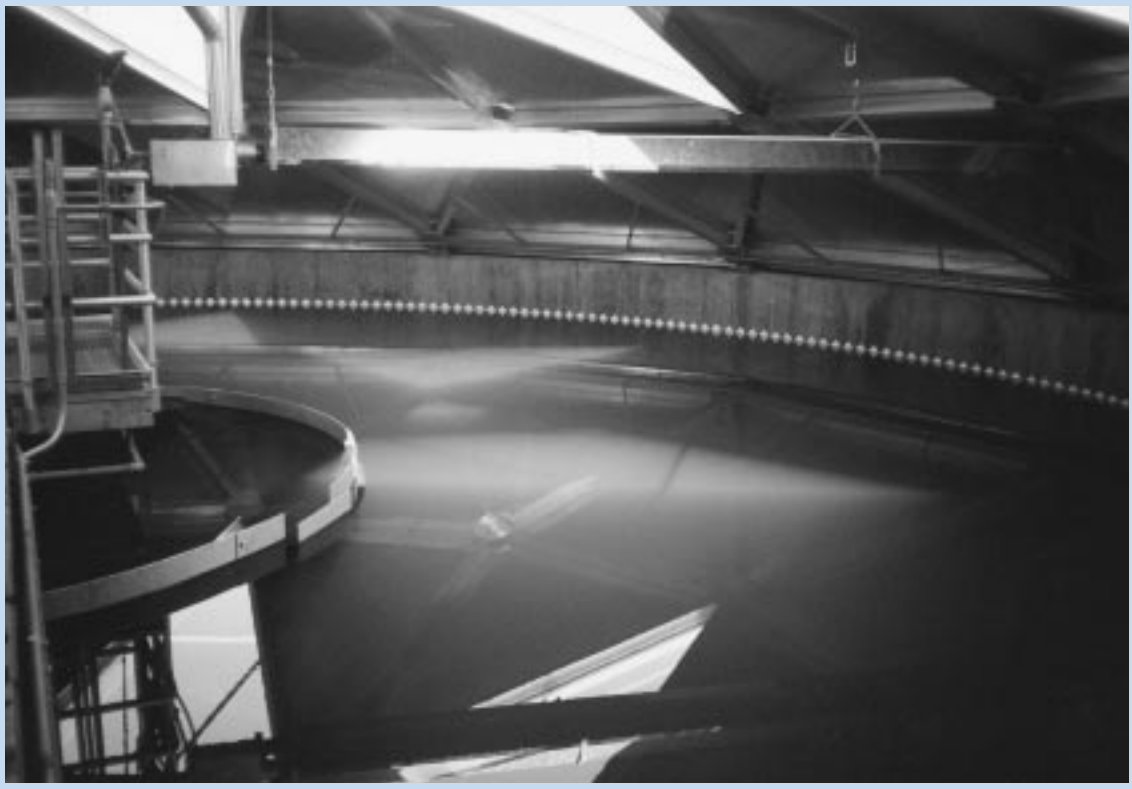
The Cost of Clean and Safe Water

Sustaining Our Water Infrastructure



May 2006

New England Interstate Water Pollution Control Commission

Letter of Introduction

Numerous studies point to the growing need in the United States to invest billions of dollars over the next 20 years to improve drinking water and wastewater infrastructure. How will such a massive investment be felt at the household level? That question — and the need for decision makers at all levels to know the answer — provided the impetus for *The Cost of Clean and Safe Water*, a joint project of the New England Interstate Water Pollution Control Commission, EPA New England, the New England states, and New York State.

Represented in this report are the results of a year-long effort to collect and analyze cost data from drinking water and wastewater systems serving communities throughout our region. More than 200 systems provided budget data for on-going capital improvement projects, facility upgrades, and the cost of daily operations and maintenance. Using these data, NEIWPCC projected the maximum annual household cost for each community over the next 20 years. Data are presented as household costs for two reasons — to provide a common denominator for information from seven states, and more importantly, to put the information in numbers that everyone can understand.

Projected costs vary widely. Many of the communities do not have the resources to develop 20-year capital and operating plans. And, due to political pressures, communities often do not increase their rates. Other communities either cannot afford to improve their infrastructure or will not receive funding assistance. The combined impact of minimal planning, low rates, and lack of state and federal resources will almost certainly result in household costs far exceeding those projected in this report.

The Cost of Clean and Safe Water is for federal, state and local officials, environmental groups, community organizations, economists, businesses, citizens — anyone who wants a better understanding of and appreciation for the economic impact of meeting environmental regulations and maintaining treatment systems. In offering actual cost data for providing drinking water and wastewater services, the report is a resource for community leaders to call on when facing difficult, critical decisions about infrastructure improvements.

Ronald Poltak
NEIWPCC Executive Director

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Acknowledgments

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Drinking Water	Wastewater
Rachel Grabowski, CT DPH	Stacy Pappano, CT DEP
Roger Crouse, ME DHHS	John True, ME DEP
Michael Maynard, MA DEP	Brian Jeans, MA DEP
Rick Skarinka, NH DES	Brad Foster, NH DES
Craig Jackson, NY DOH	Alan Cherubin, NY DEC
Gary Chobanian, RI DOH	Jay Manning, RI DEM
Roger Bergeron, VT DEC	Nopadon Sundarabhaya, VT DEC
Jane Downing, EPA NE	Linda Murphy, EPA NE
Jackie LeClair, EPA NE	Steve Silva, EPA NE

For more information about the report and study participants, contact Denise Springborg, NEIWPCC's Director of Drinking Water Programs and manager of this project.

Established by an Act of Congress in 1947, the New England Interstate Water Pollution Control Commission is a not-for-profit interstate agency that utilizes a variety of strategies to meet the water-related needs of its member states — Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. NEIWPCC coordinates activities and forums that encourage cooperation among the states, educates the public about key water issues, supports scientific research projects, trains environmental professionals, and provides overall leadership in water management and protection. While NEIWPCC's initial emphasis was on surface water protection, the Commission now also devotes substantial attention and resources to such matters as drinking water treatment, wetlands restoration, nonpoint source pollution, water allocation, and underground storage tanks.

NEIWPCC
116 John St
Lowell, MA 01852
(978) 323-7929
www.neiwpcc.org

Executive Summary

Without doubt, the costs of maintaining, repairing, and replacing aging infrastructure and meeting increasingly protective environmental regulations are of growing concern to Northeast communities. Many struggle to balance the high costs of improving wastewater and drinking water systems with the numerous other public services they provide. Like these communities, state and federal agencies are struggling to identify innovative methods for sustaining our nation's water infrastructure.

In 1995, the New England Interstate Water Pollution Control Commission, EPA New England, and the New England states attempted to develop a better understanding and appreciation for the economic impacts of compliance with wastewater, drinking water, and solid waste management regulations on our communities. Results of this effort were documented in the report *Projected Household Costs of Mandated Environmental Infrastructure Investments*. Now, over 10 years later, using the same methods and a new survey of financial data from New England and New York drinking water and wastewater systems, NEIWPCC presents a revised report *The Cost of Clean and Safe Water.*

Like the 1995 report, this study identifies current and projected annual household costs for maintaining and improving drinking water and wastewater systems. Financial data for 144 communities and a combined total of 210 drinking water and wastewater systems are represented. Some of the communities have more advanced drinking water systems and centralized treatment while others maintain simple distribution and collection systems. States attempted to choose a range of system sizes and types representative of the systems operating in their communities.

The report includes lists, tables, and figures that offer snapshots of the costs of sustaining drinking water and wastewater infrastructure and treatment systems in the sampled communities. The methodology applied is useful for generating comparative costs to communities and can be used as a means of checking cost projections developed by others. Most importantly, the results provide general guidelines of what might be considered "typical" system costs. The final data should not be used to gauge the relative affordability against other public services or to assess the communities' ability to pay for services. The issue of affordability, while recognized in this report, was largely beyond the scope of the study.

GENERAL FINDINGS

- Cost projections vary widely for both drinking water and wastewater systems. Generally, annual projected household costs for wastewater systems ($443 median annual cost) are higher than for drinking water systems ($310 median annual cost).
- Maximum projected annual household costs for wastewater systems range from $82 to $4,776. The results expressed as a percentage of median household income (% MHI) range from 0.3% MHI to 11% MHI.
- Maximum projected annual household costs for drinking water systems range from $149 to $1,449. The results expressed as percentage of median household range from 0.2% MHI to 3% MHI.

- Large as well as small communities are faced with disproportionately high costs. Efforts were made to include very small systems (serving less than 500 households) in addition to very large systems (serving greater than 100,000) in the sample set.
- Projections indicate that 50 percent of the households served by the surveyed drinking water and wastewater systems may incur annual rate changes of 0 to 50 percent of their current annual rate over the next 20 years.
- For the 66 communities with cost information for both drinking water and wastewater, the projected combined annual household costs ranged from a high of $3,592 to a low of $333. In terms of percentage of median household income, cost projections ranged from 0.6% MHI to 8.4% MHI. These data also show that approximately 87 percent of the two-media communities studied have combined household costs greater than $500 per year and approximately 50 percent have combined projected costs greater than $800 per year.

COST VS. AFFORDABILITY

The projected costs presented in this report should not be used to assess affordability for two important reasons. First, the costs for providing drinking water and wastewater services as examined herein represent only part of the burden supported by communities. Costs for schools, transportation infrastructure, and compliance with other federal and state requirements must be considered in any assessment of affordability.

Second, there has been no assessment of the communities' ability to pay these costs. Although "percent median household income" has been used as a general indicator or trigger level of affordability, percent MHI is an incomplete measure of ability to pay. Other factors such as residents' disposable income and community bond indebtedness are also important. Thus, while the data in the report provide useful information on the costs and impacts of some environmental regulations, they should be used with caution.

To date, there is no national standard to measure affordability. Although an affordable "trigger" of 1.5 percent median family income was mentioned in the proposed Clean Water Act revision, that rate may or may not be an appropriate trigger. In this report, like the 1995 report, data on communities with projected annual household rates greater than 1.5% MHI are included for informational purposes only.

The task of measuring affordability is complicated by an assortment of factors that affect a community's ability to pay — the availability and accuracy of the data, the site-specific nature of the situation, and the subjective nature of the analysis. Affordability decisions are influenced by property taxes, land valuation, total revenues and expenses, population, number of taxpayers, number of service users, outstanding debt and history of debt payments, delinquency rates, growth index, percent of industrial community devoted to industrial or commercial activities, project costs, and future regulatory requirements.

While outside the scope of this study, these factors can be identified for each community. Once identified, some important questions must be answered: Are the data readily available? Are the data routinely or periodically updated to reflect current conditions such as seasonal population? Which data fairly portray affordability across a wide range of municipal services provided (schools, fire, police, ambulance, roads, etc., as well as services related to environmental compliance)? The question of affordability on a regional, state, or municipal basis must draw on the expertise of economists, financial consultants, bond rating houses, as well as state and local financial managers.

Background and Model Development

BACKGROUND

In July 1993, the commissioners of the New England state environmental agencies and EPA New England agreed to work cooperatively to generate the information necessary for evaluating the financial impact on households of federal water, wastewater and waste disposal regulations. All were concerned that regulations set in accordance with the Clean Water Act, Safe Drinking Water Act, and Resource Conservation and Recovery Act be crafted in a manner that balances available financial assistance to communities with annual household affordability.

Later that year, the New England states, EPA New England, and NEIWPCC set in motion a project to develop an accurate and consistent method for projecting the future costs of compliance with environmental requirements at the state and regional levels. The group's goal was to produce as much data as possible in a short period of time on household costs associated with federally mandated wastewater, water supply, and solid waste services. The information and methodology acquired through the 1995 effort was designed to help the states calculate annual household costs, estimate future environmental infrastructure costs, and assess the individual and cumulative costs of compliance in the areas of wastewater, water supply, and solid waste. This cost information was to be shared on a regional basis.

As a starting point, EPA New England staff developed a household cost rate projection model (spreadsheet), which was validated by comparing it with existing cost projections from a variety of municipal projects. The spreadsheet provides an accurate and consistent tool for projecting household cost rates in terms of "annual cost" and "percent median household income" (% MHI).

During the spring and summer of 1994, state personnel from each program area (wastewater, water supply, and solid waste) collected and developed cost information for a sampling of communities and entered the cost information into the spreadsheets. The states forwarded the media-specific data to EPA for consolidation and summarization. EPA then worked with the states and NEIWPCC to depict the cost data graphically from various perspectives.

Recognizing the need to update cost data for our region's communities, the same organizations and New York State decided to conduct another survey during the summer of 2005. Prior to the survey, staff reviewed the 1995 model and methodology and agreed to move forward with an exact report revision with one exception. Because most solid waste disposal projects in the region are complete, communities would not be asked to provide this data. In addition, an EPA economist reviewed the model and determined that it was still a valid approach to projecting household costs.

MODEL ASSUMPTIONS

Because all communities and systems are different and financial variables change annually, several assumptions were made prior to generating report data.

- The spreadsheet model assumes an inflation rate of three percent and that all future capital expenses are bonded at six percent for 20 years.

- All rate projections are reported in 2006 dollars and are not adjusted for inflation.
- The "current rate" or base annual costs for a community often include substantial amounts of financial assistance for past compliance with environmental mandates. However, the projected future costs to communities ("projected rate" and "percent MHI") for most communities assume no additional grants or loans.
- Many communities include significant capital improvement costs in their tax rates; operation and maintenance (O&M) costs are included in their user charges. Since it was not possible to know how a community might choose to apportion such future costs, the following conservative assumption was used in this study:

  > Future infrastructure capital and O&M expenses are funded in the same manner that current expenses are raised (i.e., taxes vs. user charges).

