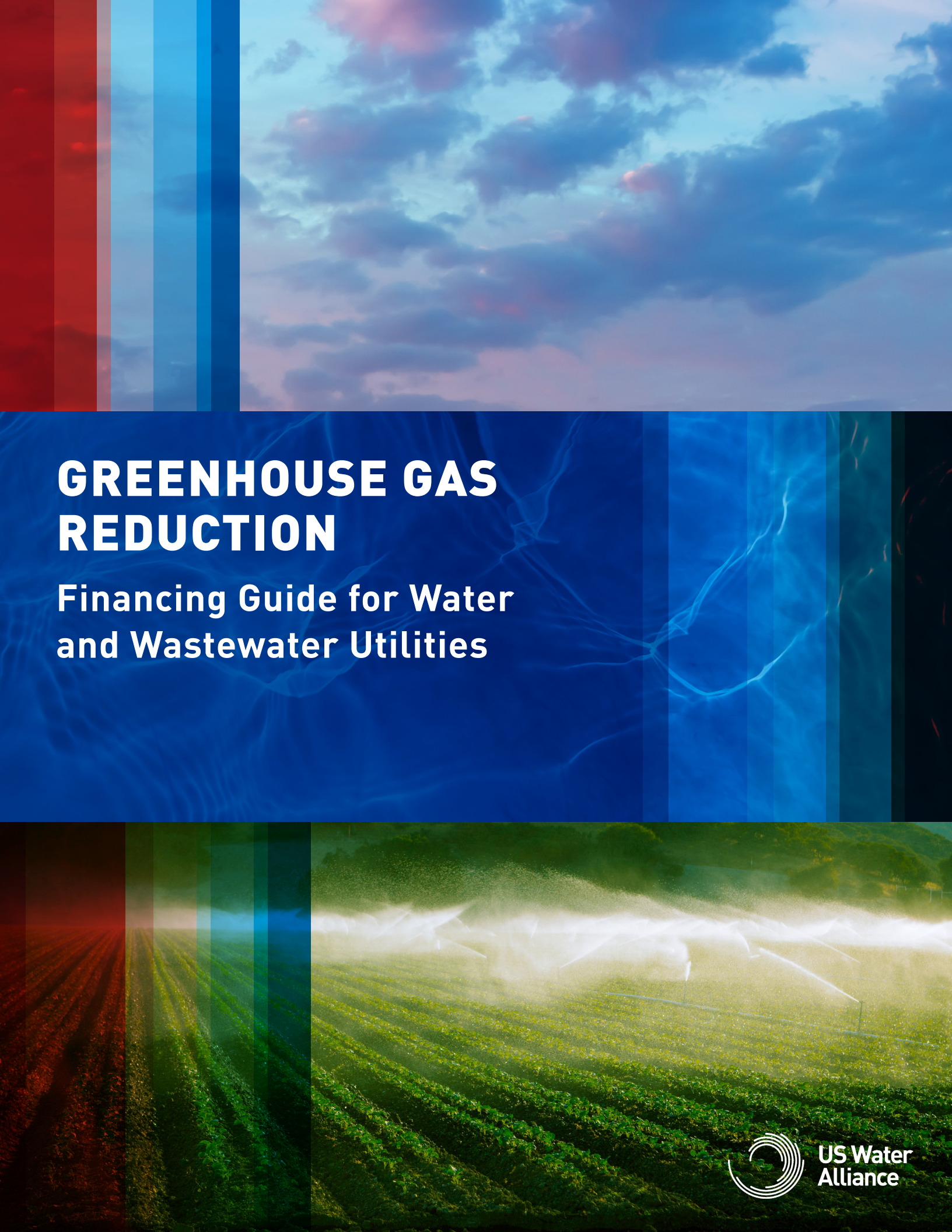


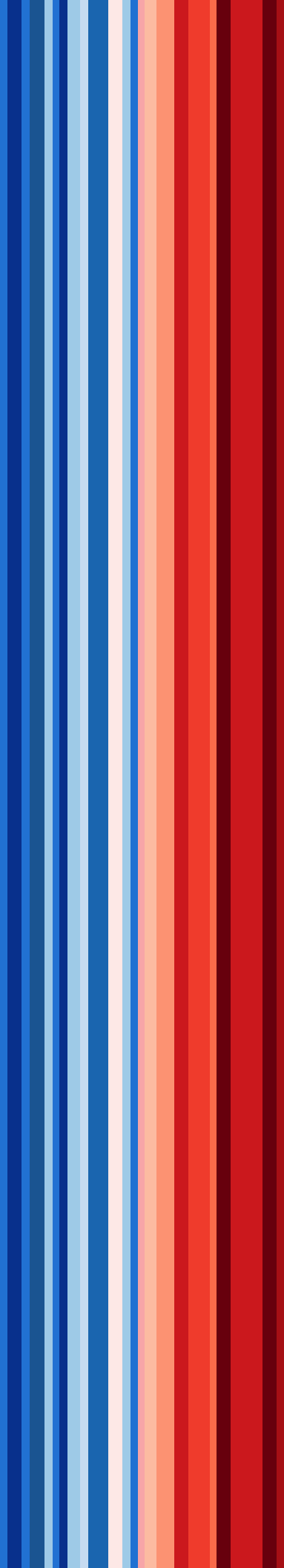


GREENHOUSE GAS REDUCTION

Financing Guide for Water and Wastewater Utilities



**US Water
Alliance**



PREFACE

Water is critical to the well-being of our communities and the planet. Managing this vital resource is becoming increasingly challenging as climate change affects water supplies, damages critical infrastructure, and complicates future planning. Our ability to secure a sustainable water future depends on addressing these climate realities now; without significant emissions reductions, water utilities will face even more complex and costly challenges in the years ahead.

To avoid irreversible impacts to natural systems and to protect communities from worsening climate risks, greenhouse gas (GHG) emissions must be reduced across all sectors, including water. Research shows that [water supply and wastewater treatment are significant contributors to global emissions](#), largely due to energy-intensive operations and potent process-related emissions. This makes water management a critical opportunity for reducing climate pollution.

As stewards of natural resources with deep community ties, water utilities are uniquely positioned to lead. Proactive climate action strengthens relationships, enhances reputations, and aligns with community goals while also improving financial stability, reducing risks, and ensuring long-term resilience.

Yet utilities face real challenges in advancing GHG reduction projects. Capital budgets are often stretched thin, and many GHG reduction measures fall outside a utility's traditional mission or are difficult to finance through conventional means. To meet these challenges, utilities are increasingly looking to innovative delivery and financing models that bring new partners, resources, and expertise to the table.

Now is the time to act.

Across the country, the water sector is stepping up to reduce emissions and provide ancillary benefits to communities, but the work is just beginning. This report highlights those efforts and explores emerging approaches to overcome financial barriers and accelerate progress.



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CONTENTS

ABOUT THIS GUIDE 5

TABLE OF FINANCIAL APPROACHES 6

RENEWABLE ENERGY 9

ENERGY EFFICIENCY..... 13

BIOGAS AND ENERGY RECOVERY 16

WATER EFFICIENCY AND REAL WATER LOSS REDUCTION 19

NATURE-BASED SOLUTIONS 23

**CONSIDERATIONS FOR UTILITIES CONSIDERING CREATIVE FINANCIAL
APPROACHES FOR GHG REDUCTIONS 27**

GLOSSARY 29



ABOUT THIS GUIDE

The guide is designed to help utility staff, local governments, investors, and community partners navigate the financial landscape, learn from peer examples, and inspire creative strategies to move greenhouse gas (GHG) reduction projects from concept to reality.

The water sector is on the frontlines of the climate crisis. More intense storms, rising seas, and more frequent droughts are straining supplies, damaging infrastructure, and threatening the delivery of water, sanitation, and stormwater services. Without urgent action to reduce GHG emissions, these risks will only intensify. This reality underscores the sector's responsibility to help lead the transition to a carbon-free economy.

The good news is that the water sector also has a unique opportunity to advance climate solutions. By expanding renewable energy and energy recovery, implementing nature-based solutions, enhancing resource circularity, and improving efficiency through better equipment, operations, and energy management, utilities can reduce emissions while strengthening system performance and service reliability. Many of these strategies deliver benefits that extend beyond a utility's own footprint, supporting broader community climate goals while reducing costs and enhancing resilience.

Despite the opportunity, barriers remain. Many GHG reduction projects extend beyond the traditional mission of water and wastewater utilities and may require expertise not readily available in-house. The sector also faces significant capital demands, with **an estimated \$270 billion** required in 2024 alone. Limited revenues and pre-committed budgets often leave little room to fund projects beyond infrastructure repair and replacement.

While many GHG reduction projects can deliver both direct and indirect cost savings, capturing these benefits within traditional budgeting and accounting frameworks is challenging. As a result, projects often stall and may not move forward without alternative financing strategies.

In response, this guide explores creative financial approaches that leverage third-party capital and technical expertise to advance GHG reduction efforts. These approaches are explored in the context of five categories of projects: **energy efficiency, renewable energy, resource recovery, non-revenue water reduction and water efficiency, and nature-based solutions.**

The financial approaches highlighted in this guide share three characteristics:

- 1. They are additional to the utility's capital improvement plan or shift the upfront project capital costs to a third-party partner.**
- 2. They have been implemented by at least one U.S. water or wastewater utility.**
- 3. They are broadly applicable but not yet common practice.**

The guide is organized into three sections. The first presents a table outlining each financial approach, including how it works, the roles of key stakeholders, applicable project types, and utility examples. The second introduces the five project categories, each paired with a case study that illustrates how a creative financial approach was applied in practice. The final section offers ten cross-cutting considerations, drawn from the case studies, to help utilities adapt these approaches to their own contexts.

FINANCIAL APPROACHES

Creative financial approaches can help water utilities implement GHG reduction projects that may be challenging to fund or deliver using traditional models. They differ based on the type of project, the roles of participating entities, and how costs are funded and repaid, but all involve collaboration with a private partner. Different models are suited to different types of projects, such as energy efficiency upgrades or renewable energy installations.

Although the structure of these agreements depends on local context and project specifics, each involves a formal agreement between the water utility and the private entity providing the services or financing the project. Though the contract typically involves only these two parties, other actors, such as financiers, energy utilities, or technology providers may also play important roles. Understanding the interests and responsibilities of each helps identify which models best align with utility goals and local context.

Most arrangements fall into a set of common models. The most common of these are performance contracts and concession agreements.

