Measure Information – [Water and Wastewater Tariffs]

2008 California Building Energy Efficiency Standards

Proposer: Lawrence Berkeley National Laboratory
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Purpose

This document proposes changes to the calculation of costs and benefits under the Title 24 Residential Building Standards. Energy efficiency measures that reduce the consumption of hot water save water as well as energy. The end user may save money through reduced water bills and possibly also reduced waste water bills, if the measure results in less water being released to the sewer system. We propose that the cost savings of the saved water be included in the cost/benefit analysis of measures which save hot water.

Overview

Complete the following table, providing a brief sentence or two for each category of information.

Description	Efficiency measures that reduce the consumption of hot water save water as well as energy. The current methodology does not include the cost savings due to decreased water consumption and therefore undervalue measures which reduce hot water consumption.
Type of Change	The proposed change is a modeling change. The change would modify the calculation procedure used in making performance calculations. This change would not add a compliance option or a new requirement, but would affect the way that trade-offs are made.
Energy Benefits	Because the value of saved water is not currently included in evaluation of measures that save hot water, such measures are undervalued. Measures that would actually be cost-effective may not appear so due to this undervaluation. Inclusion of the value of saved water will give a more accurate estimate of the costs and benefits of hot water saving measures. More such measures are likely to be implemented, increasing overall energy savings.
Non-Energy Benefits	Reduced consumption of water, and reduced releases of water to sewer systems, will have numerous benefits. These include decreased environmental impacts of water withdrawals and sewer releases, and decreased costs to maintain and expand water supply and sewer systems.
Environmental Impact	Since the proposed change would likely increase the number of hot water saving measures that are implemented, this will have a beneficial environmental impact due to decreased consumption of energy and water.
Technology Measures	Not required for modeling rule change.
Performance Verification	Not required for modeling rule change.
Cost Effectiveness	Not required for modeling rule change.
Analysis Tools	Not required for modeling rule change.
Relationship to Other Measures	The proposed change will likely increase the number of hot water saving measures that are deemed to be cost effective.

Methodology

The Lawrence Berkeley National Laboratory has gathered data on water and waste water tariffs in high growth areas of California. Such data will give insight into the value of water saved through hot water efficiency measures. We describe here our methodology for identifying high growth areas and gathering tariff data for those areas.

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 that 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.

To date we have 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 A-1 in Appendix A lists all of the utilities for which data was entered.

Analysis and Results

Nearly all of the water tariffs in our sample 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 11^{th} 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 11^{th} 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.

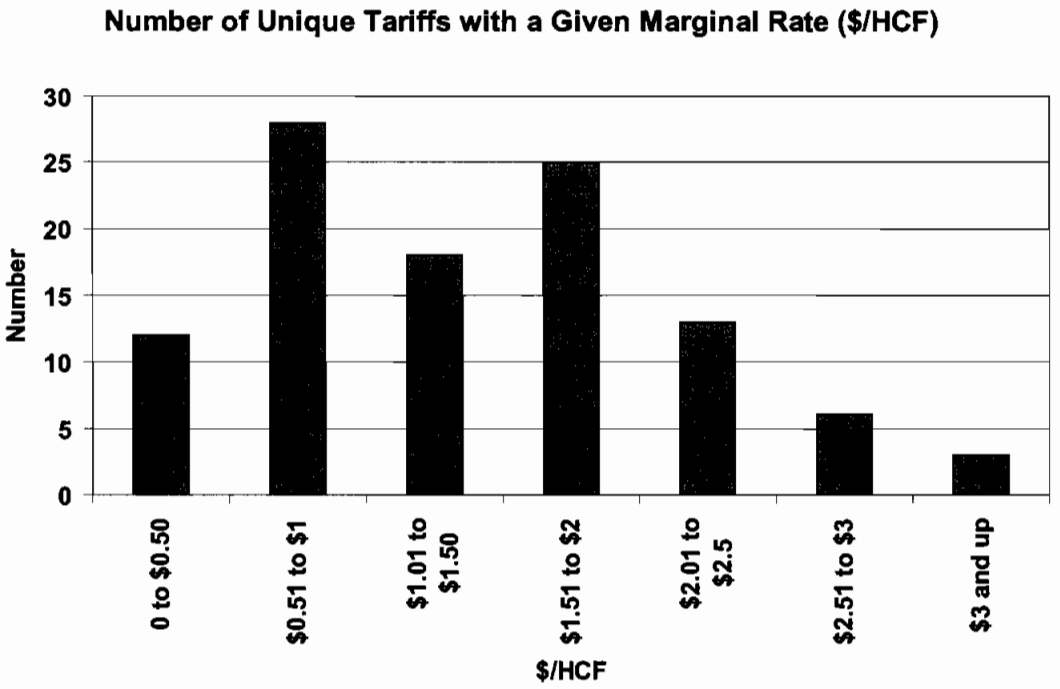

Figure 1. Distribution of Marginal Rates for Water Consumption (11th HCF in a month)

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.

Recommendations

We recommend that the value of water saved be included in the cost effectiveness calculation for measures that save water. Based on our preliminary evaluation (described above), we recommend a value of $2 per HCF (100 cubic feet) to represent the savings in both water and waste water bills to the end user.

Material for Compliance Manuals

We recommend that a new section be added to the compliance manual, in which the savings to the end user are calculated from reduced water consumption and waste water releases due to decreased hot water consumption.

Bibliography and Other Research

Water and Waste Water Tariffs for New Residential Construction in California (draft), (2006) Lawrence Berkeley National Laboratory, Berkeley California.

Appendices

Appendix A

Table A- 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 A-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