

EXHIBIT KMM-2

**Volume 1: Appalachian Power Co – Virginia
2009 to 2013 DSM Action Plan**



COMMONWEALTH OF VIRGINIA
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APPALACHIAN POWER COMPANY

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VOLUME 1:
APPALACHIAN POWER CO - VIRGINIA

2009 TO 2013
DSM ACTION PLAN

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Volume 2 (bound separately)

2009 to 2028 Potential Study

Volume 3 (bound separately)

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Forward

APCo Virginia is Virginia's 2nd largest provider of electric service with a mix of over one half a million residential, commercial and diversified industrial customers. APCo Virginia provides among the lowest electric rates in Virginia, ensures high levels of customer satisfaction, and provides reliable utility service to its customers, which include more than 100 communities.

APCo Virginia has commissioned development of this five-year DSM Action Plan ("Plan"). The DSM Action Plan details a diverse portfolio of electric energy efficiency and demand response programs APCo Virginia may offer. Ultimate program plans would be available for all customer classes, including low-income residential.

This portfolio of electric demand-side management ("DSM") programs was developed with the experienced guidance of an outside consultant, Summit Blue Consulting ("Summit Blue"). Summit Blue drew upon successful programs from other states, particularly the Midwest, and their combined program design and implementation experience with other utilities, in crafting APCo Virginia's program portfolio.

Summit Blue believes this portfolio provides a menu of proven programs that will directly help participating customers save money on their energy bills. The plan is based on a 5 year horizon, predicated on beginning in 2009, and represents one option APCo could consider for implementation in Virginia. In any event, the ultimate plan portfolio assumes that appropriate regulatory approvals and cost recovery are granted.

E

EXECUTIVE SUMMARY

Demand-side management (“DSM”) represents an important resource for APCo Virginia, one growing increasingly important as fuel and commodity prices become more volatile and greenhouse gas regulation becomes more likely. Estimates of DSM potential are a key input to the integrated resource planning process, which considers the load forecast and both supply- and demand-side resources. This study presents the results of an analysis of the DSM potential in APCo Virginia’s service territory by Summit Blue Consulting (“Summit Blue”).

This DSM Action Plan presents strategic information on the approach, energy efficiency and demand response measures and proposed incentive levels. We anticipate that portions of the DSM Plan will need to be revised upon implementation to reflect better information or changing market conditions.

DSM Action Plan Portfolio Summary

If APCo Virginia elects to implement the recommended plan portfolio, in its entirety, this would equate to an investment of \$134 million (2009\$) on energy efficiency and demand response programs over a five-year period. Over this same time frame, Summit Blue estimates these programs would result in 492 GWh and 199 MW cumulative annual net savings at generator. The division of DSM program investment between residential and business customers is commensurate with the relative contribution to the portfolio.

Table E-1 provides the projected savings and associated funding for 2009 to 2013.

Table E-1. Savings Goals and Efficiency Portfolio Investment – 2009 to 2013

Consumer Sector (incremental annual net savings at generator)	2009	2010	2011	2012	2013	2009-2013 Total
Energy Savings (GWh) (1)	22.3	35.7	46.7	48.9	57.9	211.5
% of Total Sector Loss-Adjusted Sales	0.30%	0.48%	0.62%	0.65%	0.76%	-
Winter Demand Savings (MW) (1)	14.9	17.4	19.7	24.2	33.0	109.2
% of Total Sector Loss-Adjusted Sales	0.70%	0.82%	0.93%	1.13%	1.53%	-
Total Cost (2009\$ million) (2)	\$5.4	\$7.0	\$8.7	\$11.3	\$14.6	\$47.1
Business Sector (incremental annual net savings at generator)	2009	2010	2011	2012	2013	2009-2013 Total
Energy Savings (GWh) (1)	28.3	41.3	61.3	67.9	82.2	281.0
% of Total Sector Loss-Adjusted Sales	0.29%	0.41%	0.61%	0.67%	0.81%	-
Winter Demand Savings (MW) (1)	14.0	15.9	18.4	19.2	22.5	89.9
% of Total Sector Loss-Adjusted Sales	0.80%	0.90%	1.04%	1.08%	1.26%	-
Total Cost (2009\$ million)	\$7.2	\$9.7	\$13.4	\$17.4	\$23.3	\$70.6
Total (incremental annual net savings at generator)	2009	2010	2011	2012	2013	2009-2013 Total
Energy Savings (GWh) (1)	50.5	77.0	108.0	116.8	140.1	492.5
% of Total Sector Loss-Adjusted Sales	0.29%	0.44%	0.62%	0.66%	0.79%	-
Winter Demand Savings (MW) (1)	28.8	33.3	38.1	43.4	55.5	199.1
% of Total Sector Loss-Adjusted Sales	0.75%	0.86%	0.98%	1.11%	1.41%	-
Total Cost (2009\$ million)	\$12.7	\$16.7	\$21.8	\$28.7	\$37.9	\$117.7
Other Costs (2009\$ million) (2)	\$3.0	\$3.2	\$3.0	\$3.2	\$3.8	\$16.3
Portfolio Total Investment (2009\$)	\$15.7	\$19.9	\$24.8	\$31.9	\$41.7	\$134.0

(1) Savings are not projected for Low Income Energy Conservation Kits. APCo Virginia would also conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables and portfolio cost-benefit analysis.

(2) Other Costs include support and other services, including: APCo Virginia DSM Department, General Education/Training/Media, Low Income Energy Conservation Kits, and Pilot Program Fund.

Incentive levels and other program elements would be reviewed and adjusted to reflect changes in market conditions or implementation processes in order to maximize cost-effective savings, including considerations for APCo staffing as programs grow over time.

Figure E-1 presents the strategic portfolio structure, including six consumer sector and four commercial and industrial sector programs, as well as two multi-sector programs: education and training and new pilots/emerging technology. APCo Virginia would also conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables, and portfolio cost-benefit analysis; these costs are included in the reported program budgets.

Figure E-1. DSM Action Plan Portfolio Structure – 2009 to 2013

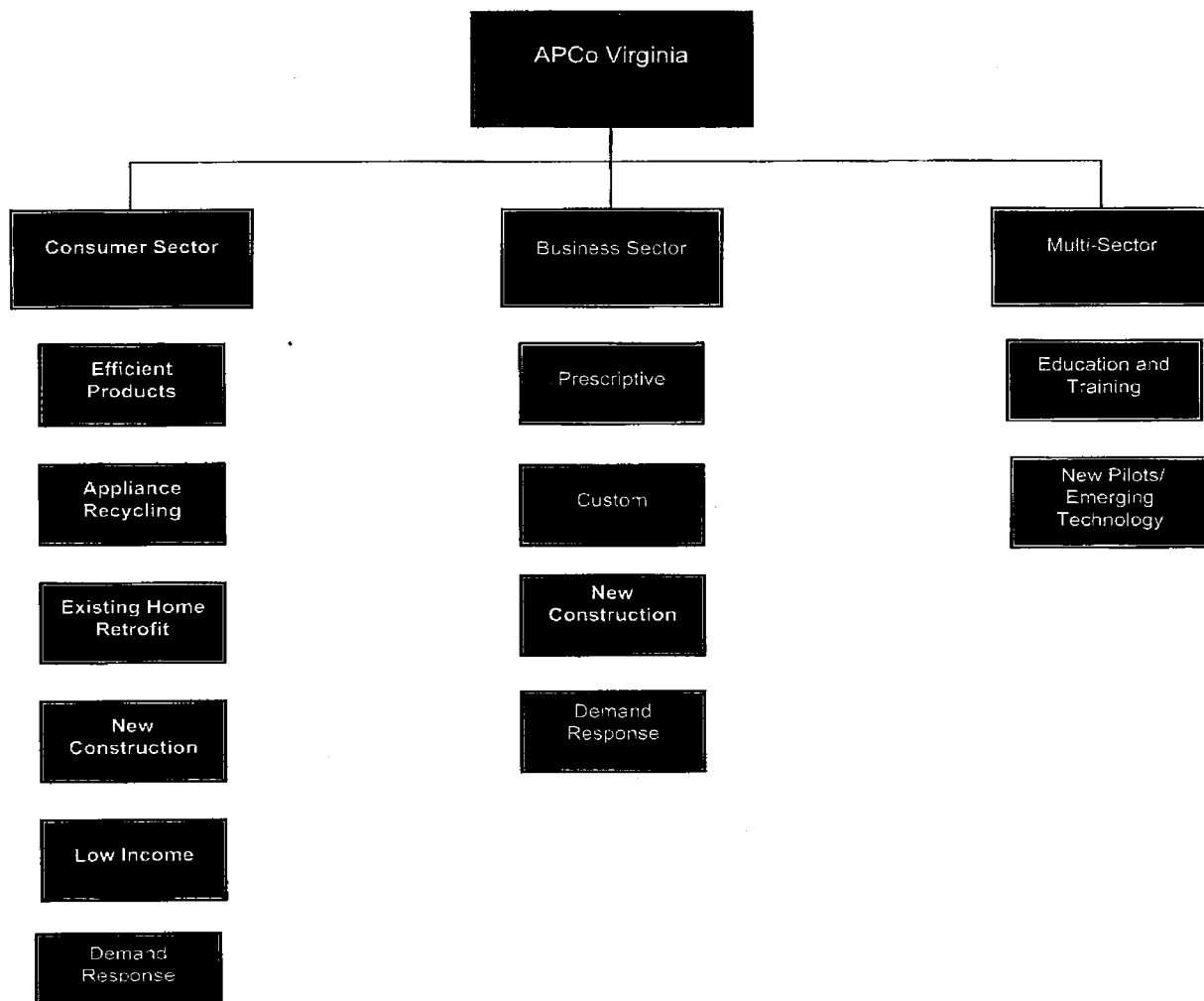


Table E-2 presents the projected MWh energy savings, Total Resource Cost ("TRC") Test results, Net Present Value Benefits in 2009\$ million, Lifetime MWh Energy Saved and Lifetime Cost of Saved Energy in 2009\$ per kWh over the five-year period from 2009 to 2013.