  This assumption is particularly important for smaller systems that serve a small percentage of households in a community. For example, if a community currently raises funds for a service, such as wastewater treatment, solely from user charges, the cost projection methodology assumes future revenues (both capital and O&M) will all be raised by user charges. If, in actuality, future capital costs were to be put on the tax base and spread over the entire community rather than just on the relatively small number of users tied into the treatment system, actual household rates would be much lower than those projected in this study.
- The goal of this study was to project future household costs for as many communities and for as large a representation of the state population as possible. Some communities have already installed new facilities to meet current environmental and public health standards, but are still paying off the costs. For these communities, current costs of past upgrades are reflected in the base or "current rate" and are carried into the projected annual costs. Capital costs for future improvements are included only in the projected annual costs. For example, if the future costs for complying with a particular environmental regulation or program are greater than the current annual costs, then the community faces a future capital cost for complying with the regulation. If the future and current costs are the same, then the future annual costs ("projected rate") represent the future costs related to past improvements.

PROJECT QUALIFICATIONS

Accounting for all financial variables and producing a final report that compares costs in the same manner for every community is an extremely difficult task and is beyond the scope of the study. Below are several qualifications to consider while reviewing the 2006 report data.

- The states made every effort to obtain the best data available for this study. Communities were not chosen by random selection, and states differed in their method of selection. An effort was made to include communities of all sizes in the sampling as well as communities affected by costs associated with both drinking water and wastewater system improvements. Methods by which cost data were gathered also varied. Since this project was not designed as a rigorous scientific study, caution should be used in extrapolating any of these results to show statewide or regional cost trends.
- **Due to budget constraints and lack of personnel, many communities do not have the resources to properly plan for needed improvements. And, due to political pressures, many communities do not increase their drinking water and wastewater rates as needed to pay for future infrastructure improvements. When combined, the results of minimal planning and low rates will almost certainly result in annual household costs far exceeding those projected in this report.**

- The lack of uniformity among community accounting practices complicated the process of gathering data for this study and required that states use their best professional judgment in finalizing the data. For example, if a community's accounting system added all costs together, the state may have had to apportion costs for a given program area between user charges and the tax base so that the data could be entered into the study spreadsheet. The guidance on using the rate projection model for consistency in data quality control and gathering is included in the Appendix.
- Political boundaries do not necessarily coincide with the physical boundaries of environmental infrastructure system service areas. In some cases, a system serves only part of a community; while other systems may serve several communities. This reality makes it difficult to gather financial information on a community-wide basis. For the purpose of this study, states used their own judgment in selecting communities and developing cost information to use in the spreadsheet. This same boundary issue means that, when looking at the cumulative costs for the communities that provided both drinking water and wastewater data, the residents of one community may not all bear the same costs if different utility systems service the community.
- For projects that do not serve an entire community, the annual cost rates in terms of a percentage of median household income may need to be adjusted to reflect varying income levels in different parts of the community.
- This report is not exclusively reflective of federal and state regulations; it also includes the base costs of providing service (maintaining drinking water distribution systems and wastewater collection systems).
- The environmental costs identified in this study include only those capital costs foreseen by each community and may not include the costs for all the improvements that will be needed to upgrade existing wastewater and drinking water treatment facilities.
- The maximum annual household costs projected for the period 2006 to 2025, as presented in this report, occur in different years for each community depending on varying planning and construction schedules. For the purposes of this report, data for all communities is presented without reference to the maximum rate year.

Data and Results

INTRODUCTION

Data used to project annual household costs for drinking water and wastewater services included: the number of residential households served by the system, the residential share of the system's budget, the median household income (1999 census), and the current annual budget for maintaining, upgrading, and operating the system. Systems were asked to include anticipated costs for the next 20 years. Using additional information and a series of checks and balances, costs were calculated.

Results indicate that costs to communities for both drinking water and wastewater services tend to cluster within specific ranges, with some communities experiencing significantly higher costs and future increases. It is important to note that though the model projects maximum household rates over the next 20 years, many communities will likely face much higher increases. As budgets and staffing are cut at the local level, fewer resources are available for future planning. Of the combined drinking water and wastewater systems participating in this study, 21 percent projected no future costs, 31 percent projected costs through 2010, 13 percent projected costs through 2015, 6 percent projected costs through 2020, and 29 percent project costs through the end of the study period (2025). **When communities underestimate the future costs to sustain their infrastructure and at the same time do not charge enough for services, their future household costs will be even higher than predicted by the NEIWPCC rate model.**

Data and results presented in the following sections highlight trends in the projected annual household user costs for the surveyed systems. The data should only be used as a reference point for discussion and to illustrate future costs in general terms. All costs are in 2006 dollars without an adjustment for inflation and represent the maximum annual rate calculated during the model period of 2006 to 2025. Indicated trends are for the surveyed communities and may not be representative of other communities in New England and New York State.

Summary of Model Results — Drinking Water and Wastewater

- Projected annual household costs vary widely for the households served by surveyed communities. Costs range from **$149 to $1,449 per year for drinking water services** and from **$82 to $4,776 for wastewater services** (Table 1).
- Projected annual household costs expressed as a percentage of median household income (% MHI) range from **0.2 to 3% MHI for drinking water services** and **0.3 to 11 % MHI for wastewater services** (Table 2).
- Further analyses, including an examination of results for communities providing both drinking water and wastewater results as well as a comparison of 1995 and 2006 model projections, are presented later in the report.

NEIWPCC and the states mailed over 300 surveys to systems across the region. Approximately 66 percent of survey recipients returned the financial information needed to project a maximum household rate for their system. Overall, the number of systems participating in this study (Table 3) represent a small percentage of the number of drinking water and wastewater systems serving New England and New York State communities (Tables 4 and 5).

TABLE 1 SUMMARY OF PROJECTED ANNUAL HOUSEHOLD COSTS

Maximum Projection*	Drinking Water	Wastewater
Min	$ 149	$ 82
Median	$ 310	$ 443
Mean	$ 388	$ 550
Max	$1,449	$4,776

** During 2006 to 2025 ($/yr in 2006 dollars)*

TABLE 2 SUMMARY OF PROJECTED ANNUAL HOUSEHOLD COSTS EXPRESSED AS PERCENTAGE OF MEDIAN HOUSEHOLD INCOME

Percentage Median Household Income	Drinking Water	Wastewater
Min	0.2	0.3
Median	0.7	1.0
Mean	0.8	1.2
Max	3.0	11.0

** 1999 census data*

TABLE 3 NUMBER OF PARTICIPATING SYSTEMS AND COMMUNITIES PER STATE

State	Drinking Water	Wastewater	Communities*
Connecticut	9	16	21
Maine	9	26	31
Massachusetts	17	10	17
New Hampshire	29	26	31
New York	6	15	15
Rhode Island	3	5	6
Vermont	19	20	23
Totals	**92**	**118**	**144**

** Some communities provided financial information for both their drinking water and wastewater treatment operations.*

TABLE 4 TOTAL NUMBER OF SYSTEMS SERVING MUNICIPALITIES PER STATE*

State	Drinking Water	Wastewater
Connecticut	586	76
Maine	399	162
Massachusetts	523	116
New Hampshire	698	106
New York	2,816	622
Rhode Island	83	9
Vermont	435	100
Totals	**5,540**	**1,191**

**The federal definition of a community water system was used to determine the number of drinking water systems in each state. Methods and definitions for determining the number of wastewater systems varied by state.*

TABLE 5 TOTAL NUMBER OF TOWNSHIPS/CITES PER STATE*

State	Townships/Cities
Connecticut	190
Maine	446
Massachusetts	351
New Hampshire	234
New York	994
Rhode Island	39
Vermont	246
Total	**2,500**

** New York recognizes villages*

Data Interpretation

Percentage of the study systems versus annual rates per household for both drinking and wastewater are presented in Figure 1. Costs tend to cluster in definite ranges with "outlying" high end annual costs for those systems with greater infrastructure needs.

- The percentage of drinking water systems with lower projected annual household rates (>$100 and <$300 per year) is higher than that of wastewater systems with rates in the same range. However, at higher projected annual rates, the percentage of wastewater systems exceeds that of drinking water systems.

The same data is presented in Figure 2; however it is expressed as cumulative percentage of surveyed systems.

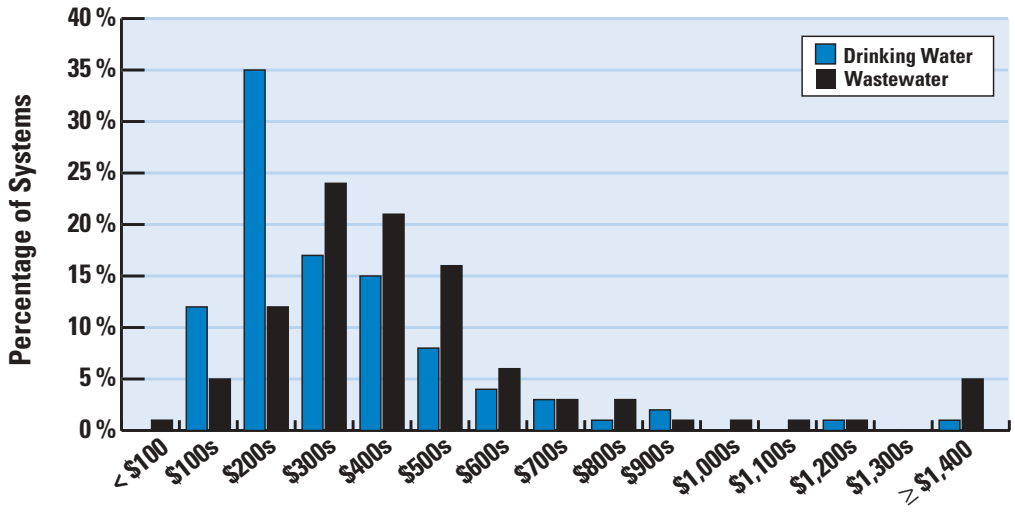
- Almost 50 percent of households served by surveyed drinking water systems are expected to pay less than $300 per year for services over the next 20 years. And 42 percent of households are expected to pay less than $400 per year for wastewater services over the next 20 years.

In Figure 3, projected annual household costs for drinking water and wastewater systems are presented as percentages of their respective community median household incomes (1999 census data). Although "percent median household income" (% MHI) is sometimes used as a general indicator or trigger level of affordability, percent MHI is an incomplete measure of a community's ability to afford or pay for services. It is presented in the report only as a guideline and one of many methods of examining cost data.

- Over 80 percent of drinking water systems have projected annual household rates at less than 1% MHI. Whereas, only 50 percent of wastewater systems have projected rates at less than 1% MHI.

FIGURE 1

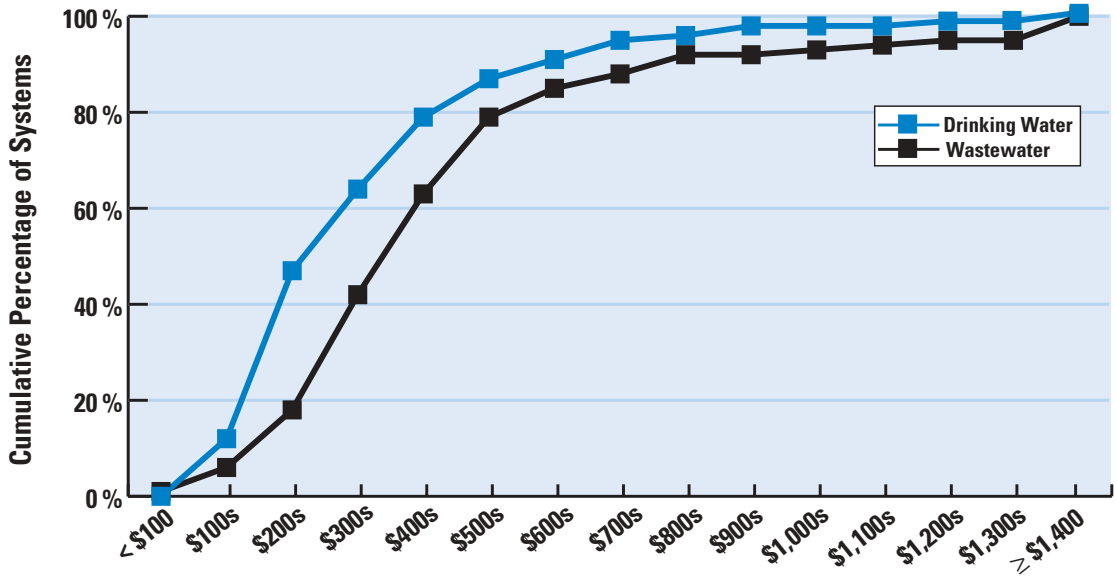
PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER & WASTEWATER



Rate per Household ($/yr)
(Maximum Projection during 2006-2025)

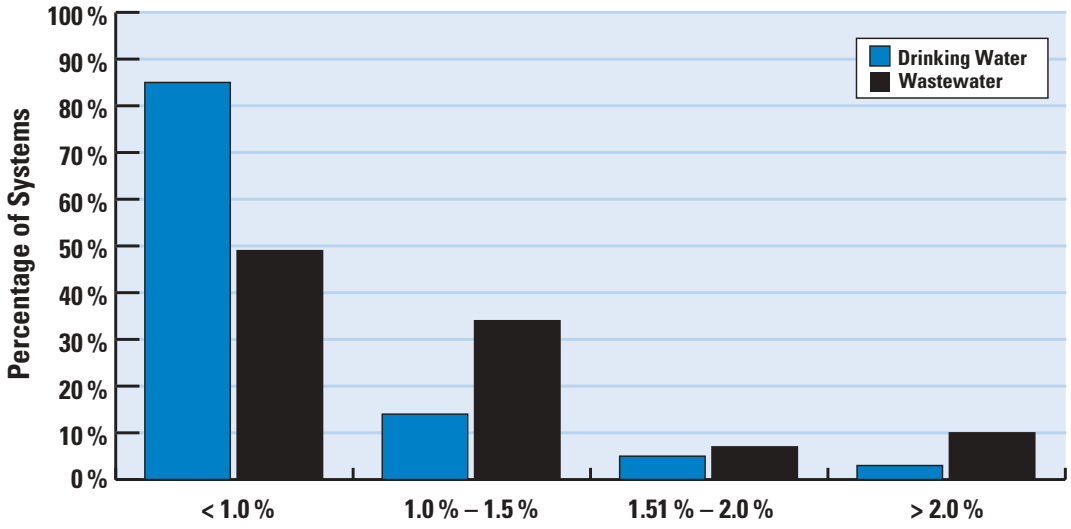
FIGURE 2

PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER & WASTEWATER CUMULATIVE DATA



Rate per Household ($/yr)
(Maximum Projection during 2006-2025)

FIGURE 3 PROJECTED ANNUAL HOUSEHOLD COSTS AS A PERCENTAGE OF MHI: DRINKING WATER & WASTEWATER



DRINKING WATER

In 1996, Congress amended the Safe Drinking Water Act (SDWA), which greatly enhanced existing laws by requiring new standards for contaminants and increased protection from microbial risks through advanced treatment and source water protection. The financial burden of complying with these new regulations was not reflected in the 1995 NEIWPCC report. Many systems are still in the process of updating treatment processes, particularly small systems with groundwater sources that are affected by the Arsenic, Radionuclides, Radon and the Ground Water Rules and larger surface water systems that are impacted by revised Surface Water Treatment and Disinfection By-product Rules.

