Energy-Related Financing Options

in the

Drinking Water and Wastewater (DW/WW) Industries

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1. OVERVIEW

This working paper presents an overview of the drinking water and wastewater (DW/WW) industries, identifies opportunities for energy efficiency improvements and pollution prevention, provides information on ways to finance energy improvements in these industries, and discusses some of the barriers to implementing energy efficiency upgrades. The paper offers insights into whether and how financing might affect opportunities for pursuing improved energy efficiency in both industries.

Intended for internal review within EPA's Climate Protection Partnerships Division (CPPD), this working paper will help EPA assess the feasibility of pursuing an ENERGY STAR initiative in the DW/WW industries. The information presented is based on Cadmus' long experience with these industries, and recent interviews with more than 20 industry representatives—association staff, private-sector consultants in the energy industry, and engineers or program managers at the state and local government level who understand the issues in municipal DW/WW utilities (see Appendix 1 for list of contacts).

1.1 PRELIMINARY FINDINGS/INSIGHTS

- What is the main target opportunity? The vast majority of the U.S. population is served by a small number of relatively large DW/WW utilities. This group offers EPA the most cost-effective, high-impact opportunity for improving energy efficiency and preventing pollution. Further, these large utilities tend not to have difficulty accessing the capital markets to fund system improvements. A secondary opportunity is present with the State Revolving Loan Fund (SRF), discussed later.

- Is energy relevant to the DW/WW? Even though energy comprises a significant portion of the DW/WW utilities' overall operating cost, energy efficiency is largely a secondary concern. These utilities are more concerned about regulatory compliance and security. Therefore, an ENERGY STAR initiative would need to be "packaged" as part of improving overall system infrastructure.

- Where are the opportunities? Opportunities for reducing energy use in the DW/WW industries fall into two categories:
    - Traditional measures outside the "water treatment process," such as installing more efficient equipment—better pumps and motors for collection, distribution, and transmission—as well as upgrading the building's energy efficiency with improved indoor and outdoor lighting, HVAC, and an energy management systems (EMS).
    - Water treatment process improvements that reduce energy use, including any equipment germaine to the process(es) .

  With regard to traditional measures, preliminary evidence suggests that the market is already on its way to being transformed in terms of energy efficiency—new pumps and motors are more energy efficient. The opportunity here for ENERGY STAR would be to

accelerate the pace of improvements to capture the efficiencies sooner. (See next bullet on building upgrades.)

From discussions with industry representatives, it appears that substantial energy savings may be found in treatment process improvements, notably as they relate to surface water. Process changes can provide energy savings. However, additional research would focus more on identifying more treatment options that could create energy savings, while maintaining the focus on regulatory compliance and security.

Anecdotal evidence suggests that DW/WW facilities are slow to adopt new treatment processes until they are tried and proven. DW/WW facilities are slow to adopt new treatment processes until they are approved by state regulatory agencies that review plans and specs. Some of this reluctance may come from the increased staff training required when processes change. The increased staff training would be a secondary concern, but it might have substantial cost implications if the new process upgraded the certification required of the operator. Certification (like any licensing) creates an artificial labor shortage, driving up prices.

- Does the industry take advantage of the energy opportunity? Even in the DW/WWfacilities that have dedicated energy/environmental staff, it appears that the standard building energy audit is rare. In discussions, local government officials said that energy improvements are "generally included" when treatment processes are being evaluated and equipment replaced; however, these energy upgrades do not appear to be carefully documented or tracked (based on limited research). This gap presents an opportunity for energy service companies (ESCOs), who have only recently begun to expand their services to the DW/WW market, to collaborate with engineering companies that already provide water treatment process upgrades to ensure that traditional building upgrades occur simultaneously.

- Are the opportunities similar around the country? The promotion of energy efficiency improvements (and associated financing) must reflect the cultural, geographic, legal, and financial parameters of individual drinking water and wastewater facilities. For example, those in New York State are challenged by the problems of an aging infrastructure, whereas facilities in Phoenix and Las Vegas need more capacity due to population growth.

- Are there opportunities with small and medium systems? Particularly for small and medium drinking water systems, and most wastewater systems, state and federal agencies provide a significant portion of the funds used for improving the nation's drinking water and wastewater infrastructure. A careful understanding of the SRFs (both Clean Water State Revolving Fund and the Drinking Water State Revolving Fund) and conversations with fund manages may foster energy efficiency improvements.

  It appears that for small- and some medium-sized utilities, energy improvement projects do not get implemented because these utilities (1) cannot sccure the necessary capital,

(2) do not take advantage of regional or federal funding available, or (3) don't feel they have staff to implement the projects. Performance contracting would help fill this need.

- Is there a role for performance contracts and energy service companies? With rising energy costs, the time may be right to target energy improvements (financed by future utility bill savings) as a way to free-up funds when capital budgets are not sufficient to carry out the improvements. This might be particularly useful for small- and medium-sized DW/WW utilities, and it represents an opportunity for the National Association of Energy Service Companies (NAESCO) with whom EPA has a strong relationship to work more closely with the key drinking water and wastewater associations.

- Is the industry ready for energy improvements? Information obtained from the American Water Works Association Research Foundation (AwwaRF) and comments from local government engineers indicate that often when "energy efficiency" is the topic, people in the industry think first of energy bill savings and shift directly into a discussion of supply/demand issues, rate increases, and use of off-peak hours. Officials are striving to bring down costs, but not necessarily kilowatt-hours (energy use) or the associated air pollution from energy generation. This mindset represents an educational challenge for ENERGY STAR. Several association/ESCO contacts said that while many talk or write about energy efficiency in the DW/WW industry, not much concrete action seems to be happening.

2. THE STRUCTURE AND CHARACTERISTICS OF THE DRINKING WATER AND WASTEWATER INDUSTRIES

Please see our memo and Excel spreadsheet dated July 14 for an introduction on the characteristics of the DW/WW industry.

