LOS ANGELES DEPARTMENT OF WATER & POWER

2014 Water Service Cost of Service Study

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1 EXECUTIVE SUMMARY

1.1 Introduction

On October 2, 2012, the Los Angeles City Council approved the Los Angeles Department of Water and Power's (LADWP or the Department) Incremental Electric Rate Ordinance No. 182273 to provide incremental rate adjustments for fiscal years (FY) 2012-13 and 2013-14. In its action to approve LADWP's power rates, the Council, along with other recommendations, requested that LADWP "conduct a new formal cost of service study (COSS) in order to prepare for future power rate restructuring". Though this recommendation was in response to a Power System rate ordinance, LADWP has also completed a cost of service study for its Water System rates to evaluate its water service cost structure and ensure that its rates are appropriate for each customer class.[1]

The City of Los Angeles has a long history of implementing water rates that address water efficiency and sustainability. The Mayor's Blue Ribbon Committee (BRC) established precedent for LADWP's rate setting approach in 1992; several of the BRC's objectives and principles for water rates in the City of Los Angeles are still applicable today.

Objectives of Rate Setting

- Rates should be equitable across customer classes;
- Rates should maximize the efficient allocation of resources;
- Rates should be simple and understandable; and
- Rates must generate adequate revenue. .

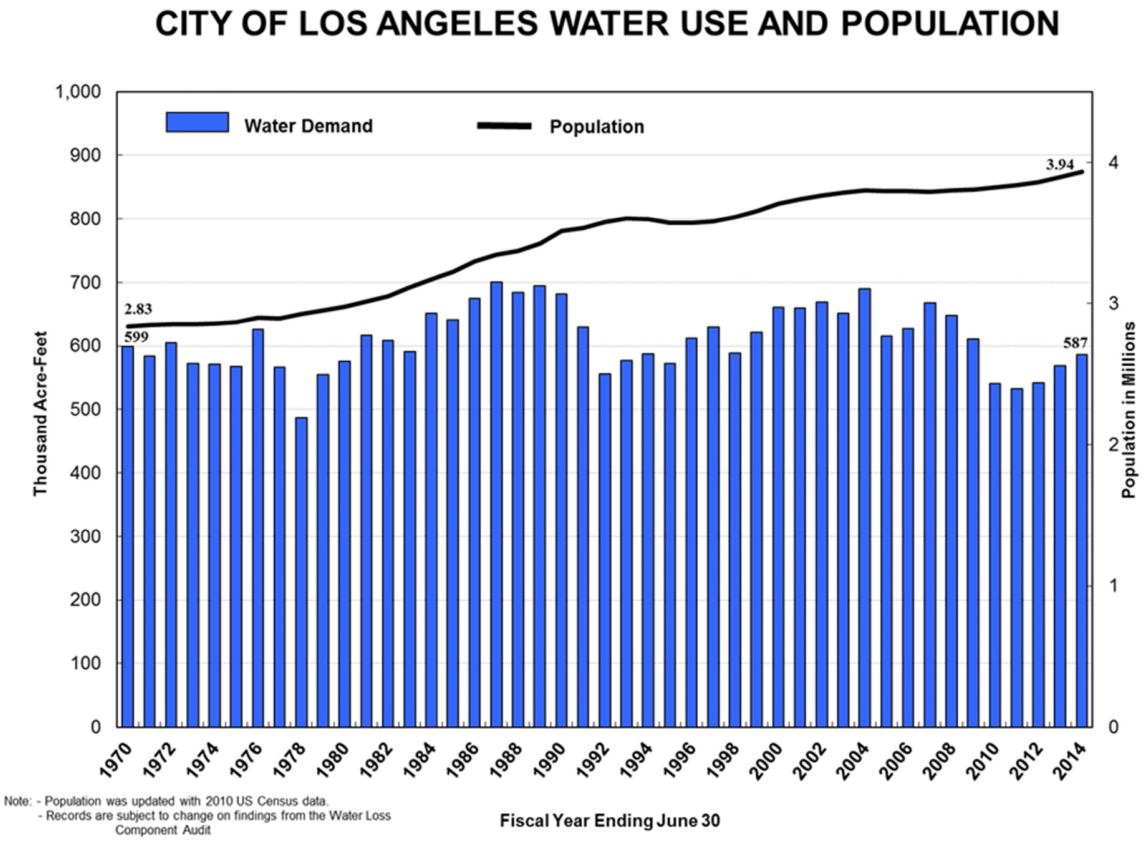
Principles of Rate Setting

- Marginal cost should be the basis of the rate structure in order to maximize efficient water use;
- Customers should not be penalized for conserving water; and
- The water rate structure should ensure that necessary investments to improve and equalize water quality throughout Los Angeles are made.

Rates based on marginal forward-looking costs were central to achieving the water rate reforms recommended by the BRC and have fundamentally contributed to water demand management in Los Angeles during periods of water scarcity, other supply uncertainties, and supply and demand imbalances. Recently, conservation has been stressed even further, as California is currently experiencing a significant drought. In early October 2014, in response to these conditions, the Mayor of Los Angeles issued an executive directive on water conservation to reduce Los Angeles' potable water use by 20% per capita by the end of 2017. A marginal cost based rate structure will help continue LADWP's conservation success. As shown in Figure 1 below, since 1970, water usage by LADWP customers has been virtually unchanged despite a 10% growth in population in the region. LADWP looks to continue this success story.

[1] Even in the absence of the Council's Motion, periodic cost of service studies are a common industry practice.

Figure 1: Historical LADWP Water Usage



A cost of service study which follows a marginal cost approach facilitates attaining the following objectives:

- Ensure rates for each major class of customers recover the costs associated with providing service to that class of customers;
- Allow the development of rates that produce revenue to recover the costs of LADWP's programs;
- Encourage efficient system expansion and the efficient use of utility facilities, and discourage wasteful use;
- Provide appropriate (and efficient) price and resource allocation signals (in tandem with the related cost based rate design); and
- Provide legally defensible foundation for cost based rates.

1.2 Marginal Cost Study Approach

LADWP has chosen to use a marginal cost approach to determine the cost of providing service to the major customer classes and to guide the development of rates. Marginal costs reflect the change in cost incurred to serve a small increment in demand for services. Marginal costs therefore measure the additional costs of providing the next unit of service, whether that is the next unit of water or the additional burden that adding an additional HCF (hundred cubic feet) of demand places on the water system. Marginal costs are calculated for small changes in each cost driver by dividing the change in total cost by

the change in the cost driver. For instance, a marginal cost is calculated for a change in distribution O&M cost from a small change in water usage.

The marginal cost approach is an accepted methodology for utility cost of service studies in the United States and globally. For over twenty years, the California Public Utilities Commission (CPUC) has relied on marginal cost principles to guide rate setting. The CPUC Water Action Plan (adopted in 2005 and updated in 2010) decoupled sales from revenues, instituted tiered rate structures, and updated the water conservation funding rule - all features of the LADWP rate structure dating back to the early 1990's that are grounded in marginal cost principles. Historically, marginal cost approaches have precedent established by the Public Utility Regulatory Policy Act (PURPA) and have been used by both publicly owned utilities (POUs) and investor owned utilities (IOUs). The current LADWP cost of service study follows a marginal cost framework and marginal cost techniques.

1.3 Marginal Cost Study Methodology

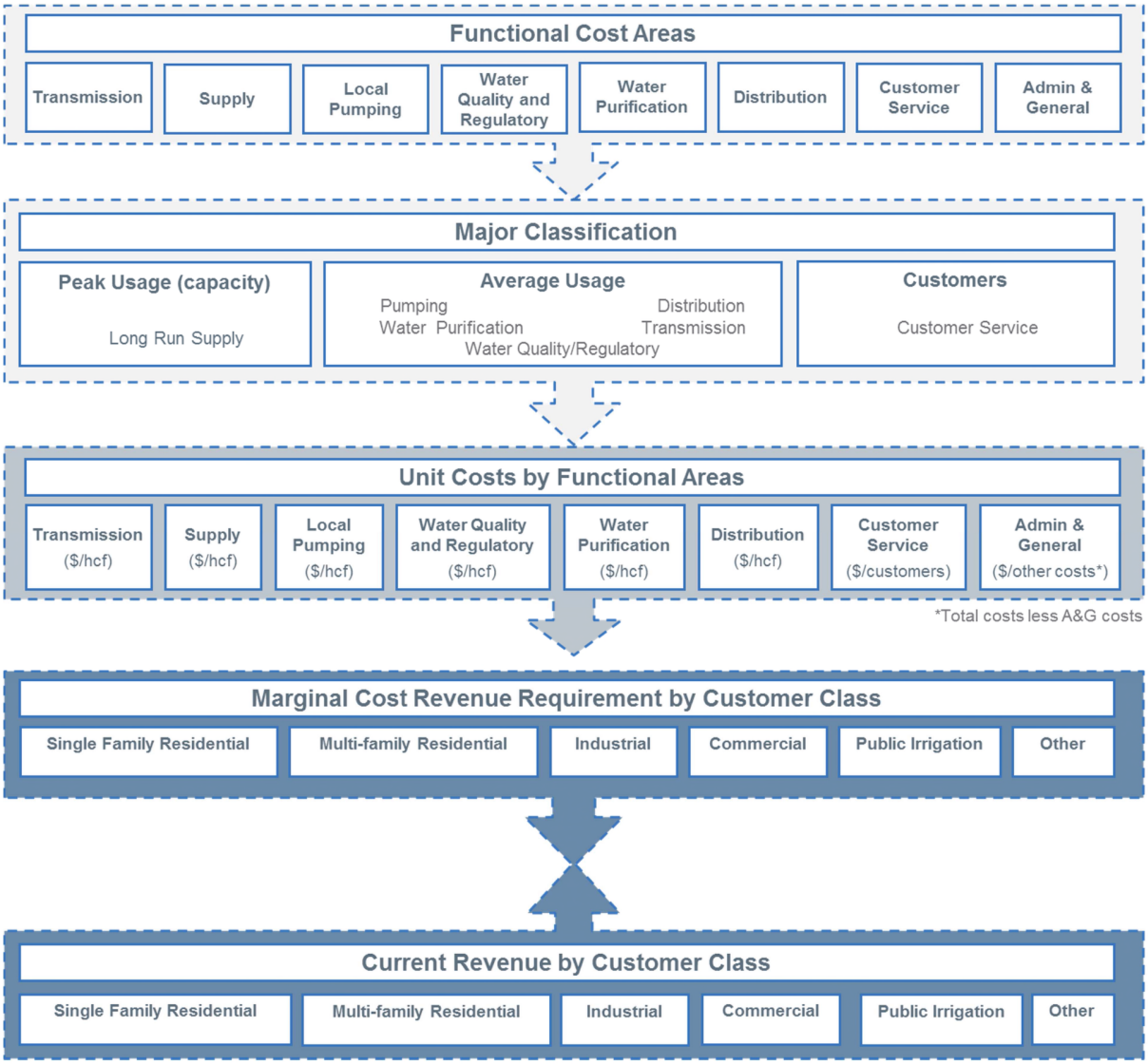
Prior to the commencement of the marginal cost study, the appropriate test year has to be established for the analysis. For the LADWP study, FY 2012-13, the most recent year deemed to have reliable information at the time of the study, was selected.

The marginal cost of service study comprises three general steps:

- Functionalization of service costs;
- Development of unit marginal costs for cost drivers; and
- Determination of marginal cost revenue requirements by customer class.

This methodology is outlined in Figure 2 below.

Figure 2: Marginal Cost of Service Study Methodology



The marginal cost of service study methodology (as applied to LADWP's water service) is comprised of the following major steps:

1.3.1 Functionalization

1. Establish the test year.
2. Identify all functional cost components associated with providing water service (transmission, supply, local pumping, water quality and regulatory, water purification, distribution, customer service, administration & general).
3. On a bottom-up basis, determine the annual marginal related costs associated with providing water service for each functional component.

1.3.2 Determination of Unit Marginal Costs

4. Determine the appropriate cost causation factor for calculating a unit marginal cost for each functional component; for example:

a. Coincident Peak (peak HCF);

b. Water usage (HCF);

c. Number of Customers (customers); or

d. Proportionate to other costs.

5. Develop a unit marginal cost for each functional category component by dividing the marginal costs calculated for each functional component in Step 3 by the corresponding cost causation factor from Step 4.

6. Identify all major customer classes for water service[2]:

- Single-Dwelling Unit Residential Customers (Schedule A)
- Multi-Dwelling Unit Residential Customers (Schedule B)
- Commercial (Schedule C)
- Industrial (Schedule C)
- Other (Schedule C Governmental and Temporary Construction)[3]
- Public Irrigation (Schedule F - Publicly-Sponsored Irrigation; Recreational; Agricultural, Horticultural, and Floricultural Uses; Community Gardens and Youth Sports)

7. From Step 4, determine the customer class-specific cost causation factors:

- Proportionate capacity levels (Coincident Peak) for each customer class;
- Water consumption volume (HCF) for each customer class;
- Number of customers in each class; or
- Proportionate to other costs

1.3.3 Determination of Unit Marginal Cost Revenue Requirements

8. Calculate the marginal cost revenue requirement for each customer class by distributing the functionalized costs to customer classes. This is accomplished by multiplying the unit marginal cost for each functional component in Step 5 by the corresponding customer class–specific cost causation factor in Step 7.

