

Home and Office Electronics

Program Evaluation

2009-2011 Program Years

Prepared for:

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1. Executive Summary

This report presents the results of an evaluation of the Sacramento Municipal Utility District's (SMUD) Home and Office Electronics Program as implemented during the 2009, 2010 and 2011 program years. The Home and Office Electronics program is designed to capture energy savings in the consumer electronics market by offering midstream incentives to retailers for the sale of energy efficient televisions, desktop computers, and computer monitors. The theory of the program is that these incentives prompt retailers to stock, promote, and sell a higher percentage of energy efficient consumer electronics than they otherwise would. In addition to midstream incentives, the program also provides in-store marketing materials and retailer training to further promote sales of energy efficient models.

The objectives for this study were to verify, document, analyze and estimate the following aspects of the program:

- Numbers of televisions, desktop computers and computer monitors incentivized and sold through the program;
- Annual gross kWh savings;
- Average gross peak kW reduction;
- Market potential for the program in future years; and
- Other findings resulting from evaluation activities.

Various data were used to accomplish these objectives including program tracking data, retailer sales data, interview data collected through sample surveys of SMUD customers, data collected on-site at participating retail locations, and relevant secondary sources.

1.1 Summary of Gross Energy Impacts

All energy (kWh) and peak demand (kW) impacts listed in this report represent gross savings. Gross savings are changes in energy consumption/demand that result directly from program-promoted actions regardless of the extent or nature of program influence on these actions. As specified during the evaluation kick-off meeting, it is not within the scope of this report to provide net savings estimates: the portion of gross savings that is directly attributable to the program.

The gross energy impacts estimated as part of this evaluation are summarized in Table 1-1.

Table 1-1: Summary of Ex Post Gross Annual kWh Savings and Peak kW Demand Reductions

Unit Type	2009		2010		2011	
	kWh Savings	Peak kW Reduction	kWh Savings	Peak kW Reduction	kWh Savings	Peak kW Reduction
Televisions	5,909,669	883	9,501,773	1,419	6,915,451	1,033
Desktop Computers	468,639	70	76,331	11	145,036	22
Monitors	99,851	15	323,908	48	644,949	96
Total	6,478,159	968	9,902,012	1,479	7,705,436	1,151

The *ex post* estimates of kWh savings and peak kW reductions developed through this evaluation were compared to the program level *ex ante* estimates that SMUD used for program tracking purposes. This comparison resulted in the realization rates reported in Table 1-2 below.

Table 1-2: SMUD Ex Ante Energy Impact Estimates and Annual Program Level Realization Rates

	SMUD Ex Ante Estimates			Realization Rates		
	2009	2010	2011	2009	2010	2011
Gross kWh Savings	6,504,042	15,557,442	14,290,430	99.6%	64%	54%
Average kW Reduction per Peak Hour	650	1,276	1,309	149%	116%	88%

1.2 Conclusions

Ex ante annual energy impact estimates in 2010 and 2011 were overstated because baseline equipment efficiencies were not updated: Program qualification criteria have been updated regularly to reflect yearly product cycles and changes in ENERGY STAR® qualifications. However, the *ex ante* per unit savings estimates listed in the SMUD program summary spreadsheets were often not updated to reflect these changes. Additionally, the actual program qualification criteria listed in the summary spreadsheets were not always in line with actual program implementation.

Ex ante peak demand reductions were estimated based on a peak period inconsistent with SMUD’s defined summer peak period: The peak demand reductions listed in this report are based on SMUD’s defined summer peak period of 4:00 to 7:00 PM during weekdays in June

through September. The *ex ante* peak demand reductions were taken from PG&E and SCE work papers that calculate demand reduction according to the DEER peak period, which is from 2:00 to 5:00 PM. The vast majority of gross annual energy savings and gross peak demand reductions resulting from program encouraged activity came from the sale of televisions. Televisions in general are more likely to be powered on between 4:00 and 7:00 PM than 2:00 to 5:00 PM. As a result, the *ex ante* peak demand reductions were underestimated in general.

Current retail partners cover a large portion of the television market and are likely to account for the majority of residential TV sales in the near future: The customer survey indicated that approximately 84% of recent television purchasers (n=79) purchased their devices through stores that are targeted by the Home and Office Electronics program. ADM estimates that over the next two years, roughly 295,532 television sets will be sold through participating retailers to households in the SMUD service territory. The number of televisions that are program eligible will depend on the evolution of program qualification criteria in the near future.

Energy efficiency is not a primary consideration for most consumers purchasing consumer electronics: Results from the customer survey and sales associate interviews indicate that consumers place importance on a number of characteristics above energy efficiency when selecting a new television, desktop computer, or computer monitor for purchase. Price, screen size, and picture quality tend to be most important to television purchasers. For computers, consumers are most interested in price, memory, and processor speed. Finally, the most important characteristics for monitor purchasers are screen size, price, and screen resolution. Still, when asked directly if energy efficiency was a consideration when selecting a particular model, 48% of recent television purchases said it was a consideration. Sales associates who were interviewed claimed that customers almost never consider energy efficiency.

1.3 Recommendations

Update baseline efficiency assumptions on a yearly basis: The consumer electronics market is fast-moving and subject to yearly product refresh cycles. It is important to review and revise baseline efficiency assumptions on an annual basis to ensure estimates of gross energy impacts are not overstated. This review should coincide with annual reviews of program qualification criteria.

Estimate peak demand reductions based on the SMUD defined peak period of 4 to 7 PM on weekdays, June through September: The PG&E and SCE work papers cited for *ex ante* per unit demand reduction estimates use a different peak period definition than SMUD. Specific SMUD peak demand reduction estimates should be developed to reflect the time period when SMUD experiences the highest demand for electricity.

Organize tracking spreadsheets based on sales period: The program activity summary spreadsheets provided by SMUD were organized into three program years based on when invoices were received. However, this caused a number of 2009 transactions to be listed in the

2010 program summary spreadsheet. Similarly, a number of 2010 transactions were listed in the 2011 program summary spreadsheet. For the purposes of tracking program sales and energy impacts, organizing the activity summary spreadsheets by sales period is preferable. This will ensure that sales during each calendar year are collected in one place and separated from other program years.

Establish relationships with additional Original Equipment Manufacturers (OEMs) to increase sales in the business-to-business sales channel: Between 2009 and 2011 there was limited participation from OEM and other business-to-business sales entities. Dell and Best Buy for Business made up the entirety of those sales. Building relationships and encouraging program participation from additional OEMs represents an avenue for increased influence in the business-to-business market.

Consider additional training for retail sales associates: Results from salesperson interviews suggest that some sales associates are more able to identify energy efficient products than others. Nine out of 15 sales associates interviewed were aware of Home and Office Electronics point-of-purchase materials, but only six were able to correctly identify what the labels indicate. Previous reports regarding consumer electronics programs have used mystery shoppers and found that sales associates are not actively promoting energy efficiency. This is consistent with reports from sales associates that customers almost never consider energy efficiency when comparing TV models. Staff turnover is often very high at retail locations; periodic training regarding point-of-purchase display materials and energy efficiency in general could help increase the programs influence on customer purchasing decisions through salesperson advocacy.

Make sure that point-of-purchase marketing materials clearly identify program eligible products: ADM field staff visited a sample of participating retail locations within the SMUD service territory and documented placement of program marketing materials. In many cases, point-of-purchase materials were affixed directly to a specific television, making it easy to identify that model as an energy efficient model. However, in a number of instances program displays were placed on a shelf between a number of different models, making it difficult to identify which models were energy efficient.

Consider future research regarding specific program influences: The focus of this evaluation has been to estimate verified *ex post* gross energy and demand impacts. These impacts are assessed based on the quantities of program eligible equipment incentivized and sold through the program, and the difference in energy consumption between eligible and non-eligible products. However, the Home and Office Electronics program is designed to promote market transformation in the consumer electronics market and as such, future research should explore the influence of the program on retailers and manufacturers decisions. Additionally, future research should focus on identifying the specific impacts of the Home and Office Electronics program amongst the many forces driving the consumer electronics market. SMUD works in conjunction with a number of partner utilities implementing similar programs in California,

Nevada, and the Northwest. The retailers participating in the Home and Office Electronics program are, for the most part, large corporations with a national presence. Previous research has found that these retailers generally set their assortment of products on a national basis. Additionally, because incentives are given to corporate headquarters and not directly to regional store locations, the program may not give retailers a direct incentive to increase the sale or stocking of efficient products in a particular regional store. There are also a number of external forces affecting energy efficiency in the consumer electronics market (technological advances, national programs such as ENERGY STAR®, etc.). Future research should examine the interaction of these various forces to determine what specific influences are attributable to SMUD's program.

2. Introduction and Program Description

This report provides the results of an evaluation of SMUD's Home and Office Electronics Program during the 2009, 2010 and 2011 program years. The Home and Office Electronics Program is designed to use existing retail channels to reach customers purchasing televisions, desktop computers, or monitors. The program focuses on retailers because of the direct connections retailers have to downstream end-use customers as well as upstream equipment manufacturers. The program uses a midstream incentive process whereby participating retailers are paid incentives for sales of qualifying televisions, desktop computers (PCs), and monitors. The retailers are expected to influence customer purchases by stocking more efficient products and by identifying those products to customers through in-store signage and other marketing collateral. The retailers can also send signals "upstream" to supply chain vendors and manufactures by purchasing a larger percentage of high efficiency products.

2.1 Participating Retailers

The following "brick-and-mortar" retailers within the SMUD service territory participated in the program at various points between January 2009 and December 2011:

- Best Buy (5 retail locations);
- Costco (5 retail locations);
- Fry's Electronics (2 retail locations);
- Kmart (3 retail locations);
- Nationwide Marketing Group (1 retail location – Filco Electronics);
- Sam's Club (5 retail locations);
- Sears (5 retail locations);
- Target (10 retail locations); and
- Wal-Mart (11 retail locations).

In addition to these retail locations, there was also program participation from the following online/OEM business-to-business entities:

- Best Buy for Business; and
- Dell

2.2 Television Qualification Criteria

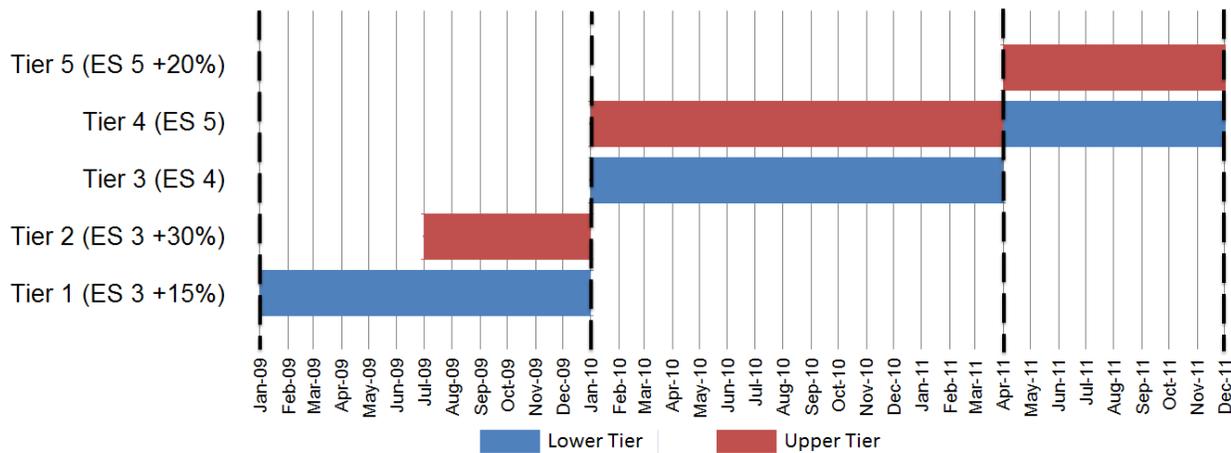
The television market has experienced tremendous technological change in recent years. Recognizing this change, the Home and Office Electronics Program increased the rigor of its qualification criteria for televisions twice between January 2009 and December 2011. These qualification criteria include different tiers which are progressively more stringent in energy efficiency requirements. The five television tiers in effect between 2009 and 2011 are shown in Table 2-1 below.

Table 2-1: Television Qualification Criteria Tiers

Energy Efficiency Tier	ENERGY STAR Level
Tier 1	ENERGY STAR 3 + 15%
Tier 2	ENERGY STAR 3 + 30%
Tier 3	ENERGY STAR 4
Tier 4	ENERGY STAR 5
Tier 5	ENERGY STAR 5 + 20%

At the beginning of 2009, the Home and Office Electronics program offered incentives for televisions that used 15% less energy in on-mode than the ENERGY STAR Version 3 television specification (Tier 1). Beginning in July of 2009, the program added an additional incentive tier for televisions consuming at least 30% less energy in on-mode than ENERGY STAR 3 minimum specifications (Tier 2). These two tiers remained in effect until January 1, 2010 when the incentive levels were adjusted for the first time. During all of 2010, incentives were given for the following two tiers of energy efficiency: 1. TVs meeting ENERGY STAR 4.0 minimum specifications (Tier 3); and 2. TVs meeting ENERGY STAR 5.0 minimum specifications (Tier 4). These qualification criteria remained in place until March of 2011. Beginning in April 2011, TVs only meeting ENERGY STAR 4.0 were phased out of the program and the effective qualification criteria became: 1. TVs meeting ENERGY STAR 5.0 minimum specifications (still Tier 4); and 2. TVs that use at least 20% less energy than ENERGY STAR 5.0 specifications (Tier 5). The qualification criteria and the time periods they were in effect between 2009 and 2011 are illustrated below in Figure 2-1.

Figure 2-1: Television Qualification Criteria Levels



2.3 Desktop Computer and Computer Monitor Qualification Criteria

Unlike the television qualification criteria, specification levels for desktop computers and computer monitors remained relatively consistent between 2009 and 2011. At the beginning of 2009, ENERGY STAR Version 4.0 for desktop computers was in effect. During all of 2009, program qualification criteria for computers were in line with the ENERGY STAR Version 4.0 specification. The current ENERGY STAR specification for desktop computers, Version 5.0, became effective July 1, 2009. During 2010 and 2011, qualifying criteria for computers were in line with the Version 5.0 specification. The ENERGY STAR Version 6.0 Computer Specification is currently under development.

The original program qualification criteria for monitors required units to use at least 25% less energy annually than required by the ENERGY STAR Version 4.0 tier 2 requirements. However, in October of 2009 ENERGY STAR Version 5.0 became effective. The Home and Office Electronics qualification criteria changed for the rest of 2009, 2010 and 2011 and were based on this specification. Specifically, program qualifying monitors had to have on-mode power demands that were at least 10% lower than ENERGY STAR Version 5.0 on-mode power demand requirements. Additionally, all qualifying monitors had to meet all of the other Version 5.0 criteria. The ENERGY STAR Version 6.0 Displays Specification is currently under development.

2.4 Program Activities and Stakeholder Roles

There are a number of stakeholders collaborating to operate the Home and Office Electronics program. These stakeholders included SMUD’s Programs & Services Department, third-party implementation contractors, participating retailers, and partner utilities in the BCE program. The responsibilities and activities of these stakeholders are described below.

- **SMUD Programs & Services Department.** SMUD implementation staff is responsible for managing and coordinating the implementation of the program among the other stakeholders. These responsibilities include: setting the contract criteria; reviewing, adjusting, approving, and submitting invoices for payment; overseeing and coaching contractor performance to achieve goals; tracking and reporting contractor activities; creating and maintaining a program tracking spreadsheet; and collaborating with other utilities and programs.
- **QDI Strategies (Implementation Contractor).** The primary responsibilities of QDI include retailer recruiting, educating retailers and manufacturers regarding qualified products, developing program measures and distribution channels, and delivering and maintaining marketing materials and training to retailers.
- **Energy Solutions (Implementation Contractor).** The main role of Energy Solutions is to provide and manage a database for sales data submitted by retailers. As part of this role, Energy Solutions is responsible for providing a monthly report itemizing monthly sales results and transmitting invoices between retailers and SMUD. In collecting and analyzing the retailer sales data, Energy Solutions also does product model matching with the ENERGY STAR qualified product list to determine which models should receive incentives.
- **Participating Retailers.** The participating retailers listed in section 2.1 of this report offer Initiative-qualified televisions, desktop computers, and monitors at retail locations throughout the SMUD service territory. The retailers provide equipment sales data in the Sacramento area to SMUD and receive incentives for models sold that meet the program qualification criteria.
- **Partner BCE Utilities.** The partner utilities (such as PG&E, NEEA, Southern California Edison [SCE], San Diego Gas and Electric [SDG&E], and Nevada Energy) run Business and Consumer Electronics programs similar to the Home and Office Electronics Program in their own service territories. They primarily interact with SMUD through meetings to coordinate on program strategy, qualification criteria and feedback on national programs such as ENERGY STAR. For example, in June of 2011 NEEA, PG&E, SMUD and SDG&E jointly submitted comments to ENERGY STAR regarding the development of Version 6.0 television specifications.

