PUGET SOUND ENERGY

The Energy To Do Great Things

Avoided Cost Calculations for Electric Energy Efficiency Programs

Prepared By:

Bobette Wilhelm

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1. Introduction

Puget Sound Energy's (PSE) avoided cost of electricity is used by the Energy Efficiency Department in the calculation of benefits for three of four cost-effectiveness tests. The tests that utilize PSE's avoided cost of electricity as benefits for the cost-effectiveness calculations include: the Utility Cost Test (UC), the Total Resource Cost Test (TRC), and the Ratepayer Impact Measure (RIM) Test. The fourth test, the Participant Cost Test (PCT), calculates benefits using customer bill savings, program incentives, and tax credits.

PSE calculates the avoided cost of electricity, which consists of two main components: the avoided cost of energy and the avoided cost of capacity. The avoided cost of energy and capacity are calculated for each year over the thirty year time period. The present value of the annual avoided cost are then included as a benefit in the relevant cost-effectiveness test. This range of costs allows PSE to assess measures that have a savings life ranging from one to thirty years

This paper provides the background assumptions and calculation of avoided costs used in PSE 2012-2013 cost-effectiveness calculations. The calculation of the avoided energy costs is explained in section two; the calculation of the avoided capacity costs is explained in section three. Section four provides details on how the avoided cost of energy and capacity are combined to calculate the total avoided cost of electricity.

2. Avoided Cost of Electric Energy

PSE calculated the 2012-2013 avoided cost of electricity for sixteen end-uses[i] which are representative of the measures PSE currently offers though energy efficiency programs. When calculating benefits for use in the cost-effectiveness tests, each measure is assigned to one of the sixteen end-uses which best fits the measure description. Since the value of the energy varies throughout the year, the avoided cost of energy is calculated separately for each of the sixteen representative end-uses to account for the variance in end-use and hence measure load shape.

Avoided energy cost is calculated using the following inputs:

1. Weighted average annual market price of electricity
2. Avoided line losses
3. Planning adjustment
4. Avoided incremental costs of compliance with renewable energy standards
5. Conservation credit (set to zero for the UC & RIM)

Each input to the calculation of the avoided cost of energy is described in the remainder of this section.

2.1. Weighted Average Annual Market Price of Energy

The first step in calculating avoided cost of energy was to calculate a weighted average annual market price for energy (WAAMPE) over the next thirty years. This price represents the average annual price PSE expects to pay to purchase energy from the market to serve the load which is being reduced though an energy efficiency technology.

To calculate the weighted average annual market price of energy, PSE used a combination of hourly market prices and hourly load shapes, for the 16 representative end-uses.

2.1.1 Hourly Load Shapes

Hourly load shapes for each of the 16 end-uses are provided as a distribution of one megawatt (MW) of energy over an entire year, providing the portion of that megawatt used in each hour throughout a typical year.[ii] Therefore, the sum of the hourly loads over 8,760 hours, for each of the end-uses, is one MWh.

2.1.2 Hourly Market Prices

Hourly market prices from the 2011 Integrated Resource Plan (IRP) were used in the estimation of the weighted average annual price of energy from 2012 through 2032. The 2011 IRP hourly market prices came from the most recent ARORA forecast.

2.1.3 Calculation

To PSE calculated the weighted average annual market price of energy for years 2012 through 2032, PSE energy efficiency evaluation staff obtained the hourly load shapes[iii] used in the 2011 IRP and the hourly market prices for electricity used in the 2011 IRP. The weighted average annual cost of energy was then calculated for each of the sixteen end-uses for each year 2012-2032.

Because hourly market prices in PSE's 2011 IRP only cover 21 of the 30 years required to perform the cost-effectiveness tests, further assumptions were required to project the prices to the end of the 30-year period. This was done by inflating the weighted average annual market price of energy in 2032 (the last year of the IRP projections) by the assumed long-run inflation rate in the IRP (2.5%).

The weighted average annual market price of energy is calculated for each year, by end-use, by summing the product of the hourly market energy prices, in year y, and hourly loads for each end-use.

