Water and Waste Water Tariffs for New Residential Construction in California

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1. Introduction

Title 24 contains guidelines requiring a certain level of energy efficiency in new residential construction in California. These guidelines may be changed to include measures that save energy by reducing hot water consumption of water using appliances and fixtures. Some changes may also reduce the amount of waste water released to the sewer. In order to calculate the full value of such reductions to the consumer, it is necessary to determine and include the marginal cost of the water saved.

2. Sample Selection and Data Collection

In order to do this, we collected water and waste water tariffs in California cities and counties where there is a high level of new residential construction. We determined the areas for which we would gather data by first obtaining data from the Construction Industry Research Board, an institution which compiles construction related statistics within California. We purchased a data set which listed the number of new single family homes and units of multi-family housing built in each California city plus the unincorporated areas of each county in the year 2004. We summed the number of single family homes and number of units of multifamily homes, and then ordered the data from highest to lowest number. We then began to gather data on residential water and waste water tariffs for the top 100 cities and county unincorporated areas on this list. The list included 79 cities and the unincorporated areas of 21 counties.

For each city or county, we first looked at that location's website – all 100 of the cities and counties on our list have an official website. We then looked for current water and waste water tariffs on these websites. We found that residential water tariff information was available online for 64 cities and 1 county (El Dorado) and that waste water information was available for 54 cities and 1 county (El Dorado). However, for approximately half of these locations, it was necessary to contact someone for clarification or further information. For example, some cities only listed the tariff information for single family homes on their websites, and it was necessary to contact city staff for information on tariffs for multi-family residences.

For each city or county in our top 100 which did not have its tariff information on its website, we tried to identify a contact person or office, and then emailed or telephoned for more information. If the city had a "utilities" department, that is generally who we contacted. Otherwise, we would contact their "billing" or "finance" department. In the case of the counties, we generally contacted their planning or land development division, and asked the contact to identify the names of the two or three largest residential water and waste water service providers in unincorporated areas of the county. Once these were identified, we went to the provider's website to look for tariff information, and contacted them directly by email or phone if such information was not on their website.

This process has proven to be quite labor intensive. To date we entered data into our database on residential water tariffs for 74 cities or counties, and on residential waste water tariffs for 65 cities or counties. The cities and counties for which we have water tariffs account for 64% of all new housing units built in 2004, and for waste water tariffs we have 57% coverage. Table 1 lists all of the utilities for which data was entered. The rest of this report describes what we found for those localities. We also describe the structure of the database, and some of the assumptions made when entering data.

Table 1. Utilities Entered into Water TAP Database

Name of Utility	Utility Type*
Apple Valley Ranchos Water Company	DW
Beaumont-Cherry Valley Water District	DW
Calaveras County Water District	B
California Water Service Company	DW
Carlsbad Municipal Water District	B
City of American Canyon, Water Department	B
City of Bakersfield, Public Works Department, Wastewater Division	WW
City of Beaumont	WW
City of Brentwood	B
City of Ceres	B
City of Chino	B
City of Chula Vista, Public Works Department	WW
City of Clovis, Public Utilities	B
City of Folsom	B
City of Fresno, Public Utilities Department	B
City of Hayward	B
City of Lincoln	WW
City of Livermore	B
City of Loma Linda, Water/Sewer	B
City of Los Angeles, Bureau of Sanitation	WW
City of Los Banos	B
City of Merced	B
City of Oceanside	B
City of Orange	DW
City of Oxnard Water Division	DW
City of Riverbank, Water and Sewer	B
City of Riverside, Public Utilities Department	B
City of Roseville, Environmental Utilities	B
City of Sacramento	B
City of San Diego, Metropolitan WasteWater Department	WW
City of San Diego, Water Department	DW
City of San Jose	WW
City of Santa Maria, Wastewater Services	WW
City of Santa Maria, Water Services	DW
City of Santa Rosa	B
City of Stockton, Municipal Utilities Department	B