3. Evaluation Methodology

This chapter provides a description of the methodologies applied in the evaluation of SMUD's 2009 – 2011 Home and Office Electronics Program. The objectives of the evaluation approach included the following:

- Verify how many qualifying units had been sold by participating retailers in SMUD's service territory;
- Identify industry standard data that determines the energy consumption by qualified units in comparison to baseline efficiency level units;
- Determine resulting gross annual energy savings and peak demand reductions;
- Identify market potential for the program in future years; and
- Document other key findings resulting from evaluation activities.

Primary data collection activities undertaken in support of this evaluation included a telephone survey with a random sample of SMUD residential customers, shelf-level inventories of a sample of participating retail stores, and in-store interviews with retailer salespeople. This evaluation also relied on a number of existing energy impact work papers and relevant secondary sources to draw conclusions about the Home and Office Electronics Program.

3.1 Sampling Methodology

There were three primary data collection activities that required sampling techniques. Specifically, these activities were telephone interviews with a random sample of SMUD residential customers, shelf-level inventories of a sample of participating retail stores, and in-store interviews with retailer salespeople.

ADM's sampling approach for the telephone survey of SMUD customers was to provide estimates of annual hours of use for televisions at the 90% confidence level with $\pm 10\%$ relative precision (90/10). Television sales comprise over 90% of the *ex ante* gross energy impacts, and as such, received priority over information regarding desktop computer and computer monitor usage patterns.

To accomplish this sampling goal, ADM surveyed a total of 149 SMUD customers, 79 of whom reported purchasing a television within the past three years. The minimum required sample size to achieve 90/10, assuming a coefficient of variation of 0.5,¹ is 68 customers, as shown in the following formula:

¹ The coefficient of variation, $cv(y)$, is a measure of variation for the variable to be estimated. Its value depends on the mean and standard deviation of the distribution of values for the variable (i.e., $cv(y) = sd(y)/mean(y)$). Essentially, cv is a metric of how wide the distribution of values for the variable of interest is.

As set out in the *Model Energy Efficiency Program Impact Evaluation Guide*¹:

Minimum Sample Size Formula for 90 percent Confidence

$$n_0 = \left(\frac{1.645 * CV}{RP} \right)^2 = \left(\frac{1.645 * 0.5}{0.10} \right)^2 = 68$$

Where:

- n_0** = minimum required sample size
- CV** = Coefficient of Variation (assumed to be 0.5)
- RP** = Relative Precision (0.10)

Thus, ADM's sample of 79 SMUD customers who recently purchased televisions is sufficient to provide 90/10 estimates of annual hours of use. The larger sample of 149 total SMUD customers is also sufficiently large to provide statistically significant estimates of a number of variables that help inform the market potential analysis. SMUD provided ADM with a list of 9,000 residential account holders including telephone numbers. ADM assigned each account a random number which was used to prioritize the call list.

ADM's sampling approach for conducting retailer shelf-level inventories and sales-person interviews was to mitigate sampling bias by ensuring that at least two retail locations for each of the participating retailers was visited. The only exception to this was for Nationwide Marketing Group, which was represented by only one retail location (Filco Electronics) in the SMUD service territory. Table 3-1 shows the total number of stores visited and the activities performed.

"Until the actual mean and standard deviation of the population can be estimated from actual samples, 0.5 is often accepted as an initial estimate for cv. The more homogenous the population, the smaller the cv."

Using a cv = 0.5 is also in accordance with California Evaluation Protocols for homogenous measures.

Table 3-1: Retail Location Visits and Associated Data Collection Activities

Retailer	Number of Locations Visited	Shelf-level Inventory?	Sales-person Interview?
Best Buy	2	Yes (2)	Yes (2)
Costco	2	Yes (2)	Yes (2)
Filco Electronics	1	Yes (1)	Yes (1)
Fry's Electronics	2	Yes (2)	Yes (1)
Kmart	2	Yes (2)	Yes (2)
Sam's Club	2	Yes (2)	Yes (2)
Sears	3	Yes (3)	Yes (3)
Target	2	Yes (2)	Yes (2)
Wal-Mart	2	Yes (2)	Yes (2)

3.2 Verification of Units Sold

SMUD provided ADM with program activity tracking spreadsheets for 2009 through 2011. These tracking spreadsheets included the number of units sold through the program and *ex ante* energy impact estimates. The spreadsheets also included invoice numbers showing the number of units attributable to a particular invoice.

To verify the reported number of units sold, ADM requested access to the BCE Incentives database² maintained by Energy Solutions. This database allows users to view and export participant sales data in a number of formats. Data reported in the BCE Incentive database include the following:

- Invoice number;
- Measure type;
- Participating retail store;
- Quantity sold;
- Sales date;
- Make and model information; and
- Rebate amount paid.

² www.bceincentives.com

Additionally, the BCE Incentives database allows users to view detailed summaries of each invoice, including date approved, date paid, check number, check payee, and each transaction associated with the invoice.

ADM reviewed a census of the invoiced program transactions listed in the BCE Incentives database representing sales during the 2009, 2010, and 2011 program years. Invoice number lookups were used to verify the numbers of televisions, desktop computers, and computer monitors reported by SMUD in their program tracking spreadsheets. Additionally, ENERGY STAR[®] qualified product lists³ and Efficient Television Lists maintained by the Consortium for Energy Efficiency (CEE)⁴ were used to verify that unit characteristics such as screen size and efficiency level were correctly reported.

3.3 Calculating Gross Annual Energy Savings (kWh)

SMUD provided per unit *ex ante* gross annual kWh savings projection for the various types of equipment sold. The *ex ante* savings projections were largely based on work papers provided by Pacific Gas and Electric (PG&E) and Southern California Edison (SCE). ADM reviewed these work papers and checked their assumptions against industry standards for equipment efficiency. The specific assumptions that were reviewed include:

- Average baseline on-mode power demands;
- Percentages of units being sold through the business-to-consumer and business-to-business channels;
- Annual hours of use; and
- HVAC interactive effects.

Average baseline on-mode power demands and business vs. consumer channel assumptions were reviewed by examining supporting analysis for the various PG&E and SCE work papers. Where necessary, baseline on-mode power demands for time periods not covered by the PG&E and SCE work papers were developed by analyzing data provided in ENERGY STAR[®] qualified product lists. Annual hours of use were reviewed by comparing assumptions in the work papers to information collected through the customer telephone survey and other relevant secondary sources. Finally, HVAC effects were reviewed in comparison to DEER 2008 interactive effects for California Climate Zone 12 (CZ 12), which covers all of the SMUD service territory.

The product brand and model numbers reported in the BCE Incentives Database were used to verify the type, eligibility, and power demands of incentivized units via specification

³ http://www.energystar.gov/index.cfm?c=products.pr_find_es_products

⁴ <http://www.cee1.org/resid/rs-ce/qualify-prod-arch.php3>

information contained in databases maintained by the Consortium for Energy Efficiency and ENERGY STAR®.⁵

Gross annual kWh savings represent the total kWh saved when rebated equipment is in operation for an entire year. Gross savings are changes in energy consumption that result directly from program-promoted actions regardless of the extent or nature of program influence on these actions. It is not within the scope of this report to provide net savings: the portion of gross savings that is directly attributable to the program. Program level *ex post* gross annual savings are calculated as the sum of *ex post* annual savings for all qualifying equipment. Gross annual kWh savings were calculated for program years 2009, 2010, and 2011.

3.4 Calculating Gross Peak Demand Reductions (kW)

The average peak demand reductions resulting from the sales of energy efficient consumer electronics products were also estimated. The demand reduction value estimated is the average kW reduction from the devices over SMUD's defined summer peak demand period. SMUD's summer peak period is 4:00 pm to 7:00 pm during the summer months of June through August, excluding weekends and summer holidays (Independence Day and Labor Day). The average kW reduction across these 255 hours is reported in this evaluation as the peak demand reduction for each year.

An 8,760 hour load shape was developed for typical consumer electronics devices using normalized hourly television load data reported in a Lawrence Berkeley National Laboratory (LBL) publication documenting input data for the Home Energy Saver website.⁶ While the load shape is specific to televisions, it was also used as a proxy for desktop computers and computer monitors, as these devices made up less than 10% of the program's projected annual energy savings. The normalized hourly load data reported by LBL are based on load shape data developed under contract to the California Energy Commission. The data provides a load profile for an average day in each of 12 calendar months by day type – weekday, weekend, and holiday. Figure 3-1 shows the average weekday load profile.

⁵ Ibid.

⁶ <http://homeenergysaver.lbl.gov/consumer/>

⁶ <http://escholarship.org/uc/item/674092gm>

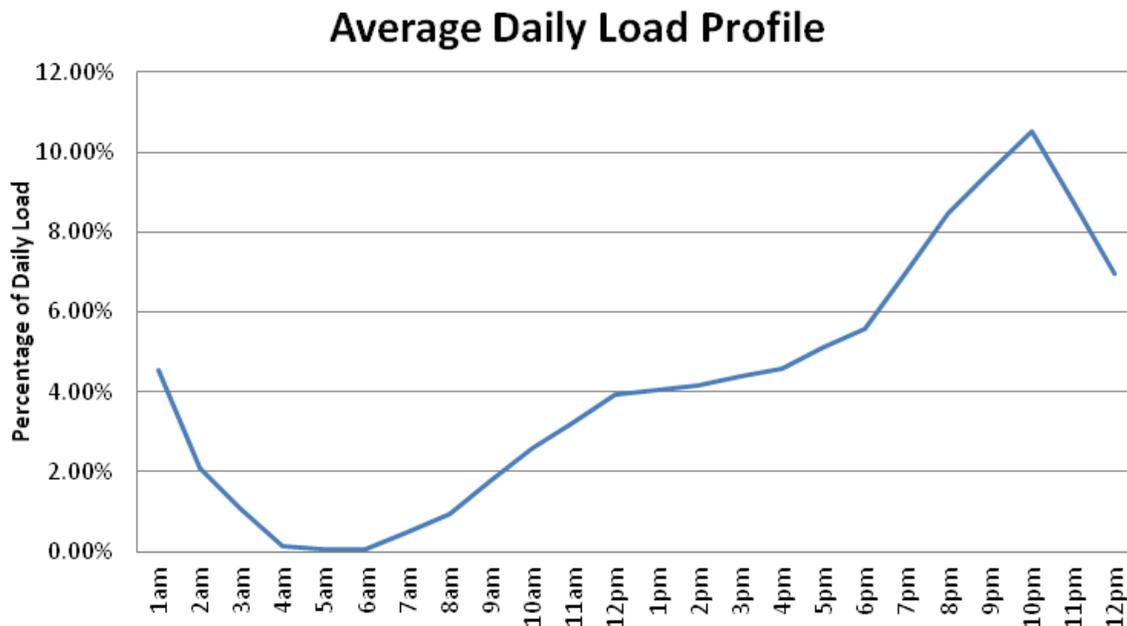


Figure 3-1: Average Daily Load Profile for Televisions

This data was extrapolated to produce calendar specific load shapes for each of the three years of interest to this evaluation. Based on this analysis ADM estimated that approximately 3.81% of an electronics device’s annual energy use occurs during the SMUD summer peak hours. That is, multiplying gross kWh savings by 0.0381 gives the kWh used during summer peak hours. Dividing the summer peak kWh by the number of hours in the summer peak period (i.e., 255) gives the aggregate average kW reduction per summer peak hour.

3.5 Estimating Market Potential for Televisions in Future Years

The focus of the market potential analysis was to estimate the number of televisions likely to be sold in the SMUD service territory in future years. Because of the fast-paced nature of the television market, this analysis is intentionally limited in scope to the next two years. Estimates of desktop computer and computer monitor sales were not included in the analysis, as they have made up less than 10% of the estimated energy savings attributable to the program over the past three years. There are a number of other consumer electronics categories not

currently being incentivized that present potential energy savings opportunities.⁷ However, the scope of the market potential analysis excludes products not currently offered through the program. Finally, this analysis is limited in scope to the business-to-consumer sales channel. Over the initial three years of program implementation, there has been relatively little program participation from OEMs and other business-to-business sales entities. Program participation from additional OEMs could present additional opportunities to promote market transformation in the consumer electronics market. However, the extent of that potential is not explored in this analysis due to time and budgetary considerations. This is an area that future research could explore, especially if OEM participation picks-up over the next several years.

Forecasts of television sales over the next two years were developed using data from the customer survey as well as relevant secondary sources. Customers were asked several questions aimed at determining the current stock of televisions, and when they might purchase new devices. This information was used along with SMUD population data to develop future sales estimates. These estimates were compared against alternate sales forecasts developed using information from market research firms in the consumer electronics market and population data for Sacramento County and the U.S. as a whole.

The product of these efforts was a sales forecast for televisions that was specific to households in the SMUD service territory. Estimates of the percentage of total unit sales that are likely to occur through program targeted retailers were also developed. However, no attempt was made to estimate the percentage of sales that will be program qualified. There are a number of reasons for this. Most importantly, the Home and Office Electronics program design is focused on transforming the consumer electronics market. In order to do so, the program must continue to increase program qualification criteria to promote the stocking of more and more efficient products. As qualification criteria are increased over the next several years, it becomes difficult to forecast what percentage of future sales will meet those new criteria.

⁷ There are a number of market studies that investigate other consumer electronics equipment categories and potential energy savings opportunities. For two such studies, see:
Opinion Dynamics Corporation, *California Statewide Business and Consumer Electronics Program New Products Baseline*, January, 2011. Available at:
http://calmac.org/publications/BCEP_New_Products_Market_Baseline_Report_Jan_2011_V2.pdf
Research Into Action, *Electronics and Energy Efficiency: A Plug Load Characterization Study*, January 1, 2010.
Available at: http://calmac.org/publications/BCE_Final_Report_2010.04.26.pdf

4. Gross Energy Impact Findings

This chapter reports the results of the gross impact evaluation for qualified products sold through the Home and Office Electronics Program during 2009, 2010, and 2011 in the SMUD service territory.

4.1 Verification of Units Sold

The program activity summary spreadsheets provided by SMUD were reviewed by comparing each invoice to records in the BCE Incentives database. Each invoice number was inspected with respect to the claimed sales period and number of units sold. This analysis showed that in 2009 and 2010 the SMUD summary spreadsheets were largely accurate in portraying program participation. There were, however, a few small discrepancies. In 2011, the SMUD summary spreadsheets were mostly accurate in portraying television units sold through the program. However, there was one data entry error that resulted in approximately 4,060 computer monitors being incorrectly categorized as desktop computers. This data entry error was corrected when considering *ex ante* participation levels. Table 4-1 shows the SMUD *ex ante* participation levels compared to the verified BCE Incentives participation levels by unit type.

Table 4-1: SMUD Claimed and Verified Units Sold

Unit Type	SMUD Claimed Units Sold	Verified Units Sold
2009		
Televisions	49,474	49,407
Desktop Computers	3,201	3,063
Computer Monitors	3,362	3,362
2010		
Televisions	75,863	75,721
Desktop Computers	1,002	1,011
Computer Monitors	10,906	10,906
2011		
Televisions	71,780	71,748
Desktop Computers	1,930	1,921
Computer Monitors	24,623	24,623

The verified quantities of units sold and incentivized through the program can be further categorized by qualifying efficiency level, as shown in Table 4-2.

Table 4-2: Verified Units Sold by Type and Efficiency Level

Unit Type	Verified Units Sold
2009	
ES 3.0 +15% Televisions	26,311
ES 3.0 +30% Televisions	23,096
ES 4.0 Desktop Computers	3,063
ES 5.0 +10% Monitors	3,362
2010	
ES 4.0 Televisions	56,426
ES 5.0 Televisions	19,295
ES 5.0 Desktop Computers	1,011
ES 5.0 +10% Monitors	10,906
2011	
ES 4.0 Televisions	18,900
ES 5.0 Televisions	35,225
ES 5.0 +20% Televisions	17,623
ES 5.0 Desktop Computers	1,921
ES 5.0 +10% Monitors	24,623

4.2 Gross Annual Energy Savings (kWh)

This section presents the estimates of annual gross kWh savings resulting from the sale of program qualifying equipment. Results are presented by device type and program year. For the purposes of this evaluation, gross energy savings are calculated as the difference between estimates of average annual energy usage of program qualifying devices and non-qualifying devices available to consumers.

