BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

DOCKET NO. 09AL-299E

IN THE MATTER OF ADVICE LETTER NO. 1535 BY PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO PUC NO. 7 ELECTRIC TARIFF TO REFLECT REVISED RATES AND RATE SCHEDULES TO BE EFFECTIVE ON JUNE 5, 2009

ANSWER TESTIMONY OF

RICHARD COLLINS

ON BEHALF OF THE

SOUTHWEST ENERGY EFFICIENCY PROJECT

October 2, 2009

Q. Please state your name and occupation.

A. My name is Richard S. Collins. I am an Associate Professor of Economics and Finance at Westminster College located at 1840 South 1300 East, Salt Lake City, UT 84108.

Q. On whose behalf are you filing testimony in this Docket?

A Southwest Energy Efficiency Project, better known by its acronym SWEEP, is a private non-profit organization that strives to advance more efficient energy use in Colorado and five other states in the region.

Q. Have you submitted testimony to the Colorado Public Utilities Commission (the "PUC" or the "Commission") before?

A. I submitted written comments to the Commission in its Docket No. 08I-420EG "In The Matter Of The Investigation Of Regulatory And Rate Incentives For Customers Of Gas And Electric Utilities."

Q. Do you have experience in utility regulatory matters?

A. Yes. Prior to my position at Westminster College, I worked for the Public Service Commission of Utah (the "Utah Commission") for approximately 13 years. After leaving the Utah Commission in 2001, I have represented the interests of a number of clients before the Utah Commission, mostly for parties that are either interested in developing renewable resources within the state or public interest groups such as SWEEP that desire a regulatory environment that is conducive to the efficient utilization of electricity.

Q. Please describe some of your responsibilities at the Utah Commission.

A. I worked as a Staff advisor to the Utah Commission. Under Utah statutes, Utah Commission staff can only perform an advisory role and cannot advocate or testify for a particular position. In this role, I provided technical and policy advice to the Utah Commission on rate proceedings and a variety of other issues. I drafted the Standards and Guidelines for Integrated Resource Planning for PacifiCorp and Questar Gas and was responsible for tracking the IRP planning process. I headed the Utah Commission's investigations into avoided cost and demand-side management issues; I drafted the cost of capital as well as other sections of major rate cases. I was active in deregulation issues and wrote or coauthored a series of technical reports on deregulation issues for the Utah Commission and the legislature. My experience and qualifications are further described in my Statement of Qualifications, which is attached as Exhibit RSC-1 to this testimony.

SUMMARY OF TESTIMONY

Q: What is the purpose of your testimony in this docket?

A: I advocate that the Commission implement some of the important findings it made regarding rate design in Docket No. 08I-420EG. The Public Service Company of Colorado (the "Company" or "PSCo") and its ratepayers face some substantial changes in the next few years. Although the recession has lowered the projected growth in demand for electricity, it is anticipated that growth for electricity will continue after the recession ends, leading to the need for additional generation resources. In general, these new resources will be more expensive than existing resources and thus result in higher rates for ratepayers. The Commission has the opportunity to mitigate these negative impacts by adopting innovative rate designs. The new rates should send strong price signals to ratepayers and reflect the true cost of these new resources. A Commission approved innovative rate design can encourage the efficient use of electricity, conserve resources and thus mitigate the need for future rate cases. The rate design advocated by SWEEP will force ratepayers to recognize that additional use of energy is costly and increased usage will eventually lead to higher future rates. The rate design is intended to invoke a demand response that will encourage ratepayers to conserve energy and invest in more efficient appliances and to otherwise use electricity more efficiently. I reviewed and critiqued the Company's proposal for residential rates and SWEEP makes a number of suggestions for improving the Company's analysis. I propose two residential inverted rate designs for Commission consideration. The first is a four-tiered summer rate with a two-tier winter rate with the breakpoint between tiers set at 400 kWh, 1000 kWh and 2000 kWh for the summer months. The two winter tiers are delineated at 700 kWh. The second proposal, a variation of the first proposal, maintains the winter breakpoint at 700 kWh, but changes the summer breakpoints to 200 kWh, 700kWh and 2000 kWh. The goal of these rate structures is to encourage higher usage customers to cut consumption and reduce peak loads. In addition, I recommend that the Commission reject the Company's requested increase in the customer charge and place this additional revenue requirement in base rates which will help to stimulate energy efficiency and demand response.

Q: **Could you give a summary of your conclusions and recommendations?**

A: A four-tiered summer rate design coupled with a two-tiered winter rate design provides consistent pricing signals year round and reflects the cost of operating the system. The summer tiers should be set at 200 kWh, 700 kWh and 2000kWh, while the breakpoint between the two winter tiers should be set at 700 kWh. SWEEP's recommended rate design produces better results than the Company's proposal in terms of reductions in system electricity consumption and in reductions in peak. The Commission should reject the Company's request for an increase in the residential customer charge and collect this additional revenue in base rates. By doing so, I estimate the Commission can achieve an additional 0.3% savings in both residential electricity consumption and residential contribution to peak.

BACKGROUND

Q: **What are the fundamental considerations that the Commission should take into account when setting rate design?**

A: According to James Bonbright,[1] the criteria for ratemaking are listed in the table below in relative order of importance.

Bonbright's Criteria for Ratemaking

1. Does the rate provide adequate revenue recovery to the utility?
2. Does the rate promote fairness in cost allocation (equity between customer classes)?

1 See *Principles of Public Utility Rates* by James C. Bonbright, Albert L. Danielsen, and David R. Kamerschen (Hardcover - Mar 1, 1988).

3. Does the rate promote efficient resource use?
4. Is the rate practical to implement (understanding, acceptance)?
5. Is the rate easy to interpret (noncontroversial)?
6. Does the rate provide revenue stability for the utility?
7. Does the rate provide bill stability for customers?
8. Does the rate avoid undue discriminate amongst customers?

Bonbright's criteria for rate design are as relevant today as they were when he wrote them decades ago. The Commission should review the criteria for ratemaking and decide its priorities and goals. Next the Commission should figure out how to apply these criteria to effectively meet the Commission's goals. There will be times when there are conflicts between the ratemaking criteria and in such instances the Commission should choose which criterion takes priority. I agree with Bonbright that the number one criterion for ratemaking is to insure adequate revenue recovery for the utility. The second criterion is also important to insure fairness in cost allocation between customer classes. Bonbright's third criterion cites efficient resource use, thus pricing should encourage technical and economic efficiency. Economic theory tells us that allocative efficiency occurs when prices equal marginal costs. The use of increasing tiered rates recognizes the reality that the marginal cost of electricity production is higher than the average cost of electricity; thus the greater use of electricity leads to higher rates for all.

Q: Why should the Commission implement a major change in rate design at this time?

A: The Commission has already studied this issue in its Docket No. 08I-420EG and has come to the conclusion that inverted block rates should be filed by the Company in the Phase II portion of this rate case. It is important to implement an inverted block rate at this time because of rising costs of new generation and the likelihood that a carbon tax or carbon cap and trade regime will be adopted at some point in the near future. By encouraging conservation and energy efficiency, a strong inverted block rate design will reduce dependence on fossil fuel resources and mitigate to some degree the costs associated with a future carbon tax or cap and trade regime.

