



**Environmental
Protection**

Carter Strickland, Commissioner

WATER CONSERVATION REPORT

ANNUAL UPDATE

June 2012



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SUMMARY

This document is an annual update to the current Water Conservation Program issued by the New York City Department of Environmental Protection (DEP) in July 2011. This document contains detailed information on the history and operation of the water supply and wastewater treatment systems as well as historic information on water conservation efforts. The main purpose of this report is to provide updates on recent ongoing activities at DEP and on other New York City water conservation efforts.

1

Water Efficiency & Reuse Programs

DEP implements a number of programs to promote efficient use of water and detect, target, and fix leaking components in the water supply system. System specific programs, such as leak notification and leak management programs are designed to monitor system distribution and unaccounted-for-water (UAW). Open hydrant emergency response systems, water saving kits and residential surveys are also implemented by DEP to maintain system efficiency and optimization. Several properties in New York City (NYC) have implemented water reuse initiatives and have taken advantage of the Comprehensive Water Reuse Program. DEP is considering replacing this program with an incentive based program which will expand eligibility criteria.

DEP began implementation of a citywide fixed-network automatic meter reading (AMR) system in August 2008 with the start of installation work for Data Collection Units (DCUs) around the city as part of New York City Department of Information, Technology and Telecommunication's NYCWiN citywide wireless system. Replacement of most pre-1998 water meters and installation of the AMR devices or Meter Transmission Units (MTUs) on all water meters was largely completed between 2009 and 2011. As of the end of 2011, network completion was 92% with most of the remaining DCUs to be installed in central Staten Island. DEP will move from having meters read four times a year with an 85% actual read rate overall, to four times a day (for most customers) or hourly (for larger customers) with a 98% or greater actual read rate. DEP is also installing MTUs in apartment buildings that are physically metered but are still billed under the flat-rate or frontage system to enable owners or managers to better understand their water use. As of the end of 2011, those buildings are 93% complete.

This year, DEP has also launched a Municipal Water Efficiency Program (MWEP) as part of the development of a city-wide Demand Management Plan (DMP). The MWEP focuses on implementation of water efficiency and conservation projects in municipally-owned buildings and facilities to reduce water consumption. DEP has planned implementation of four water efficiency demonstration projects this summer in two high schools and two playgrounds in Queens to quantify total water savings from selected plumbing fixture and spray shower bollard retrofits.

2

Regulatory Updates

The NYC Water Board plans to end Frontage based billing as of July 2012. The Multi-Family Conservation Program (MCP) will be offered to qualified multi-family housing of four or more dwelling units with billing based on a fixed charge per unit in lieu of billing based on metered charges. The Water Board has established a rate schedule for the MCP and outlines specific requirements for compliance and transition to the MCP rate.

Another round of revisions to the Water Use rules (15 RCNY 20-01 et seq.), are under consideration in 2012, which aim to reduce system leakage, improve system efficiency, and to eliminate antiquated rules, specifications and policies concerning indoor and outdoor water use. Recent regulatory requirements, such as the Green Codes and Local Law 86 are also making buildings more water efficient.

Regulatory Updates (cont'd)

Additionally, DEP has begun the process of updating the existing “Drought Management Plan & Rules”, which shall now be known as the Water Supply Shortage Condition Contingency and Management Plan (WSCMP). Revisions to the WSCMP are underway, with the goal of prioritizing public outreach and education to encourage voluntary reductions in water shortage watch and warning stages. Conservation rates are also being evaluated as a part of the proposed change in the rule. Anticipated total water savings generated by each restriction measure will be estimated as part of this effort.

3

Education Programs

DEP’s Bureau of Communications and Intergovernmental Affairs (BCIA) continues to conduct a variety of education and public outreach programs on water and water efficiency directed at both students and adults, and regularly participates in development of publications, guidance and planning efforts outlining the importance of water conservation in NYC. In areas where illegally opened fire hydrants are a recurring issue, the DEP maintains communication and dialogue with community partners to educate stakeholders and build awareness around the importance of water conservation.

4

Tracking and Projecting Water Demand

DEP’s Bureau of Environmental Planning and Analysis (BEPA) tracks and analyzes current and past water consumption trends, which are largely based on the consumption data dating from 2001 to the present. Consumption is estimated for each available borough, block and lot and verified through various analytical methods. As a part of this effort, BEPA also tracks this data against water supply, distribution, and wastewater flows. This data is used in conjunction with various planning efforts within the agency, such as emergency preparedness, study of DEP’s rate structure, and projecting future water use.

DEP is also participating in the Water RF 4375 project. This research study is a collaborative effort between municipalities and water utilities in Texas, California, Colorado, Florida, Arizona and New York City. This study will develop, test, and recommend sound and practical methods to track and identify how utility-provided water is used in important categories of Commercial, Institutional and Industrial (CII) water customers.

5

Water for the Future (WFF)

The Water for the Future Program is a long-term planning effort that has put water conservation and demand management efforts at the forefront to prepare the City for the repair of a leaking section of the Delaware Aqueduct in 2020. In order to perform the repair work, the leaking portion of the Delaware Aqueduct will be shut down and decommissioned while a by-pass tunnel is constructed and connected to the system over a two-year period. These activities could potentially temporarily suspend delivery of approximately 50% of the NYC’s water supply for a period of six months to two years, which requires DEP to develop a plan for making up the water supply shortfall between now and the start of the shut-down. In addition to a city-wide Demand Management Plan, DEP is considering a combination of solutions including augmentation of water supply by creating connections with New Jersey and Nassau County, optimization of the Catskill Aqueduct, and reactivation of the groundwater supply system in order to maximize available water resources during the shut-down period.

Under the Water for the Future program, DEP has begun significant outreach to local, state and Federal partners to discuss long-term, cost-effective water conservation and efficiency strategies.

INTRODUCTION

The New York City water supply system is an integrated network of nineteen reservoirs and three controlled lakes (see Figure 1). The system delivers approximately one billion gallons of water per day to over eight million users. With the city's population expected to rise to 9.1 million by 2030, conservation will continue to have an important role in meeting demands for water. It is important to note that, although population growth has increased demand for housing, energy, and transportation, total water consumption has been declining and is lower today than it was 50 years ago.

In 1985, the Department of Environmental Protection began installing meters in residential properties. This allowed both DEP and the customers to understand actual consumption. Once rates based on metering were established, customers were able to understand and reduce their consumption. In 1994, DEP continued with its water efficiency efforts and launched the world's largest toilet rebate program in response to increasing water use and wastewater flows.

DEP has continued to work with regulators and other agencies over the years to monitor and support conservation efforts (see the Program Accomplishments section). Although NYC has been a long-term beneficiary of sufficient water supply, DEP continues to use conservation methods for long-term sustainability whenever they are cost effective and do not conflict with other important agency goals. The results are apparent - current levels of water consumption are at historic lows. However, it is important to maintain these gains to prepare for the Delaware Aqueduct repair and increased volatility that may occur due to climate change, and to create additional capacity in our sewer system for stormwater.



FIGURE 1

PROGRAM UPDATE

1

Water Efficiency & Reuse Programs

Leak Notification Program

The Leak Notification Program allows DEP to proactively alert customers to potential water leaks on their property. The program gives customers the opportunity to sign up online to receive email notifications when their water use increases significantly over a period of several days, enabling homeowners to quickly respond to potential leaks and fix them before they become a serious billing problem. The program was expanded in February 2012 to include properties with four or more families and to allow these property owners to customize their own leak parameters.

Leak Management

DEP's Bureau of Water and Sewer Operations (BWSO) continues to investigate infrastructure leaks and replace water mains as necessary. DEP has around-the-clock response teams and leak detection crews that use cutting edge technology to locate and repair leaking valves and pipes. In 2011, DEP surveyed approximately 2,648 miles of water mains, and replaced 20.6 miles of water main lines. As part of these efforts, leak detection crews reduce the volume of influent entering the city's wastewater treatment plants by discovering unreported and undetected leaks from the water distribution system.

Detecting and resolving unreported leaks prevents additional water which had previously escaped the distribution system from travelling in to the sewer collection system, resulting in lower water volumes entering the wastewater treatment plants.



Field crews are assigned to monitor leaks in each borough.

Open Hydrant Emergency Response

DEP's BWSO has a field team dedicated to monitoring unauthorized fire hydrant use and closing full flowing hydrants, particularly during the peak days of summer. DEP has partnered with the local communities to educate about safety and to distribute sprinkler caps (read about the HEAT team on page 13).

DEP works with FDNY to make sprinkler caps available to the public for relief from heat and to reduce flow.



Water Saving Kits and Residential Surveys

DEP continues to offer free water saving kits to homeowners as well as free walk-through surveys of private homes to identify leaks and install low-flow showerheads, faucet aerators, and toilet displacement bags.

Comprehensive Water Reuse Program

On July 1, 2004, the New York City Water Board created the Comprehensive Water Reuse Program (CWRP) rate, which provides for a discounted water and sewer rate for mixed use or residential buildings that recycle water using a “blackwater” or “greywater” recycling system, as well as meeting fixture and appliance efficiency requirements. One year later the qualifications for the rate were expanded to buildings that recycle blackwater or combinations of greywater and stormwater or greywater and district steam condensate.

Water reuse system at the Solaire



There are several buildings in New York City that have taken advantage of this water rate incentive including:

- The Solaire Building, Battery Park City, Manhattan, NY
- The Helena Building, 601 West 57th Street, Manhattan, NY
- Goldman Sachs, 200 Water Street, Manhattan, NY
- The Visionaire Building, Battery Park City, Manhattan, NY
- The Tribeca Green Building, Battery Park City, Manhattan, NY

DEP is considering discontinuing this rate and creating an incentive program that would allow the owner to take advantage of more near-term return on their investment in reuse technologies.