4.2.1 Televisions: Program Year 2009

Per unit *ex ante* values for annual kWh savings were assigned to each TV unit sold in 2009 based on data sources and calculation procedures described in PG&E and SCE work papers.⁸ Using these *ex ante* values, the *ex ante* gross annual kWh savings attributable to the sale of program qualifying televisions in 2009 was 5,873,085 kWh. Table 4-3 below shows the data underlying this calculation and the distribution of *ex ante* savings by screen size category.

⁸ For derivation of these savings values, see Pacific Gas & Electric Company, Customer Energy Efficiency Department, *Energy Efficient Televisions*, Work Paper PGECOAPP104: Energy Efficient Televisions, Revision #0, September 3, 2008. Additionally, see Southern California Edison Company, *Residential Use Energy Efficient Televisions*, Work Paper WPSCREOE0002 Revision #2, November 23, 2009.

Table 4-3: Ex Ante Annual kWh Savings for Televisions Sold in 2009

<i>Size of Screen</i>	<i>Number of Units Sold</i>	<i>Baseline Power Demand (W)</i>	<i>Measure Power Demand (W)</i>	<i>Annual Hours of Use</i>	<i>HVAC Interactive Effect Multiplier</i>	<i>Estimated Ex Ante Annual kWh Savings</i>
ES 3.0 +15% Televisions: January through June 2009						
10-25.4"	158	97.9	43.8	1,884	1.00	16,104
25.5-35"	174	130.8	93.5	1,884	1.00	12,228
36-39"	3	169.2	114	1,884	1.00	312
40-42"	137	215.7	141	1,884	1.00	19,281
43-49"	95	253.9	193.9	1,884	1.00	10,739
50-60"	147	335.4	249.3	1,884	1.00	23,845
>60"	14	566.8	350.8	1,884	1.00	5,697
All Sizes	728					88,205
ES 3.0 +15% Televisions: July through December 2009						
10-25.4"	2,628	92.3	43.1	1,899	1.00	245,536
25.5-35"	6,900	123	88.9	1,899	1.00	446,816
36-39"	2,379	164.4	111.5	1,899	1.00	238,987
40-42"	6,459	208.5	147.2	1,899	1.00	751,884
43-49"	3,644	245.4	178.6	1,899	1.00	462,253
50-60"	3,577	323.9	227.4	1,899	1.00	655,498
>60"	14	427.9	350.6	1,899	1.00	2,055
All Sizes	25,601					2,803,029
ES 3.0 +30% Televisions: July through December 2009						
10-25.4"	10,938	92.3	37.5	1,899	1.00	1,138,265
25.5-35"	4,332	123	75.4	1,899	1.00	391,580
36-39"	411	164.4	87	1,899	1.00	60,410
40-42"	2,612	208.5	128.9	1,899	1.00	394,831
43-49"	2,416	245.4	150.2	1,899	1.00	436,776
50-60"	2,330	323.9	208.2	1,899	1.00	511,934
>60"	105	427.9	186.9	1,899	1.00	48,054
All Sizes	23,144					2,981,850
Total, All 2009 TVs	49,473					5,873,085

As demonstrated in Table 4-3 above, given the verified number of units sold, there are four other factors that enter the calculation of gross annual kWh savings (i.e., baseline and measure power demands, annual hours of use, and HVAC interactive effect).

ADM reviewed the baseline power demand assumptions in the PG&E and SCE work papers and determined that the values presented in the SCE work paper were most appropriate for 2009, as they were based on a larger sample size of units.

For the measure power demand values, on-mode power requirement values were identified for each model sold in 2009 by using data from the Consortium on Energy Efficiency and ENERGY STAR® qualified product lists. This allowed for calculation of a sales-weighted average on-mode power value for each screen size category based on actual units sold through the program in 2009.

The hours of use assumed in the SCE work paper were 1,899 hours per year. To determine if this was a reasonable assumption, ADM asked 106 telephone survey respondents to estimate how many hours per day their primary television was on during weekdays and weekend days. Respondents indicated that, on average, their televisions are on 5.3 hours per day on a weekday, and 6.7 hours per day on a weekend day. This is roughly equivalent to 2,087 hours per year. As this survey question is specific to primary televisions, it is reasonable to assume that the hours of use for the average television might be slightly lower. As such, ADM believes that the SCE work paper assumption of 1,899 hours per year is appropriate for televisions in residential use. However, this value does not consider televisions that are used in commercial applications (hotels, hospitals, restaurants, etc.). Future revisions to the PG&E work paper⁹ did consider hours of use for televisions in commercial settings and determined a weighted average hours of use of 1,966 hours per year. Considering the results of the customer telephone survey, ADM determined that 1,966 hours per year is an appropriate and conservative estimate for televisions sold and incentivized through the program.

The *ex ante* gross annual kWh estimates used in 2009 do not consider HVAC interactive effects. Interactive effects take into account the distribution of various heating and cooling system combinations and source fuels for residential and nonresidential customers. The energy interactive effects include positive savings from electric cooling systems and negative savings from electric heating systems, with a net positive savings attributable to the energy interactive effects overall. For the *ex post* calculation of annual kWh savings, ADM used the DEER CFL interactive effects multiplier for CZ 12, which includes all of the SMUD service territory.¹⁰ The value of this HVAC interactive effects multiplier is 1.06. Using CFL interactive effects as a proxy for the interactive effects resulting from the installation of an energy efficient television is

⁹ Pacific Gas & Electric Company, Customer Energy Efficiency Department, *Energy Efficient Televisions*, Work Paper PGECOAPP104: Energy Efficient Televisions, Revision #3, May 19, 2010.

¹⁰ Interactive effects taken from:

http://www.deeresources.com/DEER2011/download/LightingHVACInteractiveEffects_13Dec2011.xls

consistent with recommendations from the California Public Utility Commission (CPUC) to PG&E during the work paper revision process.

Based on this analysis, the *ex post* gross annual kWh savings for televisions sold and incentivized through the program in 2009 was 5,909,669 kWh. This is equivalent to a gross realization rate of 100.6 percent. Table 4-4 shows the data underlying this calculation.

Table 4-4: Ex Post Annual kWh Savings for Televisions Sold in 2009

<i>Size of Screen</i>	<i>Number of Units Sold</i>	<i>Baseline Power Demand (W)</i>	<i>Measure Power Demand: Sales-Weighted Average (W)</i>	<i>Annual Hours of Use</i>	<i>HVAC Interactive Effect Multiplier</i>	<i>Estimated Ex Post Annual kWh Savings</i>
All 2009 Qualifying Televisions						
10-25.4"	13,724	92.3	43.3	1,966	1.06	1,401,831
25.5-35"	11,406	123	84.5	1,966	1.06	914,890
36-39"	2,793	164.4	113.1	1,966	1.06	298,463
40-42"	9,207	208.5	147.7	1,966	1.06	1,166,629
43-49"	6,155	245.4	186.1	1,966	1.06	761,277
50-60"	6,007	323.9	219.0	1,966	1.06	1,313,988
>60"	115	427.9	208.5	1,966	1.06	52,590
All Sizes	49,407					5,909,669

4.2.2 Televisions: Program Year 2010

In 2010, SMUD updated the Home and Office Electronics Program television qualification criteria based on new ENERGY STAR® specifications. Specifically, in order to qualify for incentives in 2010, televisions had to meet ENERGY STAR® 4.0 (lower tier) or ENERGY STAR® 5.0 (upper tier). The *ex ante* annual kWh savings estimates for televisions were updated accordingly based on a revised PG&E work paper.¹¹ Using these *ex ante* values, the *ex ante* gross annual kWh savings attributable to the sale of program qualifying televisions in 2010 was 14,946,084 kWh. Table 4-5 below shows the data underlying this calculation and the distribution of *ex ante* savings by screen size category.

¹¹ For derivation of these savings values, see Pacific Gas & Electric Company, Customer Energy Efficiency Department, *Energy Efficient Televisions*, Work Paper PGECOAPP104: Energy Efficient Televisions, Revision #2, January 1, 2010.

Table 4-5: Ex Ante Annual kWh Savings for Televisions Sold in 2010

<i>Size of Screen</i>	<i>Number of Units Sold</i>	<i>Baseline Power Demand (W)</i>	<i>Measure Power Demand (W)</i>	<i>Annual Hours of Use</i>	<i>HVAC Interactive Effect Multiplier</i>	<i>Estimated Ex Ante Annual kWh Savings</i>
ES 4.0 Televisions						
10-25.4"	8,242	83.9	34.3	1,899	1.00	776,004
25.5-35"	18,555	124.3	69.6	1,899	1.00	1,927,406
36-39"	2,076	169.2	89.3	1,899	1.00	314,992
40-42"	12,113	215.7	105.6	1,899	1.00	2,532,585
43-49"	6,511	253.9	120.4	1,899	1.00	1,650,275
50-60"	8,124	335.4	147.3	1,899	1.00	2,901,908
>60"	947	566.8	203.5	1,899	1.00	653,342
All Sizes	56,568					10,756,512
ES 5.0 Televisions						
10-25.4"	5,791	83.9	22.4	1,899	1.00	676,113
25.5-35"	4,951	124.3	51.9	1,899	1.00	680,419
36-39"	635	169.2	69.8	1,899	1.00	119,862
40-42"	1,810	215.7	79.8	1,899	1.00	466,874
43-49"	2,982	253.9	95.6	1,899	1.00	896,396
>50"	3,126	335.4	108.0	1,899	1.00	1,349,909
All Sizes	19,295					4,189,572
Total, All 2010 TVs	75,863					14,946,084

In calculating *ex post* gross annual kWh savings for televisions in 2010, ADM reviewed the pertinent calculation assumptions: baseline and measure power demands, annual hours of use, and HVAC interactive effect.

ADM reviewed the baseline power demand assumptions presented in the PG&E work paper used by SMUD and determined that an incorrect baseline was specified. Specifically, the baseline considered was televisions not meeting the ES 3.0 +15% efficiency level, rather than televisions not meeting the ES 4.0 efficiency level. This baseline specification was actually changed in a revised version of the PG&E work paper submitted to the CPUC just a few months later.¹² ADM reviewed the baseline power demands in this revised work paper and determined they were appropriate.

¹² Pacific Gas & Electric Company, Customer Energy Efficiency Department, *Energy Efficient Televisions*, Work Paper PGECOAPP104: Energy Efficient Televisions, Revision #3, May 19, 2010.

For the measure power demand values, on-mode power requirement values were identified for each model sold in 2010 by using data from the Consortium on Energy Efficiency and ENERGY STAR® qualified product lists. This allowed for calculation of a sales-weighted average on-mode power value for each screen size category based on actual units sold through the program in 2010.

As described in section 4.2.1, ADM determined that an appropriate hours-of-use assumption is 1,966 hours per year. HVAC interactive effects were also included in the *ex post* calculations as described in section 4.2.1.

Based on this analysis, the *ex post* gross annual kWh savings for televisions sold and incentivized through the program in 2010 was 9,501,773 kWh. This is equivalent to a gross realization rate of 63.6 percent. Table 4-6 shows the data underlying this calculation. The main reason for the low realization rate for televisions sold in 2010 was the improper baseline assumptions used for *ex ante* purposes.

Table 4-6: Ex Post Annual kWh Savings for Televisions Sold in 2010

<i>Size of Screen</i>	<i>Number of Units Sold</i>	<i>Baseline Power Demand (W)</i>	<i>Measure Power Demand: Sales-Weighted Average (W)</i>	<i>Annual Hours of Use</i>	<i>HVAC Interactive Effect Multiplier</i>	<i>Estimated Ex Post Annual kWh Savings</i>
All 2010 Qualifying Televisions						
10-25.4"	13,891	47.6	29.7	1,966	1.06	518,738
25.5-35"	23,506	96.1	59.4	1,966	1.06	1,795,761
36-39"	2,711	128.7	74.2	1,966	1.06	308,067
40-42"	13,923	165.3	95.3	1,966	1.06	2,029,945
43-49"	9,493	197.3	103.1	1,966	1.06	1,863,096
>50"	12,197	251	133.5	1,966	1.06	2,986,167
All Sizes	75,721					9,501,773

4.2.3 Televisions: Program Year 2011

The 2011 program activity spreadsheet SMUD provided ADM did not include updated per unit *ex ante* energy impact estimates for the 2011 program year. As such, ADM was unable to determine the calculations leading to SMUDs *ex ante* gross annual kWh savings claims. However, after subtracting out the kWh savings attributable to desktop computers and

computer monitors, ADM was able to determine that SMUD estimates *ex ante* annual kWh savings of 13,370,874 kWh for the 71,780 televisions claimed sold in 2011.

In calculating *ex post* gross kWh savings, ADM assumed the same baseline on-mode power demands as in 2010 for all units sold January through March 2011. This reflects the nature of the television market, where retailers typically change their television assortment during the spring months. After this “spring assortment changeover” is complete in May or June, the assortment of televisions offered by a particular retailer typically stays the same until the next spring.¹³

Baseline on-mode power demands for units sold in April through December of 2011 were determined by analyzing an ENERGY STAR® dataset originally designed to be used in the development of the Version 6.0 television specification.¹⁴ The dataset is comprised of 430 televisions that were available on the market in the last quarter of 2010 through April of 2011. The EPA claims that major retailers indicated that these products made up a majority of products available in May of 2011. ADM reviewed this dataset and identified 212 televisions that did not meet the ENERGY STAR® Version 5.3 qualification criteria. These 212 models were used to develop average baseline on-mode power demands. Table 4-7 shows the baseline values by size category that were used to estimate *ex post* energy impacts for televisions sold between April and December 2011.

Table 4-7: Ex Post Baseline Power Demands for Televisions sold April through December 2011

Size of Screen	Average Baseline Power Demand (W)	Sample Size
10-25.4"	34.8	25
25.5-35"	63.5	49
36-39"	85.8	11
40-42"	96.8	43
43-49"	109.0	26
>50"	158.0	58

¹³ For a more detailed description of the television market assortment schedule, see: *Consumer Electronics Television Initiative Market Progress Evaluation Report*, Report #E11-230, Northwest Energy Efficiency Alliance (NEEA), November 22, 2011. Available at: http://neea.org/research/reports/E11-230_Combinedv2.pdf.

¹⁴ The dataset used for this analysis is available at:
http://www.energystar.gov/ia/partners/prod_development/revision/downloads/television/D1_V6.0_Data_Set.xls?1d98-c4f2

For the measure power demand values, on-mode power requirement values were identified for each model sold in 2011 by using data from the Consortium on Energy Efficiency and ENERGY STAR® qualified product lists. This allowed for calculation of a sales-weighted average on-mode power value for each screen size category based on actual units sold through the program in 2011.

As described in section 4.2.1, ADM determined that an appropriate hours-of-use assumption is 1,966 hours per year. HVAC interactive effects were also included in the *ex post* calculations as described in section 4.2.1.

Based on this analysis, the *ex post* gross annual kWh savings for televisions sold and incentivized through the program in 2011 was 6,915,451 kWh. This is equivalent to a gross realization rate of 51.7 percent. Table 4-8 shows the data underlying this calculation. Because ADM was not provided with per unit *ex ante* kWh savings values used in 2011, the full cause of the low realization rate is unknown. However, it is likely that the baseline power demand assumptions were not updated between the 2010 and 2011 program years.

Table 4-8: Ex Post Annual kWh Savings for Televisions Sold in 2011

<i>Size of Screen</i>	<i>Number of Units Sold</i>	<i>Baseline Power Demand (W)</i>	<i>Measure Power Demand (W)</i>	<i>Annual Hours of Use</i>	<i>HVAC Interactive Effect Multiplier</i>	<i>Estimated Ex Post Annual kWh Savings</i>
All Televisions: January through March 2011						
10-25.4"	3,900	47.6	29.5	1,966	1.06	147,486
25.5-35"	8,738	96.1	56.6	1,966	1.06	718,829
36-39"	1,452	128.7	70.5	1,966	1.06	176,023
40-42"	5,500	165.3	92.7	1,966	1.06	832,342
43-49"	4,086	197.3	96.2	1,966	1.06	860,778
>50"	5,075	251	121.5	1,966	1.06	1,370,155
All Sizes	28,751					4,105,614
All Televisions: April through December 2011						
10-25.4"	8,732	34.8	23.0	1,966	1.06	216,178
25.5-35"	10,169	63.5	44.6	1,966	1.06	400,360
36-39"	1,326	85.8	60.7	1,966	1.06	69,189
40-42"	6,760	96.8	70.7	1,966	1.06	367,857
43-49"	7,415	109.0	75.7	1,966	1.06	514,040
>50"	8,595	158.0	88.7	1,966	1.06	1,242,213
All Sizes	42,997					2,809,837
Total, All 2011 TVs	71,748					6,915,451

4.2.4 Desktop Computers: Program Year 2009

In 2009, the Home and Office Electronics Program offered incentives for Desktop Computers meeting the ENERGY STAR® Version 4.0 Computer Specification. The *ex ante* value for per unit gross annual kWh savings assigned by SMUD to each desktop PC sold in 2009 was 153 kWh. This per unit *ex ante* value was derived from a PG&E work paper.¹⁵ Using this *ex ante* per unit value, the *ex ante* total projected annual kWh savings for the 3,201 qualifying desktop computers claimed sold in 2009 was 489,753 kWh.