Q: Why is it the responsibility of the Commission to set prices to encourage the efficient use of electricity?

A: A well functioning market system is the most effective mechanism ever developed to allocate scarce resources. The market uses relative prices as a signal to producers to increase production during times of scarcity and as a signal to consumers to adjust their consumption patterns. The most effective way to change consumption patterns is to change prices. Note what happened in the automobile market in response to rising gasoline costs. It wasn't until the price of gasoline rose above $4.00 per gallon that consumers started to drastically change their behavior. As a result, the sales of SUVs and trucks plummeted and American auto manufacturers were forced to the brink of bankruptcy. In the electric utility industry a competitive market at the retail level does not exist for consumers. Thus, it is the responsibility of the Commission to provide guidance to the Company and its ratepayers and to set prices that will produce efficient results. The state of the electricity market should be kept in mind when choosing the policy goals of the Commission and how the design of rates will best meet those goals. When costs of new resources are rapidly rising then prices must be designed to reflect that fact. Bonbright lists adequate revenue recovery as the primary goal for ratemaking with the second goal being fairness in cost allocation. However, in today's environment, the Commission should put greater emphasis on efficient pricing to help lower costs in the future.

<u>REVIEW OF COMPANY'S PROPOSAL</u>

Q: Could you summarize the Company's recommendations for rate design for residential customers?

A: The Company is proposing a two-tiered, summer-only inverted block rate design for residential customers. The first tier will be priced at 5.1 cents which will be approximately a 0.4 cent reduction in the current rate. The second tier is priced at 8 cents a kWh for the base rate. The non-summer or winter rate is also lowered to 5.1 cents per kWh. The Company is also proposing an increase in the customer charge from $6.25 to $6.75, an 8% increase.

Q: How did the Company arrive at this recommendation?

A: The Company hired Dr. Ahmad Faruqui from the Brattle Group, an economics consulting firm, to produce a model that would test the impacts of various pricing scenarios using different combinations of tiers and prices. The model attempts to predict the effects of rate design on residential energy usage and residential contribution to peak load. The Company adopts one of the rate designs developed by Dr. Faruqui. Company witness Mr. Brockett states that the Company is basing the inverted block rates on cost principles. The pricing of the last summer tier should conform to the marginal cost of providing service during the summer peak period. However the Company also cites that the two-tiered rate structure should be simple and easy to understand and should mitigate adverse customer impacts from higher bills. The Company also cites the need to address revenue stability for the Company.

Q: Do you care to comment on the Company's proposal at this time.

A: I will make more detailed comments later in my testimony, but suffice it to say the Company adopts a inverted tiered structure that does not comport with marginal cost principles and appears to be more concerned with mitigating rate impacts on customers and ensuring revenue stability than encouraging more efficient utilization of electricity.

Q: Can you comment on Dr. Faruqui's testimony and how Dr. Faruqui structured his rate design model?

A: He created a spread sheet model which appears to be populated with data that combines both historical and forecasted test year consumption data for residential customers.· Five different scenarios with various tier structures and prices were analyzed. He incorporates an elasticity response into his model and estimates the impact on residential energy usage and peak demand.

Q: Dr. Faruqui has five different scenarios in which he tests the impact on the PSCo system. Can you briefly describe these?

A: His first scenario is a simple two-tiered rate structure that only applies to the summer months of June, July, August and September. It allows for revenue neutrality after adjustments for customer price responses. The break point for the two summer tiers occurs at 500 kWh. This scenario has a base rate at of 5.1 cents and the second tiered rate at 8 cents. The second variation of this scenario has the same break point of 500 kWh, but a base rate for the second tier is set at 10 cents with a corresponding first tier rate of 4.8 cents. Faruqui keeps the winter rate equal to the first tier summer rate in both of these scenarios.

He then creates a three-tiered summer-only rate. In this instance, he places a breakpoint between the two previous tiers, while keeping the same pricing differential between the two-tiered rates. The other two scenarios examine tiered rates for the entire year and divide tiers into a two block rate and a three block rate structure.

Q: Do you agree with Dr. Faruqui's use of elasticity in calculating revenue requirements and do you agree with his elasticity estimates?

A: Although it is uncommon for state utility commissions to incorporate elasticity effects into their determination of revenue requirements, it may be useful in this docket which is considering an inverted block rate design. The purpose of the inverted block rate design is to encourage customers to utilize their energy more efficiently which leads to reduced consumption. If inverted block rates reduce the demand for electricity more than a flat rate design, then the Commission should take such effects into account when changing to inverted block rates. I also agree with Dr. Faruqui's use of different elasticity coefficients for summer and winter usage and his differentiation between lower and higher usage. Customers' responses to changes in prices will be less responsive at low energy usage because the first kWhs that ratepayers consume can be regarded as providing essential services while higher level usage can be regarded as providing more discretionary services which are generally more price elastic. Also, it is taken as an economic given that as prices increase and consumers move up their demand curve, their response becomes more elastic. His estimates of -.26 for the elasticity coefficient for general summer use and -.13 for the elasticity coefficient for low usage levels and for winter usage seem conservative but reasonable.[2]

Q: Do you agree with how Dr. Faruqui modeled his elasticity effects within his spreadsheet model?

A: His illustrative example of a two tiered rate where customers encounter a decrease in the first block and an increase in the second rate is a little confusing but his model does a fair job of incorporating elasticity effects and their impact on energy and peak usage. It appears Dr. Faruqui is measuring elasticity as a change in average prices while economic theory stresses the importance of marginal analysis and postulates that customers respond to marginal prices. The marginal price that the customers face is the price in the last tier that they are using. As

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2 See Espey, James and Espey, Molly " Turning on the Lights: A Meta-Analysis of Residential Electricity Demand Elasticities", Journal of Agricultural and Applied Economics, 36,1 April 2004 p. 65-81 for elasticity estimates. Short run price elasticity estimates range from -.2.01 to -0.004 with a mean of -.35 and a median of -.28. Long run estimates of elasticity have a mean of -.85 and a median of.81.

such, Dr. Faruqui's estimates on customer responses could be underestimated. In this instance the marginal price change is substantially greater than the average change in price or change in bills.

Q: Did you change Dr. Faruqui's model to correct for your interpretation of elasticity effects?

A: No, given the complexity of the models and the fact that the models' macros were non-functional when I received them, I have kept Dr. Faruqui's interpretation of elasticity effects in my adapted model. However, in my four-tiered rate example, I increased the estimate for elasticity to -.4 for the third block and -.5 for the fourth block. These estimates are still very inelastic but reflect the fact that elasticity effects increase as consumers move up their demand curve with an increase in price.

Q: Is there some way to justify Faruqui's modeling of elasticity?

A: One could argue that unsophisticated consumers might not respond to changes in marginal prices but to changes in their bills. Thus, they respond to average price changes and therefore the response will be muted given that the average increase in their bill will be less than the increase in the price of the last tier However, this mixed price response should only occur once when the new tiered tariff is first implemented. With time, consumers will realize that their bills are determined by their marginal increase or decrease in consumption which is controlled by the prices in the tier corresponding to their marginal usage.

Q: What general conclusions do you draw from Dr. Faruqui's results?