Rain Barrel Giveaway Program

DEP distributed a total of 2,000 rain barrels between 2008-2011 to single- and two-family homeowners as part of a Rain Barrel Giveaway Program Pilot. Rain barrels help mitigate stormwater runoff to the city's sewer system as well as help conserve city water otherwise used for landscaping and gardening, or non-potable uses. These water uses can account for up to 40% of a household's summer water consumption in areas with single-family homes. Using the stored water can reduce the demand on the City's water supply during the summer's hottest days and help rate-payers save on their water bills. Rain barrels can also prevent stormwater runoff from entering the City's combined sewer system.

Rain barrel programs provide a unique opportunity for DEP to partner with local communities on water conservation and stormwater management strategies. Because the previous Rain Barrel Giveaway Program was so successful, DEP is planning to continue to offer rain barrels as part of the Green Infrastructure Program. The NYC Green Infrastructure Plan presents an integrated approach to improving water quality that includes "green infrastructure," such as right-of-way bioswales, rain gardens, green and blue roofs, and rainwater harvesting to reduce or manage stormwater runoff. Proper use of rain barrels results in dual benefits of water supply conservation and reduction of stormwater runoff. More information on the Green Infrastructure Plan can be found here:

<http://www.nyc.gov/dep/greeninfrastructure>



Automated Meter Reading

DEP began to install rooftop Data Collection Units (DCUs) in August 2008 and as of December 2011, network completion was 92% with most of the remaining DCUs to be installed in central Staten Island. The network provides close to double redundancy so coverage has been provided for almost all of Brooklyn, Queens, the Bronx, and Manhattan.

Wide-scale installation of the transmitters (MTUs) on water meters, and the replacement of approximately 50% of pre-1997 small meters, began on March 5, 2009, in Brooklyn and Queens, in mid-March 2009 in Manhattan, early April 2009 in the Bronx, and July 1, 2009 in Staten Island. By the end of 2011, 778,000 MTUs had been installed (92%) and work was nearing substantial completion.

The system generates a much as 98% actual read rate with the remaining 2% attributable mostly to installation errors, defective MTUs and meters that will be corrected. Most MTUs are programmed to read the meter and transmit the read four times a day. Meters two inches and larger are being read once an hour and transmitting four times a day. Installation of the AMR system will not only improve customer service and collections but will increase the volume of water use data by orders of magnitude. DEP will move from having meters read four times a year with an 85% actual read rate overall, to four times a day (for most customers) or hourly (for larger customers) with approximately 98% actual read rate. In late 2010, DEP began to introduce a leak notification service for one-to-three family properties covered by the AMR system. Email notifications are sent to customers whose accounts show a dramatic short-term increase in consumption.

DEP is making effort to install MTUs in apartment buildings that are physically metered but are still billed under the flat-rate or frontage system so the building owners or managers can better understand their water use. Those buildings were 93% complete by the end of 2011.

DEP began making AMR readouts available to customers through its website during summer 2010.

Additional information:

http://www.nyc.gov/html/dep/html/water_and_sewer_bills/amr_about.shtml

http://www.nyc.gov/html/dep/html/water_and_sewer_bills/amr_about.shtml



Left: Older meters were read up to four times a year.

Right: The Automated Meter Reader transmits real time data several times a day.

Municipal Water Efficiency Program

The Municipal Water Efficiency Program (MWEP) targets municipally owned facilities and properties for implementation of water conservation strategies that will generate water savings at a given cost per gallon, without impacting DEP revenue streams. This initiative will be consistent with PlaNYC Water Conservation Initiative 13 and will be a key component of the city-wide Demand Management Plan currently under development. DEP conducted significant intergovernmental outreach and coordination through the end of 2011, meeting with City agencies that are on a fixed water charge to discuss water conservation and demand management opportunities on city-owned properties, in the context of the Water for the Future program. This type of water conservation strategy, when implemented correctly, results in revenue-neutral water savings achieved through a one-time investment by DEP with a short payback period.

As previously mentioned, DEP has begun implementation of four demonstration projects scheduled for Summer 2012. Old, inefficient fixtures in two Queens high schools will be replaced with high-efficiency models, resulting in significant water savings. At the two playground sites in Queens, the spray shower bollards will be automated, instead of running continuously during the day (and often during the night) throughout the spray shower season of late May to early September. The spray shower projects are expected to reduce water consumption by 50% per year for both sites. Toilet fixtures in the comfort station at one of the playground sites will also be replaced yielding additional annual water savings. DEP has installed water meters and AMR transmitter devices on the services lines at all four sites and is monitoring current water consumption. DEP will continue to monitor water consumption at the demonstration project sites after construction work has been completed in order to quantify and compare anticipated and actual water savings.

Multi-Family Conservation Program

The Water Board recently revised its Multi-Family Conservation Program (MCP) in order to expand it to customers whose frontage billing was set to expire July 1, 2012. The revised program offers qualified multiple-family housing of four or more dwelling units billing based on a fixed per unit charge in lieu of those based on metered consumption. The program objective is to promote water conservation in multiple-family housing, while giving customers control over their water and wastewater costs.

The MCP requires participants to implement certain conservation measures in order to remain on flat-rate billing. Properties must have an Automated Meter Reading (AMR) compatible contemporary meter and an AMR device installed by January 2014, and high-efficiency water-using fixtures installed in 70% of all units by June 2015. Toilets installed as a part of DEP's original 1994 to 1997 Toilet Rebate Program will count towards this requirement.

Water Use Rules

DEP completed revisions in the "Rules of the City of New York" (RCNY), Title 15, Chapter 20, Rules Governing the Supply and Use of Water, which took effect on June 22, 2009. DEP has recently proposed amendments to the Rules (15 RCNY 20-01 et seq.), relating to water conservation and efficiency. The current proposed changes pertain to: 1) installation, repair and maintenance of water services, 2) service connections, selection and use of water meters, and 3) introduction of new technologies and updated rules for outdoor and indoor water use. These proposed amendments are part of DEP efforts to reduce system leakage, incorporate the use of new technologies and products to improve system efficiency, and to eliminate outdated rules, specifications and policies concerning indoor and outdoor water use.

DEP began an internal study for a new round of rule changes in 2011 and expects to conduct a public hearing process in 2012. While most of the likely changes concern technical specifications related to water meters and the new AMR system, expansion of the requirement for individual metering of new condominiums and optional individual metering of larger condominiums is a conservation-related issue raised for discussion.



Public fountains and sprays are required to have automatic shutoff.

Local Law 86 and LEED® Rating Systems

Local Law 86 (LL86) of 2005, the NYC green building law, was enacted on October 3, 2005. The requirements of LL86 may apply to projects where construction is directly managed by City agencies as well as to projects managed by non-city entities, such as cultural organizations, state agencies and private developers, that receive a certain amount of city funding. These projects must achieve, at a minimum, 20 to 30% potable water use reduction below the standards of the United States Environmental Protection Agency Energy Policy Act of 1992 (EPA Act 1992) as well as a minimum Silver rating under the United States Green Building Council's Leadership in Energy and Environmental Design (LEED®) rating systems program.

Office buildings can achieve a LEED Water Efficiency (WE) credit 3.1 for 20% water reduction through the use of low flow plumbing fixtures on efficient buildings. More efficient buildings can achieve WE credit 3.2 for 30% water reduction. For landscaping and irrigation, a LEED WE Credit 1.1 can be achieved for reducing potable water used for building irrigation by 50%. Ultra efficient and innovative buildings could obtain the additional WE credit 1.2 for reducing the potable water for irrigation by 100%.

Updates to Drought Management Plan & Rules

DEP has begun development of the Water Supply Shortage Condition Contingency and Management Plan (WSCMP), which is proposed to supercede the existing Drought Management Plan & Rules for NYC. The WSCMP provides guidelines for DEP to manage water supply and demand in the event of a supply problem. Such problems could include imminent supply disruptions resulting from infrastructure failure, as well as forecasted water supply shortages due to droughts and system repairs. Water shortage, as discussed in the plan, means that DEP will not have the normal amount of water typically available to provide to its customers. The various supply shortage phases noted in the WSCMP will be implemented depending on the magnitude of the water shortage. DEP will produce estimated water savings for each type or category of the water use restrictions that will be implemented during each phase, yielding an overall estimated total water savings for each phase of water supply shortage conditions. This analysis also accounts for seasonality of water use in evaluation of the impacts of various water use restrictions.

New York State Reuse Guidance

In November 2010, the New York State Department of Environmental Conservation (NYSDEC) released "Potential Reuses of Greywater and Reclaimed Wastewater in New York State." This document can be found here:

http://www.dec.ny.gov/docs/water_pdf/waterresue.pdf

As stated in the 2011 PlaNYC update, the DEC is expected to release a report to guide regulatory decisions on reuse in the near future, and NYC would work within the State's comprehensive standards to encourage reuse, remove barriers in local building codes, conduct cost-benefit analysis, establish long-term compliance management and maintenance requirements, and, where appropriate, provide incentives.

Education Programs

In order to help educate the public and raise awareness about water conservation, DEP has developed, through its Bureau of Communications and Intergovernmental Affairs (BCIA), a comprehensive public education and outreach program. This program has been running for many years and has several integrated components that address a wide range of topics through a multi-media approach, as described below. Furthermore, any future programs directed at demand and use reductions will be tied to the implementation of a major public information campaign on the value of water and water infrastructure such that any inconveniences, costs and sacrifices can be seen in the context of their civic benefit.