9. Determine the aggregate marginal cost revenue requirement for each customer class by summing the functional component revenue requirements from Step 8.

10. Compare the marginal cost revenue requirement percentage (compared to the aggregate) and the current (FY 2012-13)[4] revenue percentage for each customer class to determine whether the current revenue distribution across customer classes is in proportion to the marginal costs.

The results will be used to develop rates and rate structures to collect customer class revenues appropriate for each class.

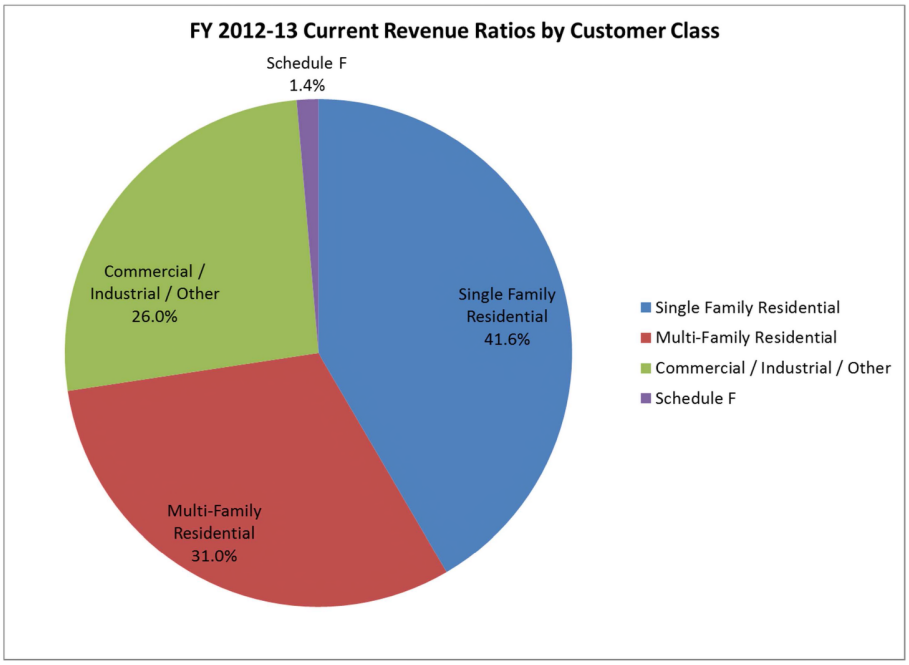
The current (FY 2012-13) allocation of water service revenues to customer classes is displayed in Figure 3.

[2] Due to the relatively small amount of usage, Reclaimed Water Service (Schedule D) and Private Fire (Schedule E) were excluded.

[3] Commercial, Industrial, Non-Irrigation Government and Temporary Construction customers are treated as one customer class.

[4] FY 2012-13 was the most recent year for which reliable data were available at the time of the study.

Figure 3: FY 2012-13 Current Revenue Ratios by Customer Class



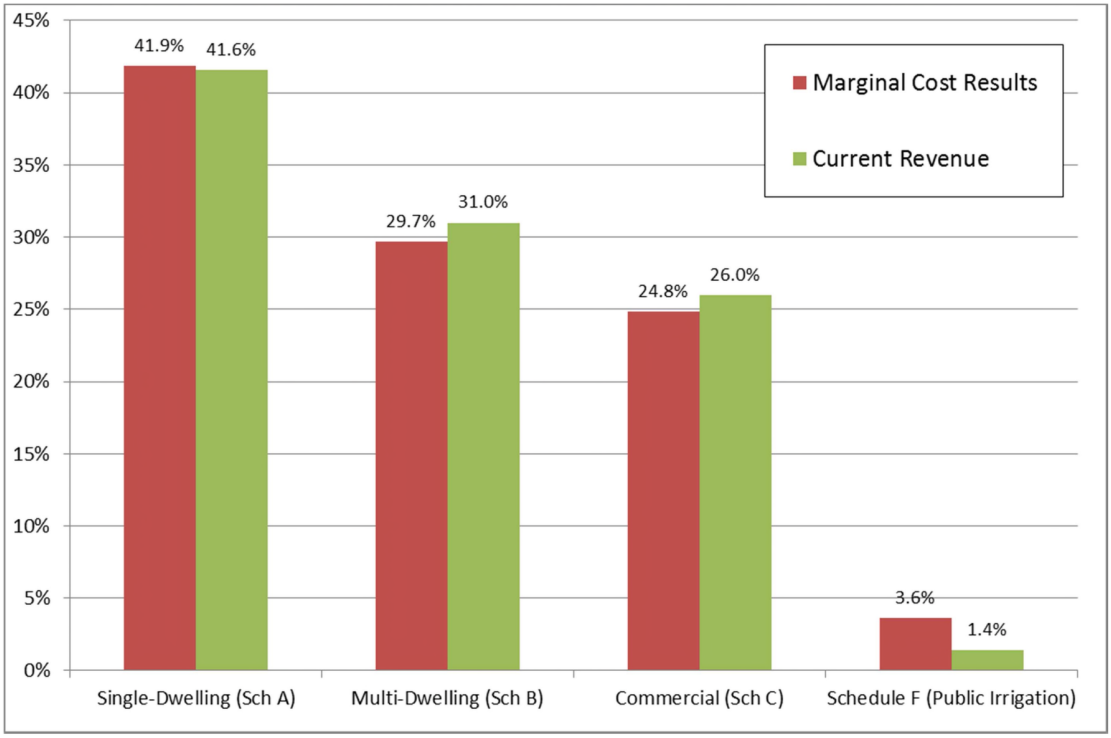
1.4 Summary of LADWP Marginal Cost Study Results

Figure 4 and Figure 5 below provide the comparisons between the marginal cost revenue requirement and the current revenue percentages (for the FY 2012-13 test year) for each customer class.

Figure 4: Comparison of Marginal Cost Revenue Requirement and Current Revenues

	Single-Dwelling Unit Residential (Sch A)	Multi-Dwelling Unit Residential (Sch B)	Commercial/ Industrial/ Other (Sch C)	Public Irrigation (Sch F)	Total
Total Marginal Cost Revenue Requirement (FY 2012-13)	$745,433,344	$527,775,075	$442,156,766	$63,986,765	$1,779,351,949
Percent of Total	41.9%	29.7%	24.8%	3.6%	100.0%
Current Revenue	$385,439,493	$287,958,501	$241,187,291	$12,825,922	$927,411,208
Percent of Total	41.6%	31.0%	26.0%	1.4%	100.0%

Figure 5: Comparison of Marginal Cost Revenue Requirement and Current Revenue Ratios



Results of the LADWP marginal cost of service study indicate that allocating the revenue requirement based on marginal costs results in Single Dwelling Unit Residential (Schedule A) customers being responsible for 41.9% of the revenue requirement, which is slightly higher than the current revenue level of 41.6%. Conversely, the allocated marginal costs for the Commercial/Industrial/Other customer class would result in a slightly lower revenue requirement of 24.8% instead of the current revenue level of 26.0% for this customer class. For Schedule F, customer class revenue requirement is 3.6% compared to the current revenue level of 1.4%.

As an added step to consider allocation of costs among customer classes in relation to cost of service, the Department conducted a draft embedded cost of service analysis[5] based on the Base-Extra Capacity methodology outlined in American Water Works Association's (AWWA) *M1 Manual, Principles of Water Rates, Fees and Charges*. The embedded cost[6] of service analysis confirms the marginal cost of service study in that the results are in the same direction – the revenue requirement percentages of both methodologies are either both above or both under current revenue requirement percentages of each customer class.

The percentages for each customer class as calculated from the marginal cost of service study will be used to guide allocation of the total revenue requirement to customer classes through the rate design. Rates for each major class of customers will be designed to recover approximately the portion of the revenue requirement assigned to each class based on the cost of service study results, consistent with legal considerations.

[5] Data based on Financial Case #33.

[6] Embedded Cost is also referred to as Average Embedded Cost.

2 MARGINAL COST OF STUDY APPROACH & METHODOLOGY

2.1 Introduction

On October 2, 2012, the Los Angeles City Council approved the Los Angeles Department of Water and Power's (LADWP) Incremental Electric Rate Ordinance No. 182273 to provide incremental rate adjustments for fiscal years (FY) 2012-13 and 2013-14. In its action to approve LADWP's power rates, the Council, along with other recommendations, requested that LADWP "conduct a new formal cost of service study (COSS) in order to prepare for future power rate restructuring". Though this recommendation was in response to a Power System rate ordinance, LADWP has also completed a cost of service study for its Water System rates to evaluate its water service cost structure and ensure that its rates are appropriate for each customer class. [7]

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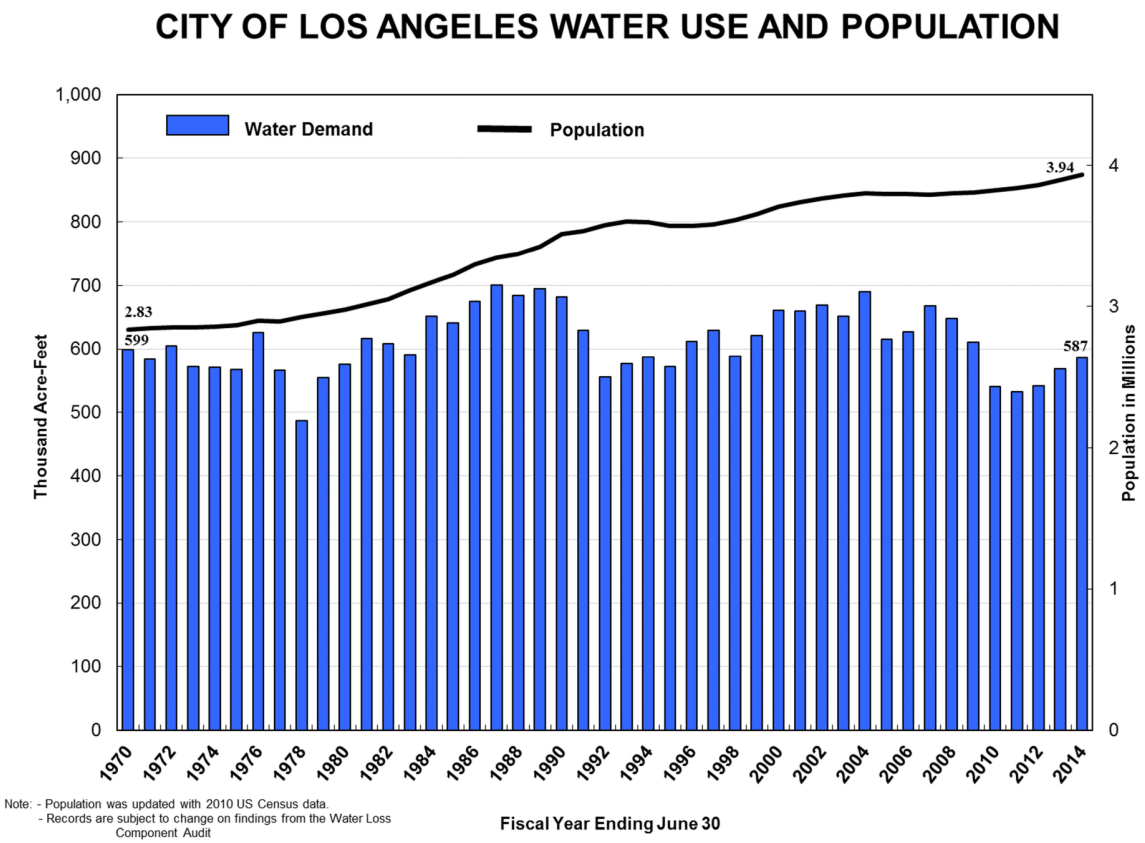
[7] Even in the absence of the Council's Motion, periodic cost of service studies are a common industry practice.

Figure 6: Historical LADWP Water Usage and Population by Fiscal Year



2.2 Marginal Cost of Service Study Approach

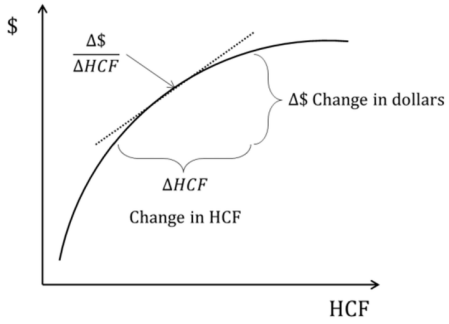
Traditional utility ratemaking is founded upon a cost-causation principle, in that rates for providing utility services should reflect the costs of providing that service. Cost of service studies also use cost-causation principles in allocating the costs of providing services to individual customer classes. A marginal cost of service study is comprised of three key steps:

- *Functionalize* costs according to whether they are supply, transmission, distribution, customer, or general in nature;
- *Classify* costs as to whether they are driven by long run supply costs (demand or capacity), commodity costs, customer related, or proportionate to other costs; and
- *Distribute* costs to specific customer classes (e.g., single-dwelling unit residential, multi-dwelling unit residential, etc.).

In simple economic terms, marginal costs measure the additional costs incurred to provide the next unit of service. A marginal cost of service study is forward-looking and answers the question: *How much will it cost the utility to provide an additional unit of service by customer class?* The study assesses the incremental costs of an additional HCF of water, or to serve an additional customer.