A: His model and analysis provide for some interesting results and there are a couple of general conclusions that can be inferred from the analysis. First, a year round-tiered rate structure versus a summer-only tiered structure will result in higher overall energy savings during the year but will result in lower peak savings during the summer. Given that the Loss Of Load Probability (LOLP) occurs exclusively in the summer peak period, peak savings are particularly valuable and should take precedence over year round energy saving. The second conclusion reached is that greater pricing differentials between tiers will yield both higher energy savings and higher peak savings. Therefore, if customer response is a key policy goal behind rate design, then price differentials between blocks should be substantial.

Q: What is the impact of increasing the number of tiers in a rate structure on energy usage and peak reductions?

A: From Dr. Faruqui's results one might infer that fewer tiers lead to greater reductions in energy usage and peak. But this is just an anomaly of his selection of tiers and pricing within those tiers. Rather than add a third tier with higher prices, Dr. Faruqui chooses to add an additional tier in between the two tiers and selects a price in between the original first and second tiered prices. This appears to be the reason that the impacts on the system with his three-tiered rate design are smaller than his two tiered rates.

Q: Which rate design proposal analyzed by Dr. Faruqui had the biggest impact on the system in terms of reductions in overall energy and reductions in system peak?

A: The rate design that had the biggest impact on over all system energy reduction was the two-tiered year round rate, but it had one of the smallest decreases in system peak. The rate design that had the largest impact on peak reduction was the summer-only two tiered rate. But as discussed above, a three-tiered rate design would have a bigger impact as long as there were bigger differentials between the blocks. (See Company Exhibit AF-4 for the results of Dr. Faruqui's rate designs.)

Q: What are your conclusions regarding Dr. Faruqui's model?

A: The model does a good job of estimating the probable impact on system usage and system peak, given its assumptions on elasticity and assumptions about the relationship between residential consumption of electricity and their contribution to peak load. However, there may be some issues about the use of both historical and projected usage levels that may affect the results.[3] In addition, the model was not easily adaptable if the user wanted to change the number of tiers and the breakpoints between tiers.

Q: What are your conclusions regarding the Company's recommended rate design for residential customers?

A: The Company recommends a rate design that in my opinion is too conservative

3 See Company's response to SWEEP's data request 1-5. Attachment SWEEP1-5.A1.xls to view how both historical and projected usage is combined for test year data.

and does not achieve enough savings in energy consumption and system peak to warrant adoption. The Commission should adopt a residential rate design that achieves greater system savings and thus could lead to fewer rate increases in the future. In addition, the Company's proposed pricing of its last tier at 8 cents per kWh is far below its estimate of the marginal cost of providing service during the summer peak period which by the Company's estimate is almost 13 cents per kWh. Although the Company argues that marginal costs of the peak summer period should guide the pricing of the last tier, it appears that the Company has chosen to place rate mitigation and revenue stability goals ahead of efficient pricing goals.

SWEEP'S RESIDENTIAL RATE DESIGN PROPOSALS

Q: What does SWEEP propose for rate design for residential customers?

A: SWEEP analyzed a number of rate designs for residential customers and concluded that a four-tiered summer rate with a two-tiered winter rate provides the best results in the short run and we also believe in the long run as well. We are convinced that the rate differential between tiers should be accentuated to achieve the desired results. We believe that price signals can change behavior and in so doing help the system as a whole.

Q: Can you describe your rate design analysis?

A: We adapted Dr. Faruqui's Prism Model (labeled IBR on his spread sheet) so that various rate design options could be analyzed. We then analyzed a number of different rate design options both in terms of the number of tiers, their break points and the rate differentials between tiers. We were able to change the breakpoints between tiers and add additional tiers for analytical purposes. Dr. Faruqui's IBR model estimates elasticity effects of the rate changes and then calculates the impact on the system's year round energy consumption and the system's peak. We kept the IBR model's calculation of elasticity but changed some of the elasticity coefficients when appropriate. Although the version of the IBR model that we received did not have functioning macros, we were able to duplicate his results and analyze the impacts of our proposals.

Q: Can you describe the rate designs proposals that you have analyzed?

A: We analyzed a number of different rate designs before settling on two to present to the Commission. The first proposal is a four-tiered summer rate with a two-tiered winter rate. The summer breakpoint between the first and second tier is 400 kWh, between the second and third tier the breakpoint is 1000, and between the third and fourth tiers it is 2000 kWh. We use 700 kWh as the breakpoint between the two tiers in winter months. The summer rates would apply in June, July, August and September and the winter rates in the remaining months. The rates for the first two summer tiers were used as the differential for the two winter tiers. The price differential between tiers was a 50% increase between tier one and tier two, 100% increase between tier one and tier three, and a 200% increase between tier one and four. Variations of Proposal #1 were run that varied elasticity estimates for higher tiers. The details of Proposal #1 are shown in Exhibit RSC-2.

Proposal #2 is the same as Proposal #1 except that the breakpoints were changed to incorporate a lifeline rate for consumers who use 200 kWh or less. This is somewhat consistent with what we believe is a proposed rate design of Commission staff. The first tier ends at 200 kWh, the second tier ends at 700 kWh and the third tier ends at 2000 kWh. Once again, the two-tiered winter rate has a 700 kWh breakpoint. A variation of Proposal #2 was also made using different elasticity assumptions. Details of Proposal #2 are shown in Exhibit RSC-3.

Q: What conclusions can you draw from the results of these two proposals?

A: With our higher elasticity assumptions, Proposal #1 results in a 1.9% reduction in residential system electricity consumption and a 4.1% reduction in residential system peak. This rate design results in considerably more savings than the Company's proposed rate design which has an estimate 0.6% reduction in electricity consumption and 1.8% reduction in peak demand.[4] Our proposal #2 yields even greater savings, a 2.1% reduction in energy consumption and a 5.3% reduction in system peak. Because of this, we recommend the adoption of our Proposal #2.

Q: What were the results of the variation of these proposals?

A: In order to provide comparable results that are consistent with the assumptions of Dr. Faruqui's model, we re-estimated the results of our proposals using the elasticity coefficients used by his estimation. The first tier elasticity coefficient

4. Exhibit No. AF-4 contains an error in class impact for its Company's recommended rate design. The number for reduction in system peak was taken before the adjustment rather than from the actual change in system peak

was -0.13 and all other tiers were -0.26. The results for Proposal #1 and Proposal #2 are shown in Exhibits RSC-2 and RSC-3 respectively and a summary of the impact of the SWEEP rate proposals can be seen in Exhibit RSC-4.

Q: Given that the Company's peak demand occurs in the summer, why does SWEEP support a two-tiered rate structure in the winter, along with the four-tiered rate structure in the summer?

A: SWEEP believes that consumers should be sent relatively consistent price signals year round. Prices should be set to signal to customers that greater usage whether it is in the summer or winter will result in higher prices and bills. The difference between winter and summer peaks is not too pronounced. Thus, a change in usage patterns could lead to an increase in LOLP in the winter time, so a consistent pricing regime is desired.

Q: What are the rate impacts on customers who consume different quantities of electricity and therefore are subjected to different prices?

