BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

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IN THE MATTER OF THE APPLICATION OF PUBLIC SERVICE COMPANY OF COLORADO FOR APPROVAL OF ITS ELECTRIC AND NATURAL GAS DEMAND-SIDE MANAGEMENT (DSM) PLAN FOR CALENDAR YEARS 2009 AND 2010 AND TO CHANGE ITS ELECTRIC AND GAS DSM COST ADJUSTMENT RATES EFFECTIVE JANUARY 1, 2009, AND FOR RELATED WAIVERS AND AUTHORIZATIONS.	)	**DOCKET NO. 08A-366EG**

STIPULATION AND SETTLEMENT AGREEMENT

I. INTRODUCTION

Public Service Company of Colorado ("Public Service" or "the Company"), the Staff of the Colorado Public Utilities Commission ("Staff"), the Colorado Office of Consumer Counsel ("OCC"), the Southwest Energy Efficiency Project ("SWEEP") and Western Resource Advocates ("WRA"), Colorado Energy Consumers ("CEC"), the City of Boulder and Boulder County (collectively "City"), Energy Outreach Colorado ("EOC"), the Governor's Energy Office ("GEO"), Wal-mart Stores, Inc. and Sam's West, Inc. (Wal-Mart"), The Kroger Co. on behalf of its King Soopers and City Market Divisions ("Kroger"), Nancy LaPlaca, the Energy Efficiency Business Coalition ("EEBC"), collectively referred to as the "Settling Parties", hereby enter into this Stipulation and Settlement Agreement ("Stipulation") resolving, as between these Parties, all issues that have been raised or could have been raised in Docket No. 08A-366EG relating to the Company's 2009-2010 DSM Biennial Plan. This Stipulation sets forth all the terms and conditions of such settlement.

The Parties to this Stipulation state that the results of the compromises reflected herein are a just and reasonable resolution of the issues addressed in this Stipulation, and that reaching agreement as set forth herein by means of a negotiated settlement is in the public interest. Each Party hereto pledges its support of this Stipulation and states that each will defend the settlement reached. The Parties respectfully request that the Public Utilities Commission of the State of Colorado ("Commission" or "CPUC") approve this Stipulation.

II. BACKGROUND

On August 11, 2008, Public Service filed its Application For Approval Of Its Electric And Natural Gas Demand-Side Management Plan For Calendar Years 2009 And 2010 And To Change Its Electric And Gas DSM Cost Adjustment Rates Effective January 1, 2009, and For Related Waivers and Authorizations. By Decision No. C08-0986, the Commission referred this matter to an administrative law judge (ALJ) for preparation of an initial Commission decision. On September 29, 2008, the ALJ issued Decision No. R08-1033-I establishing pre-filing deadlines and setting this case for three days of hearings commencing on November 19, 2008.

Public Service's 2009-2010 DSM Biennial Plan is a combined electric and natural gas DSM plan under which the Company proposes to offer a total of 31 direct impact and 4 indirect impact DSM programs targeted to residential, business and low-income customer classes over the course of two years. The Company's plan also includes a Planning and Research component consisting of four additional programs: DSM Market Research; DSM Planning and Administration; DSM Product Development; and Evaluation, Measurement and Verification. As originally filed the Company's proposed

plan was designed to achieve annual electric and natural gas energy savings of approximately 181 GWh and 318,000 Dth, respectively, in 2009 and 244 GWh and 403,000 Dth, respectively, in 2010, at a proposed total cost of $61 million and $76 million for 2009 and 2010, respectively.

By this Stipulation, the Settling Parties recommend that the Commission authorize the Company to implement the DSM plan as amended by the Stipulation, and grant it the discretion to modify the plan, within the limits set forth in the Stipulation, and consistent with the Company's commitment to use its best efforts to meet or exceed the energy savings and demand reduction goals approved in Docket No. 07A-420E with respect to the electric DSM plan and approved in this case with respect to its natural gas DSM plan.

III. TERMS OF SETTLEMENT

The Settling Parties hereby stipulate and agree as follows:

1. **The 2009-2010 DSM Biennial Plan.** The Settling Parties agree that Public Service's 2009-2010 DSM Biennial Plan ("the DSM Plan"), as modified by the terms of this Stipulation, is consistent with §§ 40-3.2-103 and 40-3.2-104, C.R.S.; Decision Nos. C08-0560 and C08-0769 issued by the Commission in Docket No. 07A-420E; and the Commission's Gas DSM Rules, 4 C.C.R. 723-4-4750 through 4760, except to the extent such rules have been waived as recommended in Paragraph 9 to this Stipulation.

The Settling Parties agree that Public Service has the discretion and the responsibility to manage the proposed gas and electric DSM Plan to meet and attempt to exceed the electric energy savings and demand reduction goals established by the

Commission in Docket No. 07A-420E and the natural gas savings goals established in this proceeding. In implementing the 2009-2010 DSM Biennial Plan, Public Service agrees to launch all of the programs identified and described in the DSM Plan and not to discontinue or significantly modify such programs except after notice as described in Paragraph 2.b *supra.*

The Settling Parties recommend that the Commission authorize the Company to implement each of the programs described in the DSM Plan, together with the amendments and additions to such programs that are described in Appendix A. The Settling Parties further recommend that, subject to the budgetary restrictions and other limitations described in this Stipulation, the Commission grant the Company the discretion to modify the specific DSM programs set forth in the DSM Plan as amended by this Stipulation, including but not limited to, changing the level of rebates paid to participants, shifting budget dollars between programs within the natural gas or electric DSM portfolios, and adding new programs or discontinuing DSM programs without the requirement to obtain the Commission's pre-approval of such modifications. The Company may in its discretion file an application seeking pre-approval of the technical assumptions associated with any new program offerings, or approval to incur costs in excess of 115% of its annual budget for its electric DSM portfolio or 125% of the annual budget for its natural gas DSM portfolio. The Settling Parties recommend that the Commission endeavor to act upon such an Application as expeditiously as possible.

2. **Modifications to the DSM Plan.**

a. **Changes to the DSM Plan filed with the Application.** In the course of negotiations, the Settling Parties have discussed with Public Service various

details of the Company's proposed programs and the associated technical assumptions. As a result of these discussions, Public Service has agreed to make certain changes to the DSM Plan originally filed with its Application. An updated version of the DSM Plan that reflects changes agreed to as part of this Settlement, together with errata correcting certain errors, shall be filed with the Commission within sixty days following issuance of a final Commission order approving this Stipulation.

The program-related changes that Public Service has agreed to make are summarized in Appendix A. Some of these changes require increases to the Company's originally proposed budgets which are also specified in Appendix A. The Settling Parties agree that the additional budget amounts for 2009 will be recovered over six months through adjustments to the electric and natural gas DSMCA filed on April 1, 2009 to be effective July 1, 2009. The full-adjusted budget amounts for 2010 will be recovered from ratepayers over twelve months beginning January 1, 2010.

Certain changes to the DSM Plan that Public Service has agreed to make will further result in changes in the expected electric and gas savings for 2009 and 2010. As a consequence of these changes, the Settling Parties agree to the modified levels of expected savings as set forth in Paragraph 6 below.

b. **Process for Potential Changes to the DSM Plan in the Future.** At the time of the quarterly roundtable meeting described in paragraph 10, interested persons may submit new program ideas or proposed revisions to existing programs to the Company in writing in a format to be provided by the Company. The Company agrees to act in good faith in considering new program ideas and proposed revisions to existing programs. The Company currently uses an initial screening process to score

and prioritize all new DSM program ideas for further research and development. Within three months of receipt, the Company agrees to evaluate all written DSM program ideas received from interested persons in accordance with its existing initial screening process and to consider all proposed revisions to existing programs and to report the results of such screening and consideration as part of its next written quarterly update. The Company retains discretion whether to implement proposed revisions to existing programs and new program ideas presented to it by interested persons.

In the event the Company decides to discontinue any DSM program identified in the DSM Plan, it shall provide ninety-days notice and the basis of such decision to all persons who have asked to be included on the DSM Roundtable distribution list ("DSM Roundtable Distribution List"). The Company shall provide sixty-days advance notice to the DSM Roundtable Distribution List of any decision to add a new DSM program, to reduce rebate levels, to adopt new or discontinue existing measures, or to change technical assumptions or eligibility requirements for any DSM program. Persons receiving such notices shall have thirty-days following receipt within which to provide a response to the Company's notification. The Company agrees to act in good faith to consider any responses received in making its final decision regarding the proposed modification and/or discontinuation.

3. **Self-Directed Custom Efficiency Program.** As directed by the Commission at Paragraph 156 of Decision No. C08-0560, Public Service met with representatives of its large industrial customers who participated in Docket No. 07A-420E as part of its planning for its Self-Direct Program. The Company also met with the large commercial customers and other interested persons who had participated as

Intervenors in Docket No. 07A-420E. The Settling Parties agree that the Company's proposed Self Direct Program shares many of the features of its proposed Custom Efficiency Program and should therefore be viewed as a subset of the Company's Custom Efficiency Program rather than as a traditional Self-Direct program. The only significant difference between the Company's proposed Self-Direct program and the proposed Custom Efficiency Program is that customers participating in the Self-Direct program will perform their own engineering evaluation of the anticipated energy savings and will conduct their own measurement and verification of achieved energy savings after the fact, resulting in a lower cost to the Company. The Company will verify the results of customers' energy savings calculations and evaluation, measurement and verification results. Participants in the Company's proposed Self-Direct program will pay the DSMCA just as all other participants in the Company's DSM programs.

In recognition of the fact that the proposed Self-Direct Program is designed to operate as a subset of the Custom Efficiency Program, the Settling Parties agree that the Self-Direct Program should be renamed, "Self-Directed Custom Efficiency Program." The Settling Parties agree to recommend to the Commission that it authorize the Company to provide rebates under the Self-Directed Custom Efficiency Program in any case where the customer meets the eligibility requirements, provided that the program has a Total Resource Cost (TRC) test value, as defined in § 40-1-102, C.R.S., that is at least equal to one (1) rather than limiting this program to installations that have a TRC value at least equal to the TRC value for the overall DSM portfolio as specified in Paragraph 158 of Decision No. C08-0560.

The Company shall offer the Self-Directed Custom Efficiency Program to commercial and industrial customers who have an aggregated peak demand at all meters of at least 2 MW in any single month and an aggregated annual energy usage of at least 10 GWh. The customer of record must be the same for all meters aggregated to qualify for this program. The Company agrees that rebates will not be given under the Self-Directed Custom Efficiency Program for applications with expected paybacks of less than one year or paybacks greater than fifteen years. Rebate levels will be adjusted downward so that no project (with rebates included) has a payback less than one year. The Company agrees to track the expenditures, energy savings, and paybacks associated with each approved project under the Self-Directed Custom Efficiency Program.

4. **Confidentiality of Participant O&M Data.** The Settling Parties understand that, in the absence of a written agreement signed by the Participant authorizing disclosure of the Participant's operations and maintenance savings or expense data ("Participant O&M data"), all such Participant O&M data shall be treated as proprietary and trade secret information that is privileged and highly sensitive. Accordingly, the Company agrees that, while Participant O&M data shall be used to evaluate the cost-effectiveness of all DSM projects and programs that use the custom-efficiency analysis process, Public Service will not include Participant O&M data in its incentive calculations unless it has been authorized to disclose such Participant O&M data by written agreement as set forth above.

In the absence of a written agreement authorizing disclosure of Participant O&M data, the Company agrees to treat Participant O&M data as proprietary and trade secret

information that is privileged and highly sensitive and shall not disclose such information except as provided in this paragraph. For the sole purpose of achieving settlement in this proceeding, the Settling Parties agree that the Company may only disclose the results, by cost category, of calculations made using the privileged values, but not the values themselves, by making such results available for inspection by members of the Staff of both the Commission and the Office of Consumer Counsel at the Company's Colorado offices, pursuant to the following procedures. The Company will provide the Participant customer ten (10) business-days notice of the place and time of the inspection and provide the opportunity for a representative of the customer to be present during the inspection. The Company shall maintain a log of the persons, dates, times and documents reviewed. Participant O&M data shall not be disclosed to any other party or by any other means, except after receipt of written authorization from the Participant. Within forty-five days following the end of each quarter, the Company agrees to provide a report to the Staff of the Commission and the Office of Consumer Counsel on the number and value of rebates spent on measures whose cost effectiveness depends on the Participant O&M data (*i.e.*, the TRC for the measures would be less than one (1) without the Participant O&M data).

5. **Participation by All Classes of Customers.** The parties agree that, with respect to the targeted customer segments (*i.e.*, residential, business, and low-income) and to the breadth of program offerings contemplated for each segment, Public Service's proposed electric and gas DSM portfolios, as set forth in the DSM Plan as amended by this Stipulation, have been designed to afford all classes of customers an opportunity to participate as required by §§ 40-3.2-103 and 40-3.2-104, C.R.S.

6. **Energy and Demand Savings.** The Settling Parties agree that Public Service shall use its best efforts to achieve at least 175.8 GWh in electric energy savings in 2009 and at least 237.5 GWh in electric energy savings in 2010, both of which exceed the energy savings goals prescribed by the Commission in Decision No.C08-0560 issued in Docket No. 07A-420E. These electric savings include a reduction of approximately 6 GWh each year due to a decrease in the Residential Home Lighting Program's Net-to-Gross ratio from .93 to .83 as explained in Appendix A. The Settling Parties also agree that the Company shall use best efforts to achieve at least 58 MW and 75 MW in demand reductions in 2009 and 2010, respectively, from its proposed electric energy efficiency programs and from its expanded Saver's Switch program.[1] These demand reductions equal the demand reduction goals prescribed by the Commission in Decision No.C08-0560 issued in Docket No. 07A-420E.

The Settling Parties further agree that the Company shall use its best efforts to achieve natural gas savings of at least 318,141 Dth and 402,808 Dth for 2009 and 2010, respectively. The Settling Parties request that the Commission approve these levels of gas savings, in combination with actual gas program expenditures to calculate dekatherms saved per dollar expended, as the energy targets that may be used in the future by the Company for the purpose of calculating a bonus under Rules 4754 and 4760.

7. **2009 and 2010 DSM Budgets.** The Settling Parties agree to recommend that the Commission approve a total electric DSM portfolio budget for 2009 of $50,818,284, and for 2010 of $63,650,147, and a total gas DSM portfolio budget for

[1] These expected demand reductions do not include the expected impacts from Public Service's Interruptible Service Option Credit (ISOC) program or the expected impacts from a third-party demand

2009 of $12,628,529 and for 2010 of $16,516,364, including the increases to both the electric and gas budgets referenced in Paragraph 2 above and specified in Appendix A. The Settling Parties agree that the Company's proposed 2009-2010 DSM Biennial Plan and associated budgets as modified by the Stipulation were developed giving due consideration to the impact of the DSM Plan on non-participants and on low-income customers.

The Settling Parties agree that Public Service shall have flexibility to move budget dollars between specific programs and customer segments within its proposed gas DSM program portfolio and within its proposed electric DSM program portfolio in order to achieve the energy savings and demand reduction goals set forth in the DSM Plan, provided, however, that the Company shall not reduce the level of spending on low-income DSM programs unless the Company has achieved 100 percent of the forecasted level of participation in such programs.

The Settling Parties agree that so long as the total portfolio of natural gas DSM programs that are implemented by the Company reflects a benefit-cost ratio of at least one (1) calculated as provided in §40-1-102(5) C.R.S., there shall be a rebuttable presumption that actual expenditures within 125% of the approved gas budget for any given plan year are reasonable and prudent. The Settling Parties agree that so long as the total portfolio of electric DSM programs that are implemented by the Company reflects a benefit-cost ratio of at least one (1) calculated as provided in §40-1-102(5) C.R.S., there shall be a rebuttable presumption that actual expenditures within 115% of the approved electric budget for any given plan year are reasonable and prudent. The Company shall not be precluded from spending amounts in excess of these limits.

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response contract, both of which have been addressed in separate dockets.

However, if the Company's total expenditures in any year exceed 125% of the total approved gas DSM portfolio budget or 115% of the total approved electric DSM portfolio budget, the Company shall have the burden of going forward and the burden of proof with respect to the reasonableness and prudence of any expenditures exceeding 125% of any specific gas DSM program budget or 115 % of any specific electric DSM program budget.

The Settling Parties agree that the company shall file an Advice Letter within sixty (60) days following issuance of a final Commission order approving this Stipulation that proposes to amend the electric and gas DSMCA tariffs to incorporate in the tariffs a process whereby the Company's DSMCA filings would be allowed to take effect by operation of law while a separate adjudicatory proceeding is initiated annually following the April 1 DSMCA filing by the Commission to review the prior year's DSM expenditures for reasonableness and prudence. The Settling Parties agree that the Commission should initiate such a prudence review proceeding automatically if the Company's total expenditures in any year exceed 125% of the total approved gas DSM portfolio budget or 115% of the total approved electric DSM portfolio budget. If the budgets are not exceeded, the Settling Parties agree that the Commission should initiate a prudence review proceeding if, after allowing interested persons an opportunity to comment, the Commission believes that an investigation into the reasonableness and prudence of Public Service's DSM expenditures is warranted. In any such prudence review proceeding, the presumptions and burdens of going forward and proof discussed in the paragraph above shall apply. If the Commission determines in a prudence review proceeding that a portion of the Company's DSM expenditures should not be recovered

from customers, the next April 1 electric or gas DSMCA filing, as applicable, shall be adjusted as appropriate to reflect that decision.

8. **Technical Assumptions and Cost Benefit Calculations.** The Settling Parties agree that the technical assumptions set forth in Appendix B attached hereto are reasonable for the purposes of:

- Developing a forecast of annual DSMCA expenditures associated with the Company's electric and gas DSM portfolios in 2009 and 2010;
- Establishing overall annual energy savings targets for 2009 and 2010 for the Company's gas DSM portfolio;[2] and
- Determining savings achieved in 2009 and 2010 based on the actual project completions in each calendar year, where such savings are compared to the overall annual portfolio energy savings goals as established by the Commission in Docket No. 07A-420E for the Company's electric DSM portfolio and as established in this proceeding for the gas DSM portfolio, when calculating the electric DSM financial incentive pursuant to Decision Nos. C08-0560 and C08-0769 issued by the Commission in Docket No. 07A-420E and in support of an application for a bonus under Rule 4760.

The Settling Parties agree that for purposes of calculating the gross savings associated with each of the prescriptive gas or electric DSM program measures offered as part of the gas and electric DSM portfolios, Public Service shall use the technical assumptions relating to the energy savings calculations for such measures actually

[2] The Commission established electric energy savings goals for the Company in Decision C08-0560 in Docket No. 07A-420E.

installed during calendar years 2009 and 2010. Such savings shall be referred to as "deemed savings."

The Settling Parties agree that the Company shall use the technical assumptions set forth in Appendix B relating to incremental customer O&M savings (for prescriptive measures only), customer O&M costs (for prescriptive measures only), incremental customer capital costs (for prescriptive measures only), net-to-gross ratios, and the deemed savings formulas and other technical assumptions set forth in Appendix B for purposes of determining program and portfolio cost effectiveness and for calculating annual portfolio net economic benefits based on measures actually installed during calendar years 2009 and 2010.

The Settling Parties agree that, for purposes of determining program and portfolio cost effectiveness and for calculating annual portfolio net economic benefits based on measures actually installed during calendar years 2009 and 2010, Public Service shall use the avoided cost assumptions set forth in Appendix E attached to the DSM Plan.

The Settling Parties agree that Public Service shall use the methodology described in the Direct Testimony of Company witness Jeremy Petersen for purposes of determining DSM portfolio and program cost-effectiveness based on measures actually installed during calendar years 2009 and 2010. Accordingly, Public Service shall use this same methodology for calculating the net economic benefit associated with DSM measures actually installed during calendar years 2009 and 2010.

9. **DSMCA Tariffs.** The Settling Parties agree to recommend that the Commission should grant waivers from its Gas DSM Rules to allow for changes to the gas DSMCA every six months in accordance with the following filing schedule:

- April 1 filings for gas DSMCA rates to be effective July 1, to recover DSM costs for programs that were implemented prior to January 1, 2009; Gas Bonus; and reconciliation of deferred balances from previous calendar year
- October 1 filings for gas DSMCA rates to be effective January 1 to recover current period DSM costs for the calendar year beginning the same January 1.

The Settling Parties agree that Public Service shall file in compliance with the Commission decision in this proceeding a gas DSMCA tariff, Sheets 42 to 42C, that conform to the pro forma tariff attached to this agreement as Appendix C, effective January 1, 2009.

The Settling Parties further agree to recommend to the Commission that it authorize the Company to implement changes in the gas DSMCA rates as set forth, for illustrative purposes, on Sheet 42D of the gas DSMCA tariff attached to this agreement as Appendix C. The Settling Parties recognize that the actual gas DSMCA percentage rider will be calculated to recover the 2009 gas DSM portfolio budget based on the rates that are approved to take effect as a result of the Commission's final order in Docket No. 08S-146G. The Settling Parties agree to recommend to the Commission that it authorize the Company to implement changes in the electric DSMCA rates as set forth on Sheet 107C of the electric DSMCA attached to this agreement as Appendix D. The Settling Parties recognize that rates included in the electric tariff sheets were designed

to recover $48,713,284, which was the electric DSM budget as proposed in the Application, less the portion of those costs currently being recovered in base rates ($2,216,921). Public Service shall be permitted to include in its April 1, 2009 DSMCA tariff filings the additional budget amounts for 2009 agreed to as set forth in Appendix A.

10. **DSM Roundtable Meetings.** The Company agrees to conduct quarterly DSM roundtable meetings in 2009 and will review this schedule with the parties for 2010. These meetings shall be open to all persons interested in the Company's DSM activities. Public Service shall provide quarterly written updates to all persons on the DSM Roundtable Distribution List as set forth in Paragraph 11. The Company agrees to post the agendas for such roundtables meetings and all quarterly updates on the Xcel Energy website.

11. **Reporting Requirements.**

a. **Quarterly Updates.** The Company agrees to file with the Commission in this docket and to provide to all persons on the DSM Roundtable Distribution List, within forty-five days following the end of each quarter, written quarterly updates, describing the implementation status for all programs included in the DSM Plan, including the energy and demand savings achieved, and expenditures made by program, and any changes in the way a program is being implemented.

b. **Annual Reports.** On or before April 1 following the end of each year of the Biennial Plan, the Company shall file an annual report of the results achieved during the previous plan year in total and by program, including achieved energy and demand savings , avoided annual and cumulative CO2 and SOx emissions

in metric tons, actual expenditures, expenditures expressed in terms of $/kwh over the lifetime of the measures installed, and net economic benefits achieved.

12. **Evaluation, Measurement & Verification Plan.**

a. **On-Going Measurement & Verification.** The Settling Parties agree that the Company's proposal for on-going measurement and verification ("M&V") as described generally in the Direct Testimony of Ms. Suzanne Doyle and in the Plan Documentation is reasonable and should be approved by the Commission. However, the parties also recognize that the Company is continuing to develop the specific activities that will be undertaken to measure and verify energy savings for particular programs. The Company agrees to provide a detailed description of the M&V plan for each DSM program to all Settling Parties within 30 days after such plan is finalized. The Company will report any modifications made to its M&V plans in its written quarterly updates referenced in Paragraphs 11(a) above.

b. **Comprehensive Program Evaluations.** In addition to the ongoing measurement and verification described in the plan, the Settling Parties agree that Public Service shall conduct comprehensive program evaluations of three or four specific programs each year. The comprehensive program evaluations of particular programs will be staggered over a number of years. The principal purposes of comprehensive program evaluations are to assess customer satisfaction with the DSM program being evaluated, and to assess changes that should be made to technical assumptions, net-to-gross (NTG) ratios and program processes based on the evaluator's own research as well as a thorough review of industry-wide and the Company's current processes, technical assumptions and NTG ratios. If, as a result of

a comprehensive program evaluation that is completed prior to December 31, 2009, the evaluator recommends changes to any technical assumptions, NTG ratios, or program processes, the Company shall implement such changes for purposes of its DSM activities undertaken during 2010. The Settling Parties understand that such changes shall not affect the calculation of achieved savings and net economic benefits for 2009.

The Settling parties recognize that the Company is currently conducting a comprehensive evaluation of the Business Lighting Program. The Company agrees that it shall plan to conduct Comprehensive Program Evaluations of the following programs during 2009, 2010, and 2011:

2009: Residential Home Lighting

Residential Saver's Switch

Business New Construction

Business Cooling

2010: Residential Evaporative Cooling

Business Motors

Business Recommissioning

Business and Residential Customer Behavior Change Program

2011: Low-Income Single Family Weatherization

Business Boiler Efficiency

Business Self-Directed Custom Efficiency

Residential Energy Star Retailer Incentive Program

The Company agrees to provide the non-confidential portion of all Comprehensive Program Evaluations to all persons on the DSM Roundtable

Distribution List. The Company will also consult with interested parties at the scheduled roundtable meetings regarding suggested changes to the programs that are proposed to be included as part of the comprehensive evaluation performed during 2010 and 2011.

IV. GENERAL PROVISIONS

The Settling Parties agree to join in a motion that requests the Commission to approve this Stipulation and to support this Stipulation.

This Stipulation is a negotiated compromise of issues raised in this proceeding relating to the Company's proposed gas and electric DSM plan for calendar years 2009 and 2010, the proposed changes to the electric and gas DSMCA to become effective January 1, 2009, and the requested waivers of the Commission's Gas DSM Rules. By signing this Stipulation and by joining the motion to adopt the Stipulation filed with the Commission, the Settling Parties acknowledge that they pledge support for Commission approval and subsequent implementation of these provisions.

Nothing in this Stipulation shall bind any of the Settling Parties with respect to any position such party may take in any subsequent biennial DSM Plan proceeding before this Commission. This Stipulation shall not become effective until the issuance of a final Commission Order approving the Stipulation, which Order does not contain any modification of its terms and conditions that is unacceptable to any of the Settling Parties. In the event the Commission modifies this Stipulation in a manner unacceptable to any Party, that Party shall have the right to withdraw from this Stipulation and proceed to hearing on the issues that may be appropriately raised by that party in Docket No. 08A-366EG. The withdrawing Party shall notify the

Commission and the Parties to this Stipulation by e-mail within five business days of the Commission's final order modifying the Stipulation that the Party is withdrawing from the Stipulation and that the Party is ready to proceed to hearing; the e-mail notice shall designate the precise issue or issues on which the Party desires to proceed to hearing (the "Hearing Notice").

The withdrawal of a Party shall not automatically terminate this Stipulation as to the withdrawing Party or any other Party. However, within five business days of the date of the Hearing Notice from the first withdrawing Party, all Settling Parties shall confer to arrive at a comprehensive list of issues that shall proceed to hearing and a list of issues that remain settled as a result of the first Party's withdrawal from this Stipulation. Within five business days of the date of the Hearing Notice, the Settling Parties shall file with the Commission a formal notice containing the list of issues that shall proceed to hearing and the list of issues that remain settled. The Parties who proceed to hearing shall have and be entitled to exercise all rights with respect to the issues that are heard that they would have had in the absence of this Stipulation. Hearing shall be scheduled on all of the issues designated in the formal notice filed with the Commission as soon as practicable.

The Settling Parties agree that the negotiations or discussions undertaken in conjunction with the Stipulation shall not be admissible into evidence in this or any other proceeding, except as may be necessary in any proceeding to enforce this Stipulation.

Approval by the Commission of this Stipulation shall constitute a determination that the Stipulation represents a just, equitable and reasonable resolution of all issues that were or could have been contested among the Settling Parties in the above-

captioned proceeding. The Settling Parties state that reaching Stipulation in this docket by means of a negotiated settlement is in the public interest and that the results of the compromises and settlements reflected by this Stipulation are just, reasonable and in the public interest.

All Settling Parties have had the opportunity to participate in the drafting of this Stipulation. There shall be no legal presumption that any specific Settling Party was the drafter of this Stipulation.

This Stipulation may be executed in counterparts, all of which when taken together shall constitute the entire agreement with respect to the issues addressed by this Stipulation.

Dated this 28th day of October, 2008.