3. OPPORTUNITIES FOR IMPROVING ENERGY EFFICIENCY IN THE WATER AND WASTEWATER INDUSTRIES

Drinking water and wastewater systems account for 3 percent of the energy used in the United States.[1] Energy consumption is typically the third largest operating cost category for most DW/WW plants, after recurring capitalization and capital improvement costs, and labor and related costs. The American Water Works Association Research Foundation (AwwaRF) indicates that energy as a percent of operating cost ranges between 2 and 35 percent, with 11 percent being the average for water facilities, and 7 percent the average for wastewater facilities.[2] At smaller plants, energy's proportion rises to 30 to 40 percent of total operating costs due to plant economies of scale.[3]

[1] Awwa's *E-Mainstream*. http://www.awwa.org/Communications/mainstream/Archives/2000/July/confbrief.cfm
[2] http://www.awwarf.org/research/TopicsAndProjects/Resources/Presentation/CEE2/AwwaRFCEE_files/frame.htm (September 2003)
[3] Water Environment Federation

In terms of energy savings potential and pollution prevention, Pareto's Principle ("The 80-20 Rule") applies to the drinking water and wastewater industries as it does to other industries. In both, by making energy efficiency improvements in the largest 500 systems, 70 percent of all potential energy savings can be addressed.

Of the 53,500 drinking water systems in the United States, the largest 100 systems serve about 45 percent of the total U.S. population that is served by public water systems. The next 400 systems serve another 25 percent. Therefore, the largest 500 drinking water systems serve about 70 percent, and the other 53,000 serve about 30 percent of the population. In Publicly-Owned Treatment Works (POTWs), which measure size in terms of existing flow, a similar curve exists. The 100 largest POTWs account for 53% of the total national flow, and the next-largest 400 account for an additional 28%. Thus, the largest 500 POTWs account for 81% of total national flow.

According to the California Energy Commission, "energy represents the largest controllable cost of providing water or wastewater services to the public. Most facilities were designed and built when energy costs were not a concern."[4]

The main form of energy used in water and wastewater plants is electricity, which is consumed by water pumps, blowers for air flotation and aeration devices, and numerous motors that run belt presses, clarifier rakes, and other equipment. The use of fuels such as natural gas, propane, and fuel oil is mostly restricted to the heating of buildings and other equipment during cold weather.

It should be noted that, AwwaRF sees energy management opportunities falling into two categories: "***Technology changes*** encompass a shift to more energy-efficient equipment or processes that can save electricity and operational costs. ***Management changes*** include strategies such as a proactive process for energy procurement, demand forecasting, and the scheduling of pumping activities and other energy-consuming processes to off-peak hours with lower electric rates."[5] Like with other sectors, the water industry associates "energy management" with "ways to reduce energy costs. Therefore, supply/demand issues related to reducing costs, not with reductions in total energy use (total kilowatt hours (kWh)) serves their purpose. Further research will likely reveal that many utilities do both.

EPA, through ENERGY STAR, focuses on overall reductions in energy use (kWh), which in turn bring down utility bills (capturing the cost savings that the DW/WW industry is looking for) and help prevent greenhouse gases. From this perspective, energy efficiency opportunities in the DW/WW industries are available in two areas:

(1) Traditional energy improvements, such as indoor and outdoor lighting, HVAC upgrades, use of an energy management system (EMS) for the entire facility, and installation of energy-efficient pumps and motors for water and wastewater distribution, transmission, or collection.

[4] California Energy Commission. Water/Wastewater Process Energy web page located at http://www.energy.ca.gov/process/water/eff_water.html
[5] http://www.awwarf.org/research/TopicsAndProjects/topicSnapshot.aspx?topic=EnrgyMgm

(2) Efficiencies from improvements in the water treatment process(es), including related equipment. This is an area that requires more research because process improvement opportunities vary between water and wastewater facilities. Additional research would focus more on identifying more treatment options that could create energy savings, while maintaining the focus on regulatory compliance and security.

The most common distinction in the industry is between pumping (which, according to the ICF paper, accounts for 99% of all energy use in ground water drinking water systems); and everything else (which primarily means process changes). Additional analysis would help clarify this number and where the traditional building changes (eg., HVAC) or process would lie. The more complex the treatment sequence is, the more important the energy savings in process becomes.

The "traditional" energy efficiency improvements (#1 above) are relatively easy to gain acceptance for and implement because the money saved every month on utility bills pays for the equipment improvements. And the technologies are proven by thousands of ENERGY STAR partners.

With regard to motors and pumps, industry representatives indicate that the new motors and pumps on the market today are already energy efficient. Therefore, as DW/WW systems pursue infrastructure upgrades in the coming years and install more efficient equipment, they will eventually become more energy efficient. However, one must be careful about this characterization. "Efficient" motors are not as efficient as those labeled "premium efficiency", just like the T-12 "energy saving" fluorescent lamps are far from representing state of the art efficient lighting. Setting aside process, the opportunity for ENERGY STAR now would be to accelerate the pace of upgrades that involve motors and pumps, and help define "most efficient".

Preliminary investigations show that, in general, efficiencies in ground water treatment will likely come from motor and pump upgrades, whereas efficiencies in surface water treatment can be realized by optimizing the treatment process. At this time, the energy saving opportunities from process improvements (#2 above) are difficult to quantify; however, anecdotal evidence suggests that they could be significant. One treatment system manufacturer interviewed cited potential energy savings of as much as 50 percent. Drinking water and wastewater facility managers, however, can be risk-adverse when dealing with process changes and may prefer to retain familiar, albeit older, less efficient technologies.

Bob Davis, Director of Engineering and Program Management at the Environmental Facilities Corporation (EFC), which offers financing in New York, observed that from his experience with larger municipalities managing multiple systems (e.g., New York City (NYC)), they are resistant to change. "Once they lock onto a process, they want to replicate it throughout their system. Many of the NYC systems were updated in the 1960s with a form of activated sludge—they will not deviate from this because they have thousands of employees operating these facilities, and they want them to be shared within the network without retraining."[6] Change is further impeded by labor unions in New York that strictly define jobs and tasks,

[6] Telephone conversation with Mr. Davis on July 9, 2004

therefore, larger municipalities resist innovative process improvements. Further research will determine whether this is the case in other states.