A review of the per unit kWh savings calculations for desktop computers used in 2009 showed these calculations to be appropriate for units meeting the ENERGY STAR® 4.0 specification.

¹⁵ For derivation of these savings values, see Pacific Gas & Electric Company, Customer Energy Efficiency Department, *Computer Internal Power Supplies - Upstream*, Work Paper PGECOCOM102: Desktop Computers, Revision #0, March 25, 2008.

While the work paper where the *ex ante* per unit kWh savings estimates were derived relies on desktop computer power demand data from 2007, the EPA estimated that in 2008 the market penetration of ENERGY STAR® version 4.0 desktop computers was only 11%.¹⁶ As such, the data used to calculate per unit kWh impacts remained largely relevant heading into the 2009 program year.

Based on this analysis, *ex post* gross annual kWh savings for the 3,063 desktop computers verified to be sold in 2009 were 468,639 kWh. This is equivalent to a realization rate of 95.7% for desktop PCs sold in 2009.

4.2.5 Desktop Computers: Program Year 2010

In 2010, SMUD continued to use the per unit energy savings estimate of 153 kWh per desktop computer sold and incentivized through the program. Using this *ex ante* per unit value, the *ex ante* total projected annual kWh savings for the 1,002 qualifying desktop computers claimed sold in 2010 was 153,306 kWh.

However, program design changed in 2010 to only incentivize desktop PCs meeting the ENERGY STAR® 5.0 specification, which became effective on July 1, 2009. As such, the 2009 per unit kWh estimates became obsolete, as they considered a baseline of non- ENERGY STAR® 4.0 desktop computers. Recognizing this, PG&E went through a series of revisions to the desktop computer work paper. The result of this effort was updated savings estimates for ENERGY STAR® 5.0 qualified desktop computers as compared to non-qualifying units.¹⁷ ADM reviewed the assumptions of the revised work paper and determined them to be appropriate for gross energy impact estimates.

The per unit kWh savings for a desktop computer as estimated in the revised work paper depend on whether the computer is being purchased for residential usage or for commercial usage.

- For computers in residential usage, the work paper estimates annual energy savings of 69 kWh. This value was derived from metered plug load data from a study conducted by the Energy Center of Wisconsin.¹⁸

¹⁶ For ENERGY STAR market penetration information in 2008, see:

http://www.energystar.gov/ia/partners/downloads/2008_USD_Summary.pdf

¹⁷ For derivation of these savings values, see Pacific Gas & Electric Company, Customer Energy Efficiency Department, *Computer Internal Power Supplies - Upstream*, Work Paper PGECOCOM102: Desktop Computers, Revision #2, February 18, 2010.

¹⁸ Energy Center of Wisconsin, *Energy Savings Opportunities for Home Electronics and Other Plug-In Devices in Minnesota Homes: A technical and behavioral assessment*, May 2010.

- For computers in commercial usage, the work paper estimates annual energy savings of 134 kWh. This value was derived by using load data for over 91,000 desktop computers that were collected in a study conducted for PG&E.¹⁹

The work paper develops a weighted average kWh savings estimate of 95.3 kWh by assuming that 60 percent of units sold are for residential usage and 40 percent are for commercial usage. However, there were very limited desktop computer sales through Original Equipment Manufacturer (OEM) channels in 2010 – only 9 out of the 1,011 verified units sold. OEM direct sales would be expected to largely be for commercial use, whereas retail store sales would largely be expected to be for residential use. As such, ADM determined that a 90% residential to 10% commercial use split was more conservative and appropriate for the Home and Office Electronics program in 2009.

Based on this split, ADM estimated *ex post* per unit gross annual energy savings to be 75.5 kWh. Multiplying by the 1,011 desktop computers verified to be sold in 2010 result in *ex post* annual energy savings of 76,331 kWh. This represents a realization rate of 49.8% for 2010 desktop PCs. The low realization rate is largely the result of *ex ante* savings estimates that were developed for ENERGY STAR® version 4.0 equipment as opposed to the ENERGY STAR® version 5.0 equipment incentivized through the program in 2010.

4.2.6 Desktop Computers: Program Year 2011

In 2011, SMUD estimated *ex ante* annual energy savings of 179,070 kWh for the 1,930 desktop computers claimed sold and incentivized through the program. This savings estimate was based on a per unit energy savings estimate of 88 kWh for most of the computers sold in 2011 (although some were still receiving the 153 kWh value). All of the PCs incentivized in 2011 exceeded ENERGY STAR® version 5.0 qualification criteria. ADM examined the sales data and determined that, just as in 2010, OEM direct sales were not a significant portion of program sales in 2011. As such, it is reasonable to assume that the majority of PCs sold in 2011 were purchased for residential use. As in 2010, ADM estimated *ex post* per unit gross annual energy savings to be 75.5 kWh for program qualifying units as compared to non-qualifying units. Multiplying by the 1,921 desktop PCs verified sold through the program in 2011 results in *ex post* annual energy savings of 145,036 kWh. This represents a realization rate of 81 percent.

4.2.7 Computer Monitors: Program Years 2009 and 2010

The *ex ante* value for per unit annual kWh savings assigned by SMUD to each monitor sold in 2009 and 2010 was 42 kWh. Using this *ex ante* value, the *ex ante* total projected annual kWh

¹⁹ QDI Strategies, Inc., *Thin Client Investigation including PC and Imaging State Data(Tasks 1, 2 & 3): Thin Client Report # 0920*, Prepared for PG&E Emerging Technologies Program, June 4, 2010.

savings for the 3,362 qualifying computer monitors claimed sold in 2009 was 141,204 kWh. The *ex ante* total projected annual kWh savings for the 10,362 qualifying computer monitors claimed sold in 2010 was 458,052 kWh.

In the SMUD 2009 and 2010 program activity spreadsheets, the *ex ante* per unit savings value of 42 kWh is claimed to be for monitors exceeding ENERGY STAR® Version 4.0 tier 2 qualification criteria by at least 25%. A similar savings estimate for such a measure appears in a proposal submitted by PG&E to the California Energy Commission (CEC) regarding Title 20 qualification criteria for computer monitors.²⁰ While the ENERGY STAR® Version 4.0 tier 2 + 25% was the original program qualifying criteria level in early 2009, it was soon changed to ENERGY STAR® Version 5.0+10% in October of 2009. Examining the monitors incentivized through the program in 2009 and 2010 reveals that in fact all of the incentivized monitors met the ENERGY STAR® Version 5.0 + 10% qualification criteria. As such, gross energy savings for monitors sold through the program should be in comparison to a baseline of non-ENERGY STAR® 5.0 + 10% monitors, as opposed to non-ENERGY STAR® 4.0 monitors.

For the purposes of estimating *ex post* gross annual energy savings estimates, ADM reviewed a PG&E work paper regarding Liquid Crystal Display (LCD) computer monitors that are at least 10% more efficient than the ENERGY STAR® 5.0 specification.²¹ As specified in the work paper, per unit kWh savings for qualifying monitors depends on whether the computer is being purchased for residential usage or for commercial usage. Table 4-9 shows the calculation of kWh savings per unit for qualifying monitors in both usage groups.

²⁰ Proposal Information Template for: Computer Monitors and other Video Displays January 30, 2008.

http://www.energy.ca.gov/appliances/2008rulemaking/documents/2008-02-01_documents/templates/PG&E_Computer_Monitors_and_other_Video_Displays_Template.pdf

²¹ For derivation of these savings values, see Pacific Gas & Electric Company, Customer Energy Efficiency Department, *High Efficiency LCD Computer Monitor*, Work Paper PGECOCOM104: LCD Computer Monitor, Revision # 2, February 19, 2010.

Table 4-9: PG&E Work Paper kWh Savings Values for Qualifying Monitors by Usage Mode

	Active Mode	Sleep Mode	Off Mode	Total
<i>Residential Usage (B2C)</i>				
Baseline	57.9	0.7	3.9	62.6
Measure	37.8	0.6	3.3	41.7
kWh Savings per Unit				20.9
<i>Commercial Usage (B2B)</i>				
Baseline	95.8	3.6	0.9	100.2
Measure	62.4	2.9	0.7	66.1
kWh Savings per Unit				34.2

Given the per unit kWh savings shown in Table 4-9, an overall kWh savings of 29.7 kWh per unit is derived assuming that approximately 34 percent of the sales of qualifying monitors are for residential usage while approximately 66 percent are for commercial usage. That is:

$$29.7 \text{ kWh} = (20.9 \times 0.34) + (34.2 \times 0.66)$$

A review of these kWh savings calculations for monitors used in residential and commercial applications showed the calculation methodology to be appropriate for monitors sold in 2009 and 2010.

Multiplying the 3,362 monitors verified sold in 2009 by 29.7 kWh per unit results in *ex post* gross annual savings of 99,851 kWh. Multiplying the 10,906 monitors verified to be sold in 2010 by 29.7 kWh per unit results in *ex post* gross annual savings of 323,908 kWh. This represents a realization rate of 70.7 percent for both years. The low realization rates are the result of *ex ante* per unit savings estimates that were not in line with program qualification criteria and actual units sold through the program.

4.2.8 Computer Monitors: Program Year 2011

In 2011, SMUD projected *ex ante annual* energy savings of 740,486 kWh for the 24,623 monitors claimed sold through the program in 2011. For 9,939 of these monitors, SMUD assigned per unit kWh savings of 42 kWh just as in 2009 and 2010. For the remaining 14,684 monitors, SMUD assigned per unit kWh savings of 22 kWh. ADM was unable to verify exactly what the source of the 22 kWh per unit *ex ante* savings estimate was. However, that value is in

line with values presented in a SCE work paper from June 2010 that focused solely on monitors used in residential applications.²²

A review of the SCE and previously mentioned PG&E work papers showed the calculation methodologies to be appropriate. However, the work papers in which the baseline and measure kWh usages are described is based on 2009 data. Between 2009 and 2011 the market for computer monitors changed significantly with respect to average screen size. The savings calculations outlined in the work papers assume 68.3 percent of monitors sold are 19" or less (based on 2009 shipment data), though units 19" or smaller made up less than 25% of the monitors sold in 2011. As such, ADM determined that a more applicable 2011 baseline could be developed using more recent data for monitors between the size of 19 and 27 inches.

Using the February 16, 2011 ENERGY STAR® qualified products list, it was determined that units in this size category that did not meet the Home and Office Electronics requirements on average consume 30.1 Watts while in active mode, 0.6 Watts while in sleep mode, and 0.5 Watts while in off mode. Meanwhile, units that did qualify for the Home and Office Electronics program on average consume 20.7 Watts while in active mode, 0.4 Watts while in sleep more, and 0.3 Watts while in off mode. Using these power demand values and the hours of use assumptions outlined in the PG&E work paper, the annual kWh savings values shown in Table 4-10 were estimated for monitors in residential and commercial use.

Table 4-10: Ex Post kWh Savings Values for Qualifying Monitors by Usage Mode

	Active Mode	Sleep Mode	Off Mode	Total
<i>Residential Usage (B2C)</i>				
Baseline	56.2	0.5	2.7	59.4
Measure	38.5	0.4	1.9	40.8
kWh Savings per Unit				18.6
<i>Commercial Usage (B2B)</i>				
Baseline	92.8	2.6	0.6	96.0
Measure	63.7	1.8	0.4	65.9
kWh Savings per Unit				30.1

²² For derivation of these savings values, see Southern California Edison Company, *Residential LCD Monitors*, Work Paper WPSCREOE0001: Residential LCD Monitors, Revision # 3, June 15, 2010.

Total energy savings (kWh) for the monitor measure is also determined by the split of sales between residential and commercial users. As discussed in Section 4.2.7, the PG&E work paper assumes was a split of 34 percent residential and 66 percent commercial.

Reviewing the sales data in the BCE Incentives database, approximately 49.5% of the monitors sold the program in 2011 were sold through direct OEM channels. It is likely that the majority of these sales were for commercial applications. It is also reasonable to assume that some portion of the monitors sold through retail stores were for commercial applications. As such, the split assumed in the PG&E work paper was determined to be reasonable and was used for *ex post* calculations. Given the per unit kWh savings shown in Table 4-10 , an overall *ex post* kWh savings of 26.2 kWh per unit is derived by weighting the appropriate kWh savings estimates by their assumed market shares. That is:

$$26.2 \text{ kWh} = (18.6 \times 0.34) + (30.1 \times 0.66)$$

Thus, total *ex post* energy savings for the 24,623 monitors verified sold in 2011 were 644,949 kWh. This represents a realization rate of 87.1 percent.

4.3 Gross Peak Demand Reductions (kW)

The average peak demand reductions resulting from sales of energy efficient consumer electronics products were estimated using SMUD's defined summer peak demand period. SMUD's summer peak period is 4:00 pm to 7:00 pm during the summer months of June through August, excluding weekends and summer holidays (Independence Day and Labor Day). In total, there are 255 hours that fall into the SMUD peak period. The average kW reduction across these 255 hours is reported in this evaluation as the peak demand reduction for each year.

An 8,760 hour load shape was developed for typical consumer electronics devices using normalized hourly television load data reported in a Lawrence Berkeley National Laboratory (LBL) publication documenting input data for the Home Energy Saver website.²³ While the load shape is specific to televisions, it was also used as a proxy for desktop computers and computer monitors, as these devices made up less than 10% of the program's projected annual energy savings.

Using this normalized load shape, ADM estimated that approximately 3.81% of a typical electronic device's annual energy use occurs during on-peak hours. Thus, average demand reduction per peak hour for each program year is calculated as shown in Table 4-11.

²³ Ibid.

Table 4-11: Calculation of Average Demand Reduction Per Peak Hour

Program Year	Ex Post Annual kWh Savings		Percentage of kWh Savings Occurring On-Peak		Number of On-Peak Hours		Ex Post Average Demand Reduction Per Peak Hour
2009	6,478,159	X	0.0381	÷	255	=	968 kW
2010	9,902,012		0.0381		255		1,479 kW
2011	7,705,436		0.0381		255		1,151 kW

Comparing these *ex post* demand reduction estimates to the *ex ante* projections used by SMUD shows generally high realization rates as shown in Table 4-12.

Table 4-12: Peak Demand Realization Rates by Program Year

Program Year	Ex Ante Average Demand Reduction Per Peak Hour (kW)	Ex Post Average Demand Reduction Per Peak Hour (kW)	Realization Rate
2009	650	968	149%
2010	1,276	1,479	116%
2011	1,309	1,151	88%

There are a number of reasons for the relatively high peak demand reduction realization rates in 2009 and 2010. Perhaps most importantly, the per unit *ex ante* demand reduction estimates were taken from the various PG&E and SCE work papers previously mentioned. These work papers used at least two different peak period definitions, neither of which corresponded to the SMUD peak period of 4:00 to 7:00 PM during the summer months. The hours most often used in defining the peak period in these work papers were those described in DEER 2008: 2:00 to 5:00 PM. As the average daily load profile shown in Figure 3-1 illustrates, television power demand is higher during the hours of 4:00 to 7:00 PM than it is during the hours of 2:00 to 5:00 PM. As a result, the average demand reduction during these hours is higher than estimated in the PG&E and SCE work papers.

The peak demand reduction realization rate in 2011 is less than 100% mainly because the *ex ante* energy savings estimates SMUD used for the 2011 program year were likely based on improper baseline equipment specifications. As such, the *ex post* difference in power demand between qualifying and non-qualifying equipment was considerably lower than the *ex ante* assumptions.

5. Market Potential and Other Key Findings

This chapter presents the results of the market potential analysis along with other key findings resulting from the evaluation effort.

5.1 Market Potential for Televisions in Future Years

An estimate of the current population of residential home electricity accounts for the Sacramento region was provided by SMUD (529,849) and used along with customer survey data to estimate the number of televisions likely to be sold for residential use in the SMUD service territory over the next two years.

ADM asked survey respondents to identify the number of televisions in their household. The average response was 2.4 televisions per household (n=149), which is slightly lower than the national average of 2.93.²⁴ Multiplying the estimated number of TVs per household by the number of SMUD residential electricity accounts produces an estimate of TVs currently in residential use in the Sacramento region. This number is 1,260,614 TVs.