Incremental costs may result from factors such as additional overall water use, peak seasonal capacity, or water treatment needs. Such incremental services may also trigger the need for new supply, distribution, or treatment facilities, each of which may have its own incremental cost. Figure 7 provides a graphical depiction of the incremental cost concept.

Figure 7: Depiction of incremental costs with incremental increase in HCF



While the approach to completing a marginal cost of service study is forward looking and incremental in nature, historical accounting information may be used to inform the understanding of future costs. However, since a marginal cost of service study uses a bottom-up approach in deriving functional costs, the marginal cost revenue requirement(s) derived may be different from the current revenue requirement(s).

Conducting a marginal cost of service study is relevant and appropriate for a utility dealing with a changing cost structure because the resulting rates should provide appropriate forward-looking price signals and encourage more efficient use of system resources. Thus, marginal cost of service studies are recommended by the Blue Ribbon Committee and CPUC. LADWP has successfully used an efficiency oriented water rate structure over the last two decades to manage water demand and system costs. LADWP has therefore selected the marginal cost approach for its current cost of service study to allocate costs to customer classes for establishing rates.

A marginal cost of service approach has the following benefits:

- Is based on an established framework formulated by NERA Economic Consulting, a nationally recognized expert in the field;
- Follows an accepted methodology amongst IOUs in California;
- Aligns with marginal cost principles, which the CPUC has used for 20 years;
- Recognizes incremental costs of water supply, consistent with trends in the water industry that have been shifting toward increasing block rates;
- Tracks cost changes associated with changing technologies and regulatory requirements of the dynamic and highly capital-intensive water industry; for these, future costs may be more representative of present conditions than historical costs;
- Encourages more efficient utilization of both the water system and water resources; and
- Is consistent with legal considerations.

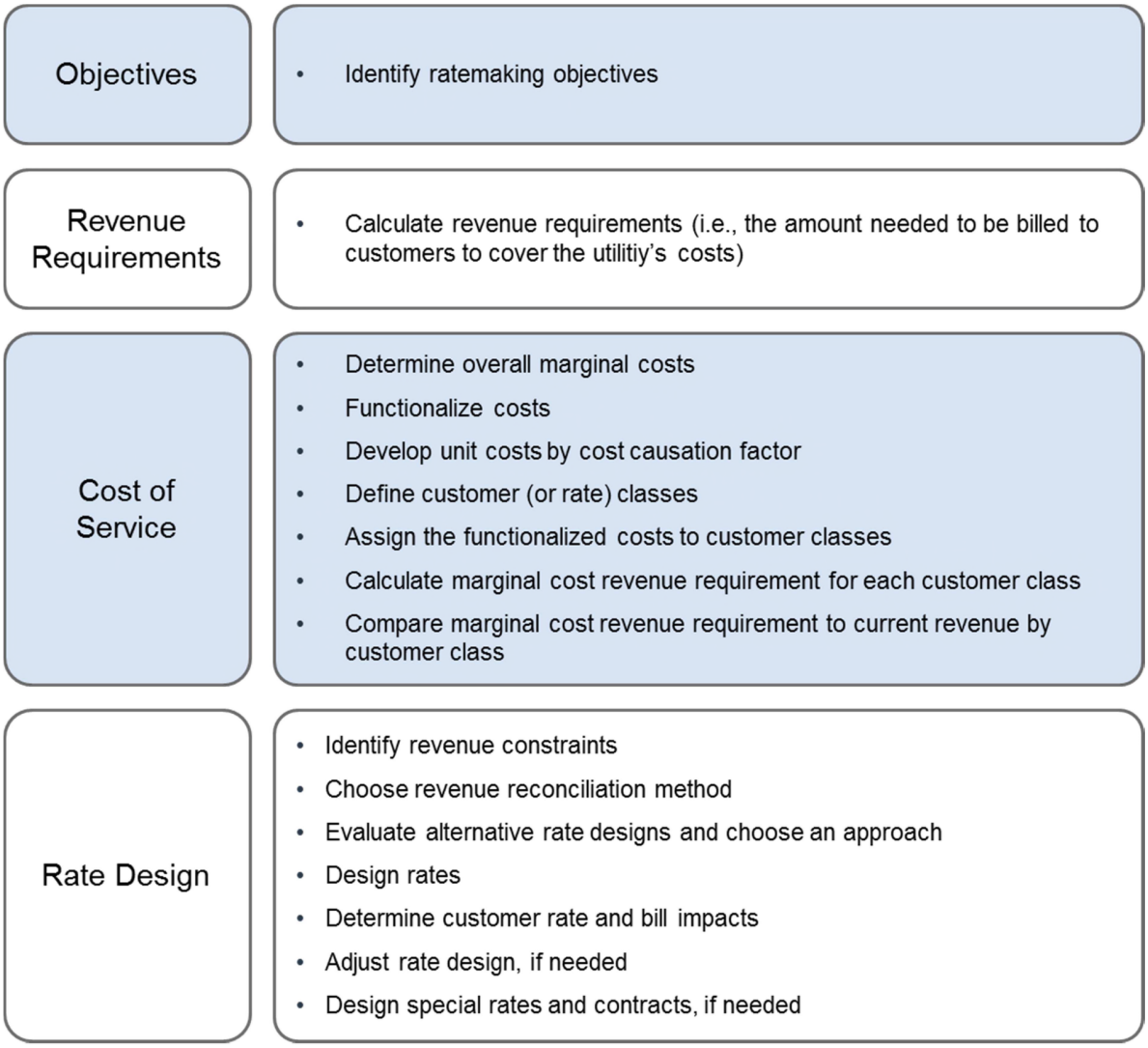
It should be noted that the marginal cost of service approach involves a detailed analysis of projected utility costs and deals with greater uncertainty. Specifically,

- Marginal cost of service study requires projections of future costs for water or additional capacity, not simply the use of historical costs already recorded in the books of the utility;
- Capital-related, consumption-related, and customer-related costs have to be estimated in a careful manner to account for the variability of capital expenditures from year to year; and
- Shifting costs to peak periods or higher blocks of consumption may affect revenue stability as water demand changes. If the higher billing rates for higher blocks serve their intended purpose, they reduce demand during peak periods and from high use customers. Revenue recovery needs to be addressed through the design and level of the rate structure.

2.3 Marginal Cost of Service Study and the Rate Design Process

A marginal cost of service study is an established method that sets the starting point for utilities to develop rates and rate structures which produce revenue sufficient to recover the costs associated with the provision of water service. Therefore, the marginal cost of service study is an important aspect of the overall rate making process as outlined in Figure 8 below.

Figure 8: Typical Rate Making Process



2.4 Water System Overview

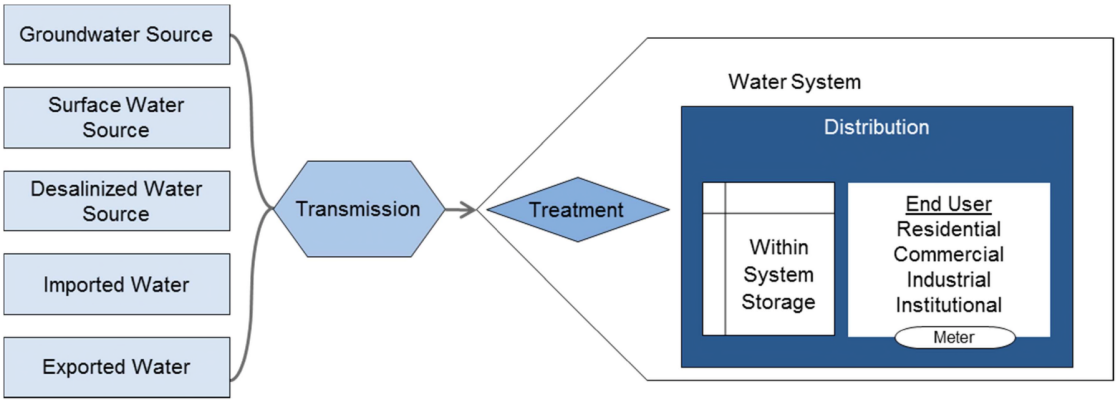
Water utilities are to provide safe, potable water to a variety of customers that include commercial, industrial, and residential classes. The water supply system in general is composed of the following major functional components:

- Supply;
- Transmission/Conveyance;
- Treatment/Water Quality; and
- Distribution.

Supporting these functional components of the water system is the Administration and General function.

Figure 9 provides an illustration of a sample water supply system.

Figure 9: Illustration of Sample Water Supply System



Water enters the system from various sources on the left - potentially including groundwater, surface water, and other sources. The water utility withdraws the water at its source, conveys the water (transmission), treats, stores, and distributes the water to its customers.

The water is delivered to the different end users - residential, commercial, industrial, and other types of customers. Consumption of the delivered water is measured by a water meter that provides the basis for determining a customer's water bill.

This picture of a water system provides the different utility functional components related to obtaining, transmitting, and delivering water. Examination of the costs and benefits of the different functions necessitated by water consumption lies at the heart of efficiency analysis. In fact, the movement toward "Full Cost" pricing[8] by water utilities requires that costing be broken out by functional component.

2.5 Marginal Cost Study Methodology

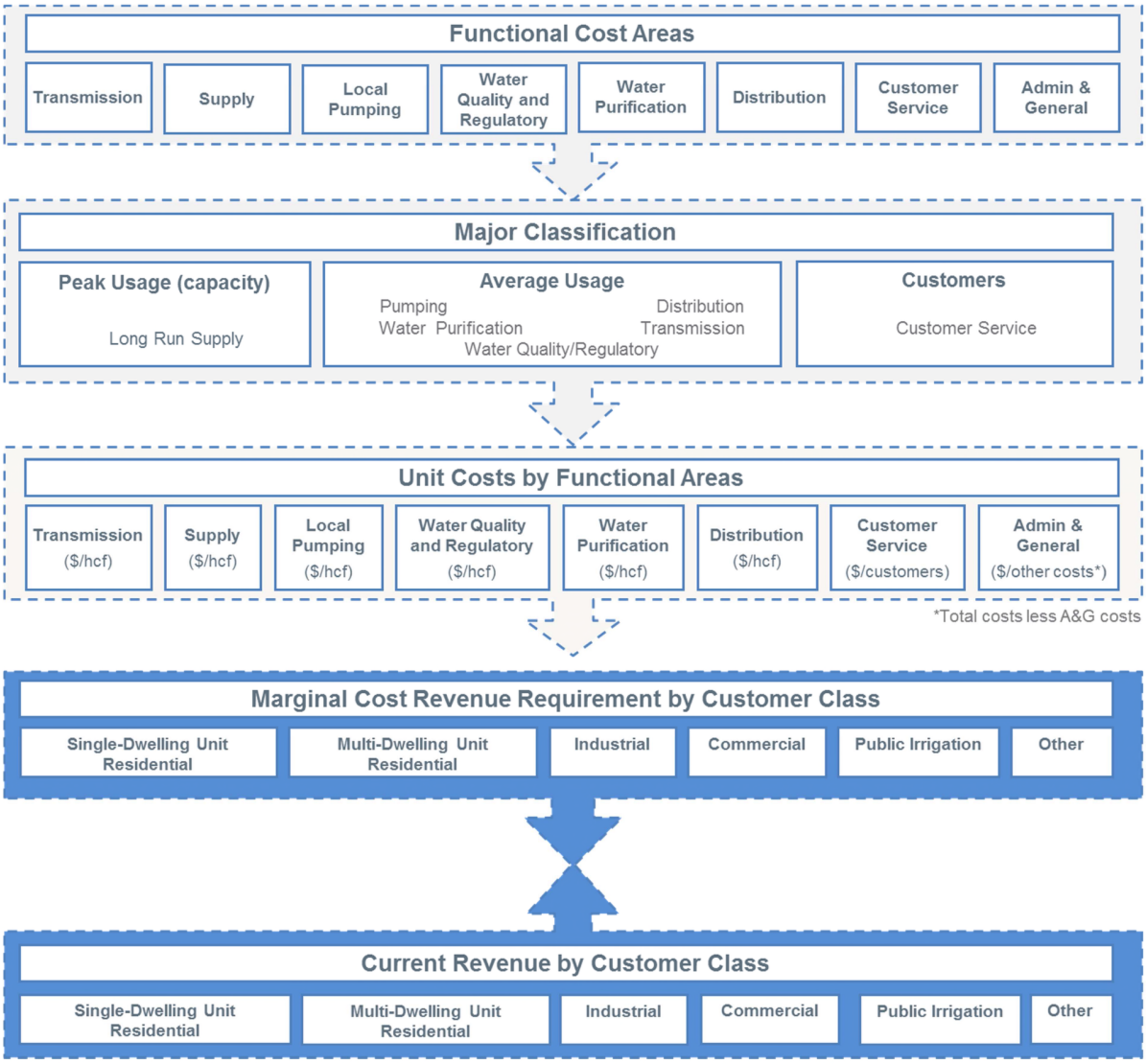
The marginal cost of service study comprises three general steps:

- Functionalization of service costs;
- Development of unit marginal costs/ cost drivers for cost causation factors; and
- Determination of marginal cost revenue requirements by customer class.

The following graphic Figure 10 summarizes these three general steps.