Ingrained expectations can also impede taking action on energy saving opportunities. For example, in the State of Wisconsin, the issue is rebates. According to Joe Cantwell, Program Manager, Wisconsin Focus on Energy, more than 50 energy efficiency projects in DW/WW facilities have been completed in his state. Several of these have helped reduce utility bills by more than 50 percent. However, the utilities' cultural dependency on large incentives in order to implement projects continues to be his largest hurdle to doing more energy efficiency upgrades. The Focus on Energy program offers rebates (3% to 5% of a project cost) rather than financing. Mr. Cantwell said that the majority of the projects were internally funded, and believes that the only outside financing used for these energy efficiency projects came from the State Revolving Loan Fund (SRF). Mr. Cantwell feels that the simple payback must be less than 2 years for the utility clients to accept implementing the project. This is partially due to the perception that increases in energy costs are uncontrollable and will ultimately get passed through to the rate-payer. Most of Wisconsin's DW/WW are public and, therefore, judged on their ability to deliver a quality service rather than on how well they manage their budgets and assets. Mr. Cantwell noted that it is easier to raise water rates than raise taxes.

Key to understanding the opportunity for energy efficiency improvements in the DW/WW industries is that energy efficiency projects are rarely implemented based on energy savings alone. Rather, they are bundled with larger process/infrastructure improvement projects in water and wastewater facilities.[8] This happens because regulatory compliance, water quality issues, and security concerns overshadow energy efficiency opportunities during the decisionmaking process.

4. FINANCING UPGRADES IN THE DRINKING WATER AND WASTEWATER INDUSTRIES

4.1 THE NEED FOR UPGRADES

Several recent studies have highlighted the need for substantial investment in the nation's drinking water and wastewater infrastructure. For example, the drinking water industry is faced with deteriorating infrastructure (e.g., the underground pipes that deliver water to the end user) as well as the cost of new drinking water standards and replacement of aging treatment process facilities.

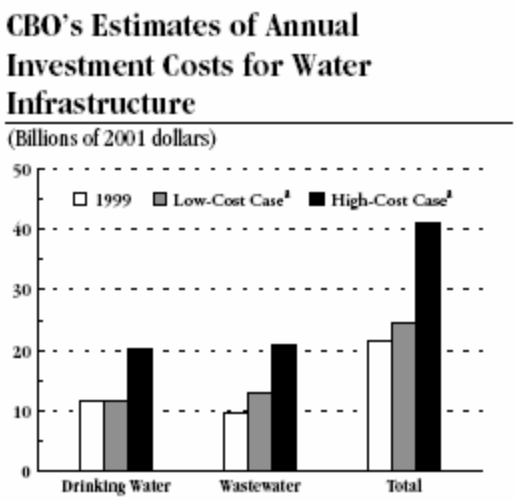
Cost estimates for the needed investments vary. EPA's *Clean Water and Drinking Water Infrastructure Gap Analysis* [7] estimates the capital needs for clean water from 2000–2019 will approach $388 billion, and the capital needs for drinking water during the same period will be almost $274 billion.

[7] U.S. EPA Office of Water, The Clean Water and Drinking Water Infrastructure Gap Analysis, EPA-816-R-02-020, September 2002.

The American Waste Water Association (AWWA) estimates that $250 billion will be needed over the next 30 years to replace worn-out drinking water pipes and associated structures.[8] A recent AWWA study of 20 utilities indicted that "on average, the replacement cost value of water mains is about $6,300 per household …. If water treatment plant, pumps, etc., are included, the replacement cost value rises to just under $10,000 per household ….”[9]. The wastewater infrastructure is likely to be in a similar state.

The Congressional Budget Office (CBO) projects that the annual costs over the period for operations and maintenance (O&M), which are not eligible for aid under current federal programs, will average between $25.7 billion and $31.8 billion for drinking water systems and between $20.3 billion and $25.2 billion for wastewater systems (…in 2001 dollars.)[10]

Figure 1



Source: Congressional Budget Office.

a. Average annual costs for the 2000 to 2019 period.

The recognized need for DW/WW infrastructure improvements in coming years provides EPA with the perfect opportunity to pursue incorporating energy efficiency improvements as part of the drinking water and wastewater infrastructure upgrades. And, these upgrades will require financing.

4.2 Financing Energy Efficiency Improvements

Many options exist for financing energy efficiency improvements in the DW/WW industries. Financing can come from internal and external sources. Externally, funding can be obtained from capital markets, ESCOs (through guaranteed savings performance contracts), local and regional incentive programs, and the federal government.

[8] *Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure, A* Study Sponsored by The AWWA Water Industry Technical Action Fund, May 2001 page 5, http://www.win-water.org/win_reports/infrastructure.pdf
[9] IBID, page 6
[10] *Future Investment in Drinking Water and Wastewater Infrastructure*, November 2002, The Congress of the United States, Congressional Budget Office

To determine "the best financing option(s)," it is crucial to understand the:

- nature of the energy efficiency improvement
- ownership status of the utility (public or private)
- utility's size and credit rating
- availability of federal energy efficiency financing programs and regional or local incentives (see sections 4.2.3 and 4.2.4).

Setting aside the nature of the upgrade for now, the following section addresses the second and third bullets.

Ownership. Type of ownership in the drinking water industry (e.g., public or private) can affect financing decisions. Publicly owned systems can easily access the lower interest rates offered by tax-exempt financing vehicles, whereas privately owned (i.e., investor-owned) utilities may have to deal with the added cost and inconvenience of working through conduit agencies to access the same tax-exempt financing vehicles. Investor-owned utilities tend to aggressively seek ways to save money. They also tend to be more focused on the "bottom line" than publicly owned utilities. Based on our experience, research, and discussions, it is generally acknowledged that the decision making and approval process for implementing new projects is faster for investor-owned utilities than for publicly owned utilities. The latter may be required to build a concensus with a larger number of concerned parties before embarking on changes. Of the 84 systems serving populations of more than 500,000, 4 are investor-owned. Of the 430 systems serving populations of 100,001–500,000, 36 are investor owned.