The table on the following page summarizes key features of each approach, including the types of projects they support, their potential benefits, how they work in practice, and the roles of the key actors involved. It also includes utility case studies to illustrate how these approaches have been applied in practice.



Table of Financial Approaches

FINANCIAL APPROACH	APPLICABLE PROJECT TYPE	WHAT IS IT?	WHAT ARE THE BENEFITS TO THE UTILITY AND COMMUNITY?	HOW DOES IT WORK?	ROLE OF THE ACTORS	UTILITY EXAMPLE
On-site Third Party Power Purchase Agreement (PPA)	Renewable energy projects (e.g., solar, biogas-powered CHP, micro-hydro)	An agreement in which a private entity owns and operates a renewable energy system, and the water utility agrees to purchase the electricity it generates at a defined rate over a specified term.	Provides energy cost certainty and can reduce energy costs. Is third-party financed, so it does not compete for the utility's capital funds. Helps reduce greenhouse gas emissions by sourcing renewable energy.	A third-party developer designs, finances, installs, owns, and operates the renewable energy system at the utility's facility. The utility purchases the energy generated at a predetermined rate, typically fixed or with a set annual escalation, over the contract term.	The Water Utility: Hosts the project and agrees to purchase the electricity under a long-term contract. Primary interest is in stabilizing or lowering energy costs, avoiding upfront capital outlays, and reducing GHG emissions through renewable electricity purchases. The Private Entity (Renewable Energy Services Provider): Develops, finances, owns, and operates the project. Primary interest is in capturing value from the design-build phase, earning revenue from electricity sales, monetizing environmental attributes, and utilizing available tax incentives. The Investor: Provides upfront capital project developer may not have or be able to fully leverage. Primary interest is in earning returns through project revenues and claiming tax benefits linked to the project. The Energy Utility: Maintains grid connection, supplies backup power, and may purchase excess generation. Primary interest is in ensuring reliable service, recovering costs for maintaining grid access and standby supply, and in some cases, meeting renewable energy or regulatory goals.	Gresham, OR Wastewater Treatment Facility
Community Solar Model	Renewable energy (shared solar array)	An arrangement in which the water utility subscribes to a portion of a third-party-owned shared solar system. The utility contracts with the developer, who maintains a separate agreement with the electric utility to manage interconnection and bill crediting.	Provides energy cost certainty and can reduce energy costs. Does not require utility capital funds. Reduces GHGs by adding renewable energy to the grid. Allows participation in off-site projects and supports clean energy without on-site installation.	A third-party developer installs, owns, and operates a solar facility connected to the electric grid. The utility subscribes to a portion of the system's output and receives bill credits from the electric utility based on its subscription share and a predetermined credit rate. The utility may also choose to host the solar array on its property, though this is not required. The developer and the electric utility manage a separate agreement covering interconnection and billing arrangements.	The Water Utility: Serves as an anchor subscriber by committing to a substantial share of the solar facility's output, helping the developer secure financing. Does not install, own, or operate the system. Continues to pay its electric utility and receives a bill credit based on its subscription share, reducing net electricity costs. Primary interest is in lowering energy expenses, avoiding capital investment, and supporting clean energy without on-site installation. The Private Entity (Renewable Energy Services Provider): Develops, owns, and operates the shared solar facility, typically with support from investors. Develops, owns, and operates the shared solar facility, typically with support from investors. Primary interest is in capturing value from the design-build phase, earning revenue from subscriber payments, monetizing environmental attributes, and utilizing available tax incentives. The Investor: Provides upfront capital to finance construction. Not involved in operations or subscriber billing. Primary interest is in earning returns through project revenues and claiming tax benefits linked to the solar facility The Energy Utility: Receives the electricity generated by the solar facility and supplies power to subscribers from the grid. Provides bill credits to the water utility and other subscribers based on their subscription share. Manages key aspects of program administration, including reviewing, approving, and queuing projects for interconnection. Primary interest is in fulfilling its role as program administrator, recovering costs for grid and billing services, and meeting clean energy or regulatory targets.	Metropolitan Council (MN) Community Solar Garden

Table of Financial Approaches (Continued)

FINANCIAL APPROACH	APPLICABLE PROJECT TYPE	WHAT IS IT?	WHAT ARE THE BENEFITS TO THE UTILITY AND COMMUNITY?	HOW DOES IT WORK?	ROLE OF THE ACTORS	UTILITY EXAMPLE
Offsite Power Purchase Agreement (PPA)	Renewable energy (offsite wind, solar, etc.)	A financial agreement in which the utility agrees to pay a fixed price for energy produced by a renewable project located offsite. The energy is sold into the wholesale market, and the utility receives or pays the difference between the fixed price and the market price. The utility does not receive the actual electricity.	Provides long-term cost certainty and can reduce electricity costs if market prices rise. Is third-party financed, so it does not compete for the utility's capital funds. Supports new renewable energy projects and reduces GHG emissions from overall electricity generation.	The water utility enters into a long-term contract with a renewable energy developer to purchase energy at an agreed-upon price. The energy is sold by the developer into the wholesale power market. The utility pays or receives the difference between the contract price and the market price. Electricity continues to be delivered by the local electric utility. The agreement may include the transfer of environmental attributes. Because this is a financial contract, not a physical power delivery agreement, it may be subject to financial market regulations.	The Water/Wastewater Utility: Signs a financial contract with the developer to support an offsite renewable project. Pays or receives the difference between the contract price and the market price. Primary interest is in managing long-term energy costs and reducing GHG emissions through renewable electricity purchases. The Private Entity (Renewable Energy Services Provider): Installs the facility (often with the backing of a bank or investor), owns, and operates the energy facility. Sells energy into the wholesale market and settles the contract with the utility, either directly or through a third party acting on its behalf. Primary interest is in earning profit from energy sales and contract settlements, and monetizing tax incentives and environmental attributes. The Investor: Provides upfront capital to build the project but does not participate in contract settlement. Primary interest is in earning stable returns backed by project revenues and tax benefits. The Energy Utility: Continues to supply electricity to the water utility and is not a party to the VPPA. Primary interest is in delivering reliable service and fulfilling its standard regulatory responsibilities.	Arlington County, VA - Amazon-Arlington Solar Farm Virtual PPA
Energy Savings Performance Contract (ESPC)	Energy efficiency, water efficiency, and non-revenue water reduction	An agreement in which an energy services company (ESCO) finances and delivers efficiency improvements. The utility repays the ESCO over time using the cost savings achieved from reduced energy or water use. The utility retains ownership of the installed technology.	Reduces energy and water costs and improves system performance. Can be third-party financed, to avoid competing for the utility's capital and or O&M funds. Environmental benefits result from reduced energy use and water loss. Performance guarantees shift delivery and savings risk to the ESCO.	After selecting a qualified ESCO, the firm conducts a detailed audit of energy and water use. The audit identifies efficiency improvements expected to generate cost savings. Based on the audit results, the ESCO and utility refine the scope of work and agree on final terms for implementation. The ESCO then designs and delivers the improvements, using either third-party financing or utility-sourced funding. The utility repays project costs over time using the savings achieved. The contract includes performance guarantees to ensure cost savings are sufficient to cover costs. The ESCO is responsible for verifying savings are being achieved, using agreed-upon methods. If savings fall short, the ESCO covers the shortfall, transferring performance risk from the utility to the private partner.	The Water/Wastewater Utility: Executes the contract, authorizes the audit, and works with the ESCO to define the project scope. Owns and operates the improvements and repays costs over time from savings. Primary interest is in lowering operating costs and GHG emissions through efficiency improvements, avoiding upfront capital spending, and relying on ESCO to manage risk and guarantee performance. The Private Entity (ESCO): Conducts the audit, develops and implements efficiency improvements, and may arrange third-party financing if not provided by the utility. Guarantees performance and verifies costs. Primary interest in generating revenue through project delivery and savings-based compensation while managing performance risk.	City of Riverband ESPC with Shneider Electric
Efficiency-as-a-service (EaaS)	Energy efficiency; non-revenue water; water efficiency	A service agreement in which a third party owns and maintains efficiency equipment installed at the utility, and the utility pays for the realized savings over time. Similar to a performance contract, but the service provider retains ownership of the technology.	Reduces energy and water costs without requiring upfront capital. Avoids utility ownership of equipment and associated maintenance responsibilities. Environmental benefits result from improved efficiency and reduced resource use. Performance risk is shifted to the service provider.	The utility enters into an agreement with a service provider that audits energy and water use, identifies efficiency upgrades, and designs and installs improvements. Commonly covered systems include HVAC, lighting, building controls, and other non-process systems. The service provider retains ownership of the installed equipment and is responsible for ongoing maintenance and performance monitoring. The utility pays over time, typically through a fixed or savings-based fee structure. Because the utility does not own the equipment, it avoids asset-related risks and maintenance responsibilities. The model relies on clear performance terms to ensure savings are delivered and sustained.	The Water/Wastewater Utility: Issues an RFP for energy and/or water efficiency improvements. Negotiates an agreement with a service provider based on an energy and/or water audit, upfront cost of improvements, and expected ROI on energy and/or water savings. The water/wastewater utility does not own or operate the efficiency improvements (i.e., the technology). The Private Entity: Audits the facility, develops and delivers improvements, and retains ownership of the installed technology. Responsible for performance and ongoing maintenance. Primary interest is in generating revenue from service payments and sustaining performance to ensure returns. The Investor: If applicable, may provide upfront capital to the service provider. Primary interest is in earning stable returns backed by service revenues and long-term project performance.	American Geophysical Union Headquarters, Washington, DC and Noventa Energy

Table of Financial Approaches (Continued)