A: For our recommended rate design, i.e., Proposal #2 with no increase in the customer charge, the impact on summer bills varies depending on how much electricity is used. Customers in the first tier, the lifeline rate, will experience a 16% reduction in their bills in the summer. For customers in the second tier, summer bills will increase by 4%. For customers in the third tier, summer bills will increase by 20.7% and in the fourth tier summer bills will increase by 30.2%. It should be kept in mind that these rate increases will be partially offset by a decline in rates in the winter for the first 700 kWh.

Q: Isn't it unfair to the high users to bear such a rate increase in the summer?

A: To answer this question, I believe it is important to look at the distribution of summer time usage amongst customers. As shown in Exhibit RSC-5, customers using 200 kWh or less make up approximately 12.6% of the bills but use less than 2% of the electricity. Customers in the second tier comprise close to 50% of the bills and use 30.6% of the electricity. This means that a little over 60% of the customers use just over 30% of the energy. The customers in the next tier from 700 kWh to 2000 kWh comprise 34.9% of bills and use 53.5% of the energy, while the highest use customers with consumption over 2000 kWh per month in the summer comprise just 3.2% of the bills but consume 14% of the energy. Residential usage of summertime electricity is highly concentrated in the high use tiers. See Exhibit RSC-5 for a breakout of usage by tier for the two SWEEP rate proposals. Thus it is the high users who are placing the largest demands on the system and they should therefore bear the costs of doing so.

Q: How do you justify such a high price in the last tier of the summer period?

A: The Company has stressed, and I fully agree, that the last tier or the tail block rate should be guided by the marginal cost of producing the electricity during the peak. Given that we are determining the base rate which includes generation, transmission and other considerations not captured by the ECA or other separate charges, the marginal costs of these components should be included in the calculation of marginal costs.

Q: What is the Company's estimate for the marginal cost of generation?

A: According to Company witness Scott Brockett, the Company's summer time marginal cost of generation is approximately 13 cents per kWh.[5] This includes the recognition that peak summer energy costs exceed average summer energy costs by 1 cent. It also includes variable O&M expenses. However, this estimate of the cost of marginal generation costs should also include other considerations.

Q: What other considerations should be included in the calculation of the marginal cost of the base rate?

A: Transmission costs are collected in base rates and should be included in the calculation of marginal costs. Although the Company did not calculate marginal transmission costs, it did calculate its embedded transmission costs at 0.55 cents per kWh.[6] This adds .55 cents per kWh to the estimate of marginal costs. This is a conservative estimate given that new transmission is generally more costly than existing transmission.

In addition, the marginal generation is a combustion turbine (CT). Fuel costs per kWh for a CT can be significantly higher than the average fuel costs of the system. Such costs should be reflected in the cost of new generation. This requires the capitalization of energy costs of a combustion turbine. It requires the heat rate of the CT, projected price of natural gas over life of CT and the projected ECA. Another consideration for inclusion into the calculation of marginal generation costs of base rates is the value of avoided emissions; this

5 See SBB-5 line 13.
6 See SBB-10 line 27.

includes NO_X, SO_2 and other potential emissions that will be regulated in the future, most notably CO_2. Currently, carbon emissions carry no explicit costs; however, such costs are anticipated in the future. In fact, the Company's preferred integrated resource plan recognizes this fact by including a shadow price for carbon emissions in cost estimates for different resource portfolios. Thus the value of reduced carbon emissions should be included in the calculation of marginal costs of new generation.

Q: What is your estimate of the cost for the marginal generation, transmission and all other relevant considerations?

A: Although I have not made an explicit calculation, I would estimate that the inclusion of the other components would add an additional 2 cents or more per kWh to Mr. Brockett's estimate of 13 cents per kWh. Thus a rate for the last tier based on marginal costs should be in the 15 cent range.

Q: The Company has recommended a two-tiered rate in part to keep the rate structure simple and easy to understand. Can you comment on whether customers would be able to understand a four-tiered rate structure in summer and a two-tiered rate structure in winter?

A: The Company is underestimating the ability of its customers to understand complex rate structures. Colorado citizens encounter inverted block rates in their water bills. For example, the City of Denver has a four-tiered rate structure that has substantial rate differentials. The second tier is twice as high as the initial tier, the third tier is three times the first, and the fourth tier is priced at four times the first tier. (See Exhibit RSC-6 for a complete breakout of the Denver water rates.) Further Commission study of the results of the Denver water rate design is warranted. In addition, many Colorado households own a cell phone and have to decide which of the multitude of rates structures is best. The large per minute charge for usage above the allotted amount results in either a modification of cell phone use or a change in the plan.

Q: Do you believe that the ratepayers of PSCo can comprehend a four-tiered rate structure?

A: Yes, I do. However, SWEEP believes that ratepayers should be educated about the new rate design, why it was implemented, and ways that consumers can reduce their use of electricity in the higher cost tiers and thus reduce their total utility bill.

Q: What is your recommendation regarding the residential customer charge?

A: The Company is recommending a 50 cent increase per month in the residential customer charge, from $6.25 to $6.75. The Company is using 13,796,868 billing units for the residential class which results in an additional revenue collection of $6,898,434. We recommend that the Commission reject this request for an increase in customer charge and instead collect the revenue in base rates. Adding this increase to variable costs rather than fixed costs would encourage more efficient utilization of electricity and lead to lower costs in the long run. By collecting this revenue requirement in base rates rather than the fixed customer charge, I estimate that there will be an additional savings of approximately 0.3%

in both system consumption and system peak (see Exhibit RSC-7). The Commission should as a matter of course shift the collection of revenues from fixed charges to usage charges where feasible to encourage energy efficiency.

Q: Does your rate design proposal provide the same amount of revenue as the Company's proposal?

A: Yes, our examination of rate designs used Dr. Faruqui's model to ensure that revenue neutrality was achieved. However, we did run a scenario where the revenue for the proposed increase in the customer charge was collected in the base rates, but total collection of revenues from the residential class remained the same.

Q: Do you have a preference between the two rate proposals you put forward?

A: SWEEP prefers Rate Proposal #2 because it results in a larger savings in both residential electricity consumption over the year and a larger reduction in system peak. However, if the Commission believes that the division of the tiers in Proposal #1 is more equitable we would support its adoption.

Q: How would your proposed rate designs affect low income customers?

A: As shown in Exhibit RSC-8, low income customers tend to use less electricity than non-low-income customers in all months of the year. But the differential is highest in summer months, presumably because low income customers have much lower air conditioning saturation than middle and upper income customers. Thus low income customers on average will benefit from my rate design proposal, relative to the Company's proposal, because I am recommending a lower rate for the first tier compared to what the Company is recommending. In addition, relatively few low income customers would consume electricity in the higher two tiers; i.e., above 1,000 kWh per month in the summer.

Q: Do you recommend mitigating the rate impact particularly for customers that are in the highest priced blocks?

A: In general SWEEP does not. SWEEP is cognizant about potential adverse impacts on consumers who are high users. Each customer is unique and has a multitude of legitimate reasons for consuming electricity. That said, one can assume that the majority of the high summer time users are using the energy to cool their homes with central air conditioning. Such customers tend to be more affluent and thus can more easily afford higher utility bills, relative to low income customers. Such customers can take steps to reduce their electricity use if they so choose. However, if customers have health issues and need electricity for oxygen or other medical reasons, we suggest that they be given the opportunity for an exemption from the higher tiers. Along similar lines, many state regulatory commissions have protected such customers with no shut-off provisions.