Size. While one could argue that EPA's efforts to embed energy efficiency improvements in future DW/WW system upgrades would be most cost-effective (from a program perspective) if it focused on the largest 500 facilities, we recognize that small- and medium-sized facilities are also important to the nation. This working paper addresses financing opportunities for all utilities.

Large utilities (serving populations greater than 250,000) tend to have easier access to capital and better access to the latest technologies. ESCOs, third-party lenders, and equipment manufacturers or water process engineering firms often actively market large utilities. Smaller utilities (serving populations less than 10,000) tend to have smaller projects, which are less attractive to potential funders and ESCOs. As a result, they tend to have difficulty accessing capital markets (and new technologies), and turn instead to regional, state, or federal financing sources if internal funding is inadequate. Medium-sized utilities (serving populations of 10,000 – 250,000) fall in-between.

System improvements are paid for using a combination of internal and external funding.

4.2.1 Internal Financing Options

Internal funding can come from rate increases, impact fees, system development and expansion charges, contributions, and the utility's own capital budget. In addition to implementing traditional cost reduction and cost avoidance actions, most utilities can tap into revenue enhancements from developers and manufacturers (to support system expansions),

builders (to offset the cost of installing new meters), and water customers (to offset the cost of treating and delivering water). Internal funding reflects a "pay-as-you-go" philosophy, which often undervalues the cash flow benefits realized by installing efficiency equipment immediately.

The utility's capital budget addresses both short and long-term needs for services, including the construction of new or expanded facilities and the replacement of equipment. It is part of a master plan that may encompass projected needs out to 20 years or more. "The Capital Improvement Program (CIP), developed from a master plan, is typically broken into a 1-year plan, and a period plan of up to 10 years (or more). The annual plan, in turn, contains two components: major and routine capital projects."[11]

4.2.2 External Commercial Financing Options

External funding (i.e., obtaining outside financing for projects) reflects more of a "pay-as-you-use" philosophy, which tends to favor energy efficiency. Regulatory agencies at the federal, state, and local levels set limitations on the way water utilities can access external capital. Local governments usually regulate publicly owned utilities, while investor-owned utilities are controlled by a state agency,[12] typically a Public Utility Commission.

Major capital projects are funded by some form of **debt**, which is categorized as either short term (for periods of less than 1 year), intermediate, or long term (for periods greater than one year). Most borrowings by publicly owned utilities require citizen approval, either directly through referendum or indirectly through actions of an appointed board or elected council.[13] However, revenue bonds and tax-exempt lease-purchase agreements may avoid the need for voter approval (see details below).

Commonly used **short-term debt instruments** include bank loans (term loans or lines of credit), anticipation notes (in anticipation of bond, tax, grant or revenues to be received), commercial paper (taxable or tax-exempt unsecured promissory note which can be refinanced or rolled over for periods exceeding one year), and floating-rate demand notes (notes that allow the purchaser to demand that the seller redeem the note when the interest rate adjusts).

Long-term debt is frequently in the form of bonds, which fall into two categories: general obligation (GO) bonds and revenue bonds. **GO bonds** are backed by the issuer's full faith and credit and can only be issued by units of government with taxing authority. Because the issuer promises to levy taxes to pay for these obligations, if necessary, these bonds have the lowest risk of default, and, therefore, the lowest cost. Interest paid on GO bonds is typically exempt from federal income taxes and may be exempt from state income taxes.

Revenue bonds are also issued by local governments or public agencies. However, because they are repaid only from the specific revenues named in the bond, they are considered to be riskier than GO bonds. Revenue bonds may not require voter approval and often contain covenants intended to reduce the perceived risk. Typical covenants include rate formulas, the order of payments, establishing sinking funds, and limiting the ability to issue new debt. Small

[11] *Water Utility Capital Financing*, AWWA Manual M9, second Edition, 1998, page 9
[12] Ibid, page 9
[13] Ibid, page 27

municipalities that have difficulty issuing debt often add credit enhancements to their bonds in the form of bond insurance or letters of credit.

In any discussion of bonds as they relate to drinking water and wastewater utilities, "IRS Private Activity Bond Regulations" must be mentioned. These regulations may preclude a municipality from using tax-exempt municipal bonds to pay for a municipal project, resulting in increased costs to the borrower. Events that could trigger the loss of tax-exempt status include contract conditions with a private company dealing with special payments, rates, or management services.[14]

Public agencies, including municipal DW/WW facilities, can enter **into tax-exempt lease-purchase agreements** (TELPs), also known as municipal leases, to finance energy efficiency improvements and equipment purchases. TELPs are similar to installment-purchase agreements. The government entity, in this case the DW/WW utility, owns the equipment after the financing term expires. One distinguishing characteristic of a lease-purchase agreement is that the lessee's (borrower's) payment obligation usually terminates if the lessee fails to appropriate funds to make lease payments. Because of the inclusion of this *non-appropriation language*, neither the lease nor the lease payments are considered debt; therefore, payments to cover the new equipment or services can be made from the projected energy savings in the operating budget.

Unlike GO bond issues, tax-exempt lease-purchase financing does not usually require voter approval[15] because it is considered an operating expense rather than a capital expenditure (due to the non-appropriation language). However, lenders will want to know that the assets being financed are of *essential use*, which will minimize the risk of non-appropriation. TELPs can be paid for using the savings from utility bills (operating expense dollars saved), rather than tapping dollars in the utility's capital budget. TELPs are effective alternatives to traditional debt financing and allow the water authority to pay for equipment by using money that is already in its utility budget. When properly structured, TELPs allow agencies to draw on dollars saved from future energy bills to pay for new, energy-efficient equipment today. The use of operating budgets for energy efficiency improvements was not widely known in the public sector until 4 years ago when Cadmus in collaboration with Catalyst Financial began disseminating information to public sector energy managers about this creative financing opportunity.

Performance contracting is increasingly being used to capture the savings from improved energy efficiency and use them to pay for the cost of the necessary equipment and associated upgrades. The most frequently used performance contract is the "Guaranteed Savings Performance Contract," which incorporates equipment and system performance guarantees issued by the ESCO. However, performance contracts are not financing vehicles by themselves, and they often separate financing from the technical services. The underlying financing vehicle most commonly used is the tax-exempt lease-purchase agreement.