FINANCIAL APPROACH	APPLICABLE PROJECT TYPE	WHAT IS IT?	WHAT ARE THE BENEFITS TO THE UTILITY AND COMMUNITY?	HOW DOES IT WORK?	ROLE OF THE ACTORS	UTILITY EXAMPLE
Internal Revolving Loan Fund	Energy efficiency, water efficiency, non-revenue water reduction, and on-site renewable energy	An internal loan fund, managed by the water utility or municipal agency, that finances eligible projects using repaid savings to support future investments.	Reduces energy and water costs. Avoids external debt and does not compete for capital funds. Supports reinvestment in cost-saving and GHG-reducing improvements.	The fund is capitalized through a one-time internal allocation, external grant, philanthropic contribution, or investment or some combination. The fund sponsor manages the fund, establishes project eligibility criteria, and approves loan applications. Utilities may work with developers, ESCOs, or other partners to design and implement eligible projects Loan is repaid though over time using the resulting savings or revenues. Repaid funds are used to finance future projects, enabling a self-sustaining cycle of investment.	The Water/Wastewater Utility: Applies for project funding and leads implementation, often with support of third party partner. Repays the loan using cost savings or project revenues. Primary interest is in accessing flexible capital to lower operating costs, reduce GHG emissions, and reinvest in system improvements. The Fund Sponsor: Oversees the fund, establishes project criteria, evaluates applications, and monitors repayment. Primary interest is in sustaining the fund’s long-term viability and advancing program goals. This is often the local government. The Investor: Provides seed capital through an internal allocation, grant, or external contribution. Primary interest may include enabling infrastructure investment, supporting climate or policy objectives, or receiving modest returns where applicable.	Mattabassett District, CT
Concession Agreement	Biogas and Energy Recovery	A long-term agreement in which a private entity finances, delivers, and operates a major utility system or asset. The private partner may also own the system during the contract term. Unlike ESPCs or EaaS models, concession agreements typically involve larger capital infrastructure and long-term operational responsibility	Reduces utility workload and transfers delivery, operational, and performance risk to the private partner. Enables complex infrastructure projects without upfront capital. Environmental benefits result from resource recovery, renewable energy generation, and reduced emissions.	The water utility identifies a project opportunity and issues a request for qualifications or proposals. Based on defined selection criteria, the utility evaluates respondents and selects a preferred concessionaire. Some contract terms may be included in the solicitation, while others are finalized during negotiations with the selected partner. The private partner finances and delivers the project, then owns and operates the system over a defined term. The utility may retain certain roles during the design-build phase, such as approving design submittals, participating in milestone reviews, or overseeing compliance with permitting and regulatory requirements. Depending on the agreement, the utility may make service payments, allow the concessionaire to sell recovered energy or resources, or both. The utility maintains oversight throughout the contract term and may resume ownership and operation at the end of the agreement.	The Water/Wastewater Utility: Selects and oversees the private partner, retains approval rights over key design and operational decisions, and may make service payments or authorize resource sales. Primary interest is in accessing private capital and expertise to deliver and operate complex systems while reducing internal staffing or operational burdens. The Private Entity (Concessionaire): Delivers and manages the system under contract terms, including financing, construction, and long-term operations. Primary interest is in earning predictable returns through long-term service delivery or resource recovery. The Investor: If applicable, provides upfront capital to support project development. Primary interest is in securing stable, long-term returns linked to the project’s performance and revenue structure	NYC DEP Newtown Creek WRRF Biogas-to-RNG
Community-Based Public-Private Partnership	Nature-based Solutions	A contractual partnership in which a public entity collaborates with a private partner to deliver nature-based solutions that improve water quality and provide community benefits including reductions in GHG emissions	Improves water quality and climate resilience while delivering cost savings, local amenities, and environmental equity. Supports GHG mitigation through increased carbon sequestration and reduced energy-intensive infrastructure. Can accelerate implementation and shift delivery risk to a private partner.	The local government enters into a contract with a private partner to implement nature-based solutions that deliver water quality improvements, carbon benefits, and broader community co-benefits. The private entity provides upfront capital and is compensated by the public agency through milestone payments, implementation fees, or performance-based incentives. Compensation is typically funded through stormwater, water quality, or capital improvement budgets. These arrangements allow public agencies to shift delivery and performance risk to the private partner, while benefiting from faster, more flexible implementation that maximizes environmental and social outcomes.	The Water/Wastewater Utility: Establishes program goals and desired outcomes, issues a request for qualifications or proposals, selects a private partner, and negotiates contract terms. Provides funding through relevant budgets (e.g., stormwater, water quality) and oversees implementation. Primary interest is in improving water quality, meeting regulatory requirements, and delivering broader community benefits while managing cost and risk. The Private Entity: Responds to the solicitation, assesses potential projects, and develops implementation plans aligned with utility goals. Provides upfront capital and delivers nature-based solutions under the terms of the contract. Primary interest is in generating returns through implementation and performance payments, while delivering measurable outcomes that support long-term partnership viability.	MMSD Fresh Coast Green Communities Program

Table of Financial Approaches (Continued)

FINANCIAL APPROACH	APPLICABLE PROJECT TYPE	WHAT IS IT?	WHAT ARE THE BENEFITS TO THE UTILITY AND COMMUNITY?	HOW DOES IT WORK?	ROLE OF THE ACTORS	UTILITY EXAMPLE
Corporate Water Stewardship	Nonrevenue water and water efficiency	An approach to water management by businesses that accounts for the true value of water and leads to more sustainable management of aquatic resources. This approach can include improving practices at the business and/or investing in sustainable water use outside of direct operations (e.g., at a local water utility).	Conservation benefits; reductions in energy and/or treated water costs	Corporations engage in internal practices to reduce water use and with local water stakeholders (e.g., utilities) to implement water efficiency projects and practices to conserve water, reduce costs, and mitigate supply-related risk. Corporations provide the capital for said projects and realize the benefit of those projects broadly in their operations (e.g., via fewer disruptions in water supply), rather than through a specific payment stream. Given the somewhat limited pool of resources at this time, the funding is better suited for piloting new technologies or approaches to water management.	The Water/Wastewater Utility: Works with the corporate partner to identify a water-saving project; implements project with funding from corporate partner; measures impact. The Corporate Partner: Approaches the water/wastewater utility with funding for a project; works with the utility to identify a water-saving project; provides funding; reports impact on financial/ESG reports.	Cocopah Indian Tribe - Cocopah Colorado River Limitrophe Habitat Restoration Project California and Arizona - Saving Money and Water through Leak Detection in Affordable Multifamily Housing
Blue Banks	Nonrevenue water and water efficiency	A non-profit organization focused on financing water conservation projects via a revolving fund model. Requires upfront capitalization or “seed funding” to offer loans.	Conservation benefits; reductions in energy and/or treated water costs	A Blue Bank is established as an organization and receives seed funding to capitalize the bank. Based on programmatic priorities established by the bank, a water user applies for funding from the Blue Bank to implement a water conservation project that provides water and/or energy savings. Should the project meet the programmatic priorities and criteria, the Blue Bank provides the upfront capital for the project. Principal and interest are repaid to the Blue Bank via the stream of cost savings from the project.	The Water/Wastewater Utility: Identifies opportunities for water conservation and partners with a blue bank. Based on projects implemented, the utility saves energy and/or water. The Seed Funder: Provides the upfront capital to start the blue bank. The Blue Bank: Identifies water conservation project opportunities, posts a call for projects, scores projects and issues loans for eligible water conservation projects. Manages the fund to ensure loans can be issued in perpetuity or for the length of the programmatic goals. The Borrower: Identifies potential water conservation projects with significant cost savings, applies for funding from the Blue Bank, realizes savings, repays loan. The borrower could be a local government, a business owner, non-profit, or individual.	City of Phoenix, AZ and BlueCommons

RENEWABLE ENERGY

What Are Renewable Energy Projects?

Renewable energy projects use wind, solar, hydro, and thermal resources to produce energy that is both environmentally sustainable and economical. These alternatives replace traditional fossil-fuel-based energy sources, thereby reducing GHG emissions.

As technology costs fall and fossil energy prices rise, renewable energy is often cheaper than conventional energy sources. Renewables also provide stable energy prices, operational resilience during outages, and energy independence. As a result, renewable energy projects are growing throughout the United States in both urban and rural areas. Public policy and incentives play a key role in this growth by providing renewables with the same types of support—such as incentives and regulatory backing—that fossil fuel industries have long received.

Federal and state policies reduce upfront costs and accelerate project adoption in several ways. They mitigate upfront costs through tax credits, allow projects to sell excess electricity back to the power grid, enable third-party ownership and financing, and allow electricity consumers to purchase renewable energy from nearby projects without building their own facilities.

Drinking water and wastewater utilities are using renewable energy to manage costs, reduce GHG emissions, and create energy resilience. Traditionally, this involved installing hydroelectric turbines at drinking water reservoirs. More recently, utilities have adopted solar photovoltaic (PV) panels to generate electricity and reduce reliance on the grid. Some have also developed in-line hydro projects that generate electricity from the existing flow and pressure in water pipelines. They are also adopting thermal energy recovery systems that can power district and community energy systems.

Why Might Renewable Energy Projects be Difficult to Finance?

While renewable energy projects offer many benefits, like any capital investment, they involve significant upfront costs and technical requirements that must be addressed to deploy and maintain these systems. This can be a barrier for utilities with limited budgets or staff capacity and experience with these types of projects.

State and local policies can also constrain renewable energy project development. Some states limit or prohibit third-party project ownership and power purchase agreements (PPAs), making it difficult for utilities to pursue projects without owning the infrastructure directly. Other constraints include limits on project size or location relative to the customer's facility, caps on the value of electricity generated, or restrictions on exporting excess energy to the grid. Permitting and interconnection rules can also delay or discourage projects. To learn more about the rules in a specific state, visit the **Database for State Incentives for Renewable Energy** [website](#).

To overcome these challenges, many utilities and project developers are finding creative financial models and partnership strategies to implement renewable energy projects while ensuring long-term financial and environmental viability.

UTILITY SPOTLIGHT:

Met Council Community Solar Garden Project



UTILITY: Metropolitan Council, Division of Environmental Services

PARTNERS: 31 local governments in the seven-county Twin Cities region of Minnesota, Xcel Energy, private solar developers, and solar O&M companies

FINANCIAL APPROACH: A Community Solar Model, where the Metropolitan Council and partner local governments entered into subscription agreements with solar developers for a portion of the electricity generated by the solar gardens.

Background on Metropolitan Council

The Metropolitan Council (Council) is the regional policy-making body, planning agency, and provider of essential services in the seven-county Twin Cities, Minnesota region. **The Council's Environmental Services division** is responsible for operating the regional wastewater system, regional water resource planning, water quality monitoring, and industrial pollution prevention. The division operates nine wastewater resource recovery plants serving nearly three million people and treating about 250 million gallons of wastewater each day. Additionally, the Council has adopted a commitment to reducing its own GHG emissions and to supporting emissions reductions across the region.

Why Community Solar Gardens?

