Governance Options, and Opportunities, for Public Clean Water Agencies in a COVID-19 World

THE NATIONAL ASSOCIATION OF CLEAN WATER AGENCIES

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Introduction

January 1, 2020 ushered in a new decade with both great promise and great peril for public clean water agencies. The promise was embodied by a remarkable range of new management, financial and operational approaches that improve almost every aspect of utility governance. New technologies, often funded by innovative funding mechanisms, were paired with new management approaches that could deliver better services to the customer at lower cost. However, an equally impressive array of challenges is looming on the horizon. Scores of water systems are confronted with decaying infrastructure, the result of decades of underinvestment. Increasing efforts to raise additional revenue threatens to make water unaffordable to many vulnerable communities. A large percentage of the water workforce is eligible to retire in the next few years, threatening the loss of institutional knowledge. Affordability and workforce challenges are particularly acute for thousands of smaller water systems. Compounding these challenges is climate change, yielding more frequent and severe floods, droughts, extreme weather, and rising sea levels.

Then came the novel Coronavirus.

The COVID-19 pandemic heightened beyond measure the threats posed by these existing challenges. Protecting courageous water professionals that deliver drinking water and clean water services from exposure to health risks requires social distancing and staggered shifts – accentuating the reliance on critical and hard-to-replace essential personnel. Support for the public health of all citizens, particularly those in underserved communities, has fostered widespread suspension of service shut-offs, late fees, and the advent of new payment plans.

The good news is that – despite revenue and operational impacts — the water sector overall is resilient and has demonstrated terrific leadership in its response to the pandemic. Promising technology enables distance operations and management, virtual control systems are field-tested and proving worthy of further study or implementation. Most importantly, utilities have moved quickly to consider and implement new governance, procurement, and financial management systems. One of the astonishing stories of the pandemic is how water, this lifegiving resource critical to hygiene and stemming the spread of the virus, continues to flow safely and largely without interruption despite the current challenges.

The greatest challenge to the water sector is now upon us. Efforts to "flatten the curve" of the pandemic have mandated shutdowns of economies worldwide. Vast numbers of people have been thrown out of work, prompting an economic recession that some fear will rival the Great Depression. Historic job losses have driven people to seek the benefit of assistance programs to ensure water services. Many individual households and businesses can no longer afford to pay their basic utility bills.

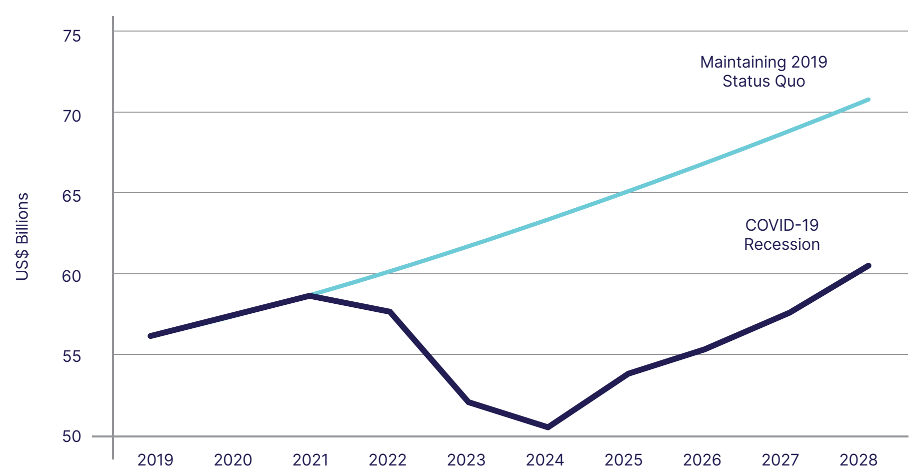
Drastically reduced commercial usage and significantly increased residential receivables together have crushed projected utility revenue. Many utilities are already grappling with a 25-30% loss of revenue and expect material shortfalls to continue into 2021. Recent projections suggest the overall loss for water utilities will measure in the tens of billions.[1]

When faced with revenue shortfalls in the past, water utilities have typically focused on maintaining operating budgets, balancing the shortfall by reducing capital expenditures. According to one projection, planned capital funding for water infrastructure will start dropping in 2021, peaking at more than a $10 billion a year reduction in 2024. In this projection, Capex is still $10 billion dollars less than the Pre-COVID projection in 2028.[2]

1. NACWA one-pager summarizing the collective revenue impacts to drinking water and clean water – see this link

2. See analysis by Bluefield Research

Exhibit 6: U.S. Municipal Water/Wastewater Utility CAPEX 2019-2028[2]



These challenges exacerbate historic capital underinvestment in the sector. Pre-COVID-19 estimates of revenue needed for the sector were measured in the tens of billions.[3] The loss of both commercial and residential revenue due to the pandemic is made worse by the prospect of severe reductions to capital spending on top of the severe pre-existing shortfalls — a sober reality that will make key governance considerations discussed in this document all the more critical.

Governance Challenges On The Horizon

These economic realities are likely to encourage, and in some cases force, many public utilities to consider financial and governance options and opportunities that have not been considered before. These opportunities, which include consolidations, public-private partnerships, operating concessions, and utility privatization, may well be an appropriate outcome in certain circumstances. NACWA's Board of Directors has previously outlined the Association's views on governance options in a prior policy statement, which stands as a foundation for this paper.[4]

The key question for public clean water utilities going forward is what benefit the private effort can offer a community and its ratepayers that the public agency cannot. While the answer to this question may vary based on unique situations, there is strong evidence, supported by numerous case studies, demonstrating that a public agency can achieve most if not all of these benefits on their own – and return any realized cost reductions or revenue generation back to the community rather than to shareholders.

NACWA has partnered with Moonshot Missions to offer this Road Map in the form of a checklist that we suggest a clean water utility review before considering or accepting proposals for private funding, management and/or ownership.[5] Although a utility can jump to any component on the checklist that is most relevant to the issue at hand, we also recommend that a utility work through the checklist to ensure that all steps that can help a utility operate efficiently and effectively are considered.

Some component of privatization may still be relevant in some cases, but utilities are encouraged to consider those options only after the steps recommended here have been evaluated and implemented first. By following the Road Map, utilities will maximize the likelihood of delivering clean and plentiful water at an affordable price while preserving public ownership and management of water resources.

This document is intended to be a "living document" that can be further updated and refined based on feedback and input from the utility community. NACWA and Moonshot welcome any thoughts or comments on this Road Map.

3. ASCE

4. NACWA Policy Statement of Principles on Utility Governance, May 2018

5. NACWA is deeply grateful to Moonshot Missions, especially George Hawkins and Andy Kricun, for their hard work on this document.

Governance Road Map

I. Budget Optimization

The most direct way to address revenue shortfalls is to implement an internal optimization program to identify opportunities to reduce operating costs, target capital expenditures, reduce annual debt service costs and optimize revenue. In this way, the utility can offset projected revenue shortfalls that are expected to manifest themselves over the next few months and also achieve permanent benefits that will last beyond the current situation.

Management preparation

The utility should consider two key attributes of an optimization initiative: 1) a general management program to organize its internal optimization initiatives, and 2) consideration of the most cost-effective funding mechanisms available. A management system enables a utility to identify long term goals, yet also put in place practices that ensure daily operations are identifying and implementing steps to attain those goals. An example of a well-understood system is ISO-14001 – which while designed to achieve environmental outcomes, can be deployed to also drive cost saving and revenue generation.

CASE STUDY

Environmental Management Services (EMS)[6]

The Camden County Municipal Utility Authority (CCMUA), which serves 500,000 people across 37 communities in southwestern New Jersey, responded to economic pressures over the last five years with a series of Utility of the Future (UOTF) initiatives including operating performance improvements, green infrastructure, solar energy, and planned methane recovery from biosolids. Combined operating and capital costs are now lower than they were in 1996, effluent is cleaner as are the tributaries to the Delaware River into which CCMUA's effluent is discharged, odors from the plant have been significantly reduced, and vendor-financed solar photovoltaic arrays save about $300,000 a year in energy costs.

CCMUA used an environmental management system (EMS) process to address its discharge and biosolids issues with equally impressive results. Prior to its EMS, CCMUA was barely meeting its state discharge permit, being fined and sued for almost continuous odor problems and had recently raised its user rates by over 22%. Through the EMS, the CCMUA identified its core objectives to be (1) optimization of water quality, (2) minimization of odors and (3) cost efficiency. Within 5 years of implementing an EMS, the CCMUA improved solids capture by 40%, virtually eliminated its odor problems, completely overhauled its physical plant, and reduced suspended solids in its discharge from 26 to 7 parts per million (permit limit of 30 ppm). The utility accomplished all of this while reducing rates from $337/household in 1996 to $324/household in 2012.

Camden County Municipal Utility Authority (CCMUA)

Location: **Camden, NJ**
Service Population: **500,000**

6. Source: NACWA

CASE STUDY

Lean/Six Sigma[7]

Clean Water Services (CWS), a water resources management utility serving 536,000 customers in Washington County, Oregon escalated its productivity improvement program developed in the early 1990s to Lean/Six Sigma in 1996, with the following results:

- A 24% gain in productivity in three years;
- A Goal-Share Program to support collaborative improvement efforts;
- A pay-for-performance system within a collective bargaining agreement;
- The nation's first integrated, municipal watershed-based permit;
- A partnership with Ostara Nutrient Recovery Systems, to provide the nation's first full-scale commercial phosphorus recovery system;
- Formation of the Clean Water Institute to commercialize its intellectual property; and
- A Business Process Management Center of Excellence, with core staff trained on Lean and Six Sigma methods.

Over the last decade, CWS has saved nearly $100 million in operating costs despite its advanced treatment levels. CWS saved an additional $140 million by instituting the nation's first temperature water quality trading program. It increased labor productivity by more than 35 percent. The utility's fleet was reorganized enabling a 33% reduction in vehicle count. During this period, the utility made strong steps toward the Utility of the Future by reorienting its vision and focus from engineering excellence to watershed and public health stewardship, attaining 100% compliance with all permit terms at all four wastewater treatment plants.

Clean Water Services (CWS)

Location: **Washington County, OR**
Service Population: **536,000**

With respect to funding, the standard funding "cascade" of options is:

- **PayGo and Cash on Hand** | Obviously, there are no financing costs associated with using Cash on Hand. This approach is subject to available funds, which will likely be more limited for many utilities because of the economic impact from COVID-19.
- **State Revolving Funds (SRF)** | Other than a cash payment, the SRF is the most cost-effective option as it provides lower interest rates over a longer period, thereby resulting in a lower annual debt service payment. If operational savings from a capital improvement project exceed the annual debt service payment, then the utility can improve performance while reducing overall annual costs. In some states, SRF loans do not need to be repaid until the funded project is complete, which is highly favorable.
- **WIFIA (Water Infrastructure Finance and Innovation Act)** | For regional and nationally significant water infrastructure projects, WIFIA provides long-term and low-cost supplemental funding. WIFIA can be used to cover a group of bundled projects from smaller and rural utilities.
- **Municipal Debt** | Funding from municipal debt provides tax free benefits to investors but is often subject to municipal or county debt caps.
- **Commercial Paper and Bank Loans** | In a low interest environment, accessing private capital through traditional bank loans can be an attractive option.

Operating Cost Saving Opportunities

There is an enormous and constantly expanding range of projects that can help permanently reduce operating costs and/or improve employee and customer safety. The following list is only a summary of several key examples:

- Implement automation and cross training initiatives to reduce workforce requirements and reduce vulnerability to future circumstances like COVID-19.
- Operational adjustments to reduce electricity usage.
- Capital improvements to reduce electricity usage, such as upgrade of aeration equipment.
- Implementation of green energy alternatives such as solar panels or combined heat and power facilities.
- Implementation of preventative maintenance programs to reduce reactive and emergency maintenance costs.
- Upgrade of biosolids thickening and dewatering equipment and/or digestion equipment to reduce sludge disposal costs.

CASE STUDY

Nutrient Removal[8 9]

The 0.5 million gallon per day wastewater treatment plant in Chinook, Montana was originally constructed in 1984 as an oxidation ditch treatment plant that was not designed for total nitrogen (TN) or total phosphorous (TP) removal. In 2012, nitrogen removal was required for permit reissuance. The staff began experimenting with aeration cycling using knowledge gained from a two-day training sponsored by the Montana Department of Environmental Quality. By cycling the aeration rotor on and off, the plant achieved sufficient aerobic conditions to maintain ammonia removal and sufficient anoxic conditions to reduce TN without purchasing any new equipment. In 2013, plant installed an oxidation reduction potential (ORP) probe for $5,000, upgraded the dissolved oxygen (DO) probe with a new luminescent DO probe for $8,000, and integrated both probes with their SCADA system. Combined, these optimization changes reduced TN levels from over 17 to under 6 mg/L. Energy savings through reducing rotor operating time and an earlier upgrade that added mixers to the oxidation ditch offset the capital and operational costs of the improvements.

Chinook Wastewater Treatment Plant

Location: **Chinook, MT**
Gallons Per Day: **0.5 million**

8. US EPA. "Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants." 2015.

9. The Water Planet Company. "Low Cost Nutrient Removal in Montana: A 2016 Report on 11 Wastewater Treatment Plants." 2016.