PUBLIC SERVICE COMPANY OF COLORADO

By: Fredric C. Stoffel by A C. Hyf
Fredric C. Stoffel
Vice President, Policy Development
Xcel Energy Services Inc.
1225 17th Street, Suite 1000
Denver, CO 80202

Agent for Public Service
Company of Colorado

APPROVED AS TO FORM:

By: A C. Hopf
Ann E. Hopfenbeck #15460
Ducker, Montgomery, Aronstein
& Bess, P.C.
1560 Broadway St., Suite 1400
Denver, CO 80202
Telephone: (303) 861-2828
Fax: (303) 861-4017

Attorney for Public Service
Company of Colorado

STAFF OF THE PUBLIC UTILITIES COMMISSION

By: _____

Ronald E. Davis
Principal Economist
Colorado Public Utilities Commission
1560 Broadway, Suite 250
Denver, CO 80202
Telephone:
Fax:

APPROVED AS TO FORM:

JOHN W. SUTHERS
Attorney General

By: _____

Anne Botterud, #20726
First Assistant Attorney General
Business and Licensing Section

Attorneys for Trial Staff of the
Colorado Public Utilities Commission

1525 Sherman Street, 5th Floor
Denver, CO 80203
Telephone: (303) 866-3867
Fax: (303) 866-5395

COLORADO OFFICE OF CONSUMER COUNSEL

By: _____

P.B. Schechter
Rate/Financial Analyst
Office of Consumer Counsel
1560 Broadway, Suite 200
Denver, CO 80202
Telephone: (303) 894-2124
Fax: (303) 894-2117

APPROVED AS TO FORM

By: _____

Christopher M. Irby, 35778
Assistant Attorney General
Office of the Attorney General
1525 Sherman Street, 5th Floor
Denver, CO 80203
Telephone: (303) 866-5441
FAX: (303) 866-5342

Attorneys for the Colorado
Office of Consumer Counsel

SOUTHWEST ENERGY EFFICIENCY PROJECT

By: Howard Geller

Howard Geller, Executive Director
Southwest Energy Efficiency Project
2260 Baseline Rd., #212
Boulder, CO 80302
Telephone: 303-447-0078 x3
Fax: 303-786-8054
hgeller@swenergy.org

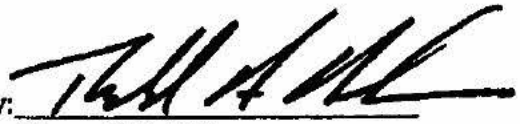
SOUTHWEST ENERGY EFFICIENCY PROJECT

By:_____
Howard Geller, Executive Director
Southwest Energy Efficiency Project
2260 Baseline Rd., #212
Boulder, CO 80302
Telephone:
Fax:
hgeller@swenergy.org

WESTERN RESOURCE ADVOCATES

By: Bart F. Mich FOR Steven Michel
Steven S. Michel
2025 Senda De Andres
Santa Fe, NM 87501
Telephone:
Fax:
smichel@westernresources.org

COLORADO ENERGY CONSUMERS

By: 

Thorvald A. Nelson
Holland & Hart LLP
8390 E. Crescent Pkwy, #400
Greenwood Village, CO 80111
Telephone: (303) 290-1601
Fax: (303) 290-1606
tnelson@hollandhart.com

CITY OF BOULDER and COUNTY OF BOULDER

By: _____

Sue Ellen Harrison, #5770
Senior Assistant City Attorney
Box 791
Boulder, CO 80306
Telephone: (303) 441-3020
Fax: (303) 441-3859
HarrisonS@bouldercolorado.gov

Signature block for EOC

Skip Arnold
Executive Director
Energy Outreach Colorado
225 E. 16th Avenue, Suite 200
Denver, Colorado 80203
sarnold@energyoutreach.org

Jeffrey G. Pearson, 5874
1570 Emerson Street
Denver, CO 80218
Tel: 303.832.5138
Fax: 303.837.1557
jgplaw@qwest.net
ATTORNEY FOR ENERGY
OUTREACH COLORADO

Skip Arnold
Executive Director
Energy Outreach Colorado
225 E. 16th Avenue, Suite 200
Denver, Colorado 80203
sarnold@energyoutreach.org

Jeffrey G. Pearson, 5874
1570 Emerson Street
Denver, CO 80218
Tel: 303.832.5138
Fax: 303.837.1557
jgplaw@qwestoffice.net

ATTORNEY FOR ENERGY
OUTREACH COLORADO

JOHN W. SUTHERS
Attorney General

/s/ Jerry W. Goad by [illegible]
JERRY W. GOAD, 11284*
Senior Assistant Attorney General
Natural Resources and Environment
Section

Attorneys for Colorado Governor's Energy
Office
1525 Sherman Street, 5th Floor
Denver, Colorado 80203
Telephone: (303) 866-5117
FAX: (303) 866-3558
*Counsel of Record

KROGER COMPANY

By: _____

Kurt J. Boehm, Esq.
36 East Seventh St., #1510
Cincinnati, OH 45202
Telephone: (513) 421-2255
Fax: (513_ 421-2764
kboehm@BKLlawfirm.com

Attorney for Kroger Company

Nancy LaPlaca
4801W. Yale Ave.
Denver CO 80219
nancylaplaca@yahoo.com
303-588-3937

ENERGY EFFICIENCY BUSINESS COALITION

By: _____

Paul M. Kriescher, President
4303 Brighton Blvd.
Building 3
Denver, CO 80216
Telephone: (303) 733-3078

By: _____

Karl F. Kumli, III, #11784
Dietze & Davis, PC
2060 Broadway, #400
Boulder, CO 80302
Telephone: (303) 447-1375
Fax: (303) 440-9036
karlk@dietzedavis.com

By: _____

Mark D. Detsky, #35276
Telephone: (303) 915-2428
mdetsky@gmail.com

#11784

Attorneys for Energy Efficiency Business Coalition

WAL-MART STORES, INC. and
SAM'S WEST, INC.

By: _____

Holly Rachel Smith, Esq.
6212-A Old Francomia Road
Alexandria VA 22310
Telephone: (202) 302-3172
holly@raysmithlaw.com

APPENDIX A

PROGRAM CHANGES AGREED TO BY PUBLIC SERVICE

Appendix A

Program Changes Agreed to By Public Service

a. **Residential Air Conditioning Program.** In addition to those programs identified in the DSM Plan as originally filed, the Company agrees to evaluate residential Air Conditioning program options during the first four months of 2009, including incentives for proper cooling sizing, high efficiency (SEER) central air conditioning units, air source heat pumps, and quality installation including tight/right-sized duct installation, and to implement a residential Air Conditioning Program by June 2009. The Company will file an amendment to the DSM Plan for informational purposes in this docket on or before May 1, 2009, describing the Residential Air Conditioning Program, including 1) Proposed Budget and Goals, 2) Application Process, 3) Marketing objectives, goals and strategy, 4) Program-Specific Policies, 5) Stakeholder Involvement, 6) Evaluation, Measurement & Verification Plan, 7) Rebate Levels and 8) Technical Assumptions. The Company shall also provide the Benefit-Cost Analysis for the program for 2009 and 2010. The Settling Parties agree that the 2009 and 2010 DSM budgets shall be increased by $ 1.22 million and $ 2.15 million, respectively, based on the Company's goal of paying 2,000 rebates in 2009 and 4,000 rebates in 2010.

As part of the development of the Residential Air Conditioning Program described above, the Company agrees that it will work in good faith with designated representatives of the EEBC and GEO to evaluate modifications to the Central Air Conditioner Tune-Up Program that would allow it to successfully re-launch this program in June 2009 and meet a TRC of at least 1.0. The EEBC agrees to provide the

Company with access to any updated information it may have regarding energy savings associated with A/C tune-up and to provide the Company with a proposal for contractor training and program promotion to be provided by the industry that would support the successful implementation of this program. If the EEBC and the Company are able to reach agreement regarding re-design of the Residential Air Conditioning Tune-Up Program, Public Service will file an amendment to the DSM Plan for informational purposes in this docket by May 1, 2009 describing the Residential Air Conditioning Tune-Up Program, including 1) Proposed Budget and Goals, 2) Application Process, 3) Marketing objectives, goals and strategy, 4) Program-Specific Policies, 5) Stakeholder Involvement, 6) Evaluation, Measurement & Verification Plan, 7) Rebate Levels and 8) Technical Assumptions. The Company shall also provide the Benefit-Cost Analysis for the program for 2009 and 2010. If the Residential Air Conditioning Tune-Up Program is added to the DSM Plan, the Settling Parties agree that the 2009 and 2010 budgets for the electric DSM portfolio shall be increased by $ 150,000 and $ 250,000, respectively.

b. **Evaporative Cooling.** In order to ensure that the Residential Air Conditioning Program does not adversely impact the proposed Evaporative Cooling Rebate Program, the Company agrees to expand this program by offering higher rebates for whole-house systems in 2009 and by evaluating broader marketing and builder/customer adoption strategies to be implemented by June 1, 2009. Builders will be eligible for rebates under the Company's Evaporative Cooling program. The Settling Parties agree that the 2009 and 2010 DSM budgets shall be increased by $ 280,000 and $ 365,000, respectively, to accommodate the expansion of the Evaporative Cooling Rebate Program.

c. **Energy Efficient Showerhead Program.** During the first quarter of 2009, Public Service agrees to evaluate modification of its Energy Efficient Showerhead Program to promote the use of low-flow showerhead with a flow rate of 1.5 gallons per minute rather than a showerhead with a flow rate of 2.0 gallons per minute as originally proposed and to implement such a modification during 2009 provided that the Company is able to identify units with a flow rate of 1.5 gallons per minute that can be obtained for a cost of $13.00 per unit or less and provide adequate quality. So long as the Company can obtain 1.5 gpm showerheads for $13.00 per unit or less it shall also include such showerheads in its Easy Savings Energy Kits available to low-income customers and in its School Education Kits. If the Company is unable to obtain 1.5 gpm showerheads for $13.00 per unit or less, the Company may, in its discretion, choose to scale back participation levels in the Energy Efficient Showerhead Program and in the Easy Savings Energy Kit Program to allow it to promote the higher cost 1.5 gpm showerhead without a significant increase in the overall budget for these programs or it promote the 2.0 gpm showerheads through these programs and maintain participation rates as originally forecast.

d. **School Education Kits.** The Company agrees to expand participation in the School Education Kits Program to 15,000 participants during 2010. The Settling Parties agree that the 2010 DSM electric and gas budgets shall be increased by $ 385,000 and $ 388,000, respectively, to accommodate this expansion of the School Education Kit Program.

e. **Residential Home Lighting.** The Company agrees that the net-to-gross ratio to be used in calculating net energy savings associated with the Residential

Home Lighting program shall be .83 and have reduced the net savings goal for 2009 and 2010 by approximately 6 GWh each year to reflect this change.

f. **Research on Emerging Technologies and New Product Development.** The Company agrees to increase the budget provided for research on emerging technologies and new program development by $250,000 for each year of the 2009-2010 DSM Biennial Plan. Of this $250,000 increase, $175,000 will be included in the updated electric DSM portfolio budget and $75,000 will be included in the updated gas DSM portfolio budget.

g. **Home Performance with ENERGY STAR Program.** Prior to launching this program in the first quarter of 2009, the Company agrees to evaluate the following modifications to the Home Performance with ENERGY STAR Program: 1) extending the period within which the customer must complete the required and optional installations under this program from six months to up to two years, 2) requiring a blower door test as part of the initial Home Performance audit for homes meeting specifically defined criteria, and 3) to allow rebates to be given to customers as each measure is implemented. If both or either of these changes can be implemented without lowering the Program's TRC below a value of 1 and the EEBC and the Company are able to reach consensus regarding the criteria for when a blower door test will be required, Xcel Energy will incorporate such changes in its Home Performance with ENERGY STAR Program.

h. **ENERGY STAR New Homes Program.** Prior to launching this program on March 1, 2009, the Company agrees to re-evaluate the program design, including rebate levels, HERS ratings incentives, use of multiple HERS rating vendors

and providers, and Measurement and Verification. The Company agrees to work in good faith with EEBC, GEO, and any others of the Settling Parties who desire to participate, in evaluating and finalizing the program. Provided that a consensus can be reached regarding the redesign of this Program prior to March 1, 2009, the Company agrees to implement the agreed upon changes and will file an amendment to the DSM Plan for informational purposes in this docket, reflecting such changes by May 1, 2009. If consensus is not reached prior to the March 1, 2009 deadline for program launch, the Company will implement this Program as originally filed.

i. **Insulation Rebate Program.** The Company agrees to extend eligibility for rebates under the residential insulation rebate program to to electric only customers by the third quarter of 2009 if such an extension can be accomplished in a manner that meets a TRC of at least 1.

j. **Coordination with local communities and other governmental agencies.** In implementing its DSM programs, the Company agrees to use its best efforts to coordinate its efforts with those of local communities and other governmental agencies of which it is aware that have developed similar energy savings efforts. The Company shall encourage contractors that it hires to implement its DSM programs across multiple local jurisdictions to work with local contractors that are qualified to perform the work and whose rates are competitive.

k. **Certification Standards.** The Company agrees to require that all contractors or vendors providing home energy audits under the Residential Home Energy Audit, ENERGY STAR New Homes, or Home Performance with ENERGY STAR programs have RESNET and/or BPI certifications. The Company agrees to work

in good faith with the EEBC, the GEO, and any other interested party to establish certification standards for contractors and analysts who will be providing energy efficient services under programs where rebates will be provided.

APPENDIX B

TECHNICAL ASSUMPTIONS

DRAFT

This spreadsheet contains technical assumptions for the 2009/2010 Demand-Side Management Biennial Plan

The tabs in this file have been divided into three types:
All tabs with **Deemed** in the name describe how we will calculate actual conservation and net benefit.
All tabs with **Forecast** in the name detail how we came up with our estimates for program participation and performance for the filing period.
All tabs with **Ref** in the name are external references that support our assumptions.

Within each of the Deemed tabs, certain cells have been highlighted using the following convention:
Green - Energy savings calculation equation

Light Yellow - Assumed values that are inputs to energy savings equations

Light Blue - Assumed values that are not inputs to the energy savings equations (incremental cost, measure life, etc.) but are included in benefit cost tests.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Boiler Efficiency Program

Prescriptive rebates will be offered for new Hot Water Boilers (Condensing and non-condensing), replacement of currently operating hot water boilers, steam traps. (commercial only), and various boiler improvements.

Algorithms:

New Boiler Savings (Gross Dth)	= (BTUH - (BTUH x EFFb/EFFh)) x Hrs / 1,000,000
Boiler Tune Up savings (Gross Dth)	= ((BTUH x EFFh/EFFb) - BTUH) x Hrs / 1,000,000
Outdoor Air Reset savings (Gross Dth)	= ((BTUH x EFFh/EFFb) - BTUH) x Hrs / 1,000,000
Stack Dampers savings (Gross Dth)	= ((BTUH x EFFh/EFFb) - BTUH) x Hrs / 1,000,000
Modulating Burner Controls savings (Gross Dth)	= (BTUH x EFFh/EFFb - BTUH) x Hrs / 1,000,000
O2 Trim Control savings (Gross Dth)	= (BTUH x EFFh/EFFb - BTUH) x Hrs / 1,000,000
Steam Traps savings (Gross Dth)	= Leak_Rate x Leak_Hours x BTU_per_Pound / EFFb
Net Dth	= Gross Dth x NTG

Variables:

BTUH	= Rated boiler Input BTUH nameplate data provided by customer on rebate form.
Hrs	boiler. 1004 hours will be used for space heating and 876 hours will be used for domestic hot water. Forecast Ref Boiler Op Hours work sheet which includes an oversizing factor of 54%.
EFFb	=Efficiency of Baseline boiler. Refer Table 2 below
EFFh	= Efficiency for higher efficiency boiler. Refer Table 2 below.
Leak_Hours	= Annual hours boiler lines are pressurized = 6000 hours (Refer Forecast Boiler Ancil Equip Calcs)
Leak_Rate	=Leakage rate, pounds of steam per hour. High Pressure = 11, Low Pressure = 5 (Refer Forecast Boiler Ancil Equip Calcs)
BTU_Per_Pound	= 1164 BTU per pound for lost to atmosphere, 964 BTU per pound lost to condensate. Assume 50/50 mix = 1064 BTU per pound. (Refer Forecast Boiler Ancil Equip Calcs)

Measure Life	= Length of time the boiler equipment will be operational = 20 years. Low pressure Steam Trap measure life = 10 years. High pressure Steam Traps = 4 years Boiler Tuneup = 2 years.
Baseline Cost	= Cost of the baseline technology. Cost for an existing boiler is $0. Baseline cost for new application is assumed to be the cost of 80% efficient unit based on customer provided size. Refer Table 1 below.
High Efficiency Cost	= Incremental costs given based on customer provided size and efficiency. Refer Table 1 below.
NTG	Net-to-gross = 97% . Reference 5.

Provided by Customer:	**Verified during M&V:**
For boilers:	
Boiler size (BTUH)	Yes
Boiler Efficiency (85% or 92%)	Yes
For steam traps:	
High or low pressure	Yes
Incremental cost	No
For all but boilers and steam traps:	
Boiler size (BTUH)	Yes
Implemented measure	Yes
Incremental cost	No

Assumptions:

- Each boiler is replaced with the same size on a 1 for 1 basis.
- Only commercial boilers can receive prescriptive rebates, industrial boilers must go through Custom Efficiency.
- Climate zone assumed to be Denver for all boilers
- Prescriptive rebates are only given for boilers put into service, rebates are not given for backup boilers. Even though we do not rebate backup boilers, our assumed hours have been conservatively reduced to 65% of the predicted hours to account for boiler redundancy.
- Steam boiler has condensate return.
- Thermal Efficiency indicates the heat exchangers effectiveness to transfer heat from the combustion process to the water in the boiler, exclusive radiation and convection losses

- Assumed savings for boiler tune-up = 2% for non condensing boiler. This is an average value of the two years, 4% initial to no savings at the end of the two years. Life of product is 2 years. DOE states up to 5%.
- Assumed savings for outdoor air reset on non condensing boilers = 3%. Life of product is 20 years. The Natural Gas consortium states up to 5% savings
- Assumed savings for installing Stack dampers on non condensing boilers = 1%. Life of product is 20 years. Canada energy council, up to 4%
- Assumed savings for modulating burner controls on non condensing boilers = 3%. Life of product is 20 years. The Natural Gas consortium states up to 4% savings
- Assumed savings for O2 trim controls on non condensing boilers = 2%. Life of product is 20 years. The Natural Gas consortium states of 2 to 4% savings

Table 1, Excerpt from Hot water boiler costs, Full table on Deemed Incremental Costs tab					
	Non-condensing		Condensing	Incremental	Incremental
	80% eff.	85% eff.	92% eff.	Cost for 80% to 85% eff	Cost for 80% to 92% eff
175,000 Btuh	$3,000	$3,500	$4,600	$500	$1,600
500,000 Btuh	$5,000	$9,000	$11,200	$4,000	$6,200

Table 2, Boiler Efficiencies		
	Baseline Boiler Efficiency (EFFb)	**Efficient Boiler Efficiency (EFFh)**
New Boilers (Non-Condensing)	80.00%	86.00%
New Boilers (Condensing)	80.00%	96.20%
Boiler Tune Up	78.00%	80.00%
Outdoor Air Reset	80.00%	83.00%
Stack Dampers	80.00%	81.00%
Modulating Burner Controls	80.00%	83.00%
O2 Trim Control	80.00%	82.00%
Steam Traps	80.00%	N/A

References:

1. The baseline efficiency for the boiler is based on 2006 IECC, minimum of 80%, ASHRAE 90.1, and Federal Energy Management Program (FEMP).
2. Bin Temp & CO Bin Hrs are taken from ASHRAE, to determine operating hours. Value is 1880 hours for both space heating and domestic water production.
3. Did not account for altitude, since boiler equipment is manufactured for use in Colorado.
4. Leakage data from Energy Management Handbook, by Wayne Turner
5. Net-to-Gross factor for Boiler Efficiency was calculated using 1/2 of the free-rider factor for Cooling Efficiency.

Table 1,Hot water boiler costs, Vendor supplied, Engineered Products.					
	Non-condensing		Condensing	Incremental	Incremental
Boiler Nameplate Capacity	80% eff.	85% eff.	92% eff.	Cost for 80% to 85% eff	Cost for 80% to 92% eff
175,000 Btuh	$3,000	$3,500	$4,600	$500	$1,600
500,000 Btuh	$5,000	$9,000	$11,200	$4,000	$6,200
1,000,000 Btuh	$7,300	$11,700	$15,000	$4,400	$7,700
2,000,000 Btuh	$12,000	$17,000	$26,500	$5,000	$14,500
4,000,000 Btuh	$24,000	$34,000	$53,000	$10,000	$29,000
6,000,000 Btuh	$36,000	$51,000	$79,500	$15,000	$43,500
8,000,000 Btuh	$48,000	$68,000	$106,000	$20,000	$58,000
Boiler Tune Up	Actual costs will be provided by customer				
Outdoor Air Reset	Actual costs will be provided by customer				
Stack Dampers > 750 Mbtuh	Actual costs will be provided by customer				
Stack Dampers > 750 Mbtuh	Actual costs will be provided by customer				
Modulating Burner Controls < 750 Mbtuh	Actual costs will be provided by customer				
Modulating Burner Controls > 750 Mbtuh	Actual costs will be provided by customer				
O2 Trim Control	Actual costs will be provided by customer				
Steam Traps	Actual costs will be provided by customer				

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Compressed Air Efficiency

Custom and prescriptive rebates will be offered under the compressed air program. Prescriptive rebates are available for Variable Frequency Drive Compressors that are less than 50 hp, and no air loss drain valves. Other measures may receive rebates through the Custom Efficiency program. Each custom efficiency project will be analyzed individually by Xcel Energy. Engineering variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methodologies.

Algorithms:

VFD Comp Electrical Demand Savings (Customer kW)	= HP x Service Factor x 0.746 x (% Load_b / Motor_Effb - % Load_h / Motor_Effh)
VFD Comp Electrical Energy Savings (Customer kWh)	= Demand Savings (Customer kW) x VFD_Hours
No Loss Air Drains Electrical Energy Savings (Customer kWh)	= Number_of_Drains x kW_per_Drain x Drain_Hours
No Loss Air Drains Electrical Demand Savings (Customer kW)	= Number_of_Drains x kW_per_Drain

Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

HP	= HP of new Compressor provided by the customer
Service_Factor	= Service factor of the motor, we will use 1.1 (Reference 1)
0.746	= Standard conversion from HP to kW.
% Load_b	= Average percent loading for baseline compressor = 0.8952 as calculated on %BHP to %Flow tab
% Load_h	= Average percent loading for VFD compressor = 0.61 as calculated on %BHP to %Flow tab
Motor_Eff_b	= Efficiency of existing compressor motor as determine in Table 1 using customer provided HP
Motor_Eff_h	= Efficiency of new compressor motor as determine in Table 1 using customer provided HP
VFD_Hours	= Operating hours of compressors from Table 1.
Drain_Hours	= Operating hours of compressed air systems. We will use 6920 hours which is an average of completed CO and MN custom compressed air project hours.
Number_of_Drains	= Number of drains replaced will be provided by the customer
kW_per_Drain	= kW savings per drain, we will use 0.53 kW per calculations on Forecast NLAD tab.
TDLF	Transmission-Distribution Loss Factor = 6.39%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
CF_VFD	= Coincidence Factor - Probability that the measure peak demand reduction will occur at the same time as the grid peak demand, we will use 88.8% for small VFD compressors based on historic small VFD compressor projects in MN and CO.
CF_NLAD	= Coincidence Factor - Probability that the measure peak demand reduction will occur at the same time as the grid peak demand, we will use 88% for No Loss Air Drains based on historic custom compressed air projects in MN and CO.

NTG	Net-to-gross = We will use 87% for Compressed Air projects (Reference 2)
Incremental operation and maintenance cost	= 0 - conservative approach, taking no credit for improved mean time between failure.
Incremental Cost of Efficient Equipment	= Incremental cost of efficient measures from Table 2. Compared to the do-nothing option.

Provided by Customer:
Size of Compressor
Number of Drains

Verified during M&V:
Yes
Yes

Assumptions:
VFD Compressors<50 hp
Compressed air system in which VFD compressor is installed must have a capacity < 50hp.
Existing compressor was a non-reciprocating load/no load type with a minimum of 1 gallon of storage per cfm capacity, or modulation with or without unload.
No Loss Air Drains
Compressor must be one of the following:
Load/no-Load with at least 5 gal/CFM of storage (180 CFM compressor would need to have 5*180=900 gallons of storage or more)
Variable Speed Drive compressor
Variable Displacement/Capacity compressor
Centrifugal compressors in their efficient trim range without any blowoff to atm.

Table 1. Motor Efficiencies from NEMA

Compressor HP	Motor Description	Existing Compressor Motor Efficiency	New Compressor Motor Efficiency	Operating Hours
10	10 HP 1800 RPM ODP	89.5%	91.7%	3391
15	15 HP 1800 RPM ODP	91.0%	93.0%	3391
20	20 HP 1800 RPM ODP	91.0%	93.0%	3391
25	25 HP 1800 RPM ODP	91.7%	93.6%	4067
30	30 HP 1800 RPM ODP	92.4%	94.1%	4067
40	40 HP 1800 RPM ODP	93.0%	94.1%	4067

Existing Compressor Motor Efficiency values are from EPAC motors
New Compressor Motor Efficiency values are from NEMA Premium motors
Operating hours from completed MN and CO custom projects 2007-2008

Table 2. Incremental Costs for Efficient Measures

10 HP VFD Compressor	$10,841
15 HP VFD Compressor	$14,018
20 HP VFD Compressor	$16,879
25 HP VFD Compressor	$19,561
30 HP VFD Compressor	$24,357
40 HP VFD Compressor	$27,429
No Loss Air Drain	$448

Compressor prices are the average price from three retailers plus $1500 for installation as calculated on VFD info tab
NLAD price is average of nine retailers prices as calculated on Forecast NLAD tab

Changes from 2008
The 2008 Custom C&I, Custom SB, and Compressed Air Efficiency programs have been combined in the 2009 Custom Efficiency Program
Prescriptive rebates have been added for VFD compressors < 50hp and No Loss Air Drains

References
(1) Service factor (1.1) from Compressed Air & Gas Institute (CAGI) standards comparing Nameplate HP to actual BHP @ 100% Full rated pressure and flow
(2) National Energy Efficiency Best Practices Report (http://www.eebestpractices.com)

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Cooling Efficiency

Prescriptive rebates will be offered for new cooling equipment. Rebates for most measures are dependent on size and on meeting a minimum efficiency. Additional rebates are available for better efficiencies than the minimum qualifying efficiencies.

Custom rebates are available for cooling-related improvements that are not covered by the aforementioned prescriptive rebates. These would include such applications as heat recovery.

Algorithms:

Conversions

Energy Efficiency Ratio	= Seasonal Energy Efficiency Ratio x 0.85
kW/ton	= 12 / Energy Efficiency Ratio
For Rooftop Units, Water Source Heat Pumps, Split Systems, Condensing Units	
Cooling Electrical Energy Savings (Customer kWh)	= Size x EFLH x (12/SEER_Standard - 12/SEER_Eff)
Cooling Electrical Demand Savings (Customer kW)	= Size x (12/EER_Standard - 12/EER_Eff)
For Chillers	
Cooling Electrical Energy Savings (Customer kWh)	= Size x EFLH x (IPLV_Standard - IPLV_Eff)
Cooling Electrical Demand Savings (Customer kW)	= Size x (FLV_Standard - FLV_Eff)
For Variable Air Volume (VAV) Boxes	
Cooling Electrical Energy Savings (Customer kWh)	= # of fans x Savings x EFLH x [(cfm_per_fan / cfm_per_ton) x FLV + bhp_per_fan x 0.746 x Load_Factor)]
Cooling Electrical Demand Savings (Customer kW)	= # of fans x Savings x [(cfm_per_fan / cfm_per_ton) x FLV + bhp_per_fan x 0.746 x Load_Factor)]

Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLV)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLV)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Size	= The equipment capacity in tons, provided by customer
EFLH	= Equivalent Full Load Hours. The equivalent number of hours that the equipment would be running at full load over the course of the year. Values are shown in Table 2 for different building types and locations, to be provided by the customer.
SEER_Standard	= Seasonal Energy Efficiency Ratio in Btu/Wh of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2006. Value determined from table 1 based on customer provided equipment type and size.
SEER_Eff	= Seasonal Energy Efficiency Ratio in Btu/Wh of High Efficiency equipment that the customer will install, provided by customer
EER_Standard	= EER of standard equipment, based upon the minimum acceptable efficiency defined by the International Energy Conservation Code, 2006, for a specific type of equipment and size. Tbale 1.
EER_Eff	= EER of High Efficiency that the customer will install, provided by customer.

FLV_Standard	= Full load cooling efficiency in kW/ton of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2006 for chiller type and size (type and size provided by customer). Table 1
FLV_Eff	= Full Load Value cooling efficiency in kW/ton, representing the efficiency at design conditions, provided by customer
IPLV_Standard	= Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of standard equipment, based upon the minimum acceptable efficiency defined by International Energy Conservation Code, 2006 for chiller type and size (type and size provided by customer). Table 1
IPLV_Eff	= Integrated Part Load Value (representing the average efficiency over a range of loaded states) cooling efficiency in kW/ton of High Efficiency equipment, provided by customer.
CF	= Coincidence Factor, the probability that peak demand of the motor will coincide with peak utility system demand. 0.90 will be used for prescriptive rebates (1).
Measure Life	Measure life is taken at 20 years for all cooling equipment. (Reference 2)
#_of_fans	= Number of fans provided by customer
cfm_per_ton	= Cubic feet per minute of airflow, typical amount of supply air per ton of cooling, 400 is a standard value used in the Colorado Industry (5)
FLV	= Full Load Value of Chiller, taken to be 0.6 kW/ton for VAV (5)
Savings	= Savings factor associated with Variable Air Volume conversion, taken to be 15% (5)
Load Factor	= Average fraction of full load operation, taken to be 80% (5)
bhp_per_fan	= Brake horsepower per fan, taken to be 1 bhp (5)
TDLF	Transmission-Distribution Loss Factor = 6.39%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-gross = We will use 94% for cooling projects (6)
Incremental operation and maintenance cost	= 0 - conservative approach, taking no credit for improved mean time between failure.

Provided by Customer:	**Verified during M&V:**
For all but VAV:	
Cooling equipment type	Yes
Cooling equipment size (tons)	Yes
Cooling equipment efficiency (SEER, EER, IPLV, kW/ton - dependent on the technology)	Yes
Climate zone	Yes
Building type	Yes
For VAV:	
# of Variable Air Volume Boxes	Yes
# of fans	Yes
Climate zone	Yes
Building type	Yes

Assumptions:
- Each piece of cooling equipment is going in instead of a machine of the same size that only met minimum International Energy Conservation Code, 2006 requirements.
- Prescriptive rebates are not given for backup cooling equipment.
- Some equipment is rated in only EER or SEER. To convert a Seasonal Energy Efficiency Ratio (SEER) to an Energy Efficiency Ratio (EER), multiply SEER by 0.85. The conversion factor of 0.85 a generally accepted factor for converting from SEER to EER. Once EER is obtained, convert EER to kW/ton using the following equation: kW/ton = 12/EER. To convert kW/ton to kW, multiply by tons.
- VAV = Variable Air Volume

Table 1. Excerpt from Deemed Baseline Efficienc tab

Equipment	Equipment Classification	FLV (kW/ton)	IPLV (kW/ton)	Incremental Cost
Centrifugal Chiller (150-300 tons)	Standard Efficiency	0.63	0.60	-
Centrifugal Chiller (150-300 tons)	High Efficiency			$20,000

Table 2. Equivalent Full Load Hours by Building Type - Market segment hours scaled from Minnesota OES data (Reference 3) with Office value calculated for Denver and Grand Junction Typical Meteorological Year data. Distributions developed from CBECS data (Reference 4)

Building Type	Front Range EFLH	Western Slope EFLH
Education - Community College	725	844
Education - Secondary School	456	531
Education - University	981	1,142
Health/Medical - Clinic	833	969
Health/Medical - Hospital	1,616	1,880
Lodging	1,356	1,578
Office	1,102	1,283
Retail	975	1,135

EFLH*- Zone 1 (Front Range/Denver) and Zone 2 (Western State as represented by Grand Junction)

Changes from 2008

Baseline efficiencies updated. Cost information updated from various sources. Methodology now look at market segment rather than a single Equivalent Full Load Hours value for all participants and measures.