Table E-2. Annual Incremental Net Energy (MWh) Savings at Generator – 2009 to 2013

Consumer Sector	2009	2010	2011	2012	2013	2009-2013 Total	Percent of Portfolio Total	Total Resource Cost Test Ratio (TRC)	Net Present Value Net Benefits (2009\$ million)	Lifetime Energy Saved (thousand MWh)	Lifetime Cost of Saved Energy (2009\$/kWh)
Products	9,366	18,205	25,789	21,140	21,854	96,355	19.6%	2.4	\$28.1	746	\$0.011
Recycling	319	1,157	1,138	1,121	1,104	4,839	1.0%	1.1	\$0.5	24	\$0.024
Retrofit	6,944	8,807	10,988	15,025	20,115	61,879	12.6%	2.5	\$54.4	898	\$0.016
Low Income	4,632	6,206	8,010	9,830	12,925	41,603	8.4%	2.6	\$33.2	560	\$0.015
New Construction	1,072	1,373	787	1,761	1,879	6,872	1.4%	2.5	\$4.0	104	\$0.010
Demand Response	0	0	0	0	0	0	0.0%	1.5	\$7.9	-	-
Consumer Sector Total	22,333	35,747	46,713	48,877	57,878	211,547	42.9%	2.4	\$125.7	2,332	\$0.014
% of Total Sector Loss-Adjusted Sales	0.30%	0.48%	0.62%	0.65%	0.76%						
Business Sector	2009	2010	2011	2012	2013	2009-2013 Total	Percent of Portfolio Total	Total Resource Cost Test Ratio (TRC)	NPV Net Benefits (2009\$ million)	Lifetime Energy Saved (thousand MWh)	Lifetime Cost of Saved Energy (2009\$/kWh)
Prescriptive	18,845	28,679	43,005	40,628	41,726	172,883	35.1%	2.1	\$58.7	1,835	\$0.009
Custom	9,186	12,199	17,164	25,165	36,354	100,068	20.3%	1.4	\$11.0	1,391	\$0.004
New Construction	331	384	1,115	2,133	4,087	8,050	1.6%	1.4	\$5.4	200	\$0.012
Demand Response	0	0	0	0	0	0	0.0%	0.0	\$21.1	-	-
Business Sector Total	28,362	41,262	61,284	67,926	82,168	281,002	57.1%	1.8	\$96.2	3,426	\$0.007
% of Total Sector Loss-Adjusted Sales	0.29%	0.41%	0.61%	0.67%	0.81%						
PORTFOLIO TOTAL	50,695	77,009	107,997	116,803	140,046	492,549	100.0%	1.9	\$221.8	5,758	\$0.012

Note: savings from Low income Energy Conservation Kits are not projected.

Table E-3 presents the projected winter peak demand kW savings levels over the five-year period from 2009 to 2013.

Table E-3. Annual Incremental Net Winter Peak Demand (kW) Savings at Generator – 2009 to 2013

Consumer Sector	2009	2010	2011	2012	2013	2009-2013 Total	Percent of Portfolio Total
Products	1,114	2,012	2,700	2,558	2,836	11,221	4.6%
Recycling	33	120	118	116	114	501	0.3%
Retrofit	5,446	6,418	7,628	10,149	14,865	44,525	22.4%
Low Income	3,245	3,820	4,580	6,093	8,890	26,628	13.4%
New Construction	169	209	117	339	384	1,217	0.6%
Demand Response	4,834	4,806	4,607	4,951	5,909	25,107	12.6%
Consumer Sector Total	14,860	17,386	19,749	24,206	32,998	109,199	54.8%
% of Total Sector Loss-Adjusted Sales	0.70%	0.82%	0.93%	1.13%	1.53%		
Note: savings from Low income Energy Conservation Kits are not projected.							
Business Sector	2009	2010	2011	2012	2013	2009-2013 Total	Percent of Portfolio Total
Prescriptive	2,988	4,628	7,012	6,447	6,725	27,800	14.0%
Custom	727	990	1,427	1,993	2,831	7,968	4.0%
New Construction	35	40	116	182	350	723	0.4%
Demand Response	10,247	10,209	9,805	10,556	12,616	53,433	26.8%
Business Sector Total	13,996	15,867	18,361	19,178	22,521	89,924	45.2%
% of Total Sector Loss-Adjusted Sales	0.80%	0.90%	1.04%	1.08%	1.26%		
PORTFOLIO TOTAL	28,856	33,353	38,110	43,385	55,519	199,123	100.0%
% of Total Portfolio Loss-Adjusted Sales	0.75%	0.86%	0.98%	1.11%	1.41%		

DSM Investment

The estimated investment for these programs for 2009 to 2013, in 2009 dollars, would be approximately \$16 million in 2009, \$20 million in 2010, \$25 million in 2011, \$32 in 2012, and \$42 in 2013, for a total \$134 million, as shown in Table E-4. The projected investments include one-time startup costs (included in the Administration costs) in the first year of program implementation.

Table E-4. Estimated Annual Total Investments by Program for APCo Virginia (2009\$)

Consumer Sector	2009	2010	2011	2012	2013	2009-2013	% of Portfolio Total
Products	\$806,998	\$1,385,579	\$2,046,757	\$2,336,383	\$2,428,506	\$9,004,224	6.7%
Recycling	\$79,066	\$265,002	\$260,779	\$256,815	\$252,906	\$1,114,569	0.8%
Retrofit	\$1,627,769	\$1,842,840	\$2,265,559	\$3,126,567	\$4,387,718	\$13,250,452	9.9%
Low Income	\$1,906,535	\$2,220,500	\$2,745,672	\$3,682,920	\$5,148,039	\$15,703,665	11.7%
New Construction	\$97,231	\$114,086	\$64,195	\$204,886	\$224,587	\$704,985	0.5%
Demand Response	\$867,054	\$1,145,455	\$1,391,348	\$1,723,119	\$2,185,105	\$7,312,080	5.5%
Consumer Sector Total	\$5,384,653	\$6,973,462	\$8,774,310	\$11,330,690	\$14,626,861	\$47,089,975	35.1%
Business Sector	2009	2010	2011	2012	2013	2009-2013	% of Portfolio Total
Prescriptive	\$2,091,280	\$2,796,926	\$3,951,333	\$5,168,031	\$6,520,793	\$20,528,364	15.3%
Custom	\$1,676,989	\$2,058,544	\$2,787,756	\$4,121,182	\$6,170,125	\$16,814,596	12.5%
New Construction	\$40,693	\$44,967	\$130,267	\$287,723	\$550,558	\$1,054,207	0.8%
Demand Response	\$3,375,961	\$4,837,284	\$6,172,566	\$7,830,447	\$10,027,316	\$32,243,575	24.1%
Business Sector Total	\$7,184,923	\$9,737,721	\$13,041,922	\$17,407,384	\$23,268,793	\$70,640,743	52.7%
Other Costs	2009	2010	2011	2012	2013	2009-2013	% of Portfolio Total
APCo Virginia DSM Department	\$750,000	\$1,250,000	\$1,250,000	\$1,500,000	\$2,000,000	\$6,750,000	5.0%
General Education/ Training/Media	\$2,000,000	\$1,500,000	\$1,250,000	\$1,250,000	\$1,250,000	\$7,250,000	5.4%
Energy Conservation Kits	\$150,000	\$200,000	\$200,000	\$200,000	\$200,000	\$950,000	0.7%
Pilot Program Fund	\$150,000	\$300,000	\$300,000	\$300,000	\$300,000	\$1,350,000	1.0%
Other Costs Total	\$3,050,000	\$3,250,000	\$3,000,000	\$3,250,000	\$3,750,000	\$16,300,000	12.2%
PORTFOLIO TOTAL	\$15,619,576	\$19,961,182	\$24,816,232	\$31,988,074	\$41,645,653	\$134,030,718	100.0%

These cost estimates are high-level for strategic planning and initial organizational development purposes. To firm up cost estimates and make any necessary budget and schedule changes, it is assumed that APCo Virginia would issue RFP(s) for implementation contractors to bid on the work, and require them to submit more detailed budgets along with estimated savings and implementation schedules. Any adjustments to the cost recovery mechanism, including load management rate discounts, are assumed to be tried up on an annual basis.

The next section discusses the approach to estimating DSM potential. After that section, there is an overview of DSM Potential results for 2009 to 2028, followed by program plans, and finally, conclusions and recommendations.

E.1 Approach to Estimating DSM Potential

APCo Virginia's suggested program portfolio was developed by incorporating elements of the most successful energy efficiency programs across North America into program plans designed for the Virginia market and APCo Virginia customers in particular. A benchmarking process was to review the selected programs, with a focus on successful Eastern and Midwest programs to help shape the portfolio.

As detailed in Figure E-2, there are four major types of energy efficiency potential: (1) *technical* potential for all technologies, (2) *economic* potential, the amount of energy efficiency available that is cost effective, (3) *achievable* potential, the amount of energy efficiency available under current market conditions and available investments, and (4) *program* potential, the amount of energy efficiency available given limited resources, available time and duration of the efficiency program planning period. This DSM Action Plan is focused on capturing cost-effective *program potential* in its service territory. Energy efficiency measures that were known not to be cost-effective were pre-screened out of consideration from all potential scenarios.

Figure E-2. The Four Stages of Energy Efficiency Potential

Not Technically Feasible	Technical Potential			
Not Technically Feasible	Not Cost Effective	Economic Potential		
Not Technically Feasible	Not Cost Effective	Market and Adoption Barriers	Achievable Potential	
Not Technically Feasible	Not Cost Effective	Market and Adoption Barriers	Program Design, Budget, Staffing, and Time Constraints	Program Potential

Reproduced from "Guide to Resource Planning with Energy Efficiency November 2007" written by the US EPA. Figure 2-1

Summit Blue undertook the DSM potential study with the following key tasks:

- Develop baseline consumption profiles, and develop initial building simulation model specifications
- Characterize the DSM measures
- Conduct a DSM benchmarking and best practices analysis
- Conduct benefit-cost analysis
- Estimate DSM potentials
- Develop DSM program plans

Each of these tasks is summarized below.

E.1.1 Develop Baseline Consumption Profiles and Develop Initial Building Simulation Model Specifications

Summit Blue conducted this task to characterize the APCo Virginia service territory in terms of customer numbers, as well as age and size of the household/housing stock. Segment-level commercial and industrial sales data delivered by APCo Virginia provide a good starting point to determine customer energy use in broad end-use categories, such as lighting, heating, and cooling. These profiles were the calibration points in developing hourly computer models of energy consumption. The models are used to estimate savings from DSM measures.

E.1.2 Characterize the DSM Measures

Characterization of DSM measures requires:

- 1) Estimating the baseline energy consumption for each end-use (heating, cooling, cooking, hot water, etc.) or unit energy consumption (“UEC”)
- 2) Estimating the incremental savings from each measure – improving from the baseline to the new technology
- 3) Determining the incremental costs and lifetimes for each of the new technologies

In addition, the baselines must consider that different classes of buildings have different penetrations of technologies, such as existing homes compared to new construction.

Summit Blue used a combination of approaches to characterize the DSM measures for this study. For the DSM measures having impacts that do not vary with climate, the team used engineering estimates and publicly available and well-respected sources, such as the California Database on Energy-Efficiency Resources (“DEER”) database. The team adjusted the DEER energy and demand impacts for APCo Virginia’s customer operating parameters as necessary based on the local weather. For climate-dependent measures, Summit Blue used a combination of building simulation modeling and engineering estimates specifically developed for APCo Virginia to estimate DSM measure per unit savings.