The methodology for calculating the weighted average annual cost of energy for years 2012 through 2032, for each end-use, is summarized below:

$$WAAMPE_{j_y} = \sum_{h=1}^{8760} load_{j_h} * price_{h_y}$$

Where:

$load_{jh}$: Percent of one MW used in hour h for end-use j

$Price_{hy}$: Price of electricity in hour h of year y

$WAAMPE_{jy}$: Weighted average annual market price of electricity for end-use j in year y ($/MWh)

2.2. Avoided Cost of Line Losses

As energy is transmitted from a generation facility to a customer premise, a portion of this energy is lost. As a result, when PSE runs an efficiency program that saves energy at a customer's home, let's say one kilowatt-hour, PSE actually saves slightly more than one kilowatt during that hour. PSE avoids serving that house with one kilowatt during that hour and also avoids the line losses experienced while delivering that one kilowatt to the customer. To account for energy line losses in the 2012-2013 avoided cost calculations, a loss factor of 8.02% was applied to the weighted average annual market price of energy for residential programs; a loss factor of 6.55% was applied to the weighted average annual market price of energy for commercial and industrial programs.

The energy losses factors listed above include other forms of unmetered usage, in addition to the line losses that are of primary interest in PSE's cost-effectiveness calculations. Therefore, these loss factors slightly overestimate energy losses that are due solely to the transmission of energy across PSE's electric delivery system.

When AMR meters were installed in the majority of PSE service territory, PSE stopped tracking unmetered usage on an ongoing basis. Therefore, it is not possible to estimate this unmetered usage, subtract them from total loss, and estimate line loss based on that difference. Notwithstanding these deficiencies, PSE has included the total energy loss factor in the avoided cost calculations as a proxy for avoided line losses.

PSE recognizes that these losses may slightly overstate the benefits attributable to its energy efficiency programs. However, PSE believes these effects are minor and will work in the coming years to estimates of line losses.

2.2.1. Calculation of Avoided Cost of Line Losses (LL_{jy})

Residential Line $Loss_{jy}$ $WAAMPE_{jy}$ * 8.02%

Commercial/Industrial Line $Loss_{jy}$: $WAAMPE_{jy}$ * 6.55%

Where:

$WAAMPE_{jy}$: Weighted Average Annual Market Price of Energy for end-use j in year y

2.3 Planning Adjustment

The 2011 IRP provided guidance for an all market portfolio, adjusted for firm capacity needs and the renewable portfolio standards. Therefore, the planning adjustment for the 2012-2013 programs is simply the cost difference- which is not attributable to the market value of energy, the avoided capacity costs, or the avoided renewable portfolio standard costs- between the 2011 IRP portfolio with no demand side resources (DSR) and the 2011 IRP portfolio with optimal DSR. This is shown formulaically below.

Levelized Avoided Cost of Planning Adjustment:

$$PA = \frac{\sum_{y=1}^{20} [[(PNDSR_y - PWDSR_y) - (PNDSRC_y - PWDSRC_y) - (PNDSRR_y - PWDSRR_y) - (PNDSRE_y - PWDSRE_y)] / (1+I)^y]}{\sum_{y=1}^{20} [EnergySavings_y / (1+I)^y]}$$

Where:

PNDSR: Cost of the portfolio with no DSR

PWDSR: Cost of the portfolio with DSR

PNDSRC: Cost of peaking resources (capacity) in the portfolio with no DSR

PWDSRC: Cost of peaking resources (capacity) in the portfolio with DSR

PNDSRR: Cost of the renewable portfolio standards in the portfolio with no DSR

PWDSRR: Cost of the renewable portfolio standards in the portfolio with DSR

PNDSRE: Market price of energy in the portfolio with no DSR

PWDSRE: Market price of energy in the portfolio with DSR

I: Interest rate used for discounting, PSE ROR (8.10%).

$EnergySavings_{y:}$ Energy Savings in year y from the portfolio with DSR

Because resources are built to meet demand over time, the value of the planning adjustment is calculated as a levelized[iv] payment over the life of the portfolio, which is 20 years. The levelized avoided cost of the planning adjustment, over the 20-year planning horizon in the 2011 IRP, is $0.23 per MWh. However, PSE cost-effectiveness calculations require avoided costs calculated over a 30 year planning horizon. For years 2032 through 2041, PSE held the nominal cost of the planning adjustment flat at $0.23 per MWh. The value of the planning adjustment does not change by end-use; it is a constant $0.23 per MWh for every end-use[v].