The Council's Environmental Services division began exploring renewable energy opportunities in the early 2010s. Its initial project was a 1.25-Megawatt AC, **behind-the-meter** solar PV project located on unused

buffer land at the Blue Lake Water Resource Recovery Facility. The project is directly connected to the facility's electrical infrastructure. It is owned and operated by a solar developer. The Council entered into a **land lease agreement** with the developer to allow the project to be built on Council property and a corresponding **power purchase agreement (PPA)** to purchase the electricity generated by the project.

While the behind-the-meter solar project proved these projects were feasible, directly connecting it to the facility created challenges. The utility and developer had to negotiate equipment choices and electrical safety practices. These issues prompted the Council to look for models that were more scalable and less operationally complex. Shortly after the Blue Lake project was commissioned, Minnesota launched its **Community Solar Garden (CSG)** program.

How Community Solar Works

A Community Solar Garden program allows consumers to subscribe to grid-connected solar projects, even if the project is not located on their property. A subscriber pays the project owner a monthly fee based on the amount of energy their share produces. The project owner sells the electricity to the electric utility, which is required to connect these projects to the grid. In return, the electric utility retains the **renewable energy certificate** to meet state requirements and provides

the subscriber with bill credits tied to the same energy output. On net, a subscriber usually receives a small discount on their total cost of electricity because of the credit received.

For the Council, investing in solar under this program allowed them to avoid the complexities of behind-the-meter systems. The program also meant the Council was no longer limited to projects at its own facilities and allowed it to support solar development across the region in alignment with its broader commitment to advancing renewable energy.

It is important to note that a subscriber continues to purchase electricity directly from their electric utility, and the subscription does not reduce the amount of grid electricity they consume. Additionally, subscribers may not retain the ability to claim the environmental benefits of renewable electricity. As a result, subscribers are not technically purchasing “green” or zero-carbon electricity through their CSG subscription. Instead, they are supporting shared reductions in the carbon intensity of the grid, benefiting all utility customers.

How States Shape Solar

At the heart of any CSG program is a policy framework that determines how the program operates, who can participate, and what benefits are delivered. These programs are enabled by state-level legislation and rulemaking that outline the responsibilities of electric utilities, developers, and subscribers. This process typically specifies:

- Which utilities are expected to participate (e.g., investor-owned, municipal, cooperatives);
- What electric utilities are required to offer under the program;
- The project size limits, location restrictions, interconnection requirements, and minimum participation from low- to moderate-income customers; and,
- Caps on individual and total subscriptions, how bill credits are calculated and applied to subscriber utility bills, and consumer protections.

From Project Development to Financing

Once rules are in place, project developers begin identifying sites, securing land access, constructing projects, and enrolling subscribers, often simultaneously. Proposed projects must be reviewed for technical and program compliance, and the electric utility and developer must power purchase terms and subscriber enrollment processes.

The stream of payments from project subscribers is just one revenue stream developers use to secure financing. Other revenue streams can include tax incentives, compensation from the electric utility for electricity produced, and the sale of renewable energy certificates. Together, these sources provide the revenue developers need to secure upfront financing.

In the case of the Council, solar developers were also able to leverage the fact that a substantial share of project subscribers were government entities. Public agencies are ideal customers due to their reliability, creditworthiness, and willingness to make long-term commitments, which reduces developer risk and financing costs, enabling more favorable terms for government subscribers.

Like other third-party solar projects, CSGs are usually financed through a mix of equity investors and lenders. Each financial backer has different investment goals. Some prioritize short-term returns from tax credits and incentives, while others are more interested in steady subscriber payments over time. As a result, developers often form special-purpose entities (SPEs) that allow each party to access the revenue stream they value most. For example, tax equity investors often exit after capturing available credits, while others may acquire the remaining interest to collect ongoing subscriber or utility payments.

While these ownership changes are common in third-party financing, participating organizations need to understand them. Transitions may require amending contracts to formally recognize new parties and ensure continuity.

Pricing Models and Risk Allocation

For subscribers, a key advantage of participating in a CSG program is avoiding the upfront capital costs and minimizing exposure to project development-related risks. However, some risks remain with the subscriber.

These risks are mitigated through the terms and conditions of the subscription agreement, which defines how financial, operational, and legal responsibilities are allocated between the subscriber and the developer. Key terms include performance expectations and provisions related to liability, breach, and early termination of the agreement. These elements shape the subscriber's financial exposure and the reliability of expected benefits over the life of the project. Perhaps most important, however, are the terms governing pricing. In the case of the Met Council, they entered into subscription agreements with three different pricing models: **discounted**, **fixed**, and **escalated**.

How the Council Scaled Solar with Partners

During program development, the Council leveraged its position as a regional convener to coordinate and facilitate a collaborative solicitation, bringing together more than 30 local governments, counties, and public entities to develop and subscribe to solar garden projects across the region. The Council played a central role in managing the solicitation, procurement, proposal evaluation, and due diligence.

As part of the procurement process, the Council offered buffer land to developers through a land lease agreement. The result was the installation of 8.3 Megawatts at three water resource recovery facilities. By serving as both project host and anchor subscriber, the Council secured more favorable contract terms that reflected the value of the lease payments the developer would have otherwise paid.

In addition to subscribing to these projects, the Council's Environmental Services division also subscribes to 17.5 MW from 79 other solar installations across the region. Altogether, these subscriptions are projected to save ratepayers over 5 million dollars in net

present value over the 25-year contract terms. The Council's leadership in aggregating demand from other local government subscribers through the regional partnership helped drive competitive bids by creating economies of scale. The collaboration also benefited developers by lowering customer acquisition costs and providing access to public sector agencies.



ENERGY EFFICIENCY

What are Energy Efficiency Projects?

Energy efficiency projects reduce overall energy use through equipment upgrades or optimized operations to achieve the same or better performance with less energy. While upfront costs can be high due to the need to overhaul existing systems, energy efficiency is often the most affordable and effective entry point for GHG reductions compared to other climate solutions.

Drinking water and wastewater utilities use large amounts of energy to extract, convey, treat, and distribute water. Core process equipment, such as mixers, pumps, and blowers, as well as building systems like HVAC and lighting, account for the majority of this demand. Energy efficiency projects help reduce this consumption through more efficient equipment, improved operational practices, and advanced monitoring and control systems that optimize performance in real-time. These improvements cut costs, reduce emissions, and improve operational resilience.

Public policies and energy utility incentive programs can help water utilities overcome financial and technical barriers to adopting high-impact efficiency projects. Efficiency standards, benchmarking requirements, rebates, energy assessments, and customized engineering studies all help reduce upfront costs and make these projects more feasible.

Why Might Energy Efficiency Projects be Difficult to Finance?

Although energy efficiency upgrades help utilities lower energy costs, the upfront investment can take years to recover. As a result, utilities typically focus on replacing aging infrastructure or making upgrades required by regulations or capacity needs. Efficiency measures may be included in these broader projects, but standalone initiatives are rarely prioritized. Even when long-term savings outweigh the initial capital costs, utilities can struggle to fund efficiency projects because savings and expenses fall under separate budget categories. This disconnect makes it difficult to justify investments despite strong long-term returns.

Another challenge is quantifying energy savings. Unlike renewable energy projects that generate measurable

electricity, energy efficiency projects rely on estimated savings derived from before-and-after comparisons of energy use. Because these savings reflect energy not consumed—rather than a tangible output—they cannot be directly measured. This uncertainty complicates financing decisions and makes it harder to demonstrate a clear return on investment.

Finally, individual efficiency projects may appear unattractive when savings are modest or payback periods are long. The time and resources required to launch, manage, and verify such projects can be difficult to justify. Aggregating multiple smaller projects into a single portfolio helps address this challenge by balancing overall payback, spreading planning and implementation costs, and making investments more appealing and easier to finance.



UTILITY SPOTLIGHT:

Energy Services Agreement for Energy Efficiency Measures

Image courtesy of the Mattabassett District.



The Mattabassett District and Ameresco Energy Service Agreement

UTILITY: The Mattabassett District Wastewater Treatment

PARTNERS: Ameresco and Eversource

FINANCIAL APPROACH: This project involves an Energy Service Agreement (ESA), which is a performance contract with an Energy Services Company (ESCO). The utility self-financed the project and partnered with an ESCO to identify and implement projects, guarantee savings, and monitor and verify savings. The utility recoups its costs through savings, mainly via an internal revolving fund.

Background on The Mattabassett District

The Connecticut Legislature established the Mattabassett District (District) to provide wastewater treatment services for the communities of New Britain, Middletown, Berlin, and Cromwell, as well as portions of several other neighboring communities. The District is not a municipality, though it shares some powers and responsibilities with the state's municipalities. The District's [Water Pollution Control Facility \(WPCF\)](#), located in the Town of Cromwell, treats between 25 and 35 million gallons of wastewater daily.

Why an Energy Services Agreement for Energy Efficiency Projects?

Before pursuing an ESA, the District had already implemented several initiatives to improve energy performance at the WPCF, including a solar PV and process upgrades to reduce electricity use from its electric utility provider, [Eversource](#). However, with state policies such as the phaseout of net metering reducing the financial returns from additional renewable energy projects, the District shifted its focus to a narrower set of energy efficiency opportunities.

The District was unsure of the scope of the energy efficiency projects and assumed the cost savings would be limited. As such, the District sought a third-party partner with experience implementing energy efficiency measures at wastewater facilities and structuring them to be repaid through cost savings. To that end, the District issued a Request for Qualifications (RFQ) for performance-based energy management services, aiming to contract with an ESCO to improve the WPCF energy efficiency.

The RFQ outlined a range of services, including:

- conducting an energy audit, identifying potential energy-saving measures, estimating savings, and calculating payback periods;
- designing and installing efficiency improvements;
- assessing the GHG impact of the proposed measures;
- evaluating financing options for the project;
- providing staff training on the new efficiency measures;
- offering ongoing maintenance and repair services; and
- performing annual monitoring and verification of energy savings.

How does the Energy Services Agreement work?

After advertising the RFQ and reviewing submissions, the District interviewed several firms. Few had experience with energy efficiency performance contracting in wastewater utilities, but one firm—Ameresco—had completed similar projects. Based on that experience, the District selected Ameresco to move forward.

Ameresco began by conducting an energy audit and identifying projects with guaranteed energy savings over the 12-year contract period. These projects included LED lighting upgrades, low-voltage transformers, building controls (such as thermostats and motion sensors), and building heat exchangers. While the District had already identified many of these opportunities before issuing the RFQ, Ameresco's audit added value by identifying the transformer upgrades and providing detailed estimates of energy savings, cost savings, and payback periods.

