

M1

Water Rates, Fees, and Charges

Seventh Edition



American Water Works
Association

Contents



List of Figures, ix	
List of Tables, xi	
Preface, xv	
Acknowledgments, xvii	
Introduction, xix	
Section I	Introduction, 1
Chapter I.1	Overview of Cost-Based Water Utility Rate-Making 3
	Objectives of Cost-Based Rate-Making, 4
	Generally Accepted Rate-Setting Methodology, 4
	Key Technical Analyses of Cost-Based Rate-Making, 5
	Other Water Rate Issues and Considerations, 6
	References, 6
Section II	Revenue Requirements, 7
Chapter II.1	General Concepts for Establishing Revenue Requirements 9
	Adequacy of Revenues, 9
	Approaches to Projecting Revenue Requirements, 10
	Test Year, 11
	Reference, 18
Chapter II.2	Revenues 19
	Sources of Revenue, 19
	Cash Versus Accrual Revenues, 21
	Unbilled Revenues, 21
	Projecting Revenue, 22
	Example, 24
Chapter II.3	Operation and Maintenance Expenses 27
	Classifying O&M Expenses, 28
	Identifying Non-Recurring O&M Expenses, 28
	Identifying Capitalized O&M Expenses, 29
	Identifying Special Considerations for Government-Owned Utilities, 29
	Estimating O&M Expenses, 30
	Example, 30
Chapter II.4	Taxes 33
	Local Taxes, 33
	State Taxes, 34
	Federal Taxes, 34
	Tax Issues in Rate Cases, 35
Chapter II.5	Capital-Related Costs 39
	Cash-Needs Approach, 39
	Utility-Basis Approach, 42

	Rate of Return, 46	
	Capital Structure, 47	
Chapter II.6	Examples of Revenue Requirements	51
	Government-Owned Utilities, 51	
	Investor-Owned Utilities, 54	
Section III	Cost Allocation, 57	
Chapter III.1	Allocating Revenue Requirements to Cost Components	59
	Assigning Revenue Requirements to Functional Costs, 60	
	Allocating Functionalized Costs to Cost Components, 61	
	Special Considerations, 71	
Chapter III.2	Distributing Costs to Customer Classes.....	73
	Customer Classes, 73	
	Units of Service, 75	
	Distributing Cost Components to Customer Classes, 77	
	Unit Costs, 78	
	Distributing Costs by Base-Extra Capacity Method, 81	
	Distributing Costs by Commodity-Demand Method, 83	
Chapter III.3	Emerging Trends in Water Rate-Making.....	87
	Revenues, 89	
	Reserves, 90	
	Revenue Requirements, 90	
	Cost Allocation, 92	
	Rate Design, 95	
	Summary and Conclusions, 99	
	References, 100	
Section IV	Rate Design, 101	
Chapter IV.1	Selecting Rate Structures.....	103
	Planning the Rate Structure Study, 103	
	Rate Structure Variables and Considerations, 106	
	Summary, 108	
	References, 108	
Chapter IV.2	Uniform Rates	109
	General Considerations, 109	
	Historical Perspectives, 110	
	Advantages and Disadvantages, 111	
	Determining a Uniform Rate, 112	
	Example, 112	
	Summary, 113	
Chapter IV.3	Decreasing Block Rates	115
	General Considerations, 115	
	Historical Perspectives, 116	
	Advantages and Disadvantages, 117	
	Determining Decreasing Block Rates, 119	
	Example, 119	
	Summary, 121	

Chapter IV.4	Increasing Block Rates.....	123
	General Considerations, 123	
	Historical Perspectives, 124	
	Advantages and Disadvantages, 125	
	Setting Block Size and Pricing, 126	
	Examples, 127	
	Summary, 128	
Chapter IV.5	Seasonal Rates.....	129
	General Considerations, 129	
	Historical Perspectives, 131	
	Advantages and Disadvantages, 132	
	Determining Seasonal Rates, 133	
	Examples, 135	
	Summary, 137	
Chapter IV.6	Water-Budget Rates	139
	General Considerations, 140	
	Historical Perspectives, 141	
	Advantages and Disadvantages, 141	
	Implementing Water-Budget Rates, 143	
	Example, 147	
	Summary, 148	
	References, 148	
Chapter IV.7	Revenue Stability—Fixed Charges and Other Considerations	149
	General Considerations, 149	
	Fixed Charges, 151	
	Other Considerations, 153	
	Summary, 154	
	References, 155	
Chapter IV.8	Rates for Fire Protection Service	157
	General Considerations, 157	
	Historical Perspectives, 158	
	Public Versus Private Fire Protection, 161	
	Determining Fire Protection Costs, 162	
	Rate Design, 165	
	Emerging Issues, 169	
	References, 171	
Section V	Other Rate Issues, 173	
Chapter V.1	Water Reuse Rates and Other Considerations.....	175
	Background and Terminology, 176	
	Water Reuse Considerations, 176	
	Financial Analysis Versus Economic Analysis, 178	
	Types of Water Reuse Customers, 178	
	Financial Planning for Reuse, 180	
	Cost Allocation of Water Reuse Rates, 182	
	Pricing Reuse Water, 188	
	References, 189	
Chapter V.2	Standby Rates	191
	General Considerations, 191	
	Historical Perspectives, 192	