References

1. NYSERDA (New York State Energy Research and Development Authority); NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor
2. ASHRAE, 2007, Applications Handbook, Ch. 36, table 4, Comparison of Service Life Estimates
3. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report - source of equivalent full load hour methodology for segments
4. CBECS (Commercial Buildings Energy Consumption Survey), 2003 - Total Floor space of Cooled Buildings by Principal Building Activity - source of market segment distributions
5. Derived by Eugene Scales and Associates
6. NTG factor from National Energy Efficiency Best Practices Report (http://www.eebestpractices.com)

Building Type	Zone 1 EFLH-MOES	Ratio vs. Office EFLH
Education - Community College	560	66%
Education - Secondary School	352	41%
Education - University	758	89%
Health/Medical - Clinic	643	76%
Health/Medical - Hospital	1,248	147%
Lodging	1,047	123%
Office	851	100%
Retail	753	88%

weighting Factors for Zones ---->	10%	90%
Building Type	**Western Slope**	**Front Range**
Education - Community College	844	725
Education - Secondary School	531	456
Education - University	1,142	981
Health/Medical - Clinic	969	833
Health/Medical - Hospital	1,880	1,616
Lodging	1,578	1,356
Office	1283	1,102
Retail	1,135	975

Equipment	Equipment Classification	SEER	EER	FLV (kW/ton)	IPLV (kW/ton)	Incremental Cost, $
Rooftop Units less than 5.4 tons	Standard Efficiency	10.0	8.5			
	High Efficiency					600
Rooftop Units 5.5-11.3 tons	Standard Efficiency	11.9	8.9			
	High Efficiency					2,500
Rooftop Units11.4-19.9 tons	Standard Efficiency	11.2	9.5			
	High Efficiency					3,750
Rooftop Units 20-63.3 tons	Standard Efficiency	9.5	9.3			
	High Efficiency					7,500
Rooftop Units greater than 63.3 tons	Standard Efficiency	9.2	9.0			
	High Efficiency					31,250
Variable Air Volume Conversion	Standard Efficiency		10.0	0.60		
	High Efficiency					290
Split Systems less than 5.4 tons	Standard Efficiency	10.0	9.7			
	High Efficiency					600
Condensing Units > 5.4 tons	Standard Efficiency	11.2	10.1			
	High Efficiency					2,500
Water-source Heat Pumps	Standard Efficiency	12.4	11.2			
	High Efficiency					750
PTAC	Standard Efficiency	11.2	9.1			
	High Efficiency					188
scroll/screw chiller < 150 tons	Standard Efficiency			0.79	0.78	
	High Efficiency					12,500
scroll/screw chiller 150 to 300 tons	Standard Efficiency			0.72	0.71	
	High Efficiency					16,000
Centrifugal Chillers < 150 tons	Standard Efficiency			0.70	0.70	
	High Efficiency					12,500
Centrifugal Chillers 150- 300 tons	Standard Efficiency			0.63	0.63	
	High Efficiency					20,000
Centrifugal Chillers > 300 tons	Standard Efficiency			0.58	0.58	
	High Efficiency					90,000
Air-Cooled Chillers - avg. capacity 250 tons	Standard Efficiency			1.41	1.41	
	High Efficiency					8,608

CUSTOM SAVINGS TECHNICAL ASSUMPTIONS

Program: Custom Efficiency

Customer may apply for rebate under the Custom Efficiency Program for gas or electric projects not listed under prescriptive rebate programs. Each Custom Efficiency project will be analyzed individually by Xcel Energy. Technical variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methodologies.

Calculations:
Electrical energy savings and electrical demand savings will be calculated based on the project specific details. Each project will undergo an engineering review in accordance with standard engineering practices. The review will be in accordance with the calculation methodologies detailed in the prescriptive programs where applicable.

A net-to-gross factor of 87% will be used for electric custom projects, referenced National Energy Efficiency Best Practices Report (http://www.eebestpractices.com) A net-to-gross factor of 93% will be used for custom gas projects which assumes 1/2 of the free rider rate for electric becasue gas programs are new offerings in Colorado.
A transmission distribution loss factor of 6.39% will be used for Custom Efficiency projects. This is calculated using factors from the 2007/2008 DSM Biennial Plan; no significant system changes have been noted since then.

Product Life will be evaluated for each project, lives for end use technologies will be in accordance with prescriptive programs where applicable

Operation and Maintenance Savings will be evaluated for each project.

Changes from 2008
Rebate levels and minimum payback criteria were updated from 2008.

DATA CENTER SAVINGS TECHNICAL ASSUMPTIONS

Program: Data Center Efficiency

This is a custom program. Customer may apply for rebate under the Data Center Efficiency Program for projects not listed under prescriptive rebate programs. Each Data Center efficiency project will be analyzed individually by Xcel Energy. Technical variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methodologies.

Calculations:

Electrical energy savings and electrical demand savings will be calculated based on the project-specific details. Each project will undergo an engineering review in accordance with standard engineering practices. Where prescriptive elements exist, the review will be in accordance with the calculation methodologies detailed in the prescriptive programs.

A net-to-gross factor of 90% will be used for Data Center projects, reference National Energy Efficiency Best Practices Report (http://www.eebestpractices.com)

A transmission distribution loss factor of 6.39% will be used for Data Center projects. Reference the Enhanced DSM filing, SRD-2; no significant system changes have been noted since then.

Assumptions:

Operation and Maintenance Savings will be calculated for each specific project based on project details.

study rebate at 50% of cost not to exceed $15,000

for retrofit lighting assume no change in number of fixtures

virtualization at ratio of 15:1

Changes from 2008

This is a new program for 2009.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Easy Savings Energy Kit

A package of home energy efficiency measures in a kit that can be distributed to low-income customers through low-income agencies. Each participant receives a kit containing a high-efficiency showerhead, a kitchen sink aerator, and two compact fluorescent bulbs, in addition to other items such as a thermometer, filter alarm, leak detection tablet, night light and tape measure.

Algorithms:

CFL Electric Energy Savings (Customer kWh)	= (kW base-kW eff)x Hr use = Savings; =[(60 - 14)/1000 + (75-19)/1000] x 1,210 hr = 123 kWh/yr per kit
CFL Electric Demand Savings (Customer kW)	= (kW_EE - kW_Base) = (60-14)/1000 + (75-19)/1000 = 0.102 kW per kit
Showerhead Energy Savings (Gross Dth)	= (GPY_Saved x Delta_T x 8.33) / HGE x SPD/100000; = 1.33 Dkt/yr per kit
Aerator Energy Savings (Gross Dth)	= ((GPY_Saved x Delta_T x 8.33) / HGE)/1000000 = 0.343 Dkt/yr per kit
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF).
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG
Net Dth	= Gross Dth x NTG

Variables:

Number_of_Bulbs	= Number of bulbs provided in each kit = 2.
Hrs	= Annual operational hours per year of the fixture. We will use 1210 hours which represents the average operating hours for the first 5 CFLs installed in a house. (Reference 1)
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. 0.08 will be used for prescriptive rebates (Ref 2)
kW_EE	= Bulb wattage per supplied CFLs; = 14W and 19 W. These are in the two bulb kit.
kW_Base	= Bulb wattage replaced by supplied CFLs; = 60 W and 75W.
GPY_Saved	= Gallons per year of hot water saved with high-efficiency showerhead (for one shower per day) or aerator assuming 65% of water flow is hot water. Showerhead = 1635 gallons per year per shower, Aerator = 423 gallons.
Delta_T	= Change in temperature of water from incoming water temperature to water heater temperature setting. Delta_T is 74 degrees F. (Reference 5)
HGE	= Heat generation efficiency based on steady-state water heater efficiency. Used value of 0.76 . (Reference 3)
SPD	= Number of showers per day = 1.32 based on 2.64 people per home and 2 bathrooms. (Reference 5)
Incremental Costs	= Incremental costs of measure as seen in Table 1.
Transmission Distribution Loss Factor (TDLF)	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing - SRD-2
Net-to-Gross Factor (NTG)	= We will use 100% for school education kits as these kits would not be available without the program.
O&M savings	= Operation and Maintenance savings are assumed to be zero for the easy savings energy kits.

Table 1. (Reference 1,6)

Measure	Measure Life	Incremental Cost
CFLs	6.61 years (Reference 1)	$20.57
Shower heads	6 years (Reference 6)	$10.28
Faucet aerators	5 years (Reference 6)	$10.28

Provided by Customer:
Number of kits distributed

Verified during M&V:
Yes

Changes From 2008:
This is a new program for 2009

References

1. US DOE US Lighting Market Characterization Study 2002
2. Composite Wattages, Operating Hours and Coincidence from CFL METERING STUDY FINAL REPORT, Prepared for: Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, 2005
3. Department of Energy Domestic Hot Water Appliance Calculator
4. Japanese study: "The effects of variation in body temperature on the preferred water temperature and flow rate during showering" Authors: Tadakatsu Ohnaka, Yutaka Tochihara, Yumiko Watanabe. Affiliations: a) Department of Physiological Hygiene, The Institute of Public Health, Minato-ku, Tokyo, Japan; b) Faculty of Home Economics, Jissen Women's University, Hino, Tokyo, Japan.
5. Handbook of Water Use and Conservation, Denver Water Conservation
6. CALMAC; California Measurement Advisory Committee.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Energy Efficient Showerheads

Residential natural gas customers are eligible to receive a free high-efficiency showerhead to help reduce energy and water use.

Algorithms:

Showerhead Natural Gas Savings (Gross Dth)	=((GPY_Saved x Delta_T x 8.33)/1,000,000)/HGE x SPD [illegible]
Net Dth	=Gross Dth x NTG [illegible]

Variables:

GPY_Saved	= Gallons per year of hot water saved with high-efficiency showerhead (for one shower per day) assuming 65% of water flow is hot water. Showerhead = 1660 gallons per year per shower (Reference 2)
Delta_T	= Change in temperature of water from incoming water temperature to water heater temperature setting. Delta_T is 74 degrees F. (Reference 1)
HGE	= Heat generation efficiency based on steady-state water heater efficiency. Used value of 0.76. (Reference 1)
SPD	= Number of showers per day = 1.32 based on 2.64 people per home and 2 bathrooms. (Reference 3)
8.33	Conversion from gallons to pounds of water
Incremental Costs	=costs provided by vendor; = $5 per showerhead
NTG	= Net-to-Gross Factor - We will use 70% for showerheads. (Reference 4)
O&M savings:	= Water savings are assumed to be 1258 gallons per year @ $0.003/gallon = $3.77 per shower head
Measure Life	= 10 years

Provided by administrator:
Showerhead received by customer
Showerhead installed by customer

Verified during M&V:
Yes
Yes

Assumptions:
- 2.5 gpm replaced with 2.0 gpm, resulting in 1,660 gallons of annual water savings per shower. (reference 2)
- 1.32 showers per day at 6.9 minutes per shower (reference 2,3)

Changes From 2008:
This is a new program for 2009

References
1. Department of Energy Domestic Hot Water Appliance Calculator
2. Japanese study: "The effects of variation in body temperature on the preferred water temperature and flow rate during showering"
   Authors: Tadakatsu Ohnaka, Yutaka Tochihara, Yumiko Watanabe. Affiliations: a) Department of Physiological Hygiene, The Institute of Public Health, Minato-ku, Tokyo, Japan; b) Faculty of Home Economics, Jissen Women's University, Hino, Tokyo, Japan.
3. Handbook of Water Use and Conservation, Denver Water Conservation
4. Net-to-Gross factor is an assumed installation rate for showerheads based on Xcel MN study and aggressive CO follow-up

Energy Management System/Controls (EMS) SAVINGS TECHNICAL ASSUMPTIONS

Program: EMS Efficiency

This is a custom program including both gas and electric measures. Customer may apply for rebate under the EMS Program. Each EMS project will be analyzed individually by Xcel Energy. Technical variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on good engineering practices and standards.

Calculations:
Electrical and gas energy savings and electrical demand savings will be calculated based on the project-specific details. Each project will undergo an engineering review in accordance with standard engineering practices. Where prescriptive elements exist, the review will be in accordance with the calculation methodologies detailed in the prescriptive programs.

Assumptions:
A net-to-gross factor of 87% will be used for electric measures and a net-to-gross factor of 93% will ne used for gas EMS projects, reference National Energy Efficiency Best Practices Report (http://www.eebestpractices.com). Gas measures will assume one half of the free rider factor of electric because gas measures are new to Colorado.
A transmission distribution loss factor of 6.39% will be used for EMS projects. Reference the Enhanced DSM filing, SRD-2; no significant system changes have been noted since then.

for retrofit lighting assume no change in number of fixtures

Operation and Maintenance Savings will be calculated for each specific project based on project details.
Life of product is 10 years.

Changes from 2008
Gas measures have been added to the program for 2009.
Measure life for the program have been changed form 7 to 10 years.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: ENERGY STAR New Homes Rebates

Residential natural gas and electric customers receive a cash rebate for implementing ENERGY STAR energy efficiencies.

Algorithms:

Required measures savings (Customer kW)	= (Baseline_HERS - Measured_HERS) x kW_per_HERS
Required measures savings (Customer kWh)	= (Baseline_HERS - Measured_HERS) x kWh_per_HERS
Required measures savings (Gross Dth)	= (Baseline_HERS - Measured_HERS) x Dth_per_HERS
20 CFLs Electric Energy Savings (kWh) and Electric Demand Savings (kW)	Energy and demand savings and annual hours of operation for compact fluorescent lamps are based on data and calculations derived from the 2002 US Lighting Market Characterization performed for the Department of Energy in 2002. Energy savings are 940 kWh and demand savings are 0.93 kW.
Clothes washer natural gas savings (Dth) and electric energy savings (kWh)	Energy savings for the clotherswasher were based on the Energy Star Clotherswasher Savings Calculator: http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers. This assumed a gas water heater home, so savings are generated for gas and electric. Savings is 0.88 Dth and 26 Kwh.
Dishwasher natural gas savings (Dth) and electric energy savings (kWh)	Energy savings for the dishwasher were based on the Energy Star Dishwasher Savings Calculator: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers. This assumed a gas water heater home, so savings are generated for gas and electric. Savings is 1.27 Dth and 77 kWh.
Refrigerator electric energy savings (kWh)	Energy savings for the refrigerator were based on the Energy Star Refrigerator Savings Calculator: http://www.energystar.gov/index.cfm?c=refrig.pr_refrigerators. Savings is 93 kWh.
Net Dth	= Gross Dth x NTG
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Baseline_HERS	= Home Energy Rating System baseline for home location from Table 1.
As_Built_HERS	= Home Energy Rating System for constructed home, calculated for each home.
kW_per_HERS	= 0.0024 kW, based on average total running time of furnace and air conditioner of 2,548 hours
kWh_per_HERS	= 6.1 kWh per HERS point, based on simulated ENERGY STAR home with HERS score of 75
Dth_per_HERS	= 0.98 Dth per HERS point, based on simulated ENERGY STAR home with HERS score of 75
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
CF	Coincidence Factor = the probability that peak demand of the lights will coincide with peak utility system demand from Table 2
NTG	Net-to-Gross Factor = We will use 94% based on reference 5.
O&M savings	Operation and Maintenance savings = We will assume no O&M savings.

Table 1. Baseline HERS Values

Location	Square Footage of Home	Baseline HERS	HERS for Rebate Eligibility
City of Boulder	3,000 and below	70	60
City of Boulder	3,001 - 5,000	60	51
City of Boulder	5,001 or above	35	30
Mountain Communities	All	100	80
Other Areas	All	100	85

Table 2. Measure Life and Cost

Type of measure:	Measure life:	Incremental cost:	Coincidence factor:
Ceiling insulation	20 years (Reference 1)	$208 (Reference 6)	N/A
HE furnace AFUE 92%	18 years (Reference 12)	$331 (Reference 13)	N/A
ACH reduction	10 years (Reference 1)	$550 (Reference 7)	N/A
Water heater 57 to 62 EF	15 years (Reference 1)	$55 (Reference 13)	N/A
CFLs	8.2 years (Reference 9)	$71 (Reference 10)	8% (Reference 13)
Clothes washer	11 years (Reference 16)	$200 (Reference 14)	4.47% (Reference 14)
Dishwasher	11 years (Reference 15)	$30 (Reference 14)	2.45% (Reference 14)
Refrigerator replacement	13 years (Reference 14)	$30 (Reference 14)	100%

Provided by Customer:	Verified during M&V:
Home size info and type of equipment	Yes
HERS score	Yes
Blower door test	Yes

Assumptions:
The baseline home had an existing level of insulation in the attic of R-38 and the change case had an elevated insulation level of R-44.
The baseline home had an existing ACH of 7.08 and the change case was 4.6 ACH.
The baseline furnace had an AFUE of 78%, which is the federal minimum efficiency standard.
The baseline water heater is a 40 gallon capacity with an 57 EF.

Changes From 2008:
This is a new program for 2009

Building Characteristics for Standard Home Used for Modeling:
Single family home
Two stories with unfinished conditioned basement
Five bedrooms, two bathroom
2450 square feet above grade, 1225 square feet below grade
Basement
HVAC: Gas Furnace and Central AC
Orientation: Square home with each of the four sides facing one of the cardinal directions with the same amount of window space on each orientation
2 foot roof overhangs
Roofing material: composite shingles – medium color
Doors: wood
The duct supply, duct return and air handler are in conditioned space
No shading was assumed

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2006 Residential Energy Use Colorado Service Area - Xcel; Bruce Nelson
3. American Housing Survey for Denver - US Census Bureau
4. Xcel Energy CO DSM Potential 2006 - prepared by Kema
5. National Energy Efficiency Best Practices Study - Residential Single-Family Comprehensive Weatherization Best Practices Report from December 2004.
6. RS Means Repair and Remodeling 2007 at a cost of $0.028 per square foot per increase in R-value.
7. National Energy Audit Tool (NEAT) and Frontier estimates.
8. EEBP web site - Tacoma Residential Weatherization program.
9. US Lighting Market Characterization Study performed for the Department of Energy in 2002
10. MEEA/ES Change A Light campaign info
11. Xcel Energy estimate
12. Draft Technical Support Document: Energy Conservation Standards for Residential Furnaces and Boilers, Efficiency Standards for Consumer Products Prepared for US DOE, September 2006
13. California Energy Commission's Database for Energy Efficient Resources (DEER)
14. www.energystar.gov
15. DOE 2007
16. Appliance Magazine, September 2007

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: ENERGY STAR Retailer Incentive Pilot Program

This is a pilot program designed to increase the sales of energy efficient technologies by providing rebates directly to retailers that sell ENERGY STAR appliances and electronics such as refrigerators, clothes washers, dishwashers, room air conditioners, televisions and ceiling fans.

Algorithms:

Energy Star Refrigerator electric energy and demand savings (kWh and kW)	Energy savings for the refrigerator were based on the Energy Star Refrigerator Savings Calculator: http://www.energystar.gov/index.cfm?c=refrig.pr_refrigerators. Savings is 93 kWh and 0.011 kW.
Energy Star clothes washer natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the clotherswasher were based on the Energy Star Clotherswasher Savings Calculator: http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers. This assumed a gas water heater home, so savings are generated for gas and electric. Savings is 0.86 Dth, 26 kWh and 0.66 kW.
Energy Start dishwasher natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the dishwasher were based on the Energy Star Dishwasher Savings Calculator: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers. This assumed a gas water heater home, so savings are generated for gas and electric. Savings is 1.27 Dth, 77 kWh and 0.36 kW.
Energy Star room air conditioner electric energy and demand savings (kWh and kW)	Energy savings for the room air conditioner (AC) were based on the Energy Star Room AC Savings Calculator: http://www.energystar.gov/index.cfm?c=roomac.pr_room_ac. Savings is 59 kWh and 0.094 kW.
Energy Star television electric energy and demand savings (kWh and kW)	Energy savings for the television were based on the Energy Star Television Savings Calculator: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers. Savings is 52 kWh and 0.022 kW.
Energy Star ceiling fan energy and demand savings (kWh and kW)	Energy savings for the ceiling fan were based on the Energy Star Television Savings Calculator: http://www.energystar.gov/index.cfm?c=refrig.pr_refrigerators. Savings is 180 kWh and 0.12 kW.
Net Dth	= Gross Dth x NTG
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

NTG	Net-to-Gross Factor = We will use 60% based on reference 1.
CF	Coincidence Factor = Probability that peak demand of the bulb will coincide with peak utility system demand.
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
O&M savings	Operation and Maintenance savings = We will assume no O&M savings.

Type of Measure:	Measure Life:	Incremental Cost:	Coincidence Factor:
Energy Star Refrigerator	13 years (Reference 2)	$30 (Reference 2)	100% (fully diversified load)
Energy Star Clothes Washer	11 years (Reference 7)	$200 (Reference 2)	4.47% (calculated)
Energy Star Dishwasher	11 years (Reference 4)	$0 (Reference 2)	2.45% (calculated)
Energy Star Room AC	9 years (Reference 2)	$30 (Reference 2)	75% (Reference 5)
Energy Star Television	6.2 years (Reference 3)	$0 (Reference 2)	5% (assumed value)
Energy Star Ceiling fan	10 years (Reference 2)	$6 (Reference 2)	8% (Reference 6)

Changes from 2008:
This program is new for 2009

References:

1. NYSERDA market transformation efforts
2. Energy Star Calculator DOE 2004
3. Consortium for Energy Efficiency
4. Appliance Magazine, September 2007
5. MN Cooling Coincidence Factor
6. CA CFL Metering Study Final Report 2005
7. DOE 2007

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Evaporative Cooling

Prescriptive rebates will be offered for the purchase and installation of evaporative coolers. Two tiers of rebates are offered based on the Evaporative Efficacy of the unit and the type of media. The rebates and analyses are based on a nominal 3 ton cooling load. Tier 1 units are standard efficiency evaporative coolers. Tier 2 units are high efficiency evaporative coolers (see assumptions for details). Credit will be calculated based on the number and type of units installed, and the type of the existing unit.

Algorithms:

Refrigerated air to Tier 1 savings:

Energy Savings (Customer kWh)	= Ref_air_energy - (MotorHP x Motor_kW_Constant/Tier1Motor_eff x LF_evap x EFLH) = 1840 kWh
Demand Savings (Customer kW)	= Ref_air_demand - (MotorHP x LF_evap x Motor_kW_Constant/Tier1Motor_eff) = 2.2 kw

Refrigerated air to Tier 2 savings:

Energy Savings (Customer kWh)	= Ref_air_energy - (MotorHP x Motor_kW_Constant/Tier2Motor_eff x LF_evap_efficient x EFLH) = 2095 kWh
Demand Savings (Customer kW)	= Ref_air_demand - (MotorHP x LF_evap_efficient x Motor_kW_Constant/Tier2Motor_eff) = 2.43 kW

Tier 1 to Tier 2 savings:

Energy Savings (Customer kWh)	= (MotorHP x Motor_kW_Constant/Tier1Motor_eff x LF_evap x EFLH) - (MotorHP x Motor_kW_Constant/Tier2Motor_eff x LF_evap_efficient x EFLH) = 362 kWh
Demand Savings (Customer kW)	= (MotorHP x LF_evap x Motor_kW_Constant/Tier1Motor_eff) - (MotorHP x LF_evap_efficient x Motor_kW_Constant/Tier2Motor_eff) = 0.24 kW

Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Ref_air_energy	= modeled hourly energy use of home with 3 ton 13 SEER standard AC unit in Denver using ESPRE. We will use 1,358 kWh. (Reference 1)
Ref_air_demand	= Btuh/EER x 1000. We will use 3.22 kW (Reference 2)
Tier1Motor_eff	Standard evaporative cooling motor efficiency. We will use 0.7. (Reference 3)
Tier2Motor_eff	High efficacy evaporative cooling motor efficiency. We will use 0.7. (Reference 3)
LF_evap	Load factor for standard evaporative cooler of 0.90. (Reference 5)
LF_evap_efficient	Load factor for high efficiency evaporative cooler of 0.69. (Reference 5)

MotorHP	Motor Horsepower - We will use 1.0725 to represent the motor size for an evaporative cooler which corresponds to the cooling output of a 3 ton AC unit. (Reference 5)
Motor_kW_Constant	kW conversion / HP = 0.746
EFLH	Effective full load hours (700 hours) (Reference 5)
CF	= Coincidence Factor, the probability that peak demand of the coolers will coincide with peak utility system demand. 0.90 will be used for prescriptive rebates (Reference 5)
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-Gross Factor = We will use 60% for standard AC to standard evaporative cooling, and 100% for remaining projects based on Xcel Energy program experience.
Incremental Costs	= Incremental cost of efficient technology over baseline technology. Costs will be provided by customer if available, if not, assumed costs will be used. AC unit = $1268(Reference 6), Std Evap Cooler = $400(Reference 6), HE Evap Cooler = $2200(Reference 8)
O&M savings	= Operation and Maintenance savings related to water use are listed in Table 1.
Measure Life	= 10 years (Reference 4)

Provided by Customer:	**Verified during M&V:**
Type of unit installed (Tier 1 or Tier 2)	Yes
If Tier 2, type of unit previously installed (AC or None)	Yes

Assumptions:

Table 1. Operation and Mainrtenance Savings (Reference 9)

Base System	New System	O&M Savings
Refrigerated Air	Standard Evap Cooling (Tier 1)	$ (19.85)
Refrigerated Air	Hight Efficient Evap Cooling (Tier 2)	$ (5.06)
Standard Evap Cooling (Tier 1)	Hight Efficient Evap Cooling (Tier 2)	$ 14.79

Qualifying equipment must be new and be a permanently installed direct, indirect or two-stage evaporative cooling unit. Portable coolers or systems with vapor compression backup are not eligible, nor is used or reconditioned equipment.
Tier 1: Qualifying evaporative cooling units must have a minimum Industry Standard Rated airflow of 2,500 CFM
Tier 2: Qualifying evaporative cooling units must have a minimum Media Saturation Effectiveness of 85% and above. The units must be installed with a remote thermostat and a periodic purge water control.

References:

1. ESPRE 2.1 engineering model: Simplified energy analysis methods for residential buildings
2. Building America, Research Benchmark Definitions, Pg 9, http://www.eere.energy.gov/buildings/building_america/pdfs/37529.pdf
3. Average motor efficiency for 0.75 hp motor from NEMA, http://www.eere.energy.gov/buildings/appliance_standards/commercial/pdfs/small_motors_tsd.pdf
4. Kinney, Larry. New Evaporative Cooling Systems: An Emerging Solution for Homes in Hot Dry Climates with Modest Cooling Loads. SWEEP
5. Summit Blue/Nexant Study - Motor HP, load factor, EFLH
6. An average of the price for a 13 SEER Goodman (http://www.acfactoryoutlet.com/home.asp?p=listgoodman.asp&cat=73&sort=1&ah=1) and the price as noted in the DOE's AC calculator spreadsheet (www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/Calc_CAC.xls) is assumed.
7. http://www.google.com/products?q=home+depot+evaporative+cooler+cost&ie=UTF-8&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&sa=X&oi=product_result_group&resnum=1&ct=title
8. http://www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=750: "A two-stage evaporative cooler with a cooling capacity equivalent to a three-ton conventional system retails for about $1,800." The California Energy Commission states that installation costs are equivalent to refrigerated air systems, so only equipment cost is included in this analysis (http://www.consumerenergycenter.org/home/heating_cooling/evaporative.html: "Installation costs of swamp coolers are comparable to air conditioning units").
9. O&M Savings based on manufacturers water use data and an assumed $3/thousand gallons cost for water

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Furnace Efficiency

Prescriptive rebates will be offered for new Condensing Furnaces and replacement of current furnaces.

Algorithms:

Furnace Savings (Gross Dth)	= Alt.X (BTUH - (BTUH x EFFb/EFFh)),x Hrs / 1,000,000
Net Dth	= Gross Dth x NTG

Variables:

Hrs	= Annual operational hours per year of the furnace = 2864, based on the BIN data for Denver from ASHRAE. Reference 1.
EFFb	=Required Efficiency of Baseline furnace (AFUE), as defined in the 2006 IECC. It is 78%.
EFFh	= Required efficiency for higher efficiency furnace (AFUE). The customer provides the rated nameplate efficiency, either 92% or 94%.
BTUH	= British thermal unit per hour - Rated furnace BTUH nameplate data provided by customer on rebate
1,000,000	=Conversion from BTU to dekatherms = 1,000,000
Alt	=Altitude correction factor for Denver which is 0.80. This factor represents the reduced capacity of a furnace at increased altitude. Standard reduction is approximately 4% per thousand feet, therefore we will use 20% for Colorado furnaces.
Measure Life	= Length of time the furnace equipment will be operational = 15 years (Reference 4)
Baseline Cost	= Cost of the baseline technology. For Retrofit, the cost is $0 since the baseline is to continue to operate the existing system. For New Construction, the cost is that of the lower efficiency option. Costs assumed to be $9.71 per 1000BTU/h capacity (reference 2)
High Efficiency Cost	= Installed cost of high efficiency unit assumed to be $42.48 per 1000BTUH (Reference 2)
NTG	Net-to-gross = 77% (Reference 3)

Provided by Customer:	**Verified during M&V:**
New furnace size (BTUH)	Yes
New furnace efficiency	Yes

Assumptions:
- Each furnace is replaced with the same size on a 1 for 1 basis.
- Prescriptive rebates are only given for furnaces put into service, rebates are not given for backup furnaces.
- Service life of typical furnace is 20 years (per FEMP), 15 years used in the calculations. Reference 5
- Furnaces must have a minimum efficiency of 92% AFUE for a rebate, and 94% AFUE or higher efficiency will receive a larger rebate.
- The baseline efficiency for the furnace is based on 2006 IECC, minimum of 78%.
- Efficiency of all furnaces is Annual Fuel Utilization Efficiency ("AFUE")

Changes from 2008:
There was no prescriptive program in 2008

References:
1. Bin Temp & CO Bin Hrs are taken from ASHRAE, to determine operating hours in Denver area. See table 1, used 2864 hours.
2. The average baseline and high efficiency costs are based on the California DEER database.
3. Net-to-Gross factor from Summit Blue 2006 Midwest Residential market Assessments DSM Potential Study
4. Measure life from the Federal Energy Management Program (FEMP).

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Heating System Rebates

Residential natural gas customers receive a cash rebate for purchasing high-efficiency heating equipment.