[8] For additional information on costing concepts behind "Full Cost" see *Full Cost Accounting: Practical Guidance on Converting to FCA*, Government Finance Officers Association under Cooperative Agreement with US EPA, February 2000, http://www.epa.gov/epaoswer/non-hw/muncpl/fullcost/natdocs.htm.

Figure 10: Marginal Cost of Service Study Methodology



2.5.1 Functionalization

The first step in the cost of service study is to determine the test year. For this study, FY 2012 – 13, the most recent year deemed to have reliable data at the time of the study, was chosen (refer to Section 3.1 for more detail).

Next, the various functions performed by LADWP in the provision of water services were determined. These functional cost components have been identified as the following (more detailed information can be found in sections 3.3.1 through 3.3.8):

- Transmission - Los Angeles Aqueduct system and supporting facilities plant costs;
- Supply - the supply of water including plant, O&M, purchased water, and an adder for the incremental costs of the Bay Delta Fix[9] and Cap and Trade[10];

[9] The Bay Delta Conservation Plan adder comes from the anticipated multi-billion dollar project expected in the California Bay Delta area that is comprised of conveyance tunnels and bioremediation measures to save habitats of local species. This capital project will increase prices for MWD purchases. Refer to Section 3.3.2.3 for further discussion.

- Water Quality and Regulatory - the capital costs of water quality and treatment;
- Local Pumping - O&M cost of pumping local water such as energy costs;
- Water Purification - O&M cost of water treatment;
- Distribution -- O&M and plant costs for delivery of water to customers including storage;
- Customer Service - customer service, meter reading, and billing costs; and
- Administrative and General - the cost of administrative functions such as human resources, finance and accounting, information technology, etc.

The marginal cost of service study focuses on developing marginal cost based revenue requirements for each functional component and its sub-components. The objective of this exercise is to determine the costs associated with producing an incremental unit of water, adding an HCF/Period of demand, or serving an additional customer. Then, on a bottom-up basis, the annual marginal related costs associated with providing water service for each functional component are determined.

2.5.2 Development of Unit Marginal Costs/Cost Drivers

The second general step, "cost driver classification" (Bonbright, 1961), is the process of selecting units (e.g., average usage, peak usage, number of customers) to allocate costs within functional components. Based on cost causation factors, unit marginal costs (e.g., $/HCF) are derived for each functional component.

The LADWP Water System incurs costs based on the following cost causation factors:

- **Seasonal Peak Consumption Related Costs**

  These costs are incurred as a result of maximum seasonal water consumption requirements and are allocated among the customer classes on the basis of seasonal peak consumption volume (peak HCF).

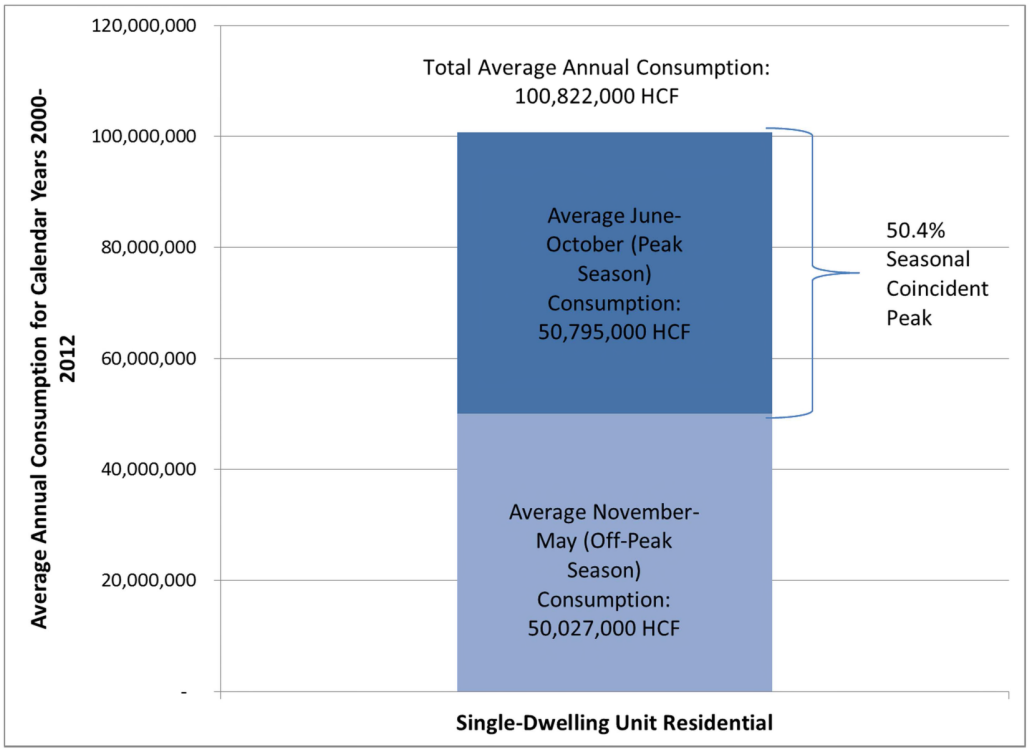
  For the marginal cost study, measuring system demand is not merely a summation of individual customer class maximum demands because the maximum demands for individual customer classes do not necessarily occur at the same time period. For example, daily usage may peak for residential customers on days when the weather is very hot and dry; for commercial and industrial customers, daily usage may peak based on demands in the marketplace. For the overall system, capacity requirements depend on peak seasonal demand which is not necessarily coincident although usually correlated with seasonal climate. Therefore, each customer class's capacity requirements at its peak determines its contribution to System Coincident Peak Demand (CP).

  System Coincident Peak Demand denotes the contributions of each customer class coincident with the system demand for peak capacity. This measurement is used to allocate marginal purchased water supply costs to customer classes. This allocation is based on the theory that marginal water supply costs are driven by periods of peak demands on the system.

  There are several variations of the Coincident Peak Demand method that could be applied to water system capacity analysis, including daily demand (MGD or thousand gallons per day), monthly acre-feet (AF), or seasonal AF peaks. For the LADWP marginal cost study, the Seasonal Coincident Peak method is used to calculate the demand during the peak season (June – October) for the long run marginal supply source (refer to Figure 11 for a sample depiction of Single-Dwelling Unit Residential Seasonal Coincident Peak).

[10] Cap and Trade refers to the regulation of emissions from electricity production. Electricity production is a significant portion of costs for the transportation of future water purchases. Refer to Section 3.3.2.3 for further discussion.

Figure 11: Depiction of Single-Dwelling Unit Residential Seasonal Coincident Peak



- **Water Consumption (Volume) Related Costs**

  Some costs, such as water supply O&M, water distribution, pumping costs, treatment operating costs, and certain other O&M expenses, are directly related to the quantity of water consumed. These costs are allocated among the customer classes on the basis of water consumption volume which the system must supply to serve the customers. In other terms, these are variable commodity costs (pumping costs, treatment O&M, and other costs related to the quantity of water consumption).

- **Customer Related Costs**

  These costs reflect the marginal costs of customer connections to the distribution system and various customer services and are allocated on the basis of the number of customers in each class.

- **Administrative and General (A&G) Costs**

  These costs typically cannot be allocated to customer classes based on direct cost causative allocation factors. Instead, A&G costs are allocated in direct proportion to total costs, an indirect cost causative allocation approach.

Figure 12 shows a summary of cost causation factors and marginal cost units for each functional cost component/sub-component.

Figure 12: Cost Causation Factor Criteria and Marginal Cost Units

Functional Cost Component	Cost Causation Factor	Marginal Cost Units
Transmission (Capital)	Consumption volume by customer class	$/HCF/annual
Supply (O&M)	Consumption volume by customer class	$/HCF/annual
Supply (Plant)	Consumption volume by customer class	$/HCF/annual
Supply, Adder for BDCP Delta Fix, Cap and Trade	Consumption volume by customer class	$/HCF/annual
Supply, Purchased Water / Long Run Supply	Seasonal coincident peak by customer class	$/peak HCF/annual
Local Pumping	Consumption volume by customer class	$/HCF/annual
Water Quality and Regulatory Capital	Consumption volume by customer class	$/HCF/annual
Water Purification	Consumption volume by customer class	$/HCF/annual
Distribution Storage (Plant)	Consumption volume by customer class	$/HCF/annual
Distribution Storage (O&M)	Consumption volume by customer class	$/HCF/annual
Distribution (Plant)	Consumption volume by customer class	$/HCF/annual
Distribution (O&M)	Consumption volume by customer class	$/HCF/annual
Customer Service, Billing	Number of Customers	$/HCF/annual
A&G and General Plant Adder	Percent of (Proportionate to) All Other Costs	$/HCF/annual

These cost causation factors form the basis for the determination of marginal unit costs for each functional component (and sub-component). Based on appropriate allocation criteria, the cost causation factors are also utilized for the allocation of unit marginal costs to customer classes.

2.5.3 Customer Class Marginal Cost Allocation

LADWP serves the following major customer classes:

- Single-Dwelling Unit Residential Customers (Schedule A);
- Multi-Dwelling Unit Residential Customers (Schedule B);
- Commercial (Schedule C);
- Industrial (Schedule C);
- Other (Schedule C Governmental and Temporary Construction)[11]; and
- Public Irrigation (Schedule F - Publicly-Sponsored Irrigation; Recreational; Agricultural, Horticultural, and Floricultural Uses; Community Gardens and Youth Sports).

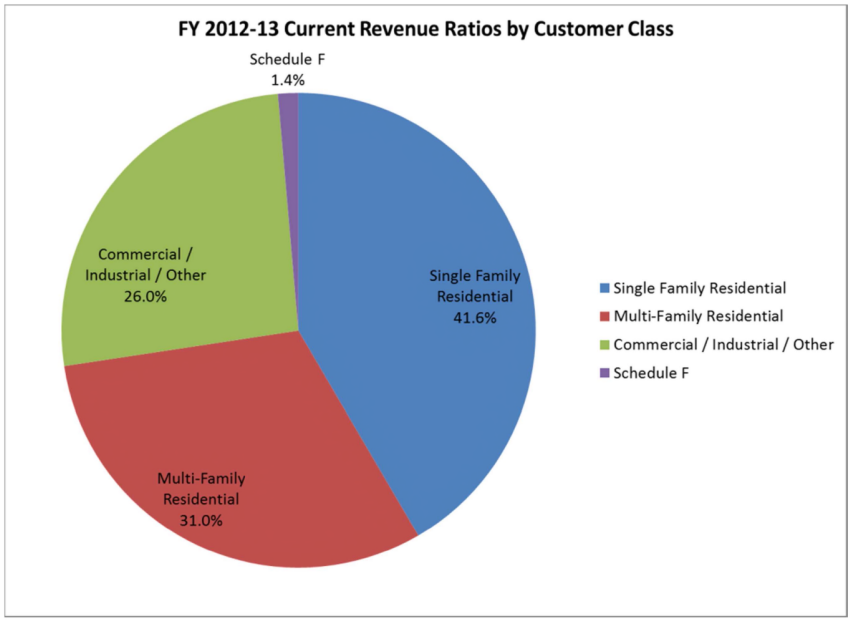
In the third general step, the marginal costs for each functional component are allocated to customer classes based on the unit marginal cost of the functional component/sub-component and the customer class cost causation factor. For example, transmission costs are allocated to customer classes by multiplying the test year usage for each customer class by the transmission functional unit cost. Total marginal costs for each class are then determined based upon the aggregation of the functional cost components.

[11] Commercial, Industrial, Non-Irrigation Government and Temporary Construction customers are treated as one customer class in the LADWP marginal cost study.

Then, marginal cost revenue percentages (as a percentage of the aggregate) are calculated and compared to the current (FY 2012-13) revenue percentages for each customer class to determine whether the revenue distribution across customer classes is in proportion to the marginal costs. The percentages for each customer class as calculated from the marginal cost of service study will be used to guide allocation of the total revenue requirement to customer classes through the rate design. Rates for each major class of customers will be designed to recover approximately the portion of the revenue requirement assigned to each class based on the cost of service study results, consistent with legal considerations.

The current (FY 2012-13) allocation of water service revenues to customer classes is displayed in Figure 13.

Figure 13: FY 2012-13 Current Revenue Ratios by Customer Class



3 MARGINAL COST UNIT CALCULATIONS

This section describes the assumptions and data sources used to select data and arrive at the calculation of unit marginal costs. It also details the unit marginal cost calculations for each functional component.

3.1 Marginal Cost of Service Study Assumptions

The estimation of marginal costs involves a detailed analysis of projected costs for the components of various services provided by utility companies, and it is typically quite sensitive to certain parameters and assumptions, depending on the type of cost being estimated. The key assumptions for this LADWP cost study are listed in Figure 14 and Figure 15 below.

Figure 14: General Marginal Cost of Service Study Model Assumptions

General Assumption	Notes
5.25% Nominal Discount Rate[12]	This nominal discount rate was calculated based on the weighted average of interest rates of traditional borrowing (5.35%) and securitized debt (5.1%) consistent with LADWP's financial plan.
FY 2012-13 data	The most recent year with reliable data was determined to be FY 2012-13.
5.2% System Loss	This number is based on the most recent LADWP System Loss Study (September 2013)

[12] The nominal interest rate represents the cost of capital to the utility.