Commercial leases may offer an interesting alternative, particularly if a utility wishes to test new technologies. The traditional equipment lease is a contract between two parties in which

[14]See Wisconsin's Dept of Natural Resources web page for more details on IRS Private Activity Bonds Regulations http://dnr.wi.gov/org/caer/cfa/EL/Guide/IRS.html

[15] Varies by state. Check with local tax or legal advisor to insure compliance with state legislation.

one party is given the right to use another party's equipment for a periodic payment over a specified term. Basically, this is a long-term rental agreement with clearly stated purchase options that may be exercised at the end of the lease term. All leases are divided into Capital Leases or Operating Leases.[16] From a financial perspective, this translates into on- or off-balance sheet treatment, respectively. Leases are usually written at higher, taxable rates (the owner of the equipment is the lessor, not the DW/WW utility) and may be appropriate when the need for the equipment is short-term, or the equipment can be upgraded or returned before the end of its useful economic life.

4.2.3 Financing Available from the Federal Government

State and federal aid pays for a significant portion of the nation's water infrastructure investment. Providing incentives through federal funding sources could foster the adoption of energy efficiency in the drinking water and wastewater industries. From fiscal year (FY) 1991 through FY 2000, nine federal agencies made available approximately $44 billion for drinking water and wastewater capital improvements. Four of the agencies—EPA, the Department of Agriculture (USDA), the Department of Housing and Urban Development (HUD), and the Department of Commerce—accounted for 98 percent of this funding (see table 1).[17]

Table 1: **Federal Drinking Water and Wastewater Infrastructure Funding Sources**

Agency	Funding Program	Acronym	% of Fed. Funding
EPA	Clean Water State Revolving Fund	CWSRF	57
	Drinking Water State Revolving Fund	DWSRF	
USDA	Rural Utilities Service	RUS	28
HUD	Community Development Block Grant	CDBG	10
Commerce	Economic Development Administration	EDA	3

The Rural Utility Service (RUS) and HUD programs are used by smaller economically challenged communities. EPA's Water and Wastewater State Revolving Loan Funds (SRFs) can be used by systems of any size, but few large systems use it.

As we indicated in the introduction, SRFs reach a different part of the market. SRFs serve primarily medium and small systems that don't have access to capital. Specifically, the 53,500 water systems that are not in the top 500; including the 16,000 medium and small POTWs. These SRFs offer low-cost or below-market loans to participating facilities and are underutilized, according to information available at this time. For example, a recent survey by the Association of Metropolitan Sewage Agencies indicated that in spite of the below-market rates, only 13.4 percent of total revenues to fund capital improvements came from SRFs; and only 36.7 percent

[16] Financial Accounting Standards Board Statement No. 13 *Accounting for Leases*
[17] *Handbook on Coordinating Funding for Water and Wastewater Infrastructure, A Compilation of State Approaches*, Office of Water (4606M), EPA 816-R-03-018, October 2003; www.epa.gov/ow

of the reporting members used SRFs, which accounted for an average (mean) of 39.5 percent of total revenues to fund capital improvements.[18] It is even less in drinking water.

SRF programs vary by state. For example, some SRFs:

- Allow transfers between the CWSRF and DWSRF
- Are leveraged (with other third-party funding)
- Deny funds to investor-owned systems
- Coordinate their funds with other finance programs
- Pay special attention to small disadvantaged communities (e.g., through principal forgiveness or deeper discounts on interest rates)

Janet Joseph, Program Manager of Environmental Research at NYSERDA, indicated that many of the state's water utilities take advantage of the SRF, which is run by the New York Environmental Finance Corporation. This contrasts with Phoenix, AZ, which does not tap into the SRF program at all because the city covers its financing needs from internal budgets or its revolving energy loan.

It is interesting to note that 20 percent of the loan dollars available through DWSRF goes to systems servicing populations greater than 100,000.[19] We believe that the percentage would drop significantly if the system size threshold were raised to 250,000 or 500,000. EPA does not collect data for these alternate thresholds.

In general, large systems do not use the SRFs because they can raise rates across their large user base to create the needed funding or can easily access capital markets. As an example of the latter, the New York City Municipal Water Finance Authority issued $602 million worth of tax-exempt, fixed-rate bonds in March 2004. The sale included $302 million of advance refunding bonds and $300 million of new money bonds with yields ranging from 0.89 percent in the 2004 maturity to 4.56 percent in the 2034 maturity. The city's water system has storage capacity of 550 billion gallons and provides drinking water to more than 8 million users.[20] Its capital plan is more than $800 million a year.

Bob Davis, Director of Engineering and Program Management Environmental Finance Corporation (EFC), which offers financing in the State of New York, observed that Congress seems to be focusing on supporting the small systems, yet energy efficiency is not factored into the incentives and loan programs. Without incentives, energy efficiency improvements in waste and wastewater facilities are considered "unfunded mandates" and will not be implemented until they are incentivized financially and/or legally. In addition, Mr. Davis noted that publicly elected officials tend to be interested in projects that affect user charges during their term in office; projects with paybacks longer than the officials' term in office tend to be discounted and are more difficult to implement.

[18] *2002 AMSA Financial Survey* is available at http://www.amsa-cleanwater.org/pubs/index.cfm
[19] USEPA, *The Drinking Water State Revolving Fund Program: Report to Congress*, May 2003, p. 38
[20] http://www.ci.nyc.ny.us/html/nyw/html/aboutus.html

Mr. Davis pointed out that the extra paperwork and implementation obligations incurred by accepting a federally funded program may be a deterrent for a DW/WW utility when it comes time to decide whether to tap into federal funding or go to the capital markets directly. For example, the Davis-Bacon Act mandates labor scales when working on federally funded projects, and could result in 150–200% increase in the wage costs.[21] This added wrinkle is very state specific; and in some cases, states (such as New York) have proprietary legislation that dictates wage scales equal to or higher than Davis-Bacon, along with other requirements that increase the cost of public projects (e.g., New York's Wick's Law mandates that all above ground public construction contracts over $100,000 be broken into 4 prime contracts; electrical, general, plumbing, ventilating and air-conditioning, resulting in increased project management costs).