Maximum projected annual household costs calculated by the model with water system budget and planning information for the 20-year period, 2006 to 2025, are presented in the following figures. As previously noted, the maximum household cost does not occur in the same year for each system. The year is dependent on several variables such as infrastructure replacement needs and SDWA deadlines. Results for each of the 92 drinking water systems are summarized alphabetically by state at the end of this section. All costs are in 2006 dollars without adjustment for inflation.

Summary of Model Results — Drinking Water

- Based on model results, almost one-half of the communities have projected annual rates of over $300. Annual household rates of $200 to $300 are projected for approximately one-third (35%) of the remaining systems; 12 percent of results range from $100 to $200 (Figure 4).

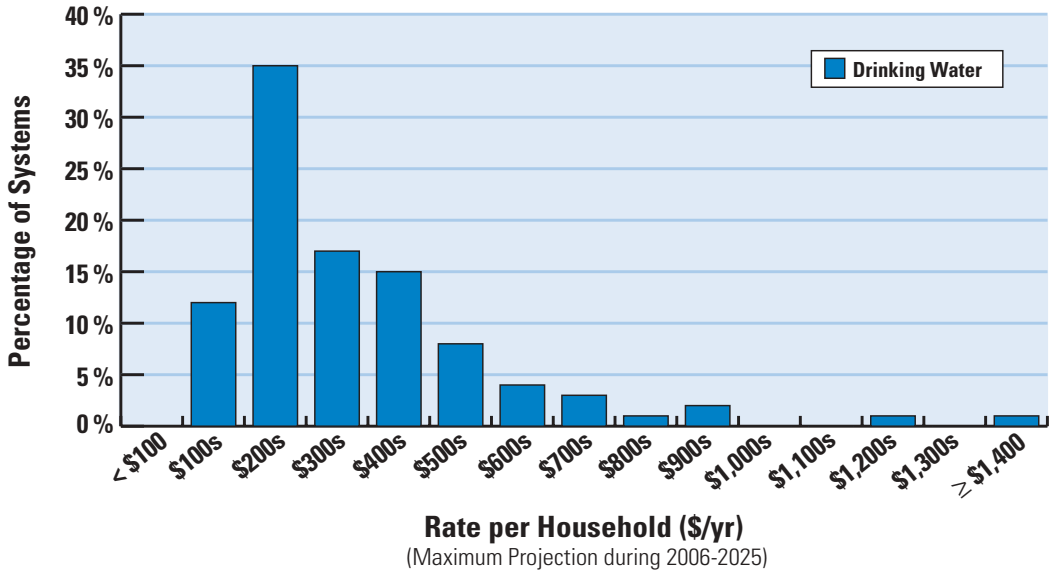
The percent increases from current annual household costs to the maximum projected annual costs were calculated and are presented in Figure 5.

- Rate increases range from zero to 159 percent with the majority of increases between zero and 24 percent. Annual household rates will either remain the same or increase for 77 percent of the 92 systems. Rate decreases were predicted for some systems and others did not provide adequate data for calculations.

In Figure 6, current annual household rates and the increase to projected maximum rates are indicated for each system by state.

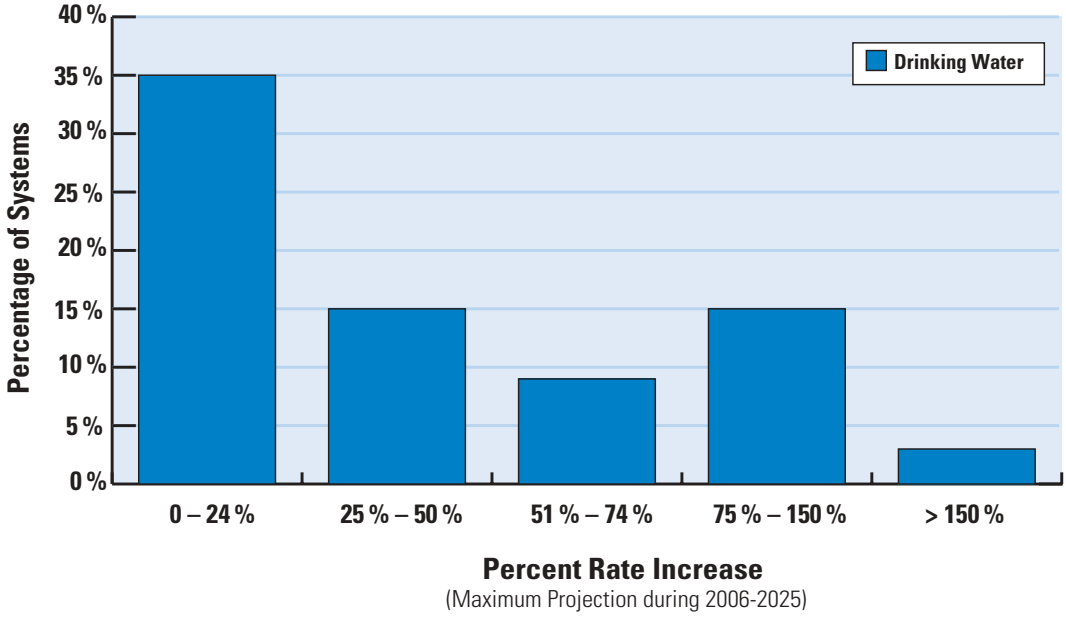
- For many systems, the increase is only a small percentage of the current household rate. And for others, the increase is double their current rate.
- Those communities with extremely high rate projections most likely provided cost data based on the need for major improvements or facility replacements without regard to the ability to pay for them. To lessen the impact on future household rates, most communities would either establish surcharges prior to construction or would not proceed with all recommended improvement projects.

FIGURE 4 PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER



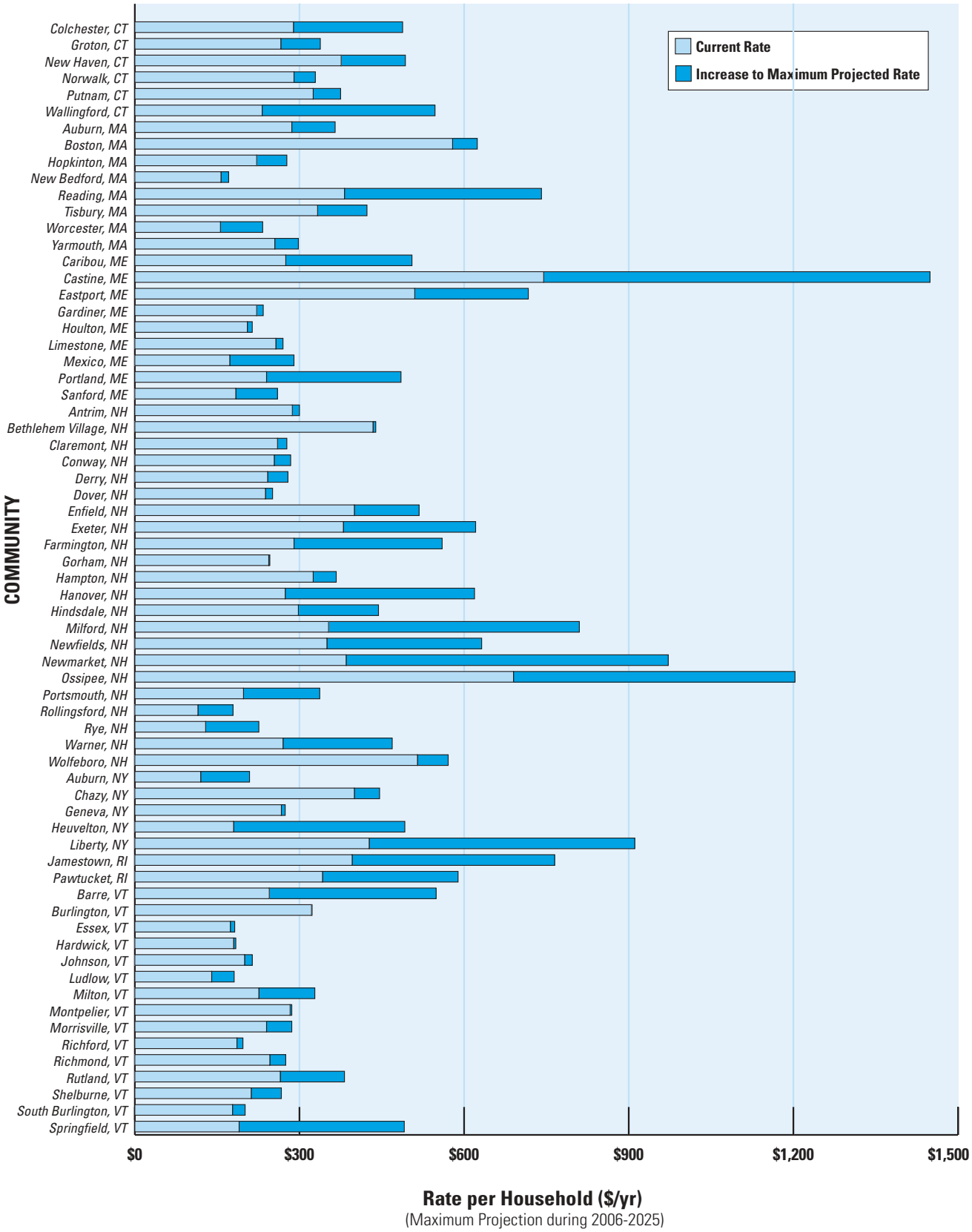
Number of drinking water systems surveyed = 92.

FIGURE 5 PERCENT INCREASE IN ANNUAL HOUSEHOLD COSTS: DRINKING WATER



Number of drinking water systems with projected increases of zero and greater = 71.

FIGURE 6 CURRENT AND PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER



Number of systems that provided current rate information and have projected rate increases = 67.

Drinking Water Costs and MHI

Projected annual costs are expressed as a percentage of the median household income in Figure 7.

- Projections for one-third of all systems indicate annual household costs as 0.5 to 0.75 percent of the communities' median household income. Approximately 20 percent of the households will spend more than 1.0 percent of their income on safe drinking water.
- Projected annual household rates were greater than 1.5 percent of the median household income for eight drinking water systems. Both large and small systems will be significantly affected by future rate increases (Figure 8).

