VFDs, including power supply, instrumentation and supervisory control and data acquisition (SCADA), and blower appurtenances.

The design life of the new blowers is assumed to be 25 years based on market research. The efficacy of the pumps is not anticipated to measurably decline prior to 2030. It is assumed that if an award is made by October 1, 2024, the measure will be implemented by 2026.

Reduction Measure 2: Reducing energy-related emissions at Wilmington WWTP (in MTCO ₂ e)	
Cumulative Reduction 2025-2030	19,205

Reduction Measure 3: A statewide program to baseline and reduce energy-related emissions at wastewater treatment facilities throughout Delaware

Reduction Measure 3 is a replicable and scalable program modeled on the energy efficiency improvements achieved via the blower replacement at the Wilmington WWTP. The program would provide direct pass-through grants to wastewater utilities in Delaware and would initially focus on blower replacement projects. It is assumed that on a per dollar basis, the new blowers will achieve energy savings comparable to that at the Wilmington WWTP once installed. The reductions calculated from 2025-2030 are proportional to the planned phasing of the program funding.

Reduction Measure 3: Statewide Program (in MTCO ₂ e)	
Cumulative Reduction 2025-2030	4,957

Reduction Measure 1-3: Sum Total (in MTCO ₂ e)	
Cumulative Reduction 2025-2030	27,199

Magnitude of GHG Reductions from 2025 through 2050

Reduction Measure 1: Wilmington WWTP - Reducing Methane Leaking During Anaerobic Digestion

It is estimated that for Reduction Measure 1, the cumulative GHG emission reductions will be 15,183 MTCO₂e over 2025-2050. These reductions are durable as they are realized through replacement of the floating steel cover of Wilmington WWTP's Digester 4 with a fixed steel cover. By physically preventing leakage to the natural environment and improving efficiency of the digester process, the previously emitted methane can be captured for beneficial reuse onsite thus reducing the need for additional energy sources.

Reduction Measure 1: Reduce Methane Leakage (in MTCO ₂ e)	
Cumulative Reduction 2025-2050	15,183

Reduction Measure 2: Reducing energy-related emissions at Wilmington WWTP

It is estimated that for Reduction Measure 2, the cumulative GHG emission reductions will be 96,025 MTCO₂e over the period 2025-2050. These reductions are durable as they are realized through replacement and upgrade of the WWTP's aeration blowers. The GHG reductions represent the annual energy savings achieved via utilization of the more modern and efficient blowers.

Reduction Measure 2: Reducing energy-related emissions at Wilmington WWTP (in MTCO ₂ e)	
Cumulative Reduction 2025-2050	96,025

Reduction Measure 3: A statewide program to baseline and reduce energy-related emissions at wastewater treatment facilities throughout Delaware

It is estimated that for Reduction Measure 3, the cumulative GHG emission reductions will be 34,056 MTCO₂e over the period 2025-2050. These reductions are durable as they are realized through funding provided for the replacement and upgrade of WWTP aeration blowers throughout Delaware. Reduction Measure 3 is a replicable and scalable program based on Reduction Measure 2. The GHG reductions represent the annual energy savings that will be achieved via utilization of the more modern and efficient blowers which will be funded via the direct pass-through grant funding.

Reduction Measure 3: Statewide Program (in MTCO ₂ e)	
Cumulative Reduction 2025-2050	34,056

Reduction Measures 1-3: Sum Total (in MTCO ₂ e)	
Cumulative Reduction 2025-2050	145,264

Cost Effectiveness of GHG Reductions

Cost effectiveness of GHG reductions = (Requested CPRG funding) / (Sum of Quantified GHG reductions from CPRG funding from 2025-2030)	
Reduction Measures 1-3: Requested CPRG Funding	\$38,960,532
Reduction Measures 1-3: Cumulative Reduction 2025-2030 (MTCO ₂ e)	27,199
Cost effectiveness of GHG reductions	\$38,960,532/27,199
Cost effectiveness of GHG reductions	\$1,432 per MTCO ₂ e

Factors Affecting Cost Effectiveness

Cost estimates for Reduction Measure 1 were developed based on the Wilmington WWTP Engineering Manager's best professional judgment. Costs for equipment, professional services and associated budget have been detailed by the City of Wilmington, as this project is part of their existing planning documentation. Factors affecting the cost effectiveness of this measure could include variables such as:

- Unexpectedly increase in materials and/or labor costs
- Supply chain availability
- Unplanned maintenance or repair costs
- Higher than expected leakage rates once the new cover is installed

Cost estimates for Reduction Measure 2 were developed based on the Wilmington WWTP Engineering Manager's best professional judgment. Costs were estimated using details from Wilmington's DOE energy assessment and preliminary scoping by the City of Wilmington. Factors affecting the cost effectiveness of this measure could include variables such as:

- Unexpectedly increase in materials and/or labor costs
- Supply chain availability

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- Unplanned maintenance or repair costs
- Less energy savings than estimated by the Industrial Assessment

The Reduction Measure 3 budget for the statewide program was informed by Wilmington’s strategy for reducing energy consumption at their site. Cost was estimated for the statewide program by reviewing the improvement plans in the Delaware Wastewater Needs Assessment for each facility in the state. Cost estimates for all pump and blower replacement projects proposed in the 5 year plan were used to estimate the Reduction Measure budget. Factors affecting the cost effectiveness of this measure could include variables such as:

- Variability in energy savings between WWTPs when new blowers are installed
- Delays in implementation or changes to phasing of program funding
- Variability in cost of installation between WWTPs

Documentation of GHG Reduction Assumptions

The GHG cost-effectiveness measure as stipulated by the EPA CPRG Grant Notice of Funding Opportunity formula does not consider savings beyond the year 2030. Additional cost effectiveness data calculating savings for Reduction Measures 1-3 through the year 2050 is available in Technical Appendix A.

3. ENVIRONMENTAL RESULTS – OUTPUTS, OUTCOMES, AND PERFORMANCE MEASURES

Expected Outputs

Work products that will be provided to U.S. EPA over the performance period include both qualitative and quantitative deliverables. Examples of outputs from the implementation of GHG reduction measures funded in this application include:

1. Equipment or technology installations
2. Municipalities assisted with funds provided under this opportunity
3. Regular progress reports and a final report to U.S. EPA

Expected Outcomes

Direct results and effects for carrying out these measures and statewide program will result in environmental benefits, increased adoption of GHG –reducing technologies, and health-related positive outcomes for Delawareans.

1. Reduced energy consumption, GHG emissions, and energy bill savings for plant operations.
2. Reduced exposure to criteria air pollutants (CAPs), hazardous air pollutants (HAPs), and unhealthy ambient air quality.

Enhanced level of community engagement as measured by an increased number of ongoing actions to engage with organizations and residents of disadvantaged communities in proximity to the Wilmington WWTP and other treatment facilities in the State.

Performance Measures and Plan

The following performance measures will allow DNREC to track, measure, and report progress back to U.S. EPA toward achieving the expected outputs and outcomes.

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Measure 1 - Wilmington WWTP - Reducing Methane Leaking During Anaerobic Digestion

1. Volume digester methane leakage (lbs.)
2. Volume biomethane generated for reuse onsite (cf)
3. Annual GHG reduction (MTCO₂e /year), CAPs, HAPs*
4. Number of pieces of equipment upgraded (#)
5. Number of projects installed in LIDACs (#)
6. Number public outreach events in LIDACs (#)

Measure 2 - Reducing energy-related emissions at Wilmington WWTP

1. Energy use (in BTUs or kWh) reduced at wastewater treatment plants
2. Post-construction energy bill savings (\$)
3. Annual GHG reduction (MTCO₂e /year)
4. Number of equipment upgraded (#)
5. Number of projects installed in LIDACs (#)
6. Number public outreach events in LIDACs (#)

Measure 3 - A statewide program to baseline and reduce energy-related emissions at wastewater treatment facilities throughout Delaware

1. Energy use (in BTUs or kWh) reduced at wastewater treatment plants
2. Post-construction energy bill savings (\$)
3. Number energy assessment completed (#)
4. Annual GHG reduction (MTCO₂e /year)
5. Number of equipment upgraded (#)
6. Number municipalities taking advantage of funding opportunity (#)
7. Number of projects installed in LIDACs (#)
8. Number public outreach events in LIDACs (#)

*Calculation reflects reductions for the following pollutants: carbon Dioxide (CO₂), Methane (CH₄), CAPs and HAPs (VOC, PM, NO_x, SO_x, and NH₃)

Authorities, Implementation Timeline, and Milestones

DNREC and the City of Wilmington have the existing authority necessary to implement Measures 1-3.