School Programs

DEP continues to develop and implement education programs to help make young people and adults aware of the importance of New York City's water resources. DEP provides opportunities to learn about water supply, wastewater treatment, and stewardship activities at the new Visitor Center at Newtown Creek, and through inquiry-based lessons, staff development workshops for teachers and administrators, printed materials, assistance for curriculum development, and student research projects. DEP continues to administer its annual Water Resources Art and Poetry contest for K-12 students. Additional information about DEP's educational programs can be found here:

http://www.nyc.gov/html/dep/html/environmental_education/index.shtml

Public Events

In 2011 and 2012, DEP continued to participate in public events including table top displays and outreach at fairs, festivals, and concerts. In June 2012, the 26th Annual Water Resources Art and Poetry Contest Award Ceremony was held at Citi Field to honor water conservation art and poetry projects of students throughout the City. Awards were given to students of all age groups and grade levels by the Commissioner and a representative from the Mets baseball team.

Other events have included several presentations to high school students. These presentations were focused on toilet replacements tied to the WFF program occurring in the two initial MWEF projects (Hillcrest and Bayside high schools) happening this summer.

Water Conservation Seminars for Building Managers

The latest water conservation, water and sewer billing and Transition to Metered Billing presentation can be downloaded from DEP's website via this URL.

http://www.nyc.gov/html/dep/html/ways_to_save_water/wcclasses.shtml

The presentation covers:

- Basics of water and sewer billing (flat-rate and metered billing)
- Transition to metered billing
- How to measure and account for water/sewer costs
- Toilets, showers, boilers, hot water heaters and other equipment
- Managing and account for water use

HEAT Team

In 2011, DEP partnered with the South Bronx Overall Economic Development Corporation to implement the Hydrant Education Action Team (HEAT) program. HEAT is a community-based program that was initiated in 2007 to address the problems associated with the illegal use of fire hydrants. The program targeted communities that historically have the highest number of open fire hydrants; Manhattan Community Board 12 (Washington Height/Inwood), Bronx Community Board 4 (Concourse) and Bronx Community Board 5 (Fordham). The purpose of HEAT is to educate community residents and stakeholders about the problems surrounding the illegal use of fire hydrants. The HEAT program provides employment as well as community service opportunities to residents and young professionals eager to make a positive difference in people's lives.

Street Teams distribute HEAT flyers and posters to provide the community with important information about the HEAT program. During this process, the Street Teams promote the use of sprinkler caps and educate the community on their importance and where to obtain them. The teams suggest alternative methods of staying cool, such as going to a local park or pool. Community awareness not only gives everyone a chance to learn about the HEAT mission, but to experience it as well. By having people in the community take part in these activities, they also become stakeholders.

Website

DEP's website addresses water conservation in institutional, regulatory, and public education programs throughout its content and across all of the target audiences. The public education component of the website enhances the myriad of DEP public education programs by providing easy internet access to event schedules, educational materials for teachers and students, downloadable promotional information such as flyers and posters, reading lists, project descriptions, and the host of information associated with DEP Public Education Programs. A direct link to Conservation outreach materials and water saving tips can also be found on DEP's website at:

http://www.nyc.gov/html/dep/html/ways_to_save_water/index.shtml

Green Infrastructure Webmap (GI Webmap)

DEP has implemented a citywide effort to better manage stormwater using a variety of innovative, sustainable green infrastructure. Improved stormwater management is connected to water conservation in that Green infrastructure, or source controls, can detain or retain stormwater runoff through capture and controlled release, infiltration into the ground, vegetative uptake and evapotranspiration thereby reducing the need for end-of-pipe stormwater storage and treatment systems, processes which require large quantities of city water. The GI Webmap is a GIS-based interactive map application developed in partnership with the Department of Information Technology and Telecommunications (DOITT) to track green infrastructure projects throughout the City. Users can access the interactive map platform through their web browser and search for existing projects, add/submit new projects and turn layers on and off to view different types of green infrastructure, and zoom in and out to the Borough or parcel level.

A link to the GI Webmap can be found here:

http://www.nyc.gov/html/dep/html/stormwater/using_green_infra_to_manage_stormwater.shtml

Social Media

DEP has started Facebook, Twitter, and Flickr accounts to communicate with the general public about NYC water related news and issues.

<http://www.facebook.com/nycwater>

<http://twitter.com/nycwater>

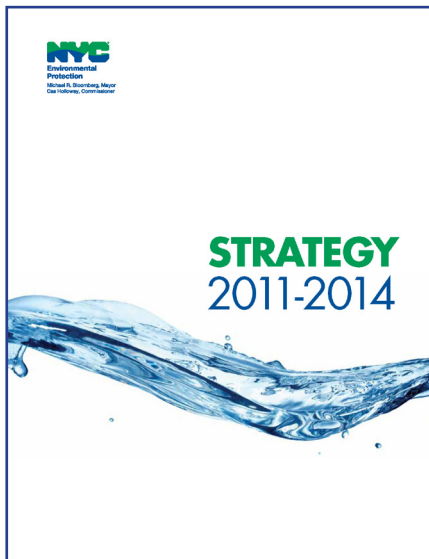
<http://www.flickr.com/photos/nycep>



flickr™

Publications

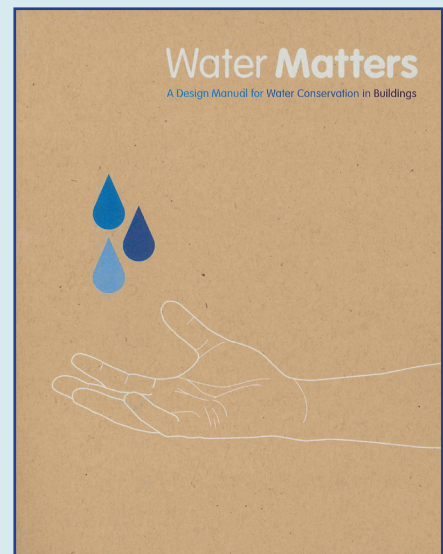
The wide array of DEP environmental conservation related material will continue to be produced and updated, as necessary, for distribution to students and teachers at public events, and on the DEP website



Water Conservation Manual

In 2011, the New York City Department of Design and Construction (DDC) released a water conservation manual, *Water Matters: A Design Manual for Water Conservation in Buildings*. This manual is primarily concerned with water aspects of the sustainable design, construction and operation of City buildings controlled by the DDC.

The manual offers guidance on plumbing fixtures, mechanical, plumbing and energy systems, optimum performance, owner furnished equipment, fire protection, and new technologies to achieve water saving goals.



4 Tracking and Projecting Water Demand

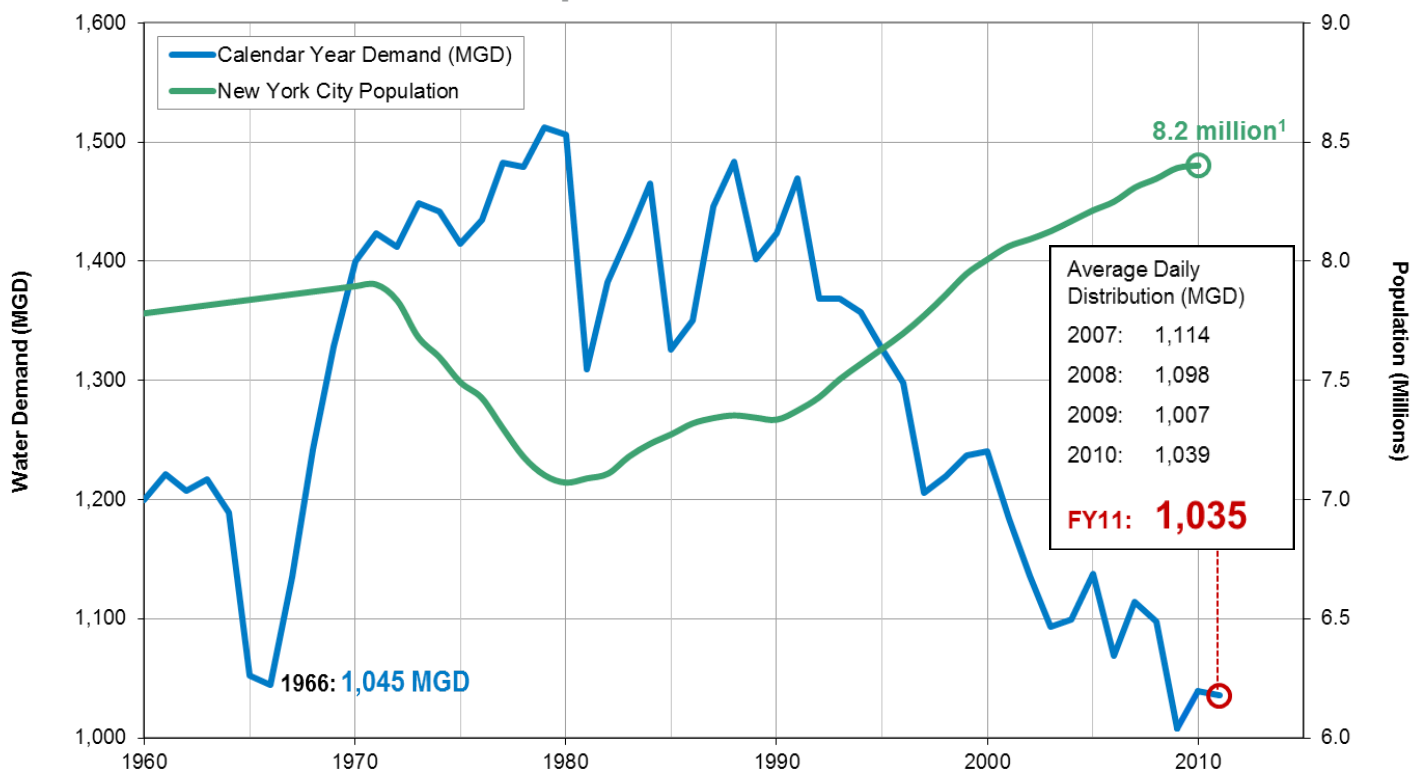
New York City water consumption has continued to decline despite increases in population as shown in the figure below (2009 water consumption was 1,007 MGD, lowest since the drought of record). Some of this is attributed to colder and wetter summers in more recent years. It is reasonable to assume that water usage will remain stable or even continue to decline over the near term due to increasing rates and customers' ability to better track usage via AMR. Volumetric meter-based billing is a water conservation pricing mechanism and water use can be expected to decrease in response to the increasing cost of water. This overall trend could be affected by a number of factors including year-to-year temperature swings and potential droughts, which tempers consumption through restrictions.