FIGURE 7 PROJECTED ANNUAL HOUSEHOLD COSTS AS A PERCENTAGE OF MHI: DRINKING WATER

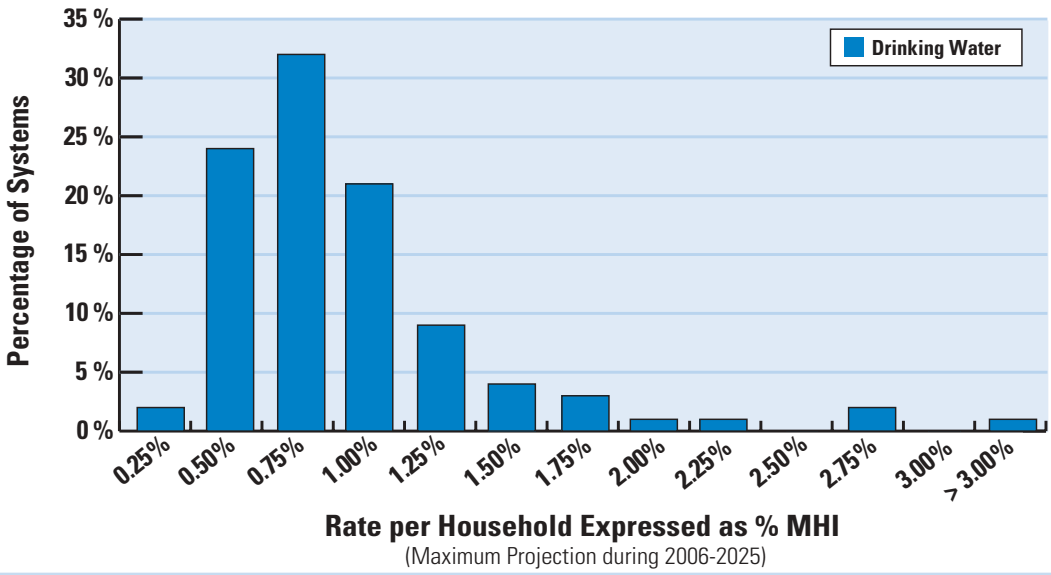


FIGURE 8 PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER COMMUNITIES WITH COSTS EXCEEDING 1.5% MHI

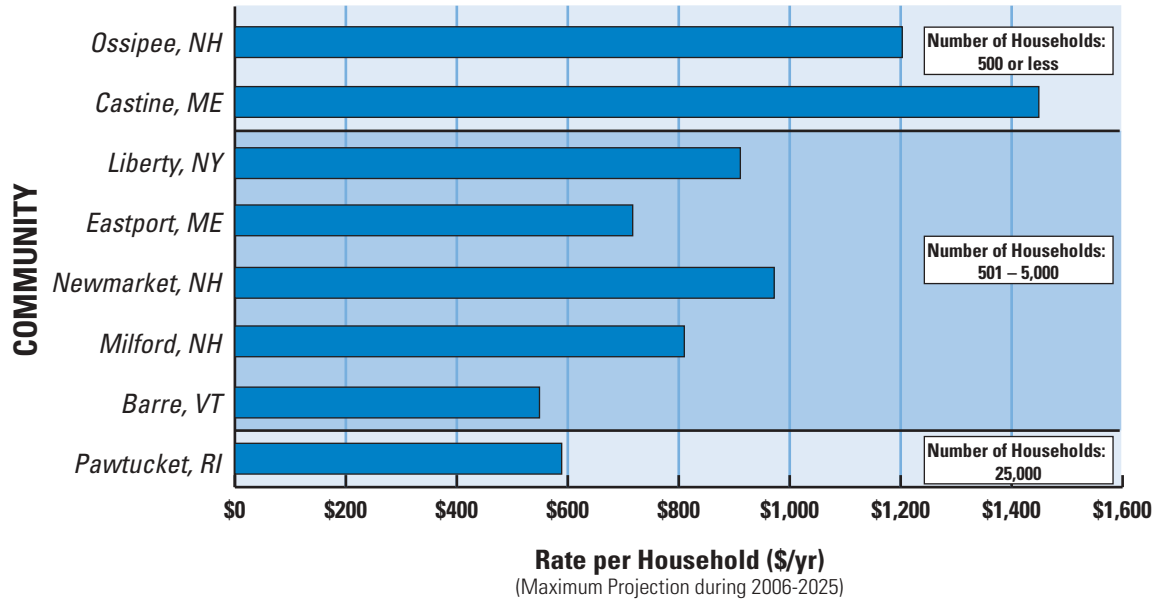


TABLE 6 PROJECTED ANNUAL HOUSEHOLD COSTS FOR DRINKING WATER SYSTEMS BY STATE

Community (alphabetical by state)	Annual Household Costs*	Annual Household Cost as % MHI**
CONNECTICUT		
Baltic	$468	0.95%
Colchester	$488	0.66%
Groton	$338	0.64%
New Haven	$493	0.88%
Norwalk (South District)	$309	0.45%
Norwalk	$329	0.48%
Norwich	$279	0.62%
Putnam	$375	0.76%
Wallingford	$547	0.83%
MAINE		
Caribou	$505	1.49%
Castine	$1,449	2.73%
Eastport	$717	2.73%
Gardiner	$234	0.58%
Houlton	$214	0.71%
Limestone	$270	0.67%
Mexico	$290	0.92%
Portland	$485	0.96%
Sanford	$260	0.65%
MASSACHUSETTS		
Acton	$346	0.33%
Auburn	$365	0.61%
Boston	$624	1.37%
Chelmsford	$489	0.61%
Chicopee	$205	0.50%
East Longmeadow	$453	0.63%
Framingham	$386	0.62%
Hopkinton	$277	0.27%
Lawrence	$301	0.94%
Leominster	$209	0.40%
New Bedford	$171	0.54%
Reading	$741	0.84%
Tisbury	$423	1.00%
West Springfield	$205	0.44%
Winchester	$208	0.19%
Worcester	$233	0.57%
Yarmouth	$298	0.65%
NEW HAMPSHIRE		
Antrim	$300	0.57%
Bethlehem Village District	$439	1.08%
Claremont	$277	0.69%
Conway	$284	0.69%
Derry	$279	0.45%
Dover	$251	0.50%
Enfield	$518	1.17%
Exeter	$621	1.09%
Farmington	$560	1.38%

* *Maximum projected during 2006 to 2025 ($/yr in 2006 dollars)*

** *1999 census data*

TABLE 6 continued

Community (alphabetical by state)	Annual Household Costs*	Annual Household Cost as % MHI**
Gorham	$246	0.66%
Hampton	$367	0.59%
Hanover	$619	0.74%
Hindsdale	$444	1.07%
Keene	$182	0.50%
Lisbon	$212	0.48%
Littleton	$157	0.38%
Milford	$810	1.52%
New Hampton	$488	0.89%
Newfields	$632	0.77%
Newmarket	$972	1.84%
Ossipee	$1,203	3.02%
Portsmouth	$337	0.65%
Rollingsford	$179	0.33%
Rye	$226	0.31%
Warner	$469	0.93%
Whitefield	$322	0.90%
Winchester	$212	0.49%
Wolfeboro	$571	1.16%
Woodsville	$310	0.73%
NEW YORK		
Auburn	$209	0.82%
Binghamton	$203	0.69%
Chazy	$446	0.93%
Geneva	$274	0.75%
Heuvelton	$492	1.25%
Liberty	$911	2.18%
RHODE ISLAND		
Jamestown	$765	1.06%
Pawtucket	$589	1.65%
Westerly	$287	0.51%
VERMONT		
Barre	$549	1.57%
Brandon	$224	0.55%
Burlington	$323	0.85%
Essex Junction	$151	0.25%
Essex	$182	0.27%
Hardwick	$184	0.48%
Johnson	$214	0.78%
Ludlow	$181	0.43%
Middlebury	$160	0.40%
Milton	$328	0.58%
Montpelier	$287	0.67%
Morrisville	$286	0.89%
Richford	$197	0.61%
Richmond	$275	0.41%
Rutland	$382	1.09%
Shelburne	$267	0.34%
South Burlington	$201	0.34%
Springfield	$491	1.25%
West Rutland	$149	0.35%

* *Maximum projected during* 2006 to 2025 *($/yr in 2006 dollars)*

** *1999 census data*

WASTEWATER

Though many communities have made necessary treatment upgrades with loans through the Clean Water State Revolving Fund, more funding sources are needed to meet the high cost of combined sewer overflow projects, general infrastructure improvements, and advanced treatment installations. Without additional funds, communities will experience significant wastewater rate increases over the coming years.

Maximum projected annual household costs calculated by the model with wastewater budget and planning information for the 20-year period, 2006 to 2025, are presented in the following figures. As previously noted, the maximum household cost does not occur in the same year for each system. The year is dependent on several variables such as infrastructure replacement needs and regulatory deadlines. Results for each of the 118 wastewater systems are summarized alphabetically by state at the end of this section. All cost projections are in 2006 dollars without adjustment for inflation.

Summary of Model Results — Wastewater

- Based on model results, almost one-half of the systems and their communities will experience future rates ranging from $300 to $500 per year at some point in the next 20 years. Several systems with much needed capital improvements have significantly higher projected annual rates of greater than $1,400 (Figure 9).

The percent increases from current annual household costs to the maximum projected annual cost were calculated and are presented in Figure 10.

- Results indicate that approximately 32 percent of the households served by study systems will experience annual rate increases of less than 25 percent; 11 percent will experience rate increases greater than 150 percent.

In Figure 11, current annual household rates and the increase to projected maximum rates are indicated for each system by state.

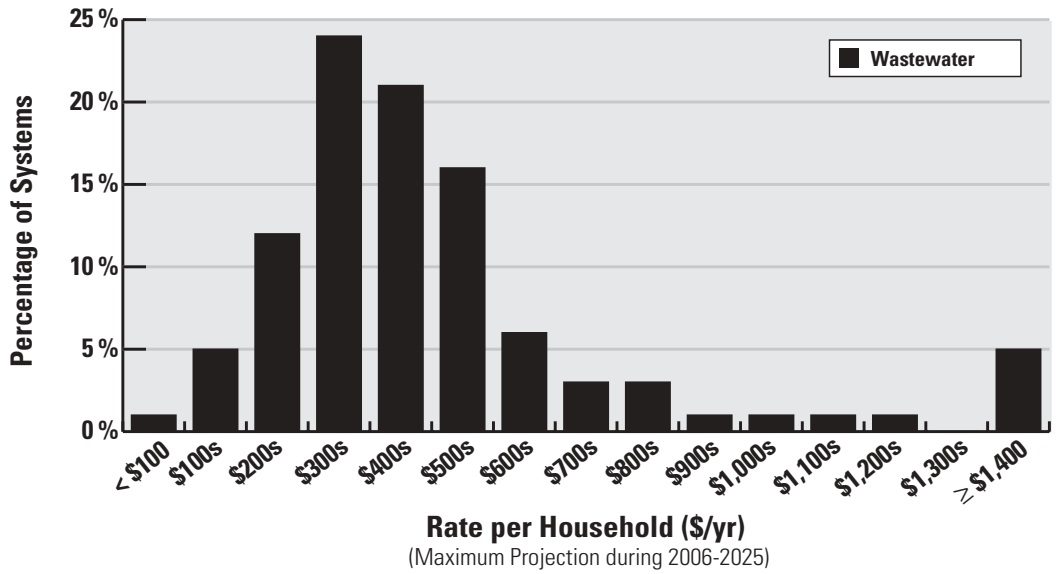
- Over the next 20 years, rates will double for one-quarter of systems.
- Those communities with extremely high rate projections most likely provided cost data based on the need for major improvements or facility replacements without regard to the ability to pay for them. To lessen the impact on future household rates, most communities would either establish surcharges prior to construction or would not proceed with all recommended improvement projects.

Wastewater Costs and MHI

Projected annual costs are expressed as a percentage of the median household income in Figure 12.

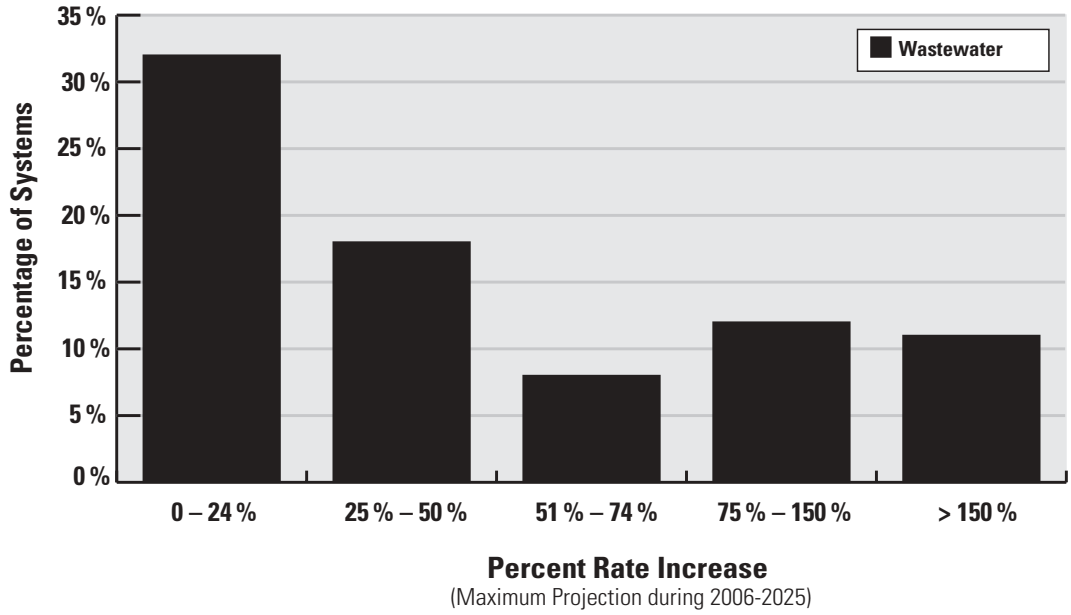
- Fifty percent of households served by the surveyed systems are expected to pay less than 1.0 percent of their median household income for wastewater services in the next 20 years; almost one-third are expected to pay between 1.0 and 1.5 percent of MHI. Twenty-one communities may incur costs exceeding 1.5 percent MHI (Figure 13).