4.2.4 Financing Available from Local and Regional Resources

Some states and cities have set up special funds to pay for energy efficiency improvements within their agencies. For example, Phoenix started its "Energy Conservation Savings Reinvestment Plan" in 1984 with $50,000 seed money from state oil overcharge funds. By 2001, Phoenix estimated the energy cost savings resulting from the Plan at about $63 million. Some $9.7 million of this has been reinvested in the energy program, with the remainder reverting to the general fund. Recently the annual limit on program investments was raised to $750,000 for retrofit work for the city. In addition, water services are allotted $500,000 annually, which can only be used for energy efficiency projects.

New York offers financing through the EFC, whose primary activities include the SRFs, the Industrial Finance Program (IFP), Technical Advisory Services (TAS) and the 1996 Clean Water/Clean Air Bond Act Financial Assistance to Business (FAB). Mr. Davis of EFC stated that 85 percent of EFC's projects are traditional water quality improvements, including collection and treatment. Many projects cover equipment replacement; however, energy efficiency is not mandated and not tracked. EFC sells revenue bonds for its projects, which it re-lends to water and wastewater facilities using a Project Finance Agreement (similar to a loan agreement). The typical terms are 20 to 30 years: the term is determined by the useful life of the equipment. Interest rates to the users are subsidized; for example, a 4% bond issue would be re-lent to a facility at approximately 2% interest, plus fees.[22]

Stand-alone energy efficiency projects can be financed by EFC. However, according to Mr. Davis, in practice the energy efficiency projects are frequently bundled into the overall system projects (and they are not identified as energy efficiency projects). He mentioned that Buffalo Sewer Authority recently completed a project worth almost $10 million for pumps, which could be categorized as an "energy efficiency project" driven by end-of-life equipment replacement and process improvements.

The New York Department of Environmental Conservation (DEC), which is the EPA grant recipient, establishes the project scoring system used by EFC. Mr. Davis mentioned that energy efficiency had been suggested to DEC as a criterion for evaluating and prioritizing applications. DEC officials responded that they believed "consulting engineers already included energy

[21] Telephone conversation with Bob Davis, EFC, July 9, 2004

[22] Fees include 0.25% on the outstanding balance of the loan, plus a cost of issuance fee of 1.2% and a State Issuance Charge between 0.14 – 0.75%, depending on the size of the obligation.

efficiency improvements in the projects and by adding an energy efficiency category to the evaluation process, they would simply 'raise the floor'." To appreciate the scale of EFC's financing activity: EFC issues three bonds a year (two for the state and one for NYC) valued at around $500–600 million per year. In 2004, EFC will be issuing around $1 billion dollars of obligations to accommodate large NYC DW/WW projects.

Both Wisconsin and New York (through NYSERDA) offer rebates on DW/WW equipment. These programs provide small cash incentives for pump and motor upgrades. NYSERDA also offers financial and technical support for audits and performance contracting. Ms. Joseph of NYSERDA mentioned that only two municipal wastewater plants in the state have taken advantage of performance contracting to date (see Amherst, NY, example in Appendix 3).

4.3 Comments from Local Government Officials and Industry Representatives on Energy Efficiency in DW/WW Project Evaluations

Interviews for this working paper were limited to publicly owned facilities, which represent the majority of the installations in terms of output and revenue. The largest facility interviewed (Phoenix, AZ) serves a population of 1.2 million, while the smallest (Burlington, VT) serves 40,000. In addition, four ESCOs provided comments.

The consensus of the interviewees is that, in general, energy efficiency plays a relatively small role in the overall decisionmaking process to implement an improvement in the DW/WW utility. Organizations are interested in being more energy efficient, but, on its own merits, energy efficiency does not appear to be enough to drive a project.

Frank Blanco, Assistant to the Water Superintendent in Phoenix, AZ, stated that projects are evaluated based on the following, in order of importance: compliance (health and safety); reliability; security; energy efficiency; improving operations; redundancy; and expansion needs. Chris Hornback, Director of Regulatory Affairs at AMSA believes that members show an overall lack of interest in energy efficiency opportunities, which they view as a management issue, rather than a technical issue.[23] Members appear to be much more concerned about environmental regulatory compliance (e.g., water quality including treatment issues, preventing overflow, and discharge limits). They want to maintain a high level of service to the ratepayer, and energy efficiency is not an integral part of their equipment replacement plan. Security has become a key concern and would take priority over energy efficiency. Mr. Hornback added, however, that asset management issues are becoming more visible as the assets are aging, and he believes that this is a good time to promote energy efficiency projects. He also noted that energy efficiency appears to play a greater role in the Pacific Northwest, where AMSA members seek a neutral environmental impact from their operations.

AMSA is lobbying to secure increased federal funding for municipal wastewater treatment (e.g., a new construction grants program), which they feel is in the general public's interest and,

[23] AMSA was established in 1970 by 22 large municipal sewerage agencies in order to secure federal funding for municipal wastewater treatment. Today, AMSA members treat the majority of the residential waste water generated in the United States and represent about 300 agencies with about 1,500 plants of the total 15,000 U.S. plants, processing between 70 and 80% of total residential wastewater.

as such, should be federally funded. Mr. Hornback acknowledged his personal, as well as professional, interest in implementing energy efficiency projects. Limited federal subsidies may force a closer evaluation of costs, underscoring the benefit of an aggressive energy efficiency plan.

Ms. Joseph of NYSERDA confirmed that water and wastewater utilities routinely approach NYSERDA about energy efficiency, and NYSERDA underwrites about 10 water and wastewater feasibility studies plus four demonstration projects a year. She recalled a follow-up effort to determine the outcome of these studies: about 50 percent of the projects studied were implemented, 25 percent were not done because the facility or needs changed or the supervisor left, and 25 percent were not done because funding for the project could not be found.