CASE STUDY

Nutrient Removal[10]

The town of Wolfeboro, New Hampshire is served by a small extended aeration activated sludge facility designed to treat 0.6 million gallons per day (MDG). Constructed in the 1970s, the facility reached its 30-year lifespan and was issued an administrative order by consent (AOC) by the New Hampshire Department of Environmental Services (NHDES) in the early 2000s. The facility initially considered major upgrades – including a $15 M new sequencing batch reactor – to fulfill the AOC requirements to improve effluent management and comply with more stringent total nitrogen (TN) and ammonia discharge limits.

Ultimately, the facility successfully identified $116,000 worth of incremental equipment retrofitting projects to optimize their aeration process and delay major any upgrades. The facility replaced antiquated ceramic dome diffusors with more efficient diffusers; downsized to lower horsepower blowers with variable frequency drivers and controllers; installed new online dissolved oxygen monitoring probes; and experimented with cyclical aeration. Together with the new equipment, a new optimized automated aeration cycle reduced airflow and energy requirements, increased plant reliability, and decreased effluent TN levels from over 6 mg/L to below 2 mg/L within three years. In 2016, the facility was awarded Plant of the Year from the New Hampshire Water Pollution Control Association (NHWPCA) for its commitment to continuous improvement in operations and maintenance.

Wolfeboro Wastewater Treatment Facility

Location: **Wolfeboro, NH**
Gallons Per Day: **0.6 million**

10. US EPA. "Case Studies on Implementing Low-Cost Modifications to Improve Nutrient Reduction at Wastewater Treatment Plants." 2015.

CASE STUDY

Process Optimization & Upgrades[11,12]

The Onondaga County Department of Water Environment Protection (WEP) processes over 30 billion gallons of wastewater annually at total of 7 treatment plants. Beginning in 2004, a range of process optimization efforts and energy efficiency upgrades were made at the Metropolitan Syracuse Wastewater Treatment Plant which receives 80 million gallons of wastewater daily. WEP used two best practices tools developed by the U.S. Department of Energy Industrial Technologies Program to assess potential areas of improvement.

Capital improvements included retrofitting the motors on waste-activated sludge pumps with variable frequency drives, replacing most 25-year-old deteriorating low-lift pump impellers and repairing others. WEP then used a systematic approach to implement numerous operational changes to optimize the plant's treatment processes. To eliminate wastewater nitrification in the aeration tanks, the number of 100-horsepower blowers was reduced from 21 to 13. Lastly, in-house staff recalibrated the waste gas burner controls to maximize waste gas usage.

The combination of operational modifications and capital upgrades saved WEP 2.8 million kWh of electricity and 270 MMBTU of natural gas. These improvements cost approximately $233,000 (with a 13-month simple payback period), in addition to approximately $209,000 annual savings.

Onondaga County Department of Water Environment Protection

Location: **Syracuse, NY**
Service Population: **417,000**

11. https://www.nrel.gov/docs/fy06osti/38076.pdf

12. http://www.ongov.net/wep/treatment-plants-operations-maintenance.html

CASE STUDY

Energy Independence[13 14 15 16]

Modified sewage treatment facilities offer an effective and cost-efficient option for the treatment of food waste, capture of methane, and production of organic fertilizers. Methane produced through the wastewater treatment processes can enable a facility to be energy independent and sell excess energy to the electric grid.

In an effort to decrease food waste within its community and decrease its impact on climate change, EBMUD modified its existing anaerobic digestion treatment facility to convert food waste to energy through the process of anaerobic digestion by installing an energy-efficient, low emissions gas turbine. The modified treatment process was able to convert the food waste to enough electrical power to meet its own power demands, as well as additional energy which is sold back to the grid. A natural byproduct of the anaerobic digestion process, organic fertilizer, is also sold for agricultural purposes.

Since many EBMUD wastewater treatment facilities already have anaerobic digesters, infrastructure investment costs were minimized and on-site expertise for operation was pre-existing. EBMUD wastewater treatment facilities are in dense, urban areas where the food waste is generated, therefore, the costs and emissions associated with transportation are reduced.

Not only did the utility reduce its greenhouse gas emissions substantially, but it provided savings to its ratepayers, and saved over $3 million each year on energy. The utility was able to gain energy independence, making it a more efficient and sustainable utility. The success of this project can serve as a model to be replicated at other wastewater treatment plants seeking to reduce costs and reduce their carbon footprint.

East Bay Municipal Utilities District

Location: **Oakland, CA**
Service Population: **642,000**

13. Bailey, Owen, Charles Creighton, Ryan Firestone, Chris Marnay, and Michael Stadler. “Distributed Energy Resources in Practice: A Case Study Analysis and Validation of LBNL’s Customer Adoption Model.” Lawrence Berkeley National Lab. (LBNL), Berkeley, CA (United States), February 1, 2003.

14. “Co-Digestion Lessons Learned at Three WRRFs | CWEA Water News.”

15. “East Bay Municipal Utility District :: Recycling Water and Energy.”

16. “EBMUD Wastewater Treatment Plant.”

Focus Capital Budget On Cost Reduction

To gain the benefit of projects designed to reduce operating costs, adopt a capital budget approach based on efficiency. This approach will require the review of capital planning to identify projects mandated by law or regulation, and those within discretion of the utility. For mandated projects, investigate whether innovative approaches may achieve the same outcome for lower costs.

- Example | Green Infrastructure for required stormwater management control.
- Example | Sewer optimization for mandated combined sewer overflow reductions.
- Example | Level sensors to achieve mandated reductions in sanitary sewer overflows.

CASE STUDY

Green infrastructure[17 18 19]

The New York City Department of Environmental Protection (DEP) manages the city's drinking water, wastewater, and stormwater systems, including the 60% of the city that relies on a combined sewer system (CSS). The DEP committed to a 20-year plan to reduce the volume of combined sewer overflows (CSOs) by more than 8 billion gallons per year by 2030. In 2012, the DEP entered a modified consent order that committed to constructed $3.4 billion in gray infrastructure to manage stormwater.

By incorporating green infrastructure (GI) projects into the plan, the City eliminated $1.4 billion in gray infrastructure capital projects, and deferred an additional $2 billion in gray infrastructure. The DEP has partnered with numerous other agencies throughout their GI initiative, including the City's Department of Transportation, Department of Design and Construction, Parks and Recreation, and Housing Authority.

Between 2010 and 2019, the program completed 1,230 equivalent greened acres, and constructed or started constructing over 10,000 GI assets. The program has retrofitted NYC's streets, sidewalks, and other public property; installed thousands of right-of-way rain gardens; and established extensive initiatives to incentivize GI on private property, including increased stormwater charges for heavy impervious services. NYC's GI program provides the community with a multitude of economic and social benefits, and the New York Harbor is the cleanest it has been in over a century.

New York City DEP

Location: **New York, NY**
Service Population: **7,500,000**

17. Congressional Research Service – GI and urban stormwater

18. NYC GI annual report (2019)

19. NYC GI annual report (2011)

CASE STUDY

Combined Heat & Power at a Small Wastewater Facility[20 21 22 23]

The Village of Essex Junction Water Resource Recovery Facility treats approximately 3.3 million gallon per day. The facility's anaerobic digester produces about 30,300 cubic feet of methane per day. Historically, the facility captured only half of this, using it in a boiler to heat the digester, and the remainder was flared. In 2003, the facility installed two 30-kW microturbines in a combined heat and power system. The methane is now used to produce power, and a heat recovery system channels waste heat from the electricity generation to warm the digester.

The methane co-generation project saves the Essex utility 412,000 kWh per year (a 36% reduction in electricity usage), translating to a $37,000 savings in electricity costs. There are approximately $4000 in annual maintenance costs, resulting in a net annual savings of $33,000. Methane-based cogeneration is normally not cost-effective for a facility of relatively small size, like this one. However, with the assistance of state agencies, federal agencies, and non-governmental organizations, the facility was able to bring the cost down to the point where it met its own requirement of a seven-year simple payback period. The overall project cost was $303,000.

The facility is now able to use nearly 100% of its waste methane, a renewable fuel, compared to 50% before improvements. The reduction in electricity consumed prevents power plant carbon dioxide emissions of 600,000 pounds and relieves transmission and distribution constraints on the grid. As an added bonus, the biosolids the facility produces are used on nearby farms as a fertilizer, further contributing to sustainable practices within its community.

The success of this project prompted the Village of Essex Junction to design a second CHP system that will generate additional electricity and further their efforts to reduce their greenhouse gas emissions. This project demonstrates the viability of combined heat and power as a cost-effective solution for small wastewater treatment facilities looking to gain energy independence, improve environmental performance, and reduce overall operating costs.

Village of Essex Junction

Location: **Essex Junction, VT**
Annual Savings: **$33,000**

20. EPA - Ensuring a Sustainable Future - An Energy Management Guidebook for Water and Wastewater Utilities 2008

21. http://www.chptap.org/Data/projects/EssexJunctionCHPprofile.pdf

22. https://www.essexjunction.org/departments/wastewater

23. https://www.nebiosolids.org/essex-junction

CASE STUDY

Combined Heat and Power & Energy Efficiency Upgrades[24 25 26]

The Town of Amherst received a $1,350,000 grant through New York State's Energy Smart Commercial and Industrial Performance Program to implement energy efficient at their facilities. The main capital improvement included the installation of a combined heat and power (CHP) system. The CHP system captures approximately 77,000 cubic feet of methane per day. This gas is used to run a compressor for oxygenating the waste stream. Other improvements included a heat recovery unit, an additional natural gas engine, a new control system, lighting dimmer switches, and high-efficiency motors. The heat recovery unit will capture heat for the facility, saving the town from needing to purchase natural gas, which was previously used to heat the facility. The project resulted in a savings of 7.5 million kWh, equating to $500,000 in annual savings on operating costs (electricity and natural gas costs).

The combination of larger capital improvements and smaller energy efficient upgrades helped Essex Junction to reduce its overall carbon footprint, reduce energy costs, gain independence from their electric and gas suppliers, and ultimately become a more resilient utility. This project was implemented by Siemens Building Services, an energy service company. Typically, an energy service company (ESCO) contracts with a facility owner to install energy efficiency improvements. The ESCO's costs and fees are paid from the energy savings. In this case, the New York State Energy Research and Development Authority (NYSERDA) also contributed to the costs of the improvements.

Town of Amherst WWTF

Location: **Amherst, NY**
Annual Savings: **$500,000**

24. EPA - Ensuring a Sustainable Future - An Energy Management Guidebook for Water and Wastewater Utilities 2008

25. https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1276&context=buffalocommons

26. https://www.nationalfuelgas.com/utility/forbusiness/docs/WaterPumpingCaseStudy.pdf

CASE STUDY

Beneficial Reuse of Biosolids[27 28 29]

The Washington Suburban Sanitary Commission (WSSC) land applies over 70 percent of its biosolids as an agricultural fertilizer and has been doing so for decades. In an effort to reduce the amount of biosolids produced, and become more sustainable, the utility is undertaking a series of efforts to optimize its biosolids processing and handling.

Thermal Hydrolysis & Anaerobic Digestion
WSSC engaged in a pilot study with Bucknell University to examine the effect of thermal hydrolysis, anaerobic digestion, and plant operations on volatile solids reduction (VSR) and other biosolids characteristics. The pilot study achieved greater than 50 percent VSR and improved dewaterability, cutting projected biosolids production and hauling costs in half.

As a result of the pilot study, a state-of-the-art Piscataway Bio-Energy Facility will be completed by 2024, and WSSC furthered its commitment to beneficial reuse of biosolids. The facility will process approximately 70 dry tons of biosolids per day through thermal hydrolysis and anaerobic digestion and generate Class A biosolids. WSSC aims to expand beneficial reuse of their biosolids to 100 percent by the end of 2020. Additionally, the process to create the Class A solids will generate renewable energy to help run the facility which will save energy costs and in turn reduce greenhouse gas emissions by 15 percent. The new facility is anticipated to serve WSSC customers for the next 100 years. The cost of the project is $262 million but will reduce operating costs by more than $4 million annually by reducing energy and biosolids disposal costs.

Use of Biosolids for Restoration
Typically, when WSSC adds new soil for backfilling after a water main break or replacement, the soil conditions are suboptimal for grass growth. The idea was proposed to utilize Class A biosolids for water main break/replacement soil and reseeding, construction restoration, mulching, and other miscellaneous uses. By using its own biosolids, WSSC will more quickly establish groundcover, save on filling costs, and become more self-sustainable. This opportunity is currently being pursued as the new biosolids facility is being constructed.

WSSC's efforts in reducing the volume and improving the quality of the biosolids it produces will enhance the marketability of its biosolids, offering more revenue, and enabling a more sustainable biosolids operation moving forward.

Washington Suburban Sanitary Commission (WSSC)

Location: **Laurel, MD**
Service Population: **1,800,000**

27. https://www.wef.org/globalassets/assets-wef/3---resources/for-the-public/utility-of-the-future/2019-honorees-compendium.pdf

28. https://www.wsscwater.com/bioenergy

29. https://www.wsscwater.com/bioenergy

For all discretionary projects, implement a process to require a "business case" for each project to identify any opportunity to reduce operating costs, generate revenue or derive additional efficiency. Elevate approval of approaches that reduce operating costs or extend the outcomes of planned investments.

- Example | Pipe condition assessment instead of wholesale replacement. Outcome: more pipeline stabilized for the dollar.
- Example | Valve refurbishment rather than replacement. Outcome: more valves made operable for the dollar.