Algorithms:

Furnace from AFUE 78% to 92% (Tier 1): Natural gas savings (Gross Dth)	Energy savings for the gas furnace were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 9.8 Dth
Furnace from AFUE 78% to 94% (Tier 2): Natural gas savings (Gross Dth)	Energy savings for the gas furnace were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 11 Dth
84% boiler natural gas savings (Gross Dth)	Energy savings for the gas boiler were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 3.0 Dth
Net Dth	= Gross Dth x NTG

Variables:

NTG	Net-to-Gross Factor = We will use 77% (Reference 6)
Measure life	= 18 years (Reference 5)

Incremental cost:

High-efficiency furnace rated at an AFUE of 92 is $450. (Reference 1)
High-efficiency furnace rated at an AFUE of 94 is $505. (Reference 1)
High-efficiency boiler rated at an AFUE of 84 is $440. (Reference 1)

Provided by Customer:
Efficiency of new unit (Furnace 92%, 94% - Boiler 84%)

Verified during M&V:
Yes

Changes From 2008:
This is a new program for 2009

Building Characteristics for Prototype Home Used for Modeling:

Single Family
Two story (Reference 3)
3 bedroom 2 bathroom (Reference 3)
2000 square feet (Reference 3)
Basement foundation (Reference 3)
HVAC:
heating - gas furnace 78 AFUE (55.9 kBtu unit required) - 85% of homes have gas heating, and 78% of which are forced air furnaces (Reference 2)
cooling - 59% have Central Air Conditioning model required a 2.5 ton unit to meet the cooling load (Reference 2)
air handler is in the basement and supply ducts and return ducts are assumed to be in majority interior space
Windows:
61% of homes have double pane windows (Reference 2)
double pane low-E are standard (Reference 4)
Model assumes 15% of wall area glazing
applied a u-factor of 0.53 (average between clear glass double pane and low-E)

Insulation Levels:

Existing Ceiling Insulation: R-19 (Reference 4)
Existing Wall Insulation: R-11 (Reference 4)

Basement Assumptions

Assumed basement walls to have R-11 insulation
Basement is considered finished space but not conditioned
The air handler is located in the basement
Some homes will have smaller sections of the basement conditioned -- maybe a bonus room etc, however this cannot be easily modeled in EnergyGauge

Appliances (Reference 2)

85% have dishwashers
74% electric ranges
88% and 89% have clothes washer and dryer (electric)
85% water heating is gas - model used a 40 gallon storage tank
68% of homes have ceiling fans

Average Customer Energy Consumption: (Reference 2)

kWh annually: 9,000 roughly for a 2,000 square foot home
Therms annually: 835

References:

1. California Energy Commission's Database for Energy Efficient Resources (DEER) http://www.energy.ca.gov/deer
(Does not include labor of equipment rental fees as this measure is considered a replace on burnout)
2. 2006 Residential Energy Use Colorado Service Area - Xcel: Bruce Neilson
3. American Housing Survey for Denver - US Census Bureau
4. Xcel Energy CO DSM Potential 2006 - prepared by Kema
5. Draft Technical Support Document: Energy Conservation Standards for Residential Furnaces and Boilers, Efficiency Standards for Consumer Products: Residential Central Air Conditioners And Heat Pumps, Prepared for US DOE, September 2006
6. Summit Blue 2006 Midwest Residential Market Assessment and DSM Potential Study.
7. Baseline costs from RS MEANS Repair and Remodeling Cost Data 2007

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Home Lighting & Recycling

Home Lighting Program encourages the purchase of compact fluorescent lamps (CFLs) and recycling of all fluorescent lamps.

Algorithms:

Electrical Energy Savings (Customer kWh)	=Number_of_Bulbs x (kW_Savings_per_Bulb) x Hours
Electrical Demand Savings (Customer kW)	=Number_of_Bulbs x (kW_Savings_per_Bulb)
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Number_of_Bulbs	= Number of bulbs sold
kW_Savings_per_Bulb	= kW savings per replaced bulb. We will subtract the manufacturer provided wattage for each CFL from the wattage of the incadescent bulb it replaces. The incadescent wattages will be determined based on the CFL wattage as seen in Table 1.
Hours	= Hours of operation per year for the bulb. Hours of operation will be determined by assuming that there are three existing CFLs in each home. A sample of customers will be used to determine the distribution of bulbs purchased per customer. This distribution of bulbs/purchase will be used to determine the average hours of newly installed bulbs per Table 3.
CF	= Probability that peak demand of the bulb will coincide with peak utility system demand. 0.08 will be used for all CFLs based on Reference 1.
Measure Life	= Measure life for the average CFL sold will be 7 years; (8000 hr life/1,119 hr/yr).
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2

Incremental Cost of Bulbs	= From Table 4 (Ref 3)
Net-to-Gross Factor	= We will use 83% for residential home lighting. Per Settlement NTG = 83% = 93% - 10% Installation Rate assumption.
O&M savings	= Operation and Maintenance savings are assumed to be zero.

Provided by Program Vendor:
Number and type of bulbs purchased

Verified during M&V:
Yes

Assumptions:
Average house in CO already has 3 CFLs installed

Table 1 - Existing lighting wattage and coincidence factors for residential lights (Reference 1,5)

CFL Wattage Range	Replaced Incandescent Bulb Wattage
9 - 12	40
13 - 16	60
17 - 23	75
24 - 30	100
31 - 52	150

Table 2 - Hours of operation by space (Reference 2)

	Number of Lamps per Space	Annual Operating Hours per Space	Total Installed Lamps
Kitchen	5.11	1210	5.11
Outdoor	4.06	1027	9.17
Utility Room	1.81	888	10.98
Living Room	5.97	864	16.95
Dining Room	1.23	829	18.18
Family Room	2.38	772	20.56
Garage	4.23	720	24.79
Office	1.16	708	25.95
Bathroom	6.88	669	32.83
Hall	5.12	616	37.95
closet	0.77	513	38.72
Other	2.05	435	40.77
Bedroom	9.94	406	50.71

Purchased lamps are installed in most frequently used locations in declining order; e.g. first 5 in Kitchen, next 4 in Outdoor locations etc.

Table 3 - Average hours for newly installed bulbs

Total Number of Bulbs in the House	Newly Purchased Bulbs	Per Bulb Hours	Total Hours for Newly Installed Bulbs	Average Hours of Newly
1	-	1210	NA	NA
2	-	1210	NA	NA
3	-	1210	NA	NA
4	1	1210	1210	1210
5	2	1210	2420	1210
6	3	1027	3447	1149
7	4	1027	4474	1119
8	5	1027	5501	1100
9	6	1027	6528	1088
10	7	888	7416	1059
11	8	888	8304	1038
12	9	864	9168	1019
13	10	864	10032	1003
14	11	864	10896	991
15	12	864	11760	980

Table 4 - Average Cost Table		
Gross Retail	$3.23	per bulb
Baseline	$0.50	
Incremental	$2.73	
Rebate	$1.30	
Net Retail	$1.43	

Changes from 2008:
Home lighting is adding a bulb recycling service for 2009.

References:
1. CFL METERING STUDY FINAL REPORT, Prepared for: Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, 2005 - Composite wattages and coincidence factor
2. US DOE, US Lighting Market Characterization, Navigant Consulting, 2002. Annual operating hours
3. Cost Data Source: 2006 MEEA Change A Light Change the World Program for 15W and 26W lamps. These costs are an upper boundary as lamp prices are significantly lower for more common 13W lamps (vast majority of residential lamps), and all lamp prices decrease.
4. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Home Performance with ENERGY STAR Rebates

Residential natural gas and electric customers receive a cash rebate for implementing multiple energy efficiency improvements.

Algorithms:

REQUIRED: Attic insulation and bypass sealing natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the attic insulation and bypass sealing were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 5.9 Dth, 180 kWh and 0.13 kW.
REQUIRED: Air sealing and weather-stripping natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the air sealing and weather stripping were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Air infiltration is measured as Air Changes per Hour (ACH); savings come from reducing the air infiltration through leaks, weatherstripping, holes etc. Savings is 7.4 Dth, 64 kWh and 0.03 kW.
REQUIRED. 20 CFLs electric energy savings and demand savings (kWh and kW)	Energy and demand savings and annual hours of operation for compact fluorescent lamps are based on data and calculations derived from the 2002 US Lighting Market Characterization performed for the Department of Energy in . 2002. Savings is 833 kWh and 0.925 kW.
Wall insulation natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the wall insulation were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 32.3 Dth/yr, 630 kWh and 0.31 kW.
Setback thermostat natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the thermostat setback were calculated in EnergyGauge modeling using a baseline model home calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 3.6 Dth, 175 kWh and 0.07 kW.
New HE Furnace AFUE 92% natural gas savings (Gross Dth)	Energy savings for the gas furnace were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 7.8 Dth
New HE Furnace AFUE 94% natural gas savings (Gross Dth)	Energy savings for the gas furnace were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 8.8 Dth
Tankless water heater 82% natural gas savings (Gross Dth)	Energy savings for the gas water heater were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 5.9 Dth
Power vented water heater natural gas savings (Gross Dth)	Energy savings for the gas water heater were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics) = 2.1 Dth
Dishwasher natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the dishwasher were based on the Energy Star Dishwasher Savings Calculator: http://www.energystar.gov/index.cfm?c=dishwash.pr_dishwashers. This assumed a gas water heater home, so savings are generated for gas and electric. Savings is 1.27 Dth, 77 kWh and 0.36 kW.

Clothes washer natural gas savings (Gross Dth) and electric energy and demand savings (kWh and kW)	Energy savings for the clotherswasher were based on the Energy Star Clotherswasher Savings Calculator: http://www.energystar.gov/index.cfm?c=clotheswash.pr_clothes_washers. This assumed a gas water heater home, so savings are generated for gas and electric. Savings is 0.88 Dth, 26 Kwh and 0.66 kW.
Refrigerator replacement electric energy and demand savings (kWh and kW)	Energy savings for the refrigerator were based on the Energy Star Refrigerator Savings Calculator: http://www.energystar.gov/index.cfm?c=refrig.pr_refrigerators. Savings is 93.41 kWh and 0.011 kW.
Refrigerator recycling electric energy and demand savings (kWh and kW)	Energy savings for the refrigerator are based on shipment-weighted average efficiencies of units manufactured from 1993-2000 with appropriate degradation factors applied to calculate baseline energy consumption (http://enduse.lbl.gov/Projects/RED.html) Demand savings are based on using an Average kW/Peak kW ratio from Deemed Refrigerator Savings for Texas developed by Frontier Associates. Reference 8. Savings is 988.9 kWh and 0.13 kW.
Net Dth	= Gross Dth x NTG
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF /.(1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

NTG	Net-to-Gross Factor = We will use 94% based on reference 5.
CF	Coincidence Factor = Probability that peak demand of the bulb will coincide with peak utility system demand. As seen in Table 1 based on Reference 1.
O&M savings	Operation and Maintenance savings = We will assume no O&M savings.
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2

Table 1. (Reference 1)

Type of measure:	Measure life:	Incremental cost:	Coincidence Factor
Attic insulation and bypass sealing	20 years (Reference 1)	$588 (Reference 6)	NA
Air sealing and weather-stripping	10 years (Reference 1)	$272 (Reference 7)	NA
CFLs	8.8 years (Reference 9)	$63 (Reference 10)	8%
Wall insulation	20 years (Reference 1)	$2,150 (Reference 6)	NA
Setback thermostat	5 years (Reference 11)	$50 (Reference 11)	NA
HE furnace AFUE 92%	18 years (Reference 12)	$390 (Reference 13)	NA
HE furnace AFUE 94%	19 years (Reference 12)	$440 (Reference 13)	NA
Tankless water heater 82%	20 years (Reference 1)	$750 (Reference 13)	NA
Power vented water heater	15 years (Reference 1)	$175 (Reference 13)	NA
Dishwasher	11 years (Reference 15)	$30 (Reference 14)	2%
Clothes washer	11 years (Reference 16)	$200 (Reference 14)	2%
Refrigerator replacement	13 years (Reference 14)	$30 (Reference 14)	100%
Refrigerator recycling	7.3 years (Reference 14)	$0 (Reference 11)	100%

Provided by Customer:
Type of Measures Implemented

Verified during M&V:
Yes

Assumptions:
The baseline home had an existing level of insulation in the attic of R-19 and the change case had an elevated insulation level of R-40.
The baseline home had an existing ACH natural of 0.60 and the change case had a 25% reduction to 0.45 ACH natural.
The baseline home had an existing level of insulation in the walls of R-0 and the change case had an elevated insulation level of R-11.
The baseline water heater is a 40 gallon capacity with an Efficiency Factor (EF) of 59%.

Changes From 2008:
This is a new program for 2009

Building Characteristics for Prototype Home Used for Modeling:
Single Family
Two story (Reference 3)
3 bedroom 2 bathroom (Reference 3)
2000 square feet (Reference 3)
Basement foundation (Reference 3)
HVAC:
heating - gas furnace 78 AFUE (55.9 kBtu unit required) - 85% of homes have gas heating, and 78% of which are forced air furnaces (Reference 2)
cooling - 59% have Central Air Conditioning model required a 2.5 ton unit to meet the cooling load (Reference 2)
air handler is in the basement and supply ducts and return ducts are assumed to be in majority interior space
Windows:
61% of homes have double pane windows (Reference 2)
double pane low-E are standard (Reference 4)
Model assumes 15% of wall area glazing
applied a u-factor of 0.53 (average between clear glass double pane and low-E)
Insulation Levels:
Existing Ceiling Insulation: R-19 (Reference 4)
Existing Wall Insulation: R-11 (Reference 4)
Basement Assumptions
Assumed basement walls to have R-11 insulation
Basement is considered finished space but not conditioned
The air handler is located in the basement
Some homes will have smaller sections of the basement conditioned – maybe a bonus room etc, however this cannot be easily modeled in EnergyGauge

Appliances (Reference 2)
85% have dishwashers
74% electric ranges
88% and 89% have clothes washer and dryer (electric)
85% water heating is gas - model used a 40 gallon storage tank
68% of homes have ceiling fans
Average Customer Energy Consumption: (Reference 2)
kWh annually: 9,000 roughly for a 2,000 square foot home
Therms annually: 835

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2006 Residential Energy Use Colorado Service Area - Xcel: Bruce Neilson
3. American Housing Survey for Denver - US Census Bureau
4. Xcel Energy CO DSM Potential 2008 - prepared by Kema
5. National Energy Efficiency Best Practices Study - Residential Single-Family Comprehensive Weatherization Best Practices Report from December 2004.
6. RS Means Repair and Remodeling 2007 at a cost of $0.028 per squsre foot per increase in R-value.
7. National Energy Audit Tool (NEAT) and Frontier estimates.
8. EEBP web site - Tacoma Residential Weatherization program
9. US Lighting Market Characterization Study performed for the Department of Energy in 2002
10. MEEA/ES Change A Light campaign info
11. Xcel Energy estimate
12. Draft Technical Support Document: Energy Conservation Standards for Residential Furnaces and Boilers, Efficiency Standards for Consumer Products Prepared for US DOE, September 2006
13. California Energy Commission's Database for Energy Efficient Resources (DEER)
14. www.energystar.gov
15. DOE 2007
16. Appliance Magazine, September 2007

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Insulation Rebates

Residential natural gas customers receive a cash rebate for installing insulation in their existing single-family home or one-to-four unit property.

Algorithms:

Attic insulation and bypass sealing natural gas savings (Gross Dth)	Energy savings for the attic insulation and bypass sealing were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 5.9 Dth/yr.
Air sealing and weather-stripping natural gas savings (Gross Dth)	Energy savings for the air sealing and weather stripping were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Air Infiltration is measured as Air Changes per Hour (ACH); savings come from reducing the air infiltration through leaks, weatherstripping, holes etc. Savings is 7.4 Dth/yr.
Wall insulation natural gas savings (Gross Dth)	Energy savings for the wall insulation were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 32.3 Dth/yr.
Net Dth	= Gross Dth x NTG

Variables:

NTG	Net-to-Gross Factor = We will use 89% based on reference 5.
O&M savings	= Operation and Maintenance savings are assumed to be zero for the insulation rebates.

Type of Insulation:	Measure life:	Incremental cost:	
Attic insulation and bypass sealing	20 years (Reference 1)	$588.00	(Reference 6)
Air sealing and weather-stripping	10 years (Reference 1)	$272.00	(Reference 7)
Wall insulation	20 years (Reference 1)	$2,080.00	(Reference 6)

Provided by Customer:	Verified during M&V:
Attic insulation depth, type of insulation and size of attic	Yes
Blower door test report and visual inspection of areas sealed, caulked, etc.	Yes
Validation of wall insulation, materials used and square footage or walls	Yes

Assumptions:
The baseline home had an existing level of insulation in the attic of R-19 and the change case had an elevated insulation level of R-40.
The baseline home had an existing ACH natural of 0.60 and the change case had a 25% reduction to 0.45 ACH natural.
The baseline home had an existing level of insulation in the walls of R-0 and the change case had an elevated insulation level of R-11.

Changes From 2008:
This is a new program for 2009

Building Characteristics for Prototype Home Used for Modeling:

Single Family
Two story (Reference 3)
3 bedroom 2 bathroom (Reference 3)
2000 square feet (Reference 3)
Basement foundation (Reference 3)
HVAC:
heating - gas furnace 78 AFUE (55.9 kBtu unit required) - 85% of homes have gas heating, and 78% of which are forced air furnaces (Reference 2)
cooling - 59% have Central Air Conditioning model required a 2.5 ton unit to meet the cooling load (Reference 2)
air handler is in the basement and supply ducts and return ducts are assumed to be in majority interior space
Windows:
61% of homes have double pane windows (Reference 2)
double pane low-E are standard (Reference 4)
Model assumes 15% of wall area glazing
applied a u-factor of 0.53 (average between clear glass double pane and low-E)

Insulation Levels:

Existing Ceiling Insulation: R-19 (Reference 4)
Existing Wall Insulation: R-11 (Reference 4)

Basement Assumptions

Assumed basement walls to have R-11 insulation
Basement is considered finished space but not conditioned
The air handler is located in the basement
Some homes will have smaller sections of the basement conditioned – maybe a bonus room etc, however this cannot be easily modeled in EnergyGauge

Appliances (Reference 2)

85% have dishwashers
74% electric ranges
88% and 89% have clothes washer and dryer (electric)
85% water heating is gas - model used a 40 gallon storage tank
68% of homes have ceiling fans

Average Customer Energy Consumption: (Reference 2)

kWh annually: 9,000 roughly for a 2,000 square foot home
Therms annually: 835

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2006 Residential Energy Use Colorado Service Area - Xcel: Bruce Nelson
3. American Housing Survey for Denver - US Census Bureau
4. Xcel Energy CO DSM Potential 2006 - prepared by Kema
5. National Energy Efficiency Best Practices Study - Residential Single-Family Comprehensive Weatherization Best Practices Report from December 2004.
6. RS Means Repair and Remodeling 2007 at a cost of $0.028 per square foot per increase in R-value.
7. National Energy Audit Tool (NEAT) and Frontier estimates.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Lighting Efficiency

Prescriptive rebates will be offered for replacement lighting equipment. New Construction rebates will be offered for new facilities or spaces overhauled for a new purpose. Custom rebates are available for lighting-related improvements that are not prescriptive.

Algorithms:

Electrical Demand Savings (Customer kW)	= (kW_Base - kW_EE) x HVAC_cooling_kWsavings_factor
Electrical Energy Savings (Customer kWh/yr)	= (kW_Base - kW_EE) x Hrs x HVAC_cooling_kWhsavings_factor
Natural Gas Savings (Dth)	= (kW_Base - kW_EE) x Hrs x HVAC_heating_penalty_factor
Lighting Controls -Electrical Energy Savings (Customer kWh/yr)	=(kW connected) x (1-PAF) x Hrs x HVAC_cooling_kWhsavings_factor
Lighting Controls -Electrical Demand Savings (Customer kW)	=(kW connected) x (1-PAF) x HVAC_cooling_kWsavings_factor
Lighting Controls -Natural Gas Savings (Dth)	=(kW connected) x (1-PAF) x Hrs x HVAC_heating_penalty_factor
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Hrs	= Annual Operating Hours. Hours to be obtained from Table 2. The type of facility is to be supplied by the customer.
kW_Base	= Baseline fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 3 is an example of a Standard Fixture information table.
kW_EE	= High Efficiency fixture wattage (kW per fixture) determined from stipulated fixture wattages from Standard Fixture information. Fixture type provided by customer. Table 3 is an example of a Standard Fixture information table.
HVAC_cooling_kWhsavings_factor	= Cooling system energy savings factor resulting from efficient lighting from Table 1. Reduction in lighting energy results in a reduction in cooling energy, if the customer has air conditioning. Existence

HVAC_cooling_kWsavings_factor	= Cooling system demand savings factor resulting from efficient lighting from Table 1. Reduction in lighting demand results in a reduction in cooling demand, if the customer has air conditioning. Existence of air conditioning to be provided by customer.
HVAC_heating_kWsavings_factor	= Heating system penalty factor resulting from efficient lighting. Reduction in lighting demand results in an increase in heating usage, if the customer has air conditioning. A value of -0.00088738 Dth/kWh given by (Reference 4).
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. CF will be determined based on customer provided building type in table 2.
Measure Life	= Length of time the lighting equipment will be operational, see Table 6 for Measure Lifetimes
Baseline Cost	the existing system. For New Construction, the cost is that of the lower efficiency option. Costs given by (Reference 5) and vendors.
High Efficiency Cost	= Cost of the High Efficiency technology. Costs given in Deemed Fixture Table (Reference 4)
kW connected	Total connected fixture load, determined as the sum of stipulated fixture wattages from Deemed Fixture Table.
PAF	Stipulated power adjustment factor based on control type from Table 4.
TDLF	Transmission Distribution Loss Factor = 6.39%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
NTG	Net-to-gross = 96% (Reference 5)
Incremental operation and maintenance cost	= Other annual savings or costs associated with the electrical savings. For Lighting, this consists of additional natural gas for heating. Methodology given by (Reference 4).

Provided by Customer:	**Verified during M&V:**
Number of Fixtures	Yes
Lighting equipment type	Yes
Building type	Yes
Existence of air conditioning	Yes

Assumptions:
- Each replacement lighting fixture is going in on a one-for-one basis for existing fixtures. New construction fixtures are put in on a one-for-one basis instead of lower efficiency options.
- In the Technical Assumptions, one will note that the Operating Hours does not appear, but rather a modified version. The methodology defines kW Savings on the basis of difference in kW with the HVAC Cooling demand factor. The Annual Energy Savings takes into account any heating that has to be added.

Table 1: HVAC Interactive Factors (Reference 2)

HVAC system	HVAC_cooling_kWhsavings_factor	HVAC_cooling_kWsavings_factor
Heating only	1.00	1.00
Heating and cooling	1.11	1.33

Table 2: Coincident Peak Demand Factors and Annual Operating Hours by Building Type (Reference 1 and 3)

Building Type	CF	Annual Operating Hours
Office	78%	3435
Restaurant	94%	4156
Retail	94%	3068
Grocery/Supermarket	94%	4612
Warehouse	96%	2388
Elemen./Second. School	73%	2080
College	71%	5010
Health	84%	3392
Hospital	84%	4532
Hotel/Motel	51%	2697
Manufacturing	96%	5913
Other/Misc.	96%	2278
24-Hour Facility	94%	8234
Safety or Code Required	96%	8760

Table 3: Example of T8 Lighting-Reference 6 - Full table in Deemed Fixture Table tab

Technology	kW
1 Lamp T12	0.039
1 Lamp T8	0.031

Table 4: Stipulated Power Adjustment Factors (Reference 1 and 7) - Full table in Deemed Fixture Table tab

Control Type	PAF
no controls	1.00
Occupancy Sensor - Wall Mount	0.70
Occupancy Sensor - Ceiling Mount	0.70

Daylighting - Continuous Dimming	0.57
Daylighting - Multiple Step Dimming	0.65
Daylighting - On/Off	0.73

Table 5: Total Connected Fixture Wattages (Reference 7) - Full table in Deemed Fixture Table tab

Connected Fixtures	kW_connected
1 2-lamp T8 32W EL Ballast Fixture	0.058
2 2-lamp T8 32W EL Ballast Fixtures	0.116
3 2-lamp T8 32W EL Ballast Fixtures	0.174
4 2-lamp T8 32W EL Ballast Fixtures	0.232
1 4-lamp T8 32W EL Ballast Fixture	0.112
2 4-lamp T8 32W EL Ballast Fixtures	0.224
3 4-lamp T8 32W EL Ballast Fixtures	0.336
4 4-lamp T8 32W EL Ballast Fixtures	0.448

Table 6: Measure Lifetimes in Years (Reference 4)

Measure	Lifetime in Years
CFL less than 19W	5
Low Wattage T8 Lamps	8
Integrated 25W Ceramic Metal Halide	7
T8 Lighting Systems	18
T5 Lighting Systems	18
Lighting Controls	18

Changes from 2008
Baseline efficiencies updated. High efficiency values updated. More measures added to program. Cost information updated from various sources. Methodology now looks at market segment rather than a single operating hours value for all participants.

References
1. Arkansas Deemed Savings Quick Start Program Draft Report Commercial Measures Final Report, Nexant. CF and hours

2. HVAC Interactive Factors developed based on the Rundquist Simplified HVAC Interaction Factor method for Minnesota, presented on page 28 of the 11/93 issue of the ASHRAE Journal - "Calculating lighting and HVAC interactions".
3. Technical Reference User Manual No. 2004-31, Efficiency Vermont, 12/31/04. CF and Hours
4. Deemed Savings Database, Minnesota Office of Energy Security, 2008. CF, Hours, kW, Costs, Measure life
5. Net-to-Gross factor from National Energy Efficiency Best Practices Study(http://www.eebestpractices.com)
6. Lighting Efficiency input wattage guide, Xcel Energy, July, 2008, kW
7. CL&P and UI program Savings Documentation modified for 3022 Daylight Hours in Denver CO

Post-retrofit Fixture	kW_EE	pre-retrofit fixture	kW_Base	Full Cost	Incremental Cost
(1) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.025	(1) F40T12 48" 34W lamps, energy saving magnetic ballast	0.043	$41.45	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	$43.45	
(3) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.072	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.108	$53.45	
(4) F32T8 48" 32W Lamps with a high efficiency, low ballast factor electronic ballast	0.096	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	$58.45	
(1) F32T8 48" 32W Lamp with a high efficiency, high ballast factor electronic ballast	0.037	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	$32.78	
(2) F32T8 48" 32W Lamp with a high efficiency, normal ballast factor electronic ballast	0.055	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.108	$37.49	
(2) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast	0.073	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	$37.49	
(3) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballast	0.093	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	$44.33	
(2) F32T8 48" 32W Lamps with a high efficiency, low ballast factor electronic ballast	0.048	(1) F96T12ES 8' 60W lamp, energy savings magnetic ballast	0.075	$47.48	
(4) F32T8 48" 32W Lamps with a high efficiency, low ballast factor electronic ballast	0.096	(2) F96T12ES 8' 60W lamps, energy savings magnetic ballast	0.123	$60.11	
(4) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballast	0.106	(2) F96T12ES 8' 60W lamps, energy savings magnetic ballast	0.123	$60.11	
(4) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast	0.141	(4) F96T12ES 8' 60W lamps, energy savings magnetic ballast	0.246	$66.62	
(1) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.025	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	$32.78	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.108	$37.49	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	$37.49	
(2) F32T8 48" 32W Lamp with a high efficiency, low ballast factor electronic ballast	0.048	(1) F96T12ES 8' 60W lamp, energy savings magnetic ballast	0.075	$37.48	
(1) F28T5 lamp with ~1.0 ballast factor electronic ballast	0.033	(1) F40T12 48" 34W lamps, energy saving magnetic ballast	0.043	$48.50	
(2) F28T5 lamps with ~1.0 ballast factor electronic ballast	0.063	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	$49.00	
(3) F28T5 lamps with ~1.0 ballast factor electronic ballast	0.093	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.108	$67.50	
(4) F28T5 lamps with ~1.0 ballast factor electronic ballast	0.126	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	$70.00	
Fluorescent, (1) 96", T-8 lamp, electronic ballast	0.056	Fluorescent, (1) 96", T-12 lamp, magnetic ballast	0.075	$93.45	$20.00
(1) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.082	Incandescent, (1) 150W lamp	0.150	$27.00	$26.75
(1) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.082	(2) F40T12 48" 34W lamps, energy saving magnetic ballast	0.072	$27.00	$27.00
(1) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.082	(3) F40T12 48" 34W lamps, energy saving magnetic ballast	0.108	$48.00	$48.00
(2) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast	0.117	(4) F40T12 48" 34W lamps, energy saving magnetic ballast	0.144	$32.00	$32.00
Fluorescent, (2) 96", T-8 lamp, low power factor electronic ballast	0.094	Fluorescent, (2) 96", T-12 lamp, magnetic ballast	0.123	$103.45	$20.00
(2) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.117	Metal Halide, (1) 150W lamp	0.190	$192.88	$110.00
(2) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.117	Metal Halide, (1) 175W lamp	0.218	$192.88	$110.00
(3) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.179	Metal Halide, (1) 250W lamp	0.265	$222.17	$110.00
(4) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.234	Metal Halide, (1) 400W lamp	0.458	$293.31	$110.00
(6) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.355	Metal Halide, (1) 400W lamp	0.458	$293.31	$110.00
(8) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.488	Metal Halide, (1) 750W lamp	0.850	$372.31	$110.00
(10) F54T5/HO 45.8" lamps with a ~1.0 ballast factor electronic ballast, high bay	0.595	Metal Halide, (1) 1000W lamp	1.080	$407.31	$110.00
(3) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast, high bay	0.093	Metal Halide, (1) 150W lamp	0.190	$140.00	$42.50
(3) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballast, high bay	0.093	Metal Halide, (1) 175W lamp	0.218	$140.00	$42.50
(4) F32T8 48" 32W Lamps with a high efficiency, very high ballast factor electronic ballasts, high bay	0.154	Metal Halide, (1) 250W lamp	0.265	$153.00	$63.75
(6) F32T8 48" 32W Lamps with a high efficiency, high ballast factor electronic ballasts, high bay	0.186	Metal Halide, (1) 400W lamp	0.458	$268.00	$85.00
(8) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.224	Metal Halide, (1) 400W lamp	0.458	$295.00	$82.00
(12) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.336	Metal Halide, (1) 750W lamp	0.850	$387.50	$127.50
(16) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.448	Metal Halide, (1) 1000W lamp	1.080	$530.00	$170.00
(18) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.88	Metal Halide, (1) 1000W lamp	1.080	$534.00	$174.00
(20) F32T8 48" 32W Lamps with a high efficiency, normal ballast factor electronic ballasts, high bay	0.755	Metal Halide, (1) 1000W lamp	1.080	$536.00	$178.00
(3) Fluorescent, 48" T-8 lamps, VHLO Ballasts	0.279	Metal Halide, (1) 400W lamp	0.458	$163.00	$7.00
(6) Fluorescent, 48" T-8 lamps, VHLO Ballasts	0.655	Metal Halide, (1) 750W lamp	0.850	$242.00	$28.00
(8) Fluorescent, 48" T-8 lamps, VHLO Ballasts	0.793	Metal Halide, (1) 1000W lamp	1.080	$334.00	$96.00
Screw-in CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 1-A 15W, no ballast	0.015	$8.78	$4.31
Screw-in CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 1-A 25W, no ballast	0.025	$8.78	$4.31
Screw-in CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 1-A 40W, no ballast	0.040	$8.78	$4.31
Screw-in CFL, 1-CF 9W, magnetic ballast	0.011	Incandescent, 3-A 15W, no ballast	0.045	$8.78	$4.31
Screw-in CFL, 1-CF 15W, magnetic ballast	0.017	Incandescent, 1-A 60W, no ballast	0.060	$8.78	$4.31