Figure 15: LADWP Marginal Cost of Service Study Sources of Data and Assumptions for Functional Components

Functional Cost	Key Assumptions
Supply Plant Transmission Plant	• LADWP capital budget 10-year levelized cost ○ 5.25% nominal discount rate
Incremental Supply / Long Run Supply Cost	• Based on long term marginal cost of water supplies (such as recycled water, desalinized water, or other)
Supply: Bay Delta Conservation Plan (BDCP) - cost increments in future purchased water costs	• Based on the projected cost of BDCP and Cap and Trade compliance in future purchased water
Water Quality & Regulatory Plant	• LADWP capital budget 10-year levelized cost ○ 5.25% nominal discount rate
Distribution Storage Plant Distribution Plant	• LADWP capital budget 10-year levelized cost ○ 5.25% nominal discount rate
Supply O&M, Distribution O&M, Distribution Storage O&M Water Purification O&M Local Pumping	• Functionalized General Ledger expenses
Customer Service, Billing	• From billing system (Customer Information System)
Administrative and General	• Pertain to expenses related to the general operation of Water System • Administrative & General Adder derived from FY 2012-13 General Ledger • General Plant Adder– includes expenses related to depreciation, property taxes, and debt servicing costs, prorated based on the ratio of general plant to total plant

3.2 Data Sources

Capital (Plant) Costs

The most recent Ten-Year Capital Improvement Plan (CIP) was used for the calculation of capital/plant costs. The costs were then levelized. The levelized cost is the annual payment over ten years equal to the present value of the capital costs over ten years. Though a 48-year Asset Management plan was available, it was determined that the 10-year CIP had more recent and accurate cost information.

Operating and Maintenance Costs (General Ledger)

A detailed analysis of General Ledger data was conducted to determine the functional cost components for the operating and maintenance costs. The source of the data is the LADWP General Ledger, which includes a range of accounts that delineate expenses and revenues. Data were provided by LADWP with the identifier PRIMACKVAL which contains the 3-digit Account Number and an additional 4 digits (Sub Account, Analysis Code, and Class Code). The time period for the data utilized is FY 2012-13 (July 1, 2012 to June 30, 2013) the most recent accounting period for which reliable data was available at the time the marginal cost of service study was completed. The data was extracted from the General Ledger system.

All Operating Expenses in Account Numbers in the 800s and 900s were included except for several accounts in these ranges that pertain to Reclaimed Water Credits (transfer payments) or amortization. These excluded accounts represent approximately 2 percent of Operating Expenses.

Figure 16 provides the results of the analysis. The amounts in column "FY 2012-13 Allocated Costs" are based on General Ledger data.

Figure 16: LADWP General Ledger Data

Function	PRIMA Account No.	FY 2012-13 Allocated Costs
Source of Supply	801, 803, 811, 812, 814, 817, 821	$70,888,394
Pumping Station	826, 835, 836, 837	$26,366,705
Purification	840, 841, 842, 843, 845, 846, 847	$45,134,506
Unused	872	$2,487
Distribution Storage	856, 858, 868, 869, 872, 874	$20,808,747
Distribution	857, 860, 861, 862, 868, 869, 871, 872, 873, 875, 876, 877, 879	$96,497,648
Customer	890, 891, 896, 897, 900, 901, 903, 904, 905	$77,715,691
Administrative and General	910, 916, 917, 919, 920, 921, 923, 938, 944, 946	$69,256,739
Purchased Water	804	$280,946,123
Total		**$687,617,041**

Consumption Data (Allocation Volumes)

Figure 17 below provides a summary of the allocation volumes utilized for the marginal cost of service study and the corresponding customer class percentages. If marginal costs are allocated to customer classes based on expected water consumption, then the row labeled "Consumption in HCF (FY 2012-13)" would be used to multiply the respective $/HCF unit marginal cost. For coincident peak allocation, the row labeled "Coincident Peak in HCF" would be used because it is calculated using the seasonal load factor, which is a thirteen-year average based on historical consumption data (2000-2012).

Figure 17: LADWP Consumption Data[13]

Expected Capacity Utilization	Single Family Residential (Schedule A)	Multi-Family Residential (Schedule B)	Commercial / Industrial / Other[14] (Schedule C)	Schedule F
Consumption in HCF (FY 2012-13)	95,080,125	73,383,205	61,270,652	8,339,259
Load Factor	50.4%	43.7%	45.9%	61.5%
Coincident Peak in HCF	47,876,123	32,040,629	28,131,000	5,097,954

The water demands (i.e., consumption levels) to be used for the allocation of transmission, supply, distribution and other functional costs are the demands at the point of delivery to the customer. Consequently, an estimate of system losses in demand is not performed.

[13] Due to the relatively small amount of usage, Reclaimed Water Service (Schedule D) and Private Fire Service (Schedule E) were excluded.

[14] Commercial, Industrial, Non-Irrigation Government and Temporary Construction customers are one customer class.

At the onset of this cost study, LADWP determined to change the summer season from June through October to June through September. The October month usage pattern is straddled between the summer and winter seasons, so this season change will not result in a material impact to this cost study.

3.3 Calculation of Unit Marginal Costs by Functional Component

This section describes how marginal costs are calculated for each of the various functional components - transmission, supply, water quality and regulatory, water purification, local pumping, distribution storage and distribution, customer service and billing, and administrative and general (A&G).

3.3.1 Transmission Unit Marginal Costs

For the LADWP marginal cost study, transmission marginal costs were comprised of plant costs for a single category – the Los Angeles Aqueduct (LAA) (other transmission costs are wrapped into purchased water costs).

These are costs associated with replacements of and capital improvements to the LAA. The marginal costs of the LAA are estimated based on levelized costs from the LADWP Ten-Year Capital Budget (October 2014 version). Since the LAA is existing infrastructure, the capital costs include capital investment for replacements and improvements needed to reliably transmit water. Two categories in the LADWP Ten-Year Capital Budget were used[15]:

Figure 18: LADWP Transmission Capital

Functional Item	Description
22140	LA AQUEDUCT SYS-A&B NORTH
22130	LA AQUEDUCT SYS-A&B SOUTH

In addition, Water System Organization facilities costs (FI 28201) are included here. One-half of the LAA plant costs were attributed to Transmission and one-half to Supply based on cost analysis of LADWP's standard practice.

The 10-year levelized capital cost per year for transmission was $18,745,345. Dividing by the 10 year average customer demand load of 231,127,966 HCF gives a transmission unit cost of $0.08 per HCF.

3.3.2 Supply Marginal Costs

Supply costs are those costs associated with procuring new sources of water and providing water from current sources, including water supply projects for maintaining groundwater supplies, increasing recycled water supplies, and performing environmental restoration activities in the Eastern Sierra. There are four functional sub-components of water supply costs:

- Supply (O&M),
- Supply (Plant),
- Adder for the BDCP Delta Fix and Cap and Trade, and
- Incremental Supply / Long Run Marginal Supply.

The calculations of marginal costs for each sub-component of supply are discussed in this section.

[15] "The Los Angeles Aqueduct Additions and Betterments (A&B) North and Los Angeles Aqueduct A&B South refer to capital projects for the Los Angeles Aqueduct and related structures (such as reservoirs, corrosion protection systems, etc.) owned by the Water System. A large portion of work on the 100-year-old original Los Angeles Aqueduct in the Southern District is dedicated to the rehabilitation of large diameter steel pipelines and covered concrete conduits. A large portion of work on the Northern District of the original Los Angeles Aqueduct is dedicated to the replacement of the concrete sidewall lining, fencing, and joint sealing." (Water System Ten-Year Capital Improvement Program for the Fiscal Years 2010-2019, Undated, LADWP).

3.3.2.1 Supply (O&M) Costs

The supply operations and maintenance marginal costs were estimated based on the General Ledger data described above for FY 2012-13. Supply O&M includes labor, materials, tools, engineering, and other related expenses. Supply functional sub-components include all sources of supply - impounding dams, reservoirs, spreading grounds domestic wells, and canals and conduits.

The O&M costs for supply in FY 2012-13 were $70,888,394. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a supply O&M unit cost of $0.31 per HCF.

3.3.2.2 Supply (Plant) Costs

The marginal costs of Supply (Plant) were estimated based on levelized costs from the LADWP Ten Year Capital Budget. The elements of the capital plan identified as "supply" are shown in Figure 19.

Figure 19: LADWP Supply Capital

Functional Item	Description
22150	E. SIERRA ENVNMTL CAPITAL
28183	ENERGY CNSRVTN-WTR FUNDED
24315	GROUNDWATER MGMT
22402	OWENS VALLEY DUST MITIGAT
21146	OWENS LAKE MASTER PROJECT
22160	RESOURCE DEVELOPMENT
22403	SUPPLMNTL DUST CNTRL DEVT
28204	WATER CONSRVTN-WTR FUNDED
24318	WATERSHED-STRMWTR CAPTURE

In addition, as noted above in Section 3.3.1, half of the LAA plant costs were attributed to Supply.

The 10-year levelized capital costs per year for supply were $186,532,421. Dividing by the 10 year average customer demand load of 231,127,966 HCF gives a supply unit cost of $0.81 per HCF.

3.3.2.3 Adder for the Bay Delta Conservation Plan (BDCP) Delta Fix and Cap and Trade Marginal Costs

The Sacramento-San Joaquin Delta is currently a major source of LADWP's water supply;; however, there is increasing pressure on the water supply from this source. To alleviate the stress on the Bay Delta habitats, stakeholders, such as the California State government, National Oceanic Atmospheric Administration (NOAA), Fisheries, and US Secretary of the Interior, proposed the Bay Delta Conservation Plan (BDCP). This plan includes construction of a conveyance that would divert water under the Bay Delta area to avoid pumping through the Delta, as well as a component for eco-restoration.

The BDCP will affect LADWP because it will increase the cost of purchased water significantly, as the Metropolitan Water District (MWD) would be responsible for about 25% of the state and federal contractor's share. These costs would then be passed through to LADWP (and other MWD customers) through higher prices of purchased water each year.

The BDCP represents an incremental supply cost not incorporated into historical accounting costs, but is a known environmental cost that will likely be incorporated into future purchased water costs.

MWD's current annual estimated cost for the proposed BDCP conveyance is approximately $418 million. Estimated MWD sales are about 1.7 MAF, which would result in additional unit cost of supply of $246/AF. LADWP's average annual share of the BDCP cost is estimated to be about $62 million, over 45 years. LADWP's average annual water sales are 550,000 AF, or 240 million HCF, which would result in an increase of $0.27/HCF in delivered water to LADWP customers. A rough estimate of the potential BDCP cost to the typical LADWP single family residential customer is about $3.24 per year (assuming 12

HCF/month usage). The majority of MWD's BDCP costs are expected to be collected through MWD's water sales to LADWP and other agencies.[16]

For Cap and Trade purposes, MWD is still a covered entity under the California Air Resources Board (CARB) regulations due to their purchase and import of non-hydro generated supplemental energy into California to power their Colorado River Aqueduct (CRA) pumps. 2013 was the start of CARB's compliance period, but LADWP has not yet been notified by MWD how the auction market to cover these emissions will operate; an update from MWD is expected in the coming months. A 2011 MWD presentation estimated the Cap and Trade Program will cost between $5 million and $10 million in the first year of the program. These assumptions have been used for LADWP's planning purposes, and will result in an increase in $.014/HCF to cover the cost of Cap and Trade.

The total adder for the BDCP plan and Cap and Trade was $0.29 per HCF delivered.

3.3.2.4 Incremental Supply / Long-Run Marginal Supply Costs

To estimate the long-run marginal supply costs, the incremental marginal supply source during peak season was identified. Figure 20 below, based on data from the 2010 Urban Water Management Plan (UWMP), shows the estimated costs of various supply sources. In keeping with the determination of the Blue Ribbon Committee and two decades of practice at LADWP, recycled water was used as the marginal source of water supply in establishing a marginal supply cost. LADWP has evaluated the cost of seawater desalination, which would increase the long run marginal supply cost, as it is a more expensive alternative at this time. Incremental recycled water supplies are currently projected to cost up to $1,500/AF, or $3.63 per HCF delivered[17].

Figure 20: Unit Costs of Water Supply[18]

Water Source	Average Unit Cost / AF
Los Angeles Aqueduct	$563
Groundwater	$215
Metropolitan Water District	$527-$869
Conservation	$75-$900
Recycled Water	$600-$1,500
Water Transfer	$440-$540
Stormwater Capture:	
• Centralized Stormwater Capture	$60-$300
• Distributed Stormwater Capture	
• Urban Runoff Plants	$4,044
• Rain Barrels	$278-$2,778
• Cisterns	$2,426
• Rain Gardens	$149-$1,781
• Neighborhood Recharge	$3,351
Seawater Desalination	$2,136[19]

3.3.3 Local Pumping Marginal Costs

Local Pumping Station O&M expenses were estimated based on the FY 2012-13 General Ledger.

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[16] It is currently uncertain whether any collection of the BDCP costs through property taxes will be possible.

[17] The unit cost of desalinized water would increase the $/HCF cost from $3.63/HCF (recycled water unit cost) to $4.84/HCF

[18] Based on 2010 Urban Water Management Plan.

[19] Based on average range of cost estimates from San Diego County Water Authority description of Poseidon Desalination Project at http://www.sdcwa.org/seawater-desalination.

O&M costs for local pumping in FY 2012-13 were $26,366,705. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a local pumping unit cost of $0.11 per HCF.