Delaware's Climate Change Solutions Act (7 Del. C. §10000) provides broad statutory authority to support implementation of Delaware's Climate Pollution Reduction Plan. The Act sets medium- and long-term, economy-wide GHG emissions reduction targets, directs state agencies to incorporate climate change into agency operations, decision making, and rulemaking, and establishes a process for completing regular updates to the Delaware CAP to be used as the state's framework for achieving the GHG emissions reduction targets. The Act further ensures coordination between the CAP and State Energy Plan.

Delaware Code (29 Del. C. §8030(b)) instructs DNREC to support implementation of EEIF projects which reduce the use of gas, electricity, or other sources through the issuance of competitive grants, low-interest loans, or other financing support. However, entities that do not pay PUT are not eligible, including municipalities and nonprofit organizations.

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DNREC obtains its authority to regulate and reduce air pollution and air contaminants from legislation passed by the Delaware General Assembly. The following statutes in the Delaware Code establish DNREC's broad authority to regulate air pollution emitted in Delaware: 7 Del. C. §§6002, 6003, 6010 (a)(c). The statutes provide authorities to develop, promulgate, and implement programs, projects, rules, regulations, and plans to regulate and reduce air pollution and air contaminants.

The Water Pollution Control Revolving Fund (29 Delaware Code, §8003 (12) 67 Del. Laws, c. 291), commonly known as the CWSRF, is set up in accordance with the requirements of Title VI of the federal Water Pollution Control Act. It is funded with federal seed grants and matching state funds. The Fund is administered by the Environmental Finance Office, within the DNREC Office of the Secretary. Funds are made available to municipalities, private organizations, nonprofit organizations, and private individuals in the form of low-interest loans, as well as grants to promote water quality improvement projects. Eligible projects include municipal wastewater treatment projects; nonpoint source pollution abatement projects; watershed protection, restoration, and estuary management projects. This statute gives authority to DNREC to operate the program and manage funds and is the State's primary funding source for county and municipal WWTPs.

Furthermore, The City of Wilmington owns and operates the Wilmington WWTP. The city's Department of Public Works is the entity responsible for treating wastewater so it can be returned safely to the environment. Pursuant to Title V permitting, DE Admin. Code 1130, Section 7, the city provides data and certification to the DNREC, Air Quality Management Section that the plant meets all applicable requirements promulgated by the U.S. EPA. DNREC and subgrantee the City of Wilmington cooperation is necessary for GHG reduction measure implementation from an authority to implement, permitting, and licensing perspective.

The Budget Calculations Spreadsheet provides detailed implementation timeline and milestone tasks for each GHG reduction measure.

4. LOW-INCOME AND DISADVANTAGED COMMUNITIES

All measures proposed in this application are designed to deliver benefits to low-income and disadvantaged communities in proximity to wastewater treatment plants in Delaware. DNREC and subgrantees are committed to ongoing meaningful engagement with those communities.

Community Impacts

Not all communities feel the effects of climate change equally. To ensure equitable outcomes and environmental justice for all, it is vitally important to identify, understand, and communicate transparently with communities most immediately affected by climate change impacts. The most prevalent climate risks within Delaware are sea level rise, rising temperatures, and changes in precipitation patterns.

In 2021, Delaware conducted a climate vulnerability assessment as part of the Climate Action Plan. Since 1900, Delaware has experienced over one foot of sea level rise. By midcentury, sea levels are projected to rise another 9 to 23 inches, and up to 5 feet by 2100. In addition, average temperatures have also increased and are projected to continue rising. Since 1895, Delaware's average temperature has risen 2.0 degrees Fahrenheit. Projections indicate average temperatures may be 2.5-4.5 degrees

Fahrenheit warmer by midcentury and 3.5-8.0 degrees Fahrenheit by 2100 (compared to the average for the 1981-2010 period). Furthermore, the number of days above 95.0 degrees Fahrenheit is projected to increase from an average of 5 days to more than 10 days over the next two decades.