Screw-in CFL, 1-CF 15W, magnetic ballast	0.017	Incandescent, 1-PAR 65W, no ballast	0.065	$8.78	$4.31
Screw-in CFL, 1-CF 11W, magnetic ballast	0.013	Incandescent, 1-A 50W, no ballast	0.050	$8.78	$4.31
Screw-in CFL, 1-CF 11W, magnetic ballast	0.013	Incandescent, 2-A 25W, no ballast	0.050	$8.78	$4.31
Hard-Wired CFL, 2-PL 42W, 1 electronic ballast	0.060	Metal Halide, 100W, magnetic ballast	0.120	$53.42	$40.00
Hard-Wired CFL, 2-PL 32W, 1 electronic ballast	0.068	Mercury Vapor, 100W, magnetic ballast	0.125	$67.87	$50.00
Hard-Wired CFL, 2-PL 26W, 1 electronic ballast	0.052	Metal Halide, 70W, magnetic ballast	0.090	$79.37	$40.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 1-A 150W, no ballast	0.180	$112.24	$50.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 2-A 75W, no ballast	0.180	$112.24	$50.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 3-A 50W, no ballast	0.150	$112.24	$50.00
Hard-Wired CFL, 2-PL 23W, 2 magnetic ballasts	0.048	Incandescent, 3-A 60W, no ballast	0.180	$112.24	$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 2-A 150W, no ballast	0.300	$102.62	$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 3-A 100W, no ballast	0.300	$102.62	$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 2-PAR 150W, no ballast	0.300	$102.62	$50.00
Hard-Wired CFL, 2-2D 38W, 1 electronic ballast	0.074	Incandescent, 1-PS30 300W, no ballast	0.300	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 2-A 100W, no ballast	0.200	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 3-A 75W, no ballast	0.225	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 40W, no ballast	0.160	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 60W, no ballast	0.240	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 75W, no ballast	0.300	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 4-A 100W, no ballast	0.400	$102.62	$50.00
Hard-Wired CFL, 2-2D 28W, 1 electronic ballast	0.056	Incandescent, 1-PS30 200W, no ballast	0.200	$102.62	$50.00
Hard-Wired CFL, 1-PL 32W, magnetic ballast	0.003	Incandescent, 2-A 60W, no ballast	0.120	$78.35	$40.00
Hard-Wired CFL, 1-PL 32W, magnetic ballast	0.003	Incandescent, 3-A 40W, no ballast	0.120	$78.35	$40.00
Hard-Wired CFL, 1-PL 32W, magnetic ballast	0.003	Incandescent, 1-R 120W, no ballast	0.120	$78.35	$40.00
Hard-Wired CFL, 1-PL 32W, 1 electronic ballast	0.038	Metal Halide, 50W, magnetic ballast	0.062	$78.35	$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 1-A 100W, no ballast	0.100	$74.60	$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 2-A 50W, no ballast	0.100	$74.60	$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 1-R 100W, no ballast	0.100	$74.60	$40.00
Hard-Wired CFL, 1-PL 26W, magnetic ballast	0.027	Incandescent, 1-PAR 100W, no ballast	0.100	$74.60	$40.00
Hard-Wired CFL, 1-PL 23W, magnetic ballast	0.024	Incandescent, 2-A 40W, no ballast	0.080	$78.17	$40.00
Hard-Wired CFL, 1-PL 23W, magnetic ballast	0.024	Incandescent, 1-R 90W, no ballast	0.090	$78.17	$40.00
Hard-Wired CFL, 1-PL 23W, magnetic ballast	0.024	Incandescent, 1-PAR 85W, no ballast	0.085	$78.17	$40.00
Hard-Wired CFL, 1-PL 20W, magnetic ballast	0.022	Incandescent, 1-A 75W, no ballast	0.075	$78.17	$40.00
Hard-Wired CFL, 1-PL 20W, magnetic ballast	0.022	Incandescent, 1-R 75W, no ballast	0.075	$78.17	$40.00
Hard-Wired CFL, 1-PL 20W, magnetic ballast	0.022	Incandescent, 1-PAR 75W, no ballast	0.075	$78.17	$40.00
250W Metal Halide, magnetic ballast	0.291	Mercury Vapor, 400W, magnetic ballast	0.454		$181
175W Metal Halide, magnetic ballast	0.209	High Pressure Sodium, 250W, magnetic ballast	0.296		$181
400W Metal Halide, magnetic ballast	0.456	Mercury Vapor, 1000W, magnetic ballast	1.080		$ 253.00
150W Pulse Start Metal Halide, energy saving magnetic ballast	0.187	175W Metal Halide, magnetic ballast	0.209	$181	$30
175W Pulse Start Metal Halide, energy saving magnetic ballast	0.191	250W Metal Halide, magnetic ballast	0.291	$181	$30
200W Pulse Start Metal Halide, magnetic ballast	0.233	250W Metal Halide, magnetic ballast	0.291	$360	$30
320W Pulse Start Metal Halide, magnetic ballast	0.367	400W Metal Halide, magnetic ballast	0.456	$283	$30
360W Pulse Start Metal Halide, magnetic ballast	0.418	400W Metal Halide, magnetic ballast	0.456	$283	$30
750W Pulse Start Metal Halide, magnetic ballast	0.814	1000W Metal Halide, magnetic ballast	1.077	$381	$30
2W LED Exit Sign	0.003	30W Incandescent Exit Sign	0.03		$80.00
0.35W LEC Exit Sign	0.00025	40W Incandescent Exit Sign	0.04		$80.00
F32T8 25W Lamp on a standard efficiency, normal ballast factor ballast	0.0213	F32T8 32W Lamp on a standard efficiency, normal ballast factor ballast	0.0272	$4.00	$2.00
F32T8 28W Lamp on standard efficiency, normal ballast factor ballast	0.0238	F32T8 32W Lamp on a standard efficiency, normal ballast factor ballast	0.0272	$4.00	$2.00
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-R 75W	0.075	$192	$57
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-R 100W	0.100	$192	$137
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-R 120W	0.120	$192	$139
Ceramic Metal Halide, 1-PAR 39W, electronic ballast	0.045	Incandescent, 1-R 150W	0.150	$222	$168
Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.025	Incandescent, 1-PAR 100W	0.100	$192	$132
Ceramic Metal Halide, 1-PAR 39W, electronic ballast	0.045	Incandescent, 1-PAR 150W	0.150	$222	$181

Ceramic Metal Halide, 1-SE 20W, electronic ballast	0.026	Incandescent, 1-PAR 150W	0.150	$192	$132
Ceramic Metal Halide, 1-SE 150W, electronic ballast	0.168	Incandescent, 1-PS40 500W	0.900	$222	$152
Ceramic Metal Halide, 1-SE 175W, electronic ballast	0.189	250W Metal Halide, magnetic ballast	0.291	$131	$139
Ceramic Metal Halide, 1-SE 250W, electronic ballast	0.275	400W Metal Halide, magnetic ballast	0.456	$253	$37
Ceramic Metal Halide, 320W, electronic ballast	0.349	400W Metal Halide, magnetic ballast	0.456	$253	$292
Ceramic Metal Halide, 350W, electronic ballast	0.36	400W Metal Halide, magnetic ballast	0.456	$253	$292
Ceramic Metal Halide, 402W, electronic ballast	0.436	400W Metal Halide, magnetic ballast	0.456	$253	$296
No Lighting controls	1.00	no controls			$0.00
Occupancy Sensor - Wall Mount	0.70	Occupancy Sensor - Wall Mount			$56.00
Occupancy Sensor - Ceiling Mount	0.70	Occupancy Sensor - Ceiling Mount			$126.00
Daylighting - Continuous Dimming	0.70	Daylighting - Continuous Dimming			$66.00
Daylighting - Multiple Step Dimming	0.80	Daylighting - Multiple Step Dimming			$66.00
Daylighting - On/Off	0.90	Daylighting - On/Off			$85.00
High Efficiency Low Ballast Factor Electronic Ballasts	kW Sa	Standard Electronic Ballasts	kW Base		
1 Lamp T8 32W Fixture	0.025	1 Lamp T8 32W Fixture	0.031		$55.00
2 Lamp T8 32W Fixture	0.048	2 Lamp T8 32W Fixture	0.056		$56.00
3 Lamp T8 32W Fixture	0.072	3 Lamp T8 32W Fixture	0.085		$56.00
4 Lamp T8 32W Fixture	0.096	4 Lamp T8 32W Fixture	0.112		$56.00

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Motor Efficiency

Prescriptive rebates will be offered for new motors (Plan A) up to 500 hp and replacement of currently operating motors (Plan B) up to 500 hp, and installation of new variable frequency drives (VFD) up to 200 hp.

Algorithms:

Motor Electrical Energy Savings (Customer kWh)	= HP x LF_Motors x Conversion x (1/Standard_Eff - 1/ High_Eff) x Hrs
Motor Electrical Demand Savings (Customer kW)	= HP x LF_Motors x Conversion x (1/Standard_Eff - 1/ High_Eff)
VFD Drive Electrical Energy Savings (Customer kWh)	= HP x LF_Drives x Conversion x (1/Standard_Eff) x Hrs x %_Savings_Drives
VFD Drive Electrical Demand Savings (Customer kW)	= HP x LF_Drives x Conversion x (1/Standard_Eff) x %_Savings_Drives
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Hrs	= Annual operational hours per year of the motor. Deemed values are used for hours based on the type and use of the motor. The customer provides the following information on the rebate form (HP, Industrial/non industrial, building type, and pump/fan/other)
LF_Motors	= Motor load factor as percentage (0 - 100). The assumed value of 75% will be used for prescriptive motors. See Reference 3
LF_Drives	= Drive load factor as percentage (0 - 100). The assumed value of 75% will be used for prescriptive pumping drives and 65% will be used for prescriptive fan drives. (Reference 5)
HP	= Rated motor horsepower provided by customer on rebate form.
High_Eff	= Efficiency of high efficiency replacement motor as percentage (0-100). The customer will provide the model and serial number of the motor along with actual nameplate efficiency from the new motor. If the actual efficiency is not provided by the custom
Standard_Eff (Plan A motors and drives)	= Efficiency of standard replacement motor as percentage (0 - 100) we will use 'EPAct Efficiency' as specified in Table 1 based on customer provided motor size, speed, and type.
Standard_Eff (Plan B motors)	= Efficiency of existing motor (0 - 100). We will use efficiency of 'Existing Efficiency Motors', from Table 1.
%_Savings_Drives	= Average savings achieved by installing a variable frequency drive on a fan or pumping motor. 33% will be used for prescriptive drive rebates. (Reference 5)
Conversion	= Standard conversion from horsepower to kW. 1 HP = .746 kW

Coincidence Factor	= Probability that peak demand of the motor will coincide with peak utility system demand. 0.78 will be used for prescriptive rebates, see Reference 2.
Measure Life	= Length of time the motor/drive will be operational = 20 years, (Reference 3)
Baseline and incremental cost assumptions	= The customer will provide the model and serial number of the motor from that the size, type and rpm of the motor/drive will determine the deemed baseline cost or incremental cost from Table 1. (Reference 1, 3 and 6)
TDLF	A transmission distribution loss factor of 6.39% will be used. This is calculated using factors from Enhanced DSM Filing - SRD-2
NTG	Net-to-Gross factors - We will use 87% as the NTG for all motors programs (Reference 7)
Incremental operation and maintenance costs or savings	= 0 value assumed for this program

Provided by Customer:	Verified during M&V:
For Motors:	
New motor model and serial number (HP, efficiency, type, and speed can then be looked up in a database)	Yes
Application of motor (Industrial/non Industrial)	Yes
Building type where motor is installed for non industrial motors	Yes
Use of motor (pump, fan, other) for non industrial motors	Yes
Equipment is installed	Yes
For Variable Frequency Drives (VFD):	
Size, speed, type and use of motor drive is connected to	Yes
Application of motor (Industrial/non Industrial)	Yes
Building type where motor is installed for non industrial motors	Yes
Use of motor (pump, fan, other) for non industrial motors	Yes
Equipment is installed	Yes

Assumptions:
- Each motor is replaced with the same size on a 1 for 1 basis. Motors replaced with different sizes can participate in the Custom Efficiency program.
- Prescriptive rebates are only given for motors put into service, rebates are not given for backup motors.
- Prescriptive rebates are only given to variable frequency drives installed on pump or fan applications.
- Rebates do not apply to rewound or repaired motors.

Table 1. Excerpt from Deemed Plan A Tables: Motor Efficiency and Incremental Cost of Premium Efficiency Motor (Reference 1,2,3) Full table in "Deemed Plan A Tables" tab

Motor Tag	Standard or Premium Efficiency	HP	Speed (rpm)	Type (Open Drip Proof or Totally Enclosed Fan Cooled)	Efficiency	Incremental Cost
Premium Efficiency Motor 1 HP 1200 RPM ODP	Premium Efficiency Motor	1	1200	ODP	82.5%	$52
Existing Efficiency Motor 2 HP 1800 RPM ODP	Existing Efficiency Motor	2	1800	ODP	78.5%	-
Premium Efficiency Motor 25 HP 3600 RPM ODP	Premium Efficiency Motor	25	3600	ODP	91.7%	$ 1,030
Existing Efficiency Motor 5 HP 1800 RPM TEFC	Existing Efficiency Motor	5	1800	TEFC	83.2%	-

Table 2. Excerpt from Deemed Plan B Tables: Motor Efficiency and Incremental Cost of Premium Efficiency Motor (Reference 1,2,3) Full table in "Deemed Plan B Tables" tab

Motor Tag	Standard or Premium Efficiency	HP	Speed (rpm)	Type (Open Drip Proof or Totally Enclosed Fan Cooled)	Efficiency	Incremental Cost
Existing Efficiency Motor 1 HP 1200 RPM ODP	Existing Efficiency Motor	1	1200	ODP	76.3%	-
Premium Efficiency Motor 3 HP 1200 RPM ODP	Premium Efficiency Motor	3	1200	ODP	88.5%	$ 434.20
Existing Efficiency Motor 15 HP 1800 RPM TEFC	Existing Efficiency Motor	15	1800	TEFC	87.2%	-
Premium Efficiency Motor 75 HP 3600 RPM TEFC	Premium Efficiency Motor	75	3600	TEFC	93.6%	$ 4,305.60

Table 3: Excerpt of Operating Hours by Motor Size, Industrial Applications (Reference 4) Full table in "Deemed Plan A Tables" tab

HP	All SIC (Industrial)
1	2,745
25	4,067
100	5,329

Table 4: Excerpt of Operating Hours by Application, Non-Industrial (Reference 3) Full table in "Deemed Plan A Tables" tab

Building Type	Operating Hours
Office HVAC Pump	2,000
Retail Ventilation Fan	3,261
Hospitals Other Application	4,500

Table 5. Excerpt from Deemed ASD Tables tab showing incremental costs for ASDs (Reference 8)

HP	Average Installed price ($)
1	684
2	737
2	815
3	921
5	1,172

Table 6. Excerpt from Deemed Enhanced Cost Table tab showing incremental costs for Enhanced NEMA Premium Motors (Reference 9)

HP	Plan A Incremental Cost	Plan B Incremental Cost
1	$69	$402
1.5	$75	$442
2	$72	$472

Changes from 2008:
Prescriptive rebates will be offered for Plan A motors from 201-500 hp in addition to previously offered rebates for 1-200 hp.
Prescriptive rebates for Plan B motors have been added for 2009
Prescriptive rebates for Enhanced NEMA Premium motors have been added for 2009

References:

1. CEE (Consortium for Energy Efficiency) Premium Efficiency Motors Initiative - Source for premium motor efficiencies, EPAct Standard Motor Efficiencies and baseline/incremental costs

2. NYSERDA (New York State Energy Research and Development Authority), Energy $mart Programs Deemed Savings Database - Source for Coincidence Factor

3. Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life, Source for load factor (75%) and baseline/incremental costs

4. United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors and source for load factor (Table 1-18 and 1-19)

5. Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 Industrial facilities in 1997) - Source for VSD opportunity in the US market along with Load Factors for Fans and Pumps along with average savings.

6. NWPCC (Northwest Power Conservation Council) RTF's (Regional Technical Forum) Archived Measures - Source for full motor cost

7. Net-to-gross factor from Energy Efficiency Best Practices (http://www.eebestpractices.com)

8. Average cost for ASD information from Grainger (6/25/08) online

9. Assumed costs for Enhanced NEMA Premium motors are 10% higher than costs for NEMA Premium motors from Motor Master

Stipulated Values

Load Factor	0.75
Conversion	= .746 (1 HP = .746 kW)
Coincidence Factor	0.78

Table 1: Motor Efficiency and Incremental Cost of Premium Efficiency Motor (1), (2), (3)

Motor Tag	Standard or Premium Effic	HP	Speed	Type	Efficiency	Efficiency	Incremental Cost (NWPCC RTF)
Standard Efficiency Motor 1 HP 1200 RPM ODP	Standard Efficiency Motor	1	1200	ODP	80	80.0%	-
Standard Efficiency Motor 1.5 HP 1200 RPM ODP	Standard Efficiency Motor	1.5	1200	ODP	84	84.0%	-
Standard Efficiency Motor 2 HP 1200 RPM ODP	Standard Efficiency Motor	2	1200	ODP	85.5	85.5%	-
Standard Efficiency Motor 3 HP 1200 RPM ODP	Standard Efficiency Motor	3	1200	ODP	86.5	86.5%	-
Standard Efficiency Motor 5 HP 1200 RPM ODP	Standard Efficiency Motor	5	1200	ODP	87.5	87.5%	-
Standard Efficiency Motor 7.5 HP 1200 RPM ODP	Standard Efficiency Motor	7.5	1200	ODP	88.5	88.5%	-
Standard Efficiency Motor 10 HP 1200 RPM ODP	Standard Efficiency Motor	10	1200	ODP	90.2	90.2%	-
Standard Efficiency Motor 15 HP 1200 RPM ODP	Standard Efficiency Motor	15	1200	ODP	90.2	90.2%	-
Standard Efficiency Motor 20 HP 1200 RPM ODP	Standard Efficiency Motor	20	1200	ODP	91	91.0%	-
Standard Efficiency Motor 25 HP 1200 RPM ODP	Standard Efficiency Motor	25	1200	ODP	91.7	91.7%	-
Standard Efficiency Motor 30 HP 1200 RPM ODP	Standard Efficiency Motor	30	1200	ODP	92.4	92.4%	-
Standard Efficiency Motor 40 HP 1200 RPM ODP	Standard Efficiency Motor	40	1200	ODP	93	93.0%	-
Standard Efficiency Motor 50 HP 1200 RPM ODP	Standard Efficiency Motor	50	1200	ODP	93	93.0%	-
Standard Efficiency Motor 60 HP 1200 RPM ODP	Standard Efficiency Motor	60	1200	ODP	93.6	93.6%	-
Standard Efficiency Motor 75 HP 1200 RPM ODP	Standard Efficiency Motor	75	1200	ODP	93.6	93.6%	-
Standard Efficiency Motor 100 HP 1200 RPM ODP	Standard Efficiency Motor	100	1200	ODP	94.1	94.1%	-
Standard Efficiency Motor 125 HP 1200 RPM ODP	Standard Efficiency Motor	125	1200	ODP	94.1	94.1%	-
Standard Efficiency Motor 150 HP 1200 RPM ODP	Standard Efficiency Motor	150	1200	ODP	94.5	94.5%	-
Standard Efficiency Motor 200 HP 1200 RPM ODP	Standard Efficiency Motor	200	1200	ODP	94.5	94.5%	-
Standard Efficiency Motor 1 HP 1800 RPM ODP	Standard Efficiency Motor	1	1800	ODP	82.5	82.5%	-
Standard Efficiency Motor 1.5 HP 1800 RPM ODP	Standard Efficiency Motor	1.5	1800	ODP	84	84.0%	-
Standard Efficiency Motor 2 HP 1800 RPM ODP	Standard Efficiency Motor	2	1800	ODP	84	84.0%	-
Standard Efficiency Motor 3 HP 1800 RPM ODP	Standard Efficiency Motor	3	1800	ODP	86.5	86.5%	-
Standard Efficiency Motor 5 HP 1800 RPM ODP	Standard Efficiency Motor	5	1800	ODP	87.5	87.5%	-
Standard Efficiency Motor 7.5 HP 1800 RPM ODP	Standard Efficiency Motor	7.5	1800	ODP	88.5	88.5%	-
Standard Efficiency Motor 10 HP 1800 RPM ODP	Standard Efficiency Motor	10	1800	ODP	89.5	89.5%	-
Standard Efficiency Motor 15 HP 1800 RPM ODP	Standard Efficiency Motor	15	1800	ODP	91	91.0%	-
Standard Efficiency Motor 20 HP 1800 RPM ODP	Standard Efficiency Motor	20	1800	ODP	91	91.0%	-
Standard Efficiency Motor 25 HP 1800 RPM ODP	Standard Efficiency Motor	25	1800	ODP	91.7	91.7%	-
Standard Efficiency Motor 30 HP 1800 RPM ODP	Standard Efficiency Motor	30	1800	ODP	92.4	92.4%	-
Standard Efficiency Motor 40 HP 1800 RPM ODP	Standard Efficiency Motor	40	1800	ODP	93	93.0%	-
Standard Efficiency Motor 50 HP 1800 RPM ODP	Standard Efficiency Motor	50	1800	ODP	93	93.0%	-
Standard Efficiency Motor 60 HP 1800 RPM ODP	Standard Efficiency Motor	60	1800	ODP	93.6	93.6%	-
Standard Efficiency Motor 75 HP 1800 RPM ODP	Standard Efficiency Motor	75	1800	ODP	94.1	94.1%	-
Standard Efficiency Motor 100 HP 1800 RPM ODP	Standard Efficiency Motor	100	1800	ODP	94.1	94.1%	-
Standard Efficiency Motor 125 HP 1800 RPM ODP	Standard Efficiency Motor	125	1800	ODP	94.5	94.5%	-
Standard Efficiency Motor 150 HP 1800 RPM ODP	Standard Efficiency Motor	150	1800	ODP	95	95.0%	-
Standard Efficiency Motor 200 HP 1800 RPM ODP	Standard Efficiency Motor	200	1800	ODP	95	95.0%	-
Standard Efficiency Motor 1 HP 3600 RPM ODP	Standard Efficiency Motor	1	3600	ODP	N/A	N/A	-
Standard Efficiency Motor 1.5 HP 3600 RPM ODP	Standard Efficiency Motor	1.5	3600	ODP	82.5	82.5%	-
Standard Efficiency Motor 2 HP 3600 RPM ODP	Standard Efficiency Motor	2	3600	ODP	84	84.0%	-
Standard Efficiency Motor 3 HP 3600 RPM ODP	Standard Efficiency Motor	3	3600	ODP	84	84.0%	-
Standard Efficiency Motor 5 HP 3600 RPM ODP	Standard Efficiency Motor	5	3600	ODP	85.5	85.5%	-

Standard Efficiency Motor 7.5 HP 3600 RPM ODP	Standard Efficiency Motor	7.5	3600	ODP	87.5	87.5%	-
Standard Efficiency Motor 10 HP 3600 RPM ODP	Standard Efficiency Motor	10	3600	ODP	89.5	89.5%	-
Standard Efficiency Motor 15 HP 3600 RPM ODP	Standard Efficiency Motor	15	3600	ODP	89.5	89.5%	-
Standard Efficiency Motor 20 HP 3600 RPM ODP	Standard Efficiency Motor	20	3600	ODP	90.2	90.2%	-
Standard Efficiency Motor 25 HP 3600 RPM ODP	Standard Efficiency Motor	25	3600	ODP	91	91.0%	-
Standard Efficiency Motor 30 HP 3600 RPM ODP	Standard Efficiency Motor	30	3600	ODP	91	91.0%	-
Standard Efficiency Motor 40 HP 3600 RPM ODP	Standard Efficiency Motor	40	3600	ODP	91.7	91.7%	-
Standard Efficiency Motor 50 HP 3600 RPM ODP	Standard Efficiency Motor	50	3600	ODP	92.4	92.4%	-
Standard Efficiency Motor 60 HP 3600 RPM ODP	Standard Efficiency Motor	60	3600	ODP	93	93.0%	-
Standard Efficiency Motor 75 HP 3600 RPM ODP	Standard Efficiency Motor	75	3600	ODP	93	93.0%	-
Standard Efficiency Motor 100 HP 3600 RPM ODP	Standard Efficiency Motor	100	3600	ODP	93	93.0%	-
Standard Efficiency Motor 125 HP 3600 RPM ODP	Standard Efficiency Motor	125	3600	ODP	93.6	93.6%	-
Standard Efficiency Motor 150 HP 3600 RPM ODP	Standard Efficiency Motor	150	3600	ODP	93.6	93.6%	-
Standard Efficiency Motor 200 HP 3600 RPM ODP	Standard Efficiency Motor	200	3600	ODP	94.5	94.5%	-
Standard Efficiency Motor 1 HP 1200 RPM TEFC	Standard Efficiency Motor	1	1200	TEFC	80	80.0%	-
Standard Efficiency Motor 1.5 HP 1200 RPM TEFC	Standard Efficiency Motor	1.5	1200	TEFC	85.5	85.5%	-
Standard Efficiency Motor 2 HP 1200 RPM TEFC	Standard Efficiency Motor	2	1200	TEFC	86.5	86.5%	-
Standard Efficiency Motor 3 HP 1200 RPM TEFC	Standard Efficiency Motor	3	1200	TEFC	87.5	87.5%	-
Standard Efficiency Motor 5 HP 1200 RPM TEFC	Standard Efficiency Motor	5	1200	TEFC	87.5	87.5%	-
Standard Efficiency Motor 7.5 HP 1200 RPM TEFC	Standard Efficiency Motor	7.5	1200	TEFC	89.5	89.5%	-
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Standard Efficiency Motor 15 HP 1200 RPM TEFC	Standard Efficiency Motor	15	1200	TEFC	90.2	90.2%	-
Standard Efficiency Motor 20 HP 1200 RPM TEFC	Standard Efficiency Motor	20	1200	TEFC	90.2	90.2%	-
Standard Efficiency Motor 25 HP 1200 RPM TEFC	Standard Efficiency Motor	25	1200	TEFC	91.7	91.7%	-
Standard Efficiency Motor 30 HP 1200 RPM TEFC	Standard Efficiency Motor	30	1200	TEFC	91.7	91.7%	-
Standard Efficiency Motor 40 HP 1200 RPM TEFC	Standard Efficiency Motor	40	1200	TEFC	93	93.0%	-
Standard Efficiency Motor 50 HP 1200 RPM TEFC	Standard Efficiency Motor	50	1200	TEFC	93	93.0%	-
Standard Efficiency Motor 60 HP 1200 RPM TEFC	Standard Efficiency Motor	60	1200	TEFC	93.6	93.6%	-
Standard Efficiency Motor 75 HP 1200 RPM TEFC	Standard Efficiency Motor	75	1200	TEFC	93.6	93.6%	-
Standard Efficiency Motor 100 HP 1200 RPM TEFC	Standard Efficiency Motor	100	1200	TEFC	94.1	94.1%	-
Standard Efficiency Motor 125 HP 1200 RPM TEFC	Standard Efficiency Motor	125	1200	TEFC	94.1	94.1%	-
Standard Efficiency Motor 150 HP 1200 RPM TEFC	Standard Efficiency Motor	150	1200	TEFC	95	95.0%	-
Standard Efficiency Motor 200 HP 1200 RPM TEFC	Standard Efficiency Motor	200	1200	TEFC	95	95.0%	-
Standard Efficiency Motor 1 HP 1800 RPM TEFC	Standard Efficiency Motor	1	1800	TEFC	82.5	82.5%	-
Standard Efficiency Motor 1.5 HP 1800 RPM TEFC	Standard Efficiency Motor	1.5	1800	TEFC	84	84.0%	-
Standard Efficiency Motor 2 HP 1800 RPM TEFC	Standard Efficiency Motor	2	1800	TEFC	84	84.0%	-
Standard Efficiency Motor 3 HP 1800 RPM TEFC	Standard Efficiency Motor	3	1800	TEFC	87.5	87.5%	-
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Standard Efficiency Motor 100 HP 1800 RPM TEFC	Standard Efficiency Motor	100	1800	TEFC	94.5	94.5%	-
Standard Efficiency Motor 125 HP 1800 RPM TEFC	Standard Efficiency Motor	125	1800	TEFC	94.5	94.5%	-
Standard Efficiency Motor 150 HP 1800 RPM TEFC	Standard Efficiency Motor	150	1800	TEFC	95	95.0%	-
Standard Efficiency Motor 200 HP 1800 RPM TEFC	Standard Efficiency Motor	200	1800	TEFC	95	95.0%	-