For DSM measure costs, Summit Blue primarily used the California DEER database, adjusted by geographic multiplier factors contained in industry sources, such as the RS Means Mechanical Cost Data.

For DSM measure lifetimes, a combination of resources was used, including manufacturer data, typical economic depreciation assumptions, and the California DEER database.

E.1.3 DSM Benchmarking and Best Practices Assessment

To ensure that the DSM potential estimates that Summit Blue developed for APCo Virginia are reasonable and appropriate, and to identify the best practices regarding DSM programs, the team conducted a benchmarking assessment on other utilities' and agencies' DSM programs. Summit Blue also collected information on selected national DSM programs that previous studies have identified as top performers. To identify common best practices of top performers, the analysis compares detailed program results by customer sector of those utilities identified as achieving high levels of DSM savings for below median costs.

For the 14 electricity DSM programs of the IOUs and agencies reviewed, the overall median energy savings as a percentage of annual sales for 2007 is 0.9% and the median first year costs for energy savings is \$0.15/kWh, but the organizations with the largest relative energy savings and below median costs achieved their energy savings at about 1.3% of annual sales. The results for peak demand savings as a percentage of peak demand are similar: the median savings is 0.6% of peak demand and the median cost is \$725/kW.

Most of the benchmarked organizations have been conducting electricity DSM programs for an extended period. Since these organizations have been conducting electricity DSM programs, savings have been realized from a lot of the "low hanging fruit" among DSM measures, such as T12 lighting system conversions to T8 systems. A new DSM program can reasonably be expected to achieve these results after an initial ramp up period of three to four years.

E.1.4 Benefit-Cost Analysis

The measures were evaluated with respect to each of the four main standard benefit-cost tests.¹

Participant test: measures are cost effective from this perspective if the reduced electric costs to the participating customer from the measure exceed the after-incentive cost of the measure to the customer.

Utility (or program administrator) ("UCT") cost test: measures are cost effective from this perspective if the costs avoided by the measures' energy and demand savings are greater than the utility's DSM program costs to promote the measure, including customer incentives.

Ratepayer impact measure ("RIM") test: measures are cost effective from this perspective if their avoided costs are greater than the sum of the DSM program costs and the "lost revenues" caused by the measure.

Total resource cost ("TRC") test: measures are cost effective from this perspective if their avoided costs are greater than the sum of the measure costs and the DSM program administrative costs.²

¹ California Public Utilities Commission. California Standard Practice Manual Economic Analysis of Demand-Side Programs and Projects, October 2001, <http://drrc.lbl.gov/pubs/CA-SPManual-7-02.pdf>.

² Administrative costs in this study are all costs for a given program aside from customer incentives: planning, marketing and sales, business process administration such as rebate processing, and evaluation, measurement and verification. General overhead costs such as general DSM department overheads, general education/training, and

In line with standard industry practice, Summit Blue used the TRC test to determine which DSM programs to include in APCo Virginia's portfolio of DSM programs. The RIM test is a more restrictive test that is only used as the main DSM benefit-cost test in very few states.³ All of the measures passed the TRC test. The portfolio of DSM programs that Summit Blue developed is quite cost effective by industry standards. Table E-5 presents the overall benefit cost ratios for the consumer sector, the commercial and industrial sector, and the overall portfolio.

Table E-5. Cost-effectiveness Ratios – 2009 to 2013

Consumer Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Products	2.4	3.6	6.6	0.5
Recycling	1.1	0.9	N/A	0.0
Retrofit	2.5	3.8	3.8	0.8
Low Income	2.6	3.9	4.1	0.8
New Construction	2.5	3.8	6.9	0.5
Demand Response	1.5	4.1	1.5	1.1
Consumer Sector Total	2.4	3.8	4.3	0.7
Business Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Prescriptive	2.1	3.4	4.6	0.5
Custom	1.4	2.1	4.5	0.4
New Construction	1.4	2.3	3.8	0.5
Demand Response	1.6	2.3	0.6	2.1
Business Sector Total	1.8	2.8	3.6	0.6
PORTFOLIO TOTAL	2.2	3.4	4.7	0.6

pilot program funding are estimated separately from specific programs, but are included in the overall portfolio benefit-cost analysis.

³ Florida and Georgia, for example, require DSM programs to pass the RIM test.

E.1.5 Estimate DSM Program Potentials

Summit Blue developed estimates of DSM measure potentials in terms of technical, economic, and “achievable” potential (the program results that would be realistic for APCo Virginia to achieve through cost-effective DSM programs). Economic potential was estimated using the TRC test as described above as the economic “screen” to apply to technical potential estimates in order to determine whether the measures are “cost-effective” or not.

To estimate achievable potential, a computer model was used to estimate conversion rates from inefficient products to more efficient products for retrofit and replacement measures, as well as installation rates in new buildings for new construction markets. These conversion, replacement, and new construction penetration rates will be based on other utilities’ actual experiences with these types of programs. Summit Blue developed three achievable potential estimates:

1. A base case or expected DSM potential estimates. These estimates will assume that adequate funding is available to achieve the DSM potentials and that APCo Virginia would be able to achieve “best practice” DSM program performance within three to four years.
2. A high case estimate based on the experience of the best of the best utilities’ DSM program results.
3. A low case estimate, assuming that either the available funding for DSM programs is constrained, or that the DSM program performance is such that average DSM program results are achieved over the forecast period.

E.2 DSM Potential Results

The net annual DSM potential savings (Base Case Scenario Market Potential) in 2028 is estimated to be approximately 2,322 GWh at generator, about 11% of forecast sales, and 591 MW at generator, about 14% of peak winter demand, as shown in Table E-6.

Table E-6 also presents the projected savings in 2028 for the technical, economic, and high and low market potential scenarios. The technical and economic potential estimates are more uncertain than the market potential results since surveys of APCo Virginia’s customers were not conducted.

These results assume a net-to-gross impact ratio of 1.0 in most instances whereby free ridership is assumed for this analysis to be offset by spillover impacts, except for the recycling of second refrigerators and freezers. The Base Case market potential includes incentives at 50% of incremental measure costs in most instances. The High Case market potential includes incentives at 75% of incremental measure costs, while the Low Case includes incentives at 37.5% of incremental measure costs.

Table E-6. Projected Cumulative Annual Net Savings at Generator and Costs – 2012, 15-Year, and 20-Year Plans

Potential Scenario	Energy Efficiency				Costs			
	Cumulative Annual Net Energy Savings at Generator		Cumulative Annual Net Winter Peak Demand and Savings at Generator		Estimated Costs - EE		Estimated Cost - DR	
	GWh	% of Forecasted Sales	MW	% of Forecasted Sales	MW	% of Forecasted Sales	Total Cost Over Term	Estimated Total Costs
Residential								
Technical	2324	31%	1046	49%	477	22%	NA	NA
Economic	1581	21%	731	32%	477	22%	NA	NA
High Case	425	6%	184	9%	29	1%	\$83,341,742	\$7,690,484
Base Case	154	2%	57	3%	19	1%	\$21,785,251	\$5,126,976
Low Case	90	1%	34	2%	14	1%	\$12,109,166	\$3,845,232
C&I								
Technical	4495	45%	455	26%	435	25%	NA	NA
Economic	3394	34%	392	22%	435	25%	NA	NA
High Case	537	5%	71	4%	61	4%	\$109,294,109	\$33,324,389
Base Case	198	2%	27	2%	41	3%	\$25,155,691	\$22,216,259
Low Case	120	1%	16	1%	31	2%	\$13,258,211	\$16,662,194
Total								
Technical	6819	39%	1501	38%	912	23%	NA	NA
Economic	4975	28%	1123	29%	912	23%	NA	NA
High Case	962	5%	255	7%	90	2%	\$192,635,851	\$41,014,852
Base Case	352	2%	84	2%	60	2%	\$46,940,942	\$27,343,235
Low Case	210	1%	50	1%	45	1%	\$25,367,377	\$20,507,426
								\$45,874,803

(1) Numbers in the above table do not include Demand Response programs and Low Income Energy Conservation Kits. APCo Virginia would also conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables and portfolio cost-benefit analysis; these costs are included in this table. Forecasted sales are adjusted for losses.

(2) Costs in this table are not included for: APCo Virginia DSM Department, General Education/Training/Media, Demand Response programs, Low Income Energy Conservation Kits, and Pilot Program Fund.

Potential Scenario	Energy Efficiency				Costs			
	Cumulative Annual Net Energy Savings at Generator		Cumulative Annual Net Winter Peak Demand Savings at		Cumulative Annual Net Winter Peak Demand Savings at Generator		Estimated Costs - EE	
	GW/h	% of Forecasted Sales	MW	% of Forecasted Sales	MW	% of Forecasted Sales	Estimated Cost - DR	Estimated Total Costs
Residential								
Technical	2427	29%	1057	46%	472	21%	NA	NA
Economic	1636	20%	738	32%	472	21%	NA	NA
High Case	1360	16%	689	30%	131	6%	\$300,512,845	\$74,389,579
Base Case	752	9%	336	15%	87	4%	\$123,951,882	\$49,593,053
Low Case	487	6%	204	9%	65	3%	\$37,194,790	\$11,717,303
C&I								
Technical	4648	41%	463	24%	435	23%	NA	NA
Economic	3509	31%	400	21%	435	23%	NA	NA
High Case	2308	20%	275	14%	281	15%	\$525,885,354	\$359,934,337
Base Case	1061	9%	127	7%	187	10%	\$168,992,944	\$239,956,225
Low Case	644	6%	76	4%	140	7%	\$84,249,143	\$179,967,168
Total								
Technical	7075	36%	1520	36%	907	22%	NA	NA
Economic	5145	26%	1138	27%	907	22%	NA	NA
High Case	3668	19%	964	23%	412	10%	\$826,398,198	\$434,323,916
Base Case	1813	9%	463	11%	274	7%	\$292,944,827	\$289,549,278
Low Case	1131	6%	280	7%	205	5%	\$121,443,933	\$191,684,472
								\$313,128,405

Potential Scenario	Energy Efficiency				Costs				
	Cumulative Annual Net Energy Savings at Generator		Cumulative Annual Net Winter Peak Demand Savings at Generator		Estimated Costs - EE	Estimated Cost - DR	Estimated Total Costs		
	GWh	% of Forecasted Sales	MW	% of Forecasted Sales					
Residential									
Technical	2486	28%	1065	45%	470	20%	NA	NA	
Economic	1667	19%	743	31%	470	20%	NA	NA	
High Case	1512	17%	757	32%	167	7%	\$332,937,893	\$123,741,968	\$456,679,861
Base Case	946	11%	427	18%	111	5%	\$157,907,126	\$82,494,645	\$240,401,771
Low Case	656	7%	271	11%	83	4%	\$92,616,487	\$61,870,984	\$154,487,471
C&I									
Technical	4715	41%	466	24%	435	23%	NA	NA	NA
Economic	3559	31%	404	21%	435	23%	NA	NA	NA
High Case	2724	24%	315	17%	361	19%	\$606,974,134	\$612,687,959	\$1,219,662,093
Base Case	1376	12%	164	9%	240	13%	\$221,590,082	\$408,458,639	\$630,048,721
Low Case	853	7%	111	6%	180	9%	\$112,966,476	\$306,343,980	\$419,310,455
Total									
Technical	7201	36%	1531	36%	904	21%	NA	NA	NA
Economic	5226	26%	1147	27%	904	21%	NA	NA	NA
High Case	4236	21%	1072	25%	528	12%	\$939,912,028	\$736,429,927	\$1,676,341,955
Base Case	2322	11%	591	14%	351	8%	\$379,497,207	\$490,953,285	\$870,450,492
Low Case	1509	7%	382	9%	263	6%	\$205,582,962	\$368,214,964	\$573,797,926

Figure E-3 and Figure E-4 show the cumulative annual net energy and winter peak demand savings in 2028 for each of the five potential analysis scenarios.