FIGURE 9 PROJECTED ANNUAL HOUSEHOLD COSTS: WASTEWATER



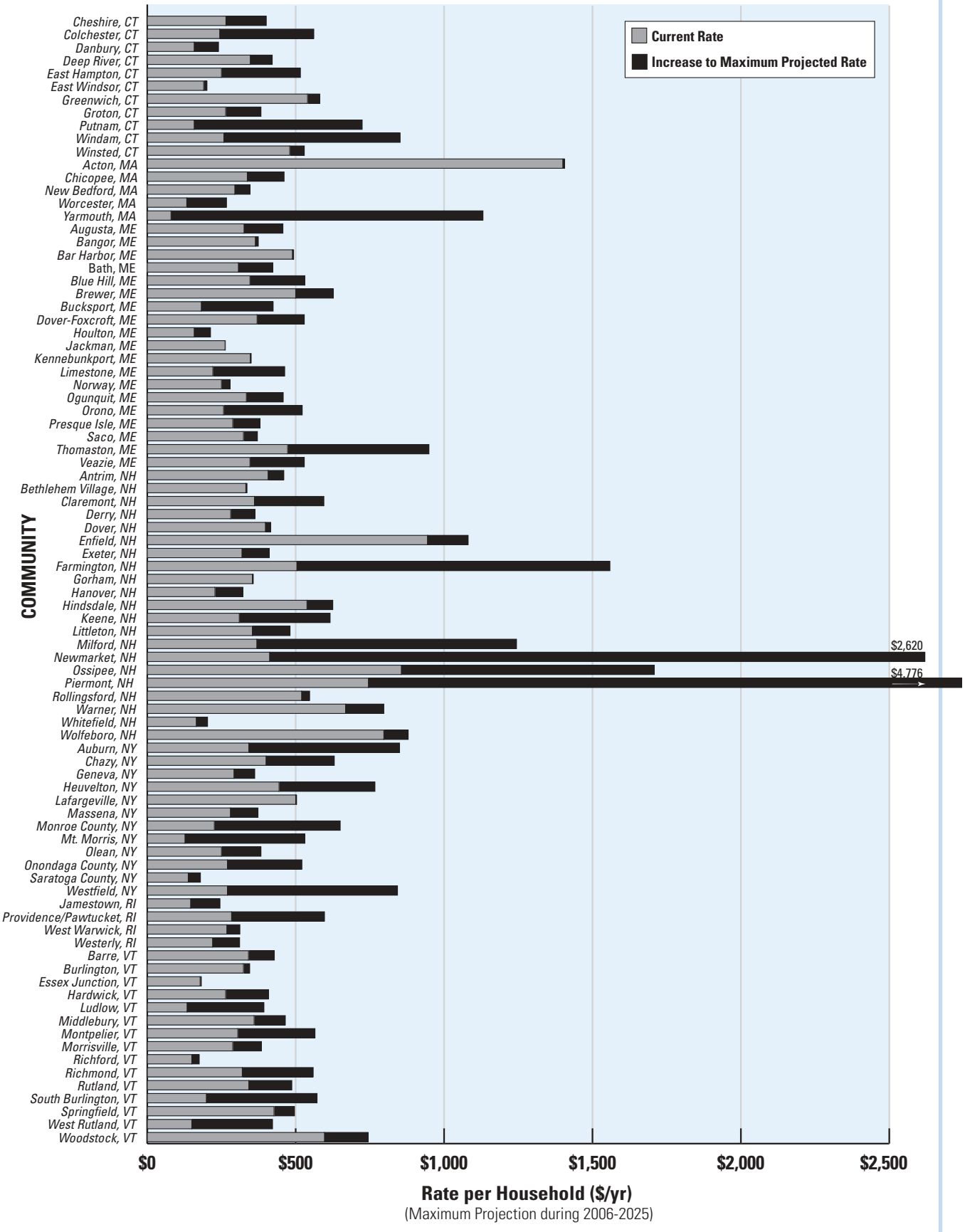
Number of wastewater systems surveyed = 118.

FIGURE 10 PERCENT INCREASE IN ANNUAL HOUSEHOLD COSTS: WASTEWATER



Number of wastewater systems with projected increases of zero and greater = 96.

FIGURE 11 CURRENT AND PROJECTED ANNUAL HOUSEHOLD COSTS: WASTEWATER



Number of wastewater systems that provided current rate information and have projected rate increases = 87.

FIGURE 12 PROJECTED ANNUAL HOUSEHOLD COSTS AS A PERCENTAGE OF MHI: WASTEWATER

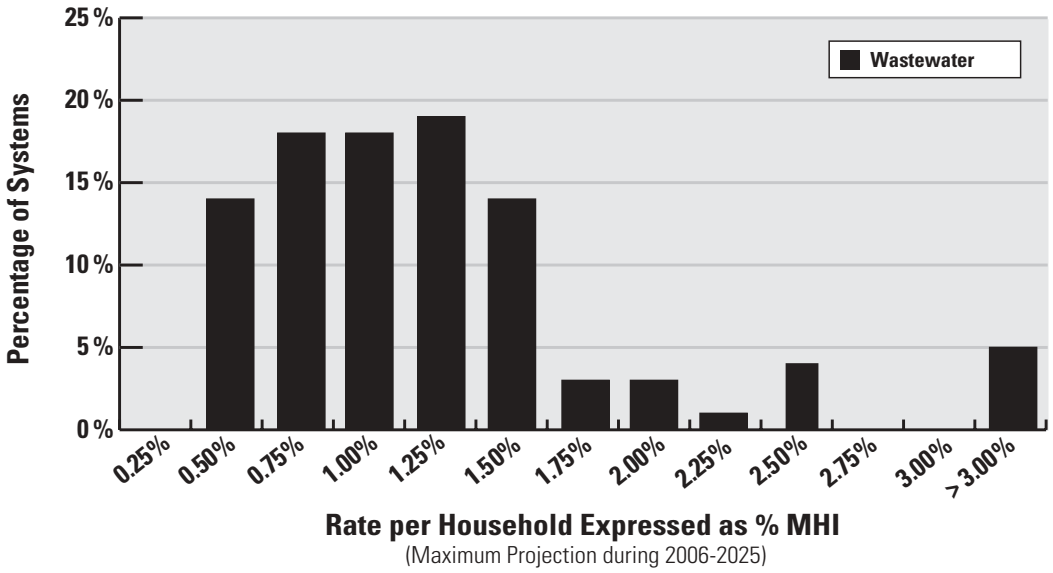


FIGURE 13 PROJECTED ANNUAL HOUSEHOLD COSTS: WASTEWATER COMMUNITIES WITH COSTS EXCEEDING 1.5% MHI

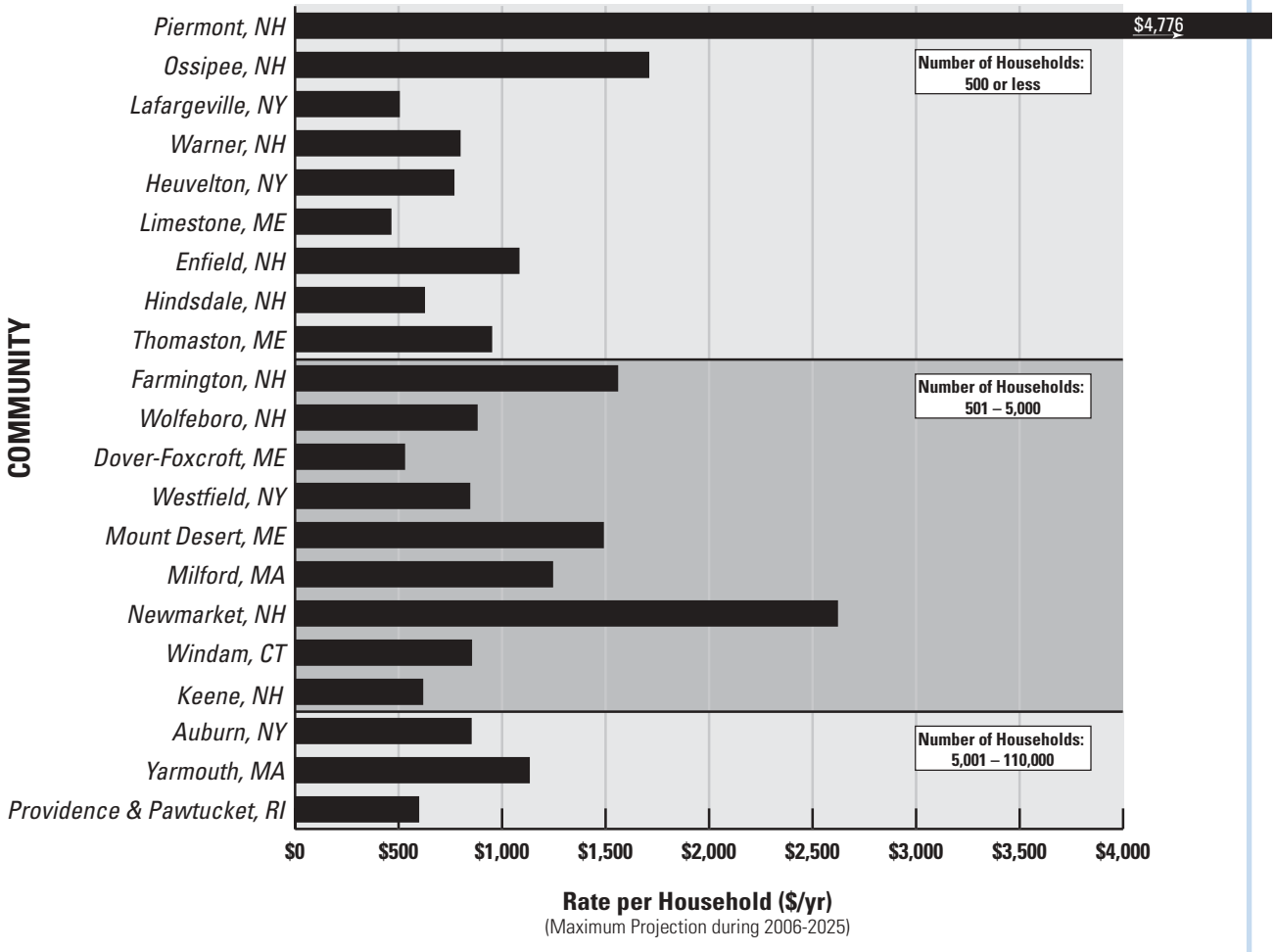


TABLE 7 PROJECTED ANNUAL HOUSEHOLD COSTS FOR WASTEWATER SYSTEMS BY STATE

Community (alphabetical by state)	Annual Household Costs*	Annual Household Cost as % MHI**
CONNECTICUT		
Baltic	$681	1.38%
Branford	$366	0.55%
Bristol	$164	0.30%
Cheshire	$401	0.43%
Colchester	$561	0.75%
Danbury	$240	0.39%
Deep River	$421	0.71%
East Hampton	$516	0.68%
East Windsor	$201	0.34%
Greenwich	$581	0.51%
Groton	$383	0.72%
Killingly	$338	0.92%
Putnam	$724	1.47%
Southington	$251	0.36%
Willimantic	$852	2.11%
Winsted	$529	1.14%
MAINE		
Augusta	$457	1.33%
Bangor	$374	1.09%
Bar Harbor	$493	1.18%
Bath	$423	1.01%
Belfast	$444	1.19%
Blue Hill	$531	1.47%
Brewer	$627	1.48%
Bucksport	$424	1.06%
Dover-Foxcroft	$529	1.53%
Houlton	$213	0.71%
Jackman	$263	0.77%
Kennebunkport	$350	0.56%
Limestone	$463	1.85%
Mars Hill	$328	1.18%
Mount Desert	$1,489	3.14%
Norway	$279	0.85%
Ogunquit	$458	0.84%
Old Town	$389	1.13%
Orono	$522	1.48%
Portland	$403	0.98%
Preque Isle	$380	1.13%
Saco	$371	0.72%
Skowhegan	$82	0.25%
South Portland	$364	0.74%
Thomaston	$949	2.48%
Veazie	$529	1.03%
MASSACHUSETTS		
Acton	$1,406	1.34%
Chicopee	$461	1.12%
East Longmeadow	$381	0.53%

* *Maximum projected during* 2006 to 2025 *($/yr in 2006 dollars)*

** *1999 census data*

TABLE 7 continued

Community (alphabetical by state)	Annual Household Costs*	Annual Household Cost as % MHI**
Framingham	$448	0.72%
Lawrence	$141	0.44%
Leominster	$156	0.30%
New Bedford	$346	1.09%
Reading	$417	0.47%
Worcester	$267	0.65%
Yarmouth	$1,131	2.47%
NEW HAMPSHIRE		
Antrim	$460	0.88%
Bethlehem Village District	$336	0.82%
Claremont	$595	1.48%
Conway	$254	0.62%
Derry	$363	0.58%
Dover	$416	0.83%
Enfield	$1,081	2.43%
Exeter	$411	0.72%
Farmington	$1,558	3.84%
Gorham	$357	0.96%
Hampton	$557	0.99%
Hanover	$322	0.39%
Hindsdale	$625	1.51%
Keene	$616	1.68%
Littleton	$481	1.34%
Milford	$1,244	2.33%
Newfields	$442	0.54%
Newmarket	$2,620	4.95%
Ossipee	$1,708	4.28%
Piermont	$4,776	10.77%
Portsmouth	$577	1.11%
Rollingsford	$547	0.99%
Wakefield	$657	1.35%
Warner	$797	1.57%
Whitefield	$203	0.57%
Wolfeboro	$879	1.79%
NEW YORK		
Auburn	$850	3.32%
Binghamton	$264	0.90%
Chazy	$630	1.32%
Geneva	$362	1.00%
Heuvelton	$767	1.94%
Lafargeville	$503	1.50%
Liberty	$366	1.14%
Massena	$373	1.05%
Monroe County	$650	1.26%
Mt. Morris	$531	1.45%
Olean	$383	1.10%
Onondaga County	$521	1.11%
Saratoga County	$179	0.31%
Schuylerville	$308	0.87%
Westfield	$843	2.26%

* *Maximum projected during* 2006 to 2025 *($/yr in 2006 dollars)*

** *1999 census data*

TABLE 7 continued

Community (alphabetical by state)	Annual Household Costs*	Annual Household Cost as % MHI**
RHODE ISLAND		
East Greenwich	$217	0.27%
Jamestown	$245	0.34%
Providence and Pawtucket	$597	1.82%
West Warwick	$312	0.57%
Westerly	$311	0.56%
VERMONT		
Barre	$428	1.23%
Brandon	$383	0.93%
Burlington	$345	0.91%
Essex Junction	$182	0.30%
Essex	$254	0.38%
Hardwick	$408	1.06%
Ludlow	$393	0.92%
Middlebury	$465	1.17%
Milton	$360	0.63%
Montpelier	$566	1.31%
Morrisville	$384	1.19%
Richford	$175	0.54%
Richmond	$559	0.84%
Rutland	$487	1.39%
Shoreham	$464	1.03%
South Burlington	$572	0.97%
Springfield	$496	1.26%
Swanton	$235	0.50%
West Rutland	$422	0.98%
Woodstock	$744	1.13%

* *Maximum projected during* 2006 to 2025 *($/yr in 2006 dollars)*

** *1999 census data*

TWO-MEDIA COMMUNITIES

Almost one-half of the communities (66 of 144) represented in this study provided financial information for their drinking water and wastewater systems (referred to as two-media communities). In Figure 14, the combined projected household costs for both media are presented in relation to the percentage of systems. Costs were added to illustrate the overall impact of providing safe drinking water and maintaining wastewater systems within the communities.