*** DW = water, WW = waste water, B = Both**

Table 1. (continued) Utilities Entered into Water TAP Database

Name of Utility	Utility Type*
City of Tracy	B
City of Turlock	B
City of Vallejo, Water Department	DW
City of Yuba City	B
Coachella Valley Water District	B
Contra Costa Central Sanitary District	WW
Corona, Department of Water and Power	B
Crestline Sanitation District	WW
Cucamonga Valley Water District	B
Dublin San Ramon Services District	B
East Bay Municipal Utility District	B
Eastern Municipal Water District	B
El Dorado Irrigation District	B
Elsinore Valley Municipal Water District	B
Fairfield Municipal Utilities	DW
Fontana Water Company	DW
Hesperia Water District	B
Indio Water Authority	DW
Inland Empire Utilties Agency	WW
Irvine Ranch Water District	B
Los Angeles County Sanitation Districts	WW
Los Angeles County Waterworks Districts	DW
Los Angeles Department of Water and Power	DW
Mission Springs Water District	B
Newhall County Water District	DW
Otay Water District	DW
Paso Robles Wastewater Division	B
Pinon Hills Water District	DW
Placer County Water Agency	DW
Redding Municipal Utilities Department	B
Sacramento County Sanitation District 1	WW
Sacramento County Water Agency	DW
San Clemente, Water & Sewer	B
San Francisco, Public Utilities Commission	B
San Jose Municipal Water	DW
Sweetwater Authority	DW
Vallecitos Water District	B
Victor Valley Water District	DW
West Sacramento Public Works	B

* DW = water, WW = waste water, B = Both

3. Structure of Tariffs

Although there is a great deal of variation in tariff structures, there are also some features which are common to most. Most tariffs include a fixed monthly cost that is independent

of the quantity of water consumed, or waste water released. The fixed monthly cost is usually based on the water meter size in inches; the larger the meter size, the larger the fixed monthly cost. Sometimes the fixed monthly cost is based on other factors, such as lot size or climate zone.

In addition, nearly all water tariffs include a quantity charge for the amount of water consumed. This quantity is usually measured in units of hundred cubic feet, or HCF. One HCF equals 748 gallons. A few utilities charge in units of thousands of gallons instead.

The most common water tariff structure we found was a fixed monthly cost based on meter size, plus a single rate for the quantity charge. Nearly half (45%) of the tariffs in our database have this structure.

Most of the rest of water utilities have quantity charges that are tiered. For example, a utility may charge $1.25 per HCF for the first 10 HCF per month, $1.50 for the next 10 HCF, and $2 for each additional HCF after that. Nearly all utilities that have tiered rates have ascending rates, i.e. where the charge per HCF goes up as usage goes up. This rate structure helps to encourage water conservation.

A few utilities base the cutoff points between tiers on factors such as climate zone or lot size. There was one utility in our sample, Irvine Ranch Water District, which bases the cutoff point between tiers on a complex formula that includes number of residents, lot size (for single family and townhomes), and an evapotranspiration index as recorded by three local weather stations (residences are divided into three climate zones and the data from one of the three stations is applied).

Some utilities also add a surcharge on its quantity rate for residences located at high elevations, to recover the additional cost of pumping water uphill.

Most waste water tariffs (74%) include a fixed monthly cost only. Those that include a quantity charge base it on metered water consumption and then apply a formula to estimate what fraction of this water is released to the sewer. This is discussed in more detail in the results section below.

4. Structure of Database

The database contains 4 tables. The utility table contains basic information about the water and waste water utilities, including name, type of utility (water, waste water or both), dates of summer and winter season (if any), etc. The Utility_Cities table contains information about which cities are covered by a given utility. The tariff table contains basic data on each tariff of each utility, indicating who is covered by the tariff based on meter size and other parameters, and also giving effective dates of the tariff when available. The component table, which will be described in more detail below, breaks each tariff down into components, each of which has one unique rate associated with it.

Tables A-1 through A-4 in the Appendix list each field in each table, along with a brief description of what the field contains.

Water and wastewater tariff documents typically contain the rates charged for several different classes of customers. When entering tariffs into the database, each "tariff" in our database consisted of all the charges that a particular class of customer might see. This meant, for example, that if there was a different fixed monthly cost depending on the customer's meter size, a separate tariff was entered for each meter size. Thus, one tariff document might yield a dozen separate tariffs in our database, one for each meter size. If there were different climate zones, the charges in each climate zone would comprise a separate tariff. .

Each tariff was further broken down into "components", and this information was stored in the "components" table. For any given tariff, each component has one unique rate associated with it. So, for example, a tariff which consists of a fixed monthly charge of $15/month, and water consumption charges in three tiers, of say, $1.00 per HCF (hundred cubic feet, or 748 gallons) for the first 5 HCF, and $1.50 per HCF for the next 5 HCF, and $2.00 per HCF for all additional HCF, would have 4 components in our components table – one for the fixed charge, and one each for each of the three tiers. There is also a "group" field, and "sequence" field, to indicate which charges go together and in what sequence. In the example given here, the fixed monthly cost would be a group with one element, and the three tiers would be a second group containing a total of three elements.