After finalizing the project list and agreeing on a savings guarantee, Ameresco assisted the District in securing rebates through Eversource totaling over \$43,500 and implemented the efficiency measures. Each year, Ameresco returns to the WPCF to measure and verify the actual energy savings.

From Project Development to Financing

Unlike many other ESAs, the District never intended for Ameresco to finance the project. Because the District had access to lower-cost capital than Ameresco, it chose to pursue its own financing for the projects. Initially, the District envisioned a much larger project—around \$3–\$4 million—which included replacing influent sewage pumps. At the time, the District was eligible for a low-interest loan through a Bank of America partnership program to help finance the project.

However, once the payback period for the influent pumps was assessed and found to be too long, they were removed from the ESA. As a result, the District decided to self-finance the remaining efficiency measures using cash, with the intent to recover the investment through energy savings. The final ESA was valued at approximately \$980,000 (i.e., the cost to implement), with guaranteed savings of \$1,000,000 over a 12-year contract. As specified in the RFQ, the savings guarantee required Ameresco to reimburse the District for any shortfall in projected savings.

From issuing the RFQ to completing project implementation, the entire ESA process took approximately six years. However, energy savings and rebates benefited the District within two years of construction commencing. Despite the lengthy timeline, the District has saved about \$300,000 since the measures went into effect and expects to achieve full payback within ten years.

BIOGAS AND ENERGY RECOVERY

What are Biogas and Energy Recovery Projects?

Biogas and energy recovery projects capture energy from water, wastewater flows, or treatment processes and convert it into electricity, heat, or **renewable natural gas (RNG)**. These projects can reduce GHG emissions, lower energy costs, and generate revenue through the sale of energy and **environmental attributes**.

Biogas is produced through the anaerobic digestion of wastewater biosolids. Yields can be increased by co-digesting food waste or fats, oils, and grease. Biogas can be used on-site to produce heat, or heat and electricity through **combined heat and power (CHP) systems**. It can also be upgraded into RNG for injection into pipelines or used as a vehicle fuel. While anaerobic digestion has long been used for biosolids management, the resulting biogas has not always been captured for energy. Today, improved technologies and renewable fuels markets are helping utilities turn biogas into a source of savings and revenue.

Some utilities are also recovering thermal energy from system flows and treatment processes. These systems use the stable temperatures of water supply pipelines, sewers, or effluent to power heat pumps that provide heating and cooling for onsite needs or district energy systems. Utilities are exploring these resources to reduce energy costs and support community climate goals.

Biogas and energy recovery projects reduce GHG emissions by displacing fossil fuels. On-site use can reduce electricity or fuel needs, while delivery to others supports lower-carbon energy use in other sectors. Partnerships, such as supplying RNG for municipal fleets, can enhance project value and reduce emissions across local government.

Federal and state policies that provide tax incentives, create markets for environmental attributes, or promote the diversion of organic waste from landfills help reduce project costs and accelerate the adoption of these technologies.

Why Might Biogas and Energy Recovery Projects be Difficult to Finance?

Utilities often face competing demands on limited capital budgets, making it challenging to invest in projects that extend beyond core service needs. Operating digesters to manage biosolids fits squarely within the utility's mission, but fully utilizing the resulting biogas requires additional infrastructure. These investments can significantly increase capital costs and may not be considered essential in traditional facility planning frameworks.

The challenge grows when the energy is provided to external partners, such as when RNG is injected into pipelines or sold as vehicle fuel or when recovered thermal energy is supplied to a district energy provider or private entity. In some cases, legal or regulatory restrictions may limit a utility's ability to provide these types of energy services. This makes biogas and energy recovery projects difficult to justify compared to conventional infrastructure investments.

Many projects also depend on generating and monetizing environmental attributes. The policies that enable these markets are often complex, uncertain, or subject to change, adding risk to long-term financial performance and complicating decisions for capital-constrained utilities.



UTILITY SPOTLIGHT:

Codigestion and Biogas to RNG at NYC DEP

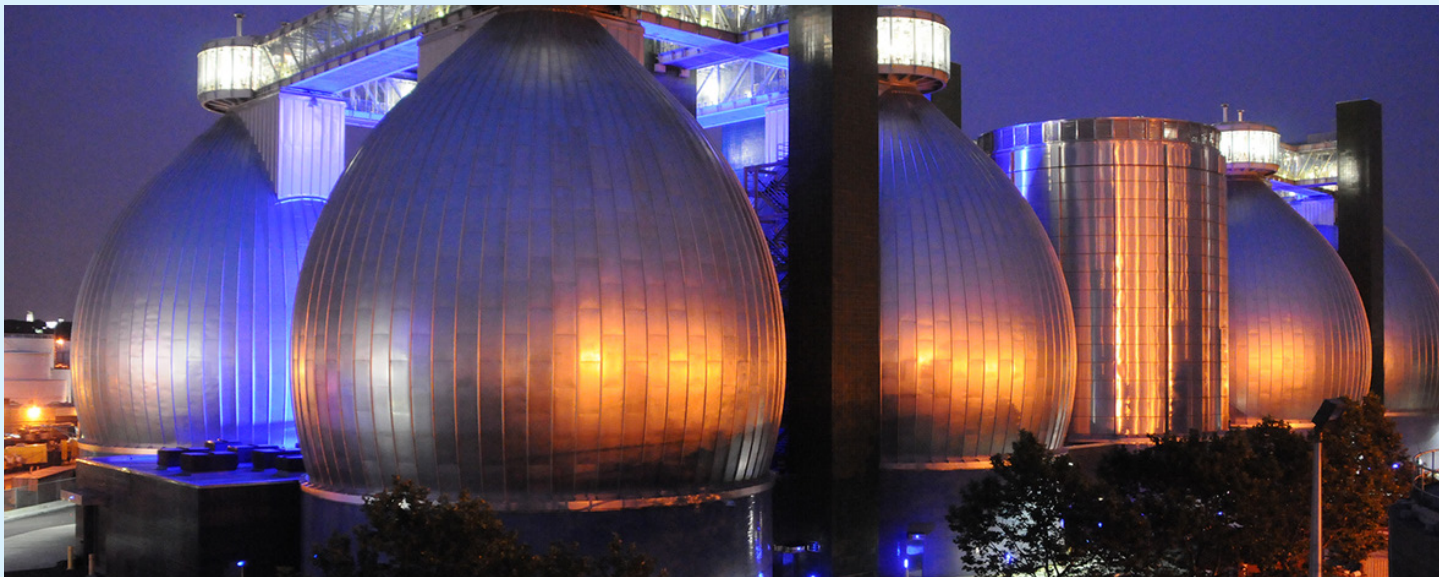


Image courtesy of the NYC.gov

UTILITY: New York Department of Environmental Protection at the Newtown Creek Wastewater Resource Recovery Facility

PARTNERS: [Waste Management](#) (Codigestion) and [National Grid](#) (Biogas to RNG)

FINANCIAL APPROACH(ES):

- **Co-digestion - Demonstration Project Contract:** Food waste processing and transport is owned/operated by Waste Management, a national waste management service provider. The Department of Environmental Protection charges a small fee to Waste Management intended to cover DEP's costs to accommodate the food waste.
- **Biogas-to-RNG - Concession Agreement:** The biogas-to-RNG system is financed, owned, and operated by National Grid, an electricity and natural gas provider. Revenue sharing begins once National Grid pays off the cost of the system.

Background on NYC DEP:

The [New York City Department of Environmental Protection \(DEP\)](#) manages the city's water and wastewater services. It operates [14 Wastewater Resource Recovery Facilities](#) (WRRFs) that collectively treat 1.3 billion gallons of wastewater per day. The [Newtown Creek WRRF](#) can treat up to 310 million gallons per day and has eight anaerobic digesters with 24 million gallons of digestion capacity. The Agency is funded primarily through rates and fees collected for the water and sewer services.

Why a demonstration project and concession agreement?

Both the co-digestion demonstration project and the biogas-to-RNG concession agreement succeeded because they created win-win outcomes for DEP and its private partners. The partners identified projects that aligned financial benefits with DEP's operational goals and were able to quickly mobilize teams to expand the programs. DEP committed to providing space and digester capacity since these were no-cost agreements that offered opportunities to reduce flaring, divert food waste from landfills, and demonstrate the economic and technical viability of similar programs for long-term deployment at other facilities.

How Concession Agreements for Biogas to RNG Work

A concession agreement for a biogas-to-RNG project is a legally binding contract where a public authority, such as a municipality or government agency, grants a private entity the exclusive right to develop, construct, operate, and finance a facility that upgrades biogas from a wastewater treatment plant into RNG. The agreement outlines the specific terms of the project, including the concession's duration. The duration is often lengthy (e.g., 20 years) to

allow recovery of capital investments. The agreement terms might also include the specifications of the quality and quantity of the RNG, pricing mechanisms, and the responsibilities of each party regarding infrastructure development and maintenance.

The private entity recoups its investment through revenue generated by the project. This may come from the sale of the RNG to gas distribution companies or directly to end users as a fuel source. A second, and often more important, revenue stream is the sale of environmental attributes, such as Renewable Identification Numbers (RINs), which are credits used to demonstrate compliance with the federal Renewable Fuel Standard, and Low Carbon Fuel Standard (LCFS) credits, which are tradable credits created under California's LCFS program and similar state initiatives to reduce the carbon intensity of fuels.

From Project Development to Financing

For the codigestion project, Waste Management approached DEP in 2013. Waste Management proposed piloting food waste co-digestion as a means to meet its organic waste diversion goals and to assess the effects on wastewater system digesters. The proximity of its Brooklyn Transfer Station to the Newtown Creek WRRF made the site economically attractive since trucking food waste out of the city was costly. With the proper infrastructure, co-digestion offered the potential for greater biogas yields, and Waste Management was simultaneously developing an organics [pre-processing system \(C0Re\)](#) to remove contaminants and produce a feedstock suitable for anaerobic digesters.

After an agreement was in place, DEP provided land at the Newtown Creek WRRF. Waste Management designed, built, and operates an off-site C0Re system at their Brooklyn Transfer Station, which removes contaminants from food waste and creates a bio slurry. They then deliver the pre-processed organic food waste to an on-site feed-in station (that Waste Management designed, built, and operates) at the Newtown Creek WRRF. DEP then processes the wastewater sludge and food scraps in digestors, producing biosolids and biogas. In later years

of the partnership, after DEP conducted cost accounting of codigestion (e.g., solids disposal from food waste), DEP implemented a small fee for Waste Management, designed to recoup DEP's costs associated with solids disposal and other department costs from the project.