3.3.4 Water Quality and Regulatory Marginal Costs

Water Quality and Regulatory capital costs were estimated based on levelized costs from the LADWP Ten Year Capital Budget related to water quality and regulatory compliance. The elements of the capital plan in Figure 21 were identified as Water Quality and Regulatory.

Figure 21: Water Quality Capital

Functional Item	Description
24130	CHLOR STATION INSTALLATNS
24316	GRNDWTR REMEDTN & CLEANUP
29130	WQIP RESV IMPRVTS
23222	WQIP TRUNKLINE IMPRVEMNTS
24310	WTR TREATMENT IMPRVTS

In addition, following normal LADWP practice, one-half of functional item 28857, "Other WSO CAP Projects" costs was included in the water quality capital, based on cost analysis of LADWP's standard practice.

The 10-year levelized capital costs per year for water quality and regulatory items were $322,625,935. Dividing by the 10 year average customer demand load of 231,127,966 HCF gives a water quality unit cost of $1.40 per HCF.

3.3.5 Water Purification (O&M) Marginal Costs

Water Purification O&M expenses were estimated based on the FY 2012-13 General Ledger.

The O&M costs for supply in FY 2012-13 were $45,134,506. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a supply O&M unit cost of $0.19 per HCF.

3.3.6 Distribution Marginal Costs

There are four functional sub-components of Distribution costs:

- Distribution Storage Plant,
- Distribution Storage O&M,
- Distribution Plant, and
- Distribution O&M.

The term Distribution Storage refers to storage within the LADWP system, as distinct from regional and state-wide storage infrastructure.

3.3.6.1 Distribution Storage (Plant)

The costs of Distribution Storage (Plant) were estimated with levelized costs from the LADWP Ten Year Capital Budget related to distribution storage.

The 10-year levelized capital costs per year for distribution storage were $41,125,382. Dividing by the 10 year average customer demand load of 231,127,966 HCF gives a distribution storage unit cost of $0.18 per HCF.

3.3.6.2 Distribution Storage O&M

Distribution Storage O&M expenses were estimated based on the FY 2012-13 General Ledger.

The O&M costs for distribution storage in FY2012-13 were $20,808,747. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a distribution O&M unit cost of $0.09 per HCF.

3.3.6.3 Distribution (Plant)

The costs of Distribution (Plant) were estimated based on levelized costs from the LADWP Ten Year Capital Budget related to distribution.

The 10-year levelized capital costs per year for distribution costs were $268,295,656. Dividing by the 10 year average customer demand load of 231,127,966 HCF gives a distribution plant unit cost of $1.16 per HCF.

3.3.6.4 Distribution O&M

Distribution O&M expenses were estimated based on the FY 2012-13 General Ledger.

The O&M costs for distribution in FY 2012-13 were $96,497,648. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a distribution O&M unit cost of $0.42 per HCF.

3.3.7 Customer Service and Billing Marginal Costs

Customer service and billing expenses were estimated from the FY 2012-13 General Ledger.

The O&M costs for customer service and billing expenses in FY 2012-13 were $77,715,691. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a customer service and billing O&M unit cost of $0.34 per HCF.

3.3.8 Administrative & General Expenses and the General Plant Adder

Lastly, A&G costs are associated with system support activities such as finance and accounting, human resources, insurance, information technology, legal and administrative. A&G Expenses were estimated from FY 2012-13 General Ledger.

The General Plant Adder pertains to the depreciation, property tax and debt servicing costs associated with the general operation of the water system. It was calculated in total for LADWP (and then allocated to customer classes) based on a proration where General Plant expenses (includes Depreciation, Property Taxes and Interest) are divided by Total Plant Expenses (refer to Figure 22 for the specific calculation). General Plant refers to investments that support general administrative activities and includes assets such as office buildings and information technology.

A&G expenses and the General Plant Adder are allocated based upon the proportion of all other costs allocated to the individual customer classes. This allocation to customer classes is made after all other class allocations have been made.

Figure 22: Calculation of General Plant Adder

Category	Amount
General Plant	$ 577,469,138
Total utility plant at original cost	$ 6,789,342,400
Ratio	8.51%
Depreciation	$ 112,677,417
Property Taxes	$ 12,557,382
Debt Servicing	$ 151,602,239
Total Depreciation, Property Taxes, Debt Servicing	$ 276,837,038
Adder (Ratio*Total Depreciation, Property Taxes, Debt Servicing)	$ 23,546,440

The O&M costs for the administrative and general category from the general ledger in FY 2012-13 was $69,256,739. The adder calculated in Figure 22 was $23,546,440. Therefore, total A&G costs were $92,803,180. Dividing by the FY 2012-13 customer demand load of 231,582,513 HCF gives a total A&G O&M unit cost of $0.40 per HCF.

3.4 Summary of Unit Marginal Costs

Figure 23 provides a summary of unit marginal costs by functional component.

Figure 23: Marginal Unit Costs by Functional Component/Sub-Component

Marginal Unit Cost By Function	Unit Marginal Cost	Units	Source
Transmission			
LAA Annual Cost (Plant)	$0.08	$/hcf/annual	Capital 10 Year Budget
Supply			
Supply (O&M)	$0.31	$/hcf/annual	FY2012-13 GL Allocated Cost
Supply (Plant)	$0.81	$/hcf/annual	Capital 10 Year Budget
Incremental Supply / Long Run Marginal Supply Cost	$3.63	$/peak hcf/annual	MC Recycled Water
Adder for BDCP Delta Fix, Cap and Trade	$0.29	$/hcf/annual	Both BDCPDeltaFix and Cap and Trade
Local Pumping	$0.11	$/hcf/annual	FY2012-13 GL Allocated Cost
Water Quality & Regulatory			
Water Quality & Regulatory Capital	$1.40	$/hcf/annual	Capital Improvement Program
Water Purification (O&M)	$0.19	$/hcf/annual	FY2012-13 GL Allocated Cost
Distribution			
Distribution Storage Plant	$0.18	$/hcf/annual	Capital 10 Year Budget
Distribution Storage O&M	$0.09	$/hcf/annual	FY2012-13 GL Allocated Cost
Distribution Plant	$1.16	$/hcf/annual	Capital 10 Year Budget
Distribution O&M	$0.42	$/hcf/annual	FY2012-13 GL Allocated Cost
Customer Service, Billing	$0.34	$/hcf/annual	FY2012-13 GL Allocated Cost
A&G	$0.40	$/hcf/annual	FY2012-13 GL Allocated Cost
Total Marginal Cost	**$9.40**[20]	**$/hcf/annual**	

[20] If the cost for the "Incremental Supply / Long Run Marginal Supply" functional component is based on the $/HCF cost of desalinized water, the total marginal cost would increase to $10.61/HCF (Incremental Supply / Long Run Marginal Supply Costs would increase from $3.63/HCF to $4.84/HCF).

4 CALCULATION OF MARGINAL COST REVENUE REQUIREMENTS

By multiplying the unit marginal cost for each functional component by the corresponding cost causation factor, marginal cost revenue requirements are calculated by functional category for each customer class. Figure 24 below provides a list of key cost causation factors by customer class.

Figure 24: LADWP Cost Causation Factors[21]

Expected Capacity Utilization	Single-Dwelling Unit Residential (Schedule A)	Multi-Dwelling Unit Residential (Schedule B)	Commercial / Industrial / Other[22] (Schedule C)	Schedule F
Consumption in HCF (FY 2012-13)	95,080,125	73,383,205	61,270,652	8,339,259
Load Factor	50.4%	43.7%	45.9%	61.5%
Coincident Peak in HCF	47,876,123	32,040,629	28,131,000	5,097,954
Customers	513,380	138,544	81,699	1,641

The summation of the marginal cost revenue requirements for all the individual functional components and/ or sub-components comprises the aggregate marginal cost revenue requirement for each customer class. The marginal cost revenue requirement determination by customer class is summarized by the following equations:

- Customer Class MC Revenue Requirement for Functional Component = Unit MC for Functional Component * Cost Causation Factor (for specific customer class)
- Total Customer Class MC Revenue Requirement = Sum of all MC Revenue Requirements for all Functional Components.

The marginal cost revenue requirement by a particular functional component for a specific class of customer is the unit marginal cost for that component times the cost causation factor for the customer class.

Figure 25 below summarizes the functional cost components and the corresponding allocation methodology used in the LADWP marginal cost study.

[21] Due to the relatively small amount of usage, Reclaimed Water Service (Schedule D) and Private Fire Service (Schedule E) were excluded.

[22] Commercial, Industrial, Non-Irrigation Government and Temporary Construction customers are one customer class. Load factor was calculated based on the sum of total coincident peak for all Schedule C customers divided by the sum of total test year consumption for all Schedule C consumption.

Figure 25: Allocation Criteria

Functional Cost Component	Allocation Criteria
Transmission (Capital)	Consumption volume by customer class
Supply (O&M)	Consumption volume by customer class
Supply (Plant)	Consumption volume by customer class
Supply, Adder for BDCP Delta Fix, Cap and Trade	Consumption volume by customer class
Supply, Purchased Water	Seasonal coincident peak by customer class
Local Pumping	Consumption volume by customer class
Water Quality and Regulatory Capital	Consumption volume by customer class
Water Purification	Consumption volume by customer class
Distribution Storage (Plant)	Consumption volume by customer class
Distribution Storage (O&M)	Consumption volume by customer class
Distribution (Plant)	Consumption volume by customer class
Distribution (O&M)	Consumption volume by customer class
Customer Service, Billing	Number of Customers
A&G and General Plant Adder	Percent of (Proportionate to) All Other Costs

By multiplying unit marginal costs (summarized in Figure 23) by the appropriate cost causation factors (summarized in Figure 24), marginal cost revenue requirements for functional components/sub-components for each customer class are calculated. A summary of these revenue requirements is shown in Figure 26.[23]

Figure 26: Summary of Marginal Cost Revenue Requirement by Functional Component and Customer Class

	Single Family Residential	Multi-Family Residential	Commercial / Industrial / Other	Sch .F	Total
Transmission					
Transmission	$7,711,354	$5,951,652	$4,969,279	$676,345	$19,308,630
Supply					
Supply (O&M)	$29,104,431	$22,462,912	$18,755,208	$2,552,683	$72,875,233
Supply (Plant)	$76,734,650	$59,224,097	$49,448,631	$6,730,220	$192,137,598
Adder for BDCP Delta Fix, Cap n Trade	$27,309,483	$21,077,563	$17,598,523	$2,395,252	$68,380,821
Purchased Water/Long Run Marginal Supply Cost	$173,905,783	$116,384,752	$102,183,371	$18,517,869	$410,991,774
Local Pumping					
Local Pumping ($/HCF)	$10,825,298	$8,355,006	$6,975,938	$949,462	$27,105,704
Water Quality & Regulatory					
Water Quality & Regulatory Capital	$132,720,028	$102,433,827	$85,526,209	$11,640,568	$332,320,633
Water Purification (O&M)	$18,530,736	$14,302,093	$11,941,405	$1,625,288	$46,399,523
Distribution					
Distribution Storage Plant	$16,917,926	$13,057,320	$10,902,093	$1,483,832	$42,361,172
Distribution Storage O&M	$8,543,384	$6,593,816	$5,505,448	$749,321	$21,391,969
Distribution Plant	$110,369,946	$85,183,948	$71,123,577	$9,680,294	$276,357,765
Distribution O&M	$39,618,745	$30,577,899	$25,530,744	$3,474,869	$99,202,256
Customer Service and A&G					
Customer Service, Billing ($/Customer/Year)	$54,263,052	$14,643,760	$8,635,385	$173,494	$77,715,691
A&G and General Plant Adder ($/Other Costs/Year)	$38,878,528	$27,526,429	$23,060,954	$3,337,269	$92,803,180
Total MC Revenue	$745,433,344	$527,775,075	$442,156,766	$63,986,765	$1,779,351,949
Percent of Total	41.9%	29.7%	24.8%	3.6%	100.0%

[23] During initial review of the cost of service study by the Ratepayer Advocate, it was discovered that usage for "purpose of enterprise," which is water used by the Water System for operation of the system, was included in Commercial/Industrial/Other rate class consumption as opposed to being treated as part of water losses. However, since removal of this consumption had an immaterial impact on the cost of service study results, the study was not restated. Appendix C provides a summary of the marginal cost revenue requirement by functional component and customer class with the removal of purpose of enterprise water.

5 COST OF SERVICE RESULTS AND IMPLICATIONS

The total marginal cost revenue requirements for each customer class are compared to the actual level of revenue for the test year (FY 2012-13) from each customer class. Specifically, the percentages of marginal cost revenue requirements and current revenues attributed to each customer class are calculated and compared. Figure 27 provides a summary of the components of the marginal cost revenue requirement calculation that includes cost drivers, functional component unit costs, and the current revenue requirement comparison.