2.4 Avoided Cost of Renewable Portfolio Standard

Chapter 19.285 of the Revised Code of Washington (RCW)[vi] statutorily requires PSE to use "eligible" renewable resources, or acquire equivalent renewable energy credits (RECs), to meet annual renewable energy targets. PSE must use these renewable resources, RECs or some combination of the two to meet at least three percent of the load by January 1, 2012, and each year thereafter through December 31, 2015. That requirement grows to nine percent by January 1, 2016, and each year thereafter through December 31, 2019; and at least fifteen percent by January 1, 2020 and thereafter.

As suggested above, the size of PSE's renewable portfolio is dependent upon the amount of energy required to serve customers. In as much as energy efficiency programs reduce the energy requirements of PSE's customers, the need for PSE to purchase renewable energy also shrinks. Therefore, the cost of meeting this renewable portfolio standard that is avoided due to energy efficiency activities needs to be accounted for in PSE's avoided costs for energy.

Because the IRP is a 20-year plan, the avoided cost of the renewable portfolio standard is first calculated as a levelized payment over 20 years. Based on the assumptions in the 2011 IRP, that levelized payment is currently $11.49 per MWh. For years 2032 through 2041, PSE held the avoided cost of the renewable portfolio standard flat, at a nominal rate of $11.49 per MWh. For purposes of calculating cost-effectiveness, the value for the avoided cost of PSE's renewable energy standard is assumed to not change by end-use. The basic formula used in these calculations is shown below.

Levelized Avoided Cost of Renewable Portfolio Standard:

$$RPSC = \frac{\sum_{y=1}^{20}[(PNDSRR_y - PWDSRR_y)/(1+I)^y]}{\sum_{y=1}^{20}[EnergySavings_y/(1+I)^y]} = \$11.49/MWh$$

Where:

PNDSRR: Cost of renewable energy standards from the portfolio with no DSR

PWDSRR: Cost of renewable energy standards from the portfolio with DSR

I: Interest rate used for discounting, PSE ROR (8.10%).

$EnergySavings_{y:}$ Energy savings in year y from the portfolio with DSR

PSE's statutory renewable portfolio requirements can be viewed with the following link:

http://apps.leg.wa.gov/rcw/default.aspx?cite=19.285.040

2.5 Conservation Credit for Energy

Section 3(4)(D) of the Pacific Northwest Electric Power Planning and Conservation Act ("NW Power Act") directs the Northwest Power and Conservation Council, and the Bonneville Power Authority, to apply a 10 percent cost advantage to conservation when comparing it with sources of electric generation. The Northwest Power and Conservation Council applies this cost credit to the value of market prices, deferred transmission and distribution investments, and risk avoidance in the formulation of their periodic Regional Power Plans. Further Section 1(a) of RCW 19.285.040 requires PSE to use a methodology "consistent" with that outlined in the NW Power Act when evaluating relative merits of demand-side resource vs. supply-side alternatives.

PSE applies this cost advantage to conservation only in the calculation of avoided electric cost for the TRC test. Specifically, the avoided cost of market priced energy, the line loss reductions, the planning adjustment, and the avoided cost of renewable standards are all increased by 10%.

Conservation Credit for Energy: $$CCE_{j_y} = (WAAMP_{j_y} + PA + RPSC + LL_{jy}) * 0.10$$

Where:

$CCE_{jy:}$ Conservation Credit for Energy for end use j in year y

$WAAMPE_{jy}$: Weighted Average Annual Market Price of Energy for end-use j in year y

LL_{jy}: Avoided cost of line loss

PA: Levelized value of the planning adjustment

RPSC: Levelized value of the renewable portfolio standard costs

2.6 Calculation of Avoided Cost of Energy

Within the cost-effectiveness tests, the avoided cost of energy is calculated as the present value of the stream of avoided costs, over the life of the measure being assessed. Obtaining the value of avoided costs in a present value is essential in producing valuable benefit-cost ratios because it allows an apples-to-apples comparison of the benefits (avoided costs) of a program, or measure, with the costs associated with obtaining those benefits, typically incurred in the first year of the measure installation.

PSE calculated the present value (in 2012 dollars) of the stream of avoided costs using the total avoided cost of energy, for years 2012 through 2041. Once the present value of avoided costs (for years 2012 through 2041) are known, PSE can calculate the present value of the stream of avoided costs for various measure lives.