Summary of Model Results – Two-Media Communities

- Combined costs range widely among the surveyed systems.
- The highest percentage of systems (at only 17 percent) may experience projected annual household costs between $600 and $700 dollars for both services.
- The highest combined rates of greater than $2,000 per year are expected for 6 percent of the surveyed systems.

The percent increases from current annual household costs to the maximum projected annual cost for both media are presented in Figure 15.

- Rate increases of 20 percent, 21 to 50 percent and 51 to almost 350 percent are projected for 35, 30, and 35 percent of the systems respectively.

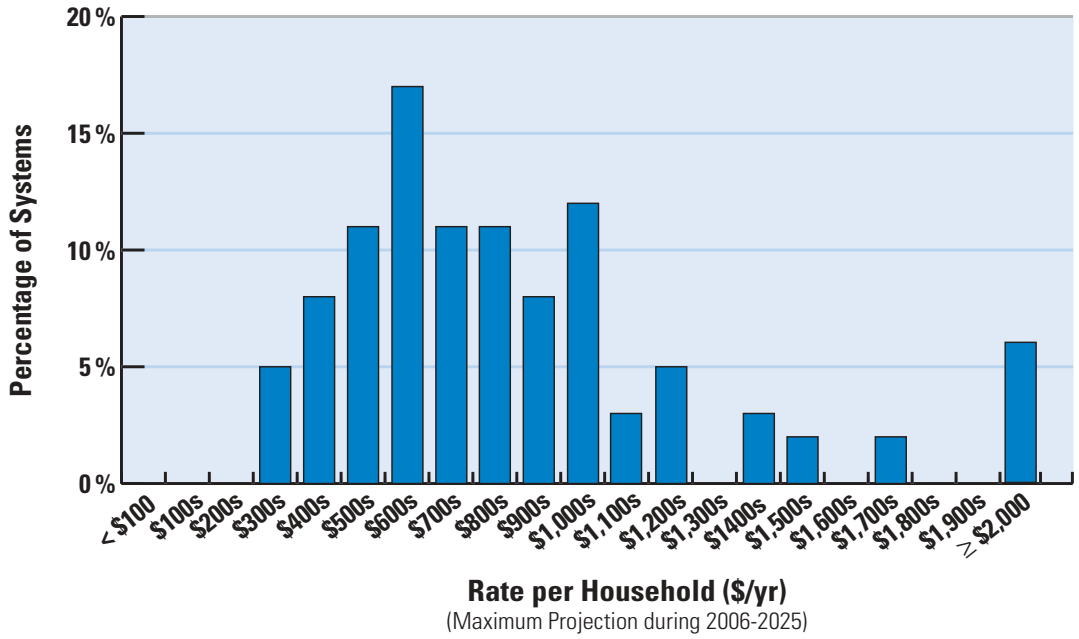
Projected costs for each media are shown by community in Figure 16.

- Regardless of community size, the projected annual household costs for both services vary significantly.
- Those communities with extremely high rate projections most likely provided cost data based on the need for major improvements or facility replacements without regard to the ability to pay for them. To lessen the impact on future household rates, most communities would either establish surcharges prior to construction or would not proceed with all recommended improvement projects.

Fifty-five percent of the households served by two-media systems may experience projected rate increases under 1.0 percent of the median household income. A small percentage (6%) may experience annual rates at over 3.0 percent of the median household income (Figure 17).

FIGURE 14

PROJECTED ANNUAL HOUSEHOLD COSTS: TWO-MEDIA COMMUNITIES



Note: The maximum projected drinking water and wastewater rates often occur in different years for a community. Rates for drinking water and wastewater presented in Figure 14 are added without regard to year.

FIGURE 15

PERCENT INCREASE IN ANNUAL HOUSEHOLD COSTS: TWO-MEDIA COMMUNITIES

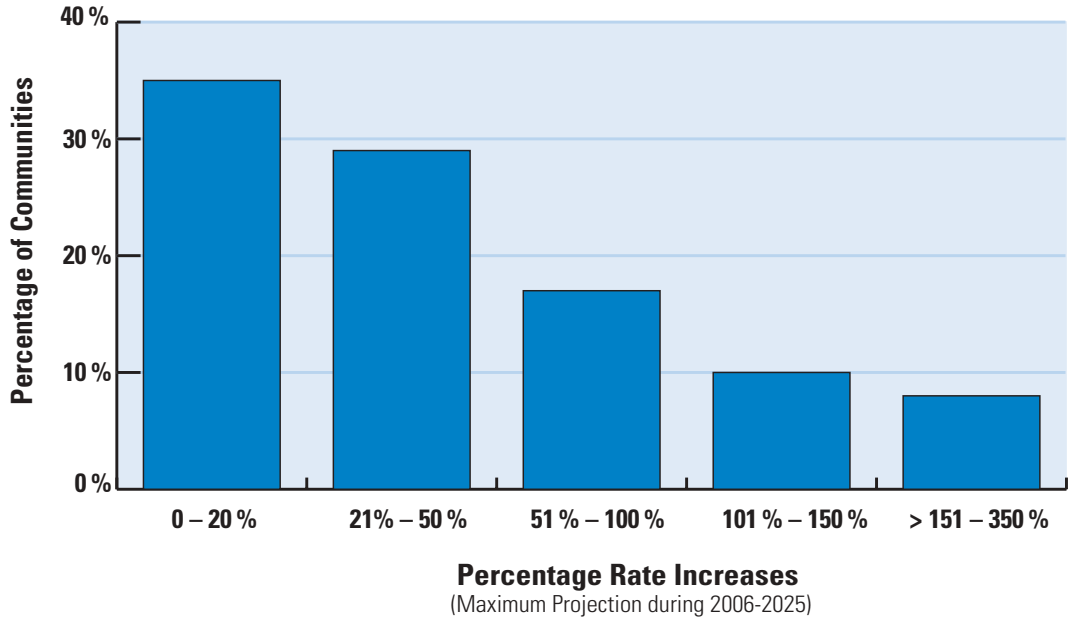


FIGURE 16

PROJECTED ANNUAL HOUSEHOLD COSTS: TWO-MEDIA COMMUNITIES

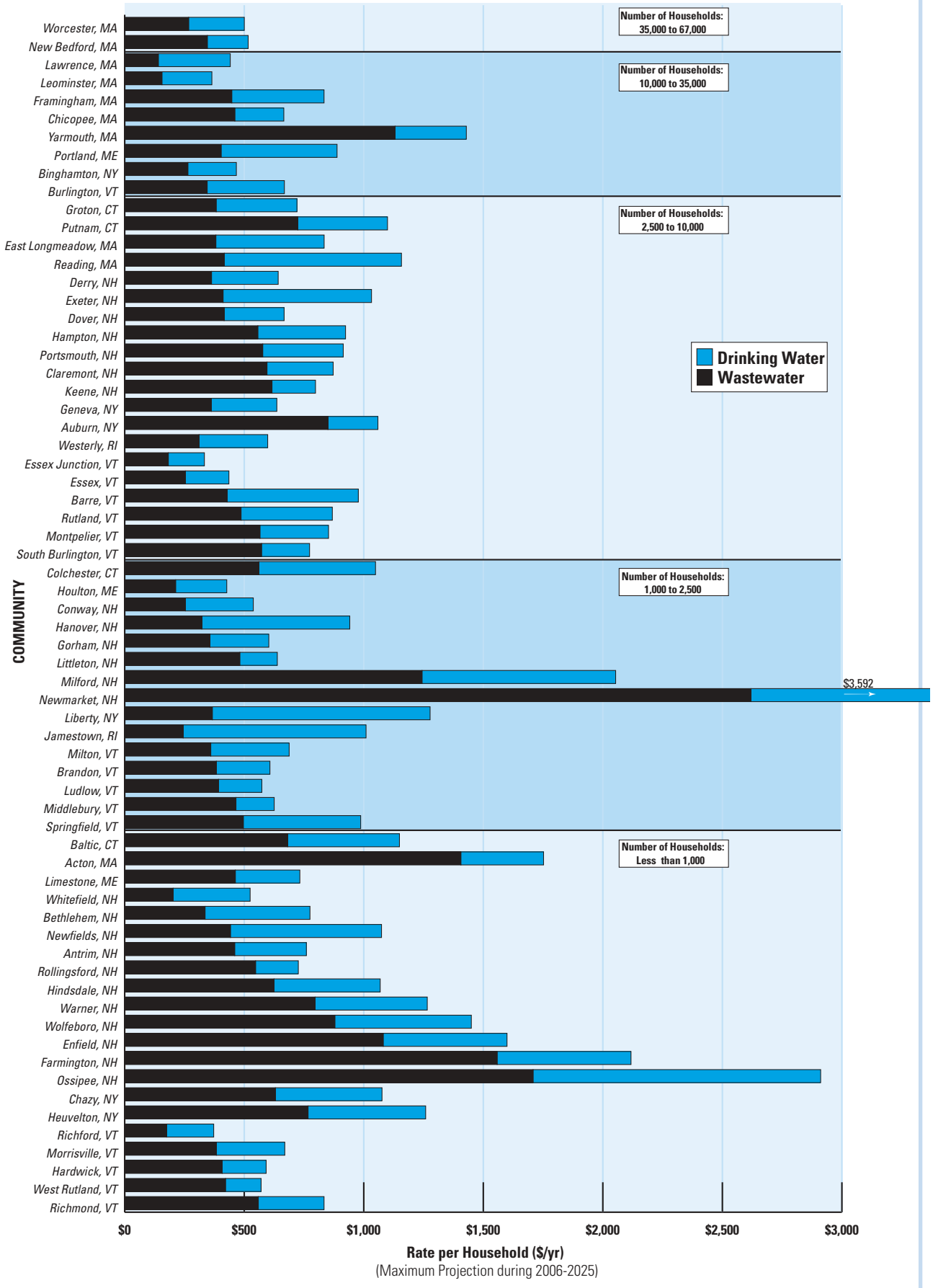
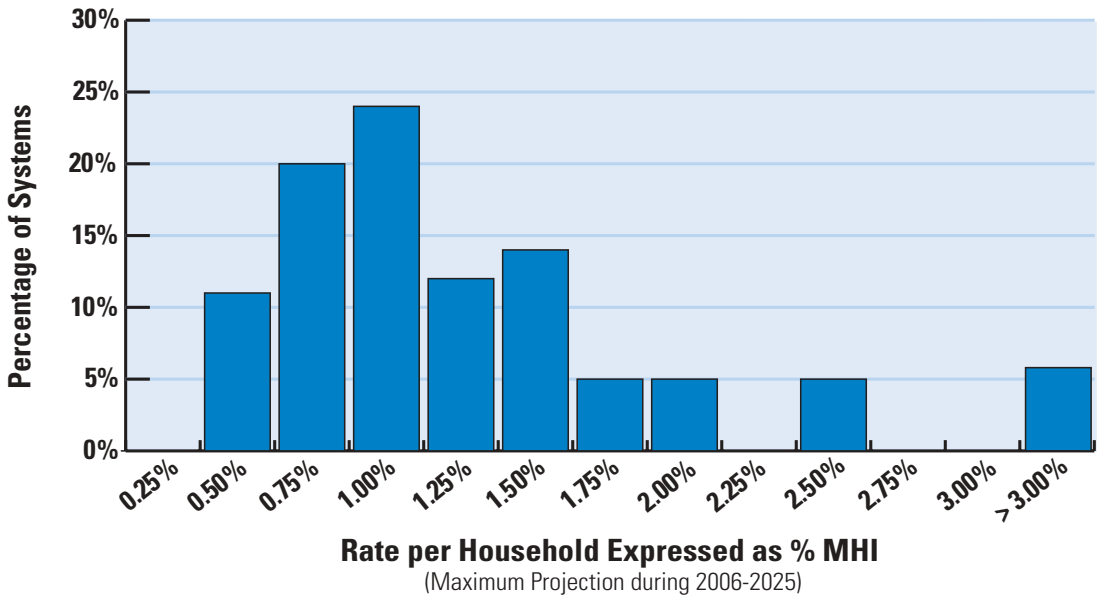


FIGURE 17 PROJECTED ANNUAL HOUSEHOLD COSTS AS A PERCENTAGE OF MHI: TWO-MEDIA COMMUNITIES



COMPARISON OF 1995 AND 2006 PROJECTIONS

Though the intent of the 2006 report is to provide an updated perspective on projected costs for the region, it would not be complete without a comparison to data projections from the original report. Comparisons of drinking water system data are presented in Figures 18 and 19; the same comparisons are made for wastewater data in Figures 20 and 21. The reader is reminded that these are not rates for 1995 and 2006; they are the projected maximum annual household rates from 1994 to 2013 (1995 report) and from 2006 to 2025 (2006 report).

For the revised report, data were included from communities that participated in the 1995 survey as well as those that did not; the majority of data is from those that did not. Thirty-two of the 92 drinking water systems participating in 2006 also provided financial data in 1995, compared to 37 of the 118 wastewater systems. The distribution of systems by state is indicated in Table 8.

TABLE 8 NUMBER OF SYSTEMS PARTICIPATING IN BOTH REPORTS

State	Drinking Water Systems	Wastewater Systems	Total
Connecticut	4	1	5
Maine	3	11	14
Massachusetts	4	2	6
New Hampshire	11	7	18
New York	0	0	0
Rhode Island	2	2	4
Vermont	8	14	22
Total	**32**	**37**	**69**

For drinking water systems, maximum annual household costs over the 1996 study period shift from the $100 to $200 range to the $200 to $300 and $400 to $500 ranges (Figure 18). This shift may represent expected rate increases resulting from new treatment improvement projects required to meet the 1996 Safe Drinking Water Act Amendments, which were not reflected in the previous report. Shifts from the lower annual rates trailing into the higher end rates are also indicated in Figure 19.