	Advantages and Disadvantages, 192	
	Example, 194	
	Summary, 194	
Chapter V.3	Drought and Surcharge Rates.....	195
	General Considerations, 195	
	Historical Perspectives, 197	
	Advantages and Disadvantages, 197	
	Determining Rate Surcharges, 198	
	Determining Drought Surcharges, 199	
	Drought Surcharge Considerations, 199	
	Drought Surcharge Example, 203	
	Summary, 205	
Chapter V.4	Low-Income Affordability Programs	207
	Defining Affordability, 209	
	Affordability Programs, 212	
	Business Case for Creating Affordability Programs, 217	
	Funding for Affordability Program Assistance, 218	
	Summary and Future Direction, 219	
	References, 220	
Chapter V.5	Negotiated Contract and Economic Development Rates.....	223
	General Considerations, 224	
	Historical Perspectives, 227	
	Advantages and Disadvantages, 228	
	Negotiated Contract Rate Example, 230	
	Economic Development Rate Example, 231	
	Summary, 233	
Chapter V.6	Indexed Rates.....	235
	General Considerations, 235	
	Advantages and Disadvantages, 236	
	Example, 237	
	Summary, 237	
Chapter V.7	Price Elasticity	239
	General Considerations, 240	
	Historical Perspectives, 240	
	Examples, 242	
	Summary, 243	
Chapter V.8	Marginal Cost Pricing	245
	General Considerations, 245	
	Practical Considerations, 246	
	Advantages, 248	
	Disadvantages, 249	
	Summary, 250	
	Reference, 251	
Chapter V.9	Miscellaneous and Special Charges.....	253
	Definition of Service Charges, 254	
	Example, 255	
	Legal Authority for Service Charges, 255	
	Selecting and Implementing Service Charges, 255	

Cost Basis and Rationale, 257
 Determining the Cost of Providing Service, 258
 Example Service Charges, 261
 Summary, 272
 Reference, 272

Section VI Outside Customer Rates, 273

Chapter VI.1 Overview of Outside Customer Rates..... 275
 Benefits of Providing Outside Customer Service, 276
 Nature of the Relationship, 276
 Outside-Customer Rate Methodologies, 278
 Implementation and Administration Considerations, 287
 Stakeholder Involvement and Public Communications, 289
 Summary, 290

Chapter VI.2 Outside Retail Rates..... 291
 Benefits of Providing Outside Retail Service, 291
 Outside Retail Rate Methodologies, 292

Chapter VI.3 Outside Wholesale Rates..... 297
 Definition of Wholesale Service, 297
 Types of Wholesale Service, 298
 Benefits of Providing Outside Wholesale Service, 299
 Wholesale Service Relationship and Financial Considerations, 299
 Determining Wholesale Revenue Requirements, 301
 Rate Design for Wholesale Customers, 305
 Implementation and Administration Considerations, 305
 Stakeholder Involvement and Public Communications, 309
 Summary, 309
 Reference, 310

Section VII Capacity and Development Charges, 311

Chapter VII.1 Connection and Customer Facility Charges313
 Allocating Costs, 315
 Capital Cost Component, 316
 Calculating Connection and Customer Facility Charges, 317
 Examples, 319

Chapter VII.2 System Development Charges321
 Financial Goals and Objectives, 322
 Methodology and Legal Considerations, 323
 Information and Documentation for Calculations, 326
 New Customer Demands (Level of Service), 327
 Approaches to Calculating SDCs, 328
 Examples of SDC Methodologies, 330
 Other SDC Technical and Administrative Issues, 340
 Administrative and Accounting Policies and Procedures, 343
 Best Management Practices, 345
 Updates of the SDC Analysis, 346
 References, 347

Chapter VII.3 Availability Charges 349

Section VIII	Implementation Issues, 351	
Chapter VIII.1	Public Involvement in Rate-Making	353
	General Considerations and Policy Issues, 353	
	Historical Perspectives, 354	
	Public Involvement Planning, 355	
	Communication Tools, 359	
	Evaluating Communications, 360	
	Summary, 361	
	Reference, 361	
Chapter VIII.2	Data Requirements.....	363
	Customer Records, 363	
	Plant Investment, 366	
	Operation and Maintenance Expenses, 367	
	Periodic Cash Flow for the Utility, 368	
	Customer Survey Information, 368	
	Summary, 368	
	Reference, 368	
Appendixes, 371		
Appendix A	Development of Peaking Factors by Customer Class	373
Appendix B	Equivalent Meter Ratios.....	383
Appendix C	Bill Tabulation Methods	389
Appendix D	Example of Citizens Advisory Committee Guidelines	397
	Glossary, 399	
	Index, 409	
	List of AWWA Manuals, 417	