Figure 27: Summary of Marginal Cost of Service Study by Customer Class

	Unit Cost	Single-Dwelling Unit	Multi-Dwelling Unit	Commercial / Industrial / Other	Schedule F	Total
Expected Capacity Utilization						
Test Year Consumption in HCF		95,080,125	73,383,205	61,270,652	8,339,259	238,073,241
Load Factor		50.4%	43.7%	45.9%	61.5%	
CP (Coincident Peak) in HCF		47,876,123	32,040,629	28,131,000	5,097,954	
No Loss Adjustment to Metered Sales		0.0%	0.0%	0.0%	0.0%	
Annual Demand Load in HCF		95,080,125	73,383,205	61,270,652	8,339,259	238,073,241
Seasonal Coincident Peak Load in HCF		47,876,123	32,040,629	28,131,000	5,097,954	113,145,707
MC Functional Cost Area						
Transmission						
Annual Demand Load in HCF		95,080,125	73,383,205	61,270,652	8,339,259	
Transmission, $s	$0.08	$7,711,354	$5,951,652	4,969,279	$676,345	$19,308,630
Supply						
Annual Demand Load in HCF		95,080,125	73,383,205	61,270,652	8,339,259	
Supply (O&M)	$0.31	$29,104,431	$22,462,912	$18,755,208	$2,552,683	$72,875,233
Supply (Plant)	$0.81	$76,734,650	$59,224,097	$49,448,631	$6,730,220	$192,137,598
Adder for BDCP Delta Fix, Cap n Trade	$0.29	$27,309,483	$21,077,563	$17,598,523	$2,395,252	$68,380,821
Seasonal Coincident Peak Load in HCF		47,876,123	32,040,629	28,131,000	5,097,954	113,145,707
Purchased Water/Long Run Marginal Supply Cost	$3.63	$173,905,783	$116,384,752	$102,183,371	$18,517,869	$410,991,774
Local Pumping						
Annual Demand Load in HCF		95,080,125	73,383,205	61,270,652	8,339,259	
Local Pumping ($/HCF)	$0.11	$10,825,298	$8,355,006	$6,975,938	$949,462	$27,105,704
Water Quality & Regulatory						
Water Quality & Regulatory Capital	$1.40	$132,720,028	$102,433,827	$85,526,209	$11,640,568	$332,320,633
Water Purification (O&M)	$0.19	$18,530,736	$14,302,093	$11,941,405	$1,625,288	$46,399,523
Distribution						
Distribution Storage Plant	$0.18	$16,917,926	$13,057,320	$10,902,093	$1,483,832	$42,361,172
Distribution Storage O&M	$0.09	$8,543,384	$6,593,816	$5,505,448	$749,321	$21,391,969
Distribution Plant	$1.16	$110,369,946	$85,183,948	$71,123,577	$9,680,294	$276,357,765
Distribution O&M	$0.42	$39,618,745	$30,577,899	$25,530,744	$3,474,869	$99,202,256
Total Cost without Cust/A&G		$652,291,764	$485,604,886	$410,460,426	$60,476,002	$1,608,833,078
Customer Service and A&G						
Customers		513,380	138,544	81,699	1,641	735,264
Customer Service, Billing ($/Customer/Year)	$105.70	$54,263,052	$14,643,760	$8,635,385	$173,494	$77,715,691
Sum Other Costs		$706,554,816	$500,248,646	$419,095,811	$60,649,496	$1,686,548,770
A&G and General Plant Adder ($/Other Costs/Year)	5.50%	$38,878,528	$27,526,429	$23,060,954	$3,337,269	$92,803,180
Total MC Revenue		**$745,433,344**	**$527,775,075**	**$442,156,766**	**$63,986,765**	**$1,779,351,949**
Percent of Total		41.9%	29.7%	24.8%	3.6%	100.0%
Current Revenue		**$385,439,493**	**$287,958,501**	**$241,187,291**	**$12,825,922**	**$927,411,208**
Percent of Total		41.6%	31.0%	26.0%	1.4%	100.0%

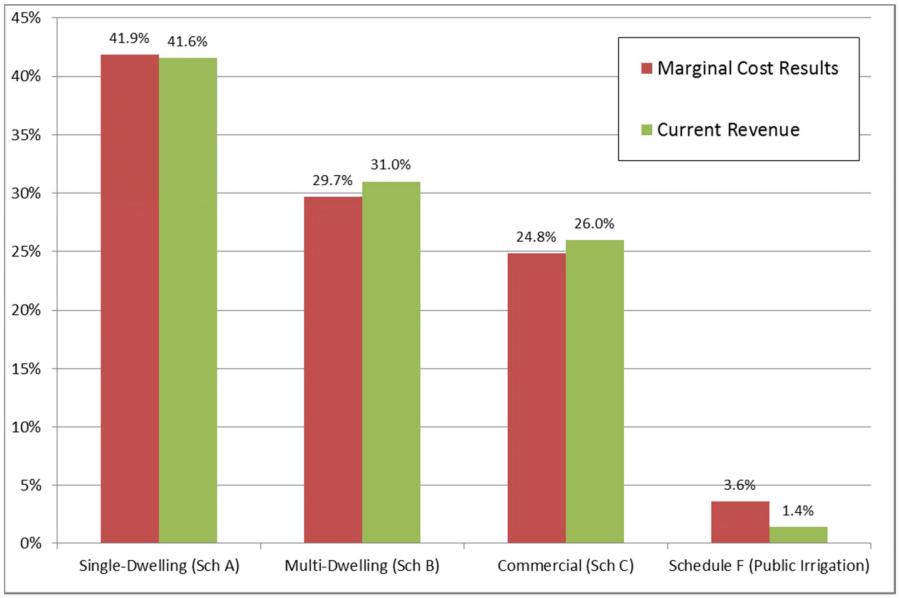
Figure 28 provides a summary of the marginal cost revenue requirement and current revenues by customer class.

Figure 28: Summary of Marginal Cost Revenue Requirement Percentage and Current Revenue Percentage by Customer Class

	Single-Dwelling Unit Residential (Schedule A)	Multi-Dwelling Unit Residential (Schedule B)	Commercial/ Industrial/ Other (Schedule C)	Public Irrigation (Schedule F)	Total
Total Marginal Cost Revenue Requirement (FY 2012-13)	$745,433,344	$527,775,075	$442,156,766	$63,986,765	$1,779,351,949
Percent of Total	41.9%	29.7%	24.8%	3.6%	100.0%
Current Revenue	$385,439,493	$287,958,501	$241,187,291	$12,825,922	$927,411,208
Percent of Total	41.6%	31.0%	26.0%	1.4%	100.0%

Results of the LADWP cost of service study indicate that Single-Dwelling Unit Residential (Schedule A) customers are responsible for 41.9% of the marginal cost based revenue requirement, which is slightly higher than the current revenue level of 41.6%. Conversely, the marginal cost revenue requirement for the Commercial/Industrial/Other customer class would result in a slightly lower revenue requirement of 24.8% compared to the current revenue level of 26.0%. The Schedule F, Public Irrigation, customer class marginal cost revenue requirement percentage is 3.6% compared to the current revenue level of 1.4%. A comparison of the marginal cost revenue requirement and current revenue percentages is shown graphically in Figure 29.

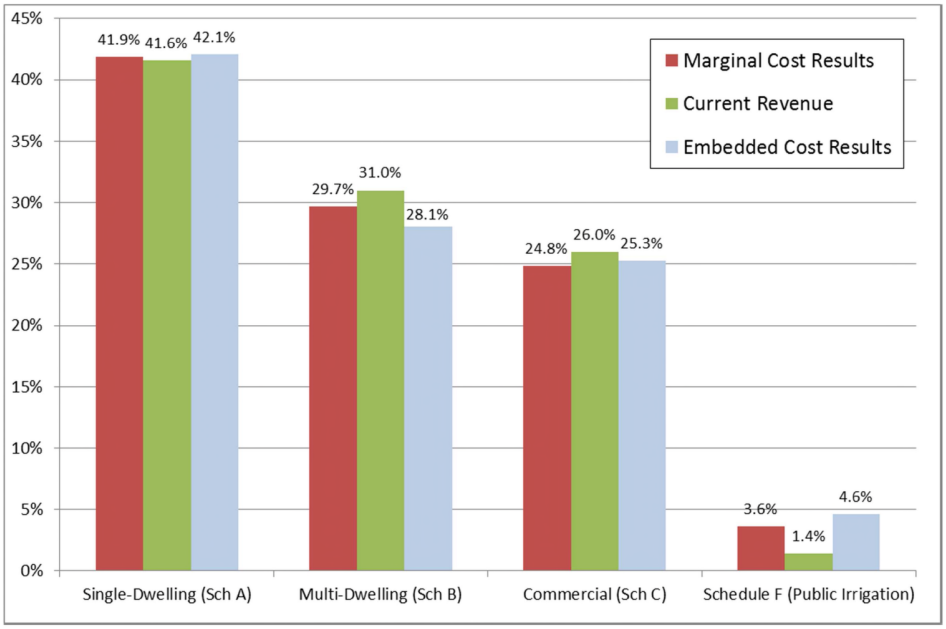
Figure 29: Comparison of Marginal Cost and Current Cost Revenue Requirement Percentages by Class



As an added step to consider allocation of costs among customer classes in relation to cost of service, the Department conducted a draft embedded cost[24] of service analysis based on the Base-Extra Capacity methodology outlined in American Water Works Association's (AWWA) *M1 Manual, Principles of Water Rates, Fees and Charges*. Unlike the forward-looking marginal cost of service study, a cost of service analysis using the Base-Extra Capacity methodology generally relies on current costs. For LADWP, embedded costs were represented by the revenue requirements outlined in the Department's financial plan[25]. The results of the embedded cost analysis based on the financial plan were then verified by a separate draft embedded cost analysis using the Department's fiscal year 2012-13 results as discussed in Appendix B.

There were several adjustments made to the Base-Extra Capacity method for LADWP's embedded cost analysis to accommodate the sources of data that were available and more accurately reflect the Department's current situation. More information about these modifications and the results of the embedded analysis can be found in Appendix B. A comparison of the marginal cost results and draft embedded cost analysis is shown in Figure 30. The embedded cost of service analysis confirm the marginal cost of service study in that the results are directionally the same – the revenue requirement percentages of both methodologies are either both above or both under current revenue requirement percentages of each customer class.

Figure 30: Comparison of Marginal Cost, Embedded Cost and Current Revenue Requirement Percentages by Customer Class



The percentages for each customer class as calculated from the marginal cost of service study will be used to guide allocation of the total revenue requirement to customer classes through the rate design. Rates for each major class of customers will be designed to recover approximately the portion of the revenue requirement assigned to each class based on the cost of service study results, consistent with legal considerations.

[24] Embedded Cost is also referred to as Average Embedded Cost.

[25] Data based on Financial Case #33.

APPENDIX A.

GLOSSARY OF TERMS

Cost Drivers: Fundamental aspects of customer demand for services that directly cause LADWP to incur costs.

Customer Class Cost-of-Service Study: The process of determining the cost of providing water service to each of the defined customer classifications. This includes the functionalization and allocation of water system revenue requirements by distribution of costs by customer classification based on the annual usage, peak demands, and customer-related costs for which each customer class is responsible.

Embedded Cost: Costs associated with funding and operating current capacity; also known as accounting costs.

Functional Cost Component: Costs related to a particular operational function of a utility for which annual operation and maintenance expenses and utility plant investment records are maintained. Functional cost components include those activities related to source of supply, pumping, treatment, transmission and distribution mains, distribution storage, customer meters and services, customer accounting, billing and collections, and general and administrative-related activities.

Marginal Cost: The change in cost incurred to serve a small increment in demand for services. Marginal costs measure the additional cost of providing the next unit of service, whether that is the next unit of water or the additional burden that adding an additional hundred cubic feet of demand places on the water system.

Marginal Cost Revenue Requirement: Revenues that would result if all the aspects of water service were priced to reflect the marginal costs of providing such service.

Non-Coincident Peak Demand: The individual customer's peak demand measured irrespective of the time of system peak and irrespective of the peak demand of any other customer or group of customers.

Present Value: Also known as present discounted value and is a future amount of money that has been discounted to reflect its current value, as if it existed today. The present value is always less than or equal to the future value because money has earning potential, a characteristic referred to as the time value of money.

Revenue Allocation: The process of assigning revenue requirement to rate groups or customer classes.

Revenue Requirement: The total annual operation and maintenance expense and capital-related costs incurred in meeting various aspects of providing water utility service.

Unit Cost: The cost of producing a unit of a product or service. An example would be the cost of treating a thousand gallons of potable water for use by the water utility's customers.

APPENDIX B.

EMBEDDED COST OF SERVICE ANALYSIS

Introduction

As an added step to consider allocation of costs among customer classes, the Department conducted an embedded cost of service analysis using a modified method based on the Base-Extra Capacity methodology outlined in American Water Works Association (AWWA) M1 Manual, Principles of Water Rates, Fees and Charges.

Since rates will be set for five years using the cost study results as guidance, data for the embedded cost of service analysis was taken from the five year financial plan[26]. Given the planned increase of capital resources for infrastructure projects and the expected changes in consumption due to the Mayor's directive to reduce consumption by 20%, this forward-looking approach was selected. A longer term (i.e., 5 year) rate plan will allow LADWP more flexibility in developing longer-term vendor contracts, which should reduce the lag in spending (once the contracts are in place). The embedded cost of service analysis was then compared to an embedded analysis using purely historical data. The results using both approaches were directionally consistent with the marginal cost of service study.

Method

In general, for the embedded cost of service analysis, the AWWA M-1's Base-Extra Capacity Method was followed. However, several adjustments were made to more accurately reflect LADWP's current environment, plans and programs.