Climate change is causing increased variability in precipitation. Annual average precipitation in the State is projected to increase 10% by 2100. The number of very wet days – defined as periods with over 2 inches of rainfall in 24 hours – is expected to increase as well. This has an inextricable impact on wastewater operations in Delaware, particularly in Wilmington where combined sewer overflow (CSO) system collects sewage and rainwater runoff into one conveyance. Furthermore, wastewater treatment process emits potent GHGs such as methane and nitrous oxide.

The State of Delaware recognizes that frontline communities – many of which are low-income, minority neighborhoods that are disproportionately exposed to industrial pollution – are the most impacted by climate change. Wilmington’s urban center is disproportionately experiencing rising temperatures⁹ in heat islands and experiencing increasing frequency of extreme weather events flooding communities in proximity to the Brandywine and Christina Rivers. Several flood events¹⁰ in the past two years have left residents in Wilmington communities displaced from their homes and damaged vehicles and other private property located on low-lying streets. High heat days put families without access to air conditioning and outdoor workers at greater risk of heatstroke.

It is described in Section 1 how the proposed measures mitigate impacts of climate change by reducing common high GWP, short-lived GHGs such as CO₂ and CH₄. However, these projects also mitigate CAPs and HAPs associated with primary and secondary treatment and anaerobic digestion (primarily VOC and other HAPs from those processes directly). Energy-related emissions from powering pumps, blowers, sludge heating, and drying, all emit CAPs such as NO_x, SO_x, CO, and PM during fossil combustion for energy from gas and diesel burning generators.

Capturing more methane during the anaerobic digestion process and reducing the energy-related demand from mechanical equipment will have an immediate benefit to air quality. Reducing the co-pollutants that contribute to respiratory disease and reducing the GHG emissions that mitigate future climate damages from extreme heat and flooding are outcomes that DNREC will address in grant reporting. DNREC and the City of Wilmington prioritize and continue to engage LIDACs to address all considerations discussed through ingrained, comprehensive stakeholder engagement process that will be deployed for Delaware’s upcoming CPRG Program deliverables.

Furthermore, there are economic benefits to reducing operating costs at the Wilmington WWTP. Improvements in energy efficiency result in energy bill relief for the city. This delta in saved energy cost will be available to fund additional investment in frontline communities such as the innovative project South Wilmington Wetland Park in Southbridge, a stormwater improvement project in the adjoining Southridge neighborhood near the Wilmington WWTP. Wilmington Public Works is required to review water and sewer bill rate increases for city residents for every \$500k capital improvement at the WWTP.

⁹ URL: <https://www.udel.edu/udaily/2024/february/climate-hub-wilmington-delaware-heat-watch-urban-heat-mapping/>

¹⁰ URL: <https://www.delawareonline.com/story/news/local/2024/01/23/tropical-storm-ida-research-finds-reasons-for-flooding-in-wilmington/72257791007/#:~:text=It%20wasn't%20a%20hurricane,sunny%22%20when%20the%20floodwaters%20came.>

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This project can abate rate increases in city water and sewer water bills, even as new regulatory requirements for NH₄ removal take effect and necessitate additional plant upgrades.

Identifying Communities

Delaware has existing state-level tools to identify low-income and disadvantaged communities. Due to Delaware's small size, use of state-level tools often provides a more accurate picture of geographic areas of need compared to federal tools. State policy encourages use of the Equity Analysis Tool, developed by the Delaware Department of Transportation (DelDOT), and the EJ Area Viewer, developed by DNREC. Both of these state tools incorporate federal data sets used in the EPA EJScreen tool but couple them with more granular geographic data. The use of these state-level tools is particularly useful for identifying smaller or isolated low-income and disadvantaged communities in more rural areas.

As required by EPA's CPRG guidelines, DNREC also utilized the EPA environmental justice screening tool EJScreen to identify Census Block Groups that the EPA designates as disadvantaged in the State. Using a federal tool in this manner ensures consistent methodology across state boundaries. Using the EJScreen Tool, DNREC identified 189 Census Block Groups as disadvantaged out of 706 total (27%). Of the 189 Census Block Groups identified as disadvantaged using EJScreen, 124 are in New Castle County, 28 are in Kent County, and 37 are in Sussex County. A full listing of the Census Block IDs that are identified as LIDACs by EJScreen in Delaware is included in Appendix C.