DEP uses water demand analysis and projections for many purposes including water supply and wastewater infrastructure planning, revenue analysis, affordability studies, assessing the effects of new growth and re-zoning, and understanding the effects of water demand on agency operations. DEP uses technologies such as Microsoft SQL Server, SAS, and ESRI ArcGIS to create statistical and GIS models.

Upcoming work initiatives include integrating the 2010 US Census data, tracking top water users, and further understanding the unaccounted-for water (UAW). Although, there is no universally applied or accepted definition of UAW, in 1996, the American Water Works Association (AWWA) recommended changing industry standard for UAW from 15% to 10%; EPA has endorsed 10%. Currently, 33 states that have water loss policies also have UAW standards ranging from 7.5% to 20%, with 15% being the most common. The standard is disputed because methodologies to determine UAW are varied and inconsistent. Definitions range from "unmetered water" to "water losses" (e.g. leaks).

DEP will continue to track water demand, analyze system-wide performance and improve its understanding of the system. Examples of these analyses are included in the Appendix.

Historical Distribution & Population, FY11



Water for the Future

Since the 1990s, DEP has been monitoring leaks in a portion of the Delaware Aqueduct Rondout West Branch Tunnel (RWBT) that connects the Rondout Reservoir in Ulster County to the West Branch Reservoir in Putnam County, specifically in the towns of Roseton and Wawarsing. The leaks release between 15 and 35 million gallons of water a day, depending on the amount of water the aqueduct is carrying. Years of comprehensive inspections, testing, and study indicate that cracking and leakage are occurring in the aqueduct where it passes through limestone, a rock more susceptible to wear and tear than sandstone, shale, gneiss and granite that form the vast majority of the tunnel.

As a part of Water for the Future Program, DEP will build a three-mile bypass tunnel around a portion of the aqueduct that is leaking in Roseton in Orange County, and repair other leaks in Wawarsing, in Ulster County, from the inside of the existing tunnel. The three-mile bypass tunnel will run east from the Town of Newburgh in Orange County, under the Hudson River to the Town of Wappinger in Dutchess County, on the east side of the Hudson. Construction of the bypass tunnel is expected to be completed by 2020, at which point the leaking portion of the Delaware Aqueduct will be shut-down and decommissioned and the bypass tunnel will be connected to the system to convey water past the leaking portion of the RBWT.

During the shut-down period, approximately 50% of the City's water supply will be unavailable and existing supplies will need to be optimized, augmented and conserved. Construction of the bypass tunnel and the repair of the tunnel lining will ensure that DEP can continue to deliver high quality drinking water every day for decades to come. To prepare for the shut-down of the aqueduct, DEP is developing a large-scale water conservation program targeting a 5% overall reduction in water consumption city-wide by the year 2020. The Demand Management Plan is scheduled to be complete in January 2013 and will outline demand management measures designed to achieve the projected savings.

PROGRAM ACCOMPLISHMENTS

Accelerated Water Metering

1985: New York City passed Local Law 53/1985 to require metering of all new residential construction and metering during substantial renovation of residential properties.

1985: The New York City Water Board established a requirement of metering as a condition of receiving water and sewer service from the city. Penalties were established for failing to meter, and in 1999 and 2000, DEP issued notices to unmetered properties requiring them to either install a meter or be subjected to a 100% surcharge on their annual flat-rate water/sewer bill. Initially, about 35,000 properties were surcharged but that number decreased to about 8,200 by the end of 2009.

1988: DEP issued the first in a series of meter installation contracts that brings the city to almost 90% metered by 1998.

2003: DEP issued the first of an ongoing series of systematic large meter replacement contracts.

2007: DEP and DoITT issue a request for proposals (RFP) for a citywide AMR system.

Green Codes

Mayor Bloomberg, Council Speaker Quinn and the U.S. Green Building Council sponsored a wide-ranging review of the city's Building Code to meet environmental and green building goals. The cooling system amendment which prohibits the use of potable water for most once-through cooling systems went into effect January 1, 2011, as did an amendment that requires alarms and sub-meters to detect water leaks and monitor usage on water equipment.

Two other changes will become mandatory July 1, 2012: one that lowers the maximum water consumption flow rate or quantity for certain plumbing fixtures and allows the installation of dual-flush toilets; and a law requiring drinking fountains in commercial buildings to have a separate faucet designed to fill a container with water.

The code changes apply to new construction and the repair or replacement of existing structures and fittings.

Installation of Locking Hydrant Caps

1993: DEP began installing locking caps on approximately 40% of the fire hydrants in the city.

Local Law 84 and Benchmarking for City Buildings

As of May 1, 2010, all city buildings of a certain size are required to benchmark their energy and water consumption annually. In order to assist customers through the process, DEP partnered with EPA and the Mayor's Office in order to develop an application that automatically uploads water consumption data to each customer's online profile.

Qualified buildings are only required to benchmark their water consumption if they have had an automatic meter reading device installed for the entire calendar year being benchmarked. Water benchmarking was not required for 2011 reporting but will be required for 2012.

NYCHA Toilet Replacements

1993 – 2005: The New York City Housing Authority (NYCHA) replaced toilets in all developments in the Newtown Creek, Wards Island and North River drainage areas and replaced toilets in City and State developments during DEP's Toilet Rebate Program.

Quarterly Water/Sewer Billing

1995: DEP assumed responsibility of water and sewer billing from the Department of Finance and commissioned a new billing system that instituted quarterly billing for all metered customers. In 2011, DEP began working on the new billing system.

Rate Study

2008-2009: The Water Board initiated a study in 2008 to examine advantages and disadvantages of several conservation rates, examine practical issues that must be addressed to implement a stormwater rate and research possible incentives for green infrastructure. The study benchmarked NYC's rate structure against other municipalities across the country, researched types of stormwater, fixed and variable models, and other rate structures implemented elsewhere, and identified data needs required to more fully understand the implications of potential implementation in NYC. The study was released in late 2009 and can be found through DEP's website:

http://www.nyc.gov/html/dep/pdf/water_board/waterboard_rate_study_12182009.pdf

Toilet Rebate Program

1994 – 1997: DEP conducted a citywide Toilet Rebate Program that replaced 1.3 million toilets and reduced consumption by approximately 90 MGD.

Ongoing Program Metrics for 2011

Water Surveys and Conservation Kits

Private Home Water Surveys	226
Apartment Surveys	680
Small Commercial Water Surveys	17
Home Water Saving Kits Distributed	0
Estimated Water Savings (MGD)	9.8

Water Mains

Water Mains Surveyed (Miles)	2,648
Estimated Water Savings (MGD)	.99

Hydrants

Hydrants Repaired	13,946
Hydrants Replaced	2,481
Hydrants Maintenance	2,854

Water Meters

Meters Installed (Unmetered Properties)	160
Meters Replaced	908

NEXT STEPS

Toilet Replacement Program

DEP is planning a two phase voucher-based toilet replacement program currently scheduled for 2013-2018. Software to allow online applications for both the MCP and the toilet replacement vouchers was designed in 2008-2009. A first phase will target properties going through a transition from the frontage rate to the Multi-Family Conservation rate. The second phase will be opened up to all other building tax classes. A link to program FAQs can be found here:

http://www.nyc.gov/html/dep/html/ways_to_save_water/toilet_replacement_program_faq.shtml

Municipal Water Efficiency Program

Beginning in 2013, DEP will scale up the MWEP to a city-wide level, implementing water conservation and efficiency projects in municipally-owned buildings in cooperation with Agency partners. Working with the Parks Department, Fire Department of New York (FDNY), Department of Education (DOE) and School Construction Authority (SCA), New York City Housing Authority (NYCHA) and City University of New York (CUNY), DEP's goal is to implement a targeted number of water efficiency and conservation projects per year for the length of the program (2013-2018), covering approximately 1,700 municipally-owned properties. DEP will incorporate lessons learned and risk management principles into planning for scaling up the MWEP, in order to achieve the goals of fixture replacements at 500 schools, six community colleges, 150 firehouses, 10 NYCHA developments, 600 comfort stations, 87 Parks recreation centers and administrative buildings, and automation of 400 spray showers in parks and playgrounds.

In addition to exploring water conservation and efficiency projects in municipally-owned properties of Agency partners, DEP has also looked at its own facilities for water efficiency opportunities. DEP has conducted water conservation surveys at each of the 14 wastewater treatment plant (WWTPs) facilities in the city to identify water saving measures that could be implemented above and beyond typical Operations & Maintenance and Capital Upgrade protocols.