2.6.1 Avoided Cost of Energy for years 2012 through 2041

The total avoided cost of energy, for years 2012 through 2041, are calculated by summing the values for the weighted average annual market price, the value of line losses, the planning adjustment, the avoided cost associated with PSE's renewable portfolio standards, and the conservation credit. The total yearly avoided cost of energy is defined below:

$$TCE_{j_y} = WAAMPE_{j_y} + LL_{j_y} + PA_y + RPSC_y + CC_{j_y}$$

Where:

$TCE_{jy:}$ Total avoided cost of energy for end-use j in year y

$WAAMPE_{jy}$: Weighted average annual market price of energy for end-use j in year y

LL_{jy}: Line losses for end-use j in year y

PA_y: Value of the planning adjustment in year y ($0.23/MWh)

$RPSC_y$: Value of the avoided cost associated with renewable portfolio standard in year y ($11.49/MWh)

CC_{jy}: Value of the conservation credit for end-use j in year y. This is set to zero for the Utility Cost Test and the RIM Test.

2.6.2 Present Value of Avoided Cost of Energy

Once the total avoided cost of energy, for years 2012 through 2041, are calculated, the present value of the avoided cost of energy are calculated in 2012 dollars.

PSE uses its authorized rate of return on rate base (ROR) of 8.1% as the discount rate in its present value calculations. This rate was approved in PSE's 2009 General Rate Case and was used in its 2011 IRP[vii].

The present value of the avoided cost of energy is defined below:

$$PV_{j_y} = TCE_{j_y} / (1+I)^y$$

Where:

PV_{j_y} : Present value of year y's avoided costs of energy for end-use j.

TCE_{j_y} : Total avoided cost of energy for end-use j in year y.

I: Interest rate used for discounting, PSE's ROR (8.10%).

2.6.3 Present Value of the Stream of Avoided Energy Costs

The present value of the stream of avoided energy costs is equal to the total benefits of avoided energy costs over the life of the measure being assessed. The present value of the stream of avoided costs are calculated for years 2012 through 2041 and are equal to the sum of avoided costs for each year, y, and all years previous. The calculation of the present value of the stream of avoided costs is below:

$$PVSACE_{j\,y} = \sum_{y=1}^{N} TCE_{j_y} / (1+I)^y$$

Where:

$PVSACE_{jy}$: Present value of the stream of avoided costs for a measure with end-use j and a savings life of y.

TCE_{j_y} : Total avoided cost of energy for end-use j in year y.

I: Interest rate used for discounting, PSE's ROR (8.10%).

N: Measure Life

3. Avoided Cost of Capacity

PSE's peak load (highest load of the year) is expected to increase over time. As peak loads increase, PSE incurs a cost to build resources which are specifically attained to assist the company in meeting the energy demands of customers during the peak hour. In addition to the costs of the peaking resources, PSE incurs a cost to upgrade the current transmission and distribution system so that it can handle the larger peak loads.

A portfolio with DSR, which saves energy on the peak hour, will assist the utility in avoiding the purchase of some peaking resources. The portfolio with DSR will also assist in deferring some of the transmission and distribution system upgrades. When calculating the avoided cost of energy efficiency activities, it's important to include the avoided costs of capacity which occur because of the investment in energy efficiency resources.

The avoided costs of capacity are added to the avoided cost of energy when calculating the benefits for energy efficiency measures and programs. The avoided costs of capacity are quantified by kW-yr, unlike the avoided cost of energy which is in units of megawatt hour of energy. Therefore, for each end-use in the efficiency portfolio, the value of capacity (or kW) is multiplied by the percent of total load, for end-use j, which occur on the peak hour per the end-use load shape[viii].

When calculating the benefits for the TRC, a 10% conservation credit is applied to the fixed cost of capacity and the deferred transmission and distribution costs.

Avoided capacity cost is calculated using the following inputs:

1. Fixed cost of capacity
2. Avoided cost of transmission and distribution
3. Conservation credit (set to zero for the UC & RIM)

3.1 Fixed Capacity Costs

The avoided fixed capacity cost are calculated as an annual payment, over twenty years, on the difference in fixed capacity costs (cost of building peaking resources) between the portfolio with no demand side resources and the portfolio with optimal demand side resources, on a per KW-year basis. The levelized value, per KW-year, is currently $202.15.

$$FCC = \frac{\sum_{y=1}^{20}[(PNDSRC_y - PWDSRC_y)/(1+I)^y]}{\sum_{y=1}^{20}[PeakBuilds_y/(1+I)^y]}$$

Where:

FCC: Fixed Cost of Capacity

PNDSRC: Cost of peaking resources (capacity) in the portfolio with no DSR

PWDSRC: Cost of peaking resources (capacity) in the portfolio with DSR

Peak Builds: The megawatts of peaking resources built in year y under the optimal portfolio with DSR.