<u>OTHER ISSUES FOR COMMISSION CONSIDERATION</u>

Q: What are your thoughts on Time Of Use (TOU) rates?

A: Generally, I believe that real time TOU rates sends the most accurate price signals to customers regarding the costs that they are placing on the system. The Commission should continue its investigation into TOU rates for larger customer classes and adopt TOU rates where feasible. For residential customers, TOU rates should be optional. One set of customers that may benefit from such an optional TOU rate is customers that participate in net metering. However, for the residential class as a whole the Commission should be cautious and await the results of the Company's Smart Gird experiment in Boulder.

Q: Do you have any recommendations regarding innovative rate designs to encourage conservation and energy efficiency by commercial and industrial customers?

A: Yes I do. I would like to bring to the attention of the Company, the Commission, and other stakeholders an innovative rate design that has been adopted for industrial customers by BC Hydro in Canada. BC Hydro's rates are reviewed and approved by a provincial regulatory body, the British Columbia Utilities Commission. I am not recommending adoption of this rate design for PSCo at this time, but I do believe it merits further consideration and possible implementation in Colorado in the future; e.g., perhaps in the next rate case that the Company files.

Q: What rate design has BC Hydro adopted for large industrial customers?

A: For its very large customers served by the transmissions grid at 60 KV or higher voltage (approximately 300 large customers in the case of BC Hydro), a two tier rate structure has been adopted for energy charges. A copy of this tariff is attached as Exhibit RSC-9 along with some graphics that help explain the concept. The way the tariff works is that each company is assigned a baseline electricity load based on its average monthly energy (GWh) consumption over the previous 12 months. Then going forward, the customer pays a relatively low energy rate (2.608 cents per kWh) for consumption each month up to 90% of its baseline consumption, but a significantly higher price of 7.360 cents per kWh for consumption above the baseline. This tariff was adopted in lieu of a flat rate of 3.1 cents per kWh. New customers pay this flat rate for the first 12 months of their service, until they are assigned a baseline load and then after the first year are shifted onto the two tier rates. Each company's baseline load is then adjusted every 12 months. This two tier rate structure provides a much stronger economic incentive for energy efficiency and conservation for energy use on the margin, compared to traditional flat energy rates.

Q: Could this type of rate design also be applied to smaller industrial customers and larger commercial customers?

A: Yes it could. BC Hydro has not adopted inverted block rates for such customers yet, but it is studying options for doing so (see Exhibit RSC-9, page two).

Q: Does that conclude your testimony?

A: Yes.

Statement of Qualifications

Richard S. Collins

Richard Collins, currently an Associate Professor of Economics and Finance at Westminster College, worked for the Utah Public Service Commission for over 12 years as an economic advisor and technical consultant concentrating on electric and gas issues. Dr. Collins participated in the decision-making process and the writing of Commission orders in all major rate cases involving Rocky Mountain Power and Questar Gas during his employment. While at the Commission, Dr. Collins' other responsibilities included: Integrated Resource Planning (IRP), Renewable Resources, Demand-Side Resources, Avoided Costs and Qualifying Facilities, Deregulation and other public policy issues. Dr. Collins chaired or co-chaired a variety of advisory committees established by the Commission to investigate these issues. He is the author or co-author of a number of reports and studies submitted to the Utah Commission and the Utah Legislature on public utility matters. After leaving the Commission, Dr. Collins has consulted for wind developers and advocates of renewable resources. Clients include Renewable Energy Systems of North America (RES), Wasatch Wind and Salt Lake City Million Solar Roof Partnership. He represented his wind development clients in a number of proceedings before the Utah Public Service Commission. Written and oral testimony was provided by Dr. Collins in dockets on avoided costs methodology, contract provision for power purchase agreements and transmission line losses associated with wind development. The IRP proceedings in which Dr. Collins was actively involved resulted in the IRP plan that included over 1400 MWs of wind as the least-cost, least-risk alternative. The Million Solar Roof Partnership was able to convince Rocky Mountain Power and the regulatory bodies to start a pilot program for rebates on customer owned photo-voltaic panels. Dr. Collins provided the economic analysis that showed that this rebate program was cost-effective and in the interest of the Company and it ratepayers.

Dr. Collins is currently working with Southwest Energy Efficiency Project to provide testimony on innovative rate design in Utah and Colorado rate cases. Dr. Collins in conjunction SWEEP, Western Resource Advocates and Utah Clean Energy Alliance participated in Rocky Mountain Power's rate case Docket No. 07-035-93 presenting both written and oral testimony. He also represented SWEEP in a second Rocky Mountain Power rate case Docket No. 08-035-38 and its resultant workshops. He participated the Colorado Public Utilities Commission Docket No. 08I-420EG "In The Matter of the Investigation of Regulatory and Rate Incentives for Customers of Gas and Electric Utilities" and presented written and oral comments to the Commission. He is currently preparing testimony in Phase 2 of Docket No. 09AL-299E.

Results for Proposal #1

Rate Proposal #1 Four-tiered Summer Rate & Two-Tiered Winter Rate

Summer Breakpoints at 400, 1000 and 2000 kWh, Winter at 700 kWh

User-Defined Assumptions

	Four Tiered Rate	
Summer		
1st Tier Cutoff	400	kWh/month
2nd Tier Cutoff	1,000	kWh/month
3rd Tier Cutoff	2,000	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.7	cents/kWh
2nd Tier Rate (Base)	7.0	cents/kWh
3rd Tier Rate (Base)	9.3	cents/kWh
4th Tier Rate (Base)	14.0	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
3rd Tier Elasticity	-0.4	
4th Tier Elasticity	-0.5	
Rest of Year		
1st Tier Cutoff	700	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.7	cents/kWh
2nd Tier Rate (Base)	7.0	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
Difference b/w All-In and Base Rate	4.4	cents/kWh

Intermediate Calculations

Summer		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	9.1	cents/kWh
2nd Tier Rate (All-In)	11.4	cents/kWh
3rd Tier Rate (All-In)	13.7	cents/kWh
4th Tier Rate (All-In)	18.4	cents/kWh
Difference b/w tiers 1&2	2.3	cents/kWh
Difference b/w tiers 2&3	2.3	cents/kWh
Difference b/w tiers 3&4	4.7	cents/kWh
Rest of Year		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	9.1	cents/kWh
2nd Tier Rate (All-In)	11.4	cents/kWh
Difference b/w tiers 1&2	2.3	cents/kWh
Revenue neutral for class?	Yes	

Output

	Four Tiered Rate
Before Response	
Class revenue change (%)	4.2%
Class revenue change (millions of $)	20.1
After Response	
System consumption change (%)	-1.9%
System consumption change (GWh)	-167.5
Class revenue change (%)	0.0%
Class revenue change (million of $)	0
System peak change (%)	-4.1%
System peak change (MW)	-76.9