Debt Service

Many utilities devote a significant percentage of their operating funds to payment of principal and interest on existing debt. The current low interest environment enables the opportunity of refinancing existing debt, which can yield savings over the term of the debt instrument – often decades or more. Again, utilities should be sure to maximize the utilization of SRF and/or WIFIA funding for capital projects, especially those that result in reduced annual operating costs.

Revenue Enhancement Opportunities

Many utilities do not explore other avenues for generating revenue to supplement volumetric or fixed rates. On one hand, the most important revenue that a utility has are funds already in hand. Steps that can be taken to generate additional revenue within existing rate levels should be a priority. "Phantom" water losses, or water that is delivered to a customer but not properly billed, should likely be first on the list. Approaches exist to identify customers being undercharged, or not at all – to ensure everyone is paying their fair share.

Additional efforts to generate revenue include assessing whether any common fees can be included in the rates and charges of the enterprise. Fees that are often overlooked are one-time connection fee for new hookups to the water and/or sewer system or a fee to manage stormwater, especially for utilities that operate combined sewer systems. Development of a capacity utilization charge is another source of revenue that charges the customer based on the level of potential use.

Of course, the utility charges for actual water and sewer use (volumetric charge) but may also recover the costs of building and maintaining the infrastructure that supports the potential use that any connection may seek. The potential use by a customer is measured by the size of the service connection – so a utilization charge escalates on this basis. A utilization charge also enables a utility to decouple a portion of revenue from volumetric uses – paralleling utility costs that are fixed regardless of usage.

A utility should also review current rate schedules and maintenance operations to ensure that it is fairly commensurate with the level of service provided and not enabling cross subsidization. For example, water meters slow with age. Loss of revenue due to this slowdown will proportionally benefit larger customers relative to smaller customers – often causing an unintentional cross subsidy from residential to commercial users.

There are numerous examples of such best practices across the water sector. And, thankfully, public sector utilities are more than willing to share information about the best practices that they have implemented. Therefore, every utility's first resort should be to look for opportunities to adapt/replicate existing best practices from their peers to reduce costs and/or increase revenues.

II. Flexible Management Options

Like long-term crises that came before, the COVID-19 pandemic demonstrates the value of adopting new strategies and modifying existing ones to enable safe and efficient responses to rapidly changing conditions and the "new normal" that is likely to follow. Fortunately, the need to respond to current urgent conditions while simultaneously planning for the post-crisis world affords a generational opportunity to remove barriers that often impede problem solving.

One governance structure that should be considered to deliver a wide range of benefits, particularly in a period of economic disruption, is the formation of an independent authority.

FORMATION OF AUTHORITY/GOVERNANCE STRUCTURE

When determining governance structure, it is important to note that many communities have benefited from being formed as independent authorities to deliver clean water services. Independent authorities typically have independent personnel, procurement and revenue generating authority (hence the name) and can devise and implement strategies quickly and efficiently – particularly when more than one community is within the service area. Local communities still maintain significant influence on the authority through dedicated seats on the Board and independent oversight. One significant advantage of this governance structure is that utility costs, and revenues, are kept separate from the general municipal fund. Therefore, all the funds raised from water and sewer rates go directly to water and sewer operating and capital costs.

CASE STUDY

Independent Authority

One example of an independent authority is the District of Columbia Water and Sewer Authority, now known as DC Water. DC Water's Blue Plains treatment facility offers services to the District of Columbia and large wholesale customers in suburban Maryland and Virginia. However, concerns were raised that its existence as a municipal agency housed within the District of Columbia's Department of Public Works confused the separation and dedication of funds allocated to Blue Plains and other joint-use facilities. To provide for both independence and efficiency of operations, DC Water was formed as an "independent instrumentality of the District Government" with formal representation on the Board of Directors from the surrounding counties. The independence of an authority enables many benefits:

- Clear contracts to allocate costs with suburban jurisdictions outside of the District of Columbia, with certainty of payment linked to a dedication of this critical revenue to appropriate uses.
- Procurement and personnel authority enabled advances in personnel hiring and technology innovation.

The Mayor of Washington, DC maintains significant influence by appointing the Chair of the Board and all members, honoring recommendations from the major jurisdictions served.

DC Water

Location: **Washington, DC**
Service Population: **681,000**

PROCUREMENT

Lowering barriers to procuring the right technology upgrades can enhance informed and timely decision-making and achieve the cost reductions or revenue gains highlighted in the optimization section. This, in turn, can free staff to devote more time to correcting the conditions that will generate tomorrow's emergencies. Governance practices that encourage the flexibility to consider new approaches to problem solving will be even more essential in the future.

Emergency Procurement Authority

Traditionally, grants of emergency procurement authority assume that most "emergencies" are discreet events of relatively short duration that warrant suspension of some or all normal competitive procurement protocols. Many times, qualifying events include severe threats to health or safety; an urgent need to preserve or protect property; the need to continue essential governmental functions; or an extraordinary requirement to meet compliance imperatives.

Exceptions from normal competitive protocols are allowed because the harm threatened is severe, or could not have been anticipated, or the time needed to respond to the harm threatened is so short that there isn't time for normal procedures to work. Emergency procurement procedures are classic exceptions to the normal rules that most procurements be planned well in advance, be exhaustively competed, and vetted as fully as possible.

Utilities should consider expanding their definition of "emergency" or creating a different category of procurement that allows for expedited acquisition of supplies, materials, or technologies under an expanded framework.

For example, if regulations, an ordinance or a policy limit the definition of emergency to specific events, consider amendments that grant supplemental, discretionary authority to a chief executive officer or governing body to declare that other circumstances that have not been specified qualify for a special acquisition process. That special process can allow for expedited submission and consideration of offers of technology, materials or supplies for periods over an extended period or on a pilot basis, subject to later competition.

Appropriate reporting and recertification requirements can be added as well as guardrails to prevent undue influence and "steered" procurements. The principle here is to encourage innovative solutions for new or escalating challenges in appropriate circumstances. If the solution acquired demonstrates potential as a long-term solution, a subsequent, "normal" procurement can follow.

Procurement Delegations

Utilities should also consider increasing existing delegated levels of procurement authority appropriate to the entity. For example, the level of approval required for procurement decisions would escalate in parallel to the size of the contract. The amounts noted for the tiered procurement approval authority are also likely to be different depending on the size of the utility and relevant state procurement laws. For example:

- Procurements up to $50,000 upon approval of the utility director, with subsequent notice in list form to the governing body.
- Procurements from $50,000 up to $100,000 on authority of a utility director, subject to notice to the governing body that reviews the procurement only by exception.
- Allowing procurements of up to $500,000 on approval of the utility director, subject to notice and specific approval by the highest level of oversight authority (i.e. City or County Council).
- Procurements above $1 million on approval by the highest level of oversight authority (Board of Directors, Commissioners or City or County Council) using an expedited review process.

Pre-Negotiated Joint Procurement Agreements

Consider adding authority to lead or join joint procurement agreements with other municipal or government agencies. For example, a procurement issued by one participant that acquires goods or services can be joined by participating utilities or jurisdictions to improve economies of scale when procuring technology, chemicals, supplies or equipment. Joint procurements should include a description of the need and benefit, identify the provisions that enable this outcome and outline how the procurement process of the lead agency satisfies public procurement principles.

Unsolicited Proposal Rules

Consider drafting or revising authority to enable consideration of offers or solutions from potential vendors for needs that are not currently the subject of a planned procurement. For example, a vendor may submit an offer to provide an innovative product or service that is not the subject of procurement, but that resolves a current challenge facing the utility. The utility could decide to conduct a pilot to determine the viability of the product or service. In most if not all cases, though, if the utility is convinced of this direction, the product or service should be subject to a competitive procurement.

The prospective vendor will likely want an acquisition with little or no competition. This outcome should be resisted, unless the technology has unique features that would justify a sole source contract under existing procurement rules. The utility should be sure to create a broad solicitation that ensures appropriate competition and allows the utility to vet offers of similar but not identical solutions. The key is flexibility without favor.

Performance Proposals

Consider phrasing competitive proposal procurements to incentivize solutions that positively impact operational efficiencies. For example, a utility could issue a Request for Proposals that establishes operational or capital financial targets and enable the submitting vendors the flexibility to develop and submit their own plans on how to achieve the efficiency goals. Other performance contracts could outline plans to improve employee safety or improve resilience. Enabling procurements based on performance goals encourages the broadest range of creativity from competing vendors.

III. Voluntary Partnerships

In addition to the opportunity to look internally for operational and cost efficiencies, utilities can gain significant financial and operational benefit from working collaboratively with other utilities. Smaller utilities can gain the benefit that comes from scale by considering approaches to look outward to their colleagues in the water sector, and larger utilities can benefit from learning some of the efficiencies that smaller utilities often have in place.

Direct peer Assistance

In some instances, utilities with greater capacity and resources can help their sister utilities at no direct cost to the volunteer utility. For example, the volunteer utility can provide technical advice, copies of procurement documents, or asset management plans. The volunteer utility can also assist with the paperwork associated with applying for funding that a less resourced utility might qualify for but lack the capacity to complete the application process. In some cases, the volunteer utility can even complete a cost saving project for the less resourced utility if they are reimbursed by the less resourced utility.

Statewide Peer Networks

Utilities should consider creating a network, mostly likely by state – but this could also be done by a region in the state or within a few states. Within a network, volunteer utilities are asked to become contributing members. Either through the state or a similar body, agencies in underserved communities with limited resources are identified. A designated agency or entity is then tasked with identifying and cataloguing needs for a utility – which is presented to the network for voluntary support. In this manner, the work associated with assistance is shared across the member utilities, instead of falling on only one. In addition, the volunteer utilities can more easily assist each other as well. Volunteer utilities can respond to requests from the underserved community for assistance, or any other utility, depending upon their capacity and capability at the time of the request.

CASE STUDY

Peer-to-Peer Network (Peer2Peer)[30]

New Jersey is a microcosm of many of the challenges facing our nation – water quality concerns in local waterbodies and the Delaware River, drinking water concerns in communities, affordability concerns for residents – all with a backdrop of climate change and extreme weather that challenges the resilience of everyone. New Jersey adds the importance of being the most developed state in the nation with many underserved communities facing decades of public health challenges, highlighted by the lack of clean water at the tap. COVID-19 has compounded this dire situation by emphasizing the need for access to clean water in every home to help protect against the virus, just as municipal and utility finances are devastated by the parallel economic downturn.

In coordination, the New Jersey Association of Environmental Authorities, the New Jersey Department of Environmental Protection, and the nonprofit Moonshot Missions are developing a Peer-to-Peer Network that will enable water professionals to support each other to improve water services for underserved communities across the state of New Jersey. The New Jersey Association of Environmental Authorities (NJAEA) has lined up 14 of its utility members to be volunteer utilities to help their peers in underserved communities. The NJ Department of Environmental Protection and the NJ Environmental Justice Advisory Council have identified 12 cities that are economically distressed and need assistance. Moonshot has entered a partnership with the NJAEA to help set up a peer-to-peer website and to provide technical assistance, along with the 14 volunteer utilities, to the communities needing resources and assistance.

Moonshot will undertake proactive diagnoses of the service challenges in the communities and offer free advice on how they can improve operational performance and/or reduce operating costs. In addition, the underserved communities can contact the NJAEA either by phone or via the website to request assistance from the volunteer utilities and/or Moonshot at any time. The NJDEP's Community Collaborative division and the NJ Environmental Justice Advisory Council will help make contacts with the underserved communities and help to facilitate the peer-to-peer work. The type of assistance to be rendered will include, but not be limited to, assistance with putting together RFPs and bids, technical and operational advice with drinking water and wastewater systems, applying for Federal and State grant and loan funding, and asset management assistance. The goal is to permanently reduce the cost of operating water systems to improve affordability while simultaneously improving water quality and environmental outcomes among New Jersey's distressed communities.

New Jersey Water Utility Sector

Location: **New Jersey**
Utilities Involved: **14**

30. Association of Environmental Authorities

IV. Shared Services

Utilities can enter into voluntary agreements to work together in common cause to reduce costs and improve efficacy. These shared service arrangements can be realized in several ways. Perhaps the most common is to work together on cooperative bids, summarized above in the procurement flexibility discussion. Shared service arrangements have been successful for energy services, bio-solids disposal and chemical delivery to reduce costs for all participants due to the larger market share.

Utilities should also consider whether they can sell spare capacity. If a utility has additional capacity for drinking water or wastewater treatment or biosolids management, the utility can sell treatment capacity to another utility. The selling utility gains additional revenue to fully utilize already existing infrastructure. The purchasing utility can either avoid the capital costs of building their own additional infrastructure, and/or reduced their own treatment or disposal costs. Utilities with excess administrative capacity can also consider contracting with other utilities to provide “back office” functions like billing.

Utilities can additionally participate in mutual aid agreements to reduce costs and risk during emergencies.

V. Public-Private Partnerships

In addition to internal improvements and public-public partnerships (P3s) discussed above, clean water utilities can also enter a variety of public-private partnerships while still retaining ownership of their core assets.

Design Build

Design-Build (DB) procurements enable the utility to share the potential for cost and time savings with a team responsible for designing and building a facility. DB typically reduces the total cost and time devoted to standard Design Bid Build practices. In addition, by uniting the design and construction responsibilities under a single entity, the risk of the project is more clearly assigned to that single entity. There are many varieties of such projects, including design/build, design/build/operate and design/build/own and operate. Each need to be assessed, and negotiated, with an eye toward reducing cost, improving outcomes, and reducing risk to the utility.