End of Frontage Billing

The New York City Water Board currently plans to end traditional flat-rate water and sewer billing on July 1, 2012. At that time, as many as 20,000 apartment buildings will have made a decision to move either to metered billing or to the MCP rate which carries specific water conservation requirements. The requirements for entry into the MCP have been written into the approved NYC Water Board Rate schedule for 2013. Detailed background is provided by the water conservation seminar presentation used by DEP:

http://www.nyc.gov/html/dep/html/ways_to_save_water/wcclasses.shtml

The MCP Guidelines can be found on DEP website:

http://www.nyc.gov/html/dep/html/customer_services/propmgmt.shtml

The FY2013 NYC Water Board Water and Wastewater Rate Schedule can be found online here:

http://www.nyc.gov/html/nycwaterboard/pdf/rates/fy2013_rates.pdf

System Optimization

The goal is to replace or rebuild meters three inches and larger to recover lost revenues and prepare for both emergency and non-emergency implementation of new rate structures.

DEP has begun a systematic effort to replace the city's 30,000 largest meters on regular industry recommended cycles over the next 10 years. This effort will increase the number of large customers on metered billing and could save millions in otherwise lost revenue. Accurate billed water readings could send price signals to encourage more efficient use of water.

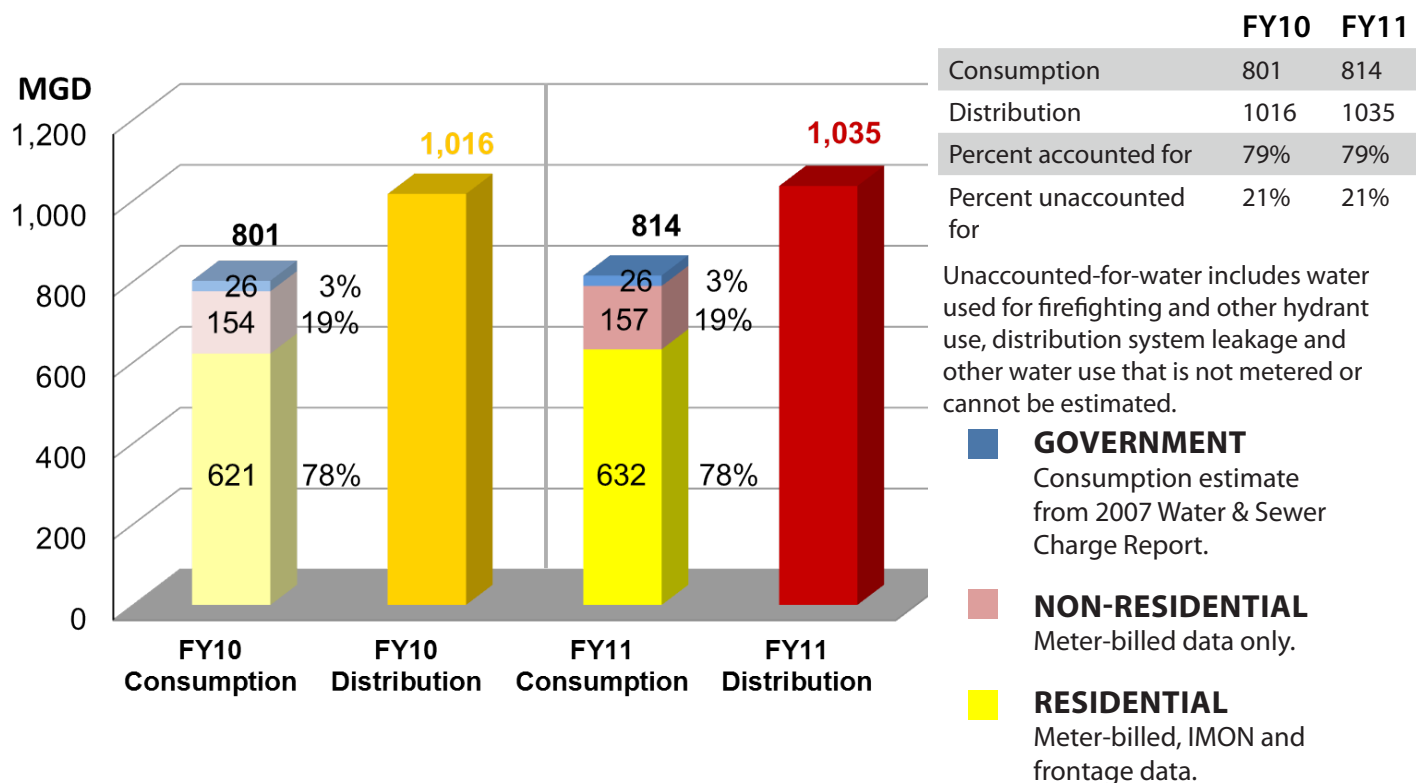
As part of the Water for the Future (WFF) program and the overall city-wide Demand Management strategy, DEP is developing a pilot project for a Leak Detection program. Working together with the New York City Housing Authority (NYCHA), a site will be selected to demonstrate effectiveness of inter-agency cooperation in locating and repairing leaks on large campus-like properties. Based on the anticipated success of the leak detection pilot project, DEP will consider developing a leak detection effort suitable for campus-like properties such as large hospitals and community colleges.

Water for the Future (WFF) Incentive Program

The request for expressions of interest (RFEI) issued in 2007 was mentioned in the 2007 and 2008 editions of this report. DEP is looking into various formats for the next solicitation. This program is being considered as a replacement for the Comprehensive Water Reuse Rate.

APPENDIX

Consumption vs. Distribution, FY10-FY11



Unaccounted-for-Water (UAW)

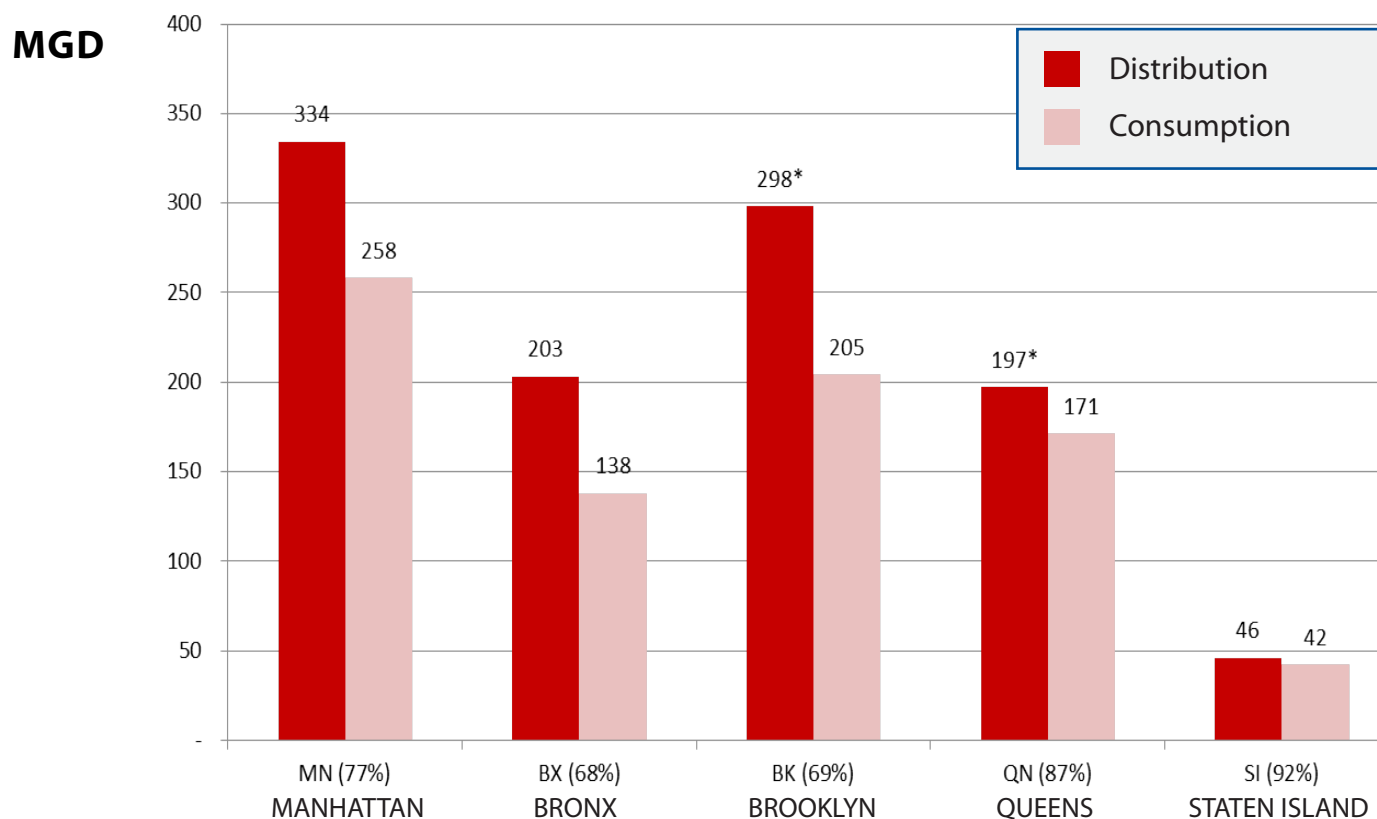
There is no universally applied or accepted definition of unaccounted-for water. In 1996, AWWA recommended changing industry standard for UAW from 15% to 10% of total; EPA has endorsed 10%. States that have water loss policies (33) have UAW standards ranging from 7.5% to 20%, with 15% being the most common. The Standard is disputed because methodologies to determine UAW are varied and inconsistent.

- Definitions range from “unmetered water” to “water losses” (e.g. leaks).
 - for NYC metered water is 52% for meter-billed only and 63% including meter-billed plus metered frontage.
- Some definitions of unmetered use distinguish between authorized use (e.g. fire protection) and unauthorized use (leaks).
- Some definitions allow for water that is metered or confidently estimated (consistent with how it is defined in this report).