A commonly cited value for the average TV replacement cycle is seven years. If one in every seven televisions in SMUD residential households is replaced over the next year, that would be 180,088 TVs, or 360,176 TVs over the next two years. To check the reasonableness of this estimate, ADM developed two alternate estimates of television sales over the next two years.

The 2010 U.S. Census estimated that there are approximately 116.7 million households in the U.S.²⁵ SMUD's residential population of 529,849 households makes up 0.45% of that value. Market research firm HIS iSuppli forecasts U.S. Shipments of flat-panel TVs to be 37.1 million units in 2012 and 34.9 million in 2013.²⁶ If 0.45% of these units are shipped and sold to SMUD residential households, that's roughly 326,899 sets over the next two years.

ADM also asked survey respondents when they are most likely to purchase a new television. Figure 5-1 shows respondents' replies.

²⁴ The national average of 2.93 TVs per household is based on an April 2010 press release from The Nielsen Company. <http://blog.nielsen.com/nielsenwire/consumer/u-s-homes-add-even-more-tv-sets-in-2010/>

²⁵ <http://www.census.gov/prod/cen2010/briefs/c2010br-14.pdf>

²⁶ <http://allthingsd.com/20120327/flat-panel-tv-sales-flatten-in-u-s/?mod=googlenews>

When do you think you are most likely to purchase a new TV in the future? (n=149)

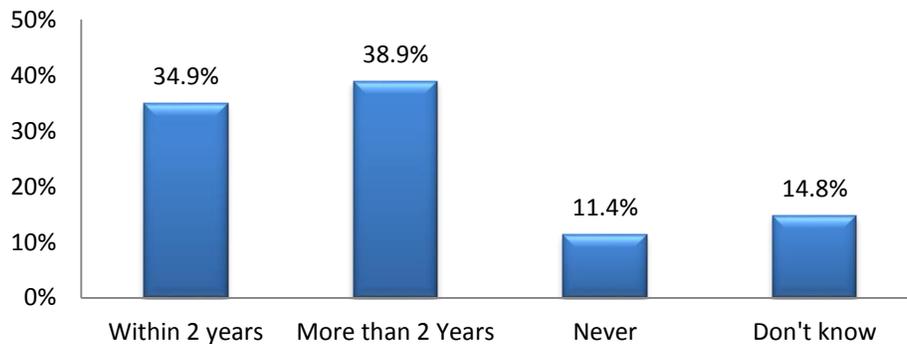


Figure 5-1: Future Television Purchasing Timeframe

As Figure 5-1 shows, 34.9% of respondents indicated they are likely to purchase a new television within the next two years. The 2010 Census estimated that Sacramento County has a population of 1,055,578 people above the age of 18.²⁷ If 34.9% of these people were to purchase a television over the next two years, that would be 368,397 sets sold.

Based on the fact that these three estimates are relatively similar, ADM determined that the average of the three would be a reasonable forecast of residential TV sales over the next two years. On this assumption, ADM forecasts that 351,824 televisions will be sold for residential use in the SMUD service territory over the next two years.

Survey respondents who purchased televisions within the past three years were asked to indicate where they made their purchases. Results are shown in Figure 5-2. Based on these responses, recent purchasers bought their televisions from retailers targeted by the Home and Office Electronics Program 84% of the time.

²⁷ <http://quickfacts.census.gov/qfd/states/06/06067.html>

²⁷ Note: the population of Sacramento County is used as a proxy for the number of people living in residential homes serviced by SMUD.

Which of the following best describes the type of store where you purchased the TV? (n=70)

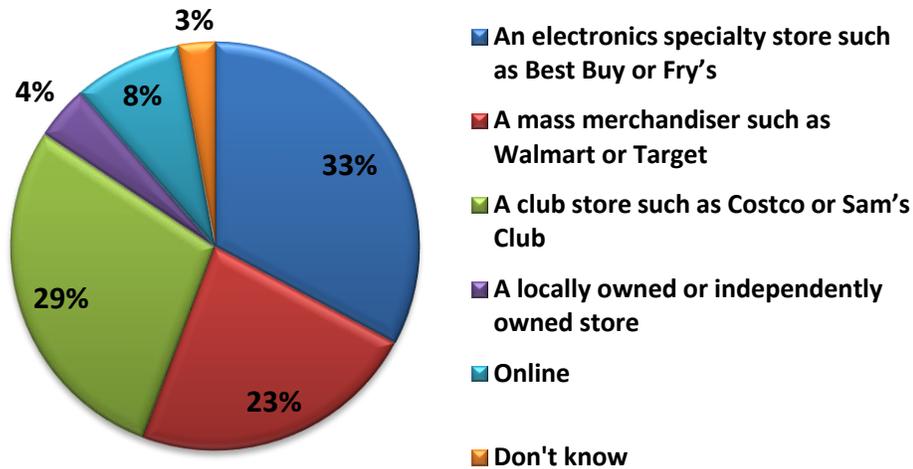


Figure 5-2: Type of Store where Recent Televisions Purchase Made

Survey respondents were also asked where they were likely to purchase their *next* television. Responses to this question indicate that the market share for Home and Office Electronics program participants is likely to remain similar in the near future, though 17% of respondents are unsure of where they are likely to purchase next (Figure 5-3).

Which of the following best describes the type of store where you are likely to purchase your next TV? (n=149)

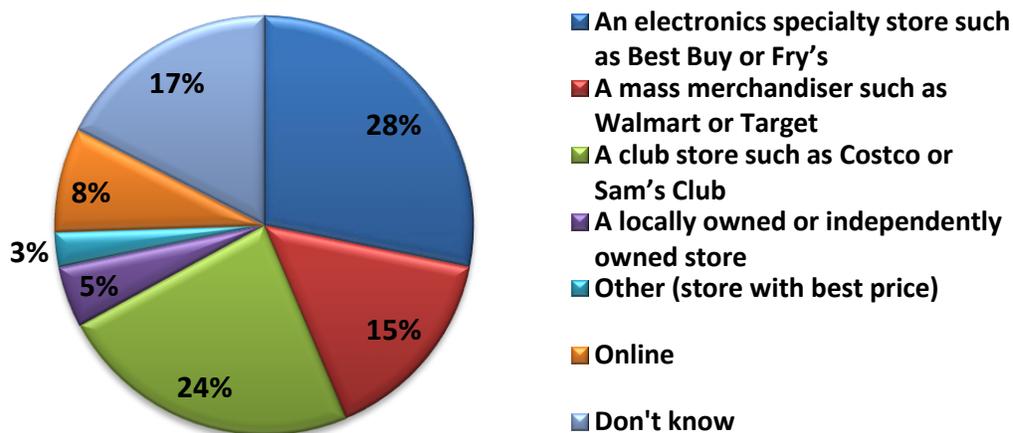


Figure 5-3: Type of Store where Respondents Likely to Purchase Next TV

Based on these findings, ADM estimates that 84% of residential television sales in the SMUD service territory over the next two years will be through program participating retailers. This is equivalent to 295,532 sets.

During 2010 and 2011, the Home and Office Electronics program incentivized 75,721 and 71,748 televisions respectively. In order to reach the same level of program qualified sales over the next two years, ADM estimates that approximately half of the units sold through participating retail locations would need to be program eligible.

5.2 Other Key Findings

This section summarizes findings from the various program evaluation activities not already covered in the gross impact analysis chapter or market potential analysis section.

5.2.1 Customer Telephone Survey Findings

Television Ownership Profile

The data collected from the customer surveys indicate that residents in the Sacramento region on average own slightly fewer televisions per capita than the national average. Figure 5-4 shows that the majority (61%) of survey respondents had one or two TVs, while the remaining 39% owned three or more. In contrast, an estimated 55% of households nationwide had three or more TVs as of 2010.²⁸

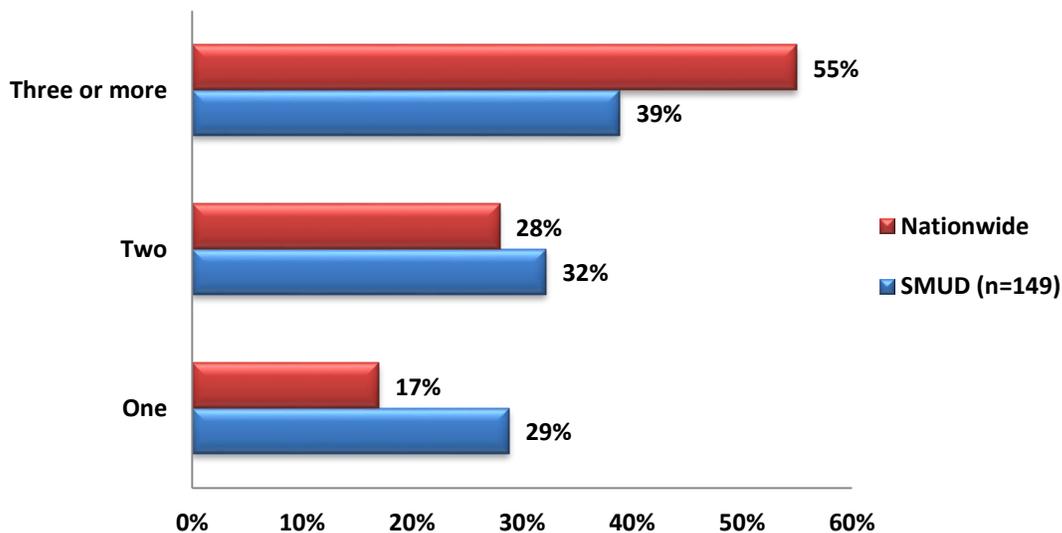


Figure 5-4: Number of TVs in Household – SMUD vs. Nationwide

²⁸ <http://blog.nielsen.com/nielsenwire/consumer/u-s-homes-add-even-more-tv-sets-in-2010/>

The majority of survey respondents indicated that the primary TV in their household was of the flat-panel variety (57%), as shown in Figure 5-5. Twenty-three percent reported their primary TV was a cathode ray tube (CRT) type.

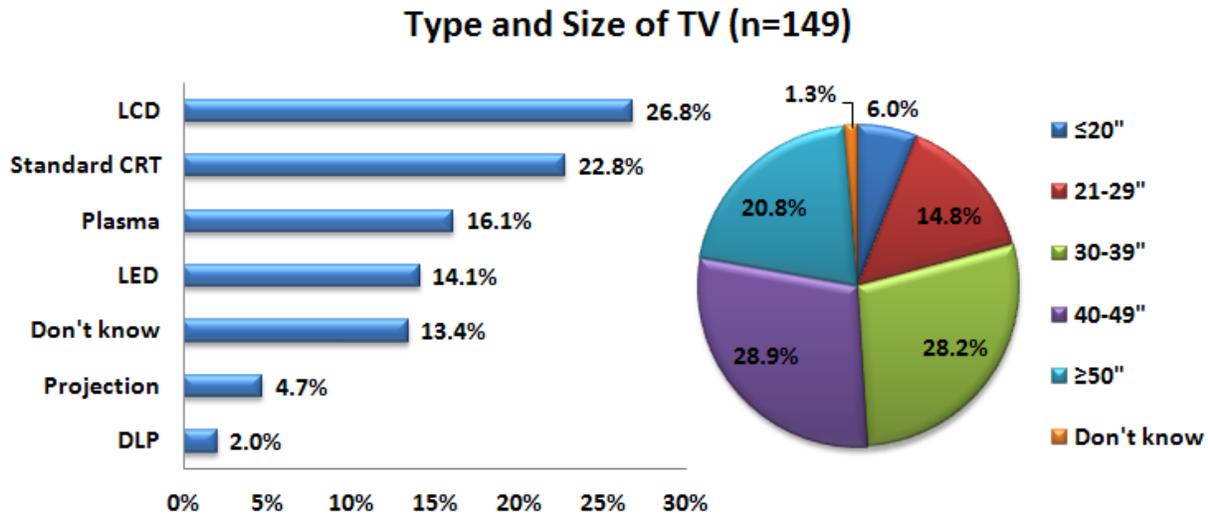


Figure 5-5: Type and Size of Primary TV

Television Characteristics Important to Purchasing Decision

Survey respondents were asked to identify the three most important characteristics they are likely to consider when selecting their next TV for purchase. Approximately 30% of respondents mentioned energy efficiency as one of the top three characteristics, but other considerations were more often cited, as shown in Figure 5-6. Price, picture quality characteristics, and screen size were the most often cited characteristics of importance. The “other” category shown in Figure 5-6 consists of a number of characteristics including: warranty (11), brand name (7), 3D capability (6), assortment of inputs (6), ease of use (5), internet connectivity (4), design/looks (3), quality/reliability (3), sound quality (2), and “features” (2). The responses to this question indicate that while energy efficiency is important to some consumers, price and other physical characteristics of televisions are likely to be of more importance.

What would be the three most important characteristics you would look for when selecting your next TV for purchase? (n=149)

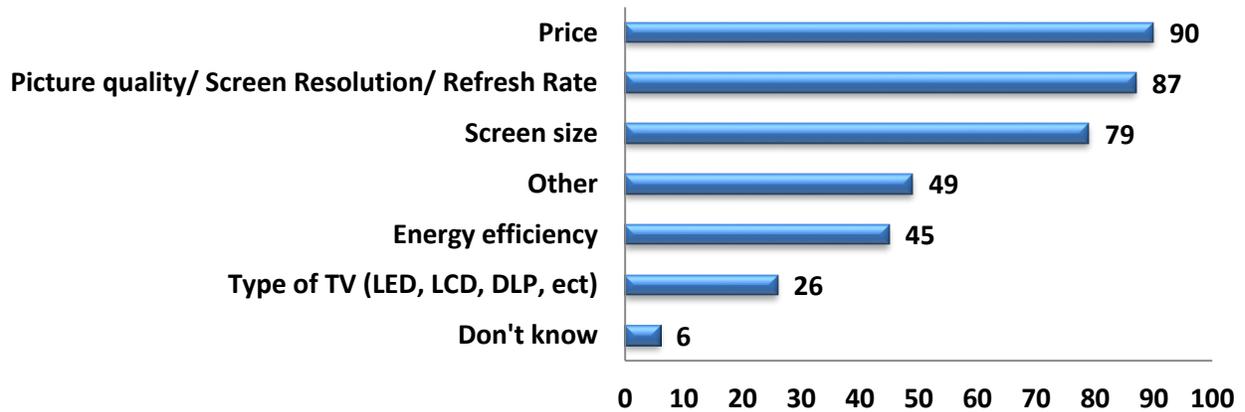


Figure 5-6: TV Characteristics Important to Purchasing Decision

Recent Television Purchasers

Survey respondents who indicated that they had purchased a television during the past three years (n=79) were asked a series of questions regarding their purchasing decision. Eighty-nine percent of these respondents indicated that they purchased the TV new, while the remaining 11% bought the TV used. Eighty-four percent of the recent purchasers who purchased the TV did so through a retail store type that is targeted by the Home and Office Electronics (Figure 5-2). This indicates that the program has been able to target a large portion of consumers through its existing retail partnerships. Only 9% of recent purchasers indicated they bought the TV online, usually through online-only stores (Amazon, etc.) or electronics specialty websites that also have a physical presence (bestbuy.com, etc.).

Recent purchasers were also asked a series of questions aimed at determining whether energy efficiency was considered at the time of purchase. Table 5-1 shows that energy-efficiency was a consideration for approximately half of the recent purchasers.

Table 5-1: Was energy efficiency a consideration when you selected the TV for purchase?

Response	Number of Respondents	Percentage of Respondents
Yes	38	48%
No	38	48%
Don't know	3	4%
Total	79	100%

Recent purchasers were largely aware of ENERGY STAR®, with 89% indicating they were familiar with the logo. Figure 5-7 shows that 59% of recent purchasers indicated the TV they bought had an ENERGY STAR® label.

As far as you know, did the TV you purchased have the ENERGY STAR logo? (n=79)

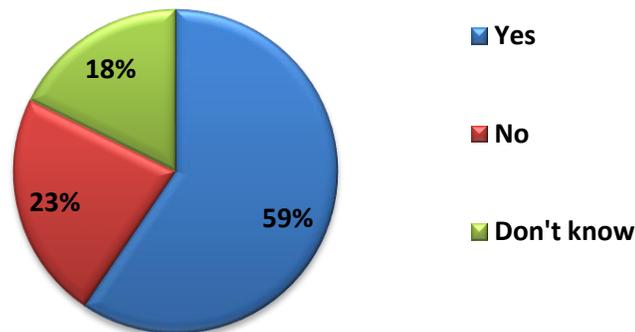


Figure 5-7: Presence of ENERGY STAR® Logo on Recently Purchased TV

Sixty-six percent of the 47 respondents who said the TV had an ENERGY STAR® label also claimed that the presence of the logo was a factor in choosing that particular model. This indicates that while energy-efficiency may not be the most important factor for consumers purchasing televisions, it is at least a consideration for many.