Immediately adjacent communities to the Wilmington WWTP include Census Tracts 10003002900, 10003001902, 10003003002, and 10003010704, all of which are designated as disadvantaged communities using the EPA's EJScreen tool and the criteria developed for the CPRG. While the Wilmington WWTP is not identified as a disadvantaged community, it is surrounded by communities with environmental and socioeconomic indicators of disadvantaged communities and health disparities. Neighboring census blocks are impacted by PM, ozone, and toxic releases to air, which are associated with proximity to polluting facilities, and suffer health consequences such as higher cancer risk and respiratory illness. The tract that the Wilmington WWTP occupies, along with the neighboring Cherry Island Landfill and the Edgemoor/Hay Road Energy Center, is not designated as disadvantaged because the area is non-residential and is a source of the pollutants that impact neighboring census tracts. Reducing methane, criteria, and HAPs from Wilmington WWTP will make them a better neighbor and provide impetus for further emissions reduction in the region. Starting with the biggest city in the Delaware is a pragmatic strategy for climate action and provides solutions to many of the State's most vulnerable populations.

Engagement Plan

Intentional engagement, partnerships, and planning with impacted communities is essential to provide meaningful benefits to LIDACs in Delaware. This engagement has been demonstrated through the development of Delaware's Climate Action Plan of 2021, the development of the Delaware Climate Pollution Reduction Plan in 2024, and in planning for the 2025 update to Delaware's Climate Action Plan. DNREC, in partnership with Wilmington, will engage the public in information sessions where community members can learn about the operations, environmental impact, and improvements at the Wilmington WWTP (Appendix E). Enhancing transparency through regular updates on emissions, potential health risks and providing access to technical experts will ensure the communities served can provide input and have questions answered. The development of the Delaware Climate Pollution Reduction Plan kicked off the process of working with local environmental organizations and engaging

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with existing community groups. DNREC looks forward to continuing this dialogue with development of the Comprehensive Climate Pollution Reduction Plan and the development of the larger WWTP energy efficiency program throughout the State (Measure 3).

Furthermore, the city has a history of engaging the public in wastewater and other public work improvement projects. The City of Wilmington engages the public and LIDACs in CSO projects such as the South Wilmington Wetland Park in the Southbridge neighborhood. Projects such as this one is not only an example of Wilmington's ability to engage communities but demonstrates how reducing operational cost for Public Works departments throughout the State can free up funds to invest in large waste and stormwater improvement projects. The City of Wilmington and DNREC plan to work with neighborhood planning councils in closest proximity to the project which include the East Side, 11th St. Bridge, Eastlake, and Riverside neighborhoods, all within the 3rd Councilmanic District of Wilmington. Neighborhood planning councils in these neighborhoods meet regularly to ensure the city is more responsive to the needs of the neighborhood, to develop a problem-solving partnership with agencies, and enable the City's administration to address problems that the community needs assistance in resolving. The project team will present on the proposed wastewater treatment upgrades, inform, and consult neighborhood residents as a part of the engagement strategy for these measures.

DNREC will report on community engagement and evolving strategies for mitigating environmental risks associated with this project to U.S. EPA in regular reports.

5. JOB QUALITY

It is also important to understand how climate action, such as transitioning to low-carbon energy, could impact existing jobs or alter job opportunities. While DNREC and its subgrantee Wilmington are not requesting funding for workforce development activities tied to a proposed measure, both entities are engaged in workforce development efforts that positively impact the water and wastewater sectors and provide opportunities to LIDACs in proximity of the project area.

Workforce Planning and Analysis

As a part of U.S. EPA CPRG Planning Grant, DNREC is engaged in a workforce development assessment which includes a workforce planning and gap analysis. DNREC has hired a consulting firm to conduct a Workforce Planning Analysis in two phases for the CPRG cooperative agreement. Phase 1 will be the baseline assessment and gap analysis of Delaware's green job workforce and associated training or education resources. Phase 2 will involve an in-depth workforce development needs assessment and recommendations for action. The Workforce Planning Analysis will focus on jobs, training, and education needed to implement the Comprehensive Climate Action Plan in Delaware. A formal workgroup will be established for the Workforce Development Assessment and Plan that will involve leaders in water and wastewater sectors in the State. The Delaware Department of Labor and the Delaware Department of Education are keenly interested in workforce development opportunities related to climate change, clean energy development, deployment of electric vehicles and other emissions reduction strategies. DNREC and DeIDOT have already engaged with staff from these agencies on workforce development requirements related to the National Electric Vehicle Infrastructure Program. This previous work sets the foundation for moving forward quickly with workforce assessments related to Delaware's 2025 Climate Action Plan.