Similar trends for wastewater household rate projections are indicated in Figures 20 and 21. Cost projections from the 1995 report to the 2006 report shift from lower rates at $100 to $300 to $500 to $600 per year.

FIGURE 18
PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER
COMPARISON OF 1995 & 2006 REPORT PROJECTIONS

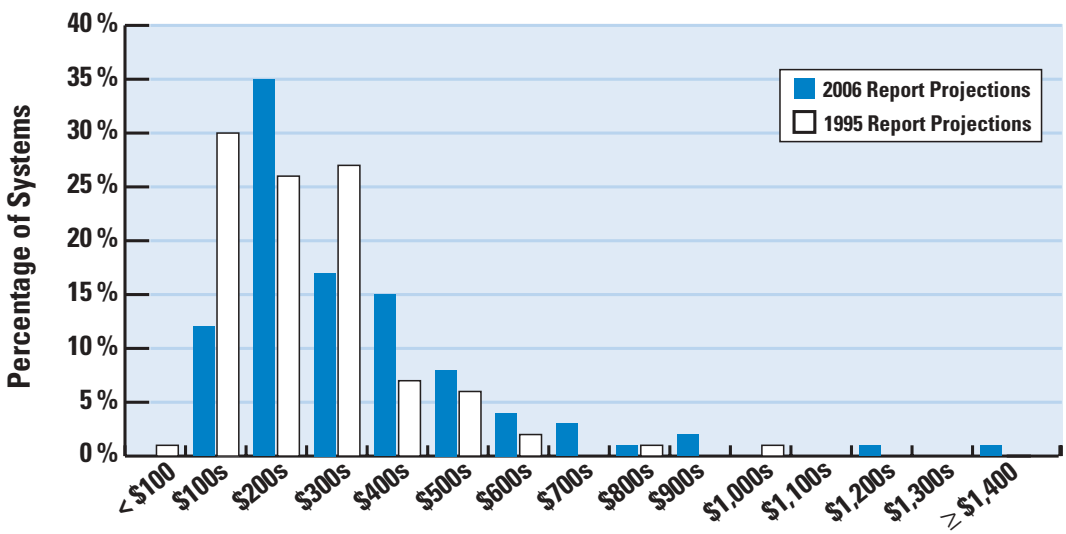


FIGURE 19
PROJECTED ANNUAL HOUSEHOLD COSTS: DRINKING WATER
COMPARISON OF 1995 & 2006 REPORT PROJECTIONS

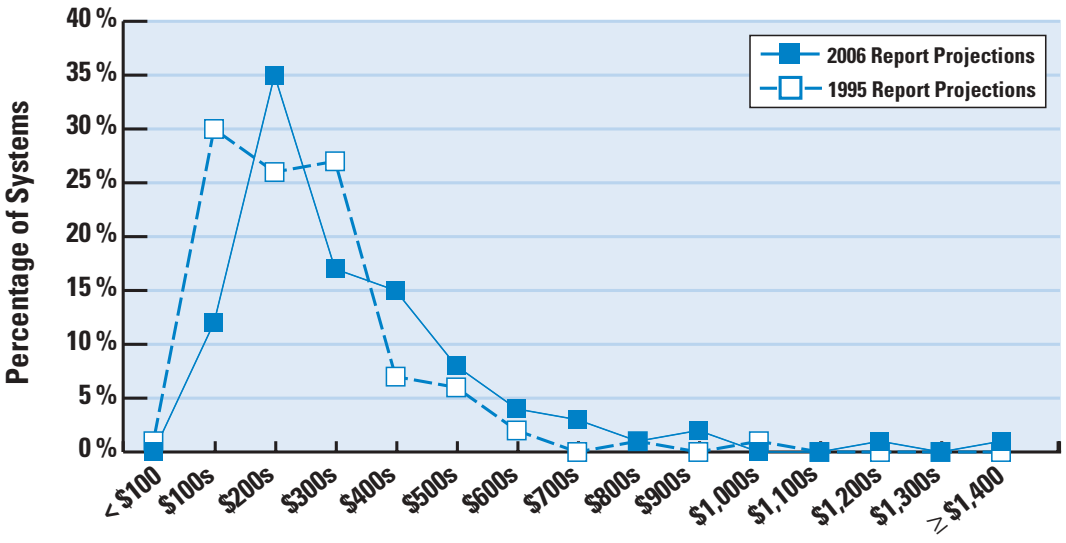


FIGURE 20

PROJECTED ANNUAL HOUSEHOLD COSTS: WASTEWATER COMPARISON OF 1995 & 2006 REPORT PROJECTIONS

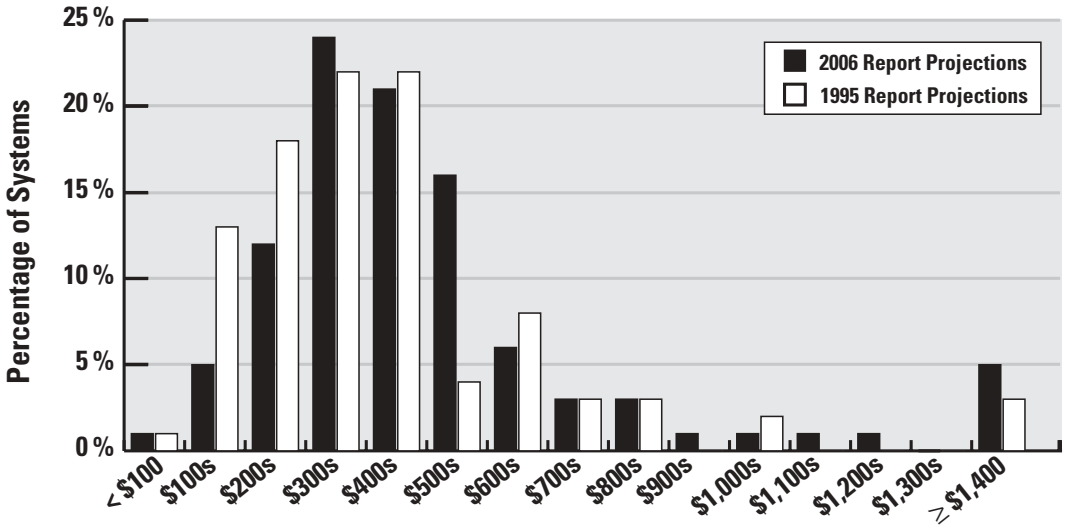
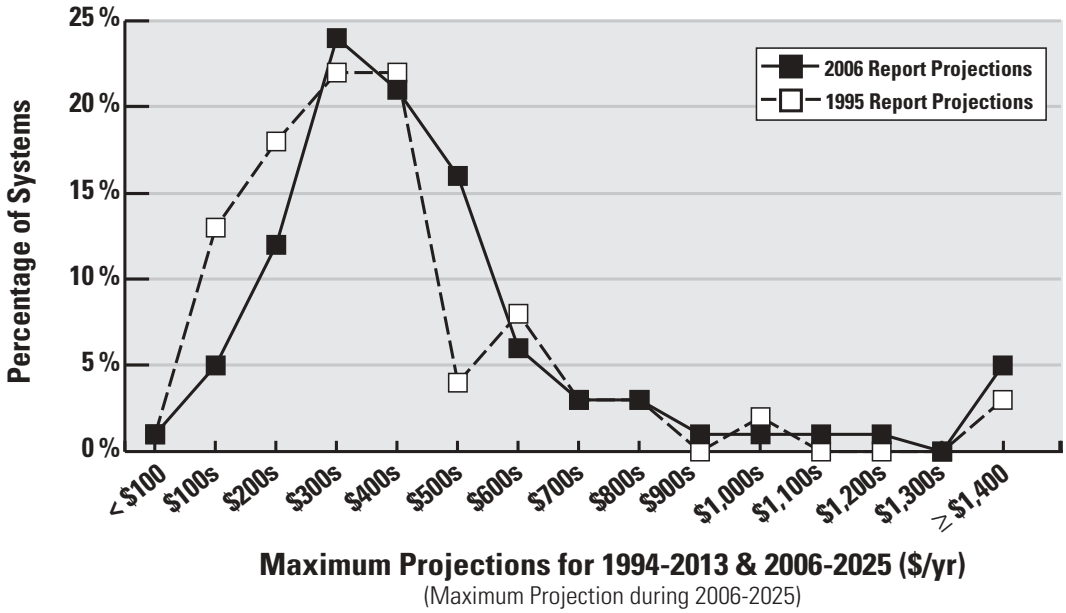


FIGURE 21

PROJECTED ANNUAL HOUSEHOLD COSTS: WASTEWATER COMPARISON OF 1995 & 2006 REPORT PROJECTIONS



Appendix

LETTER OF INTRODUCTION TO SYSTEMS

- Sample letter sent to each drinking water and wastewater system requesting participation in the project
- Blank financial information summary sheet sent attached to letter
  Instructions for completing the financial information summary sheet are similar to those for using the rate projection model.

INSTRUCTIONS FOR USING THE HOUSEHOLD RATE PROJECTION MODEL

- Instruction on use of the model and verification of data, including information on:
  - data required
  - model output
  - getting started
  - detailed instructions for data entry
  - checking model input data and results
- Equations used in the model to calculate household cost
- Sample completed financial information summary sheet

SAMPLE LETTER SENT TO SYSTEMS

Summer, 2005

In 1993, the New England states, EPA-New England, and the New England Interstate Water Pollution Control Commission set out to identify the present and future cost, per household, for communities to provide safe drinking water and wastewater discharges that meet federal standards. The resulting 1995 report, which is available by request, presented the data and conclusions of this study.

Ten years have since passed and the environmental regulatory landscape has changed. New standards and rules have been issued, and it is time once again to compose a picture of the costs, borne by households, for providing clean and safe drinking water and wastewater. The 1995 report represented a significant step forward in raising the quality of the discussion on cost of environmental requirements by providing actual data. This new effort, known as *The Cost of Clean and Safe Water* project, promises to continue the discussion in this spirit.

Your community has been selected by the State Department of Public Health Drinking Water Section to participate in *The Cost of Clean and Safe Water*. This means that you will provide some of the basic information to complete this project, and in return, you will gain a valuable supporting resource to call on the next time you're faced with questions from your local elected officials and community members about the costs of providing your community with clean and safe water.

Approximately thirty other communities in the state have been selected as well. Together, information gathered about these drinking water and wastewater systems will be analyzed and brought together in a new report. It will identify and offer a comparative perspective on the costs, across the New England region, of providing clean and safe water that meets environmental and health standards. In composing a varied picture of these costs on a broad regional scale, the Report will be a valuable tool to enhance the understanding of the resources required to sustain water-related services and to inform future drinking water and wastewater policy and funding discussions.

Your involvement in this survey entails providing information such as background system data, financial information, and projected costs of infrastructure improvement projects proposed over the next twenty years.

We will be contacting you over the next few weeks to assist with any questions or issues that arise as you begin to fill out the enclosed information sheets. If you are not the appropriate person to receive this information, please pass it along to someone who can assist us, and let one of the contacts below know that you have done so.

The deadline for completing the requested information is September 1st. When you are finished, please return all information sheets, and any additional comments, in the enclosed envelope to Sarah Reich (address included below).

If you have any questions or comments about The Cost of Clean and Safe Water project, don't hesitate to get in touch with Sarah Reich, the project contact at NEIWPCC. Her contact information follows.

Sarah Reich
New England Interstate Water Pollution Control Commission
116 John Street
Lowell, MA 01852
P. (978) 323-7929
Email sreich@neiwpcc.org

We thank you in advance for your time, and greatly appreciate your participation in this effort!

FINANCIAL INFORMATION SUMMARY SHEET

General Information

Municipality Name: _____ Form Completed By: _____

Facility ID (State/EPA): _____ Telephone Number: _____

Address: _____ Date: _____

_____

# of Residential Households: _____

% Residential Share of Budget: _____

Median Household Income (1999): _____

Urban or Rural Community: _____

Drinking Water or Wastewater System: _____

Financial Information

Current Annual Budget (000): _____ = O & M: _____ + Debt Service: _____ + Capital Reserves: _____ + Other: _____

Total Annual Revenue (000): _____ = User Charge: _____ + Taxes: _____ Other: _____

Current Annual Household User Charge: _____

System Description

General description of the system and planned improvements: _____

_____

_____

Note: If drinking water system, please indicate if served by groundwater, surface water or a combination of both.

Cost Worksheet - Page 2

Municipality Name/WW **or** DW System Information: _____

Base Year of Future Capital and O&M Estimates: _____

Enter new O&M costs for ONLY the first year in which they begin; Enter all costs in thousands of dollars (000).

Year	Current Debt Service (000)	Future Capital Expenses (000)	Future New O&M (000)	Future Estimate Source (1=Formal; 2=Informal)	Description - if needed.
2006					
2007					
2008					
2009					
2010					
2011					
2012					
2013					
2014					
2015					
2016					
2017					
2018					
2019					
2020					
2021					
2022					
2023					
2024					
2025					
Total					

INSTRUCTIONS FOR USING THE HOUSEHOLD RATE PROJECTION MODEL

The household rate model (Excel spreadsheet) computes annual household costs to pay for the current budget and projected future capital and new O&M expenses over the next 20 years in both future and current dollars. Using the model, the maximum annual household rate from 2006 to 2025 is determined.

Included with these instructions is a completed spreadsheet with input and output based on the example financial information summary sheet. Also provided is a summary of all the equations used in the rate projection spreadsheet which illustrates how each item is calculated. Data input cells are blue and data output cells are green.