Figure E-3. Cumulative Annual Net GWh Energy Savings in 2028 – At Generator

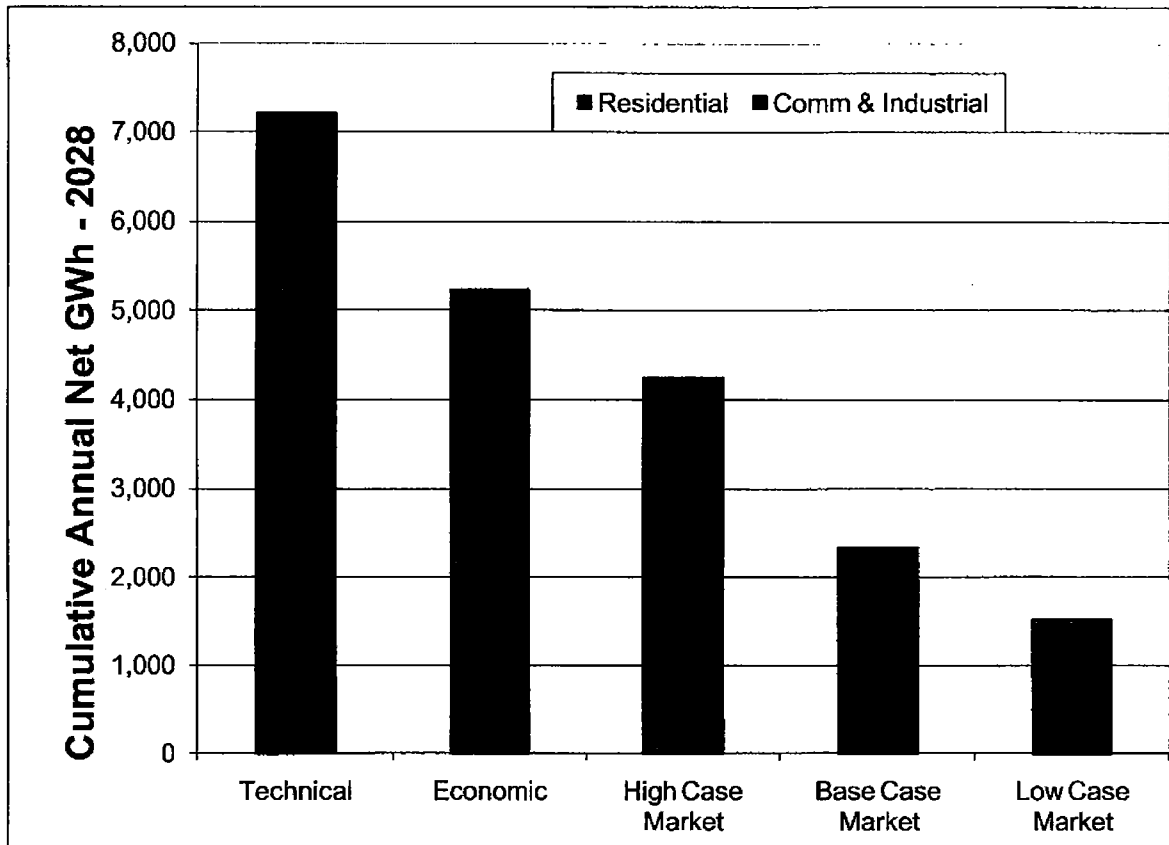


Figure E-4. Cumulative Annual Net Winter Peak MW Demand Savings in 2028 – at Generator

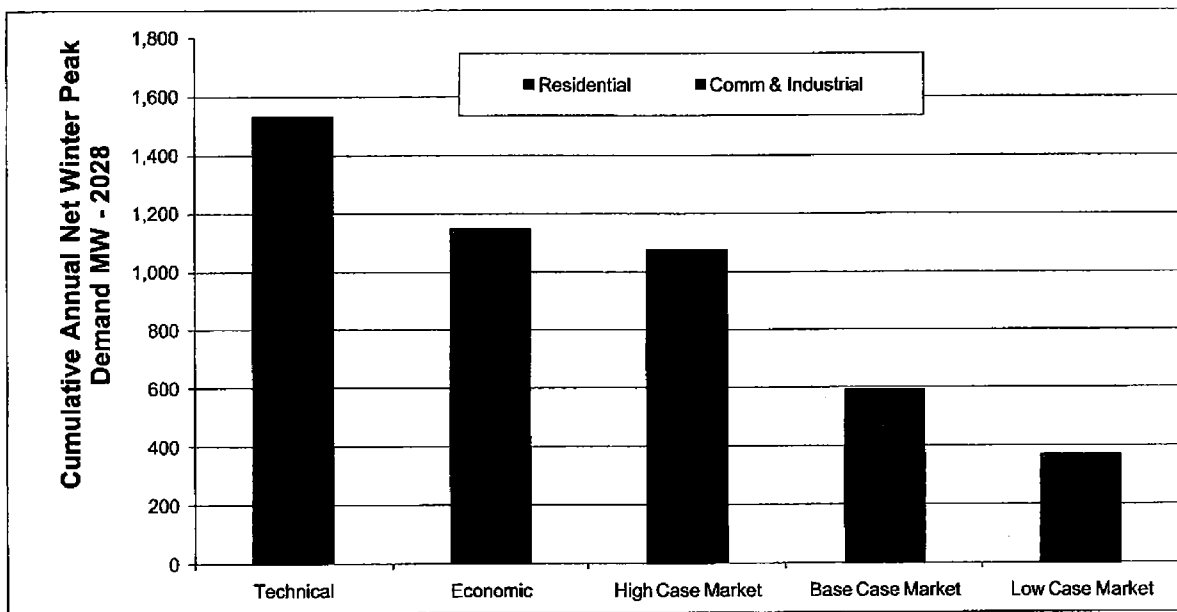
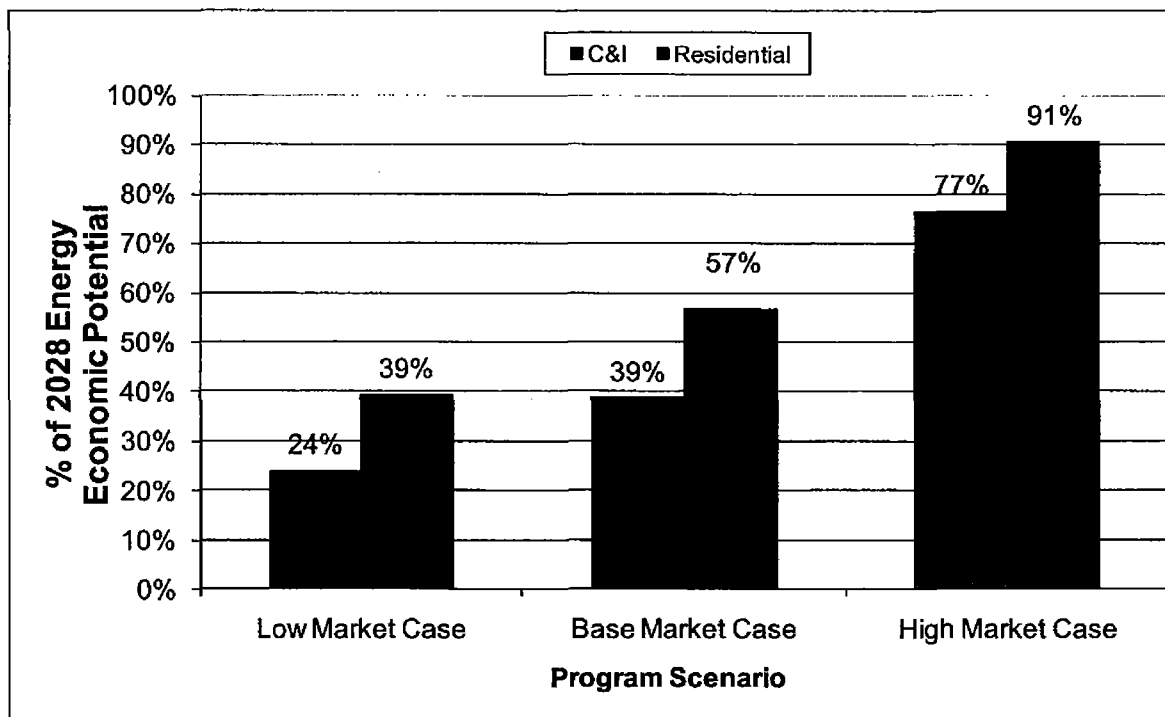