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City Programs

The City of Wilmington sponsors an annual Green Jobs Program, which is an employment program for city youth that provides participants with hands-on outdoor environmental work, career exploration and exposure to environmental issues. It also includes a mentoring component. The program is coordinated by the University of Delaware Water Resources Agency and led by the City of Wilmington's Department of Parks and Recreation and the Public Works Department. There are 14 participants chosen through program selection and interview process all within the age range 14-18 years old. The program is 6 weeks, 25 hours/week, and earns participants approximately \$1,700 per summer (minimum wage). Youth employed in the program engage with city leadership and participate in hands-on work experience and environmental education that introduces them to various environmental sectors including water and wastewater operations. Learning about the City of Wilmington's drinking water and wastewater systems and environmental careers enlightens participants to high-quality and rewarding careers in this sector. Interns create and present to leadership ArcGIS Story Maps detailing their experience and recommendations to reduce emissions and increase resiliency in their sector of focus. This allows city youth to engage in transformative climate change mitigation and experience meaningful employment opportunities in public service.

Other Commitments

DNREC strives to carry out projects in ways that produce high-quality work, avert disruptive and costly delays, and promote efficiency. In implementing the awarded project, DNREC expects to work with the City of Wilmington and future partners to use strong labor standards, including wages at or above the prevailing rate and include local hire provisions. The State of Delaware provides routine certification and training opportunities for employees. Examples include Professional Certifications, OSHA Safety Training, Technical Training, and various other opportunities to provide a well-trained, safe workforce. The City of Wilmington also requires a water operator's license, wastewater operator license and continuing education requirements. The State of Delaware routinely engages with colleges and universities to provide training, internship, and job placement opportunities for students and to increase awareness of careers with the water and wastewater industry.

DNREC will also prioritize contractors and subcontractors in their procurement decisions that demonstrate their workforce meets high safety and training standards (e.g., professional certification, licensure, and/or robust in-house training), hire local workers and/or workers from historically underserved communities, and who directly employ their workforce or have policies and practices in place to ensure contractors and subcontractors meet high labor standards. The State of Delaware and City of Wilmington frequently implement projects using state and federal grants with standards that meet requirements of Davis-Bacon, MBE/DBE, and other strong labor standards. Further prioritization will be offered to employers (including contractors and subcontractors) without recent violations of federal and state labor and employment laws.

These practices will promote effective and efficient delivery of high-quality projects that support economic resilience with strong employment opportunities for workers. Such practices will reduce the likelihood of potential project challenges such as work stoppages or safety accidents, while ensuring a reliable supply of skilled labor while minimizing disruptions. That will promote on-time and on-budget delivery within the performance period outlined in the schedule section.

Furthermore, among other requirements contained in 2 CFR 200, Appendix II, all contracts made in excess of \$100,000 with respect to a capital expenditure that involve employment of mechanics or laborers must include a provision for compliance with certain provisions of the Contract Work Hours and Safety Standards Act, 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5).

6. PROGRAMMATIC CAPABILITY AND PAST PERFORMANCE

Past Performance and Reporting

DNREC has successfully implemented other federal grants in Delaware. Federally funded assistance agreements that DNREC has and is performing within the last three years includes:

Delaware Clean Water State Revolving Fund (CWSRF or SRF)

1. Assistance Agreement/Listing Number (e.g., CFDA number): CFDA 66.458
2. Total Funding Amount: DNREC is awarded an annual base of \$7M with supplemental funds.
3. Funding Agency: U.S. EPA
4. Description: The Delaware Water Pollution Control Revolving Fund provides low-interest loans and grants to municipalities, private organizations, nonprofit organizations, and private individuals for projects that will improve water quality. It is funded with federal seed grants from U.S. EPA's Clean Water State Revolving Fund (CWSRF) and matching state funds. The Fund is administered by DNREC's Office of the Secretary.
5. EPA Project Officer: Alexander Simon, EPA Grant Specialist Wanda Miller
6. Status: The DWSRF operates on federal funding awarded to Delaware annually.
7. Reporting History: DNREC submits annual reports to U.S. EPA about progress toward achieving the expected outputs and outcomes.