Lower Elasticities Results for Proposal #1

Rate Proposal #1 Four-tiered Summer Rate & Two-Tiered Winter Rate

Summer Breakpoints at 400, 1000 and 2000 kWh, Winter at 700 kWh

User-Defined Assumptions

	Four Tiered Rate	
Summer		
1st Tier Cutoff	400	kWh/month
2nd Tier Cutoff	1,000	kWh/month
3rd Tier Cutoff	2,000	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.6	cents/kWh
2nd Tier Rate (Base)	6.9	cents/kWh
3rd Tier Rate (Base)	9.2	cents/kWh
4th Tier Rate (Base)	13.8	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
3rd Tier Elasticity	-0.26	
4th Tier Elasticity	-0.26	
Rest of Year		
1st Tier Cutoff	700	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.6	cents/kWh
2nd Tier Rate (Base)	6.9	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
Difference b/w All-In and Base Rate	4.4	cents/kWh

Intermediate Calculations

Summer		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	9.0	cents/kWh
2nd Tier Rate (All-In)	11.3	cents/kWh
3rd Tier Rate (All-In)	13.6	cents/kWh
4th Tier Rate (All-In)	18.2	cents/kWh
Difference b/w tiers 1&2	2.3	cents/kWh
Difference b/w tiers 2&3	2.3	cents/kWh
Difference b/w tiers 3&4	4.6	cents/kWh
Rest of Year		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	9.0	cents/kWh
2nd Tier Rate (All-In)	11.3	cents/kWh
Difference b/w tiers 1&2	2.3	cents/kWh
Revenue neutral for class?	Yes	

Output

	Four Tiered Rate
Before Response	
Class revenue change (%)	2.5%
Class revenue change (millions of $)	11.7
After Response	
System consumption change (%)	-1.1%
System consumption change (GWh)	-97.5
Class revenue change (%)	0.0%
Class revenue change (million of $)	0
System peak change (%)	-2.5%
System peak change (MW)	-46.8

Results for Proposal #2

Rate Proposal #2 Four-tiered Summer Rate & Two-Tiered Winter Rate

Summer Breakpoints at 200, 700 and 2000

User-Defined Assumptions

	Four Tiered Rate	
Summer		
1st Tier Cutoff	200	kWh/month
2nd Tier Cutoff	700	kWh/month
3rd Tier Cutoff	2,000	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.5	cents/kWh
2nd Tier Rate (Base)	6.7	cents/kWh
3rd Tier Rate (Base)	8.9	cents/kWh
4th Tier Rate (Base)	13.4	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
3rd Tier Elasticity	-0.4	
4th Tier Elasticity	-0.5	
Rest of Year		
1st Tier Cutoff	700	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.5	cents/kWh
2nd Tier Rate (Base)	6.7	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
Difference b/w All-In and Base Rate	4.4	cents/kWh

Intermediate Calculations

Summer		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	8.9	cents/kWh
2nd Tier Rate (All-In)	11.1	cents/kWh
3rd Tier Rate (All-In)	13.3	cents/kWh
4th Tier Rate (All-In)	17.8	cents/kWh
Difference b/w tiers 1&2	2.2	cents/kWh
Difference b/w tiers 2&3	2.2	cents/kWh
Difference b/w tiers 3&4	4.5	cents/kWh
Rest of Year		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	8.9	cents/kWh
2nd Tier Rate (All-In)	11.1	cents/kWh
Difference b/w tiers 1&2	2.2	cents/kWh
Revenue neutral for class?	Yes	

Output

	Four Tiered Rate
Before Response	
Class revenue change (%)	4.6%
Class revenue change (millions of $)	21.9
After Response	
System consumption change (%)	-2.2%
System consumption change (GWh)	-192.7
Class revenue change (%)	0.0%
Class revenue change (million of $)	0
System peak change (%)	-5.2%
System peak change (MW)	-98.2

Lower Elasticity Results for Proposal #2
Rate Proposal #2 Four-tiered Summer Rate & Two-Tiered Winter Rate

Summer Breakpoints at 200, 700 and 2000 kWh

User-Defined Assumptions

	Four Tiered Rate	
Summer		
1st Tier Cutoff	200	kWh/month
2nd Tier Cutoff	700	kWh/month
3rd Tier Cutoff	2,000	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.4	cents/kWh
2nd Tier Rate (Base)	6.6	cents/kWh
3rd Tier Rate (Base)	8.8	cents/kWh
4th Tier Rate (Base)	13.1	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
3rd Tier Elasticity	-0.26	
4th Tier Elasticity	-0.26	
Rest of Year		
1st Tier Cutoff	700	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.4	cents/kWh
2nd Tier Rate (Base)	6.6	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
Difference b/w All-In and Base Rate	4.4	cents/kWh

Intermediate Calculations

Summer		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	8.8	cents/kWh
2nd Tier Rate (All-In)	11.0	cents/kWh
3rd Tier Rate (All-In)	13.2	cents/kWh
4th Tier Rate (All-In)	17.5	cents/kWh
Difference b/w tiers 1&2	2.2	cents/kWh
Difference b/w tiers 2&3	2.2	cents/kWh
Difference b/w tiers 3&4	4.4	cents/kWh
Rest of Year		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	8.8	cents/kWh
2nd Tier Rate (All-In)	11.0	cents/kWh
Difference b/w tiers 1&2	2.2	cents/kWh
Revenue neutral for class?	Yes	

Output

	Four Tiered Rate
Before Response	
Class revenue change (%)	2.6%
Class revenue change (millions of $)	12.4
After Response	
System consumption change (%)	-1.2%
System consumption change (GWh)	-105.3
Class revenue change (%)	0.0%
Class revenue change (million of $)	0
System peak change (%)	-3.2%
System peak change (MW)	-60.4

Rate Proposal Comparison

	Proposal #1: Four-Tier Summer (400, 1000, 2000) and Two-Tier Winter (700)		Proposal #2: Four-Tier Summer (200, 700, 2000) and Two-Tier Winter (700)	
	Higher Elasticities	Lower Elasticities	Higher Elasticities	Lower Elasticities
Revenue				
Total class base (millions of $/year)	478	478	478	478
Change in class base (millions of $/year)	0	0	0	0
Change in class base (%)	0	0	0	0
Consumption				
Total class before IBR (GWh/year)	8723	8723	8723	8723
Total class after IBR (GWh/year)	8556	8626	8531	8618
Change in class (GWh/year)	-168	-98	-193	-105
Change in class (%)	-1.9	-1.1	-2.2	-1.2
Peak				
Total class before IBR (MW)	1888	1888	1888	1888
Total class after IBR (MW)	1812	1842	1790	1828
Change in class (MW)	-77	-47	-98	-60
Change in class (%)	-4.1	-2.5	-5.2	-3.2

Distribution of Average Summer Bills and Energy Use by Tier

Proposal #1		
Summer Tier	% of Average Summer Bills by Tier	% of Average Summer Consump by Tier
0-400	33.5%	10.8%
401-1000	45.8%	42.2%
1001-2000	17.5%	33.0%
2000+	3.2%	14.0%

Proposal #2		
Winter Tier Cutoff	% of Total Bills by Tier	% of Total Consumption by Tier
0-200	12.6%	1.9%
201-700	49.2%	30.6%
701-2000	34.9%	53.5%
2000+	3.2%	14.0%