For years 21 through 30, PSE held the avoided fixed cost of capacity flat at $202.15 per megawatt KW-year.

3.2 Avoided Cost of Transmission and Distribution Costs

Currently, PSE uses the value of avoided transmission and distribution from the 6th Northwest Power Plan. The plan used monetary values of avoided transmission and distribution capacity which were recommended by the Regional Technical Forum. The value recommended for avoided transmission is $23 per kW-year; the value recommended for avoided distribution is $25 per kW-year.

The values of transmission and distribution in the 6th Northwest Power Plan are in 2006 prices. To obtain a value for 2012, the price in 2006 was inflated using Moody Analytics full CPI from 2006 to 2012. The reason the assumed inflation rate in the IRP was not used is because past inflation values are known and the assumed inflation rate in the IRP is an assumed future inflation rate.

The combined value of avoided transmission and distribution is $54.32 per kW-year in 2012 dollars. The 2012 value of transmission and distribution was inflated by the assumed inflation rate in the IRP of 2.5% to obtain avoided transmission and distribution costs for years 2013 through 2041.

$$TD_y = (TD_{(y-1)} * 1.025)$$

Where:

TD_y: Avoided cost of transmission and distribution for end-use j in year y.

3.3 Conservation Credit for Capacity

Section 3(4)(D) of the Pacific Northwest Electric Power Planning and Conservation Act ("NW Power Act") directs the Northwest Power and Conservation Council, and the Bonneville Power Authority, to apply a 10 percent cost advantage to conservation when comparing it with sources of electric generation. The Northwest Power and Conservation Council applies this cost credit to the value of market prices, deferred transmission and distribution investments, and risk avoidance in the formulation of their periodic Regional Power Plans. Further Section 1(a) of RCW 19.285.040 requires PSE to use a methodology "consistent" with that outlined in the NW Power Act when evaluating relative merits of demand-side resource vs. supply-side alternatives.

PSE applies this cost advantage to conservation only in the calculation of avoided electric cost for the TRC test. Specifically, the avoided cost of market priced energy, the line loss reductions, the planning adjustment, and the avoided cost of renewable standards are all increased by 10%. This cost advantage is not applied to the UC, RIM, or PCT.

Conservation Credit for Energy:

$$CCC_y = \left(FCC + TD_y\right) \times 0.10$$

Where:

$CCC_{y:}$ Conservation Credit for Capacity in year y

FCC: Fixed cost of capacity

TD_y: Avoided cost of transmission and distribution for end-use j in year y.

3.4 Calculation of Avoided Cost of Capacity

The avoided cost of capacity is calculated as the present value of the stream of avoided capacity cost over the life of the measure being assessed. This means that PSE must calculate the present value of the stream of avoided capacity costs for years 2012 though years 2041.

The present value of the stream of avoided capacity costs in each year contains the present value of avoided capacity cost in that year and in every year previous. To calculate the present value of the stream of avoided capacity costs, PSE first calculates the nominal avoided cost of capacity for each year, 2012-2041. PSE then obtains a present value of avoided cost of capacity for each year, for years 2012 through 2041, in 2012 dollars. After calculating the present value per year, PSE calculates the stream of avoided costs by summing the present value of avoided costs for each year, y, and every year previous.

3.4.1 Calculation of the Total Avoided Cost of Capacity

The total avoided cost of capacity is calculated by summing the values for fixed capacity costs, avoided cost of transmission and distribution, and the conservation credit.

$TCC_y = (FCC_y + TD_y + CCCy)$

Where:

$TCC_{y:}$ Total avoided cost of capacity in year y

FCC_y: Avoided Fixed Capacity Cost in year y

TD_y: Avoided Transmission and distribution

CCC_y: Conservation Credit in year y. This value is set to zero for the Utility Cost Test and the Ratepayer Impact Measure Test

3.4.2 Present Value of Avoided Cost of Capacity

Once the total avoided cost of capacity (for years 2012 through 2041) is calculated, the present value of the avoided cost of capacity, for year 2012 though 2041, is obtained. The present value is calculated to set all avoided costs to 2012 dollar values. All dollar values need to be in the same time period so correct comparisons of benefits and costs can be made.