Standard Efficiency Motor 1 HP 3600 RPM TEFC	Standard Efficiency Motor	1	3600	TEFC	75.5	75.5%	-
Standard Efficiency Motor 1.5 HP 3600 RPM TEFC	Standard Efficiency Motor	1.5	3600	TEFC	82.5	82.5%	-
Standard Efficiency Motor 2 HP 3600 RPM TEFC	Standard Efficiency Motor	2	3600	TEFC	84	84.0%	-
Standard Efficiency Motor 3 HP 3600 RPM TEFC	Standard Efficiency Motor	3	3600	TEFC	85.5	85.5%	-
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Premium Efficiency Motor 1 HP 1200 RPM ODP	Premium Efficiency Motor	1	1200	ODP	82.5	82.5%	$52
Premium Efficiency Motor 1.5 HP 1200 RPM ODP	Premium Efficiency Motor	1.5	1200	ODP	86.5	86.5%	$60
Premium Efficiency Motor 2 HP 1200 RPM ODP	Premium Efficiency Motor	2	1200	ODP	87.5	87.5%	$61
Premium Efficiency Motor 3 HP 1200 RPM ODP	Premium Efficiency Motor	3	1200	ODP	88.5	88.5%	$54
Premium Efficiency Motor 5 HP 1200 RPM ODP	Premium Efficiency Motor	5	1200	ODP	89.5	89.5%	$83
Premium Efficiency Motor 7.5 HP 1200 RPM ODP	Premium Efficiency Motor	7.5	1200	ODP	90.2	90.2%	$123
Premium Efficiency Motor 10 HP 1200 RPM ODP	Premium Efficiency Motor	10	1200	ODP	91.7	91.7%	$118
Premium Efficiency Motor 15 HP 1200 RPM ODP	Premium Efficiency Motor	15	1200	ODP	91.7	91.7%	$115
Premium Efficiency Motor 20 HP 1200 RPM ODP	Premium Efficiency Motor	20	1200	ODP	92.4	92.4%	$115
Premium Efficiency Motor 25 HP 1200 RPM ODP	Premium Efficiency Motor	25	1200	ODP	93	93.0%	$201
Premium Efficiency Motor 30 HP 1200 RPM ODP	Premium Efficiency Motor	30	1200	ODP	93.6	93.6%	$231
Premium Efficiency Motor 40 HP 1200 RPM ODP	Premium Efficiency Motor	40	1200	ODP	94.1	94.1%	$249
Premium Efficiency Motor 50 HP 1200 RPM ODP	Premium Efficiency Motor	50	1200	ODP	94.1	94.1%	$273
Premium Efficiency Motor 60 HP 1200 RPM ODP	Premium Efficiency Motor	60	1200	ODP	94.5	94.5%	$431
Premium Efficiency Motor 75 HP 1200 RPM ODP	Premium Efficiency Motor	75	1200	ODP	94.5	94.5%	$554
Premium Efficiency Motor 100 HP 1200 RPM ODP	Premium Efficiency Motor	100	1200	ODP	95	95.0%	$858
Premium Efficiency Motor 125 HP 1200 RPM ODP	Premium Efficiency Motor	125	1200	ODP	95	95.0%	$841
Premium Efficiency Motor 150 HP 1200 RPM ODP	Premium Efficiency Motor	150	1200	ODP	95.4	95.4%	$908
Premium Efficiency Motor 200 HP 1200 RPM ODP	Premium Efficiency Motor	200	1200	ODP	95.4	95.4%	$984
Premium Efficiency Motor 1 HP 1800 RPM ODP	Premium Efficiency Motor	1	1800	ODP	85.5	85.5%	$52
Premium Efficiency Motor 1.5 HP 1800 RPM ODP	Premium Efficiency Motor	1.5	1800	ODP	86.5	86.5%	$60
Premium Efficiency Motor 2 HP 1800 RPM ODP	Premium Efficiency Motor	2	1800	ODP	86.5	86.5%	$61
Premium Efficiency Motor 3 HP 1800 RPM ODP	Premium Efficiency Motor	3	1800	ODP	89.5	89.5%	$54
Premium Efficiency Motor 5 HP 1800 RPM ODP	Premium Efficiency Motor	5	1800	ODP	89.5	89.5%	$83
Premium Efficiency Motor 7.5 HP 1800 RPM ODP	Premium Efficiency Motor	7.5	1800	ODP	91	91.0%	$123
Premium Efficiency Motor 10 HP 1800 RPM ODP	Premium Efficiency Motor	10	1800	ODP	91.7	91.7%	$118
Premium Efficiency Motor 15 HP 1800 RPM ODP	Premium Efficiency Motor	15	1800	ODP	93	93.0%	$115
Premium Efficiency Motor 20 HP 1800 RPM ODP	Premium Efficiency Motor	20	1800	ODP	93	93.0%	$115
Premium Efficiency Motor 25 HP 1800 RPM ODP	Premium Efficiency Motor	25	1800	ODP	93.6	93.6%	$201
Premium Efficiency Motor 30 HP 1800 RPM ODP	Premium Efficiency Motor	30	1800	ODP	94.1	94.1%	$231
Premium Efficiency Motor 40 HP 1800 RPM ODP	Premium Efficiency Motor	40	1800	ODP	94.1	94.1%	$249
Premium Efficiency Motor 50 HP 1800 RPM ODP	Premium Efficiency Motor	50	1800	ODP	94.5	94.5%	$273
Premium Efficiency Motor 60 HP 1800 RPM ODP	Premium Efficiency Motor	60	1800	ODP	95	95.0%	$431

Premium Efficiency Motor 75 HP 1800 RPM ODP	Premium Efficiency Motor	75	1800	ODP	95	95.0%	$554
Premium Efficiency Motor 100 HP 1800 RPM ODP	Premium Efficiency Motor	100	1800	ODP	95.4	95.4%	$658
Premium Efficiency Motor 125 HP 1800 RPM ODP	Premium Efficiency Motor	125	1800	ODP	95.4	95.4%	$841
Premium Efficiency Motor 150 HP 1800 RPM ODP	Premium Efficiency Motor	150	1800	ODP	95.8	95.8%	$908
Premium Efficiency Motor 200 HP 1800 RPM ODP	Premium Efficiency Motor	200	1800	ODP	95.8	95.8%	$964
Premium Efficiency Motor 1 HP 3600 RPM ODP	Premium Efficiency Motor	1	3600	ODP	77	77.0%	$52
Premium Efficiency Motor 1.5 HP 3600 RPM ODP	Premium Efficiency Motor	1.5	3600	ODP	84	84.0%	$60
Premium Efficiency Motor 2 HP 3600 RPM ODP	Premium Efficiency Motor	2	3600	ODP	85.5	85.5%	$61
Premium Efficiency Motor 3 HP 3600 RPM ODP	Premium Efficiency Motor	3	3600	ODP	85.5	85.5%	$54
Premium Efficiency Motor 5 HP 3600 RPM ODP	Premium Efficiency Motor	5	3600	ODP	86.5	86.5%	$63
Premium Efficiency Motor 7.5 HP 3600 RPM ODP	Premium Efficiency Motor	7.5	3600	ODP	88.5	88.5%	$123
Premium Efficiency Motor 10 HP 3600 RPM ODP	Premium Efficiency Motor	10	3600	ODP	89.5	89.5%	$116
Premium Efficiency Motor 15 HP 3600 RPM ODP	Premium Efficiency Motor	15	3600	ODP	90.2	90.2%	$115
Premium Efficiency Motor 20 HP 3600 RPM ODP	Premium Efficiency Motor	20	3600	ODP	91	91.0%	$115
Premium Efficiency Motor 25 HP 3600 RPM ODP	Premium Efficiency Motor	25	3600	ODP	91.7	91.7%	$201
Premium Efficiency Motor 30 HP 3600 RPM ODP	Premium Efficiency Motor	30	3600	ODP	91.7	91.7%	$231
Premium Efficiency Motor 40 HP 3600 RPM ODP	Premium Efficiency Motor	40	3600	ODP	92.4	92.4%	$249
Premium Efficiency Motor 50 HP 3600 RPM ODP	Premium Efficiency Motor	50	3600	ODP	93	93.0%	$273
Premium Efficiency Motor 60 HP 3600 RPM ODP	Premium Efficiency Motor	60	3600	ODP	93.6	93.6%	$431
Premium Efficiency Motor 75 HP 3600 RPM ODP	Premium Efficiency Motor	75	3600	ODP	93.6	93.6%	$554
Premium Efficiency Motor 100 HP 3600 RPM ODP	Premium Efficiency Motor	100	3600	ODP	93.6	93.6%	$658
Premium Efficiency Motor 125 HP 3600 RPM ODP	Premium Efficiency Motor	125	3600	ODP	94.1	94.1%	$841
Premium Efficiency Motor 150 HP 3600 RPM ODP	Premium Efficiency Motor	150	3600	ODP	94.1	94.1%	$908
Premium Efficiency Motor 200 HP 3600 RPM ODP	Premium Efficiency Motor	200	3600	ODP	95	95.0%	$964
Premium Efficiency Motor 1 HP 1200 RPM TEFC	Premium Efficiency Motor	1	1200	TEFC	82.5	82.5%	$52
Premium Efficiency Motor 1.5 HP 1200 RPM TEFC	Premium Efficiency Motor	1.5	1200	TEFC	87.5	87.5%	$60
Premium Efficiency Motor 2 HP 1200 RPM TEFC	Premium Efficiency Motor	2	1200	TEFC	88.5	88.5%	$61
Premium Efficiency Motor 3 HP 1200 RPM TEFC	Premium Efficiency Motor	3	1200	TEFC	89.5	89.5%	$54
Premium Efficiency Motor 5 HP 1200 RPM TEFC	Premium Efficiency Motor	5	1200	TEFC	89.5	89.5%	$63
Premium Efficiency Motor 7.5 HP 1200 RPM TEFC	Premium Efficiency Motor	7.5	1200	TEFC	91	91.0%	$123
Premium Efficiency Motor 10 HP 1200 RPM TEFC	Premium Efficiency Motor	10	1200	TEFC	91	91.0%	$116
Premium Efficiency Motor 15 HP 1200 RPM TEFC	Premium Efficiency Motor	15	1200	TEFC	91.7	91.7%	$115
Premium Efficiency Motor 20 HP 1200 RPM TEFC	Premium Efficiency Motor	20	1200	TEFC	91.7	91.7%	$115
Premium Efficiency Motor 25 HP 1200 RPM TEFC	Premium Efficiency Motor	25	1200	TEFC	93	93.0%	$201
Premium Efficiency Motor 30 HP 1200 RPM TEFC	Premium Efficiency Motor	30	1200	TEFC	93	93.0%	$231
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Premium Efficiency Motor 60 HP 1200 RPM TEFC	Premium Efficiency Motor	60	1200	TEFC	94.5	94.5%	$431
Premium Efficiency Motor 75 HP 1200 RPM TEFC	Premium Efficiency Motor	75	1200	TEFC	94.5	94.5%	$554
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Premium Efficiency Motor 75 HP 1800 RPM TEFC	Premium Efficiency Motor	75	1800	TEFC	95.4	95.4%	$554
Premium Efficiency Motor 100 HP 1800 RPM TEFC	Premium Efficiency Motor	100	1800	TEFC	95.4	95.4%	$858
Premium Efficiency Motor 125 HP 1800 RPM TEFC	Premium Efficiency Motor	125	1800	TEFC	95.4	95.4%	$841
Premium Efficiency Motor 150 HP 1800 RPM TEFC	Premium Efficiency Motor	150	1800	TEFC	95.8	95.8%	$908
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Premium Efficiency Motor 150 HP 3600 RPM TEFC	Premium Efficiency Motor	150	3600	TEFC	95	95.0%	$908
Premium Efficiency Motor 200 HP 3600 RPM TEFC	Premium Efficiency Motor	200	3600	TEFC	95.4	95.4%	$964

Measure Life

	Measure Life =	20 years (2), (3)	20

Table 2: Operating Hours by Motor Size, Industrial Applications (4)

[illegible] HP	Annual Hours (Industrial)
1	2,745
1.5	2,745
2	2,745
3	2,745
5	2,745
7.5	3,391
10	3,391
15	3,391
20	3,391
25	4,067
30	4,067
40	4,067
50	4,067
60	5,329
75	5,329

100	5,329
125	5,200
150	5,200
200	5,200

Table 3: Operating Hours by Application, Non-Industrial (3)

Building Type	Operating Hours
Office HVAC Pump	2,000
Retail HVAC Pump	2,000
Hospitals HVAC Pump	2,754
Elem/Sec Schools HVAC Pump	2,190
Restaurant HVAC Pump	2,000
Warehouse HVAC Pump	2,241
Hotels/Motels HVAC Pump	4,231
Grocery HVAC Pump	2,080
Health HVAC Pump	2,559
College/Univ HVAC Pump	3,641
Office Ventilation Fan	6,192
Retail Ventilation Fan	3,281
Hospitals Ventilation Fan	8,374
Elem/Sec Schools Ventilation Fan	3,686
Restaurant Ventilation Fan	4,155
Warehouse Ventilation Fan	6,389
Hotels/Motels Ventilation Fan	3,719
Grocery Ventilation Fan	6,389
Health Ventilation Fan	2,000
College/Univ Ventilation Fan	3,631
Office Other Application	4500
Retail Other Application	4500
Hospitals Other Application	4500
Elem/Sec Schools Other Application	4500
Restaurant Other Application	4500
Warehouse Other Application	4500
Hotels/Motels Other Application	4500
Grocery Other Application	4500
Health Other Application	4500
College/Univ Other Application	4500

References

1 CEE (Consortium for Energy Efficiency) Premium Efficiency Motors Initative - Source for premium motor efficiencies and EPAct Standard Motor Efficiencies
2 NYSERDA (New York State Energy Research and Development Authority), Energy Smart Programs Deemed Savings Database
3 Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for non-industrial motors (p.15) and source for measure life and source for load factor (75%)
4 United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors and source for load factor (Table 1-18 and 1-19)

Stipulated Values

Load Factor	0.75
Conversion	= .746 (1 HP = .746 kW)
Coincidence Factor	0.76

Table 1: Motor Efficiency and Full Cost of Premium Efficiency Motor (2), (5), (1)

Motor Tag	Existing or Premium Efficiency	HP	Speed	Type	Efficiency	% Eff	Full Cost
Existing Efficiency Motor 1 HP 1200 RPM ODP	Existing Efficiency Motor	1	1200	ODP	76.3	76.3%	-
Existing Efficiency Motor 1.5 HP 1200 RPM ODP	Existing Efficiency Motor	1.5	1200	ODP	77.4	77.4%	-
Existing Efficiency Motor 2 HP 1200 RPM ODP	Existing Efficiency Motor	2	1200	ODP	78.5	78.5%	-
Existing Efficiency Motor 3 HP 1200 RPM ODP	Existing Efficiency Motor	3	1200	ODP	80.6	80.6%	-
Existing Efficiency Motor 5 HP 1200 RPM ODP	Existing Efficiency Motor	5	1200	ODP	83.2	83.2%	-
Existing Efficiency Motor 7.5 HP 1200 RPM ODP	Existing Efficiency Motor	7.5	1200	ODP	85.3	85.3%	-
Existing Efficiency Motor 10 HP 1200 RPM ODP	Existing Efficiency Motor	10	1200	ODP	86.3	86.3%	-
Existing Efficiency Motor 15 HP 1200 RPM ODP	Existing Efficiency Motor	15	1200	ODP	87.2	87.2%	-
Existing Efficiency Motor 20 HP 1200 RPM ODP	Existing Efficiency Motor	20	1200	ODP	88.1	88.1%	-
Existing Efficiency Motor 25 HP 1200 RPM ODP	Existing Efficiency Motor	25	1200	ODP	88.9	88.9%	-
Existing Efficiency Motor 30 HP 1200 RPM ODP	Existing Efficiency Motor	30	1200	ODP	89.4	89.4%	-
Existing Efficiency Motor 40 HP 1200 RPM ODP	Existing Efficiency Motor	40	1200	ODP	89.7	89.7%	-
Existing Efficiency Motor 50 HP 1200 RPM ODP	Existing Efficiency Motor	50	1200	ODP	89.9	89.9%	-
Existing Efficiency Motor 60 HP 1200 RPM ODP	Existing Efficiency Motor	60	1200	ODP	90.4	90.4%	-
Existing Efficiency Motor 75 HP 1200 RPM ODP	Existing Efficiency Motor	75	1200	ODP	90.9	90.9%	-
Existing Efficiency Motor 100 HP 1200 RPM ODP	Existing Efficiency Motor	100	1200	ODP	90.9	90.9%	-
Existing Efficiency Motor 125 HP 1200 RPM ODP	Existing Efficiency Motor	125	1200	ODP	91.3	91.3%	-
Existing Efficiency Motor 150 HP 1200 RPM ODP	Existing Efficiency Motor	150	1200	ODP	91.7	91.7%	-
Existing Efficiency Motor 200 HP 1200 RPM ODP	Existing Efficiency Motor	200	1200	ODP	92.5	92.5%	-
Existing Efficiency Motor 1 HP 1800 RPM ODP	Existing Efficiency Motor	1	1800	ODP	76.3	76.3%	-
Existing Efficiency Motor 1.5 HP 1800 RPM ODP	Existing Efficiency Motor	1.5	1800	ODP	77.4	77.4%	-
Existing Efficiency Motor 2 HP 1800 RPM ODP	Existing Efficiency Motor	2	1800	ODP	78.5	78.5%	-
Existing Efficiency Motor 3 HP 1800 RPM ODP	Existing Efficiency Motor	3	1800	ODP	80.6	80.6%	-
Existing Efficiency Motor 5 HP 1800 RPM ODP	Existing Efficiency Motor	5	1800	ODP	83.2	83.2%	-
Existing Efficiency Motor 7.5 HP 1800 RPM ODP	Existing Efficiency Motor	7.5	1800	ODP	85.3	85.3%	-
Existing Efficiency Motor 10 HP 1800 RPM ODP	Existing Efficiency Motor	10	1800	ODP	86.3	86.3%	-
Existing Efficiency Motor 15 HP 1800 RPM ODP	Existing Efficiency Motor	15	1800	ODP	87.2	87.2%	-
Existing Efficiency Motor 20 HP 1800 RPM ODP	Existing Efficiency Motor	20	1800	ODP	88.1	88.1%	-
Existing Efficiency Motor 25 HP 1800 RPM ODP	Existing Efficiency Motor	25	1800	ODP	88.9	88.9%	-
Existing Efficiency Motor 30 HP 1800 RPM ODP	Existing Efficiency Motor	30	1800	ODP	89.4	89.4%	-
Existing Efficiency Motor 40 HP 1800 RPM ODP	Existing Efficiency Motor	40	1800	ODP	89.7	89.7%	-
Existing Efficiency Motor 50 HP 1800 RPM ODP	Existing Efficiency Motor	50	1800	ODP	89.9	89.9%	-
Existing Efficiency Motor 60 HP 1800 RPM ODP	Existing Efficiency Motor	60	1800	ODP	90.4	90.4%	-
Existing Efficiency Motor 75 HP 1800 RPM ODP	Existing Efficiency Motor	75	1800	ODP	90.9	90.9%	-
Existing Efficiency Motor 100 HP 1800 RPM ODP	Existing Efficiency Motor	100	1800	ODP	90.9	90.9%	-
Existing Efficiency Motor 125 HP 1800 RPM ODP	Existing Efficiency Motor	125	1800	ODP	91.3	91.3%	-
Existing Efficiency Motor 150 HP 1800 RPM ODP	Existing Efficiency Motor	150	1800	ODP	91.7	91.7%	-
Existing Efficiency Motor 200 HP 1800 RPM ODP	Existing Efficiency Motor	200	1800	ODP	92.5	92.5%	-
Existing Efficiency Motor 1 HP 3600 RPM ODP	Existing Efficiency Motor	1	3600	ODP	76.3	76.3%	-
Existing Efficiency Motor 1.5 HP 3600 RPM ODP	Existing Efficiency Motor	1.5	3600	ODP	77.4	77.4%	-
Existing Efficiency Motor 2 HP 3600 RPM ODP	Existing Efficiency Motor	2	3600	ODP	78.5	78.5%	-
Existing Efficiency Motor 3 HP 3600 RPM ODP	Existing Efficiency Motor	3	3600	ODP	80.6	80.6%	-
Existing Efficiency Motor 5 HP 3600 RPM ODP	Existing Efficiency Motor	5	3600	ODP	83.2	83.2%	-
Existing Efficiency Motor 7.5 HP 3600 RPM ODP	Existing Efficiency Motor	7.5	3600	ODP	85.3	85.3%	-
Existing Efficiency Motor 10 HP 3600 RPM ODP	Existing Efficiency Motor	10	3600	ODP	86.3	86.3%	-

Existing Efficiency Motor 15 HP 3600 RPM ODP	Existing Efficiency Motor	15	3600	ODP	87.2	87.2%	-
Existing Efficiency Motor 20 HP 3600 RPM ODP	Existing Efficiency Motor	20	3600	ODP	88.1	88.1%	-
Existing Efficiency Motor 25 HP 3600 RPM ODP	Existing Efficiency Motor	25	3600	ODP	88.9	88.9%	-
Existing Efficiency Motor 30 HP 3600 RPM ODP	Existing Efficiency Motor	30	3600	ODP	89.4	89.4%	-
Existing Efficiency Motor 40 HP 3600 RPM ODP	Existing Efficiency Motor	40	3600	ODP	89.7	89.7%	-
Existing Efficiency Motor 50 HP 3600 RPM ODP	Existing Efficiency Motor	50	3600	ODP	89.9	89.9%	-
Existing Efficiency Motor 60 HP 3600 RPM ODP	Existing Efficiency Motor	60	3600	ODP	90.4	90.4%	-
Existing Efficiency Motor 75 HP 3600 RPM ODP	Existing Efficiency Motor	75	3600	ODP	90.9	90.9%	-
Existing Efficiency Motor 100 HP 3600 RPM ODP	Existing Efficiency Motor	100	3600	ODP	90.9	90.9%	-
Existing Efficiency Motor 125 HP 3600 RPM ODP	Existing Efficiency Motor	125	3600	ODP	91.3	91.3%	-
Existing Efficiency Motor 150 HP 3600 RPM ODP	Existing Efficiency Motor	150	3600	ODP	91.7	91.7%	-
Existing Efficiency Motor 200 HP 3600 RPM ODP	Existing Efficiency Motor	200	3600	ODP	92.5	92.5%	-
Existing Efficiency Motor 1 HP 1200 RPM TEFC	Existing Efficiency Motor	1	1200	TEFC	76.3	76.3%	-
Existing Efficiency Motor 1.5 HP 1200 RPM TEFC	Existing Efficiency Motor	1.5	1200	TEFC	77.4	77.4%	-
Existing Efficiency Motor 2 HP 1200 RPM TEFC	Existing Efficiency Motor	2	1200	TEFC	78.5	78.5%	-
Existing Efficiency Motor 3 HP 1200 RPM TEFC	Existing Efficiency Motor	3	1200	TEFC	80.6	80.6%	-
Existing Efficiency Motor 5 HP 1200 RPM TEFC	Existing Efficiency Motor	5	1200	TEFC	83.2	83.2%	-
Existing Efficiency Motor 7.5 HP 1200 RPM TEFC	Existing Efficiency Motor	7.5	1200	TEFC	85.3	85.3%	-
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Existing Efficiency Motor 40 HP 1200 RPM TEFC	Existing Efficiency Motor	40	1200	TEFC	89.7	89.7%	-
Existing Efficiency Motor 50 HP 1200 RPM TEFC	Existing Efficiency Motor	50	1200	TEFC	89.9	89.9%	-
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Existing Efficiency Motor 75 HP 1200 RPM TEFC	Existing Efficiency Motor	75	1200	TEFC	90.9	90.9%	-
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Existing Efficiency Motor 15 HP 3600 RPM TEFC	Existing Efficiency Motor	15	3600	TEFC	87.2	87.2%	-	
Existing Efficiency Motor 20 HP 3600 RPM TEFC	Existing Efficiency Motor	20	3600	TEFC	88.1	88.1%	-	
Existing Efficiency Motor 25 HP 3600 RPM TEFC	Existing Efficiency Motor	25	3600	TEFC	88.9	88.9%	-	
Existing Efficiency Motor 30 HP 3600 RPM TEFC	Existing Efficiency Motor	30	3600	TEFC	89.4	89.4%	-	
Existing Efficiency Motor 40 HP 3600 RPM TEFC	Existing Efficiency Motor	40	3600	TEFC	89.7	89.7%	-	
Existing Efficiency Motor 50 HP 3600 RPM TEFC	Existing Efficiency Motor	50	3600	TEFC	89.9	89.9%	-	
Existing Efficiency Motor 60 HP 3600 RPM TEFC	Existing Efficiency Motor	60	3600	TEFC	90.4	90.4%	-	
Existing Efficiency Motor 75 HP 3600 RPM TEFC	Existing Efficiency Motor	75	3600	TEFC	90.9	90.9%	-	
Existing Efficiency Motor 100 HP 3600 RPM TEFC	Existing Efficiency Motor	100	3600	TEFC	90.9	90.9%	-	
Existing Efficiency Motor 125 HP 3600 RPM TEFC	Existing Efficiency Motor	125	3600	TEFC	91.3	91.3%	-	
Existing Efficiency Motor 150 HP 3600 RPM TEFC	Existing Efficiency Motor	150	3600	TEFC	91.7	91.7%	-	
Existing Efficiency Motor 200 HP 3600 RPM TEFC	Existing Efficiency Motor	200	3600	TEFC	92.5	92.5%	-	
Premium Efficiency Motor 1 HP 1200 RPM ODP	Premium Efficiency Motor	1	1200	ODP	82.5	82.5%	$	271.00
Premium Efficiency Motor 1.5 HP 1200 RPM ODP	Premium Efficiency Motor	1.5	1200	ODP	86.5	86.5%	$	300.05
Premium Efficiency Motor 2 HP 1200 RPM ODP	Premium Efficiency Motor	2	1200	ODP	87.5	87.5%	$	327.90
Premium Efficiency Motor 3 HP 1200 RPM ODP	Premium Efficiency Motor	3	1200	ODP	88.5	88.5%	$	434.20
Premium Efficiency Motor 5 HP 1200 RPM ODP	Premium Efficiency Motor	5	1200	ODP	89.5	89.5%	$	548.45
Premium Efficiency Motor 7.5 HP 1200 RPM ODP	Premium Efficiency Motor	7.5	1200	ODP	90.2	90.2%	$	682.75
Premium Efficiency Motor 10 HP 1200 RPM ODP	Premium Efficiency Motor	10	1200	ODP	91.7	91.7%	$	803.45
Premium Efficiency Motor 15 HP 1200 RPM ODP	Premium Efficiency Motor	15	1200	ODP	91.7	91.7%	$	1,041.80
Premium Efficiency Motor 20 HP 1200 RPM ODP	Premium Efficiency Motor	20	1200	ODP	92.4	92.4%	$	1,250.90
Premium Efficiency Motor 25 HP 1200 RPM ODP	Premium Efficiency Motor	25	1200	ODP	93	93.0%	$	1,532.15
Premium Efficiency Motor 30 HP 1200 RPM ODP	Premium Efficiency Motor	30	1200	ODP	93.6	93.6%	$	1,660.00
Premium Efficiency Motor 40 HP 1200 RPM ODP	Premium Efficiency Motor	40	1200	ODP	94.1	94.1%	$	2,409.25
Premium Efficiency Motor 50 HP 1200 RPM ODP	Premium Efficiency Motor	50	1200	ODP	94.1	94.1%	$	2,794.30
Premium Efficiency Motor 60 HP 1200 RPM ODP	Premium Efficiency Motor	60	1200	ODP	94.5	94.5%	$	3,338.80
Premium Efficiency Motor 75 HP 1200 RPM ODP	Premium Efficiency Motor	75	1200	ODP	94.5	94.5%	$	3,923.40
Premium Efficiency Motor 100 HP 1200 RPM ODP	Premium Efficiency Motor	100	1200	ODP	95	95.0%	$	4,700.60
Premium Efficiency Motor 125 HP 1200 RPM ODP	Premium Efficiency Motor	125	1200	ODP	95	95.0%	$	5,410.20
Premium Efficiency Motor 150 HP 1200 RPM ODP	Premium Efficiency Motor	150	1200	ODP	95.4	95.4%	$	6,106.55
Premium Efficiency Motor 200 HP 1200 RPM ODP	Premium Efficiency Motor	200	1200	ODP	95.4	95.4%	$	8,231.25
Premium Efficiency Motor 1 HP 1800 RPM ODP	Premium Efficiency Motor	1	1800	ODP	85.5	85.5%	$	243.70
Premium Efficiency Motor 1.5 HP 1800 RPM ODP	Premium Efficiency Motor	1.5	1800	ODP	86.5	86.5%	$	248.05
Premium Efficiency Motor 2 HP 1800 RPM ODP	Premium Efficiency Motor	2	1800	ODP	86.5	86.5%	$	279.05
Premium Efficiency Motor 3 HP 1800 RPM ODP	Premium Efficiency Motor	3	1800	ODP	89.5	89.5%	$	293.15
Premium Efficiency Motor 5 HP 1800 RPM ODP	Premium Efficiency Motor	5	1800	ODP	89.5	89.5%	$	337.15
Premium Efficiency Motor 7.5 HP 1800 RPM ODP	Premium Efficiency Motor	7.5	1800	ODP	91	91.0%	$	466.95
Premium Efficiency Motor 10 HP 1800 RPM ODP	Premium Efficiency Motor	10	1800	ODP	91.7	91.7%	$	533.70
Premium Efficiency Motor 15 HP 1800 RPM ODP	Premium Efficiency Motor	15	1800	ODP	93	93.0%	$	701.20
Premium Efficiency Motor 20 HP 1800 RPM ODP	Premium Efficiency Motor	20	1800	ODP	93	93.0%	$	881.05
Premium Efficiency Motor 25 HP 1800 RPM ODP	Premium Efficiency Motor	25	1800	ODP	93.6	93.6%	$	1,027.10
Premium Efficiency Motor 30 HP 1800 RPM ODP	Premium Efficiency Motor	30	1800	ODP	94.1	94.1%	$	1,151.70
Premium Efficiency Motor 40 HP 1800 RPM ODP	Premium Efficiency Motor	40	1800	ODP	94.1	94.1%	$	1,464.15
Premium Efficiency Motor 50 HP 1800 RPM ODP	Premium Efficiency Motor	50	1800	ODP	94.5	94.5%	$	2,033.15
Premium Efficiency Motor 60 HP 1800 RPM ODP	Premium Efficiency Motor	60	1800	ODP	95	95.0%	$	2,017.15
Premium Efficiency Motor 75 HP 1800 RPM ODP	Premium Efficiency Motor	75	1800	ODP	95	95.0%	$	2,360.15
Premium Efficiency Motor 100 HP 1800 RPM ODP	Premium Efficiency Motor	100	1800	ODP	95.4	95.4%	$	3,106.80