Unlike the forward-looking marginal cost of service study, embedded cost of service analysis generally relies on current costs, in this case represented by the revenue requirements outlined in the Department's financial plan underlying this rate action. In general, the M1 Manual approach uses a sample test year with current costs. However, for the LADWP embedded cost of service analysis, future costs were used, because LADWP has prepared a firm five-year financial plan with significantly different levels and types of investment than in recent years. Capital infrastructure investments (all costs excluding customer service and administrative and general costs) are projected to increase by approximately 2.5 times, and will increase in proportion to customer-related costs in future years. In addition, given the Mayor's directive for a 20% usage reduction by the end of 2017, historical consumption patterns may not apply for future rate recovery.

Differences between historical and forward-looking spending and consumption data suggest basing the analysis on the costs reflected in the financial plan in lieu of pure historical costs, as these planned costs more accurately reflect spending levels for appropriate rate recovery mechanisms. Given these assumptions, the following adjustments to the process outline in the AWWA M1 Manual were made.

- Expenditures and revenue requirements are based on the averages from LADWP's financial plan for the next five years (FYs 2016-20).[27]

[26] Data based on Financial Case #33.

[27] The next five years is relevant as the revenue requirements and cost of service study will support the rates to be charged to customers during that period.

- Capital costs are established based on LADWP's 10-Year levelized CIP. (The cost of capital[28] used in the levelization calculation is based on LADWP's current financial planning assumptions derived from the utility's research and supported by input from Public Resources Advisory Group.)

- For residential customer classes (Schedules A and B), projected number of accounts was based on the increase in either single family or multi-family homes. For Commercial/ Industrial/ Government classes (Schedule C), projected number of accounts was based on the increase in number of employees in those industries. These projections were based upon demographic and socioeconomic information in the 2010 Urban Water Management Plan. For Schedules D and F (recycled water and irrigation), projected usage was based on the financial plan.

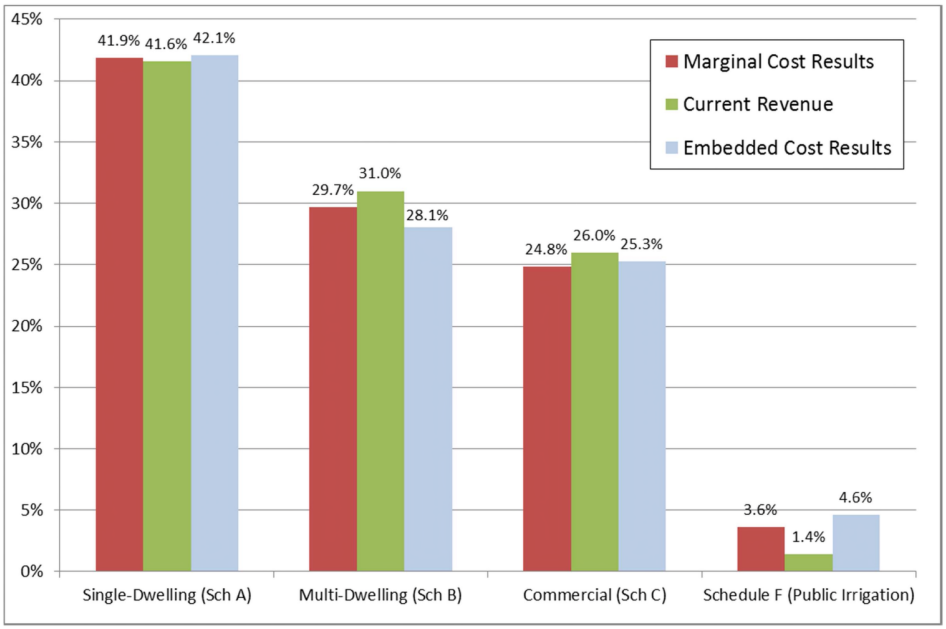
- At the completion of the analysis, recycled water and private fire costs were excluded to ensure consistency with the marginal cost of service study (service for recycled water users, Schedule D, is generally provided under separate contracts, and comparative studies are being used to verify private fire meter costs).

These adjustments to the pure application of the Base-Extra Capacity Method help provide an allocation of costs for the rate planning period that reflects the unique conditions at LADWP.

Results

As shown in Figure 31, the embedded cost of service analysis confirms the marginal cost of service study in that the results are in the same direction – the revenue requirement percentages from both methodologies are either both above or both under current revenue requirement percentages of each customer class.

Figure 31: Comparison of Marginal Cost of Service Study Results (Percent of Revenue Requirement) and Embedded Cost of Service Analysis



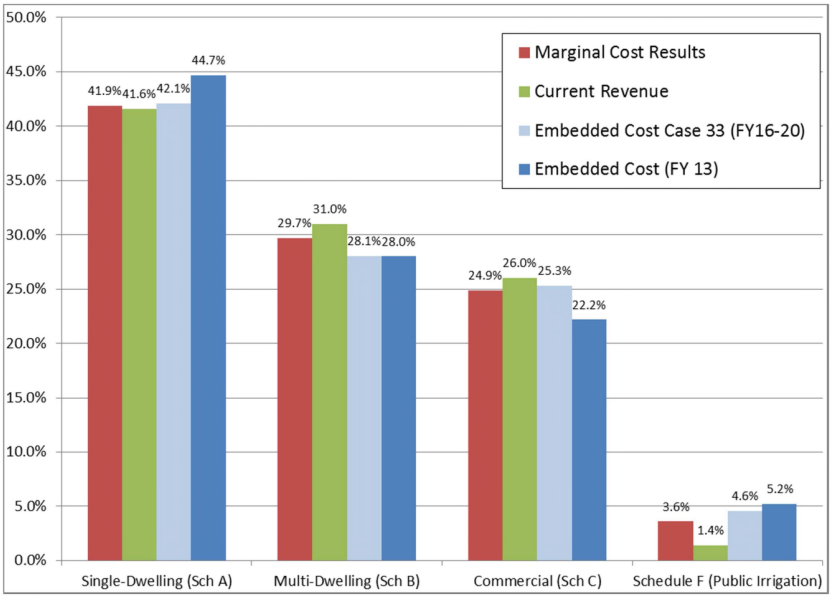
Historical vs. Forward-Looking Costs

As discussed above, forward looking costs were developed to reflect future allocation of costs among customer classes. However, a separate version of the embedded cost model based on purely historical

[28] This is also referred to as the nominal discount rate.

FY 2012-13 accounting data was developed to compare the results of the forward-looking approach. The results of the embedded cost of service analysis using both methodologies are directionally consistent with the marginal cost of service study results. In most cases the difference between any of the cost of service percentages and the current revenue percentages is less than 10% regardless of the cost of service methodology employed. Figure 32 provides a comparison of all the cost of service results and the current revenue percentages.

Figure 32: Marginal Cost of Service Study Results Compared to Historical and Forward-looking Embedded Cost of Service Analysis



As shown in Figure 33, the proportion of functional cost allocations for several major functional categories is significantly different for the future rate period. The reduction in the Billing and Customer Service Meters category has an especially large impact, as these costs are allocated based on the number of customers as opposed to some form of usage.

Figure 33: Capital Cost Differences Between Historical FY 2012-13 and Forward-Looking FY 2016-20 (millions)

	Trans-mission	Supply	Recycled Supply	WQ	Distribution Storage	Distribution	Billing / Cust Service Meters	A&G	Total
FY 2013 Actual	$7.9	$77.8	$16.1	$207.0	$10.5	$75.8	$43.3	$48.4	$486.9
	1.6%	16.0%	3.3%	42.5%	2.2%	15.6%	8.9%	9.9%	100.0%
FY 16-20 Budget	$18.8	$186.5	$99.2	$322.6	$43.9	$286.3	$52.7	$53.5	$1,063.6
	1.8%	17.5%	9.3%	30.3%	4.1%	26.9%	5.0%	5.0%	100.0%

In addition, as shown in Figure 34, due largely to the Mayor's conservation directive, customer class usage is projected to shift in the future;; in particular, conservation is expected to occur in Schedules A, B and F.

Figure 34: Sales Differences Between FY 2012-13 and FY 2016-20

Sales (million HCF)	FY 2013 Actual	FY 2013 Actual	FY 16-20 (average)	FY 16-20 (average)
Residential (Sch A)	86.87	36.7%	69.88	31.5%
Residential Low Income	8.21	3.5%	13.36	6.0%
Multi-Dwelling (Sch B)	73.38	31.0%	68.62	31.0%
Commercial (Sch C)	58.19	24.6%	61.49	27.7%
Schedule D (Recycled Water)	2.01	0.8%	2.31	1.0%
Schedule F (Public Irrigation)	8.34	3.5%	6.05	2.7%
Total	**237.0**	**100.0%**	**221.71**	**100.0%**

This analysis indicates that LADWP's changing spending plans and the changing environment in which the utility operates supports the use of a projected test period for the embedded cost of service analysis.

APPENDIX C.

RESTATED COST OF SERVICE STUDY RESULTS REMOVING PURPOSE OF ENTERPRISE (POE)

During initial review of the cost of service study by the Ratepayer Advocate, it was discovered that usage for "purpose of enterprise," which is water used by the Water System for operation of the system, was included in Commercial/Industrial/Other rate class consumption as opposed to being treated as part of water losses. However, since removal of this consumption had an immaterial impact on the cost of service study results, the study was not restated. Figure 35 provides a summary of the marginal cost revenue requirement by functional component and customer class with the removal of purpose of enterprise water.

Figure 35: Summary of Marginal Cost of Service Study Results without Purpose of Enterprise (POE) Water

	Unit Cost	Single-Dwelling Unit	Multi-Dwelling Unit	Commercial / Industrial / Other	Sch .F	Total
Expected Capacity Utilization						
Test Year Consumption in HCF		95,080,125	73,383,205	58,192,069	8,339,259	234,994,658
Load Factor		50.4%	43.7%	45.7%	61.5%	
CP (Coincident Peak) in HCF		47,876,123	32,040,629	26,579,762	4,967,017	
No Loss Adjustment to Metered Sales		0.0%	0.0%	0.0%	0.0%	
Annual Demand Load in HCF		95,080,125	73,383,205	58,192,069	8,339,259	234,994,658
Seasonal Coincident Peak Load in HCF		47,876,123	32,040,629	26,579,762	4,967,017	111,463,532
MC Functional Cost Area						
Transmission						
Annual Demand Load in HCF		95,080,125	73,383,205	58,192,069	8,339,259	
Transmission MC	$ 0.08	$7,711,354	$5,951,652	$4,719,594	$676,345	$19,058,945
Supply						
Annual Demand Load in HCF		95,080,125	73,383,205	58,192,069	8,339,259	
Supply (O&M)	$ 0.31	$29,104,431	$22,462,912	$17,812,840	$2,552,683	$71,932,866
Supply (Plant)	$ 0.81	$76,734,650	$59,224,097	$46,964,053	$6,730,220	$189,653,020
Adder for BDCP Delta Fix, Cap n Trade	$ 0.29	$27,309,483	$21,077,563	$16,714,274	$2,395,252	$67,496,572
Seasonal Coincident Peak Load in HCF		47,876,123	32,040,629	26,579,762	4,967,017	$111,463,532
Purchased Water/Long Run Marginal Supply Cost	$ 3.63	$173,905,783	$116,384,752	$96,548,637	$18,042,251	$404,881,422
Local Pumping						
Annual Demand Load in HCF		95,080,125	73,383,205	58,192,069	8,339,259	
Local Pumping ($/HCF)	$ 0.11	$10,825,298	$8,355,006	$6,625,427	$949,462	$26,755,193
Water Quality & Regulatory						
Water Quality & Regulatory Capital	$ 1.40	$132,720,028	$102,433,827	$81,228,890	$11,640,568	$328,023,314
Water Purification (O&M)	$ 0.19	$18,530,736	$14,302,093	$11,341,402	$1,625,288	$45,799,520
Distribution						
Distribution Storage Plant	$ 0.18	$16,917,926	$13,057,320	$10,354,311	$1,483,832	$41,813,390
Distribution Storage O&M	$ 0.09	$8,543,384	$6,593,816	$5,228,823	$749,321	$21,115,344
Distribution Plant	$ 1.16	$110,369,946	$85,183,948	$67,549,927	$9,680,294	$272,784,115
Distribution O&M	$ 0.42	$39,618,745	$30,577,899	$24,247,935	$3,474,869	$97,919,448
Total Cost without Cust/A&G		$652,291,764	$485,604,886	$389,336,115	$60,000,385	$1,587,233,149
Customer Service and A&G						
Customers		513,380	138,544	81,474	1,641	735,039
Customer Service, Billing ($/Customer/Year)	$ 105.73	$ 54,279,662	$ 14,648,243	$8,614,239	$ 173,547	77,715,691
Sum Other Costs		$ 706,571,426	$ 500,253,128	$397,950,354	$ 60,173,932	1,664,948,840
A&G and General Plant Adder ($/Other Costs/Year)	5.57%	$ 39,383,838	$ 27,883,788	$22,181,497	$ 3,354,056	92,803,180
Total MC Revenue		**$745,955,264**	**$528,136,917**	**$420,131,851**	**$63,527,988**	**$1,757,752,020**
Percent of Total		42.4%	30.0%	23.9%	3.6%	100.0%
Current Revenue		**$385,439,493**	**$287,958,501**	**$241,187,291**	**$12,825,922**	**$927,411,208**
Percent of Total		41.6%	31.0%	26.0%	1.4%	100.0%