Delaware Air Pollution Control "105" Grant

1. Assistance Agreement/Listing Number (e.g., CFDA number): CFDA 66.001
2. Total Funding Amount: \$3.5M
3. Funding Agency: U.S. EPA
4. Description: EPA's Air Pollution Control 105 Grant provides state, local and tribal agencies funds for implementing programs for prevention and control of air pollution or implementation of national primary and secondary ambient air quality standards. This grant is DNREC's primary funding to the Division of Air Quality. This grant funds the entire division's work which includes staff salary, monitoring equipment, and contractual work.
5. EPA Project Officer: Amanda McCullough, EPA Grant Specialist: Illaha Zubair
6. Status: This grant is awarded every three years.
7. Reporting History: DNREC submits an annual monitoring plan for EPA approval each year. The plan includes the results of the most recent assessment, describes the network, and describes any planned changes.

Delaware Solid Waste Infrastructure for Recycling Grant Program

1. Assistance Agreement/Listing Number (e.g., CFDA number): CFDA 66.920
2. Total Funding Amount: \$500k
3. Funding Agency: U.S. EPA
4. Description: Funded by the Bipartisan Infrastructure Law, this grant will improve Delaware's recycling infrastructure and waste management systems. DNREC will use this Solid Waste Infrastructure for Recycling (SWIFR) grant to evaluate potential recycling methods for re-usable

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bags, conduct an analysis on using recycled glass as an alternative to sand, update Recyclopedia, their search tool for residents to find out if and how they can recycle items, analyze recycling container sensor data to ensure more diversion from landfills, and create a map of food waste generation throughout Delaware.

5. EPA Project Officer: Evelyn Velazquez, EPA Grant Specialist: Haley McAlpine
6. Status: DNREC Division of Waste and Hazardous Substance is the lead group within the Agency responsible for implementing this grant and is waiting for approval of the Quality Assurance Project Plan (QAPP) by EPA to start working on the data collection parts of the grant. Currently, DNREC is working on Recyclopedia updates, creating Donation Drop (a new reuse tool for non-profits and community members) and setting up research contracts with the University of Delaware to help DNREC manage data from these projects.
7. Reporting History: DNREC submits quarterly reports, the first being due April 1, 2024. Since this grant is in its initial stages, no challenges have been identified.

Staff Expertise

DNREC and other state agency staff have expertise in using federal grants to improve water quality, complete air quality monitoring, and reduce GHG emissions and air toxins. DNREC has a strong history of collaboration with a wide variety of organizations, industry experts, and community-based organizations to advance Delaware's climate change mitigation efforts. It is anticipated that several key state agencies will comprise a core working group for the development of deliverables under this grant. These core agencies include the DNREC Division of Climate, Coastal and Energy, DNREC Division of Air Quality and DNREC Environmental Finance Office. These agencies are already deeply engaged in various working groups that are tracking and implementing Delaware's 2021 Climate Action Plan and The Delaware Climate Pollution Reduction Plan. The following five key staff members' knowledge, expertise, qualifications, and resources will be employed in various stages of implementation to successfully achieve the proposed project's efficiency, GHG reduction, and reporting goals outlined in Delaware Carbon Pollution Reduction Plan measures.

1. Jessica Quinn DNREC Division of Climate, Coastal, and Energy, Principal Planner and Planning Grant Lead
2. Annina Northridge DNREC Division of Climate, Coastal, and Energy, Staff Planner, and Implementation Grant Lead
3. Greg Pope, DNREC Environmental Finance Office, SRF Lead
4. Kathy Pirestani, Ph.D., DNREC Division of Air Quality, Engineer responsible for Wilmington WWTP Title V Air Permitting
5. Pam Severson, DNREC Fiscal Manager for Federal Grants

7. BUDGET

Budget Detail

Please refer to the Budget Calculations Spreadsheet with annual breakdown of Measure 1-3 budget.

Personnel

No staff positions are proposed for this grant.