The two parties entered into a no-cost demonstration agreement under which DEP provided land at Newtown Creek for a feed-in station for the pre-processed organics, while Waste Management covered all costs associated with the infrastructure required for co-digestion. As a demonstration project, the agreement had no fixed duration, and DEP reserved the right to end the project at any time.

The concession agreement with National Grid followed a similar pattern. National Grid approached DEP about using biogas from the Newtown Creek WRRF, proposing to upgrade it into RNG and for injection into the natural gas grid. The partnership between National Grid and NYC DEP began in 2018, and the biogas to RNG project was completed in March of 2022. NYC DEP entered into a concession agreement with National Grid, whereby NYC DEP provided land at the Newtown Creek WRRF, and National Grid designed, built, and operates and maintains the biogas conditioning system, which purifies the biogas, removing carbon dioxide and other unwanted compounds, before injecting it into the gas distribution system. NYC DEP owns and operates the raw biogas meters; National Grid owns and operates the meters for RNG product gas. The overall cost of the project was \$50 million.

Until National Grid's upfront capital costs are recovered, National Grid retains all revenue from the sale of RNG and associated environmental attributes. After the upfront capital costs are recovered, NYC DEP and National Grid will begin sharing the project revenues. The expected payback period has varied considerably from the beginning of the partnership to today, largely due to natural gas prices and the value of **environmental attributes** on the voluntary market. DEP does not expect revenue sharing to begin (i.e., for the capital costs to be recouped) for several years. To date, all environmental attributes have been sold in the voluntary market, rather than the compliance market. The voluntary market is

easier to enter and has less price volatility than the compliance market, but RINs sell at a higher price, further influencing the economics of the project.

Despite the biogas to RNG and codigestion projects being contracted with separate partners, the projects are heavily integrated, with DEP as the central connection point. As a result, DEP must manage the relationship and communication between the two projects. For example, if the biogas to RNG system is down for routine maintenance, DEP is responsible for communicating that to Waste Management and requesting that they not deposit food waste into the system, as any resulting biogas would need to be flared.

Image courtesy of the NYC.gov



WATER EFFICIENCY AND REAL WATER LOSS REDUCTION

What are Water Efficiency and Real Water Loss Reduction Projects?

Water efficiency and real water loss reduction projects aim to reduce losses from the system, such as leaks, breaks, and other physical losses, while also improving end-use efficiency and conservation. These efforts help preserve scarce water resources, support resilience during more frequent and severe droughts, and can delay or reduce the need for costly new water sources. They also lower treatment and distribution volumes, thereby reducing energy use and associated GHG emissions.

Water efficiency focuses on reducing end-user consumption through more efficient fixtures, appliances, and practices. Common approaches include replacing toilets, showerheads, and faucets with high-efficiency models, upgrading cooling systems, and improving irrigation practices in agriculture, as well as in residential and commercial landscapes. These strategies reduce the volume of water that must be treated, pumped, and heated, lowering both energy use and customer bills. Many of these improvements can reduce water use and improve affordability without requiring significant changes in behavior or sacrificing service quality.

Non-revenue water includes both real losses, such as leaks and breaks, and apparent losses, like unauthorized use, inaccurate metering, or unbilled authorized consumption. While addressing apparent losses can improve system efficiency and revenue recovery, this discussion focuses on reducing real losses because of their direct impact on energy use and water resource conservation. Reducing physical water loss through measures like pressure management, advanced metering infrastructure (AMI), and proactive leak detection and repair decreases the amount of water that needs to be treated and pumped. This leads to notable energy savings and related reductions in GHG emissions.

Why Might Water Efficiency and Real Water Loss Reduction Projects be Difficult to Finance?

Water efficiency and real water loss projects often compete with large infrastructure needs in capital plans and may be perceived as reducing revenue rather than creating value. Although they can help utilities avoid costly new supplies, these benefits are often overlooked in favor of more visible, supply-driven investments.

Many utilities also lack detailed data on system losses or performance, making it difficult to quantify opportunities and justify spending. Physical losses are often widespread and hard to pinpoint, reinforcing perceptions that repairs are costly and deliver uncertain returns.

In addition, because the cost of producing water is often lower than the retail rate, the financial value of reducing losses or improving efficiency may be underrepresented. Combined with a tendency to prioritize upfront costs over long-term savings, these factors can make it difficult to fund projects that reduce waste but do not generate new revenue.



UTILITY SPOTLIGHT:

Water Upgrades Save: On-Bill Program for Water Efficiency Upgrades



UTILITY: Sebastopol, California

PARTNERS: Bay Area Regional Energy Network (BayREN), Metropolitan Transportation Commission (MTC), and Association of Bay Area Governments (ABAG)

FINANCIAL APPROACH: On-bill charge for water efficiency improvements.

Water Upgrades Save is a tariffed on-bill (TOB) program administered by BayREN that enables customers of participating drinking water utilities to install water efficiency upgrades—such as high-efficiency toilets, aerators, and irrigation controls—at no upfront cost. Customers repay the cost of the upgrades through a monthly charge on their water bill. This charge is structured so that it does not exceed the value of the savings generated by the efficiency measures, making the upgrades either cost-neutral or cost-negative from the customer's perspective.

Background on BayREN

The [Bay Area Regional Energy Network \(BayREN\)](#) is a collaboration of public agencies across the nine Bay Area counties that delivers programs to advance sustainability, resilience, equity, and energy efficiency. Sponsored by the [Association of Bay Area Governments \(ABAG\)](#), BayREN provides rebates, financing, and technical assistance to support local governments and communities. Its programs are funded through utility ratepayer funds administered by the California Public Utilities Commission (CPUC), as well as other sources.

Why an on-bill charge for water efficiency upgrades?

Water efficiency and conservation are central to California's long-term water resilience strategy. In response to the 2012–2016 drought, the State adopted a policy framework focused on using water more wisely, eliminating water waste, strengthening local drought resilience, and improving agricultural water management. A core element of this approach is investing in water efficiency as a cost-effective way to manage demand, reduce system strain, and avoid or delay costly system expansions.

Water efficiency measures also reduce operational costs by lowering the energy required for water treatment, distribution, and heating. California's climate and energy policies increasingly recognize the connection between water use, energy consumption, and GHG emissions. To quantify these benefits, the state developed a water-energy nexus calculator that estimates indirect or embedded energy and emissions savings from water conservation. This understanding has helped extend on-bill financing programs, which were originally designed for energy efficiency, to also support water-saving measures.

How an on-bill charge for water efficiency upgrades program works

BayREN's *Water Upgrades Save* program is an example of an [Inclusive Utility Investment \(IUI\)](#), also known as a **tariffed on-bill (TOB)** program. It allows customers to install eligible water efficiency upgrades at little to no upfront cost. Once upgrades are installed, the customer repays the cost over time through a monthly charge on their water bill. The charge is designed to be less than the estimated savings, ensuring the customer experiences immediate net savings. After repayment is complete, the customer continues to benefit from lower bills. This model removes common financial barriers by providing upfront capital, guaranteeing savings exceed payments, and tying repayment to the property rather than the individual customer.

How States Shape On-Bill Charge Water Efficiency Programs

California enabled the use of the tariffed on-bill (TOB) program for water efficiency through the 2017 [Water Bill Savings Act](#). The Act authorized joint powers authorities to fund efficiency improvements across urban and suburban counties in the San Francisco Bay Area and Los Angeles County. It permits the joint powers authority to acquire, install, or repair water efficiency upgrades on a participating customer's property, provided the property is served by a participating local agency or publicly owned utility. The improvements are delivered under a servicing agreement and repaid through an on-bill charge collected by the utility on behalf of the joint powers authority.

While the Act allows the joint powers authority to issue bonds to fund the program, BayREN currently relies on capital provided by ABAG and MTC.

Project Development to Implementation

The Water Upgrades Save program is implemented under the authority of the Water Bill Savings Act. Governance is provided by the Association of Bay Area Governments (ABAG), which serves as the joint powers authority and fiscal sponsor, while BayREN acts as the program administrator.

Any drinking water utility within ABAG's nine-county region can participate. The business case varies by utility. Utilities with high volumetric water rates and older housing stock—where inefficient fixtures are more common—tend to see stronger financial returns for customers and a clearer path to cost recovery. In contrast, utilities with lower rates or newer housing stock may face more limited savings potential.

Participating utilities join the program by signing a master agreement with BayREN. BayREN then provides program administration and oversight, including customer outreach, marketing, product vetting, contractor coordination, and quality assurance. BayREN contracts with a program delivery partner responsible for site assessments, customer support, and coordination with pre-qualified contractors.

When a retail customer expresses interest, the program delivery partner conducts an on-site assessment to determine suitable upgrades and evaluate financial performance. The program applies the "80 percent rule," which serves as a two-part test for financial feasibility. First, the participant's annual payments cannot exceed 80 percent of the estimated annual savings on water, sewer, natural gas, and electricity bills. Second, the cost recovery period cannot exceed 80 percent of the useful life of the improvement. Together, these requirements ensure that customers retain at least 20 percent of the savings over the repayment period while maintaining confidence in the long-term value of the upgrades.

If the upgrade meets financial criteria, the program delivery partner helps the customer select approved products with pre-negotiated warranties. A licensed

contractor completes the installation, and the program delivery partner returns to inspect and approve the work.

Once upgrades are installed and approved, BayREN submits project details to the participating utility. The utility applies an on-bill charge to the customer's bill to repay the investment. Both the upgraded fixtures and the on-bill charge stay with the property. If the customer moves, the ongoing savings and responsibility for repayment transfer to the next occupant.

Flow of funds and the risk, financing, and administration of the program

Rather than requiring the utility or customer to pay out of pocket, the program uses CPUC ratepayer funds to administer the program and capital provided by ABAG—the fiscal sponsor of the program—to pay for project installation costs. The Association of Bay Area Governments (ABAG) provides upfront capital to BayREN, which contracts with a program delivery partner to conduct assessments, oversee delivery, and pay the program contractor. Once installations are complete, participating drinking water utilities collect

the on-bill charge from customers and remit payments to BayREN monthly. In other contexts, similar programs may use other public, private, or utility-backed sources as capital.