Denver Water Rates

Single-Family Residential Customers		
	Monthly Billing / Usage (Gallons)	**Rate per 1,000 Gallons**
Block 1	0 - 11,000	$1.91
Block 2	12,000 - 30,000	$3.82
Block 3	31,000 - 40,000	$5.73
Block 4	Over 40,000	$7.64

SWEEP's Recommended Rate Proposal #2 with no increase in Residential Customer Charge

User-Defined Assumptions

	Four Tiered Rate	
Summer		
1st Tier Cutoff	200	kWh/month
2nd Tier Cutoff	700	kWh/month
3rd Tier Cutoff	2,000	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.5	cents/kWh
2nd Tier Rate (Base)	6.8	cents/kWh
3rd Tier Rate (Base)	9.1	cents/kWh
4th Tier Rate (Base)	13.6	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
3rd Tier Elasticity	-0.4	
4th Tier Elasticity	-0.5	
Rest of Year		
1st Tier Cutoff	700	kWh/month
Existing Base Rate	5.5	cents/kWh
1st Tier Rate (Base)	4.5	cents/kWh
2nd Tier Rate (Base)	6.8	cents/kWh
1st Tier Elasticity	-0.13	
2nd Tier Elasticity	-0.26	
Difference b/w All-In and Base Rate	4.4	cents/kWh

Intermediate Calculations

Summer		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	8.9	cents/kWh
2nd Tier Rate (All-In)	11.2	cents/kWh
3rd Tier Rate (All-In)	13.5	cents/kWh
4th Tier Rate (All-In)	18.0	cents/kWh
Difference b/w tiers 1&2	2.3	cents/kWh
Difference b/w tiers 2&3	2.3	cents/kWh
Difference b/w tiers 3&4	4.5	cents/kWh
Rest of Year		
Existing Flat Rate (All-In)	9.9	cents/kWh
1st Tier Rate (All-In)	8.9	cents/kWh
2nd Tier Rate (All-In)	11.2	cents/kWh
Difference b/w tiers 1&2	2.3	cents/kWh
Revenue neutral for class?	No	

Output

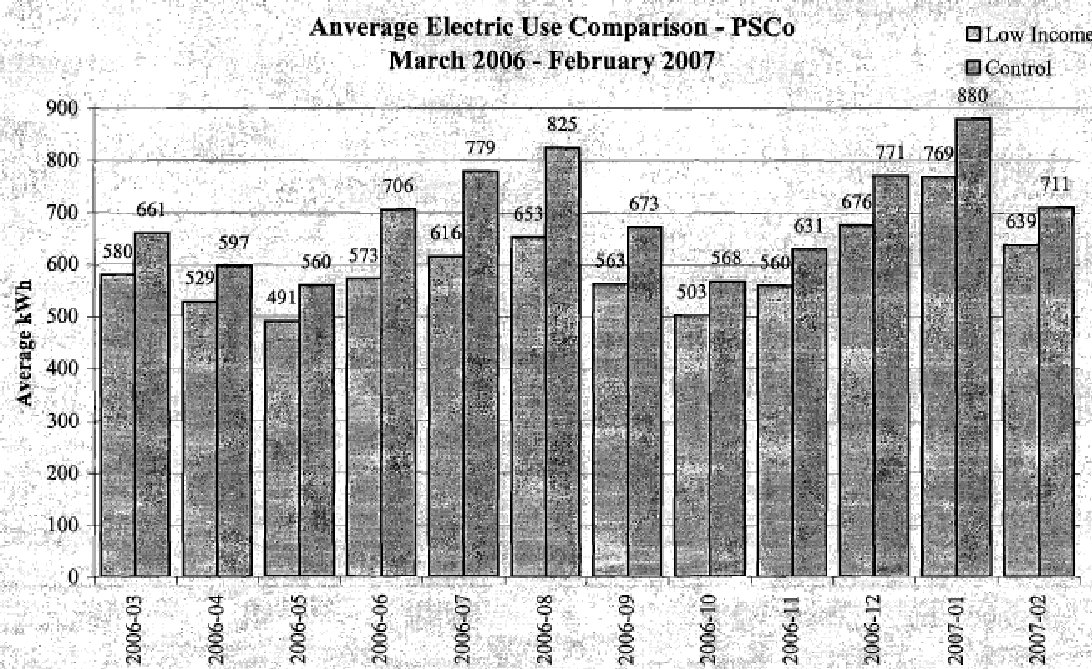
	Four Tiered Rate
Before Response	
Class revenue change (%)	6.5%
Class revenue change (millions of $)	31.0
After Response	
System consumption change (%)	-2.5%
System consumption change (GWh)	-213.9
Class revenue change (%)	1.4%
Class revenue change (million of $)	7
System peak change (%)	-5.5%
System peak change (MW)	-103.9