With the exception of Amherst, NY, none of the utilities interviewed performed energy efficiency audits strictly for the purposes of identifying ways to reduce energy consumption. This was surprising, considering that Phoenix and Billings both have energy efficiency engineering staff. Boris Krizek, head of Environmental Affairs in Billings, MT, acknowledged "electrical efficiency does not initiate replacement of equipment but plays a role in the selection of equipment."[24] It is interesting to note that AwwaRF offers a publication called *Energy Audit Manual for Water/Wastewater Facilities* (order #736) that specifically addresses energy-saving opportunities.

NAESCO was unable to identify any ESCO with extensive experience in the water and wastewater industries.[25] The ESCO it identified as having experience in these sectors focuses on the consumer arena (e.g., low-flow toilets, high-efficiency shower heads, etc.) rather than on the more sophisticated process and control systems. Further investigation confirmed that Siemens (Buffalo, NY) and Energysolve, LLC (Somerset, NJ) have expertise in the DW/WW arena and that the Danbury, CT, Water Facilities have been approached by both Johnson Controls and Honeywell to do energy improvements in their facilities. This appears to be a market "under development" for ESCOs.

See Appendix 2 for more details from the local government officials interviewed.

[24] Telephone conversation with Mr. Boris Krizek on June 25, 2004
[25] Telephone conversation with Nina Lockhart, Senior Program Manager, June 21, 2004

APPENDIX 1
CONTACTS AND RESOURCES

- Laurie Adams, Assistant Director, Burlington Electric Department
- Frank Blanco, Assistant to the Water Supervisor, Phoenix, AZ
- Elizabeth Brown, Research Assistant, American Council of Energy Efficiency Engineers (ACEEE)
- Joe Cantwell, Program Manager, WI Focus on Energy
- Jim Craft, President, Resource Management Company, Irvine, CA
- Bob Davis, Environmental Finance Corporation, NY
- Dena Diorio, CFO, Town of Danbury, CT
- Loren Doe, Burlington Electric Department
- Tom Eckhart, President, Ucons LLC, Bellevue, WA
- Don Gilligan, President, Predicate, LLC, (contractors to NAESCO)
- Chris Hornback, Directory Regulatory Affairs, Association of Metropolitan Sewerage Agencies (AMSA)
- James Johnson, PE, Town of Amherst, NY
- Ralph Jones, President, The Cadmus Group, Inc.
- Janet Joseph, NYSERDA
- Jonathan Kleinman, Market Coordinator, Efficiency Vermont
- Boris Krizek, Head of Environmental Affairs, Public Utilities Department, Billings, MT
- Dimitrios Laloudakis, Energy Management Supervisor, Phoenix, AZ
- Nina Lockhart, Senior Program Manager, NAESCO
- Manuel Morlales, Energy Engineering Manager, Siemens SIEMENS Building Technologies, District 1 - Buffalo, NY
- Mario Ricozzi, Director of Public Utilities, Danbury, CT
- Neal Skiver, LaSalle National Leasing Corporation (subsidiary of ABN-AMRO Bank)
- Bert Spaeth, Energy Engineer, Siemens NY
- Lynn Sudquist, CEO, Energysolve, LLC, Somerset, NJ
- Kurt Zwerko, VP - Distributed Generation, PPL Energy Services

APPENDIX 2

EXAMPLES OF LOCAL GOVERNMENT FINANCING FOR ENERGY EFFICIENCY PROJECTS IN THE WATER AND WASTEWATER INDUSTRIES

While energy efficiency projects can be funded a variety of ways, the general perception is that most of these improvements are bundled in revenue and GO bonds issued for larger projects, are part of normal O&M budgets, or are internally funded through capital improvement program (CIP) budgets. Additional research (or an association member survey) would be useful for gathering precise information on financing preferences in the DW/WW industries.

Neil Zobler of Catalyst Financial Inc. (a subcontractor to Cadmus) interviewed officials in the Cities of Phoenix (AZ), Billings (MT), Burlington (VT), and Amherst (NY). Phoenix and Burlington fund energy efficiency projects with special loan funds set aside for this express purpose; Billings has historically funded all of its needs with rate increases or revenue bonds; and Amherst entered into a performance contract.

Phoenix, with a population of 1.2 million, manages two wastewater and a half dozen drinking water facilities. The energy consumed in these facilities represents almost 33 percent of the city's entire annual energy bill.

Demetrious Laloudakis, Energy Management Superintendent, confirmed that "traditional" energy efficiency improvements come from upgrading motors and pumps. Mr. Laloudakis was quick to point out that the operation's bottomline energy savings as the result of combining energy-efficient equipment with the proper management of the technology and processes. As with other local officials interviewed, cost reduction was a greater concern to Mr. Laloudakis than energy use reduction. He sees the energy rate structure as an important part of the city's "savings" program because of the punitive nature of demand charges. Phoenix invests time and money in training operators to avoid unnecessary demand charges and to understand that costs can be reduced by equipment efficiencies.

Mr. Laloudakis tracks energy efficiency projects throughout the city. The $500,000 earmarked for energy efficiency projects in DW/WW facilities forces staff to consider energy projects; without it, he believes that management would focus almost exclusively on regulatory issues. Combined with bond funds, Phoenix covers all of its energy efficiency financing needs internally. The city does not take advantage of the SRF. Phoenix is not interested in performance contracting either because city officials believe that they have the internal expertise and the access to funding typically offered by ESCOs. Mr. Laloudakis acknowledged that Phoenix does not use all of the annually allocated funds, but they can be carried forward if earmarked for a specific project.

Frank Blanco, Assistant to the Water Superintendent in Phoenix, agrees that large energy efficiency savings cannot be realized unless the process is well understood from a decentralized perspective. To address this, an energy efficiency engineer, Luz Coleman, was re-assigned from

the Energy Efficiency Division to the Water Division about a year ago. Her job is to recommend energy efficiency and process improvements within the existing system.