The on-bill model reduces the financial burden for utilities. Utilities are not required to fund projects or manage installation logistics. Their only role is to apply and collect the on-bill charge. The risk of nonpayment is minimized through customer vetting and a financial structure that guarantees the charge does not exceed expected savings. BayREN's administrative oversight provides a turnkey service for program management, enabling utilities to support customer-side conservation with minimal internal resources.

Program status

The Water Upgrades Save program will close by the end of the year and has stopped accepting new projects as of July 18, 2025. A Final Report detailing the lessons learned will be available by the end of 2025 from BayREN.



NATURE-BASED SOLUTIONS

What are Nature-based Solutions?

Nature-based Solutions are actions or projects that draw on natural processes to deliver environmental, social, and economic benefits. They offer a sustainable alternative to traditional engineered (or “gray”) infrastructure for stormwater management, flood mitigation, and water quality protection. They include a range of blue-green approaches, such as **green stormwater infrastructure**, urban tree canopy, constructed wetlands, and **regenerative landscape practices**.

In addition to these primary functions, NbS offer climate and community benefits. They store carbon in plants and soils and reduce GHG emissions by reducing the need for new gray infrastructure. These GHG reductions come from avoiding the carbon-intensive materials required for gray infrastructure and the ongoing energy needed to operate it. In urban and suburban areas, added vegetation and water features help mitigate heat island effects, lowering cooling demand, reducing energy consumption, and further cutting GHG emissions while strengthening community resilience to extreme heat. Such co-benefits can help make the case for including NbS in capital planning.

Utilities are turning to NbS to reduce urban flooding, manage combined sewer overflows, and protect water quality, recognizing that reliance on gray infrastructure alone is often prohibitively costly. Many are pursuing a “green-gray” approach that integrates NbS into overall system design.

Why Might NbS Projects be Difficult to Finance?

Despite their benefits, NbS can be difficult for utilities to fund. Upfront capital costs and the long-term maintenance needed to sustain them compete with other priorities. Utilities may also face uncertainty about performance over time, future maintenance needs, and regulatory acceptance compared to conventional infrastructure. While NbS provide clear qualitative co-benefits—such as increased access to green space, shade, and improved aesthetics that support mental health, community well-being, and local economies—these benefits cannot be easily monetized. Together, these factors make NbS harder to plan, budget for, and sustain, even though they offer long-term savings and broad public benefits.

State and federal policy are major drivers for the adoption of nature-based solutions (NbS), as communities work to meet water quality and stormwater management requirements under the Clean Water Act and comparable state laws. These regulations, often reinforced through enforcement actions, create a strong compliance incentive for utilities and local governments to integrate NbS into their capital and operational planning. In new or redevelopment land use projects, local governments may require or incentivize NbS, while in existing developments, integration often depends on supplemental funding or other incentives.

At the same time, traditional funding and delivery models are not always well suited to decentralized infrastructure. In response, [community-based public-private partnerships](#) (CBP3s) are emerging as an innovative model for service delivery, helping to reduce the financial and performance risks of public investment while providing the technical and organizational capacity needed to scale up NbS.

UTILITY SPOTLIGHT:

Milwaukee Metropolitan Sewerage District's Community Based Green Infrastructure Programs (Fresh Coast Protection Partnership and Fresh Coast Green Communities)



UTILITY: Milwaukee Metropolitan Sewerage District (MMSD)

PARTNER (PHASES I THROUGH III): [Greenprint Partners](#) and [Corvias/CIS](#)

FINANCIAL APPROACH: Community-Based Public-Private Partnership (CBP3)

Background on MMSD

The Milwaukee Metropolitan Sewerage District (MMSD) is a regional government agency that provides wastewater treatment and flood management services for more than a million residents across 29 communities in the Greater Milwaukee Area. MMSD operates both combined and separate sewer systems and is nationally recognized for its leadership in wastewater management, flood management, and green infrastructure.

MMSD is funded through a combination of rates, property taxes, and other revenue sources. Its mission centers on protecting public health and the environment, with sustainability playing a central role in its [strategic direction](#).

MMSD's [2035 Vision](#) is anchored in the principle of “integrated watershed management,” which emphasizes a watershed-based approach to water management that combines green and gray infrastructure.

A key goal under this vision is to use nature-based green stormwater infrastructure (GSI) to capture the first half inch of rainfall from impervious surfaces across the service area. By 2035, this would mean managing about 740 million gallons of stormwater every time it rains.

Why a Community-Based Public Private Partnership?

MMSD has been implementing GSI for over 20 years, with a focus on projects that utilize natural systems to manage stormwater. This includes rain gardens, green roofs, bioswales, constructed wetlands, and permeable pavement, as well as preserving open space to help absorb rainfall. MMSD has also supported community

programs such as rain barrel giveaways, plant sales, and green school initiatives to build awareness and encourage community members to take part in managing stormwater.

One of MMSD's longest-standing initiatives, the [Green Infrastructure Partnership Program](#) (GIPP), offers partial funding for GSI installation and has supported many successful projects. However, they realized the scale and pace of implementation under GIPP were not sufficient to meet MMSD's 2035 goal, and the program required significant staff time to administer. MMSD's Integrated Watershed Management Division, which includes just five team members, lacked the capacity to expand implementation at the level needed to achieve the regional green infrastructure goals.

To scale up without expanding internal staffing, MMSD turned to community-based public-private partnership (CBP3) delivery models. Under this approach, private firms were engaged to source, plan, design, and implement projects, effectively expanding MMSD's capacity to accelerate green infrastructure efforts more efficiently. Although relatively new to GSI, the model has long been used in the energy sector. It provided MMSD with a way to deliver high-quality, high-impact projects with greater flexibility and speed than traditional public-sector approaches, without significantly increasing staff.

How the Community-Based P3 works

A CBP3 builds on the traditional infrastructure P3 model, in which a local government partners with a private entity to deliver services. Like an infrastructure P3, a CBP3 allows the public agency to shift upfront capital costs to a private partner while gaining additional technical expertise and staff capacity. This support helps expedite the project development and implementation, enabling more projects to be completed at a faster pace. The utility reimburses the private partner for eligible costs either at key checkpoints or upon project completion, as outlined in the partnership agreement. This approach allows costs to be spread over time while transferring much of the development risk to the private partner.

Unlike traditional P3s, which typically focus on reducing costs and speeding delivery, CBP3s are designed to achieve broader operational, environmental, and community benefits. These can include access to green spaces, urban cooling, community revitalization, reduced flood risk, and improved water quality, particularly in historically underserved areas. While the scope of a CBP3 is often broader and more aligned with local policy and community goals, its contracting structure often mirrors that of a traditional P3.

Project Development to Financing

Assuming the necessary enabling conditions exist, a CBP3 model is relatively flexible and can be structured to meet the needs and goals of a utility. For MMSD, the Community-Based Green Infrastructure program has rolled out in four phases, or tranches, with independent RFPs for each. This structure allows MMSD to break up funding, increase competition, and update performance goals and targets (e.g., benefits to the MMSD system, flood management, community benefits, and community engagement) as the program develops.

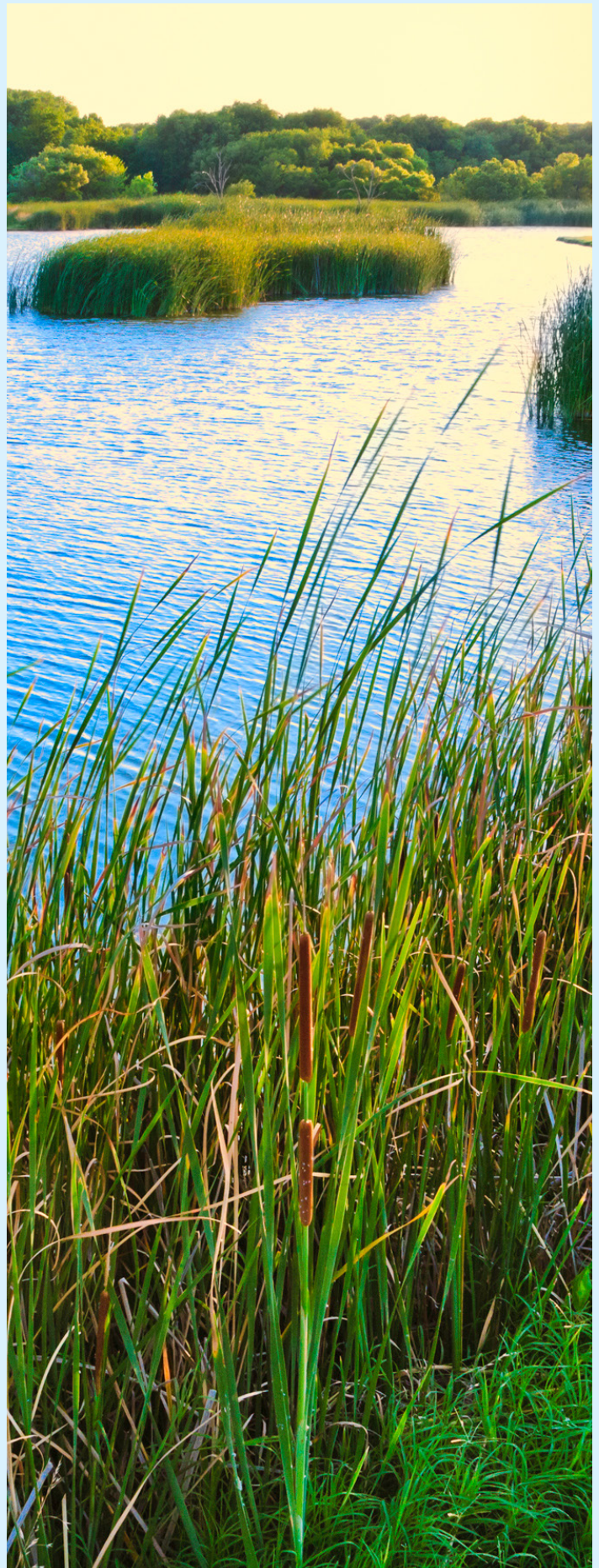
Procurement of services for each phase follows MMSD's standard procurement process: issuing an RFP, reviewing and scoring proposals, selecting a partner, and negotiating a master contract. Once selected, the partner manages the full scope of implementation, including project identification, planning, design, construction, vegetation establishment, and securing an easement to ensure long-term durability.

For each GSI project, the partner develops a concept plan for MMSD's technical team to review and approve. MMSD also reviews the construction bid and inspects the completed project to ensure alignment with the concept plan and overall program goals. After construction and easement execution, the partner is responsible for GSI establishment over a five-year period, allowing plantings to mature with less competition from invasive species. Progress is tracked, and the partner invoices monthly for work completed.