Desktop Computer and Computer Monitor Ownership Profile

The data collected from survey respondents shows that desktop computers and computer monitors are not as prevalent in SMUD customers' homes as televisions. Thirty-eight percent of survey respondents indicated that they do not own a desktop computer at all as shown in

Figure 5-8. In 2008, the U.S. Bureau of Labor Statistics estimated that 75.6% of U.S. households owned a computer.²⁹ This likely points to a high prevalence of laptop, netbook, and tablet PCs in today's market. None of these products are currently incentivized through the Home and Office Electronics program but could represent opportunities for future market transformation efforts. Figure 5-8 also shows that there are slightly more monitors than desktop computers in survey respondents' homes. This is potentially another indication of the prevalence of laptop computers. It may also represent the presence of dual-displays for some desktop computers.

How many desktop computers/monitors does your household have? (n=149)

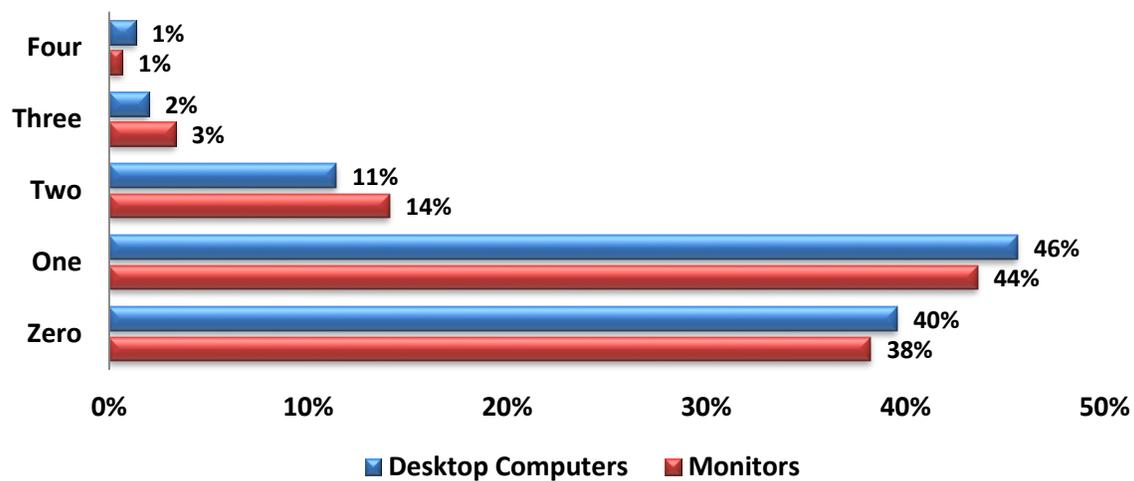


Figure 5-8: Desktop Computer and Computer Monitor Ownership

Of the respondents who indicated they have at least one desktop computer or monitor, the vast majority indicated that the devices had been purchased within the past six years (70% for desktop computers and 77% for computer monitors).

²⁹ http://www.bls.gov/opub/focus/volume1_number4/cex_1_4.htm

Approximately how long ago did you purchase the computer/monitor?

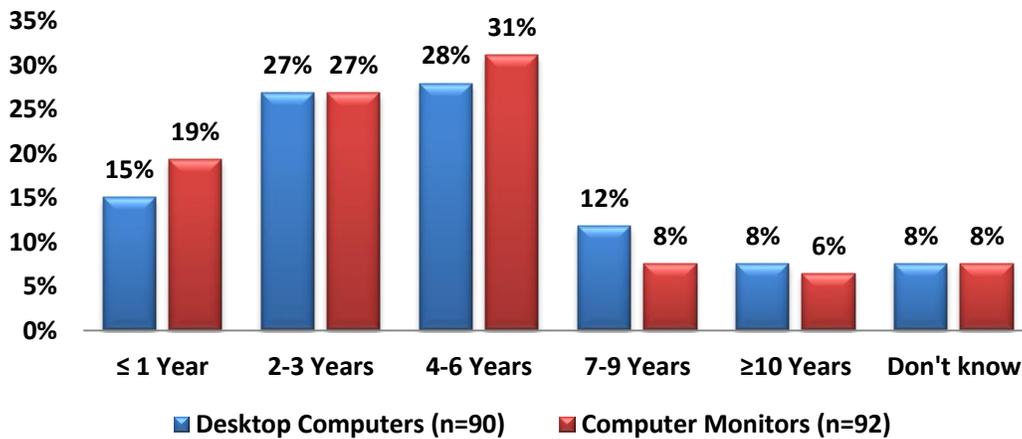


Figure 5-9: Desktop Computer and Monitor Time of Purchase

Recent Desktop Computer or Computer Monitor Purchasers

Respondents who purchased a desktop computer (n=39) or computer monitor (n=43) within the past three years were asked a series of questions aimed at understanding their purchasing decisions. Seventy-seven percent of the recent purchasers bought their device new, while the remaining 23% either bought the unit used or didn't know. Table 5-2 shows that of those who purchased the devices new, the majority purchased the devices in stores that are targeted by the Home and Office Electronics program. This indicates that the program has had the opportunity to reach a large portion of computer and monitor consumers through its current retail partnerships over the past three years.

Table 5-2: Recent Computer and Monitor Purchase Locations

Purchase Location	Computers (n=30)	Monitors (n=33)
An electronics specialty store such as Best Buy or Fry's	47%	48%
A mass merchandiser such as Wal-Mart or Target	13%	9%
A club store such as Costco or Sam's Club	7%	3%
A locally owned or independently owned store	3%	27%
Online	13%	0%
Don't know	17%	12%

Forty-one percent of recent computer purchasers and 40% of recent monitor purchasers indicated that energy efficiency was a consideration when they selected their devices (Figure 5-10). However, as Figure 5-11 illustrates, when survey respondents were asked to list the three most important characteristics they will look for when purchasing their next device, energy efficiency ranked below a number of other considerations.

Was energy efficiency a consideration when you selected your computer/monitor for purchase?

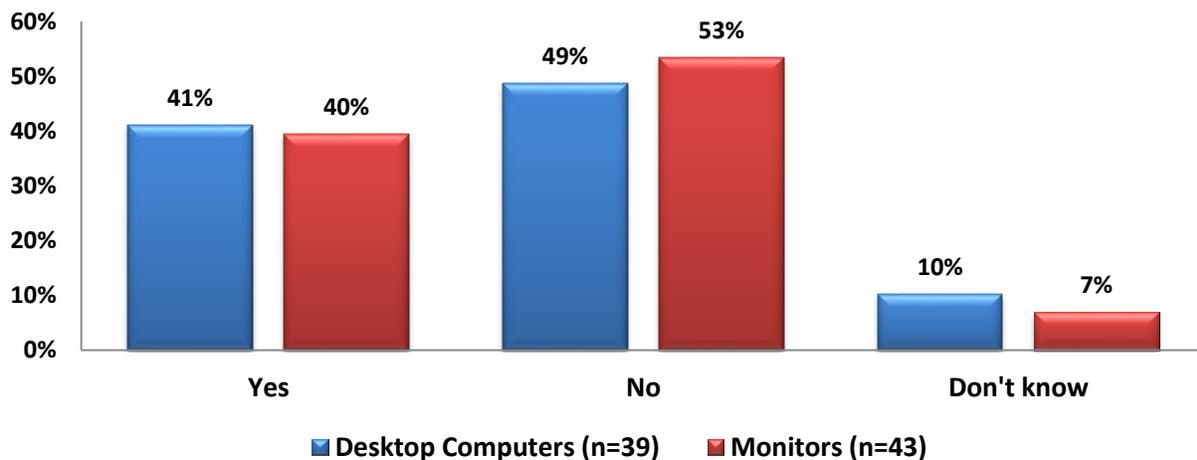


Figure 5-10: Consideration of Energy Efficiency for Recent Computer/Monitor Purchases

What would be the three most important characteristics you would look for when selecting your next computer/monitor for purchase? (n=93)

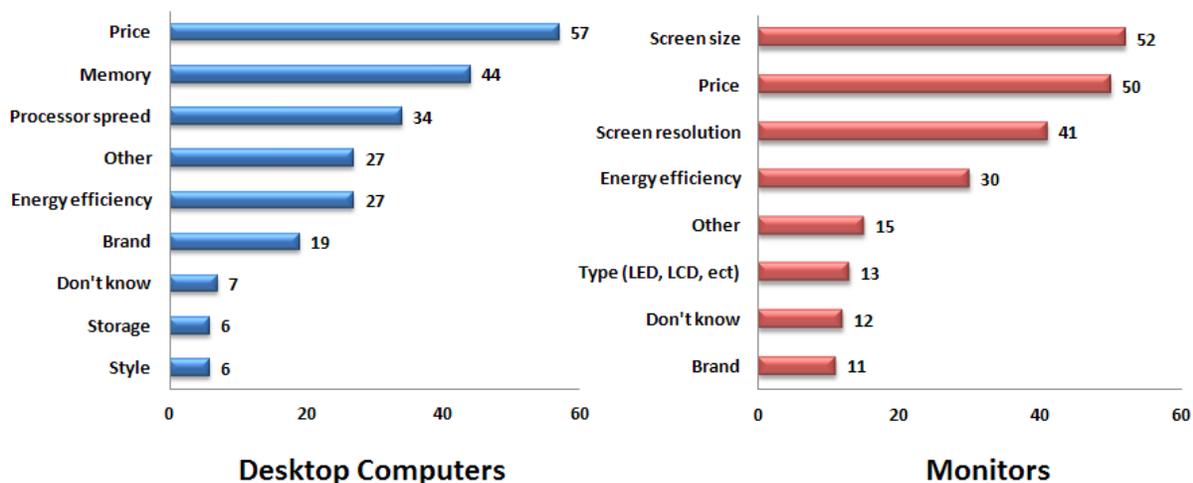


Figure 5-11: Important Characteristics for the Computer/Monitor Purchasing Decision

5.2.2 Retail Salesperson Interview Findings

ADM visited a total of 17 participating retail locations. At 15 of these stores, ADM was able to conduct short interviews with salespeople in the television department. The goal of these interviews was to gain further insight into the purchasing decisions of consumers in the market for televisions. Respondents were first asked to name television characteristics that customers care about most when deciding between different models for purchase. Answers were recorded for as many characteristics as the salespeople mentioned. Table 5-3 shows the characteristics mentioned and the number of salespeople who mentioned them. As in the customer telephone survey, price and picture quality were the two most mentioned characteristics of importance. Energy efficiency was mentioned by four salespeople, which put it ahead of a number of characteristics including brand, input assortment and 3D capability.

Table 5-3: What characteristics do customers care most about when deciding between different television models? (n=15)

Characteristic	Number of Mentions
Picture Quality/ Screen Resolution/ Refresh Frequency	10
Price	9
Screen Size	8
Type of TV (LED, LCD, etc.)	7
Warranty	5
Energy Efficiency	4
Inputs (HDMI, USB, etc.)	3
3D Capable	2
Brand	1
Quality	1
Thickness	1
Salesperson Recommendation	1

The salespeople were next asked to rank the top three characteristics they mentioned in order of importance to customers. Table 5-4 summarizes the rankings, while Figure 5-12 shows the rankings as weighted percentages of the total responses (ranked first responses are multiplied by 3, ranked second responses multiplied by 2, and ranked third response are multiplied by 1). Price was ranked first by eight of the 15 salespersons interviewed, confirming that it is the top consideration for most customers. Energy efficiency ranked below price, screen size, technology type, performance, and picture quality. It seems that some customers may care

about energy efficiency, but the vast majority of consumers are primarily interested in other characteristics.

Table 5-4: Of the characteristics you mentioned, please rank the top three most asked about. (n=15)

Characteristic	Number of Times Ranked First	Number of Times Ranked Second	Number of Times Ranked Third
Price	8	3	1
Type	2	3	0
Picture Quality/ Screen Resolution/ Refresh Frequency	1	1	1
Quality/Performance	1	2	0
Sales Person Recommendation	1	0	0
Screen Size	1	5	1
Energy efficiency	1	1	0
3D capability	0	0	2
Brand	0	0	1
Inputs	0	0	1
Warranty	0	0	2

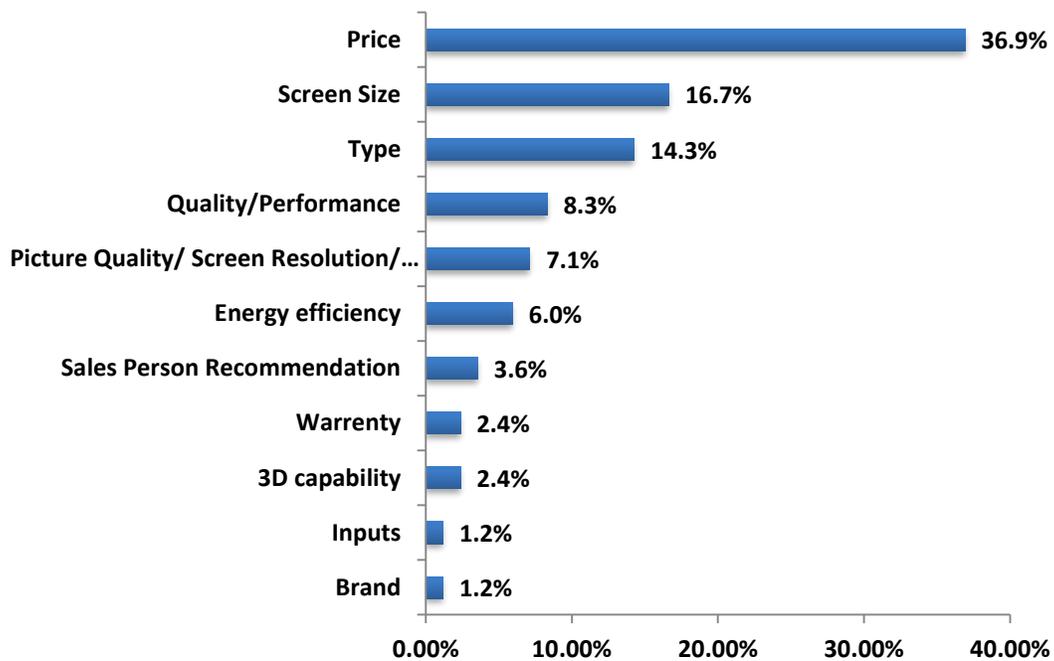


Figure 5-12: Weighted Importance of Characteristics Mentioned.

The sales people were also asked to pick out the television they would purchase if they were to purchase one from their store. Of the TVs identified, four had Home and Office Electronics marketing materials attached, while 11 did not. Respondents were also asked to indicate why they chose that particular model. None of the salespeople mentioned energy efficiency as a contributing factor. The most common responses were along the line of “great picture quality” or “best on the market for the money.”

When asked how often customers consider energy efficiency, respondent for the most part said “almost never” (67%) as shown in Figure 5-13.

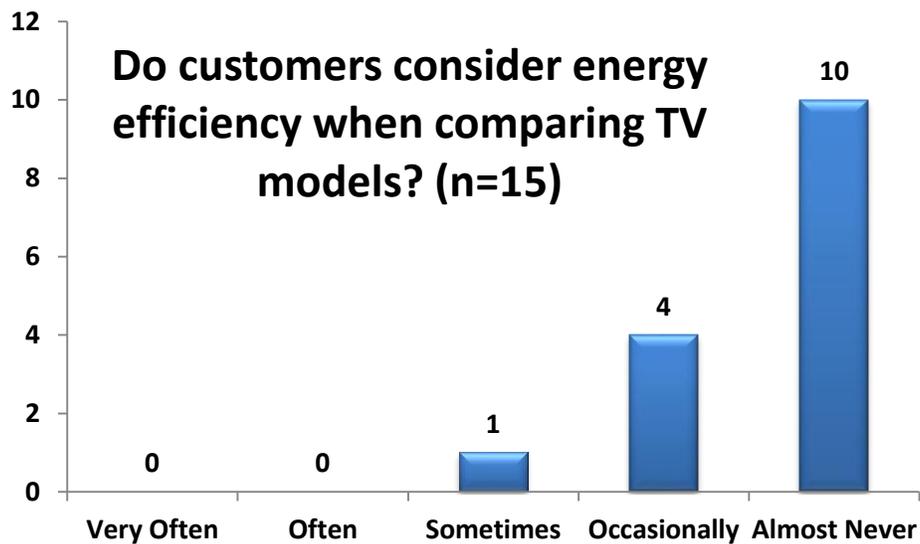


Figure 5-13: Do customers consider energy efficiency?