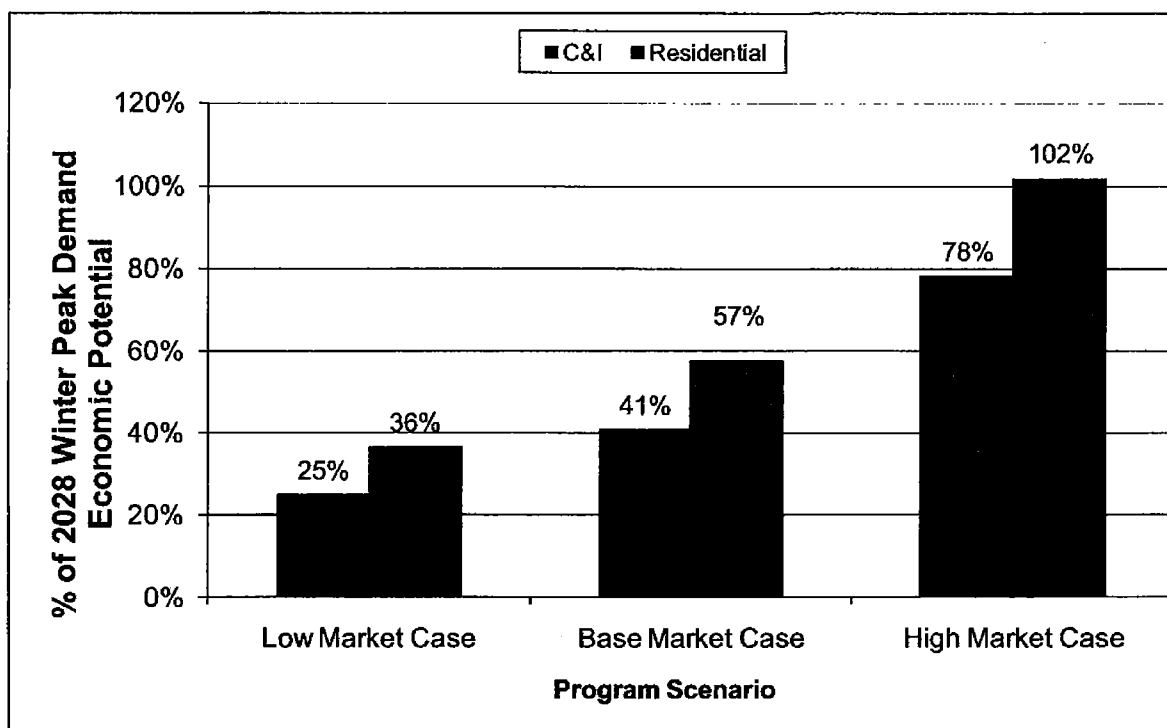
Figure E-5 and Figure E-6 show the cumulative Market Potential⁴ as a percent of the Economic Potential for energy efficiency.

Figure E-5. Market Potential Net Annual Energy Savings at Generator as Percent of Economic Potential in 2028



⁴ Defined here as the potential achievable in real-world market risk situations.

Figure E-6. Market Potential Net Winter Peak Demand Savings at Generator as Percent of Economic Potential in 2028⁵



Effects of Opt-out Legislation

Customers either legislatively excluded from funding DSM or those allowed to opt out of energy efficiency program eligibility will lower the C&I energy efficiency program potential in terms of impacts accounted for by such programs. If only the 10+ MW segment is subject to the legislative conditions, the utility program potential is reduced, particularly in the Custom Efficiency type of program where such customers can contribute significant impacts. If the 500 kW-10 MW segment is allowed to opt out on an optional basis, the utility C&I program potential could be more significantly affected, though forecasting the mix of types, numbers, and sizes of customers in the resulting optional opt-out group is likely to be impracticable. The actual number and type of 500 kW-10 MW opt-out customers needs to be determined to quantify the effect on energy efficiency program market potential.

The "universe" of energy efficiency market potential should not be significantly affected, however, because of the requirement that opt-out customers must undertake energy efficiency improvements in line with industry practices. If legislatively excluded or optional opt-out customers address their own energy efficiency potentials in such a manner, the total market potential for energy efficiency (utility programs plus opt-out customers' own "programs") should not be significantly affected.

⁵ The high market case shows >100% of economic potential because demand response program impacts are included in the High Market Case, but are not included in the Economic Potential.

Whether either segment (10+ MW only or 10+ MW plus a self-selected group of 500 kW-10 MW customers) indeed achieves at least as much impact and cost-effectiveness as what would be achieved through utility programs may not be estimable.

E.3 Overview of Program Plans

The plans developed for this study are based on best-practice programs, with the concepts outlined in a strategic manner. The plans are not intended to be operational *per se*, but are proposed as guidelines for more detailed program planning. The intent of the portfolio presented here is to provide a sense of scope and scale and to convey the general schedule and resources needed to quickly gain a foothold in the various markets in which the programs will operate.

Overall, a portfolio is presented that covers a broad range of demographic, business, facility and end-use markets. APCo Virginia's portfolio of programs can be divided into consumer, business and multi-sectors with utility administrative functions providing support across all program areas. APCo Virginia would maintain as part of its functionality the education, training and emerging technology budgets. These efforts would leverage existing AEP corporate connections and efforts to maximize impact of these outreach and education efforts.

Consumer Sector

Efficient Products: provides incentives and marketing support through retailers to build market share and usage of ENERGY STAR® lighting and other standardized equipment not requiring substantial engineering. Customer incentives encourage increased purchases of high-efficiency products while in-store signage, sales associate training, and support make provider participation easier. The program also promotes convenient recycling for CFLs at local retailers.

For appliances, the program uses a retail channel-based strategy to influence the purchase of high-efficiency appliances and electronics. Since appliance standards, as well as the market share of high-efficiency appliances, are gradually increasing, the program would be specific in its list of qualifying models, as well as marketing emphasis.

Appliance Recycling: Many of the refrigerators and freezers being replaced are still functioning and often end up as energy guzzling back-up appliances in basements and garages or are sold in a used appliance market. The Appliance Recycling Program targets these "second" refrigerators and freezers, providing the dual benefit of cutting energy consumption and keeping the appliances out of the used market. The program provides incentives to remove working units from service and fully recycle their materials. The program offers an environmentally responsible turnkey pick-up and recycling service.

Home Retrofit: produces long-term electric energy savings in the consumer sector by helping customers analyze and reduce their energy use through the installation of upgraded shell measures, such as air sealing, insulation and high efficiency equipment. A free online analysis would be offered followed by the option of a walk-through audit costing the customer between \$25 and \$150, (subject to reimbursement for those implementing at least \$1,000 in efficiency improvements). The plan would be to start with a "captive contractor" model to increase completion rates of recommended measures, eventually leading to a more traditional market-based Home Performance Retrofit with ENERGY STAR program in the later years. The three program phases are: Phase 1: On-line Energy Analysis; Phase 2: Home Walk-Through Energy Analysis; Phase 3: Home Performance Retrofit with ENERGY STAR.

Low Income: provides recommendations to encourage low-income consumers to install efficient

equipment, provide financial assistance to cover the full cost of implementation, and educate customers with limited income to reduce their energy use and manage their utility costs. The program coordinates low-income services with local weatherization providers to provide comprehensive assistance at lower administrative costs.

Energy Conservation Kits: provides a free or reduced cost package of energy saving, Do-it-Yourself measures for a variety of programs that are evaluated to be cost effective such as school programs to educate students who take the package home to install the measures with their parents and other programs to distribute the kits to educate customers and provide energy savings. The kits include the following: four CFL lamps, switch and outlet gaskets, furnace filter whistle, hot water temperature card, self-stick energy use gauge thermometer, close-cell foam weather-strip, self-stick door sweep, flow meter bag, low-flow showerhead, and refrigerator thermometer card.

ENERGY STAR® New Homes: produces long-term electric energy savings by encouraging the construction of single-family homes and duplexes to meet the ENERGY STAR National Performance Path efficiency standard. The program identifies and recruits key builders who do not consistently (or seldom) build homes to meet the ENERGY STAR standard. Builders who choose to participate in the program would gain access to cash-back incentives designed to cover approximately 30% of the cost to upgrade and certify each home. Guidance for design and construction of high-efficiency homes would be provided.

Residential Demand Response: includes a Direct Load Control (DLC) Program to residential customers with central air conditioners, electric heat pumps and central electric resistance heat or electric water heaters.

Business Sector

Prescriptive Incentive: generates energy savings for all business customers through the promotion of high-efficiency standardized equipment not requiring substantial engineering. Three primary objectives focus on increasing: market share, installation rates, and operating efficiency. Incentives typically ranging from 20% to 50% of the incremental cost to purchase energy efficient products would be offered to customers.

Custom: assists larger commercial and industrial customers with the analysis and selection of high-efficiency equipment or processes not covered under the Prescriptive Incentive program. The program approach identifies more complex energy savings projects, provide economic analysis and aid in the completion of the incentive application. Incentives would be based on energy savings on a per kWh and per kW basis for installed measures.

C&I New Construction: provides design assistance to the architects and engineers that are designing new buildings. The key design assistance tool is building simulation modeling of more efficient building designs. Provide incentives to new facility owners for the installation of high-efficiency lighting, HVAC, building envelope, refrigeration and other equipment and controls. Provide a marketing mechanism for architects and engineers to promote energy efficient new buildings and equipment to end users.

C&I Demand Response: includes a Direct Load Control (DLC) Program to non-residential customers with packaged air conditioning, electric resistance heat or electric water heaters, specifically targeting small C&I customers.

Multi-Sector

General Energy Education: This program coordinates APCo Virginia's efforts to create customer awareness for the programs, enhance demand and educate customers on energy efficiency.

Training: The program coordinates the C&I training programs offered, or supported, by APCo Virginia. Initial trainings would likely include commercial and industrial facility engineers. The goal is to broaden APCo Virginia's reach to its customers and to provide assistance for customers seeking higher efficiency

New Pilots/Emerging Technology: The program objective would be to identify and learn more about new energy efficient technologies to capture additional electric energy savings. There are numerous pilot program potentials addressing all classes of customers. Initially the program would focus on proven programs that capture significant energy savings. Later, other innovative technologies, including solid state lighting, plug load and consumer electronics, could be explored.

Portfolio Implementation

This plan assumes that APCo Virginia implements the proposed portfolio of programs through a combination of in-house utility staff and competitively selected third-party implementation contractors. APCo Virginia would issue Requests for Proposals ("RFP"s) to qualified firms related to multiple RFPs for the delivery of similar programs targeting specific sectors. By issuing multiple RFPs, it should be possible to obtain more competitive, cost-effective and qualified implementation responses. Implementation contractors would be eligible to respond to one or all of the RFPs. The process of issuing RFPs, evaluating responses and negotiating contracts along with associated program start-up time could result in 2009 launch dates, at the earliest for some programs. However, it is also recognized that it will take some time for APCo Virginia to finalize any proposed program portfolio and to obtain necessary regulatory approvals, including appropriate cost recovery. This could, and likely will, push initial program implementation beyond calendar year 2009. The remaining programs would begin at a later time due to a need for longer preparation time prior to launch.

Evaluation, Measurement and Verification

Program evaluation, measurement, and verification ("EM&V") activities are central to the success of the APCo Virginia portfolio. EM&V would be used to validate program savings impacts, monitor program performance and ensure that incentives paid are proportionate to expected savings in order to make adjustments for future expected savings. These activities would serve as a way to audit, both internally and independently, the actual level of savings being delivered and to maximize the savings achieved for the given program investment.