5. Results

Our database currently includes tariff information for 41 providers of both water and waste water services, 21 providers of water services only, and 13 providers of waste water services only. Adding these together, we have a total thus far of 75 companies or governmental agencies, of which 62 provide water service and 54 provide waste water service.

Nearly all of the water tariffs in our sample also include a quantity charge based on metered water consumption. In California, it has been a requirement since 1992 that all new construction include a water meter. Since that law went into effect, most water providers have chosen to base tariffs on water consumption, but a few have not. In our sample, we found that only 4 out of 62 water service providers (6%) have flat rates for new residences. The largest of these is the City of Sacramento, which is on record as opposing metered water rates.

For those tariffs which have rates based on water consumption, we determined what the marginal rate would be for the 11th HCF consumed in a month (10 HCF per month is a typical quantity for residential water consumption). Since each utility might have several tariffs based on meter size, but with the same marginal rate, for each utility we identified the unique marginal rates. For 4 utilities, the value was $0, because even though those utilities do have a water consumption charge, there is a certain amount of water usage that is included in the monthly fixed fee, and the 11th HCF fell below this amount. Of the

non-zero values, the lowest was $0.24/HCF, and the highest was $5.28/HCF. This high value was for a utility which has what we refer to as a "disappearing" block structure, i.e. the lower rate for the first 0 to 10 HCF is lost if an 11th HCF is consumed, so the effective rate for the 11th HCF is the rate for that HCF plus the additional charge that is incurred on HCF 0 to 10. The unweighted average value for the 11th HCF, including the zeroes for flat rate tariffs, was $1.40. The average of the non-zero values was $1.52/HCF. Figure 1 shows the distribution of charges for the unique tariffs.

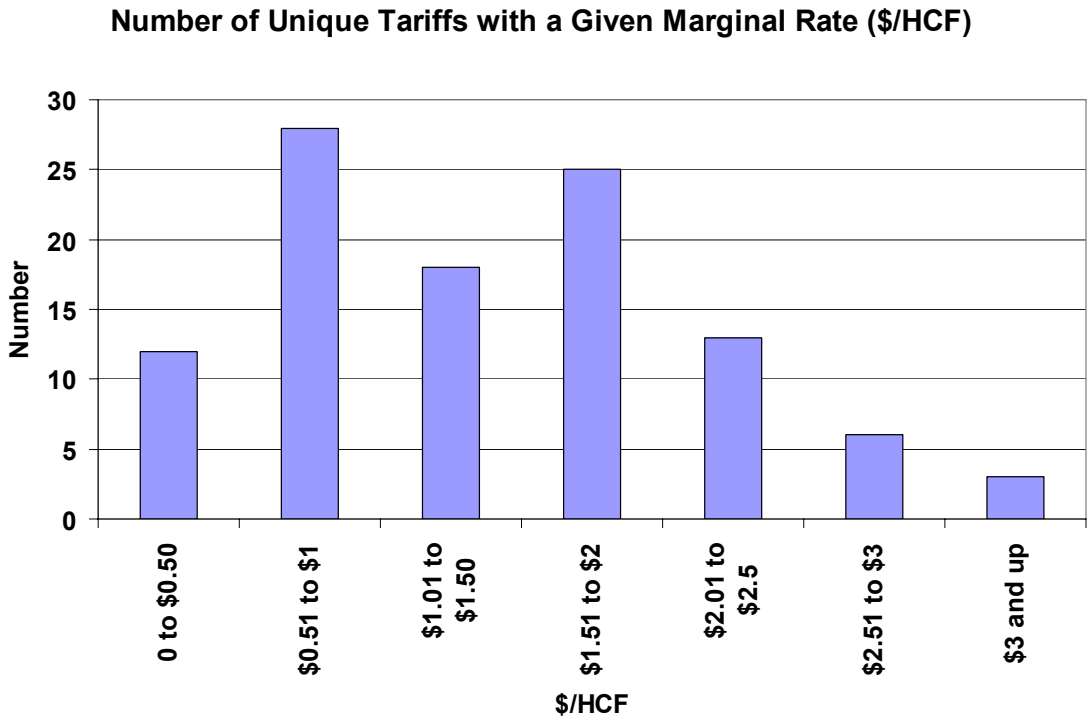

Figure 1. Distribution of Marginal Rates for Water Consumption (11th HCF in a month)