Exhibit No. RSC-8
Southwest Energy Efficiency Project
Docket No. 09AL-299E

Attachment SWEEP1-3.A1

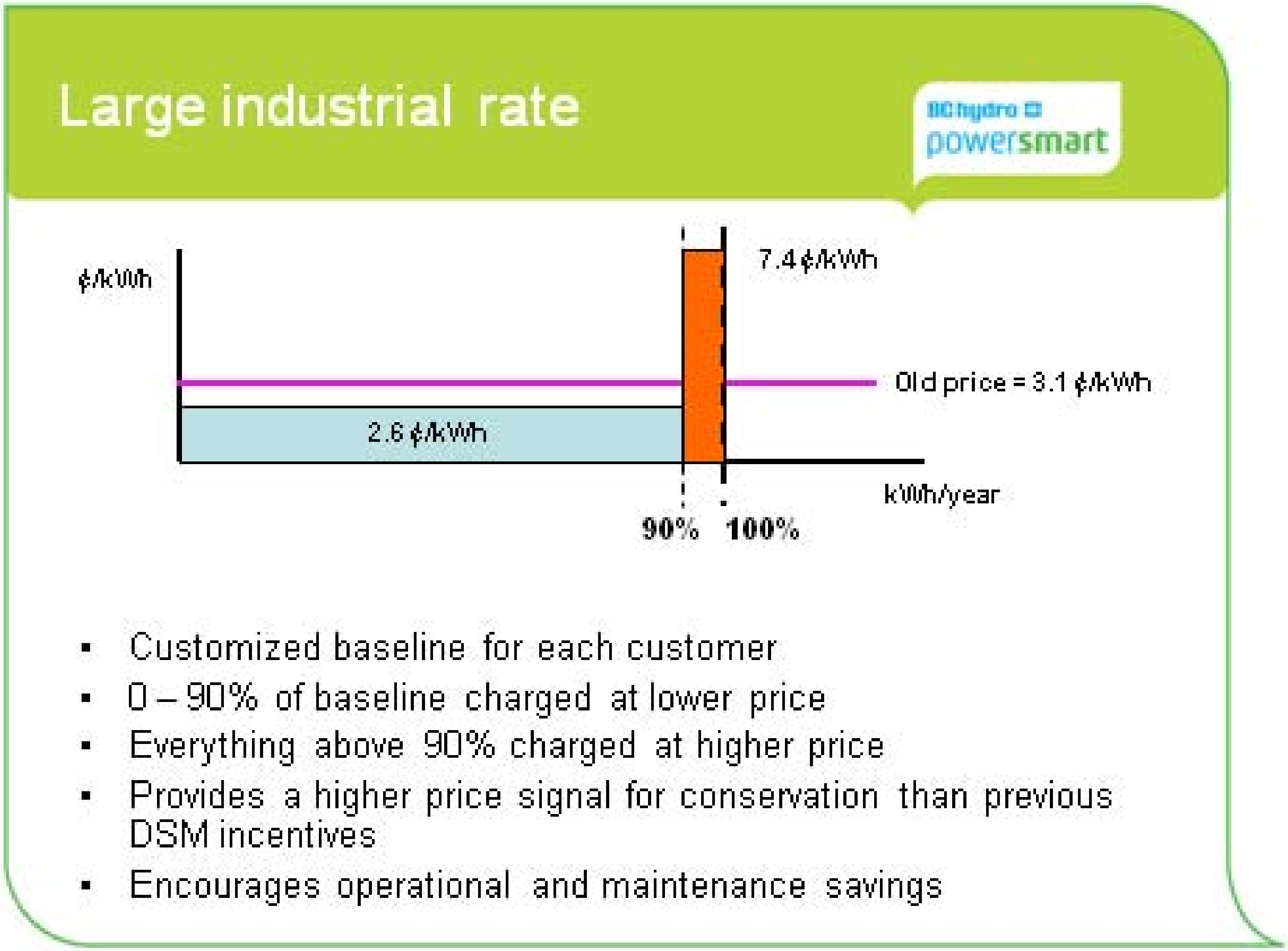
Xcel Energy

PSCo Residential Average Electric Usage

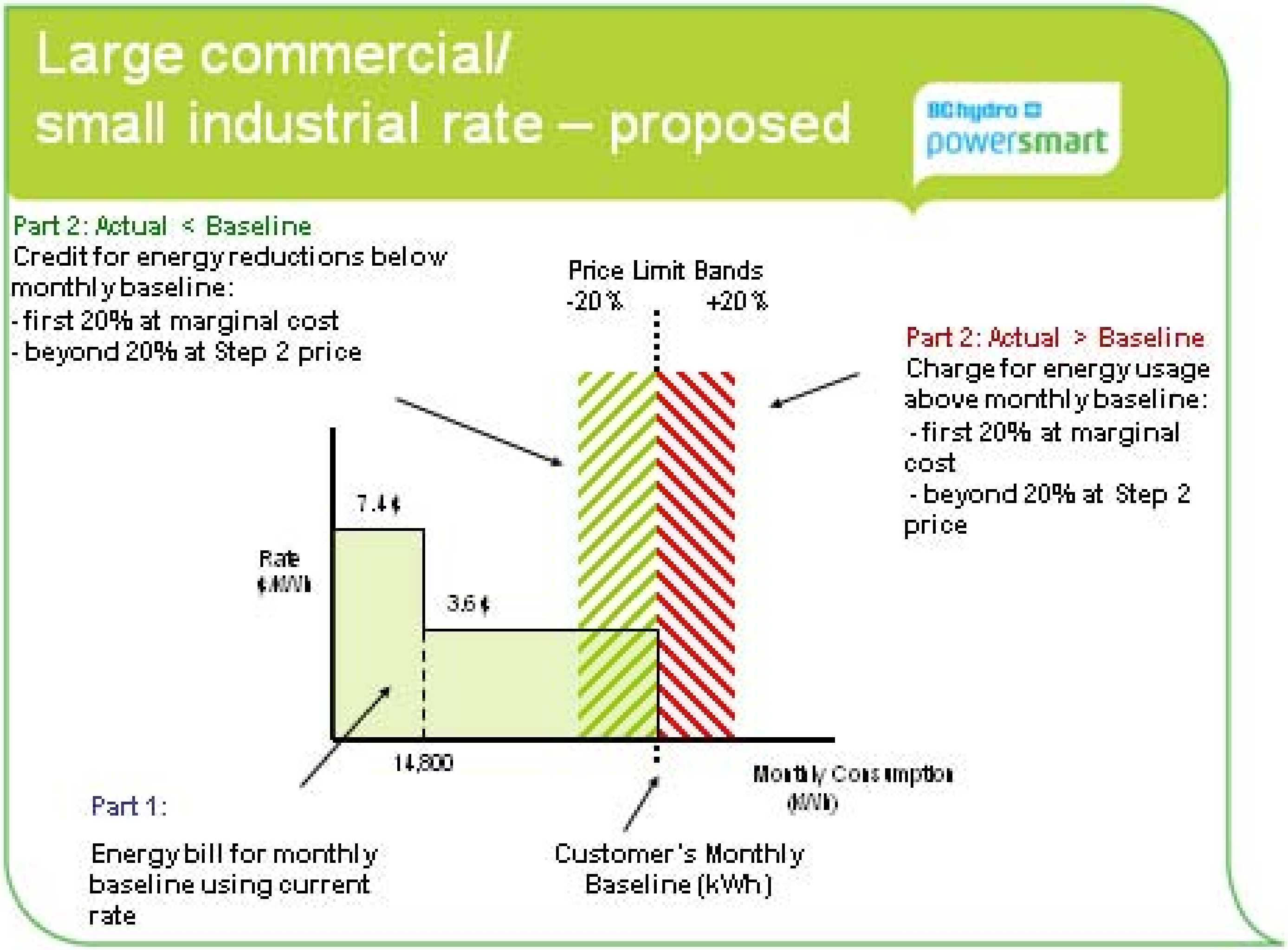


Source: 2007 Business Analytics Revised Report

BC Hydro Existing Large Industrial Rate



BC Hydro Proposed Small Industrial Rate



BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF COLORADO

DOCKET NO. 09AL-299E

IN THE MATTER OF ADVICE LETTER NO. 1535 BY PUBLIC SERVICE COMPANY OF COLORADO TO REVISE ITS COLORADO PUC NO. 7 ELECTRIC TARIFF TO REFLECT REVISED RATES AND RATE SCHEDULES TO BE EFFECTIVE ON JUNE 5, 2009

AFFIDAVIT OF RICHARD COLLINS

COMES NOW Richard Collins, of proper age and duly sworn, and states that the attached Testimony in the above-captioned matter was prepared by him or under his supervision and control and that it is true and correct to the best of hisr knowledge and belief, and would be the same if given orally under oath.

Richard S Collins
Richard Collins

STATE OF UTAH)
) ss.
COUNTY OF SALT LAKE)

SUBSCRIBED AND SWORN to before me this 28th day of September 2009.
Witness my hand and official seal.

My commission expires: 9-13 2009

Paula L. Garfield
Notary Public

NOTARY PUBLIC
PAULA L. GARFIELD
1840 South 1300 East
Salt Lake City, UT 84105
My Commission Expires
December 13, 2009
STATE OF UTAH

CERTIFICATE OF SERVICE

I hereby certify that on this 2nd day of October 2009, the original and 7 copies of the **Answer Testimony of Richard Collins on Behalf of SWEEP** were sent to Doug Dean, Director, Colorado Public Utilities Commission, 1560 Broadway Suite 250, Denver CO 80202 and a copy was e-mailed to each of the following:

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