CASE STUDY

Design, Build, Operate and Maintain P3[31]

As an example of community based P3s, consider the green infrastructure partnership underway in Prince Georges County, MD. The County has partnered with a Rhode Island company, Corvais Group, who will form a project delivery company to help finance (up to 40%) and subcontract with local businesses and community-based organizations for the design, construction, and maintenance of a broad range of green infrastructure solutions to manage stormwater on 2,000 acres of County land.

According to the County, integrating all elements of green infrastructure solutions under a single delivery partner has already reduced program costs by 40% over traditional public solutions and could ultimately reduce costs by 50% to 60%. As part of the P3, Corvais will put in place and assume delivery risk for some 50,000-60,000 local green infrastructure installations, which would have swamped the County's procurement capability (and accounts for much of the cost savings).

Using local businesses and labor to carry out the program creates a stable local workforce and reinvests in the economy of the County. County stormwater fees are used to compensate Corvais over time based on a complex formula of base payments for substantial completion of individual projects, incentive payments for special initiatives, monthly or quarterly payments for on-going maintenance, and penalties for underperformance.

Prince Georges County

Location: **Maryland**

31. Source: NACWA

CASE STUDY

Design, Build, and Finance P3[32]

The San Antonio Water System (SAWS) P3 is one of the newest and largest public-private transactions in the US. Arranged via a competitive bidding process (9 respondents, 3 short-listed) followed by several years of negotiation, this 142-mile pipeline will bring groundwater from 3,400 privately negotiated leases with landowners six counties away to more than 162,000 city residents by 2020.

The private partner, The Vista Ridge Consortium, a special purpose company formed by the Spanish developer Abengoa and a second company, Blue Water, that secured the water rights will bear virtually all the up-front costs and risks including all project development, construction, operations, and maintenance costs. The city has no obligations until water is delivered, which ensures that its customers pay only for services delivered.

After a 42-month construction period, the P3 agreement will last for 30 years. After that, title to the pipeline will revert to SAWS, who will enjoy another 30 years of supply from Blue Water if they choose to exercise it. To gain public acceptance, SAWS pitched the project as, "tomorrow's water at today's rates," so rates will increase by only 16%, on average, at the beginning of the project but remain flat thereafter – a relatively unusual structure that underscores the flexibility possible in a creative P3 arrangement.

San Antonio Water System (SAWS)

Location: **San Antonio, TX**
Service Population: **1,144,646**

32. Source: NACWA

Purchaser Agreements

Under these agreements, private parties agree to design, build, and sometimes own and operate facilities for the public agency. The most common example is solar panel installation. The private party finances, builds, owns, operates, and maintains solar panels on behalf of the utility and sells back resilient, green energy to the utility at a lower cost than the normal electric utility rate. Through this arrangement, the utility can save money while still maintaining ownership of its core facilities. The private entity can deliver non-core services at a lower cost while retaining the responsibility for operation and maintenance. For solar projects, renewable energy credits and other benefits from the solar installation are typically retained by the private party.

CASE STUDY

Design, Build, Own, Operate P3[33]

The 9.5 MGD Hill Canyon Treatment Plant (HCTP) serving Thousand Oaks, CA produces 15% of its energy needs from solar photovoltaics and the remaining supply from biogas, making the plant 100% energy self-sufficient and saving about $400,000 in electricity costs each year.

The HCTP had government and private partners in these initiatives: both solar PV and biogas projects were funded by grants from the California Public Utility Self Generation Incentive Program (SGIP) totaling $2,000,000. Both projects are owned by third-party private sector owners who designed, built, financed, own and operate the facilities (e.g., there were no public dollars spent constructing these projects).

Moreover, HCTP takes in fats, oils, and grease from the surrounding community making about $400,000 a year in revenue from this service and boosting the plant's methane output. HCTP also sells nearly all of its effluent for agricultural irrigation, netting the plant another $1 million a year in revenue. Reclaimed water has substantial regional benefits by reducing groundwater pumping and preventing sea water intrusion in the Oxnard Plain.

Hill Canyon Treatment Plant

Location: **Camarillo, CA**
% of Renewable Energy Used: **100%**

32. Source: NACWA

Performance Contracts

In this scenario, private parties agree to implement technologies or other practices for a utility at no or reduced up-front costs, with an agreement to share in operating savings or generated revenue. A critical provision is to agree in advance to the "before" baseline of costs to measure savings or revenue to be shared. A second critical aspect is how much of the savings are returned to the private party and over what time frame – including an understanding of the return on the private investment in the project. In many cases, the private party gains the benefit of most if not all the savings until the up-front transaction costs are covered, followed by a period of sharing the savings with the utility. The period of shared savings should also conclude, after which all further savings benefit the utility.

34. https://solarbuildermag.com/news/benefits-solar-water-plants/

City of Madera WWTP

Location: **City of Madera, CA**
% of Renewable Energy Used: **61%**

CASE STUDY

No Cost Solar Energy at a Wastewater Treatment Facility[34]

In 2010 the City of Madera, CA completed a 1.16 MW solar installation at its wastewater treatment facility. The system was designed and installed by REC Solar Commercial and generates an average of 2,500 MW hours of electricity per year using 5,267 solar panels. The solar installation reliably generates enough power to account for 61 percent of the treatment facility's needs.

The city entered into a Power Purchase Agreement (PPA) with SunEdison to purchase the energy produced by the solar energy facility, and the PPA rate was set below the cost of energy from the local electrical utility. Under the PPA, SunEdison will finance, operate and maintain the solar power plant, and the city will purchase the energy produced to offset demand from the grid at predictable energy rates for 20 years. The project required no upfront costs from the city.

Within its first year of operation, the city saved substantially on energy costs. The City of Madera will continue to receive electricity at an affordable rate for at least the next 20 years. It has already saved hundreds of thousands of dollars each year since the system was commissioned, which will add up to more than $3.6 million in savings over the term of the 20-year agreement with SunEdison

The project boasts both major economic and environmental benefits. By using solar energy instead of conventional electricity, the utility will offset 47 million pounds of CO2 over twenty years, the equivalent of removing an estimated 4,600 cars for one year. Installing solar energy generation systems within the existing footprint of a wastewater treatment facility has become a viable option for utilities to make strides towards energy independence, while simultaneously improving the local environment and reducing their operating budgets.

Contract Operations

Under this option, the public utility can contract out all or a portion of its operations to a private entity, while still retaining ownership of its facilities. This option is typically considered if the price of contract operations paid by the community to the private utility could be significantly lower than the cost of its own operations.

In a typical agreement, the private operator is likely to pay a concession fee to the municipality in exchange for a longer-term contract (rarely less than 10 years, often 20 or more.) The municipality then pays the contract operator an annual fee to provide services. The contract operator is likely to seek repayment of the up-front concession fee over the term of the contract in the fee.

Moreover, these agreements often allow the contract operator to improve its profits from the contract if it can reduce the cost of operating the system. The private operator will likely explain that it will reduce costs by combining operations from the target public utility with other operations to gain economies of scale. The private operator will also plan to engage in the same operating cost reductions noted above.

The municipality should understand that it will be difficult to restore public sector management after private contract operations commence. Should the private operations not meet expectation, unraveling private operations and reasserting public control is difficult. Therefore, while not an entirely irretrievable step, selecting this option may well function as a nearly permanent solution for the municipality.

The financial and operational viability of this option depends entirely on the provisions of the contract operating agreement negotiated with the private party. Experience has demonstrated that there are at least 13 key provisions to consider. In general, the public entity seeks guarantees on levels of service and investment, and the private operator wants as much flexibility as possible to make operational and investment decisions. The private operator can improve profits by reducing costs, which is fine, if levels of service and investment are maintained. In the following list, items 3-10 can and likely should be subject to an agreement on levels of service.

The key provisions to consider are as follows:

1. **Concession Fee** | Municipalities often consider contract operations in exchange for a concession fee, which can be substantial. Concession fees paid upfront can be, or seem, very attractive to municipalities seeking quick economic improvement. However, the private company is likely to seek repayment of the concession fee over the term of the contract. In this case, by gaining an up-front fee and then paying it back in the annual operating payments, the municipality is essential taking on a loan. To determine the desirability of the loan, the municipality must ensure it agrees to the principal and interest charges, plus the return on capital charged by the private party, that are included in the agreement.

2. **Rates, Costs and Revenue** | Since the municipality still owns the facilities, the contract can be written so that the municipality still sets or approves rates for its customers. However, the municipality will have less control over costs incurred and revenues received, unless the agreement is written carefully and mindfully.

3. **Billing and Collections** | If the agreement includes authorizing the private party to take responsibility for billing and collections, then it is critical to make sure that the agreement includes enforceable performance measures for collections. Otherwise, the private operator will have no incentive to maximize collections, since their contract price from the municipality is fixed, independent of the revenue collected for the municipality.

4. **Maintenance** | The agreement should define the level of maintenance that is to be performed by the contract operator. Otherwise, the contract operator may have an incentive to defer maintenance and thereby save internal costs. In addition, it is equally essential to ensure that the agreement defines the line of demarcation among normal repairs, normal replacement,

and capital replacement. In many agreements, the responsibility for maintenance lies with the operator while the responsibility for capital improvements lies with the municipality. Deferred maintenance and normal replacement can save the contract operator costs and improve profits but will increase the likelihood for capital replacement for the municipality. This tension between the best interests of the municipal owner and the private operator should be fairly resolved in the agreement.

5. **Non-Revenue Water** | If the agreement includes operation of a potable water distribution system, the agreement must include enforceable performance measures for non-revenue water management and reduction. Otherwise, the private operator will have no incentive to minimize non-revenue water levels.

6. **Infiltration and Inflow** | If the agreement includes operation of a sanitary sewer system, it is critical to make sure the agreement include enforceable performance measures for infiltration/inflow reduction measures. The agreement must also include enforceable performance measures for regular cleaning of the sewers on an agreed upon schedule. Keeping the sewers clean ensures that the system achieves its optimal conveyance capacity. Without an enforceable schedule of cleaning, there would be an incentive for the operator to reduce cleaning and thereby reduce its internal costs. For both these factors (I&I and sewer cleaning), levels of service become a cost to the contractor.

7. **Combined Sewers** | If the agreement includes operation of a combined sewer system, the agreement must include enforceable performance measures for cleaning out the regulators and CSO outfalls on a regularly scheduled basis. Otherwise, there will be no incentive for the private operator to incur these costs.

8. **Wastewater Treatment** | If the agreement includes operation of a wastewater treatment plant, the agreement should include enforceable performance measures for flow accepted and effluent quality. If the contract has a fixed annual operations price, and no such performance measures, then there will be an incentive for the operator to reduce costs at the expense of poorer water quality. Of course, permit compliance must be a requirement of the agreement. But in the absence of performance measures, permit compliance will end up being the ceiling of performance rather than a floor. For example, an operator can run the treatment plant in a way that discharges more solids to the receiving waters to reduce biosolids disposal costs.

9. **Employees** | Another important decision involves whether the contract will specify that the private operator keep some or all the current employees and, if so, for how long. Many municipalities wish to require the operator to retain the current staff not only for continuity and capture of institutional knowledge but also for reasons of public acceptance. If the municipality

does wish to do this, then it needs to be written into the agreement, and it is likely to result in additional cost and a higher price for the private operator, as opposed to the price that the operator can offer if they have more flexibility with respect to retention and selection of personnel.

10. **Community** | The municipality will also want to be sure to consider the role of the surrounding community. Certain operating issues may have direct consequence to the community, such as odor control, truck traffic, and inlet cleaning. Setting levels of performance for these issues will involve extra cost to the private operator.

11. **Duration and Inflation** | The duration of the contract will be a key point to negotiate with the private operator and is often subject to the governing laws of the state. In parallel to duration, the agreement must define how the annual price will be impacted by inflationary factors. The municipal owner and the private operator will have to reach consensus on how to fairly apportion risk.

12. **Joint Operations** | If the agreement is only for a portion of the facilities, then there will be interface between the private operator and the facilities still operated by the public entity. Therefore, the agreement must discuss and anticipate how these interfaces will be properly and professionally managed to ensure optimal operations of the facilities at minimum cost, for the entire combined operation.

13. **Change of Circumstance** | It is also important to anticipate possible changes in circumstances in the agreement, such as natural disasters, regulatory changes, and significant increases or decreases in customers. Therefore, the agreement should include reasonable ways to negotiate changes to the contract without the need or specter of litigation, such as a change order procedure, mediation, and arbitration. The change of circumstances procedure can require the private operator to notify the municipal owner immediately upon discovery of the changed condition(s) and before incurring any costs, to the maximum extent possible. The goal is to apportion the risk clearly and fairly between the municipal owner and the private operator. It will be much more difficult to negotiate with the contract operator on the same basis after the contract has been awarded than before the decision to award the contract has been made.

VI. Regionalization and Consolidation

The previous examples involved the subject utilities maintaining ownership. Regionalization and consolidation are governance options that result in elimination of some or all of the participating utilities, but the ownership of the combined/consolidated system remains in public hands. There are two main types of regionalization and consolidation, although a cooperative (co-op) model has also emerged in recent years.