In New York State (NYS Water Conservation Manual)

- No specific standard – range of 10% to 15% cited
- Distinguishes between:
 - authorized metered water use.
 - authorized unmetered water use (firefighting, public buildings and landscaping, other).
 - unaccounted for water (leaks, meter error).

Consumption vs. Distribution by Borough, FY11



NOTE: Bureau of Water and Sewer Operations (BWSO) borough data sum to 1,003 MGD, while Bureau of Water Supply (BWS distribution) is 1,016 MGD due to variability in meters.

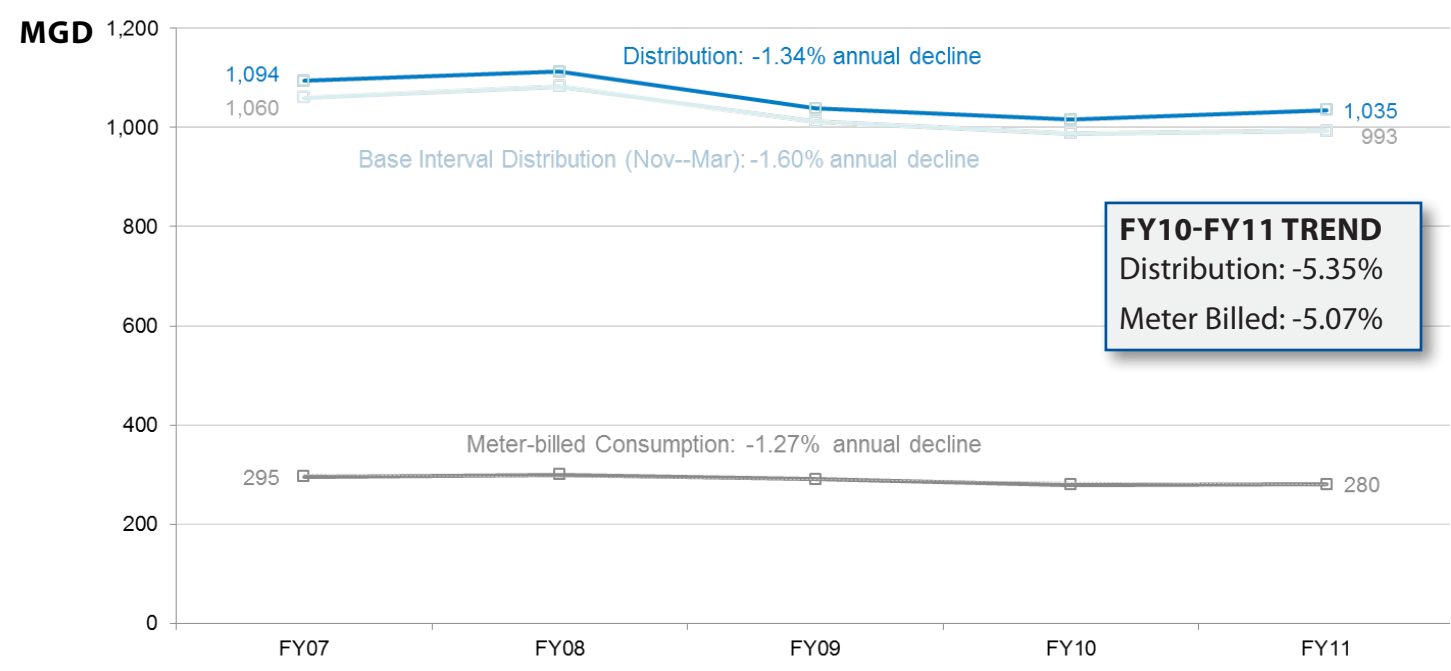
Meter-Billed Consumption Changes, FY10-FY11

Consumption increased 2.3% citywide, but increases ranged from 0.4% in the Bronx to 4.0% in Manhattan.

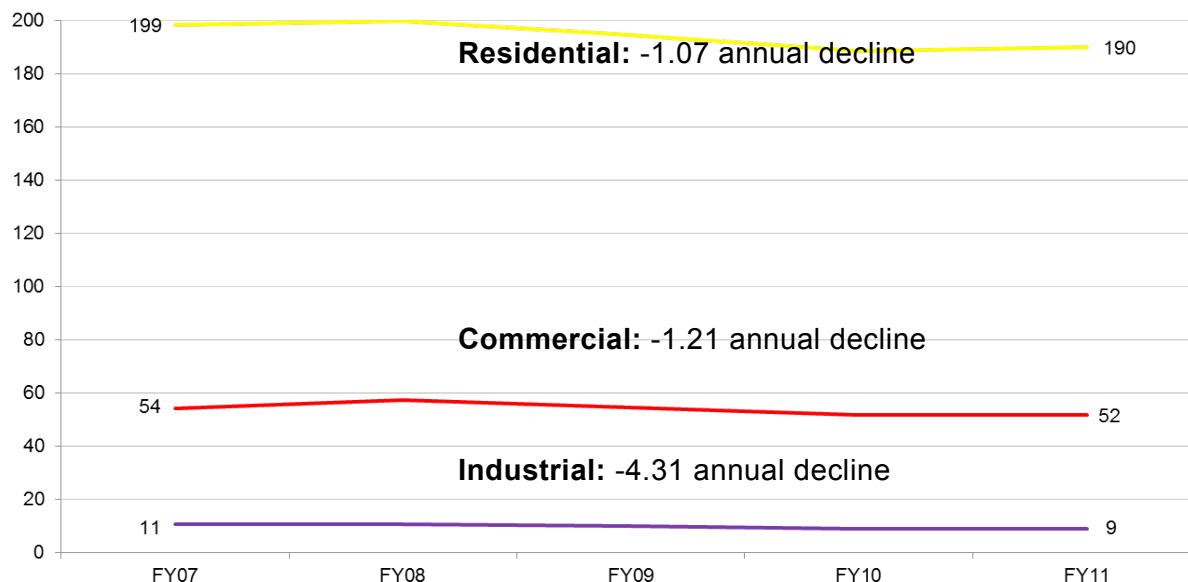
	FY10	FY11	Percent Change
Citywide	520,333,262	532,073,635	2.3%
Manhattan	166,104,421	172,677,749	4.0%
Bronx	57,524,798	57,778,319	0.4%
Brooklyn	129,738,267	131,061,455	1.0%
Queens	135,006,719	137,342,087	1.7%
Staten Island	31,959,057	33,214,024	3.9%

NOTE: In order to develop a consistent comparison, the consumption dataset in the table above includes only those customers that have been on meter billing in both FY10 and FY11.

Distribution & Consumption Trends, FY07-FY11



Meter-Billed Consumption Trends for Selected Land Uses, FY07-FY11

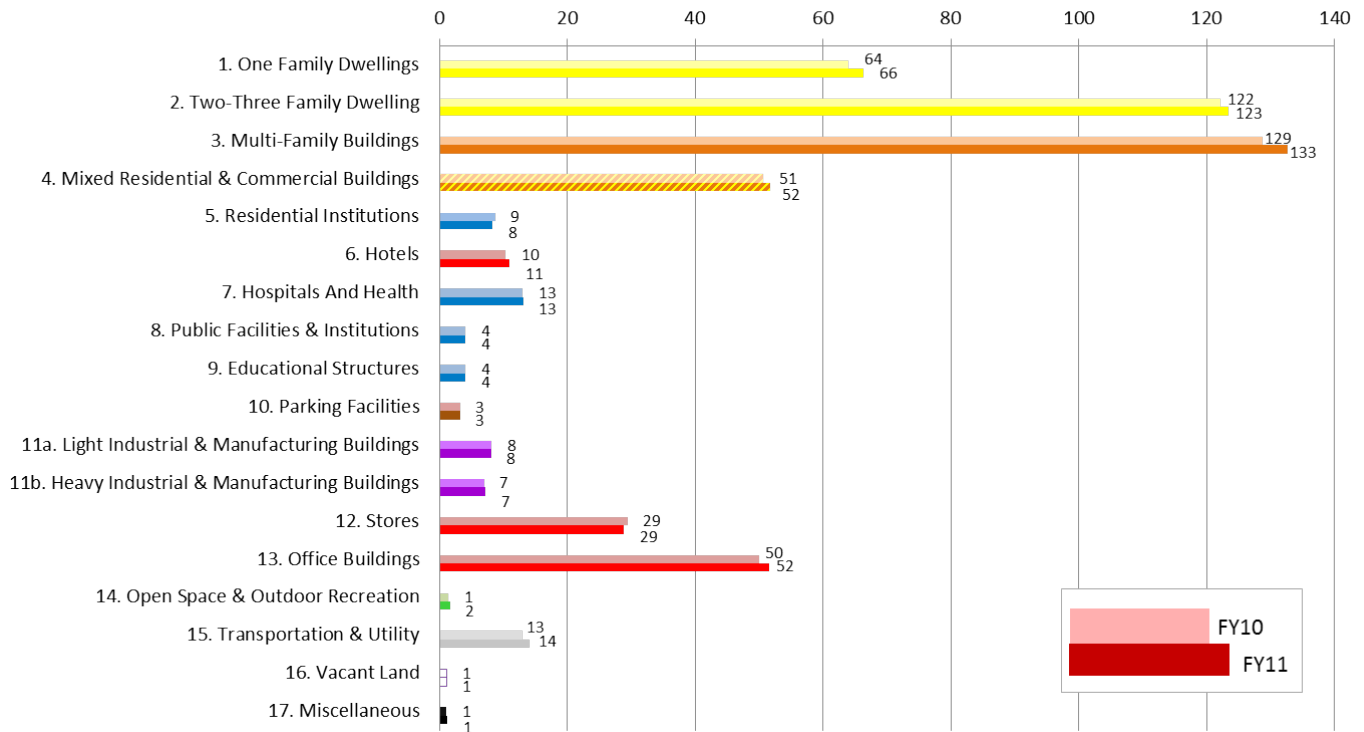


NOTE: In order to develop a consistent trend line, the consumption dataset includes only customers that have been on meter billing since FY07. Additional customers have gone to meter billing since FY07, but are not included in this analysis.