To gauge salesperson awareness of the Home and Office Electronics program and energy efficiency in general, respondents were asked if they were aware of the SMUD efficient product labels. Nine out of the 15 respondents said they were aware of the labels, while six were not. When asked how they would identify an energy efficient television, responses varied, though ENERGY STAR® labels were the most often mentioned (Figure 5-14).

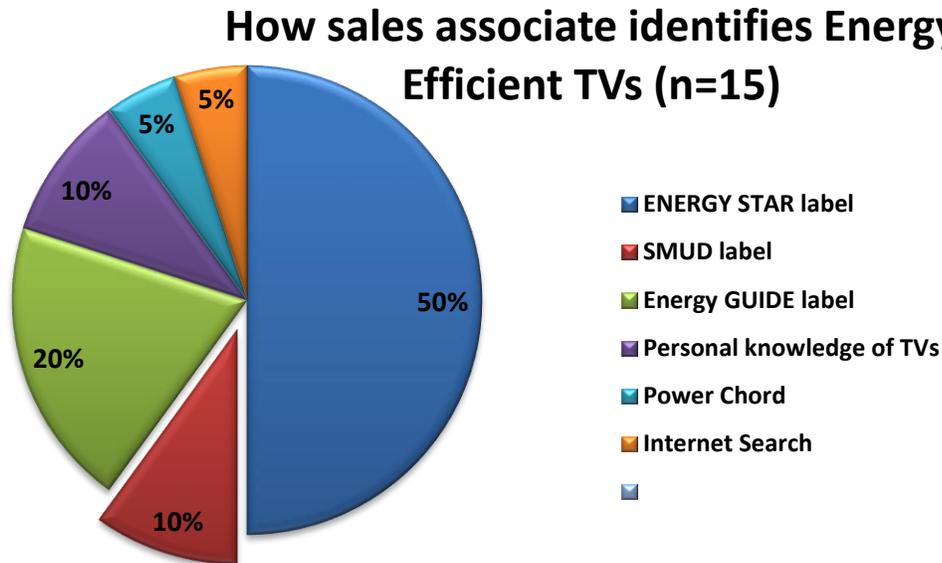


Figure 5-14: Efficient Television Identification

The nine salespeople who were aware of the Home and Office Electronics program point-of-purchase labeling were asked if they could explain what the labels indicate. Six of the nine correctly stated that the labels indicated a highly efficient television. Two replied that while they were familiar with the labels, they did not know what they meant. Finally, one salesperson incorrectly stated that the labels meant the televisions would power off after a period of not being watched. These results indicate that some salespeople at participating retail locations are more able than others to advise customers about energy efficient televisions. This highlights the importance of retailer training in conjunction with point-of-purchase marketing materials.

5.2.3 Shelf-Level Inventory Findings

ADM field staff visited 17 participating retail locations throughout the Sacramento area and conducted detailed inventories of all the televisions, desktop computers, and computer monitors on the stores' shelves. These store visits were conducted in early April of 2012. ADM staff recorded make and model numbers, technology type, and documented the presence of ENERGY STAR® labels and Home and Office Electronics program marketing materials.

The original intent of the shelf-level inventory assessment was to match model numbers of the on-shelf equipment to ENERGY STAR® qualified product lists to determine the exact percentage of units that meet current program qualification criteria. However, matching the model numbers as found in the stores to the model numbers listed in the ENERGY STAR® lists proved difficult, as simple differences such as the presence of a "dash" or extra letter prevented exact matches. Fixing these issues would require a line-by-line analysis for a large portion of the model numbers collected. Such steps were not taken for this evaluation in light of time and budget constraints. However, there were still a number of findings from the shelf-level inventory analysis worth reporting.

Televisions

There were a total of 834 televisions on the shelves of the 17 stores ADM field staff visited. The number of televisions on display varied widely, from as little as eight models in one store to as many as 104 models in another. LCD televisions made up 87% of the televisions across all of the visited stores (Figure 5-15). Plasma televisions made up 12%, while Digital Light Processing (DLP) televisions made up only 1%. This distribution largely held true on a store-by-store basis as well.

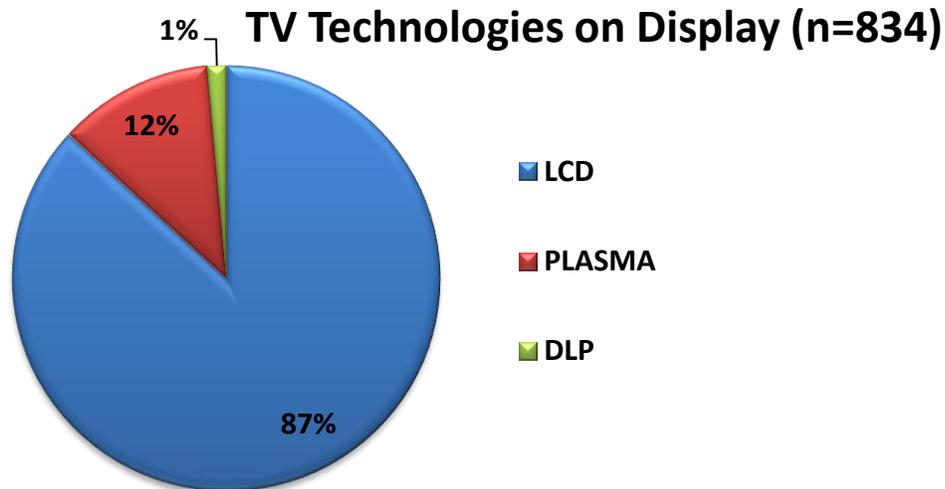


Figure 5-15: Distribution of TV Technology Types at Participating Retail Locations

Based on the data recorded by ADM field staff, 49.7% percent of the LCD TVs displayed were equipped with light-emitting diode (LED) backlighting/edge-lighting. Holding other characteristics such as size and settings, LED TVs generally consume less energy than fluorescent (CCFL) backlit LCD televisions, which in turn generally consume less energy than Plasma and DLP technologies.

ADM field staff reported seeing ENERGY STAR® labels on 57% of the televisions on display. Because of the model matching issues mentioned previously, this was not confirmed using qualified product lists. LCD televisions were much more likely to have ENERGY STAR® labels (54%) than Plasma televisions (19%) or DLP televisions (0%).

Home and Office Electronics point-of-purchase marketing materials were identified at 12 of the 17 stores. The marketing materials were often attached to particular televisions, but were sometimes placed on a shelf between a number of different models. This made it difficult to identify which of the televisions in the vicinity were actually program eligible. In at least one instance, marketing materials for the PG&E BCE program were found. The PG&E marketing

materials were not in the form of a placard or label, but rather a display on the television screen itself.

Desktop Computers and Computer Monitors

Data was collected for 141 desktop computers and 165 computer monitors on display at the retail locations visited. Figure 5-16 shows the percentage of units that had ENERGY STAR® labels as reported by ADM field staff.

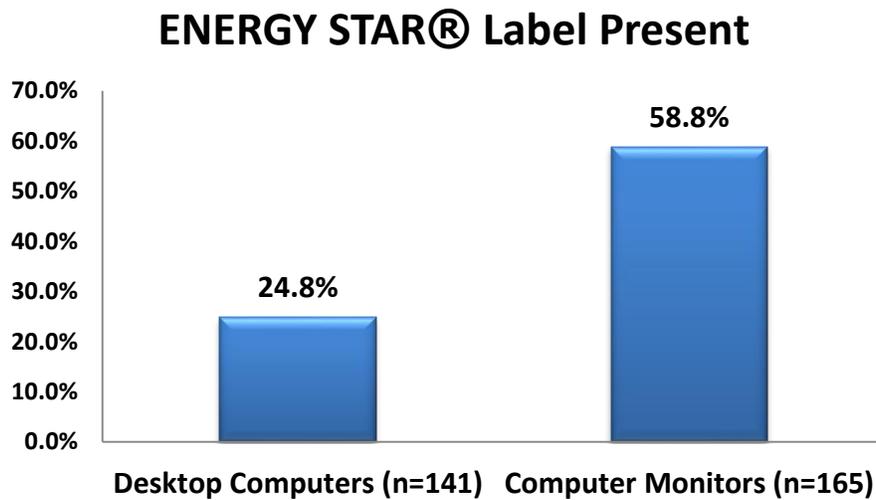


Figure 5-16: Percentage of Displayed Computers/Monitors with ENERGY STAR® Label Present

6. Conclusions and Recommendations

This section summarizes a selection of overall findings from the Home and Office Electronics Program Evaluation. These findings are based on results of the gross impact analysis, market potential analysis, customer and retailer salesperson interviews, shelf-level inventories, and relevant secondary sources.

6.1 Gross Energy Impacts

ADM estimated gross energy savings (kWh) and gross peak demand reductions (kW) for equipment sold and incentivized through the Home and Office Electronics Program in 2009, 2010, and 2011. These estimates are shown in Table 6-1 below.

Table 6-1: Ex Post Gross Annual kWh Savings and Peak kW Demand Reductions

Unit Type	2009		2010		2011	
	kWh Savings	Peak kW Reduction	kWh Savings	Peak kW Reduction	kWh Savings	Peak kW Reduction
Televisions	5,909,669	883	9,501,773	1,419	6,915,451	1,033
Desktop Computers	468,639	70	76,331	11	145,036	22
Monitors	99,851	15	323,908	48	644,949	96
Total	6,478,159	968	9,902,012	1,479	7,705,436	1,151

The *ex post* estimates of kWh savings and peak kW reductions developed through this evaluation were compared to the program level *ex ante* estimates that SMUD used for program tracking purposes. This comparison resulted in the realization rates reported in Table 6-2 by program year.

Table 6-2: Ex Ante Energy Impact Estimates and Annual Program Level Realization Rates

	SMUD Ex Ante Estimates			Realization Rates		
	2009	2010	2011	2009	2010	2011
Gross kWh Savings	6,504,042	15,557,442	14,290,430	99.6%	64%	54%
Average kW Reduction per Peak Hour	650	1,276	1,309	149%	116%	88%

6.2 Conclusions

Ex ante annual energy impact estimates in 2010 and 2011 were overstated because baseline equipment efficiencies were not updated: Program qualification criteria have been updated regularly to reflect yearly product cycles and changes in ENERGY STAR® qualifications. However, the *ex ante* per unit savings estimates listed in the SMUD program summary spreadsheets were often not updated to reflect these changes. Additionally, the actual program qualification criteria listed in the summary spreadsheets were not always in line with actual program implementation.

Ex ante peak demand reductions were estimated based on a peak period inconsistent with SMUD's defined summer peak period: The peak demand reductions listed in this report are based on SMUD's defined summer peak period of 4:00 to 7:00 PM during weekdays in June through September. The *ex ante* peak demand reductions were taken from PG&E and SCE work papers that calculate demand reduction according to the DEER peak period, which is from 2:00 to 5:00 PM. The vast majority of gross annual energy savings and gross peak demand reductions resulting from program encouraged activity came from the sale of televisions. Televisions in general are more likely to be powered on between 4:00 and 7:00 PM than 2:00 to 5:00 PM. As a result, the *ex ante* peak demand reductions were underestimated in general.

Current retail partners cover a large portion of the television market and are likely to account for the majority of residential TV sales in the near future: The customer survey indicated that approximately 84% of recent television purchasers (n=79) purchased their devices through stores that are targeted by the Home and Office Electronics program. ADM estimates that over the next two years, roughly 295,532 television sets will be sold through participating retailers to households in the SMUD service territory. The number of televisions that are program eligible will depend on the evolution of program qualification criteria in the near future.

Energy efficiency is not a primary consideration for most consumers purchasing consumer electronics: Results from the customer survey and sales associate interviews indicate that consumers place importance on a number of characteristics above energy efficiency when selecting a new television, desktop computer, or computer monitor for purchase. Price, screen size, and picture quality tend to be most important to television purchasers. For computers, consumers are most interested in price, memory, and processor speed. Finally, the most important characteristics for monitor purchasers are screen size, price, and screen resolution. Still, when asked directly if energy efficiency was a consideration when selecting a particular model, 48% of recent television purchases said it was a consideration. Sales associates who were interviewed claimed that customers almost never consider energy efficiency.

6.3 Recommendations

Update baseline efficiency assumptions on a yearly basis: The consumer electronics market is fast-moving and subject to yearly product refresh cycles. It is important to review and revise baseline efficiency assumptions on an annual basis to ensure estimates of gross energy impacts

are not overstated. This review should coincide with annual reviews of program qualification criteria.

Estimate peak demand reductions based on the SMUD defined peak period of 4 to 7 PM on weekdays, June through September: The PG&E and SCE work papers cited for *ex ante* per unit demand reduction estimates use a different peak period definition than SMUD. Specific SMUD peak demand reduction estimates should be developed to reflect the time period when SMUD experiences the highest demand for electricity.

Organize tracking spreadsheets based on sales period: The program activity summary spreadsheets provided by SMUD were organized into three program years based on when invoices were received. However, this caused a number of 2009 transactions to be listed in the 2010 program summary spreadsheet. Similarly, a number of 2010 transactions were listed in the 2011 program summary spreadsheet. For the purposes of tracking program sales and energy impacts, organizing the activity summary spreadsheets by sales period is preferable. This will ensure that sales during each calendar year are collected in one place and separated from other program years.

Establish relationships with additional Original Equipment Manufacturers (OEMs) to increase sales in the business-to-business sales channel: Between 2009 and 2011 there was limited participation from OEM and other business-to-business sales entities. Dell and Best Buy for Business made up the entirety of those sales. Building relationships and encouraging program participation from additional OEMs represents an avenue for increased influence in the business-to-business market.

Consider additional training for retail sales associates: Results from salesperson interviews suggest that some sales associates are more able to identify energy efficient products than others. Nine out of 15 sales associates interviewed were aware of Home and Office Electronics point-of-purchase materials, but only six were able to correctly identify what the labels indicate. Previous reports regarding consumer electronics programs have used mystery shoppers and found that sales associates are not actively promoting energy efficiency. This is consistent with reports from sales associates that customers almost never consider energy efficiency when comparing TV models. Staff turnover is often very high at retail locations; periodic training regarding point-of-purchase display materials and energy efficiency in general could help increase the programs influence on customer purchasing decisions through salesperson advocacy.

Make sure that point-of-purchase marketing materials clearly identify program eligible products: ADM field staff visited a sample of participating retail locations within the SMUD service territory and documented placement of program marketing materials. In many cases, point-of-purchase materials were affixed directly to a specific television, making it easy to identify that model as an energy efficient model. However, in a number of instances program

displays were placed on a shelf between a number of different models, making it difficult to identify which models were energy efficient.

Consider future research regarding specific program influences: The focus of this evaluation has been to estimate verified *ex post* gross energy and demand impacts. These impacts are assessed based on the quantities of program eligible equipment incentivized and sold through the program, and the difference in energy consumption between eligible and non-eligible products. However, the Home and Office Electronics program is designed to promote market transformation in the consumer electronics market and as such, future research should explore the influence of the program on retailers and manufacturers decisions. Additionally, future research should focus on identifying the specific impacts of the Home and Office Electronics program amongst the many forces driving the consumer electronics market. SMUD works in conjunction with a number of partner utilities implementing similar programs in California, Nevada, and the Northwest. The retailers participating in the Home and Office Electronics program are, for the most part, large corporations with a national presence. Previous research has found that these retailers generally set their assortment of products on a national basis. Additionally, because incentives are given to corporate headquarters and not directly to regional store locations, the program may not give retailers a direct incentive to increase the sale or stocking of efficient products in a particular regional store. There are also a number of external forces affecting energy efficiency in the consumer electronics market (technological advances, national programs such as ENERGY STAR®, etc.). Future research should examine the interaction of these various forces to determine what specific influences are attributable to SMUD's program.

Appendix A. Customer Survey Instrument

SMUD Home and Office Electronics Program

Telephone Survey

A1 *Hello, my name is (interviewer name), and I am calling on behalf of SMUD, your electric utility company. May I speak with (name of respondent)?*

Yes 01

No 02 [IF NOT AVAILABLE, ASK FOR ANOTHER ADULT WHO WAS
EITHER INVOLVED WITH THE PURCHASE OF THE HOUSEHOLD'S TV OR
WOULD BE INVOLVED WITH FUTURE TV PURCHASES]

A2 *I'm with ADM Associates, an independent research firm. We are conducting a study on behalf of SMUD regarding televisions, desktop computers, and computer monitors. As part of this study, we are conducting a short telephone survey with SMUD customers. If you complete this survey, you will receive a \$10 gas gift card for your participation. May I take a few minutes of your time to talk with you about your household's home electronics?*

Yes 01 [PROCEED WITH INTERVIEW]

No 02 [THANK AND TERMINATE]

Refused 99 [THANK AND TERMINATE]

A3 *Great, thank you. First I want to assure you that I'm not selling anything. Your responses will be kept strictly confidential.*

THE INTERVIEW

SCREENING QUESTIONS

1. How many TVs does your household have?

0 00

1 01

2 02

3 03

4 04

5 or more 05

Don't know 99

2. How many desktop computers does your household have? This does not include laptops, netbooks or tablets.

- | | |
|------------|----|
| 0 | 00 |
| 1 | 01 |
| 2 | 02 |
| 3 | 03 |
| 4 | 04 |
| 5 or more | 05 |
| Don't know | 99 |

3. How many computer monitors does your household have?

- | | |
|------------|----|
| 0 | 00 |
| 1 | 01 |
| 2 | 02 |
| 3 | 03 |
| 4 | 04 |
| 5 or more | 05 |
| Don't know | 99 |

[Thank and terminate IF: (Q1=00 or 99) and (Q2=00 or 99) and (Q3=00 or 99)]

TV Survey Battery

Current TVs

[Ask IF: (Q1<>00 or 99), else skip to Q17]

"Now I'd like to ask you a series of questions about the TV's in your household."