Regionalization

Creation of a new regional utility to manage existing facilities offers many advantages, like a shared service agreement, because costs are shared over a larger customer base. In addition, there are economies of scale with respect to administrative functions, such as management and purchasing, which result in reduced total costs when compared to each utility having been obliged to perform all these functions on their own. DC Water's Blue Plains wastewater treatment plant, described in part above, is an example of a regional facility that provides services to retail and wholesale customers in the District of Columbia and two neighboring states – at far lower cost than if each jurisdiction had to build and operate their own wastewater facility.

CASE STUDY

Design, Build, and Finance P3[35]

The Hampton Roads Sanitation District (HRSD) offers insight into the financial benefits of consolidation and collaboration when communities are faced with the high cost of regulatory compliance. HRSD and the localities it serves were compelled to make significant upgrades to their shared network of wastewater assets to improve environmental outcomes.

To address these regulatory requirements, HRSD and the localities pursued a collaborative strategy. HRSD led the crafting and implementation of a regional solution. Through this arrangement, HRSD made improvements to local assets that otherwise would have been the responsibility of individual localities. Although a more comprehensive consolidation model in which all the utilities fully merged likely would have presented an opportunity for greater cost savings, the localities opted for an incremental consolidated approach that balanced some savings with maintaining local service and control.

Hampton Roads Sanitation District

Location: **Virginia Beach, VA**
Service Population: **1,698,691**

35. Source: US Water Alliance and UNC Environmental Finance Center

Consolidation

Multiple utilities can consolidate to operate under the same governance, O&M and financial terms, whether it be a direct acquisition or joint merger. If one utility's financial, managerial, and operational strengths are greater than another, a direct acquisition of additional utilities and their associated assets and customer base may occur.

A joint merger is another option when two utilities join to create a new utility with a single governance, financial and operations structure. Consolidation results in fewer utilities within a region and potential for greater operational efficiencies and benefits to ratepayers. Consolidation also offers even more advantages as smaller wastewater treatment plants can be eliminated and either have their flow conveyed to a larger plant nearby, or to a new regional plant.

CASE STUDY

Acquisition and Consolidation[36]

A large municipal utility incorporated the assets and customers of six surrounding medium-sized municipal utilities through planned asset transfer and capacity purchase. City managers from affected utilities sit on the Utility Advisory Committee with Raleigh management and consult with Raleigh on key issues.

The City of Raleigh's water and wastewater utility transformed from a single, city-focused utilities department into a regional full-service provider. This model highlights the positive financial impacts and efficiencies that can arise when a high capacity urban utility takes on ownership and operations of the water and wastewater services of its small to medium-sized neighbors. In this rapidly growing area of the country, utilities consolidated to provide services in a more cost-effective and unified manner. The communities that consolidated with Raleigh realized cost savings, lower rates, and increased water security. The larger community gained regional support for future water and sewer permitting activities and reduced competition for limited new water resources.

City of Raleigh Public Utilities Department

Location: **Raleigh, NC**
Service Population: **550,000**

36. Source: US Water Alliance and UNC Environmental Finance Center

Cooperative model

Another example is cooperative agreements in which a regional utility is created as a cooperative non-profit entity that services dozens of smaller utilities in the region and offers the economies of scale associated with consolidated administration services, purchasing goods and services for a larger customer base. This co-op model for water is similar to the co-op model that has successfully operated for years in the electric power sector where cost savings or revenue generated by the cooperative are shared by all member agencies.

CASE STUDY

Water Cooperative[37]

Over the past 30 years, EJ Water has grown from only serving Effingham and Jasper county to serving 12 counties in Illinois. EJ Water provides water to more than 10,000 members throughout Sangamon, Christian, Montgomery, Shelby, Cumberland, Effingham, Jasper, Clay, Crawford, Richland, Fayette, and Edward counties.

In 2014, EJ Water became the largest rural water cooperative in the state of Illinois. At the time of the achievement the coop served 40 townships, 1600 square feet, and provided water to 4,150 farms and residents across 6 counties.

EJ Water Cooperative

Location: **Dieterich, IL**
Service Population: **19,544**

37. Source: EJ Water Cooperative

De-Regionalization

Consolidation and regionalization can reduce costs by achieving economies of scale and reducing per unit costs of treatment and enabling the sharing key personnel for common services. However, depending on the structure of the governing agreement, for municipalities in a regional utility to move in the other direction and seek to break away from an existing arrangement and begin, or resume, operations on their own. A variety a factors may lead to this, including political disagreements within the existing regional group. This step may also be considered by a community seeking to take back operations to consider a sale to another entity to generate municipal revenue.

We urge any community considering this step to review systematically the issues we outline in this report. Because of the benefit associated with economies of scale, it is not typical that it would be more cost effective for a member of the regional unit to construct its own facilities rather than remain in the regional system. And it would certainly be short-sighted to do this and lose economic benefits over political disagreements that could otherwise be resolved.

However, one example where such a move might make sense would be if the subject municipality had the opportunity to add to its revenue base but was limited by its sewer allocation within the regional unit. Then, the benefit of the new customers might outweigh the capital and operational costs associated with new local facilities. Yet, even in such a case, it might still be more cost effective to pay for an expansion of the regional facilities in order to effect the required increase in allocation within the regional unit, as opposed to construction and ongoing operations and maintenance of new local facilities.

If a community is considering separating from the regional group to enable a sale of assets, it is essential that they consider the long-term impacts on ratepayers, and not just the possible short-term benefits. In addition, the community should be sure to understand how the private operator can make up for the lost benefits associated with economies of scale realized through regionalization, while also generating the required profit and return to their investors.

VII. Sale of Facilities

The sale of public clean water facilities to a private operator is, obviously, the step that gives away the public's influence over the clean water system to the greatest degree and in an irrevocable way. Therefore, this option requires the utmost care, consideration and thoughtfulness.

In the wake of the COVID-19 pandemic, especially given the revenue challenges that many clean water utilities will be facing, there is likely to be much greater pressure on some utilities to pursue the full privatization route. The potential for a one-time infusion of cash by selling the utility and its assets may appear more enticing for local governments facing other pandemic-related economic shortfalls, and the private sector will no doubt tout its perceived ability to better restructure utility operations and finances to address revenue issues stemming from the pandemic. The private sector is already making a push in this regard. Accordingly, it is critical that clean water utilities carefully evaluate any potential move to full privatization.

The public entity must understand that the private company enters a privatization contract with an expectation to return a profit to its shareholders. The private entity can do so only if it is able to generate more revenue than the public agency, or reduce its costs, or both. As a result, many of the same considerations outlined above for a contract operations approach apply to a privatization transaction but with some differences. In an ideal scenario, the price of the sale to the municipality must be worth significantly more than the ***permanent*** loss of revenue and control of the utility.

Even more than the contracted option, the private company will have an incentive to generate additional revenue by raising rates (increasing revenue) and will have parallel incentive to reduce costs and services (to reduce costs) – both of which increase profits to the corporate entity and the return to shareholders. The public entity should therefore strongly consider including in the sale agreement:

- Enforceable performance guarantees to ensure that the public health and the environment are still protected under the operation of the private sector.
- Limits to rate increases charged to the customers.
- Provisions designed to govern impacts to the community from odor control, sewer backups, truck traffic and similar issues.
- Requirements for the retention of current workers, and for how long.
- Requirements for maintenance, replacement, and capital investment.

As we have described above, the steps that a private company can adopt to reduce costs are available to the public agency, which can still operate at lower cost without the additional obligation of providing a return to shareholders. Or, put another way, if a municipal operator can achieve the same private sector efficiency, then its costs will be lower since there is no profit to be earned or charged to the public. In addition, the public sector utility, and the public sector in general, has been created for the purpose of serving the public good – particularly delivering clean drinking water and protecting local waterways and public health. The private sector utility can also serve the public good, but only if the sale agreement is written to require such service.

Conclusion

It is not in the nature of water professionals to be discouraged in the face of extraordinary challenges. Throughout history, the sector has risen to every challenge – whether it be the building of sewers to nearly eliminate the scourge of cholera, to the implementation of chlorine disinfection to nearly eliminate pathogens in drinking water, to the building of modern wastewater facilities to nearly eliminate municipal pollutants to our waterbodies.

Today, the ongoing response to the COVID-19 pandemic will drive a deep and comprehensive burst of creativity and problem-solving in the water sector. As described above, there are several governance options available to clean water utilities that can help to reduce costs, improve operations, and increase resiliency, even in the face of the current COVID-19 crisis.

Public clean water utility managers — whether of small, medium or large utilities and whether highly resourced or facing resource constraints — can find ready examples throughout the sector to replicate and adapt in order to help address the projected revenue shortfalls that are expected to ensure, and thereby continue to provide clean water and optimal service to their customers at a reasonable price.

Governance Options, and Opportunities, for
Public Clean Water Agencies in a COVID-19 World

THE NATIONAL ASSOCIATION OF CLEAN WATER AGENCIES
OCTOBER 2020

Goverance Structures in the Water and Wastewater Sector

Summary of Case Studies Appendix

Below is a summary of research findings on the topic of water and wastewater utility governance structures. The following case studies are organized by type: 1) utility optimization through internal, self-improvement efforts, 2) informal cooperation, 3) regionalization or consolidation, 4) public-private partnerships and 5) full privatization and sale.

Utility Optimization Through Internal, Self-Improvement Efforts

Camden County Municipal Utility Authority - EMS

The Camden County Municipal Utility Authority (CCMUA), which serves 500,000 people across 37 communities in southwestern New Jersey, responded to economic pressures over the last five years with a series of Utility of the Future initiatives including operating performance improvements, green infrastructure, solar energy, and planned methane recovery from biosolids. Combined operating and capital costs are now lower than they were in 1996, effluent is cleaner as are the tributaries to the Delaware River into which CCMUA's effluent is discharged, odors from the plant have been significantly reduced, and vendor-financed solar photovoltaic arrays save about $300,000 a year in energy costs.

CCMUA used an environmental management system (EMS) process to address its discharge and biosolids issues with equally impressive results. Prior to its EMS, CCMUA was barely meeting its state discharge permit, being fined and sued for almost continuous odor problems and had recently raised its user rates by over 22%.

Through the EMS, the CCMUA identified its core objectives to be (1) optimization of water quality, (2) minimization of odors and (3) cost efficiency. Within 5 years of implementing an EMS, the CCMUA improved solids capture by 40%, virtually eliminated its odor problems, completely overhauled its physical plant, and reduced suspended solids in its discharge from 26 to 7 parts per million (permit limit of 30 ppm). The utility accomplished all of this while reducing rates from $337/household in 1996 to $324/household in 2012.

Source: *NACWA*

Clean Water Services – Lean/Six Sigma

Clean Water Services (CWS), a water resources management utility serving 536,000 customers in Washington County, Oregon escalated its productivity improvement program developed in the early 1990s to Lean/Six Sigma in 1996, with the following results:

- A 24% gain in productivity in three years;
- A Goal-Share Program to support collaborative improvement efforts;
- A pay-for-performance system within a collective bargaining agreement;
- The nation's first integrated, municipal watershed-based permit;

- A partnership with Ostara Nutrient Recovery Systems, to provide the nation's first full-scale commercial phosphorus recovery system;
- Formation of the Clean Water Institute to commercialize its intellectual property; and
- A Business Process Management Center of Excellence, with core staff trained on Lean and Six Sigma methods.

Over the last decade, CWS has saved nearly $100 million in operating costs despite its advanced treatment levels. CWS saved an additional $140 million by instituting the nation's first temperature water quality trading program. It increased labor productivity by more than 35 percent.

The utility's fleet was reorganized enabling a 33% reduction in vehicle count. During this period, the utility made strong steps toward the UOTF by reorienting its vision and focus from engineering excellence to watershed and public health stewardship, attaining 100% compliance with all permit terms at all four wastewater treatment plants.

Source: *NACWA*

Lawrence, Kansas - EMS

The Lawrence, Kansas water and clean water utility serving 90,000 customers implemented a utility-wide environmental management system (EMS) in 2007. As a result, it reduced biosolids transportation and land application fuel use by 13.5%, eliminated drinking water taste and odor problems, sited a new 530 acre wastewater treatment plant, achieved 73% customer satisfaction, and reduced workers compensation liability by more than 20% in three years.

Source: *NACWA*

City of Asheville Water Resources Department - EMS

In 2004, the City of Asheville Water Resources Department became the first ISO 14001 certified water utility in North Carolina, proving that it had implemented practices and procedures to do its part to protect the environment. In 2019, it was re-certified for the 15th year by NSF, showing that its commitment to protect the environment continues to be a priority.

The Water Resources Department is committed to managing and protecting the community's resources and to providing the highest quality of water service to customers through:

- Continuous Improvement in the product, systems, and processes to maximize customer satisfaction;

- Communication among and between staff, customers, vendors, contractors, and governing board;
- Compliance with relevant federal, state, and local environmental regulations; and
- Commitment to a clean, healthy environment through prevention of pollution.

Source: *City of Asheville*

Onondaga County Department of Water Environment Protection (WEP) – Process Optimization & Upgrades

The Onondaga County Department of Water Environment Protection (WEP) processes over 30 billion gallons of wastewater annually at total of 7 treatment plants. Beginning in 2004, a range of process optimization efforts and energy efficiency upgrades were made at the Metropolitan Syracuse Wastewater Treatment Plant which receives 80 million gallons of wastewater daily. WEP used two best practices tools developed by the U.S. Department of Energy Industrial Technologies Program to assess potential areas of improvement.