Premium Efficiency Motor 125 HP 1800 RPM ODP	Premium Efficiency Motor	125	1800	ODP	95.4	95.4%	$	3,566.15
Premium Efficiency Motor 150 HP 1800 RPM ODP	Premium Efficiency Motor	150	1800	ODP	95.8	95.8%	$	5,135.50
Premium Efficiency Motor 200 HP 1800 RPM ODP	Premium Efficiency Motor	200	1800	ODP	95.8	95.8%	$	6,129.15
Premium Efficiency Motor 1 HP 3600 RPM ODP	Premium Efficiency Motor	1	3600	ODP	77	77.0%	$	50.00
Premium Efficiency Motor 1.5 HP 3600 RPM ODP	Premium Efficiency Motor	1.5	3600	ODP	84	84.0%	$	240.90
Premium Efficiency Motor 2 HP 3600 RPM ODP	Premium Efficiency Motor	2	3600	ODP	85.5	85.5%	$	273.85
Premium Efficiency Motor 3 HP 3600 RPM ODP	Premium Efficiency Motor	3	3600	ODP	85.5	85.5%	$	295.10
Premium Efficiency Motor 5 HP 3600 RPM ODP	Premium Efficiency Motor	5	3600	ODP	86.5	86.5%	$	344.30
Premium Efficiency Motor 7.5 HP 3600 RPM ODP	Premium Efficiency Motor	7.5	3600	ODP	88.5	88.5%	$	453.30
Premium Efficiency Motor 10 HP 3600 RPM ODP	Premium Efficiency Motor	10	3600	ODP	89.5	89.5%	$	544.75
Premium Efficiency Motor 15 HP 3600 RPM ODP	Premium Efficiency Motor	15	3600	ODP	90.2	90.2%	$	695.35
Premium Efficiency Motor 20 HP 3600 RPM ODP	Premium Efficiency Motor	20	3600	ODP	91	91.0%	$	831.65
Premium Efficiency Motor 25 HP 3600 RPM ODP	Premium Efficiency Motor	25	3600	ODP	91.7	91.7%	$	1,030.35
Premium Efficiency Motor 30 HP 3600 RPM ODP	Premium Efficiency Motor	30	3600	ODP	91.7	91.7%	$	1,142.80
Premium Efficiency Motor 40 HP 3600 RPM ODP	Premium Efficiency Motor	40	3600	ODP	92.4	92.4%	$	1,475.85
Premium Efficiency Motor 50 HP 3600 RPM ODP	Premium Efficiency Motor	50	3600	ODP	93	93.0%	$	1,741.95
Premium Efficiency Motor 60 HP 3600 RPM ODP	Premium Efficiency Motor	60	3600	ODP	93.6	93.6%	$	2,105.55
Premium Efficiency Motor 75 HP 3600 RPM ODP	Premium Efficiency Motor	75	3600	ODP	93.6	93.6%	$	2,816.90
Premium Efficiency Motor 100 HP 3600 RPM ODP	Premium Efficiency Motor	100	3600	ODP	93.6	93.6%	$	3,310.90
Premium Efficiency Motor 125 HP 3600 RPM ODP	Premium Efficiency Motor	125	3600	ODP	94.1	94.1%	$	4,188.25
Premium Efficiency Motor 150 HP 3600 RPM ODP	Premium Efficiency Motor	150	3600	ODP	94.1	94.1%	$	5,258.40
Premium Efficiency Motor 200 HP 3600 RPM ODP	Premium Efficiency Motor	200	3600	ODP	95	95.0%	$	7,455.60
Premium Efficiency Motor 1 HP 1200 RPM TEFC	Premium Efficiency Motor	1	1200	TEFC	82.5	82.5%	$	373.70
Premium Efficiency Motor 1.5 HP 1200 RPM TEFC	Premium Efficiency Motor	1.5	1200	TEFC	87.5	87.5%	$	435.25
Premium Efficiency Motor 2 HP 1200 RPM TEFC	Premium Efficiency Motor	2	1200	TEFC	88.5	88.5%	$	468.40
Premium Efficiency Motor 3 HP 1200 RPM TEFC	Premium Efficiency Motor	3	1200	TEFC	89.5	89.5%	$	593.45
Premium Efficiency Motor 5 HP 1200 RPM TEFC	Premium Efficiency Motor	5	1200	TEFC	89.5	89.5%	$	736.90
Premium Efficiency Motor 7.5 HP 1200 RPM TEFC	Premium Efficiency Motor	7.5	1200	TEFC	91	91.0%	$	860.20
Premium Efficiency Motor 10 HP 1200 RPM TEFC	Premium Efficiency Motor	10	1200	TEFC	91	91.0%	$	1,129.75
Premium Efficiency Motor 15 HP 1200 RPM TEFC	Premium Efficiency Motor	15	1200	TEFC	91.7	91.7%	$	1,566.35
Premium Efficiency Motor 20 HP 1200 RPM TEFC	Premium Efficiency Motor	20	1200	TEFC	91.7	91.7%	$	1,803.40
Premium Efficiency Motor 25 HP 1200 RPM TEFC	Premium Efficiency Motor	25	1200	TEFC	93	93.0%	$	2,158.75
Premium Efficiency Motor 30 HP 1200 RPM TEFC	Premium Efficiency Motor	30	1200	TEFC	93	93.0%	$	2,366.80
Premium Efficiency Motor 40 HP 1200 RPM TEFC	Premium Efficiency Motor	40	1200	TEFC	94.1	94.1%	$	3,318.00
Premium Efficiency Motor 50 HP 1200 RPM TEFC	Premium Efficiency Motor	50	1200	TEFC	94.1	94.1%	$	3,651.00
Premium Efficiency Motor 60 HP 1200 RPM TEFC	Premium Efficiency Motor	60	1200	TEFC	94.5	94.5%	$	4,203.75
Premium Efficiency Motor 75 HP 1200 RPM TEFC	Premium Efficiency Motor	75	1200	TEFC	94.5	94.5%	$	5,024.50
Premium Efficiency Motor 100 HP 1200 RPM TEFC	Premium Efficiency Motor	100	1200	TEFC	95	95.0%	$	7,197.25
Premium Efficiency Motor 125 HP 1200 RPM TEFC	Premium Efficiency Motor	125	1200	TEFC	95	95.0%	$	8,244.20
Premium Efficiency Motor 150 HP 1200 RPM TEFC	Premium Efficiency Motor	150	1200	TEFC	95.8	95.8%	$	9,028.35
Premium Efficiency Motor 200 HP 1200 RPM TEFC	Premium Efficiency Motor	200	1200	TEFC	95.8	95.8%	$	11,508.55
Premium Efficiency Motor 1 HP 1800 RPM TEFC	Premium Efficiency Motor	1	1800	TEFC	85.5	85.5%	$	271.65
Premium Efficiency Motor 1.5 HP 1800 RPM TEFC	Premium Efficiency Motor	1.5	1800	TEFC	86.5	86.5%	$	342.95
Premium Efficiency Motor 2 HP 1800 RPM TEFC	Premium Efficiency Motor	2	1800	TEFC	86.5	86.5%	$	364.20
Premium Efficiency Motor 3 HP 1800 RPM TEFC	Premium Efficiency Motor	3	1800	TEFC	89.5	89.5%	$	390.00
Premium Efficiency Motor 5 HP 1800 RPM TEFC	Premium Efficiency Motor	5	1800	TEFC	89.5	89.5%	$	452.85
Premium Efficiency Motor 7.5 HP 1800 RPM TEFC	Premium Efficiency Motor	7.5	1800	TEFC	91.7	91.7%	$	621.85
Premium Efficiency Motor 10 HP 1800 RPM TEFC	Premium Efficiency Motor	10	1800	TEFC	91.7	91.7%	$	899.45
Premium Efficiency Motor 15 HP 1800 RPM TEFC	Premium Efficiency Motor	15	1800	TEFC	92.4	92.4%	$	928.05
Premium Efficiency Motor 20 HP 1800 RPM TEFC	Premium Efficiency Motor	20	1800	TEFC	93	93.0%	$	1,011.70
Premium Efficiency Motor 25 HP 1800 RPM TEFC	Premium Efficiency Motor	25	1800	TEFC	93.6	93.6%	$	1,396.90
Premium Efficiency Motor 30 HP 1800 RPM TEFC	Premium Efficiency Motor	30	1800	TEFC	93.6	93.6%	$	1,576.80

Premium Efficiency Motor 40 HP 1800 RPM TEFC	Premium Efficiency Motor	40	1800	TEFC	94.1	94.1%	$ 2,176.55
Premium Efficiency Motor 50 HP 1800 RPM TEFC	Premium Efficiency Motor	50	1800	TEFC	94.5	94.5%	$ 2,477.75
Premium Efficiency Motor 60 HP 1800 RPM TEFC	Premium Efficiency Motor	60	1800	TEFC	95	95.0%	$ 3,366.55
Premium Efficiency Motor 75 HP 1800 RPM TEFC	Premium Efficiency Motor	75	1800	TEFC	95.4	95.4%	$ 3,843.45
Premium Efficiency Motor 100 HP 1800 RPM TEFC	Premium Efficiency Motor	100	1800	TEFC	95.4	95.4%	$ 4,667.90
Premium Efficiency Motor 125 HP 1800 RPM TEFC	Premium Efficiency Motor	125	1800	TEFC	95.4	95.4%	$ 6,874.00
Premium Efficiency Motor 150 HP 1800 RPM TEFC	Premium Efficiency Motor	150	1800	TEFC	95.8	95.8%	$ 7,723.15
Premium Efficiency Motor 200 HP 1800 RPM TEFC	Premium Efficiency Motor	200	1800	TEFC	96.2	96.2%	$ 9,316.10
Premium Efficiency Motor 1 HP 3600 RPM TEFC	Premium Efficiency Motor	1	3600	TEFC	77	77.0%	$ 252.15
Premium Efficiency Motor 1.5 HP 3600 RPM TEFC	Premium Efficiency Motor	1.5	3600	TEFC	84	84.0%	$ 301.35
Premium Efficiency Motor 2 HP 3600 RPM TEFC	Premium Efficiency Motor	2	3600	TEFC	85.5	85.5%	$ 345.35
Premium Efficiency Motor 3 HP 3600 RPM TEFC	Premium Efficiency Motor	3	3600	TEFC	86.5	86.5%	$ 400.40
Premium Efficiency Motor 5 HP 3600 RPM TEFC	Premium Efficiency Motor	5	3600	TEFC	88.5	88.5%	$ 502.90
Premium Efficiency Motor 7.5 HP 3600 RPM TEFC	Premium Efficiency Motor	7.5	3600	TEFC	89.5	89.5%	$ 643.10
Premium Efficiency Motor 10 HP 3600 RPM TEFC	Premium Efficiency Motor	10	3600	TEFC	90.2	90.2%	$ 683.85
Premium Efficiency Motor 15 HP 3600 RPM TEFC	Premium Efficiency Motor	15	3600	TEFC	91	91.0%	$ 914.40
Premium Efficiency Motor 20 HP 3600 RPM TEFC	Premium Efficiency Motor	20	3600	TEFC	91	91.0%	$ 1,143.00
Premium Efficiency Motor 25 HP 3600 RPM TEFC	Premium Efficiency Motor	25	3600	TEFC	91.7	91.7%	$ 1,338.50
Premium Efficiency Motor 30 HP 3600 RPM TEFC	Premium Efficiency Motor	30	3600	TEFC	91.7	91.7%	$ 1,598.25
Premium Efficiency Motor 40 HP 3600 RPM TEFC	Premium Efficiency Motor	40	3600	TEFC	92.4	92.4%	$ 2,117.40
Premium Efficiency Motor 50 HP 3600 RPM TEFC	Premium Efficiency Motor	50	3600	TEFC	93	93.0%	$ 2,553.15
Premium Efficiency Motor 60 HP 3600 RPM TEFC	Premium Efficiency Motor	60	3600	TEFC	93.6	93.6%	$ 3,550.50
Premium Efficiency Motor 75 HP 3600 RPM TEFC	Premium Efficiency Motor	75	3600	TEFC	93.6	93.6%	$ 4,305.60
Premium Efficiency Motor 100 HP 3600 RPM TEFC	Premium Efficiency Motor	100	3600	TEFC	94.1	94.1%	$ 5,183.55
Premium Efficiency Motor 125 HP 3600 RPM TEFC	Premium Efficiency Motor	125	3600	TEFC	95	95.0%	$ 7,033.75
Premium Efficiency Motor 150 HP 3600 RPM TEFC	Premium Efficiency Motor	150	3600	TEFC	95	95.0%	$ 8,509.65
Premium Efficiency Motor 200 HP 3600 RPM TEFC	Premium Efficiency Motor	200	3600	TEFC	95.4	95.4%	$ 10,825.40

Measure Life

Measure Life = 20 Years (3), (5)	20

Table 2: Operating Hours by Motor Size, Industrial Applications (4)

[illegible] HP	All SIC (Industrial)
1	2,745
1.5	2,745
2	2,745
3	2,745
5	2,745
7.5	3,391
10	3,391
15	3,391
20	3,391
25	4,067
30	4,067
40	4,067
50	4,067
60	5,329
75	5,329
100	5,329
125	5,200
150	5,200
200	5,200

Table 3: Operating Hours by Application, Non-Industrial (5)

Building Type	Operating Hours
Office HVAC Pump	2,000
Retail HVAC Pump	2,000
Hospitals HVAC Pump	2,754
Elem/Sec Schools HVAC Pump	2,190
Restaurant HVAC Pump	2,000
Warehouse HVAC Pump	2,241
Hotels/Motels HVAC Pump	4,231
Grocery HVAC Pump	2,080
Health HVAC Pump	2,559
College/Univ HVAC Pump	3,841
Office Ventilation Fan	6,192
Retail Ventilation Fan	3,261
Hospitals Ventilation Fan	8,374
Elem/Sec Schools Ventilation Fan	3,599
Restaurant Ventilation Fan	4,155
Warehouse Ventilation Fan	6,388
Hotels/Motels Ventilation Fan	3,719
Grocery Ventilation Fan	6,389
Health Ventilation Fan	2,000
College/Univ Ventilation Fan	3,631
Office Other Application	4500
Retail Other Application	4500
Hospitals Other Application	4500
Elem/Sec Schools Other Application	4500
Restaurant Other Application	4500
Warehouse Other Application	4500
Hotels/Motels Other Application	4500
Grocery Other Application	4500
Health Other Application	4500
College/Univ Other Application	4500

References

1 NWPCC (Northwest Power Conservation Council) RTF's (Regional Technical Forum) Archived Measures - Source for full motor cost
2 CEE (Consortium for Energy Efficiency) Premium Efficiency Motors Initiative - Source for premium motor efficiencies
3 NYSERDA (New York State Energy Research and Development Authority): NY Energy $mart Programs Deemed Savings Database - Source for coincidence factor, measure life, and motor load factor
4 United States Industrial Electric Motor Systems Market Opportunities Assessment, EERE, US DOE, Dec 2002 - Source for operating hours for industrial motors and source for motor load factor data (Tables 1-18 and 1-19)
5 Efficiency Vermont's Technical Reference User Manual, 2004 - Source for operating hours for commercial motors (p.15) and source for measure life and source for existing motor efficiencies and source for motor load factor default value

VFD Costs

Source = Grainger (6/25/08) online

Brand =	TELEMECANIQUE	DAYTON		Emerson
Brand =		Fuji		
By Pass =	without Bypass	without Bypass		without Bypass
Voltage/Phase =	460V - 3Phase	460V - 3Phase		460V - 3Phase

HP	$	$		$
1	$413	$584	estimated	$371
2	$450	$637	estimated	$387
2	$487	$689		$454
3	$563	$746		$533
5	$675	$1,022		$648
7.5	$843	$1,287		$992
10	$1,032	$1,885		$1,307
15	$1,359	$2,125		$1,572
20	$1,687	$2,849		$2,254
25	$2,746	$3,490		$2,490
30	$2,990	$3,863		$2,582
40	$3,678	$5,328	Fuji	$3,389
50	$4,326	$6,131	Fuji	$4,183
60	$5,432	$7,663	Fuji	$5,003
75	$5,836	$8,964	Fuji	$6,256
100	$8,663	$11,287	Fuji	$7,903
125	$7,324	$14,157	Fuji	$9,467
150	$8,272	$15,004	estimated	$11,016
200	$9,504	$16,742	estimated	$14,362

Average costs including install will be used for 2009 and 2010 incremental costs.

Average Purchase Price ($)	Average Installed price (3)	HP
$456	$684	1
$491	$737	2
$543	$815	2
$614	$921	3
$781	$1,172	5
$1,044	$1,566	7.5
$1,341	$2,012	10
$1,685	$2,528	15
$2,267	$3,400	20
$2,909	$4,363	25
$3,118	$4,678	30
$4,125	$6,187	40
$4,873	$7,310	50
$6,033	$9,049	60
$7,019	$10,528	75
$8,811	$12,917	100
$10,316	$15,474	125
$11,431	$17,146	150
$13,536	$20,304	200

Installation assued as 50% of purchase price

Average % savings	33%
Measure Life (years)	20

Pumping Load Factor	75%
Fan Load Factor	65%

Coin. Factor	78%

1. From Office of Industrial Electric Motor Systems Market Opportunities Assessment : Department of Energy (assessment of 265 industrial facilities in 1997)

hp	Plan A Incremental Cost	Plan B Incremental Cost
1	$69	$402
1.5	$75	$442
2	$72	$472
3	$74	$518
5	$66	$590
7.5	$142	$767
10	$129	$889
15	$108	$1,475
20	$114	$1,798
25	$218	$2,320
30	$267	$2,750
40	$320	$3,655
50	$455	$4,032
60	$599	$5,987
75	$500	$6,958
100	$754	$8,923
125	$589	$11,851
150	$691	$13,298
200	$636	$16,953
250	$3,344	$21,468
300	$4,007	$29,638
350	$7,011	$35,792
400	$6,393	$39,233
450	$8,415	$40,915
500	$11,521	$43,173

Costs were determined for 1800 RPM TEFC motors, but will be used for all RPM and Types of Enhanced NEMA Premium motors as 1800 RPM TEFC is the most common.
Incremental costs for Plan A represents the cost differential between standard motor and efficient motor
Incremental costs for Plan B motors represent the full purchase and installation costs for the new motor

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Low Income Multi-Family Weatherization

Low Income service agency may apply for a grant to improve the natural gas and electric efficiency measures of low income multi-family housing units and common spaces/systems.

Algorithms:

Savings will be determined by results of an engineering audit of potential energy savings for the facility and living units. Calculations may include standard energy calculations or hourly energy modeling with recognized software packages. Savings for CFL lighting, refrigerator upgrades or evaporative coolers installed in living units will be deemed per other programs for low income participants or prescriptive programs.

We will use 100% for the Net-to-Gross factor for the Low Income Multi-Family Weatherization program.

We will use 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from rate case no. 07-00319-UT

References:
References for each custom efficiency projects will be documented.

Changes from 2008:
This program is new for 2009

NEW CONSTRUCTION SAVINGS TECHNICAL ASSUMPTIONS

Program: New Construction

This is a custom program including electric and gas measures. There are three choices of tracks customers may choose to follow. This program is unique in that Xcel relies heavily on expert consultant in the design process; however, we will perform independent project review in accordance with standard engineering methods. Customer may apply for rebate under the New Construction Program.

Calculations:

Electrical and gas energy savings and electrical demand savings will be calculated based on the project-specific details. Each project will undergo an engineering review in accordance with standard engineering practices. Prescriptive items within the project will be handled through their respective deemed programs.

Assumptions:

Net-to-gross = Electric 98% for the EDA tracks and 93% for the Energy Efficient Buildings track. Gas EDA NTG is 99% and Gas Energy Efficient Building track is 97%. Program requirements are well above code, so feel free-ridership will be negligible. Gas free ridership will be lower than electric because gas programs are new to Colorado.

Transmission-Distribution Loss Factor = 6.39%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2

Electric Rebate amount is $300/kW saved

Assume 55% additional savings from using Enhanced Modeling track over Basic based on actuals from MN program

Operation and Maintenance Savings will be calculated for each specific project based on project details.

Life of product is 20 years for gas and electric measures.

Changes from 2008

This is a new program for 2009.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Low Income Non-Profit Weatherization

Low income service agency may apply for a grant to improve the natural gas and electric efficiency measures of low income non-profit housing units and common spaces/systems.

Algorithms:

Savings will be determined by results of an engineering audit of potential energy savings for the facility and living units. Calculations may include standard energy calculations or hourly energy modeling with recognized software packages. Savings for CFL lighting, refrigerator upgrades or evaporative coolers installed in living units will be deemed per other programs for low income participants or prescriptive programs.

We will use 100% for the Net-to-Gross factor for the Low Income Non-Profit Weatherization program.

We will use 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from rate case no. 07-00319-UT

References:
References for each custom efficiency projects will be documented.

Changes from 2008:
This program is new for 2009

TECHNICAL ASSUMPTIONS

Program: Process Efficiency

The Process Efficiency Business Program targets energy intensive processes at large industrial facilities Customers who implement identified upgrades may receive rebates for large process changes that are not completed through Custom Efficiency or the prescriptive programs.

Calculations:

Electrical energy savings,electrical demand savings and gas savings will be calculated based on the methodologies presented in each of the end use programs.

A net-to-gross factor of 86.6% will be used for electric Process Efficency projects.
A net-to-gross factor of 93.9 % will be used for gas Process Efficency projects. This represents one half of the free rider factor for electric projects because gas programs are new to Colorado.
A transmission distribution loss factor of 6.39% will be used for Process Efficiency projects. This was calculated using factors from Enhanced DSM filing-SRD-2

Changes from 2008
The Process Efficiency Program is new for 2009.

Electric Net to Gross= 0.866
Gas Net to Gross = 0.933
ElectricNTG Factor based on Frontier from the Energy Efficiency Best Practices CA website, custom projects
Gas Net to gross is determined by assuming one half of the electric free rider factorfree rider factor 1/2 of electric (1-((1-.866)/2))=.93

RECOMMISSIONING SAVINGS TECHNICAL ASSUMPTIONS

Program: Recommissioning

Recommissioning is a special program that involves a Study phase and an Implementation phase. The customer may apply for rebate under the Recommissioning Program. Each Recommissioning project will be analyzed individually by Xcel Energy. A qualified engineering vendor will perform the study and provide a report and technical calculations to Xcel Energy for review. Analysis will be based on standard engineering methodologies. Customer may also submit for implementation a proposed "Fast Track" project without going through the Recommissioning Study phase, as long as they have performed a study. Recommissioning projects do not have to demonstrate a TRC factor greater than one on a project by project basis. In that regard the program is similar to deemed programs. In most other respects it is more of a custom program.

Calculations:

Electric and Gas energy savings and electrical demand savings will be calculated by a study vendor based on the project specific details. Each project will undergo an engineering review by Xcel Energy in accordance with standard engineering practices.

A net-to-gross factor of 100% will be used for Recommissioning projects, based on the following justification: Without having completed a recommissioning study through our program, the customer would not have known about the opportunities. If they would have known about them, they would have done them on their own due to the likelihood they are no/low cost items with very quick paybacks.
A transmission distribution loss factor of 6.39% will be used for recommissioning projects. Reference the Enhanced DSM filing, SRD-2; no significant system changes have been noted since then.
Persistence of the Recommissioning product (product life) is set at 7 years, reference "Recommissioning Persistence - Task 1 Benchmarking Deliverable 040607.pdf"

Changes from 2008
1. A gas rebate is being proposed for the first time.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Refrigerator Recycling

Rebates will be offered for pickup of a secondary working refrigerator that will be demanufactured and re-cycled.

Algorithms:

Refrigerator Electrical Energy Savings (Customer kWh)	= [Baseline Product Consumption - Efficient Product consumption] = 1,025 kWh/refrigerator recycled
Refrigerator Electrical Demand Savings (Customer kW)	= Refrigerator Electrical Energy Savings / 8760 x Average_to_Peak_kW_Factor = 0.139 kW
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF) = 1,104 kWh
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF) = 0.150 kW
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG = 673 kWh
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG = 0.091 kW

Variables:

Baseline Product Consumption	= Baseline Product Consumption is the average current year consumption for refrigerators manufactured 1993-2000 = 1025 kWh in 2009 and 1063 kWh in 2010 as calculated in Table 1.
Efficient Product Consumption	= Efficient Product Consumption is 0 when unit has been demanufacturered.
Average_to_Peak_kW_Factor	= Ratio of average electrical demand to peak electrical demand for a refrigerator from 1993 to 2000. We will use a value of 1.19 from reference 1.
8760	= Total number of hours in one year
Measure Life	= Measure life is assumed to be the remaining service life of the existing refrigerators that are removed under this program. = 7.3 years based on weighted average calculated in Table 1.
Incremental Costs	= Actual cost to implement program from vendor
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing - SRD-2
NTG	= Net to gross will be 61% for refrigerator recycling (Reference 3)

O&M savings	= Operation and Maintenance savings are assumed to be zero for refrigerator recycling.
CF	= Coincidence Factor = 1 by definition because we use average to peak kW

Provided by recycling vendor/homeowner: **Verified during M&V:**

Confirm refrigerator was removed — Yes

Confirm refrigerator was working prior to removal — Yes

Assumptions:
Rebates are available only for working secondary units released by owners.

Changes From 2008:
New program for 2009

Table 1. (Reference 1 and 2)

Year of Manufacture	% Share	Baseline kWh 2009	Baseline kWh 2010	Remaining Life
1993	11.0%	1,180	1,224	4.5
1994	11.9%	1,128	1,169	5.0
1995	12.5%	1,080	1,120	5.5
1996	12.9%	1,042	1,080	6.5
1997	12.9%	1,004	1,042	7.5
1998	12.9%	969	1,004	8.5
1999	12.9%	934	969	9.5
2000	12.9%	901	934	10.5
Weighted Average		**1025**	**1063**	**7.3**

References

1. Baseline kWh and Average to peak kW ratio from Energy Data Sourcebook for the U.S. Residential Sector. Berkeley, CA: Lawrence Berkeley National Laboratory. LBNL-40297
2. Remaining Life and % share from US DOE, Technical support document: Energy efficiency standards for consumer products: Refrigerators, refrigerator-freezers, and freezers including draft environmental assessment, regulatory impact analysis, 1995 Jul
3. Net-to-Gross factor from Fort Collins Utility report

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Residential Saver's Switch New A/C

Prescriptive rebates will be offered to customers who install a Saver's Switch on their AC system.

Calculations:

Saver's Switch Electrical Energy Savings (Customer kWh)	= Average kW per Unit x Full Load Hours of Operation
Saver's Switch Electrical Demand Savings (Customer kW)	= Average kW per Unit
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Average kW per Unit	= Average kW per A/C Unit = 3.000 kW/unit (Reference 1)
Full Load Hours of Operation	= Equivalent Full Load Hours of Operation that a Switch achieves energy savings by controlling an a/c unit during a typical year. Value includes equivalent hours during control discounted by the equivalent full load hours of payback period after the control, during which usage is increased. = 0.72 hours (Reference 1)
CF	Coincidence Factor = Percentage of the kW savings that occur during the annual hour of system peak. = 35.27% (Reference 1)
Measure Life	= Length of time the switch will be operational = 15 years from reference 1
TDLF	Transmission Distribution Loss Factor = 7.14% based on the Enhanced DSM filing, SRD-2
NTG	= Net-to-Gross factor for Saver's switches will be 100% as customers would not have the ability to install a switch without the program.

Provided by Customer:
Number of units with switch installed.

Verified during M&V:
Yes

Assumptions:
Customer kW value is the connected amps volt kW, and probably will not occur on even the hottest day due to AC over sizing. Oversizing is taken into account in the Coincidence Factor

Changes from 2008
Customer incentive revised from 2008

References
1. 2007 Xcel Energy Colorado Residential Saver's Switch Impact Evaluation.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: School Education Kits

A package of energy efficiency and water conservation classroom activities combined with projects for home that is targeted at sixth grade students in the Colorado service territory. The program is known as LivingWise and each participant receives a "LivingWise Activity Kit" containing a high-efficiency showerhead, a kitchen sink aerator, and two compact fluorescent bulbs, in addition to other educational items such as a thermometer, filter alarm, leak detection tablet, night light and tape measure.

Algorithms:

CFL Electric Energy Savings (Customer kWh)	= Number_of_Bulbs x (kW_EE - kW_Base) x Hrs
CFL Electric Demand Savings (Customer kW)	= Number_of_Bulbs x (kW_EE - kW_Base)
Showerhead Gas Savings (Gross Dth)	= (GPY_Saved x Delta_T x 8.33) / HGE x SPD
Aerator Gas Savings (Gross Dth)	= (GPY_Saved x Delta_T x 8.33) / HGE
Net Dth	= Gross Dth x NTG
Electrical Energy Savings (Gross Generator kWh)	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator kW)	= Customer kW x CF / (1-TDLF)
Electrical Energy Savings (Net Generator kWh)	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW)	= Gross Generator kW x NTG

Variables:

Number_of_Bulbs	= Number of bulbs provided in each kit = 2.
Hrs	= Annual operational hours per year of the fixture. We will use 1210 hours which represents the average operating hours for the first 5 CFLs installed in a house. (Reference 1)
CF	= Coincidence Factor, the probability that peak demand of the lights will coincide with peak utility system demand. 0.08 will be used for prescriptive rebates (Reference 1)
kW_EE	= Fixture wattage (kW per fixture) for the two CFLs provided in the kit. We will use 0.019 kW which is the average for the two bulbs per kit.
kW_Base	= Fixture wattage (kW per fixture) for the two incandescent bulbs that the CFLS will replace. We will use 0.06526 kw which is the average of the two bulbs per kit.
GPY_Saved	= Gallons per year of hot water saved with high-efficiency showerhead (for one shower per day) or aerator assuming 65% of water flow is hot water. Showerhead = 1660 gallons per year per shower, Aerator = 657 gallons.
Delta_T	= Change in temperature of water from incoming water temperature to water heater temperature setting. Delta_T is 74 degrees F. (Reference 4)
HGE	= Heat generation efficiency based on steady-state water heater efficiency. Used value of 0.76. (Reference 2)
SPD	= Number of showers per day = 1.32 based on 2.64 people per home and 2 bathrooms. (Reference 4)
Incremental Costs	Costs per Table 2; Measure Cost
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2
Net-to-Gross Factor	= We will use 70% for the gas measures in the school education kits per Dave Munk of RAP, and we will use 93% for the CFL measure.
Measure Life	Measure lives are shown in Table 1.
O&M savings	= Operation and Maintenance savings are assumed to be zero for the school education kits.