Fringe Benefits

No fringe benefits proposed for this grant.

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Travel

No travel proposed for this grant.

Equipment

Approximately 35% of funding is reserved for equipment and accessories necessary to make the equipment operational. For Measure 1, equipment includes the fixed steel digester cover and appurtenances. For Measures 2 and 3, equipment includes the blowers, their major piping, fittings, valves, and major electrical upgrades. Measure 3 includes estimated cost for blowers, pumps, and other mechanical equipment that contribute to improved energy efficiency and necessary electrical upgrades to make that equipment operational.

Supplies

No supplies offered on this opportunity.

Contractual

Around half of the budget proposed for these measures fall within the contractual services category (including consultant services). Measures 1-3 Contractual encompass all services to be carried out via an organization other than DNREC, City of Wilmington, and other county and municipal government receiving funds via professional services contract. For Measure 1, contracts will be established for engineering design of the new fixed steel roof and appurtenances. A separate construction contractor will be awarded. Engineering services during construction, construction management, and additional contractual funds for system integration (connection to biogas collection and metering) are also accounted for in the budget spreadsheet. For Measure 2 and 3, budget includes City of Wilmington and future county and municipal partners' professional services for engineering, design, and bidding for aeration blower and other energy efficiency measures as identified in the state program. This includes preparation and submittal of necessary permitting and engineering services procured during the construction phase. Finally, budget includes contracting for construction of the roof cover, including installation and commissioning. Contractual budget for Measure 1-3 will be managed by DNREC to ensure adherence to reported schedule, cost, and quality. Contractual services will be competitively bid.

Other

A mandatory audit fee has been evenly spread across the first year of all three measures. This fee is 0.003% of the total cost and required in the overall budget by DNREC Fiscal. Measure 2 and Measure 3, also include other costs listed as Contingency. Measures 2 and 3 are both energy efficiency projects that have been estimated at a high-level and are not as detailed in scope and schedule as Measure 1. Approximately 7% of total project cost is contingency to accommodate potential changes that may result during the energy assessment. The energy assessments conducted as a part of the state program may identify priority measures that differ from the measures proposed in the Delaware Wastewater Needs Assessment. An audit was not conducted in the development of the project listing. DNREC and partners would like to allow contingency dollars to account for additional or change in scope of various energy efficiency pathways that may emerge because of those audits and discussion with the SRF.

Indirect Charges

No indirect charges are proposed at this opportunity.

Expenditure of Awarded Funds

Expenditure of awarded funds will be tracked and managed by DNREC and local governments with longstanding bidding, contracting, and contract management processes to ensure cost effectiveness and adherence to schedule and budget. The project team has managed formal procurement processes in

this sector. Furthermore, Delaware Office of Supplier Diversity pledges to “enhance economic opportunities for the diverse business community of minority, women, veteran, service-disabled veteran and individuals with disabilities owned businesses as well as small businesses of a unique size and assist them in competing for the provision of commodities, services, and construction to State departments and agencies.” Delaware will work with Wilmington to ensure competitive bidding and to track and ensure adherence to contract scope and schedule. As detailed in the Budget Calculations Spreadsheet, awarded grant funds will be expended within the grant period in a timely and efficient manner.

Reasonableness of Costs

Costs for Measures 1 and 2 have been informed by the Wilmington WWTP Engineering Manager’s best professional judgment. Equipment, professional services and associated budget scoped for Measure 1 have been detailed by the City of Wilmington, as they have been considering replacing the aging digester roof cover for some time. Measures 2 was estimated using details from Wilmington’s DOE energy assessment and preliminary scoping by the City of Wilmington. Measure 3 budget for the statewide program was informed by Wilmington’s strategy for reducing energy consumption at their site. Pumps and blowers are high energy consumers at WWTPs. As other county and municipal entities complete energy assessment, it is assumed that pumps and blowers will similarly be high energy users in other municipalities’ portfolios. Cost was estimated for the statewide program by reviewing the improvement plans in the Delaware Wastewater Needs Assessment for each facility in the state. Cost estimates for all pump and blower replacement projects proposed in the 5-year plan were used to estimate the budget per county. The proposed grant expenditures are reasonable for accomplishing the proposed goals, objectives, and measurable environmental outcomes described in DNREC’s application.