Appropriate EM&V requires that a framework be established that encompasses both planned EM&V efforts and data collected as part of program implementation. EM&V efforts evolve over time and change as programs move from initial rollout with few participants to full-scale implementation. The APCo Virginia EM&V budget is assumed to be approximately 3-5% of the overall portfolio investment. Summit Blue has included appropriate costs in the proposed budgets for comprehensive EM&V.

All evaluation activities would be conducted by third-party, evaluation consultants selected through a competitive bidding process. To ensure objectivity, impact evaluations are most often performed by organizations independent of those responsible for designing and implementing programs. Process evaluations and market effects studies typically are also prepared by independent evaluators. This approach ensures the program evaluation effort is fair and objective. Process evaluations in particular are

used less to verify performance than to help improve program implementation processes and thus require active participation by the program administrator/implementer.

Implementation and/or evaluation support contractors would assist in the development of key program and evaluation related components including:

- Validation of deemed savings estimates for prescriptive measures in a Technical Reference Manual (“TRM”). The TRM would detail all measure savings assumptions, including base efficiency, high efficiency, measure size, measure life, free ridership, and spillover estimates.
- Interfaces with the Portfolio tracking system that captures measure and/or project data, develops initial estimates of savings, and retains participant information to assist with subsequent EM&V activities.
- Direct market baseline research and market characterization to support improved implementation.
- Review of program and measure cost-effectiveness.

The overall evaluation approach is based on an *integrated cross-disciplinary model* that includes evaluators as members of “project teams” involved in the various stages of program planning, design, monitoring and evaluation. This is a cost-effective method that has been highly successful for other utilities.

Program and Portfolio Risk

Through 2009, the economy will likely remain in a severe economic recession. In this economic environment, APCo Virginia’s ability to convince business customers to voluntarily take on additional debt for the installation of cost-effective measures, even with very short pay-back periods, would be very challenging. APCo Virginia asked Summit Blue to develop a balanced portfolio of programs that provides opportunities for participation at multiple levels. By proposing a multi-faceted and broad portfolio of programs, the plan set forth here would capitalize on those segments of the market who may be willing to invest in energy efficiency given the challenging economic landscape. In balance, this would provide APCo Virginia with its best available plan, under the economic constraints mentioned above, to achieve energy efficiency goals.

The following strategies should help minimize the risks associated with this suggested portfolio of energy efficiency programs:

- Implementing primarily “tried and true” programs that have been successfully implemented by many utilities in the Midwest and across the country.
- Hiring program implementation contractors with significant experience in implementing DSM programs in the Midwest and other regions.
- Initiating program evaluation activities at the start of program implementation to get real-time feedback on program progress and to allow any needed fine-tuning to occur as soon as possible.
- Setting up post installation inspection procedures and data to collect before inspections begin.
- Anticipating and preparing for stronger than expected market response

- Conducting adequate market checks on standard practices and energy efficient product availability.
- Developing incentive structures that are simple to understand.
- Creating simple participation rules.
- Monitoring and responding to rapidly dropping equipment prices quickly.
- Setting appropriate qualifying efficiency levels.
- Setting appropriate incentive levels.
- Roll out targeted marketing to contractors focusing on what's in it for them and how they participate
- Adequately training account managers on program rules.
- Carefully establishing documentation, analysis methods and reporting requirements for technical studies.
- Managing the pipeline of projects and establishing decision deadlines so the response time to those waiting for decisions is reasonable.

E.4 Conclusions and Recommendations

The DSM potential (Base Case Scenario Market Potential) identified in this study represents energy reductions of around 12% for APCo Virginia residential customers and 12% for commercial and industrial customers below forecasted levels and known enacted energy codes and standards by 2028, or about 0.6% per year. This magnitude of savings has been achieved by best practice program portfolios in the Midwest, Northeast and Western U.S. Winter peak demand and annual energy reductions of the magnitudes found for the Base Market Potentials case are being achieved by a variety of utilities.

The largest sources of uncertainty regarding the estimates that Summit Blue has developed to date for APCo Virginia stem from using secondary information to profile APCo Virginia's customers. It is uncertain how well the primarily regional and national estimates used for current DSM measure saturations apply to APCo Virginia's customers. This is particularly the case for commercial and industrial customers, where the secondary sources used included Department of Energy customer surveys such as the Commercial Building Energy Consumption Survey.

The DSM benchmarking analysis results presented in this report should give APCo Virginia management confidence that a variety of utilities in the region and throughout the country are achieving large-scale results from their DSM programs. It should be noted, however, that this level of impact is based on historical economic conditions; going forward, economic uncertainties are likely to negatively affect the market potential.

The DSM program plans that Summit Blue developed are based on the best practice results from the analysis of utility DSM program results. These program plans build on several common elements that have been identified by the analysis conducted:

- Large impacts are being realized from both lighting and multi-product energy efficiency programs for both consumer and commercial sectors.
- Significant impacts are being achieved from new construction energy efficiency programs.
- Custom incentive energy efficiency programs have produced significant impacts for some utilities.

Utilities that choose to significantly invest in DSM programs often make significant periodic investments to develop and update secondary best-practice and primary market research data to aid their DSM program planning. For example, Xcel Energy in Minnesota conducts large-scale market assessments and DSM potential studies that include significant on-site customer data collection every five to ten years. The Iowa utilities conduct DSM potential studies about every five years to support their periodic DSM program filings with their regulators. These utilities collected significant customer data as part of their 2008 DSM potential study.

Recommendations to consider include the following:

- Move the results into operational planning.
- Utilize an outsourcing strategy to jump-start key aspects of the portfolio and associated infrastructure and internal organizational development.
- Engage in long-term organizational development to assure performance and APCo Virginia brand continuity, as well as strong internal oversight over the life of the portfolio.

1 INTRODUCTION

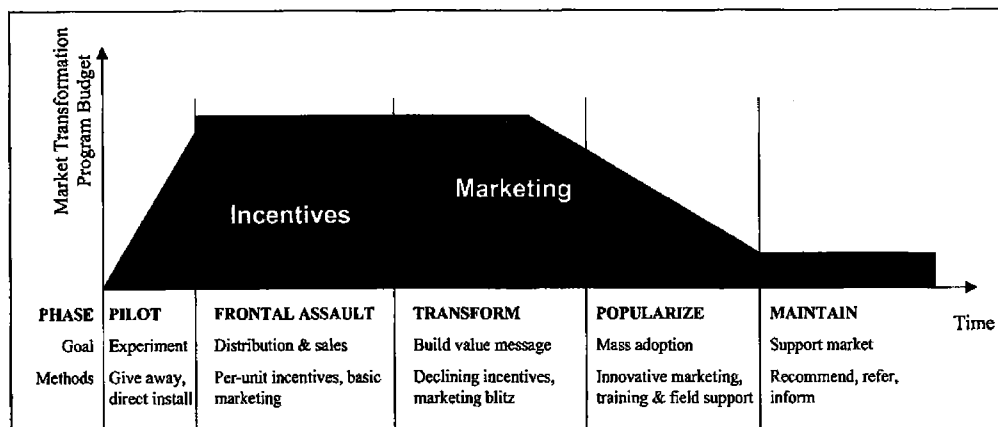
APCo Virginia is Virginia's second largest provider of electric service with a mix of over one-half million residential, commercial and diversified industrial customers.

The following DSM Action Plan presents a detailed overview of the proposed electric efficiency programs targeted at the consumer, business sectors, and associated implementation costs, savings, and benefit-cost results. This plan presents detailed information on the approach, energy efficiency measures, and proposed incentive levels. Summit Blue Consulting anticipates that, prior to actual program implementation, portions of this plan will need to be revised to reflect better information or changing market conditions.

On behalf of APCo Virginia, Summit Blue Consulting (Summit Blue) has designed a comprehensive portfolio of DSM programs to deliver significant electric efficiency savings. These programs include incentive and buy down approaches for energy efficient products and services, educational and marketing approaches to raise awareness and enhance demand, and partnerships with trade allies to apply as much leverage as possible to augment the rate-payer dollars invested. Proper coordination between the programs is essential to maximizing this leverage.

As detailed in Figure 1-1, it is anticipated that, over time, investment in energy efficiency measures would follow a predictable path of market transformation that has been experienced in other jurisdictions. With sustained levels of investment, promotion of efficient measures would in the early years focus on immediate up-front incentives to stimulate the marketplace. Over time, funds could be transitioned to marketing, training, education, and awareness to sustain program participation. Furthermore, as certain markets become transformed and the baseline conditions become the efficient options, program resources could be transferred to new program areas and new technologies and, if appropriate, the process would repeat. Each series of the market transformation process could result in greater and more efficient opportunities for residential and business customers.

Figure 1-1. Phases of Energy Efficiency Promotion



Source: ENERGY STAR® YEAR 3 AND BEYOND, Presentation by Anne Wilkins, NRCAN, 2005

Demand Side Management ("DSM") is the planning and implementation of programs and services that help and encourage customers to use electricity as efficiently as possible. DSM represents an important

resource for APCo Virginia, one growing increasingly important as fuel and commodity prices become more volatile and greenhouse gas regulation becomes more likely. Estimates of DSM potential are a key input to the integrated resource planning process, which considers the load forecast and both supply and demand-side resources. This study presents the results of an analysis of the DSM potential in APCo Virginia's service territory by Summit Blue Consulting.

1.1 APCo Virginia Overview

As described on Appalachian Power Company's website, the Company overall has about one million customers (about half of those being in Virginia) and 8,000 megawatts of generation. Figure 1-2 presents APCo's service territory, which includes a large geographic area in Virginia. APCo Virginia provides power to more than 100 communities.