Chapter **I.1**

Overview of Cost-Based Water Utility Rate-Making

Establishing cost-based rates, fees, and charges is an important component in a well-managed and operated water utility. Cost-based rates provide sufficient funding to allow communities to build, operate, maintain, and reinvest in the water system that provides the community with safe and reliable drinking water and fire protection. Properly and adequately funded water systems also allow for the economic development and sustainability of the local community. The purpose of this manual is to discuss standard practices in financial planning and rate-making that a utility can use to establish cost-based rates, fees, and charges to recover the full costs associated with its water system.

The methods and analyses used to establish cost-based rates, fees, and charges have a long history within the water utility industry. Operators of some of the earliest water systems recognized the need for sufficient funding and rates to properly operate, maintain, and expand their water systems. AWWA appointed the Committee on Water Rates in 1949. As time passed, the utility industry recognized the need for a manual of standard practice. Through the work of this committee, the first AWWA M1 manual, *Water Rates Manual*, was published in 1954. (For a more complete history, see Woodcock 2013.) Many of the same concepts, methodologies, and analyses used in 1954 remain relevant today. As time has passed, AWWA Manual M1 has been updated and expanded to reflect the changing industry and its current financial and rate issues. The development of this seventh edition continues the efforts of many dedicated rate professionals to provide a manual of standard practice for the development and establishment of cost-based water rates, fees, and charges.

As a manual of standard practice, AWWA advocates the use of the generally accepted cost-based principles and methodologies for establishing rates, charges, and fees contained and discussed within this manual. Establishing cost-based and equitable rates is technically challenging and requires, at some level, knowledge and understanding of finance, accounting, budgeting, engineering, system design and operations, customer service,

public outreach and communication, and the legal environment as it may relate to setting rates, fees, and charges.

OBJECTIVES OF COST-BASED RATE-MAKING

Water rates developed using the methodologies discussed in this manual, when appropriately applied, are generally considered to be fair and equitable because these rate-setting methodologies result in cost-based rates that generate revenue from each class of customer in proportion to the cost to serve each class of customer. Water rates are considered fair and equitable when each customer class pays the costs allocated to the class and, consequently, cross-class subsidies are avoided.

While recovery of the full revenue requirement in a fair and equitable manner is a key objective of a utility using a cost-of-service rate-making process, it is often not the only objective. The following list contains the typical objectives in establishing cost-based rates (Bonbright, Danielsen, and Kamerschen 1988):

- Effectiveness in yielding total revenue requirements (full cost recovery)
- Revenue stability and predictability
- Stability and predictability of the rates themselves from unexpected or adverse changes
- Promotion of efficient resource use (conservation and efficient use)
- Fairness in the apportionment of total costs of service among the different ratepayers
- Avoidance of undue discrimination (subsidies) within the rates
- Dynamic efficiency in responding to changing supply-and-demand patterns
- Freedom from controversies as to proper interpretation of the rates
- Simple and easy to understand
- Simple to administer
- Legal and defensible

GENERALLY ACCEPTED RATE-SETTING METHODOLOGY

This manual outlines the methodologies and analyses that are used to establish cost-based rates. As displayed in Figure I.1-1, the generally accepted rate-setting methodology includes three categories of technical analysis. The first is the revenue requirement analysis. This analysis examines the utility's operating and capital costs to determine the total revenue requirements and the adequacy of the utility's existing rates. Next, a cost-of-service analysis is used to functionalize, allocate, and equitably distribute the revenue requirements to the various customer classes of service (e.g., residential, commercial) served by the utility. The final technical analysis is the rate-design analysis. It uses the results from the revenue-requirement and cost-of-service analyses to establish cost-based water rates that meet the overall rate-design goals and objectives of the utility.

Sections of this manual have been dedicated to providing detailed discussions of the three types of analysis. Section II of this manual discusses the various technical components of establishing a utility's revenue requirements. Section III discusses the various methodologies that may be used to conduct a cost-of-service analysis. Finally, section IV reviews the various issues and technical considerations in designing water rates.