Additional Financing Considerations for a CBP3

MMSD's CBP3 for GSI differs from other case studies in this guide because the financial benefits are not easily accounted for, and the project does not directly generate revenue or direct cost savings. While GSI is often more cost-effective than gray infrastructure and provides community benefits, these avoided costs and co-benefits are difficult to monetize and therefore cannot serve as a repayment stream. For MMSD, the primary value of GSI lies in its stormwater management function; while benefits such as green space, urban cooling, and community revitalization are real, MMSD does not dedicate significant resources to quantifying them for financial purposes.

To fund the program, MMSD includes it in the capital budget, which offers more flexibility than the operating budget. Phase I was supported through general obligation bonds and MMSD's cash reserves. At the same time, MMSD worked with the State of Wisconsin to pilot the use of the Clean Water Fund Loan (CWFL) Program for GSI. MMSD successfully applied for and received a subsidized loan from the Wisconsin Clean Water Fund Program (the state's Clean Water State Revolving Fund) for several Phase I projects, subsequent phases of the program, as well as other GSI efforts funded under a cost-sharing partnership program. This approach provided access to substantial capital for GSI implementation, with repayment handled through debt service included in MMSD's capital budget, which is largely funded by a property tax levy.



CONSIDERATIONS FOR UTILITIES CONSIDERING CREATIVE FINANCIAL APPROACHES FOR GHG REDUCTIONS

Several cross-cutting themes emerged from the case studies in this guide. These themes are intended to serve as a starting point for utilities exploring creative financial approaches.

Align with Utility Priorities

Every successful project begins with a clearly defined purpose that fits within the utility's mission and operational priorities. A GHG reduction project may be driven by the need to control energy costs, reduce emissions, improve system resilience, or deliver community-facing co-benefits. This alignment shapes every aspect of financing and delivery. Projects that lack a defined purpose often struggle to gain traction, especially when they fall outside traditional capital or operational scopes.

Define the Financial Value

Understanding how a project generates financial value—and who benefits from that value—is essential to designing a viable delivery and financing structure. Potential revenue sources may include energy cost savings, avoided infrastructure investments, tax incentives, or the sale of environmental attributes. Some of these values may accrue to private partners, while others benefit from the utility directly or indirectly. Clearly defining these value streams helps determine pricing models, return expectations, and contract terms. It also ensures that utility staff and external partners are aligned in their understanding of what makes the project fundable and sustainable over time.

Assess the Enabling Environment

The legal and policy context in which a utility operates determines what types of financing delivery models are possible. Policies related to public procurement, third-party ownership, and environmental attribute markets can either facilitate or constrain a GHG reduction project.

Early legal and policy analysis is critical to avoid late-stage delays and to ensure that projects are structured for compliance and financial feasibility from the outset.

Build Partnerships, Not Just Projects

Strong partnerships with regulators, service providers, and project developers are often essential to moving a project forward. These relationships can unlock incentives, provide technical assistance, and help resolve unforeseen barriers. Engage early and maintain open communication throughout the project lifecycle. Strong relationships with regulators, utilities, and financial institutions improve project traction and durability. Early engagement can streamline approvals, surface opportunities, and help troubleshoot barriers throughout development and implementation.

Engage the Right Experts

GHG reduction projects can introduce unfamiliar technologies, contractual models, and financial mechanisms that fall outside traditional water and wastewater operations. In these cases, utilities benefit significantly from partnering with firms or advisors who have proven experience in the relevant fields. The most successful partners bring technical depth, financial modeling capabilities, and a strong understanding of local regulatory conditions. They also understand utility constraints and can collaborate effectively with public-sector stakeholders. A rigorous vetting process, including reference checks and reviewing project portfolios, helps utilities identify partners who are likely to deliver value and manage complexity over the life of the project.

Use Procurement Strategically

Procurement should be used as a tool to drive outcomes, not just a procedural requirement. By clearly articulating goals, evaluation criteria, and performance expectations,

utilities can shape the kinds of proposals they receive and the quality of the partnerships they form. Competitive processes should encourage innovation, address lifecycle cost considerations, and account for factors such as equity, resilience, and long-term service reliability. Given the long lead times between solicitation and implementation, utilities should also reassess technology options and cost assumptions prior to contract execution. Building flexibility for technical updates or market shifts will help ensure the final project remains relevant and effective.

Structure Risk and Flexibility in Contracts

Creative financial approaches rely on contracts that allocate risk clearly between the utility and its partners. Legal counsel familiar with energy, infrastructure, or environmental markets can help design agreements that protect utility interests, define responsibilities, and build in flexibility to adapt if conditions change. Important terms include performance guarantees, termination rights, liability protections, and processes for resolving disputes or transferring ownership. Contracts must clearly allocate financial, operational, and performance risks, with terms that allow for adaptation over time. Legal counsel can support strong baseline agreements, including provisions for early termination, underperformance, or market shifts.

Account for Full Lifecycle Costs

Evaluating lifecycle costs—including capital, operations, maintenance, and administrative oversight—is critical to understanding a project's true affordability. Creative financing models may eliminate upfront capital costs, but they rarely eliminate all utility responsibilities. Ongoing obligations such as monitoring, verification, reporting, data sharing, or integration into utility operations can create significant long-term workloads. Additionally, utility exposure to commodity markets, escalation terms, or contract penalties must be carefully modeled. A conservative approach to lifecycle financial planning helps avoid surprises and improves institutional readiness.

Plan for the Long-term

Project ownership, regulation, and market conditions are likely to evolve during the contract term. Ownership may shift, private partners may be acquired, regulations may evolve, and technologies may become obsolete.

Contracts should accommodate these shifts by including provisions for partner transitions, technology upgrades, or renegotiated terms. Internally, utilities must also maintain systems that can manage performance tracking, contractual obligations, and communication with successor partners over time. Long-term flexibility is not only a contractual concern—it is an operational necessity.

Build and Maintain Internal Capacity

A strong internal team is essential for long-term success, even when projects are externally financed and delivered. Utilities must be able to evaluate proposals, monitor technical and financial performance, and respond to partner issues over the life of a project. Core competencies may include engineering review, environmental credit market knowledge, energy system literacy, and contract management. Building or retaining these capabilities allows utilities to make informed decisions, protect their interests, and align external efforts with internal priorities.



GLOSSARY

Behind-the-Meter Solar: On-site solar panels that generate electricity for use at the same property where they are installed.

Codigestion: A process of adding organic waste streams to wastewater treatment digestors. This process diverts organic waste from landfills by using excess capacity at wastewater treatment plants.

Combined Heat and Power (CHP) System: A technology that uses one fuel source to generate electricity and capture the resulting heat for use in buildings or industrial processes, making it more efficient than producing heat and power separately.

Community Solar Garden: A shared solar energy project where multiple households, businesses, or organizations subscribe to a single solar array and receive credits on their electricity bills for the power it produces.

Community Solar Discounted Pricing Model: The community solar garden subscriber agrees to pay a fixed percentage below the bill credit received from the electric utility, as determined by the state rate-setting agency. This guarantees they always pay less per kilowatt-hour (kWh) than the credited value, regardless of changes in electricity prices. This pricing was negotiated only for projects on Council-owned land and reflects the value of foregone lease payments.

Community Solar Fixed Pricing Model: The community solar garden subscriber agrees to pay a constant per-kWh rate over the full contract term, set slightly above their retail rate at the time of signing. Savings depend on future utility rate increases eventually exceeding the fixed rate. This model offers long-term price certainty but may delay savings.

Community Solar Escalated Pricing Model: The community solar garden subscriber agrees to a per-kWh rate that increases annually at a set escalation. The initial price is lower than the fixed-rate model, offering early savings. Long-term savings depend on whether utility rates rise faster than the escalator, introducing more variability over time.

Concession Agreement: A contract in which a public authority grants a private entity the right to finance, build, and operate a project or service for a defined period under agreed terms.

Energy Services Agreement (ESA): A contract where a provider implements energy efficiency improvements, and the customer pays over time based on the verified cost savings rather than the upfront project cost.

Energy Services Company (ESCO): A company that develops, finances, and delivers energy efficiency projects, often through arrangements like Energy Services Agreements (ESAs) or performance contracts.

Environmental Attributes: A tradable or claimable benefit associated with the environmental value of a project, such as the renewable, emissions-reduction, or sustainability benefits linked to producing clean energy or reducing greenhouse gas emissions.



Green Stormwater Infrastructure (GSI): A nature-based approach to stormwater management that uses vegetation, soils, and other natural systems to capture, slow, infiltrate, or reuse stormwater where it falls, reducing runoff and improving water quality.

Inclusive Utility Investment Program: A program that allows a utility to pay for efficiency upgrades at a customer's property and recoup their costs via a charge on the customer's utility bill. This is also known as a tariffed on-bill program.

Land Lease Agreement: A long-term contract allowing a developer to build a solar project on private land in exchange for lease payments.

Low Carbon Fuel Standards (LCFS) Credits: A type of environmental attributes whereby credits are based on the renewable nature of fuel produced. The LCFS is designed to lower the carbon intensity of California's transportation fuels by diversifying the blend of fuels used. The LCFS sets carbon intensity metrics for each fuel type and sets the carbon intensity target for the fuel pool. The market then determines what mix of fuels is best for reaching the target.

Nature-based Solutions (NbS): Actions or projects that draw on natural processes to deliver environmental, social, and economic benefits.

Power Purchase Agreement: A long-term contract where a buyer agrees to purchase electricity from a solar project at agreed terms.

Regenerative Landscape Practices: Land management approaches that aim to restore ecosystems and landscapes to their natural states.

Renewable Instrument Numbers (RINs): A type of environmental attribute whereby credits are based on the renewable nature of fuel produced. A credit is generated per one (1) gallon of renewable fuel produced and is bought and sold within the Renewable Fuel Standard (RFS) Program.

Renewable Energy Credits (RECs): A tradable credit that represents proof that one megawatt-hour of electricity was generated from a renewable energy source.

Renewable Natural Gas (RNG): A pipeline-quality fuel made from organic waste that meets the same standards as fossil natural gas and can be used in existing gas systems for heat, electricity, or transportation.

Tariffed On-bill Program: A program that allows a utility to pay for efficiency upgrades at a customer's property and recoup their costs via a charge on the customer's utility bill. This is also known as an Inclusive Utility Investment Program.



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