DATA INPUTS

- Municipality Name
- Current Annual Budget (e.g., 2005 total budget (usually the budget for the year before the first year in the rate projection table) — include both operations and any existing or current annual debt service)
- Annual Revenue by source (e.g., user charge, taxes, and other)*
- Number of Households
- Percent Residential Share of Budget (e.g., 0.45)
- Median Household Income (for 1999 from the 2000 census)
- Current Annual Household User Charge*
- Base Year (year basis of future capital and O&M estimates, e.g., 2001 if in 2001 dollars)
- Future Capital Expenses (for each year in base year dollars)
- Future New Annual O&M Expenses (for each year, in base year dollars)
- Current Annual Debt Service (this is past debt service such as payments on the existing treatment facility loan that is still (currently) being paid)
- Future Estimate Source

** These items are used for checking model input data rather than in the model itself.*

SPREADSHEET (MODEL) OUTPUT

Based on the above input data the model computes the following for each of the next 20 years:

- New Debt Service (cumulatively)
- Annual Budget (in inflated i.e. future dollars)
- Household Rates in Future Dollars
- Household Rates in Current (2006) Dollars
- Percent Median Household Income

The model can also be used to calculate:

- Maximum Annual Rate, assuming no inflation and % MHI (a less accurate but often used approximation)
- Maximum Annual Rate with inflation and % MHI (a more accurate estimate)
- Total Capital Expenses
- Total New O&M Expenses

SETTING SPREADSHEET FINANCIAL PARAMETERS

At the top of the spreadsheet are the global financial parameters which the user can set. These parameters along with the values used for all calculations in this report are:

Parameter	Value
Inflation	0.03
Interest	0.06
Term	20
MHI inflation	0.02

DETAILED INSTRUCTIONS

Using the financial information summary sheet received from a drinking water or wastewater system, enter the data as indicated below. These directions are similar to those provided to the systems/municipalities for completing the financial information summary sheet. Additional details are provided to help the model user understand which inputs are necessary to run the model and which inputs are used to check the validity of the data provided.

Municipality Name	Enter municipality, district, sewer authority, etc. name where indicated.
Current Annual Budget	Enter most currently available (e.g., 2004) annual budget for both operations and debt service in thousands; capital reserves should be included here and "other" items described. The spreadsheet assumption is that the budget is for the year before the first year in the rate projection table. A year or two either way, however, does not make a big difference.
Total Annual Revenue	This item appears on the financial information summary sheet only, it is not used in the model except to verify input data. It consists of annual revenue by source, user charges, general taxes, or other. This item should generally add up to the current budget item above, although it may not in all cases. Therefore, it is a good check on the budget figure. This information is also useful to help decide if it is necessary to adjust the number of households for a large number of non-user charge budget contributors as described in the last section of these instructions called "checking model input data."
Number of Households	Enter number of households served (i.e., directly or indirectly contributing to the budget). The number of households served should correspond with those in the service area. If only a small portion of the community is paying user charges and a substantial portion of the budget is being paid by a larger group of taxpayers, then this item may have to be adjusted or calculated as described below under checking model input data. If this item or the next (% residential share) is difficult to obtain, it may be calculated from current budget and household rates using a simple ration equation (also discussed in checking model input). *Caution:* This number is usually larger than the number of billing accounts. It should include all households in multi-family dwellings (e.g. apartment buildings) even though they are not directly billed for service. Census data on the number of households in the service area are a potential source.

Percent Residential Share of Budget	Enter decimal percent of budget contributed by households (as opposed to industrial, commercial, and government users).
Median Household Income	Enter 1999 MHI from the 2000 census. If the system did not complete, then 2000 census data was used (almost all cases for this report).
Current Annual Household User Charge	This item appears on the financial information summary sheet only, it is not used in the model except to help verify input data as described below under "checking model input data." This item consists of the current typical household user charge.
Base Year	Enter base year of future capital and O&M estimates (e.g., 2004 if in 2004 dollars).
Future Capital Expenses	Enter projected capital expenses in thousands (and in constant base year dollars[1]) along the capital expense row in the year column that they are expected to be incurred. Don't worry if the time frames are approximate, (even +/- 5 years).
Future O&M	Enter projected new O&M expenses in thousands (and in constant base year dollars[1]) down the new O&M column in the year that they are expected to start (do not continue to add this amount to subsequent years, even if it is a recurring cost, because the model will carry this into the annual budget for future years).
Current Debt Service	Enter current debt service (i.e., annual debt costs from past or pre-2005 capital expenses which the municipality is still making annual payments on (e.g., building the existing treatment plant)), in this row, in thousands of dollars, for each year they are anticipated to continue to be paid (e.g., 2,000 per year for the next four years — i.e., until the loan is paid off). Note, entries for this item always start with the first year (2006), may vary from year to year, and continue until debt is retired. It does not increase because new debt is included in capital expenses. *Note:* Use of this item is optional but if this item is left blank the model will assume that all current budget costs are for operational expenses and will inflate and include them for each year of the 20-year model projection which may be inaccurate for communities retiring large debts during the 20-year life of this projection.
Future Estimate Source	Identify how future cost estimates were derived. Use a "1" for an estimate based on information derived from a planning process (e.g. engineering report, capital improvement plan) or from financial reports. Use a "2" for an estimate based on best expert judgment, staff estimation, or any other informal estimation process. This item is used to provide an indicator of the confidence in the future cost estimates.

1. In the situation where future capital or O&M expenses are projected for several projects and in different base year dollars, pick the most commonly used base year for the model and convert the costs given in different years (e.g. x year) to the base year chosen using the formula below:

   Costs (Base Year) = Costs (x year) x (1 + inf.)(base year – x year)

   Model value for inf. = 0.03

CHECKING MODEL INPUT DATA AND RESULTS

It is important to check (and sometimes adjust) the basic model input data, using other available data and current user rates, in order to ensure that the input data will produce as accurate projections as possible. Below are procedures for: a) checking the base current annual budget by comparing expenses to income, and b) checking the ratio of % residential share to # of households by comparing it to the ratio of the current user charge to current budget.

Checking the Current Annual Budget Value

The current annual budget value used in the model is the total annual expenses for service including operations and debt payments (but just annual payment for past debt; new debt is picked up by the model automatically as capital expenses are added in the future).

$$\text{BUDGET}_{2005} = \text{ANNUAL O\&M}_{2005} + \text{ANNUAL DEBIT PAYMENTS}_{2005}$$

The budget (expenses) should be approximately equal to income (revenue) received from both user charges and taxes.

$$\text{INCOME (REVENUE)} = \text{USER CHARGE (UC) INCOME} + \text{TAX INCOME}$$
$$= \text{BUDGET (EXPENSES)} = \text{O\&M} + \text{DEBT PAYMENTS}$$

Suggestion

Use annual budget (expenses) and income (revenue) data to check each other when determining the current budget value used in the model. If you can't get both expense and income data, get the best information possible and use it to develop the budget figure.

Checking Percent Residential Share and Number of Households Values

Consider the two cases outlined below:

Case 1 (typical situation)

In this case, essentially the same households pay both user charges and, where applicable, taxes for service. This is the case applicable to most fairly developed cities, towns, and districts.

It is very important to check the model input data against the Current User Charge (UC). For Case 1, the equation for doing this is:

(1) $$\text{UC} = \frac{(\text{TOTAL BUDGET} - \text{TAX REVENUE}) \times (\%\ \text{RESIDENTIAL})}{\#\ \text{HOUSEHOLDS}}$$

Equation (1) can be rearranged and used to calculate the ratio of % Residential to # Households, see equation (2) below.

(2) $$\frac{\text{UC}}{(\text{TOTAL BUDGET} - \text{TAX REVENUE})} = \frac{\%\ \text{RESIDENTIAL}}{\#\ \text{HOUSEHOLDS}}$$

The model uses the ratio of % Residential to # of Households to calculate the household rate for each future year. See equation (3) below, which the model uses to compute future year household rates from calculated future budgets (taxes are not subtracted out as in equation (1) because we want to calculate a HH rate including all costs whether covered by user charges or taxes). Note that it is the ratio of % Residential to # of Households that is important to calculating future year rates, not the particular values of % Residential or # of Households.

(3) $$\text{HH RATE (future yr.)} = \frac{(\text{BUDGET (future yr.)}) \times (\%\ \text{RESIDENTIAL})}{\#\ \text{HOUSEHOLDS}}$$

Suggestion
As long as data for current user charge, current total budget, and tax revenue (if applicable) are available and equation (2) checks for whatever # of households and % residential values you can obtain (or calculate assuming one or the other), the model should give acceptable results. It is not necessary to invest a lot of time trying to obtain exact figures for % residential and # of households if good figures on current budget, annual user charge, and tax revenue are available. Do adjust whatever values used in equation (2) that you are least confident in to make equation (2) check.

Case 2 (substantial non-user taxpayer support)
This case applies if only a small portion of the community is using the service and paying user charges, but the whole community provides significant support from taxes. This situation might occur in a rural community with only part of the town on sewers and paying user charges, but the whole town contributing substantial support through taxes. In this case, use equation (4) below (which does not subtract out tax revenue) to calculate a # of households which is higher than just those using the service (e.g. tied into the sewer) to reflect the other taxpayer contributors.

(4)
$$\#\ \text{HOUSEHOLDS} = \frac{(\text{BUDGET}) \times (\%\ \text{RESIDENTIAL})}{\text{UC}}$$

Note this can be rearranged and is similar to equation (2) but without the tax revenue value, see equation (5) below.

(5)
$$\frac{\text{UC}}{(\text{TOTAL BUDGET})} = \frac{\%\ \text{RESIDENTIAL}}{\#\ \text{HOUSEHOLDS}}$$

Suggestion
Again, (see equation 3) the ratio of % residential to # of households is what is important for the model to calculate accurate future household rates, not the actual values. As long as data for current user charge and current total budget are available and equation (5) checks for whatever # of households and % residential values you can obtain (or calculate assuming one or the other), the model should give acceptable results. It is not necessary to invest a lot of time obtaining exact figures for % residential and # of households if good figures on current budget and annual user charge are available. Do adjust whatever values in equation (5) you are least confident in to make equation (5) check.

RATE MODEL CALCULATIONS

New Debt Service

First Year
$$\text{Cap Exp} \times (1+\text{inf})^{(\text{yr} - \text{base yr}^*)} \times (\text{A/P, int, n})$$

Subsequent Years
$$\text{Prev Yr New Debt Serv} + [\text{Cap Exp} \times (1+\text{inf})^{(\text{yr} - \text{base yr})} \times (\text{A/P, int, n})]$$

Budget

First Year
$$(\text{Cur Bud} - \text{Cur Debt Ser}_{06}) \times (1 + \text{inf}) + \text{Cur Debt Serv}_{06} + \text{New O\&M} \times (1 + \text{inf})^{(\text{yr} - \text{base yr})}$$

Subsequent Years
$$(\text{Prev Yr Bud} - \text{Prev Yr Cur Debt Serv} - \text{Prev Yr New Debt Serv}) \times (1 + \text{inf}) + \text{New O\&M} \times (1 + \text{inf})^{(\text{yr} - \text{base yr})} + \text{Cur Debt Serv} + \text{New Debt Serv}$$

Rates Future $

First Year

$$\frac{1000 \times (\text{Bud}) \times (\text{Res Share})}{\#\ \text{of Households}}$$

Subsequent Years

$$\frac{1000 \times (\text{Bud}) \times (\text{Res Share})}{\#\ \text{of Households}}$$

Rates Current $

First Year

$$\frac{\text{Rates Future Dollars}}{(1 + \text{inf.})^{(\text{year} - 2006^{**})}}$$

Subsequent Years

$$\frac{\text{Rates Future Dollars}}{(1 + \text{inf.})^{(\text{year} - 2006)}}$$

* Base year is the year all projected capital and O&M costs are based on e.g. 2004 if in 2004 dollars.

** 2006 and 06 above actually refer to any first year in the rate projection table on the spreadsheet.

➠ ***Maximum Rate With Inflation – Current Dollars***

= the max value calculated for "Rates: Current $" [i.e. selects from this row in the spreadsheet]

➠ ***% Median Household Income With Inflation***

$$= \frac{\text{Rates: Current \$ [selects the max from this row in the spreadsheet]} \times 100}{(\text{99 MHI from the 2000 census}) \times (1 + \text{MHI inf.})^{(2006 - 1999)}}$$

➠ ***Maximum Rate – No Inflation***

$$\frac{1000 \times (\text{Cur Bud} + \text{Tot Cap Exp} \times (\text{A/P,int,n}) + \text{Tot New O\&M}) \times (\text{Res Share})}{\#\ \text{of Households}}$$

➠ ***% Median Household Income – No Inflation***

$$\frac{\text{Max Rate with No Inflation (from above equation)} \times 100}{(\text{99 MHI from 2000 census}) \times (1 + \text{MHI inf.})^{(2006 - 1999)}}$$

Sample – Completed Financial Information Summary Sheet (Data shown only through 2010)

Global Parameters			
Inflation	Interest	Term	MHI Inflation
0.03	0.06	20	0.02

Data Input | Results

Year Series					
2006	2007	2008	2009	2010	

Municipality Name	**Sample**			Current Annual Household User Charge	$480
System Name					
System Type	Wastewater	Base Year (Future Estimates)	2005		

Current Annual Budget (000)	$1,542	Current Debt Service (000)	$308	$294	$289	$274	$267
# of Residential Households	2,600	Future Capital Expenditures (000)					
% Residential Share of Budget	0.96	Future New O&M (000)					
Median Household Income (1999)	$40,202	Future Estimate Source					
Total Capital Expenditures (000)	$0	New Debt Service (000)	$0	$0	$0	$0	$0
Total New O&M (000)	$0	Budget (000)	$1,579	$1,603	$1,637	$1,663	$1,697
MAX Rates (Current $)		Rates: Future $	$541	$550	$561	$570	$582
No Inflation	$529	Rates: Current $	$541	$534	$529	$522	$517
% MHI	1.14	% MHI	1.17	1.16	1.15	1.13	1.12
W/ Inflation	$541						
% MHI	1.17						