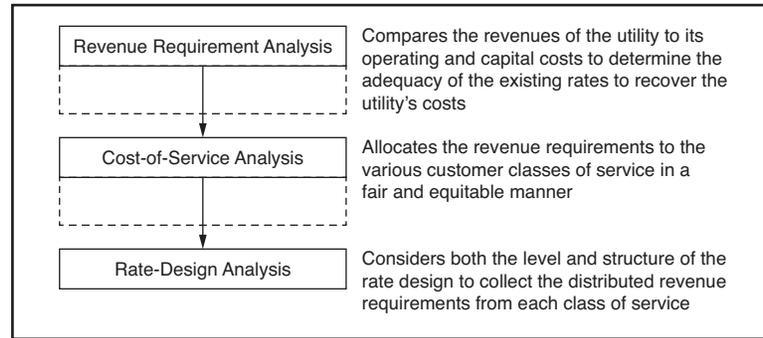


Figure I.1-1 Analytical steps of cost-based rate-making

KEY TECHNICAL ANALYSES OF COST-BASED RATE-MAKING

In establishing cost-based water rates, it is important to understand that a cost-of-service methodology does not prescribe a single approach. Rather, as the first edition of AWWA's Manual M1 noted, "the [M1 manual] is aimed at outlining the basic elements involved in water rates and suggesting alternative rules of procedure for formulating rates, thus permitting the exercise of judgment and preference to meet local conditions and requirements" (AWWA 1954). This manual, like those before it, provides the reader with an understanding of the options that make up the generally accepted methodologies and principles used to establish cost-based rates. From the application of these options within the principles and methodologies, a utility may create cost-based rates that reflect the distinct and unique characteristics of that utility and the values of the community.

Revenue Requirement Analysis

The purpose of the revenue requirement analysis is to determine the adequate and appropriate funding of the utility. Revenue requirements are the summation of the operation, maintenance, and capital costs that a utility must recover during the time period for which the rates will be in place. Two generally accepted approaches for establishing a utility's revenue requirements are discussed in this manual: the cash-needs approach and the utility-basis approach. Section II of the manual provides a detailed discussion and numerical examples about how to establish a utility's revenue requirements using these two approaches, and this section provides a framework for determining how to select between the two approaches.

Cost-of-Service Analysis

The purpose of the cost-of-service analysis is to equitably distribute the revenue requirements between the various customer classes of service served by the utility. The cost-of-service analysis determines what cost differences, if any, exist between serving the various customer classes. The two generally accepted methodologies for conducting the cost-of-service analysis are called the base-extra capacity method and the commodity-demand method. The functionalization, allocation, and distribution process of the base-extra capacity and commodity-demand methodologies are generally considered fair and equitable because both approaches result in the revenue requirements being distributed to each class in proportion to each class's contribution to the system cost components. Discussions of both cost-of-service methodologies, along with numerical examples to illustrate their differences, are provided in section III of this manual.

Rate-Design Analysis

The final technical analysis is the rate-design analysis. This analysis determines how to recover the appropriate level of costs from each customer class of service. There are different rate structures that may be used to collect the appropriate level of revenues from each customer class of service. Section IV of this manual covers the selection and development of rate designs in detail.

OTHER WATER RATE ISSUES AND CONSIDERATIONS

In addition to the topics previously discussed, this manual also contains guidance on a variety of other water rate and cost recovery issues, capacity and development charges, and water rate implementation issues. These topics are discussed in sections V through VIII.

Section V provides an overview of many distinct situations and pricing considerations that utilities may need to address. It is not unusual for a utility to face situations where a customer or group of customers has unique characteristics and circumstances. These situations include reuse rates and charges, standby rates, drought and surcharge rates, low-income affordability rates, negotiated contract and economic development rates, indexed rates, price elasticity, marginal cost pricing, and miscellaneous and special charges. Regardless of the distinctive situation and pricing considerations, the cost-based principles and methodologies as discussed within this manual should be adapted for the cost analysis to provide proper support for the rates.

Section VI is devoted to the development of rates for customers outside a municipality that owns the system. It has been expanded to include an overview of setting rates for outside customers, with chapters on wholesale (or bulk) charges and retail sales.

In recent years, the cost of system expansion and customer growth has had a significant financial impact on utilities. The development of cost-based connection fees, system development charges, or dedicated capacity charges are the topics reviewed in section VII.

Finally, while cost-of-service principles for rate-making and related fees and charges rely on significant amounts of financial analysis, engineering analysis, and policy decisions, it is necessary to engage the public. These topics, along with the data needs for developing cost-based rates, are discussed in section VIII of the manual.

REFERENCES

- AWWA. 1954. Manual M1. *Water Rates Manual*, 1st ed. Denver, Colo.: AWWA. p. 1.
- Bonbright, J.C., A.L. Danielsen, and D.R. Kamerschen. 1988. *Principles of Public Utility Rates*, 2nd ed. Arlington, Va.: Public Utilities Reports. pp. 383–384.
- Woodcock, C.P.N. 2013. A Brief History of Water Rates Manuals and Publications. *Journal of the New England Water Works Association*, December.