Provided by Customer:	Verified during M&V:
Kit was received	Yes
Measures have been installed	Yes

Assumptions:
Showerheads:
- 2.5 gpm replaced with 2.0 gpm, resulting in 1,660 gallons of annual water savings per shower. (reference 2,2)
- 1.32 showers per day at 8.9 minutes per shower (reference 2,3)

Faucet aerators:
- 2.2 gpm replaced with 1.8 gpm in bathroom, resulting in 657 gallons of annual water savings. (reference 2,3)
- 17 gal/day used by 3 primary sinks (33% per sink) (reference 4)

Table 1. Measure Life

Measure	Measure Life	Source
LW Kit-Shower heads	6	Reference 5
LW Kit-Faucet Aerators	5	Reference 5
LW Kit-CFLs	6.61	8000 hour CFL lamp divided by average hr/yr (1210 hr/yr)

Table 2 Measure Cost	Measure Cost	Source:
LW Kit-Shower heads	$12	Vendor quote per kit allocated to
LW Kit-Faucet Aerators	$12	number of items providing savings.
LW Kit-CFLs	$23	

Changes From 2008:
This is a new program for 2009

References
1. Composite Wattages, Operating Hours and Coincidence from CFL METERING STUDY FINAL REPORT, Prepared for: Pacific Gas & Electric Company, San Diego Gas & Electric Company, Southern California Edison Company, 2005
2. Department of Energy Domestic Hot Water Appliance Calculator
3. Japanese study: "The effects of variation in body temperature on the preferred water temperature and flow rate during showering" Authors: Tadakatsu Ohnaka, Yutaka Tochihara, Yumiko Watanabe. Affiliations: a) Department of Physiological Hygiene, The Institute of Public Health, Minato-ku, Tokyo, Japan; b) Faculty of Home Economics, Jissen Women's University, Hino, Tokyo, Japan.
4. Handbook of Water Use and Conservation, Denver Water Conservation
5. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).

SEGMENT EFFICIENCY TECHNICAL ASSUMPTIONS

Program: Segment Efficiency

This is a custom program that involves an energy and financial analysis of existing facilities. Customer may apply for rebate under the Segment Efficiency Program. Each project will be analyzed individually by Xcel Energy. Technical variables required for the analysis will be obtained from the customer or vendor. Analysis will be based on standard engineering methods. Prescriptive rebates may be given for measures identified during the analysis that qualify under prescriptive end use programs.

Calculations:

Electrical and gas energy savings and electrical demand savings will be calculated based on the project-specific details. Each project will undergo an engineering review in accordance with standard engineering practices. Where prescriptive elements exist, the calculations will be in accordance with the calculation methodologies detailed in the prescriptive programs.

Changes from 2008

This is a new program for 2009.

Assumptions

A transmission distribution loss factor of 6.39% will be used for custom projects. This is calculated using factors from Enhanced DSM Filing - SRD-2

We will conservatively use NTG for each end use technology as stated in their respective technical assumptions. Actual NTG should be closer to 100% because these customers have historically not participated in the programs.

TECHNICAL ASSUMPTIONS

Program: Self-Direct

The Self-Direct Program will provide large commercial and industrial customers in Colorado to self-fund electric energy conservation projects at their facilities. Customers who engineer, implement, and commission qualifying projects will receive rebates to offset their costs to implement efficient projects.

Calculations:
Electrical energy savings and electrical demand savings will be calculated based on the actual savings from a project.

A net-to-gross factor of 90.6% will be used for Self-Direct projects. The NTG assumption (90.6%) was developed based on the weighted average of the net-to-gross factors determined for individual electric conservation technologies by Energy Efficient Best Practices California. The weighting for technologies was based on the Custom Efficiency projects completed by large Colorado customers from 2006 to 2008.

A transmission distribution loss factor of 6.39% will be used for Electrical projects. This was calculated using factors from Enhanced DSM filing-SRD-2

Measure life and operation and maintenance savings will be calculated for each project.

Changes from 2008
The Self-Direct Program is new for 2009.

	% of saving	NTG Factor	weighted	
Cooling	0.063766944		0.937	6%
EMS	0.026063631		0.87	2%
Lighting	0.389723422		0.96	37%
Custom	0.264643412		0.86	23%
Compressed Air	0.255802591		0.867	22%
		Total NTG		90.6%

NTG Factor based on the Energy Efficiency Best Practices CA website
% of Savings based on large CO completed Custom Efficiency projects

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Low Income Single Family Weatherization Rebates

Residential low-income natural gas and electric customers can energy efficiency measures performed at no cost to them.

Algorithms:

Ceiling insulation from R-11 to R-38 natural gas savings (Gross Dth)	Energy savings for the ceiling insulation were calculated in REM/Rate using a baseline home model calibrated to home size and characteristics for the Denver area (see below for characteristics.) Savings is 7.9 Dth.
Wall insulation from R-3 to R-11 natural gas savings (Gross Dth)	Energy savings for the wall insulation were calculated in REM/Rate using a baseline home model calibrated to home size and characteristics for the Denver area (see below for characteristics.) Savings is 18.7 Dth.
New HE Furnace AFUE 92% natural gas savings (Gross Dth)	Energy savings for the gas furnace were calculated in REM/Rate using a baseline home model calibrated to home size and characteristics for the Denver area (see below for characteristics.) Savings is 11.1 Dth.
Refrigerator replacement electric energy savings (Customer kWh) and demand savings (Customer KW)	Energy savings for the refrigerator were based on the Energy Star Refrigerator Savings Calculator: http://www.energystar.gov/index.cfm?c=refrig.pr_refrigerators. Savings is 584 kWh and 0.08 kW.
16 CFLs electric energy savings (Customer kWh) and electric demand savings (Customer kW)	Energy and demand savings and annual hours of operation for compact fluorescent lamps are based on data and calculations derived from the 2002 US Lighting Market Characterization performed for the Department of Energy in 2002. Energy savings are 784 kWh and demand savings are 0.77 kW.
Net Dth	= Gross Dth x NTG
Electrical Energy Savings (Gross Generator k	= Customer kWh / (1-TDLF)
Electrical Demand Savings (Gross Generator	= Customer kW x CF /(1-TDLF)
Electrical Energy Savings (Net Generator kW	= Gross Generator kWh x NTG
Electrical Demand Savings (Net Generator kW	= Gross Generator kW x NTG

Variables:

NTG	Net-to-Gross Factor = We will use 96% based on reference 5.
O&M savings	Operation and Maintenance savings = We will assume no O&M savings.
TDLF	Transmission Distribution Loss Factor = 7.14%, the percentage loss of electricity as it flows from the power plant to the customer, calculated using factors from Enhanced DSM Filing SRD-2

Type of measure:	Measure life:	Incremental cost:	Coincidence Factor:
Ceiling Insulation	20 years (Reference 1)	$715 (Reference 6)	NA
Wall Insulation	20 years (Reference 1)	$670 (Reference 6)	NA
HE furnace AFUE 92%	18 years (Reference 12)	$623 (Reference 13)	NA
Refrigerator replacement	7.3 years (Reference 14)	$631 (Reference 3)	100% (by definition per calc)
CFLs	7.9 years (Reference 9)	$60 (Reference 10)	8% (Reference 9)

Provided by Customer:
Type of measures implemented

Verified during M&V:
Yes

Changes From 2008:
This is a new program for 2009

Assumptions:

Building Characteristics for Baseline Home Used for Modeling:

- Single Family
- One story (Reference 3)
- 2 bedroom 1 bathroom (Reference 3)
- 961 square feet (Reference 3)
- Crawlspace foundation (Reference 3)
- HVAC:
  - heating - gas furnace 78 AFUE (Reference 3)
  - no cooling - 25% have evaporative coolers (Reference 3)
  - air handler is in the crawlspace and supply ducts and return ducts are assumed to be in majority interior space
- Windows:
  - SHGC = 0.75
  - U-factor = 1.27

Insulation Levels:

- Existing Ceiling Insulation: R-11 (Reference 4)
- Existing Wall Insulation: R-3 (Reference 4)

Crawlspace Assumptions

- Assumed crawlspace walls do not have insulation
- The air handler is located in the crawlspace
- ACH = 0.8 and duct leakage is 25%

Appliances (Reference 2)

- 85% have dishwashers
- 74% electric ranges
- 88% and 89% have clothes washer and dryer (electric)
- 85% water heating is gas - model used a 40 gallon storage tank
- 68% of homes have ceiling fans

References:

1. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F (www.calmac.org/events/APX_F.pdf).
2. 2006 Residential Energy Use Colorado Service Area - Xcel: Bruce Neilson
3. Colorado Governor's Energy Office (GEO)
4. Xcel Energy CO DSM Potential 2006 - prepared by Kema
5. National Energy Efficiency Best Practices Study - Residential Single-Family Comprehensive Weatherization Best Practices Report from December
6. RS Means Repair and Remodeling 2007 at a cost of $0.028 per square foot per increase in R-value.
7. National Energy Audit Tool (NEAT) and Frontier estimates.
8. EEBP web site - Tacoma Residential Weatherization program.
9. US Lighting Market Characterization Study performed for the Department of Energy in 2002
10. MEEA/ES Change A Light campaign
info
11. Xcel Energy estimate
12. Draft Technical Support Document: Energy Conservation Standards for Residential Furnaces and Boilers, Efficiency Standards for Consumer
Prepared for US DOE, September 2006
13. California Energy Commission's Database for Energy Efficient Resources (DEER)
14. www.energystar.gov
15. DOE 2007
16. Appliance Magazine, September 2007

TECHNICAL ASSUMPTIONS

Program: Small Business Lighting

The Small Business Lighting Program provides free lighting efficiency audits to small and mid sized businesses. Customers who implement identified lighting upgrades may receive rebates through the Lighting Efficiency or Custom Efficiency programs.

Calculations:

Electrical energy savings and electrical demand savings will be calculated based on the methodologies and assumptions presented in the Lighting Efficiency and Custom Efficiency programs.

A net-to-gross factor of 100% will be used for small business lighting projects.

A transmission distribution loss factor of 6.39% will be used for small business lighting projects. This was calculated using factors from Enhanced DSM filing-SRD-2

Changes from 2008

The Small Business Lighting Program is new for 2009.

STANDARD OFFER SAVINGS TECHNICAL ASSUMPTIONS

Program: Standard Offer

Standard Offer utilizes an ESCO, pre-qualified by the Governor's Energy Office, or a Customer-chosen vendor to perform a pre-formatted investment grade audit from which comes a bundled set of measures that the customer, by agreement, must implement. The customer may apply for a rebate under the Standard Offer Program or the implementation funding can come from the ESCO. Analysis will be based on standard engineering methodologies. Prescriptive rebates will not be offered in this program.

Calculations:

Electric and Gas energy savings and electrical demand savings will be calculated by an ESCO or a Customer-chosen vendor based on facility-specific details. Each project will undergo an engineering review by Xcel Energy in accordance with standard engineering practices. M&V plans will be required for all Standard Offer projects and must last a minimum of three years.

A net-to-gross factor of 81.3% will be used for electric projects in 2009. A net-to-gross factor of 87.6% will be used for electric projects in 2010. A net-to-gross factor of 92% will be used for gas projects in both years.
A transmission distribution loss factor of 6.39% will be used for Standard Offer projects. Reference the Enhanced DSM filing, SRD-2; no significant system changes have been noted since then.

Measure life and operation and maintenance savings for Standard Offer projects will be calculated for each project as part of the Technical Energy Audit

Changes from 2008
1. Standard Offer program is being offered for the first time.

DEEMED SAVINGS TECHNICAL ASSUMPTIONS

Program: Water Heating Rebates

Residential natural gas customers receive a cash rebate for purchasing high-efficiency natural gas water heating equipment.

Algorithms:

Standard tank water heater 0.62 EF Natural gas savings (Gross Dth)	Energy savings for the gas water heater are based on federal minimum efficiency requirements for a baseline water heater. The replacement model has an Efficiency Factor (EF) rating of 62%, which is the current Energy Star Standard. All savings were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 1.06 Dth/yr
Standard tank water heater 0.65 EF Natural gas savings (Gross Dth)	Energy savings for the gas water heater are based on federal minimum efficiency requirements for a baseline water heater. The replacement model has an EF rating of 65%. All savings were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 2.06 Dth/yr.
Standard tank water heater 0.67 EF Natural gas savings (Gross Dth)	Energy savings for the gas water heater are based on federal minimum efficiency requirements for a baseline water heater. The replacement model has an EF rating of 67%. All savings were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 2.66 Dth/yr.
Tankless water heater 0.82 EF Natural gas savings (Gross Dth)	Energy savings for the gas water heater are based on federal minimum efficiency requirements for a baseline water heater. The replacement model has an EF rating of 82%, which is the current Energy Star Standard. All savings were calculated in EnergyGauge using a baseline home model calibrated to typical home size and characteristics for the Denver area (see below for characteristics.) Savings is 5.91 Dth/yr.
Net Dth	= Gross Dth x NTG

Variables:

NTG	Net-to-Gross Factor = We will use 90% based on letter from Davis Energy Group to DOE dated 10/23/07.
Measure life	= 15 years for standard tank water heater and 20 years for tankless water heater. (Reference 5)

Unit Type	Incremental Cost:	
Standard tank water heater 0.62 EF	$55.00	(Reference 1)
Standard tank water heater 0.65 EF	$175.00	(Reference 1)
Standard tank water heater 0.67 EF	$230.00	(Reference 1)
Standard tank water heater 0.82 EF	$750.00	(Reference 1)

Provided by Customer:
Type of unit installed

Verified during M&V:
Yes

Assumptions:
The baseline water heater is 40 gallon capacity with an Efficiency Factor (EF) of 58%.
The average baseline product cost is based on the cost from RS MEANS Repair and Remodeling Cost Data 2007

Changes From 2008:
This is a new program for 2009

Building Characteristics for Prototype Home Used for Modeling:

Single Family
Two story (Reference 3)
3 bedroom 2 bathroom (Reference 3)
2000 square feet (Reference 3)
Basement foundation (Reference 3)
HVAC:
heating - gas furnace 78 AFUE (55.9 kBtu unit required) - 85% of homes have gas heating, and 78% of which are forced air furnaces (Reference 2)
cooling - 59% have Central Air Conditioning model required a 2.5 ton unit to meet the cooling load (Reference 2)
air handler is in the basement and supply ducts and return ducts are assumed to be in majority interior space
Windows
61% of homes have double pane windows (Reference 2)
double pane low-E are standard (Reference 4)
Model assumes 15% of wall area glazing
applied a u-factor of 0.53 (average between clear glass double pane and low-E)

Insulation Levels:
Existing Ceiling Insulation: R-19 (Reference 4)
Existing Wall Insulation: R-11 (Reference 4)

Basement Assumptions
Assumed basement walls to have R-11 insulation
Basement is considered finished space but not conditioned
The air handler is located in the basement
Some homes will have smaller sections of the basement conditioned -- maybe a bonus room etc, however this cannot be easily modeled in EnergyGauge

Appliances (Reference 2)
85% have dishwashers
74% electric ranges
88% and 89% have clothes washer and dryer (electric)
85% water heating is gas - model used a 40 gallon storage tank
68% of homes have ceiling fans

Average Customer Energy Consumption: (Reference 2)
kWh annually: 9,000 roughly for a 2,000 square foot home
Therms annually: 835

References:
1. California Energy Commission's Database for Energy Efficient Resources (DEER) http//www.energy.ca.gov/deer
(Does not include labor of equipment rental fees as this measure is considered a replace on burnout)
2. 2006 Residential Energy Use Colorado Service Area - Xcel: Bruce Neilson
3. American Housing Survey for Denver - US Census Bureau
4. Xcel Energy CO DSM Potential 2006 - prepared by Kema
5. California Measurement Advisory Committee (CALMAC) Protocols, Appendix F.

APPENDIX C

COLO. PUC No. 6 Gas Settlement Appendix C

PUBLIC SERVICE COMPANY OF COLORADO

Sheet No. 42

P.O. Box 840
Denver, CO 80201-0840

Cancels
Sheet No.

NATURAL GAS RATES
DEMAND-SIDE MANAGEMENT COST ADJUSTMENT

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APPLICABILITY

All rate schedules for natural gas service are subject to a Demand-Side Management Cost Adjustment ("DSMCA") designed to recover the direct and indirect costs of Demand-Side Management Programs ("DSM Programs") in accordance with Commission-approved Demand-Side Management Plans and Rules 4750 through 4760 of the Commission's Rules Regulating Gas Utilities and Pipeline Operators, 4 Code of Colorado Regulations 723-4 ("Gas DSM Rules"). The DSMCA shall apply to all base rates for all applicable rate schedules and are as set forth on Sheet No. 42D.

ANNUAL FILINGS

Effective January 1, 2009, the Company shall place into effect a new DSMCA pursuant to the Commission's final order on Company's 2009-10 DSM Plan and shall include Current Period DSM Costs incurred on and after January 1, 2009, plus all DSM costs incurred by Company prior to January 1, 2009 in accordance with its prior DSMCA.

The Company will file an advice letter to revise the DSMCA on April 1 to be effective July 1 through December 31 of the same year and on October 1 to be effective January 1 through June 30 of the next year. The October 1 filing will revise DSMCA for Current Period DSM Costs forecasted for the following year and the April 1 filing will revise the DSMCA for the Prior Demand-Side Management Cost Adjustment ("PDSMCA"), the DSM Bonus and the DSM Deferred amount from the preceding year, including applicable DSM Interest. The Company will include in its annual DSMCA filings all pertinent information and support documentation as is required by the Commission's Rules and as specifically set forth in Gas DSM Rules.

DEFINITIONS

DSM Bonus

The amount of bonus approved by the Commission in the Company's annual DSM Report as set forth in Gas DSM Rule 4760.

Current Period Demand-Side Management Costs (CDSC)

The CDSC are projected calendar year expenditures for the Company's DSM Portfolio after January 1, 2009, including all direct and indirect costs. The CDSC shall comprise costs of DSM programs directed at residential customers and costs of DSM programs directed at nonresidential customers and shall be expenses and recovered over twelve months beginning January 1 of the year in which the costs are expected to be incurred.

(Continued on Sheet No. 42A)

ADVICE LETTER NUMBER

DECISION NUMBER

MANAGING DIRECTOR, Government & Regulatory Affairs

ISSUE DATE

EFFECTIVE DATE January 1, 2009

COLO. PUC No. 6 Gas Settlement Appendix C

PUBLIC SERVICE COMPANY OF COLORADO

Sheet No. 42A

P.O. Box 840
Denver, CO 80201-0840

Cancels
Sheet No.

NATURAL GAS RATES
DEMAND-SIDE MANAGEMENT COST ADJUSTMENT

N

DEFINITIONS - Cont'd

DSM Interest

The amount of net interest accrued on the average monthly balance in gas DSM subaccounts of Account No. 186, whether positive or negative, as determined by multiplying the monthly balance by an interest rate equal to the Company's Commission-authorized after tax weighted average cost of capital. DSM Interest shall be calculated separately for the deferred balances associated with the Residential DSMCA and the Nonresidential DSMCA.

DSM Portfolio

The energy efficiency programs as approved by the Commission in the Company's DSM plan filings as required under the Gas DSM Rules. The DSM Portfolio shall comprise DSM programs directed at residential and non-residential customers.

RESIDENTIAL DSMCA

The DSMCA for residential service ("RDSMCA") shall be a percentage adjustment applicable to all base rates for customers receiving service under rate Schedule RG and shall be calculated as follows:

$$\text{RDSMCA} = \frac{\text{RDSM Cost} + \text{RDSM Deferred} + \text{RDSM Bonus}}{\text{R CCount} * \text{RS\&F} + \text{R Sales} * \text{R Rate}} + \text{PDSMCA}$$

Where:

1) RDSM Cost is the CDSC of residential DSM Programs for the following calendar year revised annually by a October 1 filing
2) RDSM Deferred is the positive or negative difference between the projected cost of residential DSM Programs and amounts collected from residential customers during the prior calendar year, including DSM Interest, revised annually by a April 1 filing
3) RDSM Bonus is the residential allocated portion of the total DSM Bonus from the previous calendar year revised annually by a April 1 filing
4) R CCount is the Company's forecasted residential customer count for the twelve calendar months following the effective date of the RDSMCA
5) RS&F is the Service and Facility Charges applicable for residential service in effect on the effective date of the RDSMCA

(Continued on Sheet No. 42B)

ADVICE LETTER NUMBER

ISSUE DATE

DECISION NUMBER

MANAGING DIRECTOR, Government & Regulatory Affairs

EFFECTIVE DATE January 1, 2009

COLO. PUC No. 6 Gas Settlement Appendix C

PUBLIC SERVICE COMPANY OF COLORADO

P.O. Box 840
Denver, CO 80201-0840

Sheet No. 42B

Cancels Sheet No. _____

NATURAL GAS RATES
DEMAND-SIDE MANAGEMENT COST ADJUSTMENT

N

6) R Sales is the Company's forecasted residential usage (Schedules CG and IG separately) in therms for the twelve calendar months following the effective date of the RDSMCA
7) R Rate is the Usage Charge per therm applicable for residential service in effect on the effective date of the RDSMCA

NONRESIDENTIAL DSMCA

The DSMCA for nonresidential service ("NDSMCA") shall be a percentage adjustment applicable to all base rates for customers receiving service under rate Schedules CG and IG and shall be calculated as follows:

$$NDSMCA = \frac{NDSM\ Cost + NDSM\ Deferred + NDSM\ Bonus}{N\ CCount * NS\&F + N\ Sales * N\ Rates} + PDSMCA$$

Where:
1) NDSM Cost is the CDSC of nonresidential DSM Programs for the following calendar year revised annually by a October 1 filing
2) NDSM Deferred is the positive or negative difference between the projected cost of nonresidential DSM Programs and amounts collected from nonresidential customers during the prior calendar year, including DSM Interest, revised annually by a April 1 filing
3) NDSM Bonus is the nonresidential allocated portion of the total DSM Bonus from the previous calendar year revised annually by a April 1 filing
4) N CCount is the Company's forecasted nonresidential customer count for the twelve calendar months following the effective date of the NDSMCA
5) NS&F is the Service and Facility Charges applicable for nonresidential service (Schedules CG and IG separately) in effect on the effective date of the NDSMCA
6) N Sales is the Company's forecasted nonresidential usage (Schedules CG and IG separately) in therms for the twelve calendar months following the effective date of the NDSMCA
7) N Rate is the Usage Charge per therm applicable for nonresidential service (Schedules CG and IG separately) in effect on the effective date of the NDSMCA

(Continued on Sheet No. 42C)

ADVICE LETTER NUMBER _____ ISSUE DATE _____

DECISION NUMBER _____ MANAGING DIRECTOR, Government & Regulatory Affairs EFFECTIVE DATE January 1, 2009

PUBLIC SERVICE COMPANY OF COLORADO

P.O. Box 840
Denver, CO 80201-0840

Sheet No. 42C

Cancels
Sheet No. _____

NATURAL GAS RATES
DEMAND-SIDE MANAGEMENT COST ADJUSTMENT

N

PRIOR DEMAND-SIDE MANAGEMENT COST ADJUSTMENT

The PDSMCA will recover the costs incurred prior to January 1, 2009 associated with the Company's DSM programs in place on or prior to May 22, 2007, including those costs that historically have been capitalized and are amortized over a five-year period as well as those costs that are expensed and recovered over 12 months. The PDSMCA shall continue to be recovered through the DSMCA until such time as one hundred percent (100%) of the amortized costs and expenditures have been recovered. In the event that any deferred amounts remain after all such amortized costs and expenditures have been recovered, such deferred balance, whether positive or negative shall be allocated in the RDSM Deferred and NDSM Deferred balances. The PDSMCA shall be a percentage adjustment that is added to the percentage adjustments for the RDSMCA and the NDSMCA and shall be a percentage rider applied to all base rates for Gas Transportation Service. The PDSMCA shall be as follows:

$$PDSMCA = \frac{A * B + C + D}{E}$$

Where:

1) A is the Prior DSM Program amortized balance at year end of the previous calendar year as amortized over a five year period
2) B is the Commission-authorized gas rate of return
3) C is the grossed up income tax amount on A*C
4) D is the amortization expense of the prior DSM program deferred costs
5) E is the total gas base rate revenue for the prior calendar year

(Continued on Sheet No. 42D)

ADVICE LETTER NUMBER _____

DECISION NUMBER _____

MANAGING DIRECTOR, Government & Regulatory Affairs

ISSUE DATE _____

EFFECTIVE DATE January 1, 2009

COLO. PUC No. 6 Gas Settlement Appendix C

PUBLIC SERVICE COMPANY OF COLORADO

Sheet No. 42D

P.O. Box 840
Denver, CO 80201-0840

Cancels
Sheet No. _____

NATURAL GAS RATES
DEMAND-SIDE MANAGEMENT COST ADJUSTMENT
RATE TABLE

N

Residential Service		
RG	6.04 %	I
Commercial & Industrial Sales Service		
CG	3.49%	I
IG	3.49%	I
Gas Transportation Service		
TF	0.92%	
TI	0.92%	

ADVICE LETTER NUMBER _____

ISSUE DATE _____

DECISION NUMBER _____

MANAGING DIRECTOR,
Government & Regulatory Affairs

EFFECTIVE DATE January 1, 2009

APPENDIX D

Appendix D

COLO. PUC No. 7 Electric Exhibit No. TJS-5

PUBLIC SERVICE COMPANY OF COLORADO

Sheet No. 107C

P.O. Box 840
Denver, CO 80201-0840

Cancels
Sheet No. _____

ELECTRIC RATES

DEMAND SIDE MANAGEMENT COST ADJUSTMENT

RATE TABLE

Rate Schedule	Applicable Charge	Monthly Rider Rate	
Residential Service			
R	Energy Charge	$0.00304/kWh	I
RD	Demand Charge	0.80/kW-Mo	I
Small Commercial Service			
C	Energy Charge	0.00319/kWh	I
Commercial & Industrial General Service			
SGL	Energy Charge	0.01203/kWh	I
SG	Demand Charge	0.96/kW-Mo	I
PG	Demand Charge	0.94/kW-Mo	I
TG	Demand Charge	0.92/kW-Mo	I
Special Contract Service			
SCS-7	Production Demand Charge	0.94/kW-Mo	I
Standby Service			
SST	Gen Standby Capacity Reservation Fee	0.13/kW-Mo	I
	Usage Demand Charge	0.83/kW-Mo	I
PST	Gen Standby Capacity Reservation Fee	0.12/kW-Mo	I
	Usage Demand Charge	0.82/kW-Mo	I
TST	Gen Standby Capacity Reservation Fee	0.12/kW-Mo	I
	Usage Demand Charge	0.80/kW-Mo	I
Lighting Service			
RAL, CAL, PLL, SL, SSL SHL, SLU	Energy Charge	0.00306/kWh	I
TSL	Energy Charge	0.00158/kWh	I

ADVICE LETTER NUMBER _____

DECISION NUMBER _____

MANAGING DIRECTOR, Government & Regulatory Affairs

ISSUE DATE August 11, 2008

EFFECTIVE DATE January 1, 2009

CERTIFICATE OF SERVICE

I hereby certify that on the 28th day of October 2008, the original and seven (7) copies of the **STIPULATION AND SETTLEMENT AGREEMENT** were served via hand delivery in Docket 08A-366EG to the following:

Doug Dean, Director
Colorado Public Utilities Commission
1560 Broadway, Suite 250
Denver, CO 80202

and copies were hand delivered or served via United States Mail and served via email on all Parties on this service list.

Bill Vidal
Manager of Public Works
201 W. Colfax, Dept. 608
Denver CO 80202

Russell W. Ray, PLLC
6212-A Old Franconia Road
Alexandria, VA 22310
*Holly Rachel Smith, Esq.
Wal-Mark & Sam's West
holly@raysmithlaw.com

Anne K. Botterud
Office of Attorney General
1525 Sherman St., 5th Floor
Denver, CO 80203
Anne.botterud@state.co.us

Christopher M. Irby
Office of Attorney General
Chris.irby@state.co.us

P.B. Schechter
Office of Consumer Counsel
Pb.Schechter@dora.state.co.us

Stephen W. Southwick
Office of Attorney General
Stephen.southwick@state.co.us
Dale.hutchins@state.co.us
Chere.Mitchell@dora.state.co.us

Mariya Barmak
Becky Bye
Advisory Counsel
Mariya.barmak@state.co.us
Becky.bye@state.co.us

Jeff Ackerman
Advisory Staff
1560 Broadway, #250
Denver, CO 80202
Jeffrey.ackerman@dora.state.co.us

Thorvald A. Nelson
Robyn A. Kashiwa
Colorado Energy Consumers
tnelson@hollandhart.com
rakashiwa@hollandhart.com
Koriley@hollandhart.com

Ron Davis
Paul Caldara
Karl Kunzie
Billy Kwan
Trial Staff
Ronald.davis@dora.state.co.us
Paul.caldara@dora.state.co.us
Karl.kunzie@dora.state.co.us
Billy.kwan@dora.state.co.us

Karl F. Kumli, III
*Mark Detsky
Paul Kriescher
Robert Bowles
Energy Efficiency Business Coalition
karlk@dietzedavis.com
mdetsky@gmail.com
paulk@lightlytreading.com
Robert@energyefficiencybusinesses.org

Jerry W. Goad
National Resources & Envir.
Jerry.goad@state.co.us

Morey Wolfson
Governor's Energy Office
Morey.wolfson@state.co.us

Richard L. Fanyo
Mark A. Davidson
Michelle Brandt King
rfanyo@duffordbrown.com
mdavidson@duffordbrown.com
mking@duffordbrown.com

Michael L. Kurtz
Kurt J. Boehm
Kroger Company
mkurtz@BKLlawfirm.com
kboehm@BKLlawfirm.com

Howard Geller
Southwest Energy Efficiency Project
hgeller@swenergy.org

Steven S. Michel
Victoria R. Mandell
Western Resource Advocates
smichel@westernresources.org
vmandell@westernresources.org

Leslie Glustrom
lglustrom@gmail.com

Nancy LaPlaca
nancylaplaca@yahoo.com

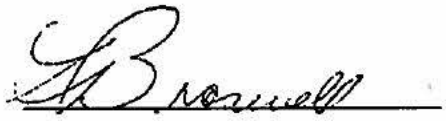
John Baeverstad
John.b@vlplighting.com

Sue Ellen Harrison
Jonathan Koehn
Sarah Van Pelt
Leslie Lacy
Ann Livingston
Boulder, City and County
harrisons@bouldercolorado.gov
koehnj@bouldercolorado.gov
vanpelts@bouldercolorado.gov
llacy@bouldercounty.org
alivingston@bouldercounty.org

Ronal W. Larson
Ratepayers United of Colorado
rongretlarson@comcast.net

Jeffrey G. Pearson
Jennifer Gremmert
Energy Outreach Colorado
Jgplawqwest.net
jgremmert@energyoutreach.org

G. Harris Adams
Administrative Law Judge
Harris.adams@dora.state.co.us



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