For waste water, we found that 41 out of 54 service providers (76% of our sample) have flat rates that are completely independent of water consumption. Of the remaining 13 there are 6 who base their rates on metered water consumption during a base period in the previous winter – the rates are fixed for a year based on the last year's water consumption and then adjusted once a year. The remaining 7 base their rates on each month's metered water consumption. Sometimes the utilities apply an additional multiplier to estimate what fraction of water use (whether it's winter water use or monthly metered water) is released to the sewer (typically 75% to 90%). For those utilities that apply such a multiplier, we multiplied the nominal rate per HCF times this multiplier to calculate the actual charge per metered HCF, and entered the actual charge into our database. For example, if a utility has a nominal sewer charge of $2.00/HCF, and multiplies 90% times metered water use to estimate sewer use, we multiplied $2.00 times 90% and entered $1.80/HCF into our database, since this is the effective charge per HCF of metered water use.

Of the 13 companies that base sewer rates on water use, there were 2 that only based it loosely on water consumption within broad categories. For example, a city might charge $10/month for users whose estimated sewer use is 0 to 5 HCF, $15/month for 6 to 10 HCF, and $20/month for 11 or more HCF. We modeled this in the database by counting the $10 charge for the lowest usage category as a fixed monthly cost (since all users pay at least this amount). We entered consumption charges of $0/HCF for the first 5 HCF, $5/HCF for the 6th HCF (this is the additional cost incurred by the 6th HCF since it bumps the user up into the next category), $0 for the 7th through 10th HCF, $5 for the 11th HCF, and $0 for all additional HCF.

There were 17 unique tariffs for the 13 companies which have consumption charges (4 companies had different rates for multifamily residences than for single family). We calculated the charge for the 11th HCF consumed in a month. There were 4 tariffs out of 17 where the marginal rate was $0. The lowest non-zero value was $0.47/HCF, the highest was $11.54/HCF. The highest value was from one of the two that bases its rates on categories of consumption, as described above. The 11th HCF is the transition from one category to the next highest, thus the marginal cost for that one HCF is quite high.

The average marginal cost per HCF of waste water, including zeroes for all 41 of the flat rate utilities, was $0.74/HCF. The average of the non-zero values was $3.23/HCF.

Appendix

This appendix lists all of the fields in each of the four Water TAP database tables. There is a brief description of each field, and the types of values it contains.

Table A-1. Fields in the Utility Table of the Water TAP Database

Field Name	Data Type	Field Values	Description and Notes
util_id	AutoNumber	Positive integers	The unique identifier for each utility.
Epa_id	Text(20)		Reserved for entry of EPA Safe Drinking Water Act ID of the utlity – not currently populated
Util_type	Text(2)	DW, WW or B	DW = provider of water only, WW = provider of waste water services only, B = provides both
Name	Text(200)	Text	Common name of the utility
state_id	text(2)	Two letters	Two letter abbreviation for state in which utility is located (CA for this project)
Pop_served	Long Integer	Positive integers	The number of people served by the utility. Entered when available.
Conn_served	Long Integer	Positive Integers	The number of service connections. Entered when available.
date_entered	Date/Time	dates	Date when utility entered into database
date_expired	Date/Time	dates	When applicable, "date_expired" is the date when utility data found to be out of date. This can occur when a utility merges with another utility (not populated, available for future use)
last_update	Date/Time	dates	Last time information was updated and/or verified for this utility.
ownership	Text(50)	Municipal, County, Private	Ownership of the utility. Entered when available.
website	Text(100)	text	Main web page address for the utility
Website_tariff	Text(255)	Text	Web page on which tariff data was found
Month_summer_begins	Integer	1 through 12	For utilities with seasonal rates, the month in which the summer season begins
Day_summer_begins	Integer	1 through 31	Day on which the summer season begins
Month_summer_ends	Integer	1 through 12	Month in which the summer season ends
Day_summer_ends	Integer	1 through 31	Day on which summer season ends
Comments	Text(255)	Text	Comments or notes from person who entered the data.