Figure 1-2. Appalachian Power Company Service Territories

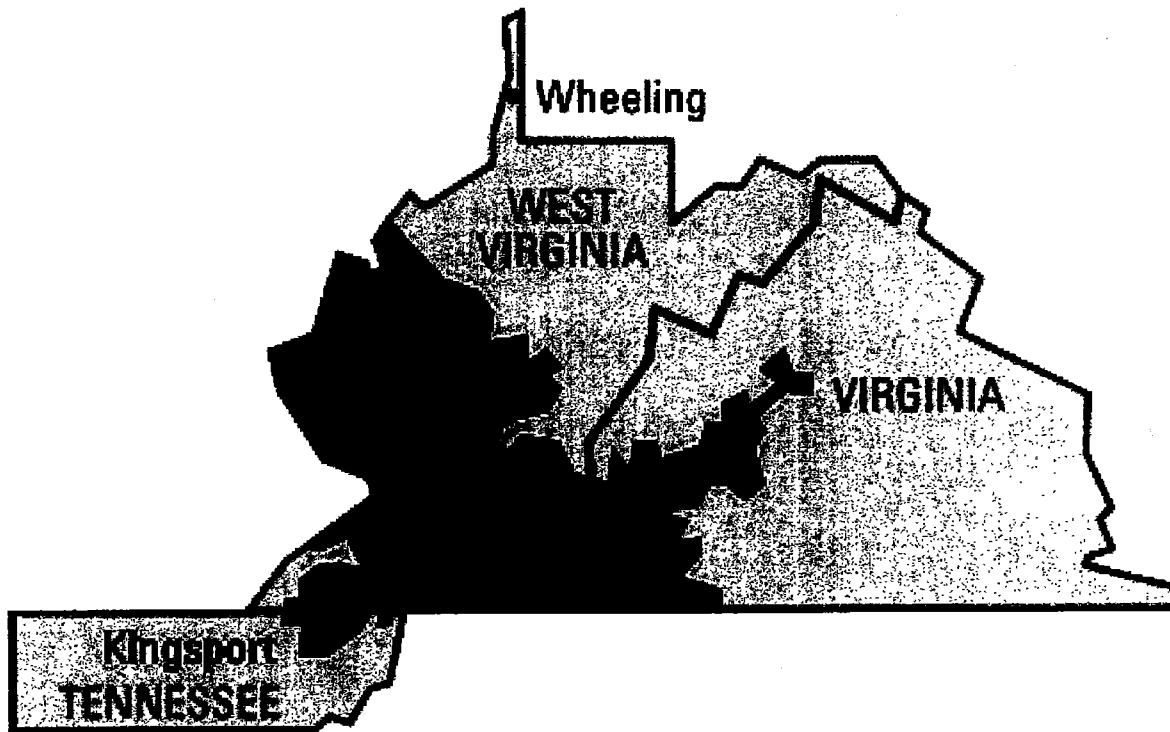


Table 1-1 outlines key statistics for APCo Virginia.

Table 1-1. APCo Key Statistics⁶

2007 electrical sales in megawatt hours:	38,443,670 (Total APCo)
	18,714,900 (Va. / Tenn.)
Average use per residential customer:	14,840 kwh per year (Va.)
Average cost per kilowatt-hour (residential):	6.88 cents (Va.)
Size of service area (asset):	10,913 square miles (Va. / Tenn.)
Communities served:	102 (Va. / Tenn.)
Net plant in service APCo:	\$6 billion
Size of distribution system:	27,565 miles (Va. / Tenn.)
Size of transmission system:	2,554 miles (Va. / Tenn.)
Total AEP Employees:	1,368 (Va. / Tenn.)

Study Goals and Approach

The overall goals of the DSM potential study are to:

- Assess the technical, economic, and achievable potential for the residential, commercial and industrial sectors
- Develop high-level DSM program plans

Summit Blue undertook the DSM potential study in the following key tasks:

- Develop baseline consumption profiles, and develop initial building simulation model specifications
- Characterize the DSM measures
- Conduct a DSM benchmarking and best practices analysis
- Conduct benefit-cost analysis
- Estimate DSM potentials
- Develop program plans

These steps are discussed in more detail in chapters of the report.

⁶ <http://www.appalachianpower.com/about/serviceTerritory/docs/AppalachianPowerFactSheet2007.pdf>

1.2 Volume 1: 2009 to 2013 DSM Action Plan Report Organization

The remainder of APCo Virginia's Volume 1: DSM Action Plan is divided into the following sections:

Section 2: Portfolio Development provides an overview of the process used and considerations in developing this portfolio of programs.

Section 3: Program Portfolio Summary provides a high-level overview of the selected portfolio of programs.

Section 4: Portfolio Summary Results details the summary results of portfolio electric savings, investment allocations and benefit-cost results.

Section 5: Consumer Program Descriptions presents detailed program plans for consumer programs.

Section 6: Business Program Descriptions presents detailed program plans for business programs.

Section 7: Portfolio Implementation presents an overview of the approach to delivering the proposed programs through a combination of in-house staff resources and third-party implementation contractors.

Section 8: Portfolio Management summarizes the management approach and areas of coordination APCo Virginia could apply in managing program delivery.

Section 9: Evaluation, Measurement and Verification provides a comprehensive overview to the various levels of EM&V activities to carry out to ensure programs are achieving intended goals with the minimum of program expenditures.

Section 10: Glossary defines key terms used in the report.

Volume 2 – 2009 to 2028 DSM Potential Study: presents the DSM potential study results.

Volume 3 – Appendices A-G: includes detailed appendices are provided in the report, including overall Benchmarking results (Appendix A), Best Practice Residential Programs (Appendix B), Best Practice Commercial and Industrial Programs (Appendix C), Measure Descriptions and Characterizations (Appendix D), Program Results Summary (Appendix E), SB-RAM Input Summary & Measure Tracking Summary (Appendix F), and References (Appendix G).

2 PORTFOLIO DEVELOPMENT

Based on a national review of leading energy efficiency programs, a balanced portfolio of DSM programs has been developed that will achieve significant and immediate energy savings, while establishing trade ally and retailer partnerships resulting in lasting market transformation. These programs would target all major sectors and customer classes, including low-income and small business customers.

The underlying concept is to offer a diverse portfolio of “tried and true” major programs (some of which include sub-program components) across the residential, commercial and industrial sectors. The portfolio includes several pilot programs targeting experimental opportunities as well as a broad-based education and awareness program offering.

2.1 Portfolio Goals and Objectives

High level efficiency-related goals and objectives for the Portfolio would be as follows:

- Design and implement a diverse group of programs that provide opportunities for participation for all customers.
- When feasible, maximize opportunities for program coordination with other efficiency programs to yield maximum benefits.
- Maximize program savings at a minimum cost by striving to achieve comprehensive cost-effective savings opportunities.
- Provide APCo Virginia customers with a single website to access information on all efficiency programs (residential and business) for electricity savings opportunities.
- Expand the energy efficiency infrastructure in the Commonwealth - for example, increasing the number of available qualified contractors.
- Transform the market for efficient technologies and highly qualified efficiency-oriented trade allies (such as electricians, HVAC contractors, builders, architects and engineers).
- Inform and educate customers and students to enable them to use energy more efficiently

2.2 Planning Process

APCo Virginia hired Summit Blue Consulting, a nationally recognized leader in the energy efficiency field, to assist with the design and preparation of this DSM Action Plan.

APCo Virginia's suggested portfolio of programs incorporates elements of the most successful energy efficiency programs across North America into program plans designed for the Virginia market and APCo Virginia customers in particular. A substantial amount of information including evaluation studies was used to develop specific programs for APCo Virginia. Summit Blue also used a benchmarking process to review the most successful energy efficiency programs from across the country, with a focus on successful Midwest programs to help shape the portfolio.

As detailed in Figure 2-1, there are four major types of energy efficiency potential: (1) *technical* potential for all technologies, (2) *economic* potential, the amount of energy efficiency available that are cost effective, (3) *achievable* potential, the amount of energy efficiency available under current market conditions and available investments, and (4) *program* potential, the amount of energy efficiency available given limited resources, available time and duration of the efficiency program planning period. APCo Virginia's DSM Action Plan is focused on capturing cost-effective *program potential* in its service territory.

Figure 2-1. Four Stages of Energy Efficiency Potential

Not Technically Feasible	Technical Potential			
Not Technically Feasible	Not Cost Effective	Economic Potential		
Not Technically Feasible	Not Cost Effective	Market and Adoption Barriers	Achievable Potential	
Not Technically Feasible	Not Cost Effective	Market and Adoption Barriers	Program Design, Budget, Staffing, and Time Constraints	Program Potential

Reproduced from "Guide to Resource Planning with Energy Efficiency November 2007" written by the US EPA, Figure 2-1.

2.3 Portfolio Risk Management

In 2009, the economy is in the midst of a severe economic recession. In this economic environment, convincing business customers to voluntarily take on additional debt for the installation of cost-effective measures, even with very short pay-back periods, would be very challenging. APCo Virginia asked Summit Blue to develop a balanced portfolio of programs that provides opportunities for participation at multiple levels. By proposing a multi-faceted and broad portfolio of programs, the plan set forth here would capitalize on those segments of the market who may be willing to invest in energy efficiency given the challenging economic landscape. In balance, this would provide APCo Virginia with its best available plan to achieve energy efficiency goals.

The following strategies should help minimize the risks associated with this portfolio of energy efficiency programs:

- Implementing primarily "tried and true" programs that have been successfully implemented by many utilities in the Midwest and across the country
- Hiring program implementation contractors with significant experience in implementing DSM programs in the Midwest and other regions
- Initiating program evaluation activities at the start of program implementation to get real-time feedback on program progress, and to allow any needed fine-tuning to occur as soon as possible