Capital improvements included retrofitting the motors on waste-activated sludge pumps with variable frequency drives, replacing most 25-year-old deteriorating low-lift pump impellers and replacing others. WEP then used a systematic approach to implement numerous operational changes to optimize the plant's treatment processes. To eliminate wastewater nitrification in the aeration tanks, the number of 100-horsepower blowers was reduced from 21 to 13. Lastly, in-house staff recalibrated the waste gas burner controls to maximize waste gas usage.

The combination of operational modifications and capital upgrades saved WEP 2.8 million kWh of electricity and 270 MMBTU of natural gas. These improvements cost approximately $233,000 (with a 13-month simple payback period), in addition to approximately $209,000 annual savings.

Sources:

- *Energy Efficiency and Renewable Energy U.S. Department of Energy*
- *Onondaga County Department of Water Environment Protection*

Village of Essex Junction, VT – Combined Heat & Power at a Small Wastewater Facility

The Village of Essex Junction Water Resource Recovery Facility treats approximately 3.3 million gallon per day. The facility's anaerobic digester produces about 30,300 cubic feet of methane per day. Historically, the facility captured only half of this, using it in a boiler to heat the digester while the remainder was flared. In 2003, the facility installed two 30-kW microturbines in a combined heat and power system. The methane is now used to produce power, and a heat recovery system channels waste heat from the electricity generation to warm the digester.

The methane co-generation project saves the Essex utility 412,000 kWh per year (a 36% reduction in electricity usage), translating to a $37,000 savings in electricity costs. There are approximately $4,000 in annual in maintenance costs, resulting in a net annual savings of $33,000. Methane-based cogeneration is normally not cost-effective for a facility of relatively small size, like this one. However, with the assistance of state agencies, federal agencies, and non-governmental organizations, the facility was able to bring the cost down to the point where it met its own requirement of a seven-year simple payback period. The overall project cost was $303,000.

The facility is now able to use nearly 100% of its waste methane, a renewable fuel, compared to 50% before improvements. The reduction in electricity consumed prevents power plant carbon dioxide emissions of 600,000 pounds and relieves transmission and distribution constraints on the grid. As an added bonus, the biosolids the facility produces are used on nearby farms as a fertilizer, further contributing to sustainable practices within its community.

The success of this project prompted the Village of Essex Junction to design a second CHP system that will generate additional electricity and further their efforts to reduce their greenhouse gas emissions. This project demonstrates the viability of combined heat and power as a cost-effective solution for small wastewater treatment facilities looking to gain energy independence, improve environmental performance, and reduce overall operating costs.

Sources:

- *EPA - Ensuring a Sustainable Future - An Energy Management Guidebook for Water and Wastewater Utilities 2008*
- *http://www.chptap.org/Data/projects/EssexJunctionCHPprofile.pdf*
- *https://www.essexjunction.org/departments/wastewater*
- *https://www.nebiosolids.org/essex-junction*

Town of Amherst, NY WWTF – Combined Heat and Power & Energy Efficiency Upgrades

The Town of Amherst received a $1,350,000 grant through New York State's Smart Commercial and Industrial Performance Program to implement energy efficient at its facilities. The main capital improvement included the installation of a combined heat and power (CHP) system. The CHP system captures approximately 77,000 cubic feet of methane per day. This gas is used to run a compressor for oxygenating the waste stream.

Other improvements included a heat recovery unit, an additional natural gas engine, a new control system, lighting dimmer switches, and high-efficiency motors. The heat recovery unit will capture heat for the facility, saving the town from needing to purchase natural gas, which was previously used to heat the facility. The project resulted in a savings of 7.5 million kWh, equating to $500,000 in annual savings on operating costs (electricity and natural gas costs).

The combination of larger capital improvements and smaller energy efficient upgrades helped Essex Junction to reduce its overall carbon footprint, reduce energy costs, gain independence from its electric and gas suppliers, and ultimately become a more resilient utility. This project was implemented by Siemens Building Services, an energy service company. Typically, an energy service company (ESCO) contracts with a facility owner to install energy efficiency improvements. The ESCO's costs and fees are paid from the energy savings. In this case, the New York State Energy Research and Development Authority (NYSERDA) also contributed to the costs of the improvements.

Sources:

- *EPA - Ensuring a Sustainable Future - An Energy Management Guidebook for Water and Wastewater Utilities 2008*
- *https://digitalcommons.ilr.cornell.edu/cgi/viewcontent.cgi?article=1276&context=buffalocommons*
- *https://www.nationalfuelgas.com/utility/forbusiness/docs/WaterPumpingCaseStudy.pdf*

East Bay Municipal Utilities District (EBMUD) – Energy Independence

Modified sewage treatment facilities offer an effective and cost-efficient option for the treatment of food waste, capture of methane, and production of organic fertilizers. Methane produced through the wastewater treatment processes can enable a facility to be energy independent and sell excess energy to the electric grid.

In an effort to decrease food waste within its community and decrease its impact on climate change, EBMUD modified its existing anaerobic digestion treatment facility to convert food waste to energy through the process of anaerobic digestion by installing an energy-efficient, low emissions gas turbine.

The modified treatment process was able to convert the food waste to enough electrical power to meet its own power demands, as well as additional energy which is sold back to the grid. A natural byproduct of the anaerobic digestion process, organic fertilizer, is also sold for agricultural purposes.

Since many EBMUD wastewater treatment facilities already have anaerobic digesters, infrastructure investment costs were minimized and on-site expertise for operation was pre-existing. EBMUD wastewater treatment facilities are in dense, urban areas where the food waste is generated, therefore, the costs and emissions associated with transportation are reduced.

Not only did the utility reduce its greenhouse gas emissions substantially, but it provided savings to its ratepayers and saved over $3 million each year on energy. The utility was able to gain energy independence, making it a more efficient and sustainable utility. The success of this project can serve as a model to be replicated at other wastewater treatment plants seeking to reduce costs and reduce their carbon footprint.

Sources:

- *Bailey, Owen, Charles Creighton, Ryan Firestone, Chris Marnay, and Michael Stadler. "Distributed Energy Resources in Practice: A Case Study Analysis and Validation of LBNL's Customer Adoption Model." Lawrence Berkeley National*
- *"Co-Digestion Lessons Learned at Three WRRFs | CWEA Water News."*
- *"East Bay Municipal Utility District: Recycling Water and Energy."*
- *"EBMUD Wastewater Treatment Plant."*

New York City DEP – Green infrastructure

The New York City Department of Environmental Protection (DEP) manages the city's drinking water, wastewater, and stormwater systems, including the 60% of the city that relies on a combined sewer system (CSS). The DEP committed to a 20-year plan to reduce the volume of combined sewer overflows (CSOs) by more than 8 billion gallons per year by 2030.

In 2012, the DEP entered a modified consent order that committed to constructing $3.4 billion in gray infrastructure to manage stormwater. By incorporating green infrastructure (GI) projects into the plan, the City eliminated $1.4 billion in gray infrastructure capital projects, and deferred an additional $2 billion in gray infrastructure.

The DEP has partnered with numerous other agencies throughout its GI initiative, including the City's Department of Transportation, Department of Design and Construction, Parks and Recreation, and Housing Authority. Between 2010 and 2019, the program completed 1,230 equivalent greened acres, and constructed or started constructing over 10,000 GI assets.

The program has retrofitted NYC's streets, sidewalks, and other public property; installed thousands of right-of-way rain gardens; and established extensive initiatives to incentivize GI on private property, including increased stormwater charges for heavy impervious services. NYC's GI program provides the community with a multitude of economic and social benefits, and the New York Harbor is the cleanest it has been in over a century.

Sources:

- *Congressional Research Service – GI and urban stormwater*
- *NYC GI annual report (2019)*
- *NYC GI annual report (2011)*

Washington Suburban Sanitary Commission (WSSC) – Beneficial Reuse of Biosolids

The Washington Suburban Sanitary Commission (WSSC) land applies over 70 percent of its biosolids as an agricultural fertilizer and has been doing so for decades. In an effort to reduce the amount of biosolids produced, and become more sustainable, the utility is undertaking a series of efforts to optimize their biosolids processing and handling.

THERMAL HYDROLYSIS & ANAEROBIC DIGESTION

WSSC engaged in a pilot study with Bucknell University to examine the effect of thermal hydrolysis, anaerobic digestion, and plant operations on volatile solids reduction (VSR) and other biosolids characteristics. The pilot study achieved greater than 50 percent VSR and improved dewaterability, cutting projected biosolids production and hauling costs in half.

As a result of a pilot study, a state-of-the-art Piscataway Bio-Energy Facility will be completed by 2024, and WSSC will further its commitment to beneficial reuse of biosolids. The facility will process approximately 70 dry tons of biosolids per day through thermal hydrolysis and anaerobic digestion and generate Class A biosolids. WSSC aims to expand beneficial reuse of their biosolids to 100 percent by the end of 2020.

Additionally, the process to create the Class A solids will generate renewable energy to help run the facility which will save energy costs and in turn reduce greenhouse gas emissions by 15 percent. The new facility is anticipated to serve WSSC customers for the next 100 years. The cost of the project is $262 million but will reduce operating costs by more than $4 million annually by reducing energy and biosolids disposal costs.

USE OF BIOSOLIDS FOR RESTORATION

Typically, when WSSC adds new soil for backfilling after a water main break or replacement, the soil conditions are suboptimal for grass growth. The idea was proposed to utilize Class A biosolids for water main break/replacement soil and reseeding, construction restoration, mulching, and other miscellaneous uses. By using its own biosolids, WSSC will more quickly establish groundcover, save on filling costs, and become more self-sustainable. This opportunity is currently being pursued as the new biosolids facility is being constructed.

WSSC's efforts in reducing the volume and improving the quality of the biosolids they produce will enhance the marketability of their biosolids, offering more revenue, and enabling a more sustainable biosolids operation moving forward.

Sources:

- *Water Environment Federation*
- *Washington Sanitary Sewer Commission*

Wolfeboro Wastewater Treatment Facility, Wolfeboro, NH – Nutrient Removal

The town of Wolfeboro, New Hampshire is served by a small extended aeration activated sludge facility designed to treat 0.6 million gallons per day (MDG). Constructed in the 1970s, the facility reached its 30-year lifespan and was issued an administrative order by consent (AOC) by the New Hampshire Department of Environmental Services (NHDES) in the early 2000s. The facility initially considered major upgrades – including a $15 M new sequencing batch reactor – to fulfil the AOC requirements to improve effluent management and comply with more stringent total nitrogen (TN) and ammonia discharge limits.

Ultimately, the facility successfully identified $116,000 worth of incremental equipment retrofitting projects to optimize its aeration process and delay major any upgrades. The facility replaced antiquated ceramic dome diffusors with more efficient diffusers; downsized to lower horsepower blowers with variable frequency drivers and controllers; installed new online dissolved oxygen monitoring probes; and experimented with cyclical aeration.

Together with the new equipment, a new optimized automated aeration cycle reduced airflow and energy requirements, increased plant reliability, and decreased effluent TN levels from over 6 mg/L to below 2 mg/L within three years. In 2016, the facility was awarded Plant of the Year from the New Hampshire Water Pollution Control Association (NHWPCA) for its commitment to continuous improvement in operations and maintenance.

Source: *USEPA*

Chinook Wastewater Treatment Plant, Chinook, MT – Nutrient Removal

The 0.5 million gallon per day wastewater treatment plant in Chinook, Montana was originally constructed in 1984 as an oxidation ditch treatment plant that was not designed for total nitrogen (TN) or total phosphorous (TP) removal. In 2012, nitrogen removal was required for permit reissuance. The staff began experimenting with aeration cycling using knowledge gained from a two-day training sponsored by the Montana Department of Environmental Quality.

By cycling the aeration rotor on and off, the plant achieved sufficient aerobic conditions to maintain ammonia removal and sufficient anoxic conditions to reduce TN without purchasing any new equipment.

In 2013, the plant installed an oxidation reduction potential (ORP) probe for $5,000, upgraded the dissolved oxygen (DO) probe with a new luminescent DO probe for $8,000, and integrated both probes with their SCADA system. Combined, these optimization changes reduced TN levels from over 17 to under 6 mg/L. Energy savings through reducing rotor operating time and an earlier upgrade that added mixers to the oxidation ditch offset the capital and operational costs of the improvements.

Sources:

- *USEPA*
- *The Water Plant Company*

Informal Cooperation

WARNs – Mutual Aid Agreements

Water and Wastewater Agency Response Networks (WARNs) are comprised of "utilities helping utilities" within a state that respond to and recover from emergencies by sharing resources with one another. WARNs are governed by a common mutual aid agreement.

The WARN agreement allows utilities to share resources in a more expedited way, compared to other mechanisms that require a formal disaster declaration. The agreement spells out how liability, workers' compensation, insurance and reimbursement will work. Other benefits include increased emergency preparedness and coordination, and enhanced access to specialized resources. Utility responders, once notified, are typically on the ground within 24 hours.

Source: *EPA*

New Jersey Water Utility Sector – Peer-to-Peer Network

New Jersey is a microcosm of many of the challenges facing the nation – water quality concerns in local waterbodies and the Delaware River, drinking water concerns in communities, affordability concerns for residents – all with a backdrop of climate change and extreme weather that challenges the resilience of everyone.