Meter-Billed Consumption Changes, FY10-FY11

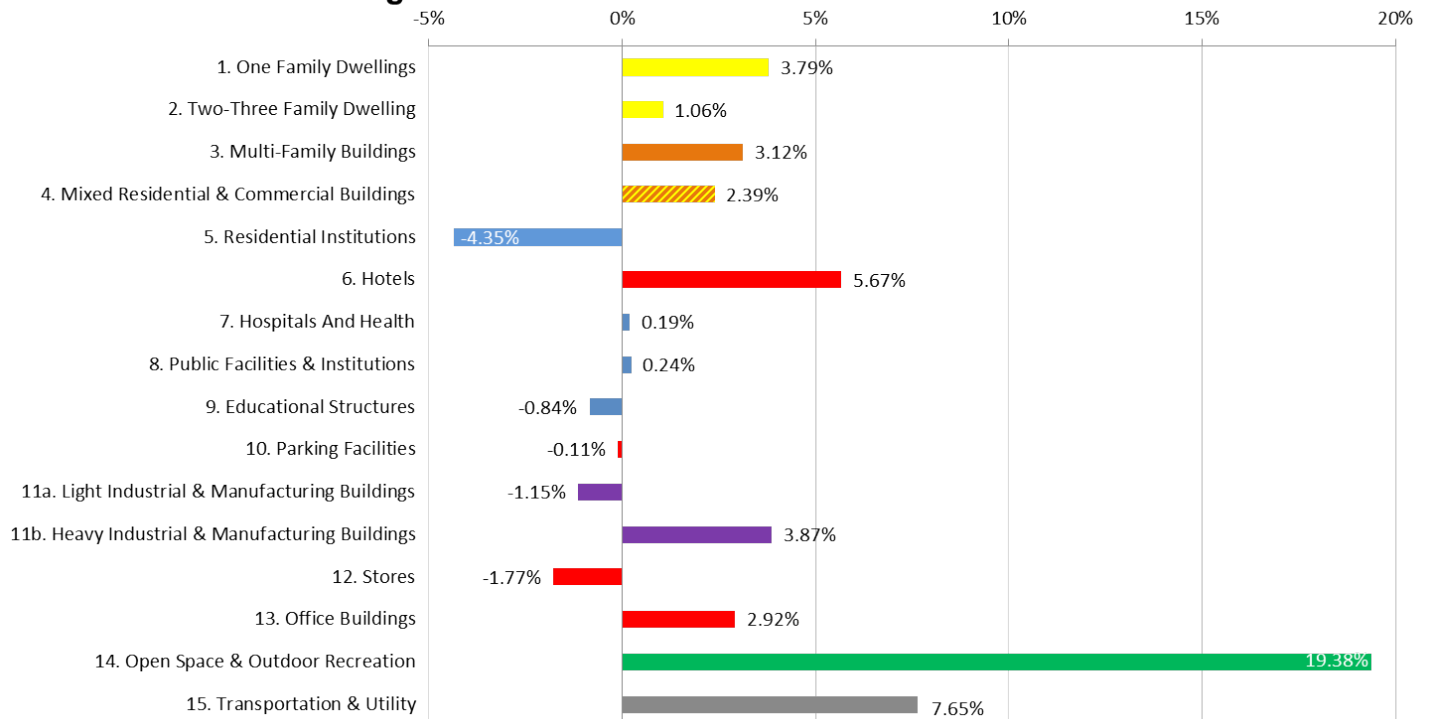
Volumetric Comparison

MGD



Percent Changes, FY10-FY11

Percent Change



NOTE: In order to develop a consistent comparison, the consumption dataset includes only those customers that have been on meter billing in both FY10 and FY11.

Meter-Billed Account Statistics, FY11

Average Daily Consumption	Mean	10th Pctl	25th Pctl	50th Pctl	75th Pctl	90th Pctl
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RESIDENTIAL LAND USES: DAILY CONSUMPTION PER HOUSING UNIT

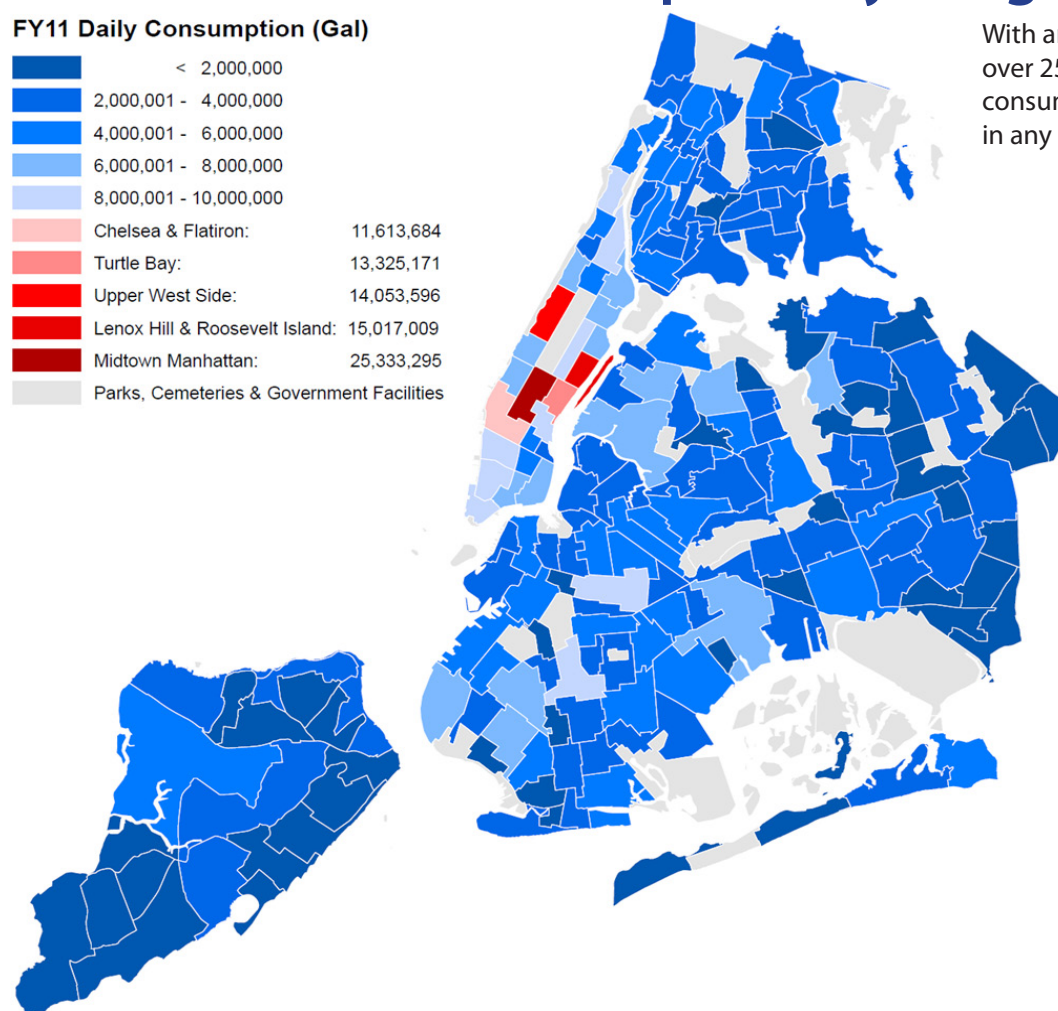
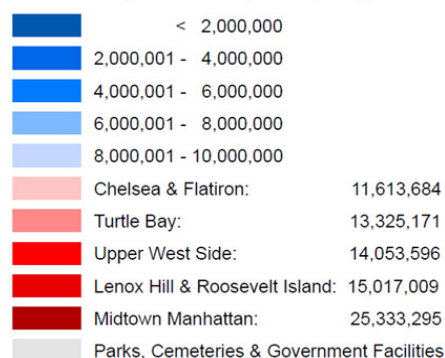
1. One Family Dwellings	206	66	113	176	258	359
2. Two-Three Family Dwellings	165	54	83	138	206	293
3. Multi-Family Dwellings	150	50	83	126	188	266
4. Mixed Residential & Commercial Buildings	205	19	67	134	242	421

NON-RESIDENTIAL LAND USES: DAILY CONSUMPTION PER BBL

6. Hotels	19,202	1,221	3,640	8,744	20,483	42,423
7. Hospitals and Health	19,962	96	379	1,228	7,109	45,403
11a. Light Industrial & Manufacturing Buildings	1,116	25	76	240	820	2,629
11b. Heavy Industrial & Manufacturing Buildings	1,808	25	70	225	715	2,289
12. Stores	1,916	41	148	578	1,896	4,843
13. Office Buildings	7,583	64	174	729	4,975	19,637
15. Transportation & Utility	30,303	25	98	676	8,726	38,494

Accounted-for Consumption by Neighborhood

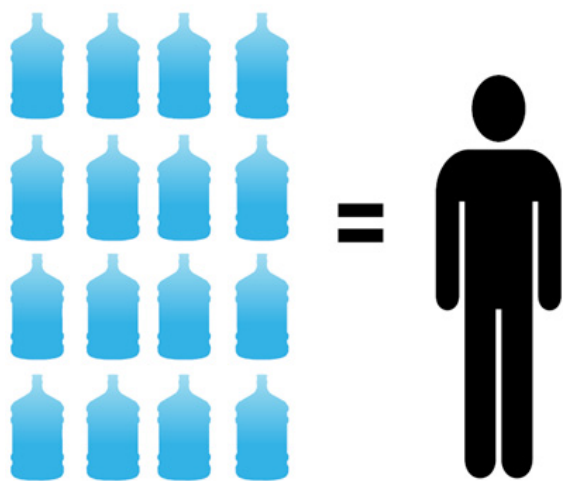
FY11 Daily Consumption (Gal)



With an average daily consumption over 25 MGD in FY11, more water is consumed in Midtown Manhattan than in any other neighborhood in the City.