For present value calculations, PSE's weighted average cost of capital (8.1%) is used as the discount rate. This rate is adopted from the commission-approved cost of capital structure from the 2009 General Rate Case and is utilized in the 2011 IRP[ix].

Present value calculations are defined below:

$$PVSACC_{j_y} = (TCC_{j_y}) / (1 + I)^y$$

Where:

PV_y : Present value of year y's avoided costs of energy for

$TCC_{y:}$ Total avoided cost of capacity in year y

I: Interest rate used for discounting, PSE weighted average annual cost of capital (8.10%).

3.4.3 Present Value of the Stream of Avoided Capacity Costs

The present value of the stream of avoided capacity costs is equal to the total benefits of avoided capacity costs over the life of the measure being assessed. The present value of the stream of avoided costs are calculated for years 2012 through 2041 and are equal to the sum of avoided costs for each year, y, and all years previous. The calculation of the present value of the stream of avoided costs is below:

$$PVSACC_{j_y} = \sum_{y=1}^{N} [[(TCC_{j_y})/(1+I)^y]*(LPH_j)]$$

Where:

$PVSACC_y$: Present value of the stream of avoided costs for a measure and a savings life of y.

$TCC_{y:}$ Total avoided cost of capacity in year y

I: Interest rate used for discounting, PSE weighted average annual cost of capital (8.10%).

LPH_j: Percent of total load on the peak hour for end-use j

N: Measure Life

4. Total Avoided Cost of Electric Energy (Energy and Capacity)

The present value of the stream of avoided costs of electricity (energy and capacity) is calculated by summing the capacity and energy components. This value is then utilized in the benefit-cost assessments in EES.

The calculation of the present value of the stream of avoided costs for electricity (energy and capacity) is provided below:

$$PVSACTE_j = \sum_{i=1}^{N} [TCE_{j_y}/(1+I)^y] + [[TCC_{j_y}/(1+I)^y]*LPH_j]$$

Where:

$PVSACTE_j$: Present value of the stream of total avoided costs for a measure and a savings life of y.

N: Measure Life

[i] End-use is a word used to describe the common uses of energy associated with a particular sector. For example, for the residential sector, water heating, space heating, lighting, and refrigeration are all end-use categories.

[ii] Load shapes were developed for a 365 day (8760 hour) year, not a leap year.

[iii] The majority of load shapes are derived from Energy 10 building simulations or adopted from the Northwest Power and Conservation Council. All load shapes used in the avoided cost calculations are obtained from CADMUS, the firm which completes PSE's IRP.

[iv] The planning adjustment was calculated as a levelized payment because resources are not built at continuous points in time as they are needed. Resources are built intermittently to meet future loads. Therefore, a levelized value was appropriate. This avoids the entire planning adjustment arbitrarily inflating the value of avoided costs only in certain years.

[v] To accurately estimate the planning adjustment in years 21 through 30, PSE would need information on the resource needs and resource costs in those periods of time. Because they are unknown, we assume the payment will stay flat over 30 years.

[vi] Sometimes referred to as the "Energy Independence Act" or "I-937."

[vii] Each time avoided costs are updated, the analyst conducting the analysis is required to update the discount rate to reflect the rate used in the most recent IRP. This rate should also correlate to the most recent commission-approved cost of capital before the finalization of the IRP. The Resource Planning Group provides the base WAACC for the most recent IRP. To obtain a breakout of the WACC for equity, long-term debt, and short-term debt, speak with the Manager of the Cost of Service in the Rates Department, currently Jon Piliaris.

[viii] Peak hour is defined in the 2011 IRP as the average load of the six hours ending at 7am to 12pm and the six hours ending at 6pm to 11pm on weekdays in December. Because load shapes obtained from Cadmus are labeled in 2005 dates, the calendar for 2005 was used to estimate average load in peak hour.

[ix] Each time avoided costs are updated, the analyst conducting the analysis is required to update the discount rate to reflect the rate used in the most recent IRP. This rate should also correlate to the most recent commission-approved cost of capital before the finalization of the IRP. The Resource Planning Group provides the base WAACC for the most recent IRP. To obtain a breakout of the WACC for equity, long-term debt, and short-term debt, speak with the Manager of the Cost of Service in the Rates Department, currently Jon Piliaris.