The Town of **Billings, MT**, population 90,000**,** has had an environmental engineer on the Public Utilities Department (PUD) staff for many years. Energy is the third largest budget item, after labor/labor support and capital improvements/recurring capitalization allocations. Energy represents 7.3 percent of the $13.7 million drinking water operating budget and 3.1% of the $8.0 million wastewater operating budget. Billings has long recognized the importance of being energy efficient; 90 percent of the motors have been upgraded over the past 4 years. The office complex and indoor/outdoor lighting, which account for about 5 percent of the total PUD energy budget, were upgraded 4 years ago. Like his counterpart in Phoenix, Boris Krizek, Head of Environmental Affairs, PUD, stated that having the operators understand electricity rates and demand charges is critical to running an efficient operation. For him "efficiency" is linked to reducing costs not necessarily reducing overall energy use. This was a common mindset encountered during the interviews.

Projects in Billings, MT, are not implemented strictly on the basis of energy efficiency improvements, but energy efficiency is always written into project specifications. Historically, these projects have been funded internally, with revenue bonds and through increases in the water and sewer rates. Mr. Krizek said that plants recently faced record electrical demand and supply costs, which required budget increases. He believes this will force the authorities to pay more attention to energy efficiency issues and opportunities.

The Burlington Electric Department (BED), the municipally owned electric utility for the **City of Burlington, VT,** and the Department of Public Works (DPW) have been working closely to capture energy efficiency savings since the conversion from electric to gas heat at the main water plant in 1993. Burlington has approximately 40,000 residents. "BED shares the values of the residents who have voted for energy efficiency programs, who have supported a clean power mix, and who have expressed a desire to move forward into the 21st century in a manner that is sustainable …."[26] The energy budget this year is about $750k (6.8 percent) of the $11 million operating budget.[27]

Loren Doe, Director of Commercial Services at BED, confirmed that BED and DPW negotiated a memorandum of agreement in 1994 to set aside funds to be used to finance energy efficiency projects. This $350,000 fund was in lieu of BED incentives (up to 25% of an energy efficiency project's cost). The fund has been drawn down to about $100,000, which will be invested in the next round of aeration blower projects currently being implemented. Once the fund is expended, it will not be replenished; and DPW will be eligible to receive rebates and other incentives available under public benefits charges. Laurie Adams, Assistant Director of Burlington Public Works, stated that her largest barrier to doing more energy efficiency projects is lack of staff and time; access to funding is not perceived as a problem.

The town of **Amherst, NY**, working with NYSERDA, took a holistic approach to energy efficiency by issuing an RFP for ESCOs to bid on overall energy efficiency improvements under

[26] http://www.burlingtonelectric.org/
[27] Telephone conversation with Ms. Laurie Adams, Assistant Director, Burlington Public Works. June 23, 2004

a town-wide energy conservation program. Amherst, with a population of 117,000, has an electricity budget of $2.7 million and a total operating budget of $100 million. The wastewater plant's electricity budget was $1.5 million, or 55.6% of the town's entire electric bill. New York State Energy Law–Article 9 allows for the bundling of projects to obtain a weighed average simple payback. So the town selected the ESCO that maximized the amount of new equipment that could be purchased from the energy savings. Amherst bid the technology separately from the financing,

Siemens Building Technologies was awarded the performance contract for Amherst, which was funded by a tax-exempt master lease-purchase agreement. The project was implemented and financed in four phases, the first two of which did not involve DW/WW facilities:

- Traditional HVAC and lighting improvements at the ice arena, police and court, community center, museum, recreational centers and others – $1.5 million.
- HVAC upgrades, lighting, EMS system, motors, etc. at four libraries – $350,000.
- Lighting and HVAC upgrades in wastewater facilities (33 buildings), electric to gas heat conversions, controls and a 600-HP engine for one of the main sewage pumps – $2.1 million.
- Efficiency motors, VFDs, SCADA system expensing and installation of a 600 HP electrical motor – $1.9 million. The new engine is fueled with natural gas and digester gas (ethane) produced onsite. NYSERDA provided financial incentives and technical support for this project.

Amherst chose to use a Tax-Exempt Lease-Purchase Master Lease Agreement because of its accommodation to their construction schedules, attractive pricing, easy approval process, and limited paperwork (when compared to the EFC). One of the challenges was to accommodate three different sources of revenue needed to pay for the lease: (1) the town's general fund, (2) the county library fund, and (3) the water treatment enterprise fund. The project was started in 2000, and the last phase is being completed in the summer of 2004.

The funding flexibility of the master lease allowed them to draw down the funds as needed, thereby minimizing the negative arbitrage caused by advanced funding that usually happens with a bond. Fortunately for the town, interest rates dropped between the date the original paybacks were calculated and the dates they actually funded the projects. This translated into increased savings for Amherst and reduced the overall 10 year payback target to 9.7 years.

James Johnson, PE, Town of Amherst confirmed that Siemens is handling measurement and verification, but the process is highly automated. NYSERDA will be reviewing the calculations for the first 3 years of the project. The ESCO is also providing complete technical support and maintenance throughout the contract.

The town board's approval was easily obtained as members embraced the guaranteed savings component of the performance contract. In fact, a number of the board members used the energy improvements as part of their re-election platforms. Amherst is very pleased with the results.

APPENDIX 3

CREATIVE FINANCING OPTIONS

AMHERST, NY
PPL
Performance Contracting and Lease-Purchase Agreements for those who have not heard of these before.

Bundling energy efficiency improvements within a whole-town conservation program, as was done by the Town of Amherst, NY, is an innovative financing method. For those municipalities not familiar with lease-purchase agreements, these are also innovation options.

During the telephone interviews a private sector financing example of interest came to light. **PPL Energy Services Holdings**, a wholly owned subsidiary of PPL Corporation (PPL) in Allentown, PA, recently entered into a contract with one of the nation's largest investor-owned water utilities to address electrical rate uncertainties, power supply security, **and** energy efficiency. The utility turned to PPL to provide the expertise and capital needed to develop, build, own, and operate an 8 MW onsite generation facility to provide power under a 15-year contract. This cost-effective outsourcing to the private sector (project financing) allows the utility to manage its energy costs and needs by locking in a portion of the energy costs, improve reliability by addressing power interruptions, and enhance the security of the power supply by having onsite generation. Capturing the thermal output from the plant to re-use in the process is an additional way the project increases energy efficiency and reduces emissions.