New Jersey adds the importance of being the most developed state in the nation with many underserved communities facing decades of public health challenges, highlighted by the lack of clean water at the tap. COVID-19 has compounded this dire situation by emphasizing the need for access to clean water in every home to help protect against the virus, just as municipal and utility finances are devastated by the parallel economic downturn.

In coordination, the New Jersey Association of Environmental Authorities, the New Jersey Department of Environmental Protection, and the nonprofit Moonshot Missions are developing a Peer-to-Peer Network that will enable water professionals to support each other to improve water services for underserved communities across the state of New Jersey. The New Jersey Association of Environmental Authorities (NJAEA) has lined up 14 of its utility members to be volunteer utilities to help their brethren peers in underserved communities. The NJ Department of Environmental Protection and the NJ Environmental Justice Advisory Council have identified 12 cities that are economically distressed and need assistance. Moonshot has entered a partnership with the NJAEA to help set up a peer-to-peer website and to provide technical assistance, along with the 14 volunteer utilities, to the communities needing resources and assistance.

Moonshot will undertake proactive diagnoses of the communities and offer free advice on how they can improve operational performance and/or reduce operating costs. In addition, the underserved communities can contact the NJAEA either by phone or via the website to request assistance from the volunteer utilities and/or Moonshot at any time. The NJDEP's Community Collaborative division and the NJ Environmental Justice Advisory Council will help make contacts with the underserved communities and help to facilitate the peer to peer work.

The type of assistance to be rendered would include, but not be limited to, assistance with putting together RFPs and bids, technical and operational advice with drinking water and wastewater systems, applying for Federal and State grant and loan funding and asset management assistance. The goal is to permanently reduce the cost of operating water systems to improve affordability while simultaneously improving water quality and environmental outcomes among New Jersey's distressed communities.

Source: *Association of Environmental Authorities*

BAYWORK – Workforce development

BAYWORK is a collaboration of 28 water and wastewater agencies in the San Francisco Bay Area. It was founded in June 2009 to address workforce development and reliability challenges in the Bay Area with a regional approach, and now works on research, workforce development programming, and recruitment for positions.

Born out of the findings from the West Coast Water Utilities Workshop on workforce development (co-sponsored by the San Francisco Public Utilities Commission and the Santa Clara Valley Water District) and a Water Research Foundation project on potential benefits of regional collaboration, BAYWORK is open to all Bay Area water and wastewater utilities.

Source: *BAYWORK*

Regionalization and Consolidation

Lower Rio Grande Public Water Works Authority (PWWA) – Joint Merger

The Lower Rio Grande Public Water Works Authority (PWWA) started with the merger of five mutual domestic associations in 2009. Today, the Lower Rio Grande PWWA includes nine water systems, serves 16 communities, and recognizes such benefits as a larger customer base to share costs, increased purchasing power, and a larger pool of available resources, among other benefits.

Source: *EPA*

EJ Water Cooperative – Co-op

Over the past 30 years, EJ Water has grown from only serving Effingham and Jasper county to serving 12 counties in Illinois. EJ Water provides water to more than 10,000 members throughout Sangamon, Christian, Montgomery, Shelby, Cumberland, Effingham, Jasper, Clay, Crawford, Richland, Fayette, and Edward counties.

Source: *EJ Water Cooperative*

Roxborough Water & Sanitation District (RWSD) - Annexation

The Roxborough Water & Sanitation District (RWSD) was established in 1972 to provide water, sewer and fire protection service to the Roxborough Community. In 1999, fire protection services moved from RWSD's jurisdiction to the West Metro Fire Protection Department. Subsequently, the District's original name, Roxborough Metropolitan District, became the Roxborough Water and Sanitation District.

In 2007, the District connected to the Littleton/Englewood Wastewater Treatment Plant (SPWRP). This regionalization eliminated the District's 30-year-old Wastewater Treatment Plant. The SPWRP is the third largest Publicly Owned Treatment Works (POTW) in the state of Colorado.

Source: *Roxborough*

Central Arkansas Water – Joint Merger

The Little Rock and North Little Rock water departments consolidated to establish Central Arkansas Water (CAW). Moving from a water supplier and purchaser wholesale relationship, two municipal water systems in North Little Rock and Little Rock fully merged to create a single consolidated water utility. It helped stabilize rates and eliminated rate differences between residents of a large region of central Arkansas.

The consolidated CAW shares water supply costs across the two jurisdictions, generates efficiency by combining distribution system maintenance and customer service functions, equally distributes rates, and borrows capital at a lower cost to invest in infrastructure or supply needs. Since it was created, other smaller utilities have joined CAW.

Source: *US Water Alliance and UNC Environmental Finance Center*

City of Colusa - Annexation

The consolidation of the Walnut Ranch District with the City of Colusa provides a snapshot of how a community served by a small private water company overcame contaminated drinking water supply problems through annexation to a nearby town. The Del Oro Water Company (DOWC) originally provided water service in Walnut Ranch, a small subdivision on the outskirts of the City of Colusa.

Low water quality caused DOWC and Walnut Ranch residents to pursue alternative sources of water which eventually resulted in DOWC selling the system and Walnut Ranch becoming part of Colusa and its water system. The project was made possible through the support of state agencies and the enactment of state level policies that promote and support consolidation.

Source: *US Water Alliance and UNC Environmental Finance Center*

City of Raleigh Public Utilities Department – Acquisition and Consolidation

A large municipal utility incorporated the assets and customers of six surrounding medium-sized municipal utilities through planned asset transfer and capacity purchase. City managers from affected utilities sit on the Utility Advisory Committee with Raleigh management and consult with Raleigh on key issues.

As a result of this consolidation, the City of Raleigh's water and wastewater utility transformed from a single, city-focused utilities department into a regional full service provider. This model highlights the positive financial impacts and efficiencies that can arise when a high capacity urban utility takes on ownership and operations of the water and wastewater services of its small to medium-sized neighbors.

In this rapidly growing area of the country, utilities consolidated to provide services in a more cost-effective and unified manner. The communities that consolidated with Raleigh realized cost savings, lower rates, and increased water security. The larger community gained regional support for future water and sewer permitting activities and reduced competition for limited new water resources.

Source: *US Water Alliance and UNC Environmental Finance Center*

Hampton Roads Sanitation District - Regionalization

The Hampton Roads Sanitation District (HRSD) offers insight into the financial benefits of consolidation and collaboration when communities are faced with the high cost of regulatory compliance. HRSD and the localities it serves were compelled to make significant upgrades to their shared network of wastewater assets to improve environmental outcomes.

To address these regulatory requirements, HRSD and the localities pursued a collaborative strategy. HRSD led the crafting and implementation of a regional solution. Through this arrangement, HRSD made improvements to local assets that otherwise would have been the responsibility of individual localities.

Although a more comprehensive consolidation model in which all the utilities fully merged likely would have presented an opportunity for greater cost savings, the localities opted for an incremental consolidated approach that balanced some savings with maintaining local service and control.

Source:

- *US Water Alliance and UNC Environmental Finance Center*
- *HDR - Regionalization of Sewer System Assets Study*

Iowa Regional Utilities Association (IRUA) - Annexation

The Iowa Regional Utilities Association (IRUA) epitomizes how a regional, consolidated utility can partner with numerous rural communities using different levels of consolidated services to provide better water quality and a more reliable water supply and wastewater service for a large region. What started as a modest effort involving a few communities became a sizeable regional utility spread across 18 counties with more than 15,000 water and wastewater customers and almost 5,000 miles of pipeline.

IRUA draws water from three municipal sources and owns a three million gallon per day wastewater treatment plant. Expanding the regional system continues to spread costs and debt across a larger base of customers and stabilizes water quality and supply for many rural communities. The variety of water sources provides more reliability for customers, and the larger revenue base generated funding for more skilled staff. The consistency of water quality and supply had the secondary benefit of enhancing the economic development in the rural communities IRUA serves.

Source: *US Water Alliance and UNC Environmental Finance Center*

Allentown Water and Sewer Utility - Concession and Lease Agreement

A public-to-public partnership between the City of Allentown and the Lehigh County Authority led to a more integrated regional utility system. At the same time, the partnership generated a large initial payment that helped Allentown meet nonutility financial obligations.

Source: *UNC Environmental Finance Center*

Logan Todd Regional Water Commission - Regionalization

The development of the Logan Todd Regional Water Commission (LTRWC) demonstrates the positive financial impact of regionalization in creating a more cost effective, reliable drinking water supply and bolstering the local and regional economy. Prior to the creation of the LTRWC, the 12-member utilities of the agency faced significant water quality concerns and water shortages.

In 1988, water shortages negatively impacted economic growth in the region. The formation of a regional water system secured water supplies and was able to attract very favorable capital financing. In creating the LTRWC, a Joint Powers Agency, twelve systems retained their individual distribution systems while purchasing water wholesale from a central treatment facility. The central treatment facility obtains water from a reliable water source. Since then, the region has supported existing and attracted new businesses and industries through a reliable water supply.

Source: *US Water Alliance and UNC Environmental Finance Center*

Charlotte Water, NC – Regionalization

The City of Charlotte's water utility (Charlotte Water) provides water and wastewater services throughout the entire Mecklenburg County metro area, which includes six other towns. While Charlotte Water owns the water and wastewater assets and the Charlotte city council maintains ultimate legal responsibility and authority for the utility, a series of agreements stipulates a number of consensus-supported governance conditions related to service expansion and rates, making Charlotte Water a unified regional utility.

Source: *UNC Environmental Finance Center*

Upper Wenatchee Valley Water & Wastewater Regionalization Study*

The goal of this study is to see if there are efficiency and cost-saving options available to ratepayers of water and wastewater services offered by several local governments through a consolidation of operations. The study is a collaborative effort between Chelan County, Chelan County PUD, the cities of Leavenworth and Cashmere and the Peshastin Water District to look at ways for improving water and wastewater services. The purpose of the study is to identify potential efficiencies for services such as meter reading, billing and using specialty equipment and contract services that are common to each of the current system operators participating in the study. One option may be to consolidate these systems under one regional operation owned and operated by Chelan PUD.

*Consolidation is pending

Source: *Chelan PUD*

Wastewater Merger & Regionalization Feasibility Awarded to Eastern Johnston County Communities

On March 13, 2019, the North Carolina State Water Infrastructure Authority awarded $50,000 of Merger/Regionalization Feasibility Grant Funding to the town of Kenly to study potential collaboration opportunities among the utility systems of the towns of Kenly, Micro, Pine Level, Princeton, Selma, and Smithfield, and Johnston County. The grant application was submitted by the Triangle J Council of Governments (TJCOG) on behalf of the seven communities after the COG identified Eastern Johnston County as an area that could dramatically benefit from regional utility opportunities.

Source: *https://www.tjcog.org/news/wastewater-merger-regionalization-feasibility-awarded-eastern-johnston-county-communities*

Public-Private Partnerships

West Coast Infrastructure Exchange

The West Coast Infrastructure Exchange (WCX) is a partnership of the three West Coast states that serves as a trusted advisor and provides impartial early stage analysis for public agencies considering public-private partnership infrastructure procurements. WCX ensures public agencies understand the potential benefits and disadvantages of alternative delivery methods that factor in lifecycle costs and long-term performance.

Source: *West Coast Infrastructure Exchange*

Hill Canyon, CA Treatment Plant

The 9.5 MGD Hill Canyon Treatment Plant (HCTP) serving Thousand Oaks, CA produces 15% of its energy needs from solar photovoltaics and the remaining supply from biogas, making the plant 100% energy self-sufficient and saving about $400,000 in electricity costs each year.

The HCTP had government and private partners in these initiatives: both the solar and biogas projects were funded by the California Public Utility Self Generation Incentive Program (SGIP) grants totaling $2,000,000. Both projects are owned by third-party private sector owners who designed, built, financed, own and operate the facilities (e.g., there were no public dollars spent constructing these projects). Moreover, HCTP takes in fats, oils, and grease from the surrounding community making about $400,000 a year in revenue from this service and boosting the plant's methane output. HCTP also sells nearly all of its effluent for agricultural irrigation, netting the plant another $1 million a year in revenue. Reclaimed water has substantial regional benefits by reducing groundwater pumping and preventing sea water intrusion in the Oxnard Plain.

Source: *NACWA*

Allentown, PA (P3 Procurement, but Public-Public Partnership)

In some cases, just the pursuit of a P3 has led to unexpectedly beneficial outcomes for the public partner. As have a growing number of cities, Allentown, PA faced the challenges of aging infrastructure, long- overdue capital improvements from deferred maintenance, and budget constraints. In addition, the city faced $160 million in unfunded pension liabilities and bill for the first $15 million that it could not pay.

The P3 procurement attracted five private proposals and one from a public entity, the Lehigh County Authority (LCA). Allentown chose the best deal and contracted with LCA for a 50-year concession agreement for Allentown's water and wastewater facilities. Allentown received a $212 million upfront payment to stabilize its pension fund and $50 million a year from LCA for 50 years. Rate increases were capped at 2.5% a year for the first 20 years and 2% a year for the final 30 years. While in the end, Allentown ended up being a public-to-public transaction, the project is a good example of a P3 procurement structured as a long-term lease concession with significant financial upside for the public partner, and rate protection for Allentown customers.