Table A-2. Fields in the Tariff Table of the Water TAP Database

Field Name	Data Type	Field Values	Description and Notes
Tariff_id	AutoNumber	Whole numbers	Unique identifier for each tariff
Tariff_type	Text(2)	DW or WW	DW = water tariff, WW = waste water
Schedule	Text(100)	Text	Utility specified "common" name for the tariff
Schedule_code	Text(50)	Text	Official utility document designation (if any) for this tariff (e.g. WA-1)
Util_id	Long Integer	Whole number	Utility identifier for this tariff
State	Text(2)	2 letter state code	State in which tariff is offered
Market	Text(1)	R,C,A or G	R = residential, C = commercial, A = agricultural, G = general
Submarket	Text(10)	SFR or MFR	SFR = single family residence, MFR = multi-family building
Geog_area	Text(100)	Text	geographic area covered by this tariff. If blank, geographic area is equal to entire service territory of the utility.
Billing_period	Text(2)	D, M, B, Q or A	D = daily (although customers are not billed daily, this code is used when tariffs list rates on a per day basis) M = Monthly, B = bimonthly, Q = quarterly, S = semi-annually, A = Annually
Metersize	Text(10)	Text	A text description of the meter size(s) covered by the tariff, e.g "5/8", "less than 1", etc.
Meternum	Number(single)	0.625 up to 18	A number for the meter size to which the tariff applies. If it applies to more than one szie, the largest is entered
Param1	Text(100)	Text	description of first parameter (other than meter size) determining which customers are covered by this tariff. E.g. lot size = 0 to 7000 sq. ft, Temperature Zone = moderate, etc.
Param2	Text(100)	Text	description of second parameter determining which customers are covered by this tariff
Addparams	Text(100)	Text	description of any additional parameters that determine which customers are covered by this tariff
Base_begin_month	Integer	1 – 12	for tariffs based on consumption in a base period, month base period begins
Base_begin_day	Integer	1-31	for tariffs based on consumption in a base period, day base period begins
Base_end_month	Integer	1-12	for tariffs based on consumption in a base period, month base period ends

Table A-2 (continued). Fields in the Tariff Table of the Water TAP Database

Field Name	Data Type	Field Values	Description and Notes
Base_end_day	Integer	1-31	for tariffs based on consumption in a base period, day base period ends
Adjust_month	Integer	1-12	for tariffs that adjust once a year based on previous consumption, month adjustment is done
Adjust_day	Integer	1-31	for tariffs that adjust once a year based on previous consumption, day adjustment is done
Last_update	Date/time	Date	last time the data for this tariff was updated and/or verified
Date_entered	Date/time	Date	date when tariff was entered into database
Doc_date_effective	Date/time	Date	official utility document date tariff goes into effect
Doc_date_expired	Date/time	Date	official utility document date tariff expires
Description	Memo	Text	utility provided description of this tariff
Notes	Memo	Text	comments regarding the tariff model assumptions or approximations

Table A-3. Fields in the Component Table of the Water TAP Database

Field Name	Data Type	Field Values	Description and Notes
Component_id	AutoNumber	Whole Numbers	Unique identifier for the tariff component
Tariff_id	Long Integer	Whole Numbers	Tariff this component is part of
Group_id	Integer	Whole Numbers	used to group like components (e.g. fixed charges with other fixed charges, consecutive tiers in a block structure)
Sequence	Integer	Whole Numbers	identifies the order of a block within a group
Rate	Number(single)	Positive number	the rate associate with this component
Rate_type	integer	1-4	1= actual consumption $/HCF, 2 = consumption during a base period ($/HCF) 3 = fixed ($/billing period) 4 = actual consumption, $/TG
Months	Text(1)	A, W or S	A = all, S = Summer, W = Winter
Max	Number(single)	Positive number	upper limit of consumption range to which the rate applies. Lower limit is defined by max of preceding block
Max_type	Integer	1-4	1 = metered HCF, 2 = HCF during a base period, 3 = percent relative to a base period, 4 = metered TG
Altmax	Number(single)	Positive number	some blocks may have two alternative maximums -- e.g. 125% of previous December usage or 28 HCF, whichever is greater
Altmax_type	Integer	1-4	1 = metered HCF, 2 = HCF during a base period, 3 = percent relative to a base period, 4 = metered TG
Logic	Integer	1 or 2	relationship between max and altmax. 1 = "or" 2 = "and"
Component_name	Text(100)	Text	component name
Group_name	Text(50)	text	name for this component group

Table A-4. Fields in the Utility_Cities Table of the Water TAP Database

Field Name	Data Type	Field Values	Description and Notes
City_id	AutoNumber	Whole numbers	unique identifier of this city, county unincorporated area, or section thereof
Util_id	Number	Whole numbers	Identifier of utility which serves this city or section of a city
City_name	Text(100)	Text	Name of the city (or county unincorporated area)
Section	Text(50)	Text	The geographic area of the city (or county unincorporated area) covered by this utility. Could be "all", or "west of highway 99", for example