Per Capita Consumption, FY10-FY11

- City-wide residential consumption per capita was 75 GPD in FY11, while meter-billed consumption per capita was 63 GPD.



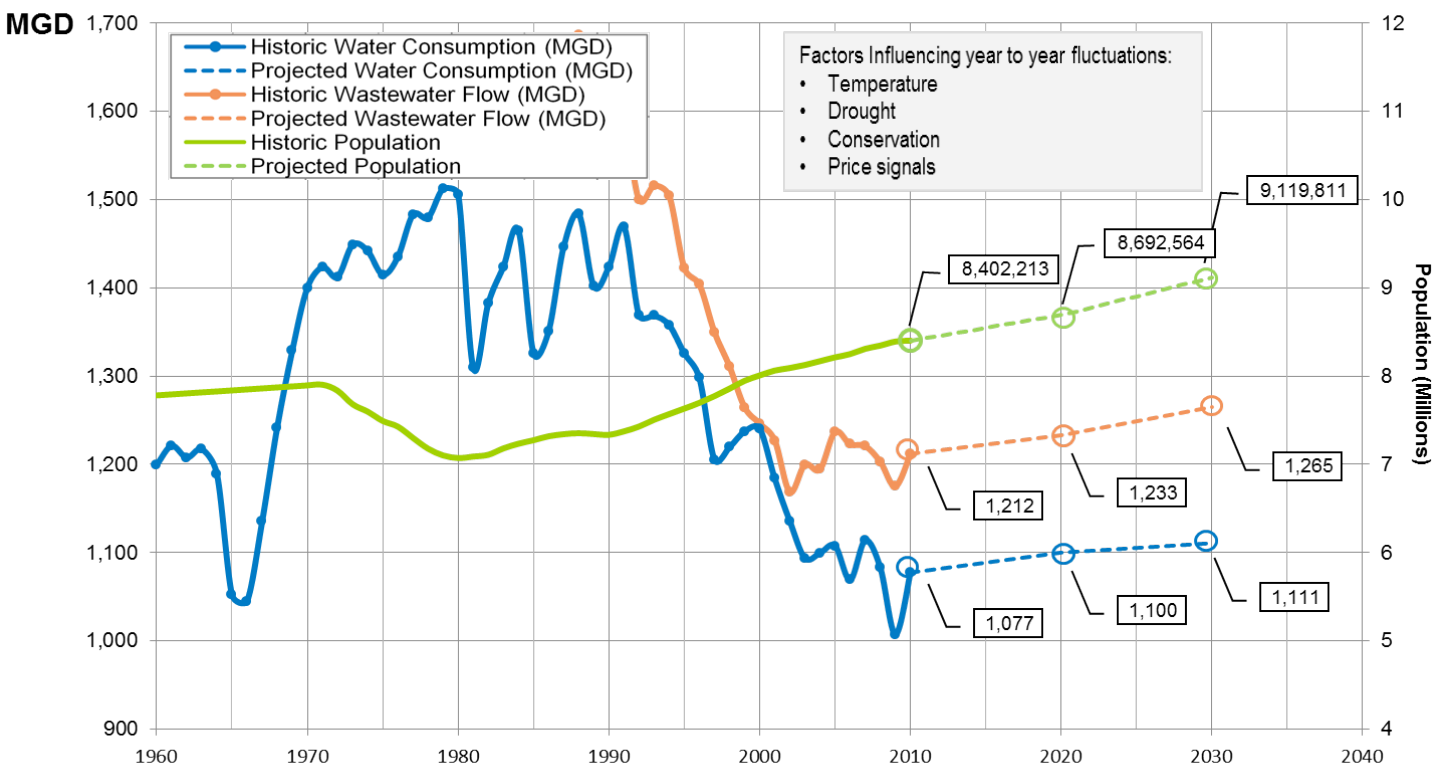
WE 1: New Yorkers use the equivalent of 15 water cooler bottles of water in their homes, everyday.

Per Capita Consumption, All Residential Development, GPD

Land Use	FY10		FY11	
	All Billing Types	Meter-Billed Accounts	All Billing Types	Meter-Billed Accounts
1. One Family Dwellings	69	67	71	69
2. Two & Three Family Dwellings	66	64	68	67
3. Multi-Family Buildings	77	56	75	53
All Residential Development	77	65	75	63

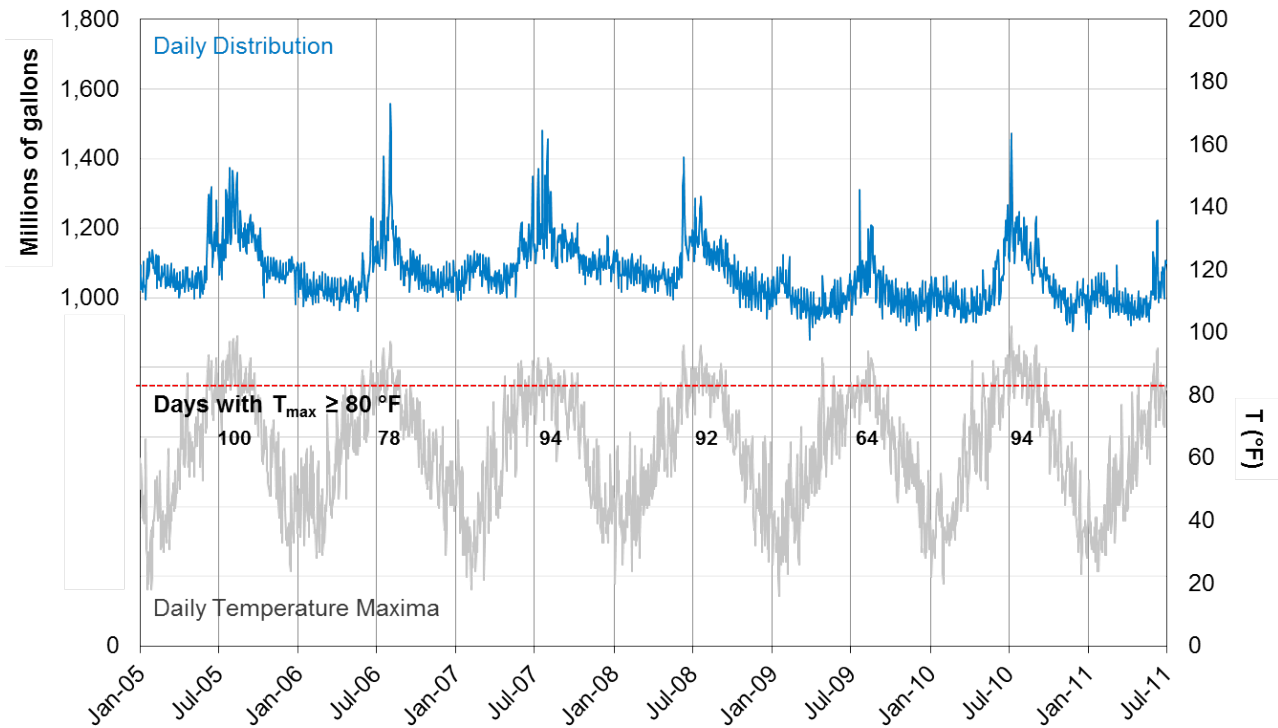
Distribution & WWTP Flow Projections

Distribution is expected to stabilize at 1.1 billion gallons per day for the next ten to twenty years, despite increasing population.



NOTE: Wastewater data are dry weather flows. 2010 demand and wastewater flow data are averages for calendar years 2005-2009.

Distribution & Daily Temperature Maxima, 2005-2011



NOTE: Distribution increases markedly with temperature during the summer, then flattens-out during the cooler months.

ABBREVIATIONS & ACRONYMS USED IN THIS REPORT

AMR	Automated Meter Reading
AWWA	American Water Works Association
BMP	Best Management Practices or Green Infrastructure
BWS	Bureau of Water Supply
BWSO	Bureau of Water and Sewer Operations
CIP	Capital Improvement Plan
CSO	Combined Sewer Overflow
CWRP	Comprehensive Water Reuse Program
CY	Calendar Year
DCU	Data Collection Unit (AMR)
DDC	Department of Design and Construction
DEC	New York State Department of Environmental Conservation
DEP	New York City Department of Environmental Protection
DMP	Demand Management Plan
DoITT	New York City Department of Information Technology and Telecommunications
DRBC	Delaware River Basin Commission
FY	Fiscal Year (July 1 – June 30)
GCPD	Gallons per Capita per Day
HCF	Hundred Cubic Feet
LF	Linear Feet
MCP	Multi-Family Conservation Program
MGD	Millions of Gallons per Day
MTU	Meter Transmitter Unit (AMR)
MWEP	Municipal Water Efficiency Program
NYCHA	New York City Housing Authority
RCNY	Rules of the City of New York
RFEI	Request for Expressions of Interest
RFP	Request for Proposals
RWS	Residential Water Survey
SCA	School Construction Authority
TRP	Toilet Replacement Program
WFF	Water for the Future
WWTP	Wastewater Treatment Plant

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