4. Please think about the [number of TVs from Q1] in your home. On average, how many hours per day would you estimate these TVs are on during a weekday?

- | | |
|------------------------------------|----|
| Record number of hours (0-24)_____ | |
| Don't know | 99 |

4a. How many hours per day during an average weekend day?

- | | |
|------------------------------------|----|
| Record number of hours (0-24)_____ | |
| Don't know | 99 |

[If Q1<>1, *"For the next series of questions, please answer for the TV that your household uses most often"*]

5. What type of TV is it?

LCD TV	01	
LED TV	02	
Plasma TV		03
DLP TV	04	
Standard tube CRT		05
Projection TV		06
Other (specify)	07	
Don't know		99

6. Approximately what size is the TV? (*Use descriptions if respondent can't provide the size in inches*)

1 to 20 inches / very small		01
21 to 29 inches / small	02	
30 to 39 inches / medium		03
40 to 49 inches / large	04	
50 inches or more / very large	05	
Don't know		99

7. Approximately how long ago did you purchase this TV?

Record age in years (if less than 1 year, enter zero) _____

Don't know 99

8. [Ask IF: Q1<>1] For this particular TV, approximately how many hours per day is the TV on during a weekday?

Record number of hours (0-24) _____

Don't know 99

8a. How many hours per day during an average weekend day?

Record number of hours (0-24) _____

Don't know 99

Recent Purchasers

[Ask IF: Q7<=3 years, else skip to Q17]

9. Was the TV purchased new or used?

New	01
Used	02
Don't know	03

10. [Ask IF: Q9=01] Was the TV purchased in a physical store or online?

In store	01
Online	02
Don't know	99

11. [Ask IF: Q10=01] Which of the following best describes the type of store where you purchased the TV?

An electronics specialty store such as Best Buy or Fry's	01
A mass merchandiser such as Walmart or Target	02
A club store such as Costco or Sam's Club	03
A locally owned or independently owned store	04
Other (specify)	05
Don't know	99

12. [Ask IF: Q10=02] Which of the following best describes the type of website where you purchased the TV?

An online only store such as amazon.com or newegg.com	01
An electronics store website such as bestbuy.com	02
A mass merchandiser website such as walmart.com or target.com	03
A club store website such as costco.com or samsclub.com	04
Other (specify)	05
Don't know	99

13. Was energy efficiency a consideration when you selected the TV for purchase?

Yes	01
No	02
Don't know	99

14. Are you familiar with the ENERGY STAR® logo?

Yes	01
No	02
Don't know	99

[Read IF: (Q14=02 or 99) "*The ENERGY STAR® logo is a blue and white label with the word "energy" followed by a five pointed star. The label is used by the Environmental Protection Agency and the Department of Energy to identify energy efficient lighting, electronics and appliances for consumers.*"]

15. As far as you know, did the TV you purchased have the ENERGY STAR® label?

Yes	01
No	02
Don't know	99

16. [Ask IF: Q15=01] When you purchased the TV, did the presence of the ENERGY STAR® label or the salesperson mentioning that the unit was ENERGY STAR® qualified factor into your choosing that particular model?

Yes	01
No	02
Don't know	99

Future Purchases

[Ask all]

17. When do you think you are most likely to purchase a new TV in the future?

0 to 6 months	01
7 to 12 months	02
13 to 18 months	03
19 to 24 months	04
More than 2 years	05
Never	06
Don't know	99

18. Are you more likely to purchase your next TV in a physical store or online?

In store	01
Online	02
Don't know	99

19. [Ask IF: Q18=01] Which of the following best describes the type of store where you are likely to purchase your next TV?

An electronics specialty store such as Best Buy or Fry's	01
A mass merchandiser such as Walmart or Target	02
A club store such as Costco or Sam's Club	03
A locally owned or independently owned store	04
Other (specify)	05
Don't know	99

20. [Ask IF: Q18=02] Which of the following best describes the type of store where you are likely to purchase your next TV?

An online only store such as amazon.com or newegg.com	01
An electronics store website such as bestbuy.com	02
A mass merchandiser website such as walmart.com or target.com	03
A club store website such as costco.com or samsclub.com	04
Other (specify)	05
Don't know	99

21. Now, please think about the factors involved in purchasing a new TV. What would be the three most important characteristics you would look for when selecting your next TV for purchase? (*Read only if necessary. Probe for three.*)

Price		01
Screen size		02
Type of TV (LED, LCD, DLP, ect)	03	
3D or 3D capable TV		04
Screen resolution (e.g. 720p, 1080p)		05
Screen refresh frequency (e.g. 60 Hz, 120 Hz, 240 Hz)	06	
Inputs (HDMI, Component Inputs, PC Inputs, USB Inputs)		07
Internet connectivity		08
Warranty		09
Picture quality		10
TV footprint		12
Energy efficiency		13
Other (specify)	14	
Don't know		99

Computer & Monitor Battery

[Ask IF: (Q2<>00 or 99) and (Q3<>00 or 99), else skip to T1]

"Now I'd like to ask you a few questions about the desktop computers and computer monitors in your household."

[If Q2<>1, "For the next series of questions, please answer for the desktop computer and monitor that your household uses most often"]

22. After you are done using your computer at night do you...

Shut it down completely		01
Put it into standby or sleep mode		02
Leave it on		03
Other (specify)	04	
Don't know		99

22a. What about the monitor? Do you...

Shut it down completely		01
Put it into standby or sleep mode		02
Leave it on		03
Other (specify)	04	
Don't know		99

23. And when you're not using the computer during the day, do you generally...

Shut it down completely	01
Put it into standby or sleep mode	02
Leave it on	03
Other (specify) 04	
Don't know	99

23a. What about the monitor? Do you...

Shut it down completely	01
Put it into standby or sleep mode	02
Leave it on	03
Other (specify) 04	
Don't know	99

24. On average, how many hours per day would you estimate the computer or monitor is left on during a weekday?

Record number of hours (0-24) _____	
Don't know	99

24a. How many hours per day during an average weekend day?

Record number of hours (0-24) _____	
Don't know	99

25. Approximately how long ago did you purchase the computer?

Record age in years (if less than 1 year, enter zero) _____	
Don't know	99

26. Approximately how long ago did you purchase the monitor?

Record age in years (if less than 1 year, enter zero) _____	
Don't know	99

27. To the best of your knowledge, does your desktop computer or monitor have an ENERGY STAR® label?

Only my desktop has an ENERGY STAR® label	01
Only my monitor has an ENERGY STAR® label	02
Both have an ENERGY STAR® label	03
Neither have an ENERGY STAR® label	04
Don't know	99

Recent Purchasers (Computers)

[Ask IF: Q25<=3 years, else skip to Q36]

28. Was the computer purchased new or used?

New	01
Used	02
Don't know	03

29. [Ask IF: Q28=01] Was the computer purchased in a physical store or online?

In store	01
Online	02
Don't know	99

30. [Ask IF: Q29=01] Which of the following best describes the type of store where you purchased the computer?

An electronics specialty store such as Best Buy or Fry's	01
A mass merchandiser such as Walmart or Target	02
A club store such as Costco or Sam's Club	03
A locally owned or independently owned store	04
Other (specify)	05
Don't know	99

31. [Ask IF: Q29=02] Which of the following best describes the type of website where you purchased the computer?

An online only store such as amazon.com or newegg.com	01
An electronics store website such as bestbuy.com	02
A mass merchandiser website such as walmart.com or target.com	03
A club store website such as costco.com or samsclub.com	04
Other (specify)	05
Don't know	99

32. Was energy efficiency a consideration when you selected the computer for purchase?

Yes	01
No	02
Don't know	99

33. [Ask IF: Q14 was not asked] Are you familiar with the ENERGY STAR® logo?

Yes	01
No	02
Don't know	99

[Read IF: (Q33=02 or 99) “The ENERGY STAR® logo is a blue and white label with the word “energy” followed by a five pointed star. The label is used by the Environmental Protection Agency and the Department of Energy to identify energy efficient lighting, electronics and appliances for consumers.”]

34. As far as you know, did the computer you purchased have the ENERGY STAR® label?

Yes	01
No	02
Don't know	99

35. [Ask IF: Q34=01] When you purchased the computer, did the presence of the ENERGY STAR® label or the salesperson mentioning that the unit was ENERGY STAR® qualified factor into your choosing that particular model?

Yes	01
No	02
Don't know	99

Recent Purchasers (Monitors)

[Ask IF: Q26<=3 years, else skip to Q44]

36. Was the monitor purchased new or used?

New	01
Used	02
Don't know	03

37. [Ask IF: Q36=01] Was the monitor purchased in a physical store or online?

In store	01
Online	02
Don't know	99

38. [Ask IF: Q37=01] Which of the following best describes the type of store where you purchased the monitor?

An electronics specialty store such as Best Buy or Fry's	01
A mass merchandiser such as Walmart or Target	02
A club store such as Costco or Sam's Club	03
A locally owned or independently owned store	04
Other (specify)	05
Don't know	99

39. [Ask IF: Q37=02] Which of the following best describes the type of website where you purchased the monitor?

An online only store such as amazon.com or newegg.com	01
---	----

An electronics store website such as bestbuy.com	02
A mass merchandiser website such as walmart.com or target.com	03
A club store website such as costco.com or samsclub.com	04
Other (specify)	05
Don't know	99

40. Was energy efficiency a consideration when you selected the monitor for purchase?

Yes	01
No	02
Don't know	99

41. [Ask IF: Q14 and Q33 were not asked] Are you familiar with the ENERGY STAR® logo?

Yes	01
No	02
Don't know	99

[Read IF: (Q41=02 or 99) "*The ENERGY STAR® logo is a blue and white label with the word "energy" followed by a five pointed star. The label is used by the Environmental Protection Agency and the Department of Energy to identify energy efficient lighting, electronics and appliances for consumers.*"]

42. As far as you know, did the monitor you purchased have the ENERGY STAR® label?

Yes	01
No	02
Don't know	99

43. [Ask IF: Q42=01] When you purchased the monitor, did the presence of the ENERGY STAR® label or the salesperson mentioning that the unit was ENERGY STAR® qualified factor into your choosing that particular model?

Yes	01
No	02
Don't know	99

Future Purchases

[Ask all]

44. When do you think you are most likely to purchase a new desktop computer or monitor in the future?

0 to 6 months	01
7 to 12 months	02
13 to 18 months	03
19 to 24 months	04

More than 2 years	05
Never	06
Don't know	99

“For the next series of questions, please think about the factors involved in purchasing a new computer or monitor.”

45. When purchasing a desktop computer or monitor in the future, are likely to purchase it in a physical store or online?

In store	01
Online	02
Don't know	99

46. [Ask IF: Q45=1] Which of the following best describes the type of store where you are likely to purchase a desktop computer or monitor?

An electronics specialty store such as Best Buy or Fry's	01
A mass merchandiser such as Walmart or Target	02
A club store such as Costco or Sam's Club	03
A locally owned or independently owned store	04
Other (specify)	05
Don't know	99

47. [Ask IF: Q45=2] Which of the following best describes the type of website where you are likely to purchase a desktop computer or monitor?

An online only store such as amazon.com or newegg.com	01
An electronics store website such as bestbuy.com	02
A mass merchandiser website such as walmart.com or target.com	03
A club store website such as costco.com or samsclub.com	04
Other (specify)	05
Don't know	99

48. What would be the three most important characteristics you would look for when selecting your next computer for purchase? (*Read only if necessary. Probe for three.*)

Price	01
Brand	02
Processor speed	03
Memory	04
Style	05
Storage	06
Energy efficiency	07
Other (specify)	08
Don't know	99

48a) What about for a monitor? What three characteristics would be most important? (*Read only if necessary. Probe for three.*)

Price	01
Screen size	02
Brand	03
Screen resolution	04
Technology type (LED, LCD, ect)	05
Energy efficiency	06
Other (specify)	07
Don't know	99

T1. Thank you for your time. That is all the questions I have for you. Could you please provide a name and address where you would like your \$10 gas gift card shipped?

Record name _____

Record address _____

Record City/Zip _____

Thanks again for your participation. You will receive your gas card in 4 to 6 weeks.

[Terminate]

Appendix B. Salesperson Interview Instrument

SMUD Home and Office Electronics Program In-Store Sales Person Interview Guide

RETAILER NAME: _____ **ADM SAMPLE #:** _____

ADDRESS: _____ **CITY/ZIP:** _____

FIELD TECH: _____ **DATE:** _____

Before conducting this interview, confirm that SMUD Energy Efficient Featured Product labels are displayed on certain televisions. Please identify or ask for a sales associate who is familiar with the televisions on display to conduct this interview.

A1. Hello, my name is (interviewer name), and I am from ADM Associates, an independent research company conducting a study on behalf of SMUD. Do you mind if I ask you a few questions about the televisions on display? It should only take a couple minutes. (If necessary, assure the sales associate that his/her answers will be kept confidential)

Yes 01
No 02 *[Thank and Terminate]*

If A1 = 01: Thank you. I'd like to first start by asking some questions regarding what customers look for when choosing a television to purchase.

1. In your experience, what characteristics do customers care most about when deciding between different television models? *(Do not read. Check all that are mentioned.)*

Price	01
Screen size	02
Type of TV (LED, LCD, DLP, ect)	03
3D or 3D capable TV	04
Screen resolution (e.g. 720p, 1080p)	05
Screen refresh frequency (e.g. 60 Hz, 120 Hz, 240 Hz)	06
Inputs (HDMI, Component Inputs, PC Inputs, USB Inputs)	07
Internet connectivity	08
Warranty	09
Picture quality	10
TV footprint	12
Energy Efficiency	13

Other: _____	98	
Don't Know		99

2. If Q1<>99 and at least four characteristics are mentioned: Of the characteristics you mentioned, can you rank the top three most asked about characteristics that customers consider when deciding between television models?

#1 _____	01	
#2 _____	02	
#3 _____	03	
Don't Know		99

2a) Do you feel that you could provide a customer with an ENERGY STAR® qualified TV that satisfies one or all of the three characteristics you just mentioned?

Yes	01	
No	02	
Don't know		99

3. If you were going to purchase a [screen size] TV from this store which model would you buy? Why?

Record Make/Brand and Model #: _____	01	
Record Reason: _____	02	
SMUD Label Present?: _____	03	

3a) If the identified model is not a SMUD labeled TV: Can you think of another TV that has the same characteristics as this TV but is more energy efficient?

Yes, Record Make/Brand and Model #: _____	01	
SMUD Label Present?: _____	02	
No		03
Don't know		04

4. How often do customers ask about energy efficiency when comparing television models?

Very often	01	
Often	02	
Sometimes	03	
Occasionally	04	
Almost never	05	
Don't Know		99

5. If a customer were to ask you to show them an energy efficient television model, how would you identify those models? (Do not read. Check all that are mentioned.)

ENERGY STAR® label	01
SMUD Energy Efficient Featured Product label	02
ENERGY GUIDE label	03
LED models as opposed to LCD, DLP, Plasma, ect.	04
Personal knowledge of energy efficient TVs	05
Other: _____	99

6. If Q5<>02: Have you seen the SMUD Energy Efficient Product labels on some of the televisions on display? (*Point out if necessary.*)

Yes	01
No	02
Don't Know	99

7. If Q5=02 or Q6=01: You mentioned that you are familiar with the SMUD Energy Efficient Product labels. Could you explain to me what these labels indicate?

Yes, Record: _____	01
No	02
Don't know	99

If Q6=02 or Q7=02: Explain that the SMUD labels indicate that the televisions exceed ENERGY STAR® on-mode power requirements by 20% or more. Explain that SMUD promotes the sale of energy efficient televisions in the Sacramento region through financial incentives and promotional marketing material.

Thank the sales associate for his/her time and terminate interview.