Source: *NACWA*

City of Madera, CA WWTP – No Cost Solar Energy at a Wastewater Treatment Facility

In 2010 the City of Madera, CA completed a 1.16 MW solar installation at its wastewater treatment facility. The system was designed and installed by REC Solar Commercial and generates an average of 2,500 MW hours of electricity per year using 5,267 solar panels. The solar installation reliably generates enough power to account for 61 percent of the treatment facility's needs.

The city entered into a Power Purchase Agreement (PPA) with SunEdison to purchase the energy produced by the solar energy facility, and the PPA rate was set below the cost of energy from the local electrical utility. Under the PPA, SunEdison will finance, operate and maintain the solar power plant, and the city will purchase the energy produced to offset demand from the grid at predictable energy rates for 20 years. The project required no upfront costs from the city.

Within its first year of operation, the city saved substantially on energy costs. The City of Madera will continue to receive electricity at an affordable rate for at least the next 20 years. It has already saved hundreds of thousands of dollars each year since the system was commissioned, which will add up to more than $3.6 million in savings over the term of the 20-year agreement with SunEdison

The project boasts both major economic and environmental benefits. By using solar energy instead of conventional electricity, the utility will offset 47 million pounds of CO_2 over twenty years, the equivalent of removing an estimated 4,600 cars for one year. Installing solar energy generation systems within the existing footprint of a wastewater treatment facility has become a viable option for utilities to make strides towards energy independence, while simultaneously improving the local environment and reducing their operating budgets.

Sources:

- *Solar Builder*
- *Water Online*

Bayonne Water and Wastewater Concession Agreement – City of Bayonne, NJ and Bayonne Water Joint Venture, LLC (Partnership between Suez/United Water and Kohlberg Kravitz & Roberts)

After a period of underfunding and deferred maintenance, the Bayonne Water and Wastewater Concession Agreement monetized existing assets, restructured debt, and transferred asset management responsibility to the private sector. The agreement led to improved service efficiency, stronger general government financial condition and modestly higher rates.

Source: *UNC Environmental Finance Center*

City of Davis, City of Woodland, and University of California at Davis/Woodland Davis Clean Water Agency and CH2MHill

The Cities of Woodland and Davis California joined together to construct a new surface water treatment plant using a 15-year Design Build and Operate ("DBO") agreement and public financing from State Revolving Fund ("SRF") loans to reduce the lifecycle cost of the project.

Source: *UNC Environmental Finance Center*

City of Phoenix, AZ and American Water Services (Project Leader and Operations), Black & Veatch (Design), and McCarthy Building Companies (Construction)

The Phoenix Lake Pleasant Water Treatment Plant is one of the nation's first large-scale Design Build and Operate (DBO) water treatment plant projects. The City of Phoenix used the DBO approach to increase the speed of construction, foster technological innovation, reduce risk, and achieve lifecycle cost savings. Customer usage and operating conditions were different than originally anticipated, highlighting the potential impact of how risk associated with reductions in demand is allocated in service delivery agreements.

Source: *UNC Environmental Finance Center*

Prince Georges County, MD

As an example of community-based P3s, consider the green infrastructure partnership underway in Prince Georges County, MD. The County has partnered with a Rhode Island company, Corvais Group, that will form a project delivery company to help finance (up to 40%) and subcontract with local businesses and community-based organizations for the design, construction, and maintenance of a broad range of green infrastructure solutions to manage stormwater on 2,000 acres of County land. According to the County, integrating all elements of green infrastructure solutions under a single delivery partner has already reduced program costs by 40% over traditional pure-public solutions and could ultimately reduce costs by 50% to 60%.

As part of the P3, Corvais will put in place and assume delivery risk for some 50,000-60,000 local green infrastructure installations, which would have swamped the County's procurement capability (and accounts for much of the cost savings). Using local businesses and labor to carry out the program creates a stable local workforce and reinvests in the economy of the County. County stormwater fees are used to compensate Corvais over time based on a complex formula of base payments for substantial completion of individual projects, incentive payments for special initiatives, monthly or quarterly payments for on-going maintenance, and penalties for underperformance.

Source: *NACWA*

City of Rialto

Facing significant deferred maintenance and an EPA Administrative Order to eliminate sanitary sewer overflows, the City of Rialto, CA competed and closed a 30-year P3 transaction for its water and wastewater systems with a private entity, Rialto Water Services LLC (RWS), a joint venture of Table Rock Capital and Veolia Environmental Services.

RWS will operate and maintain the infrastructure and collect revenue from the city's water and sewer facilities. RWS must meet all performance standards set for both water and wastewater service delivery. It also must upgrade both systems over the first five years and has an option to make (and receive payment for) subsequent improvements if both partners agree. The city will keep ownership of all of the assets, but RWS takes all performance risks.

RWS financed the P3 with a $146 million private placement of 30-year taxable bonds plus $26 million in equity from Table Rock and other investors. Rialto will use $27 million of these funds to retire outstanding utility debt. RWS will spend $41 million on capital improvements and Rialto will get another $30 million that it can use for other capital projects. RWS gets a monthly fee that includes a charge to support debt service and return on equity, operating and management costs and an escalating service fee.

Rialto's City Council sets rates subject to a rate covenant that assures payment to RWS, but limits increases to 115% over the first five years with rate stability thereafter. While this is substantial, it is less than the increase that Rialto faced in the absence of a P3, and importantly, it provides certainty that the city's water infrastructure needs will be met.

Source: *NACWA*

City of Santa Paula, CA and Santa Paula Water, LLC, a special purpose entity owned by Alinda Capital Partners (capital investor) and contracted with PERC Water Corporation (project developer and DBO firm)

The City of Santa Paula, California relied on an innovative project delivery model to build a new privately-owned and operated wastewater treatment facility, taking advantage of private capital as well as integrated design, construction and operations. Perceptions about the high cost of private capital led the City to issue tax-exempt debt to buy back the facility five years after its completion.

Source: *UNC Environmental Finance Center*

Tampa Bay Region, Florida and S&W Water, LLC, a partnership of Stone & Webster and Poseidon Resources Corporation

In Tampa Bay Region, multiple service delivery methods, each with different risk sharing approaches, contributed to the construction of one of the nation's largest seawater desalination plants.

Source: *UNC Environmental Resource Center*

Lake Pleasant Treatment Plant, Phoenix, AZ - DBO for treatment facility

This project included a new 80 mgd water treatment plant and related facilities. The City of Phoenix used the Design-Build-Operate approach to increase the speed of construction, foster technological innovation, reduce risk, and achieve lifecycle cost savings. The city had estimated $30 million in savings by using a P3 approach, though notably customer usage and operating conditions failed to meet original projections.

Source: *Bipartisan Policy Center*

Tolt Treatment Facility, Seattle, WA

Seattle Public Utilities used a Design-Build-Operate approach for a new water treatment facility, leveraging the technological innovation of the private sector to comply with drinking water standards and saving an estimated 40 percent over a conventional project delivery approach.

Source: *Bipartisan Policy Center*

San Antonio, TX - The Vista Ridge Consortium

The San Antonio Water System (SAWS) P3 is one of the newest and largest public-private transactions in the US. Arranged via a competitive bidding process (9 respondents, 3 short-listed) followed by several years of negotiation, this 142-mile pipeline will bring groundwater from 3,400 privately negotiated leases with landowners six counties away to more than 162,000 city residents by 2020. The private partner, The Vista Ridge Consortium, a special purpose company formed by the Spanish developer, Abengoa and a second company that secured the water rights, Blue Water, will bear virtually all the up-front costs and risks including all project development, construction, operations, and maintenance costs.

The city has no obligations until water is delivered, which ensures that its customers pay only for services delivered. After a 42-month construction period, the P3 agreement will last for 30 years. After that, title to the pipeline will revert to SAWS, who will enjoy another 30 years of supply from Blue Water if SAWS choose to exercise it. To gain public acceptance, SAWS pitched the project as, “tomorrow’s water at today’s rates,” so rates will increase by only 16%, on average, at the beginning of the project, but remain flat thereafter – a relatively unusual structure that underscores the flexibility possible in a creative P3 arrangement.

Source: *NACWA*

Full Privatization and Sale

Citizens Energy Group, IN

Citizens Energy Group's (Citizens Energy) acquisition of Indianapolis's water and wastewater system is an example of how consolidation can be used to reduce utility costs by integrating the provision of different utility services. Prior to the acquisition, the city was under pressure to cut costs resulting from the need to comply with an expensive 2006 Consent Decree. This became the primary driver to consolidate water and energy service. The city anticipated saving roughly 40 million dollars per year in capital and operating expenses from combining gas, steam, chilled water, water, and wastewater services with Citizens Energy. Those savings helped ensure rate increases would be less than if the city retained ownership of its water and wastewater utilities.

Source: *US Water Alliance and UNC Environmental Finance Center*

Fairview Township, York County, PA

The small community in Fairview Township sold its wastewater treatment system to a private company. This sale ensured that urgent repair needs of the system of 4,000 customers can be met without the municipality taking on additional debt. New projects taken on by the private water provider include the construction and installation of nearly 40,000 feet of new water and sewer mains, 6 new sewer pump stations, 2 new water pressure reducing stations, and 48 new fire hydrants.

Source: *Bipartisan Policy Center*

Pennsylvania American Water Acquires Municipal Water, Wastewater System in Northumberland County

Pennsylvania American Water, a subsidiary of American Water (NYSE: AWK), announced that it has signed an agreement to acquire the water and wastewater systems of Turbotville Borough in Northumberland County. The purchase price of approximately $1 million includes acquiring the water assets of the Municipal Authority of the Borough of Turbotville and wastewater assets from the Borough of Turbotville. The water system serves approximately 320 customers in the Borough and a portion of Lewis Township, while the wastewater system provides service to approximately 290 customers in Turbotville.

Source: *American Water*

Pennsylvania American Water Acquisition of Five Water and Wastewater Systems

Pennsylvania American Water, a subsidiary of American Water (NYSE: AWK), announced today that it has closed acquisitions in Clarion, Northumberland and Butler counties, comprising five municipal and privately owned water and wastewater systems. The total purchase price of the newly acquired systems is approximately $3.8 million.

Source: *BusinessWire*

New Jersey American Water

The Borough of Haddonfield water and wastewater systems consolidated with New Jersey American Water. This case provides a snapshot of the types of economic and financial impacts communities can gain when a low capacity system consolidates with a large private water and wastewater utility company. In the case of Haddonfield, the borough postponed and flattened the rate increases needed to fund millions of dollars of upgrades and repairs to its aging water and wastewater systems. New Jersey American Water's much broader revenue base covered the costs of those upgrades and smoothed out (and potentially minimized) rate increases. This spread out the anticipated local upgrade and repair costs for Haddonfield over the 650,000 accounts of New Jersey American Water instead of the 4,500 accounts of the borough.

Source: *US Water Alliance*

Aqua NC and Carolina Water Service, NC

For-profit water companies provide service to many suburban and large subdivision customers throughout North Carolina, but provide relatively little service to customers within incorporated areas. Aqua NC and Carolina Water Service, two of the largest consolidated private providers in the state, own and manage the assets of hundreds of community water systems in the state that provide water and, to a much lesser extent, sewer services to hundreds of thousands of residents. Private utilities are generally under the oversight of the North Carolina Utilities Commission. Under North Carolina Utilities Commission regulations, investor-owned utilities are permitted to use single tariff pricing such that all their costs are pooled across all their separate systems across the state and almost all their customers pay the same rates regardless of where they are in the state.

Source: *UNC Environmental Finance Center*

Kentucky American Water Acquires North Middletown Water and Wastewater Assets

Kentucky American Water announced that it has acquired the water and wastewater assets of the City of North Middletown in Bourbon County, Kentucky. The transaction adds approximately 400 water customers and 250 wastewater customers to Kentucky American Water and expands the company's service area in Bourbon County.

Source: *AP News*

Additional Resources

Atlanta and United Water dissolve 20-year contract

Source: *BizJournal*

The city of Atlanta and United Water have jointly agreed to dissolve the 20-year contract under which United was running Atlanta's water system. United Water has agreed to pay the city $6 million to settle its legal claims, and the city will pay United Water $1 million. Both of those amounts are far less than the two parties had requested form each other in the mist of legal discussions.

Pittsburgh, PA - The Briefing Book on PWSA Restructuring Options

Source: *Infrastructure Management Group*

The restructuring options for PWSA range from modest to extensive, and from public to private. It is fair to assume that each has their unique advantages and disadvantages for Pittsburgh's water and sewer ratepayers.

Strengthening Utilities Through Consolidation: The Financial Impact

Source: *US Water Alliance and UNC EFC*

Perspective: "The Financial Impact of Alternative Water Project Delivery Models" in the Water Sector

Source: *U.S. EPA, Water Infrastructure and Resiliency Finance Center*

To P3 or not to P3 A water industry view on the relevance of public-private partnership delivery models

Source: *AWWA and EY*

Public-Private Partnerships for Transportation and Water Infrastructure

Source: *Congressional Budget Office*

State Programs and Policies Supporting Cooperative Approaches for Drinking Water Systems

Source: *EPA*

The Water Resources Utility of the Future: A Blueprint for Action

Source: *NACWA*

Guiding Principles for Utility Consolidation

Source: *US Water Alliance*

Water Utility Partnerships: Resource Guide and Toolbox

Source: *Water Research Foundation*

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