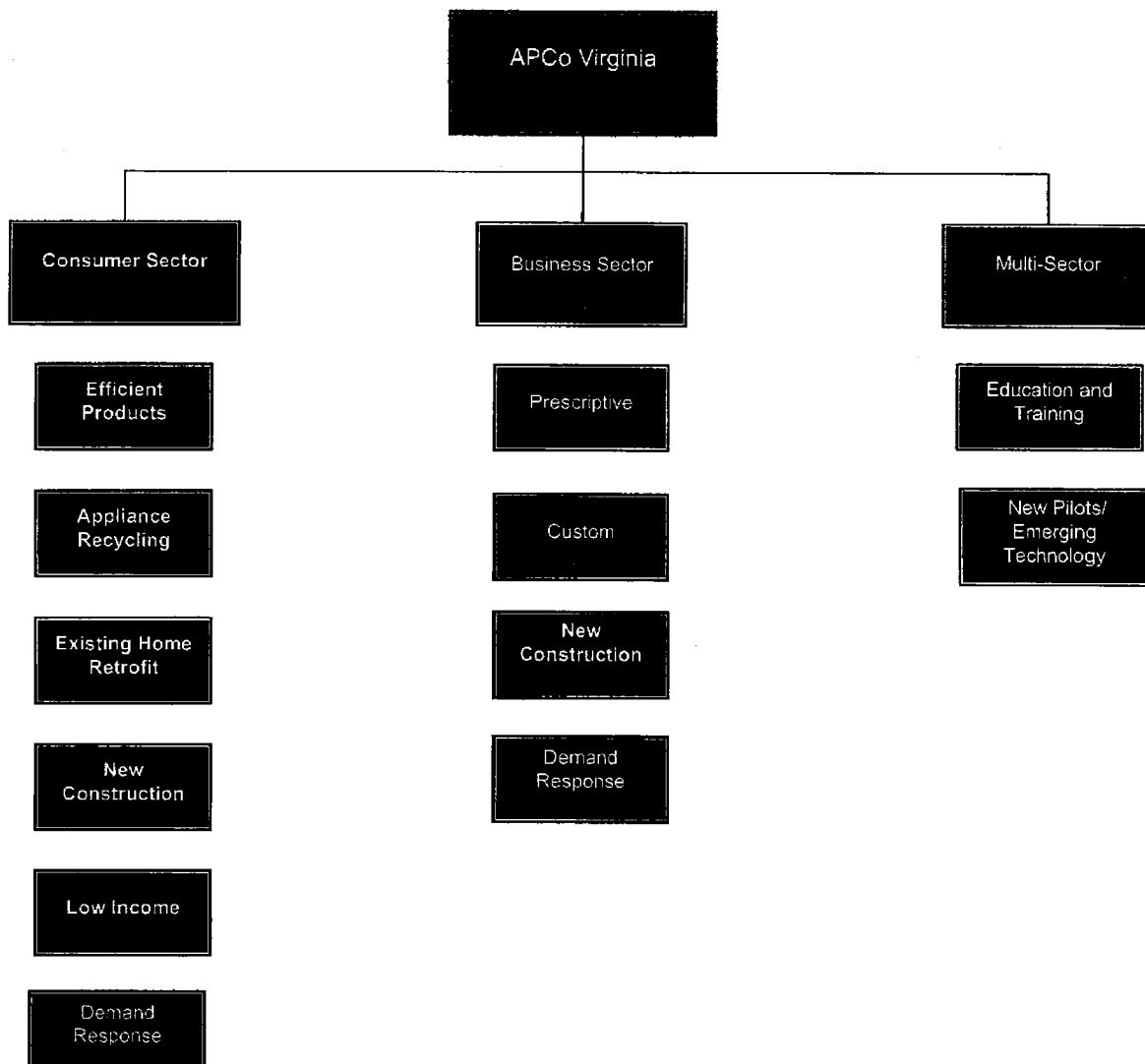
- Setting up post installation inspection procedures and data to collect before inspections begin.
- Anticipating and preparing for stronger than expected market response
- Conducting adequate market checks on standard practices and energy efficient product availability.
- Developing incentive structures that are simple to understand.
- Creating simple participation rules.
- Monitoring and responding to rapidly dropping equipment prices quickly.
- Setting appropriate qualifying efficiency levels.
- Setting appropriate incentive levels.
- Roll out targeted marketing to contractors focusing on what's in it for them and how they participate
- Adequately training account managers on program rules.
- Carefully establishing documentation, analysis methods and reporting requirements for technical studies.
- Managing the pipeline of projects and establishing decision deadlines so the response time to those waiting for decisions is reasonable.

3 PROGRAM PORTFOLIO SUMMARY

The following section presents a brief introduction to the Action Plan's efficiency and demand response programs. As demonstrated in Figure 3-1, the portfolio of programs can be divided into consumer, business and multi- sectors with utility administrative functions providing support across for all program areas.

It is important to note that, for the purposes of presenting the details of this portfolio, the word "program" is used to define a specific market sector or technology end-use type and to detail projected savings, costs and cost-effectiveness. For planning purposes, it is helpful to separate the portfolio into these multiple "programs". Upon implementation, however, it would be a priority to present the programs in a market oriented manner - that is, a range of efficiency opportunities to address entire sectors which Summit Blue believes would make customer participation more straightforward.

Figure 3-1. APCo Virginia Portfolio of Programs



4 DSM PROGRAM PLANS

The plans developed for this study are based on best-practice programs, with the concepts outlined in a strategic manner. The plans are proposed as guidelines for more detailed program planning; they are not intended to be operational *per se*. The intent of the portfolio presented here is to provide a sense of scope and scale, and convey the general schedule and resources needed to quickly gain a foothold in the various markets in which the programs will operate.

The performance targets of the program plans are based on normal economic conditions and the ability to overcome a variety of market barriers and perceived risks customers have regarding energy efficiency improvements and load management. Problems commonly encountered that affect delivery may occur and dampen program performance and include a variety of real and perceived risks in undertaking efficiency improvements or participating in load management programs:

- Reliability of the efficiency improvement, whether real or perceived
- Fit with existing facilities and processes
- Return on investment and cash flow effects compared to other financial and operating priorities
- Unfamiliarity with the technology leading to non-participation
- Availability of funds or credit to purchase the improvement
- Concern about occupant comfort and other aesthetics

Overall, a portfolio is presented that covers a broad range of demographic, business, facility, and end-use markets. The proposed portfolio of programs can be divided into consumer, business and multi-sectors with utility administrative functions providing support across for all program areas. APCo Virginia would maintain, as part of its functionality, the education, training and emerging technology (“R&D”) budgets. These efforts would leverage existing AEP corporate connections and efforts to maximize impact of these outreach and education efforts. The following section presents a summary of the services offered in each program.

4.1 Programs Summary

Consumer Sector

Efficient Products: This program would provide incentives and marketing support through retailers to build market share and usage of ENERGY STAR® lighting and other standardized equipment not requiring substantial engineering. Customer incentives encourage increased purchases of high-efficiency products while in-store signage, sales associate training, and support make provider participation easier. The program also promotes convenient recycling for CFLs at local retailers.

For appliances, the program uses a retail channel-based strategy to influence the purchase of high-efficiency appliances and electronics. Since appliance standards, as well as the market share of high-efficiency appliances, are gradually increasing, the program would be specific in its list of qualifying models, as well as marketing emphasis.

Appliance Recycling: Many of the refrigerators and freezers being replaced are still functioning and often end up as energy guzzling back-up appliances in basements and garages or are sold in a used

appliance market. The Appliance Recycling Program would target these “second” refrigerators and freezers, providing the dual benefit of cutting energy consumption and keeping the appliances out of the used market. The program would provide incentives to remove working units from service and fully recycle their materials. The program includes an environmentally responsible turnkey pick-up and recycling service.

Home Retrofit: This program produces long-term electric energy savings in the consumer sector by helping customers analyze and reduce their energy use through the installation of upgraded shell measures, such as air sealing, insulation and high efficiency equipment. A free online analysis would be offered followed by the option of a walk-through audit costing the customer between \$25 and \$150, (subject to reimbursement for those implementing at least \$1,000 in efficiency improvements). The plan would be to start with a “captive contractor” model to increase completion rates of recommended measures, eventually leading to a more traditional market-based Home Performance Retrofit with ENERGY STAR program in the later years. The three program phases are: Phase 1: On-line Energy Analysis; Phase 2: Home Walk-Through Energy Analysis; Phase 3: Home Performance Retrofit with ENERGY STAR.

Low Income: This program provides recommendations to encourage low-income consumers to install efficient equipment, provide financial assistance to cover the full cost of implementation, and educate customers with limited income to reduce their energy use and manage their utility costs. The program would coordinate low-income services with local weatherization providers to provide comprehensive assistance at lower administrative⁷ costs.

Energy Conservation Kits: This program provides a free or reduced cost package of energy saving Do-it-Yourself measures for a variety of programs that are evaluated to be cost effective such as school programs to educate students who take the package home to install the measures with their parents and other programs to distribute the kits to educate customers and provide energy savings. The kits include the following: four CFL lamps, switch and outlet gaskets, furnace filter whistle, hot water temperature card, self-stick energy use gauge thermometer, close-cell foam weather-strip, self-stick door sweep, flow meter bag, low-flow showerhead, and refrigerator thermometer card.

ENERGY STAR® New Homes: This program produces long-term electric energy savings by encouraging the construction of single-family homes and duplexes to meet the ENERGY STAR National Performance Path efficiency standard. The program would identify and recruit key builders who do not consistently (or seldom) build homes to meet the ENERGY STAR standard. Builders who choose to participate in the program would gain access to cash-back incentives designed to cover approximately 30% of the cost to upgrade and certify each home. Guidance for design and construction of high-efficiency homes also would be provided.

Residential Demand Response: This includes a Direct Load Control (DLC) Program to residential customers with central air conditioners, electric resistance heat or electric water heaters.

⁷ Administrative costs in this study are all costs for a given program aside from customer incentives: planning, marketing and sales, business process administration such as rebate processing, and evaluation, measurement, and verification. General overhead costs such as general DSM department overheads, general education/training and pilot program funding are estimated separately from specific programs, but are included in the overall portfolio benefit-cost analysis.

Business Sector

Prescriptive Incentive: This program generates energy savings for all business customers through the promotion of high-efficiency standardized equipment not requiring substantial engineering. Three primary objectives would focus on increasing: market share, installation rates, and operating efficiency. Incentives typically ranging from 20% to 50% of the incremental cost to purchase energy efficient products would be offered to customers.

Custom: This program assists larger commercial and industrial customers with the analysis and selection of high-efficiency equipment or processes not covered under the Prescriptive Incentive program. The program approach would identify more complex energy savings projects, provide economic analysis and aid in the completion of the incentive application. Incentives would be based on energy savings on a per kWh and per kW basis for installed measures.

C&I New Construction: This provides design assistance to the architects and engineers that are designing new buildings. The key design assistance tool is building simulation modeling of more efficient building designs. Provide incentives to new facility owners for the installation of high-efficiency lighting, HVAC, building envelope, refrigeration and other equipment and controls. Provide a marketing mechanism for architects and engineers to promote energy efficient new buildings and equipment to end users.

C&I Demand Response: The program includes a Direct Load Control (DLC) Program to non-residential customers with packaged air conditioning, electric resistance heat or electric water heaters, specifically targeting small C&I customers.

Multi-Sector

General Energy Education: Grade 4th-8th Energy Education for Elementary Education Classrooms. The program intent is to influence students and their families to take actions that can reduce their home energy use and increase efficiency. The implementation contractor would work directly with the Virginia Department of Education to introduce the program to schools throughout the Commonwealth. All educational materials and take-home efficiency kits will be free of charge to the schools.

Training: The program coordinates the consumer and C&I training programs offered, or supported, by the utility. These programs would be APCo Virginia sponsored and draw from corporate account managers and marketing departments. Initial trainings would likely work with commercial and municipal building engineers (such as the Building Operator Certification training) as well as consumer HVAC and weatherization contractors. The goal would be to broaden APCo Virginia's reach to its customers and to provide assistance for customers seeking higher efficiency trained contractors.

New Pilots/Emerging Technology: The program objective is to identify and learn more about new energy efficient technologies to capture additional electric energy savings. There are numerous pilot program potentials addressing residential energy use. Initially the program would focus on proven programs that capture significant energy savings. Later other innovative technologies, including solid state lighting, plug load and consumer electronics, could be explored.

The program plans below greater detail on the programs summarized above according to:

- Objectives
- Target Markets

- Duration
- Description
- Incentive Strategy
- Eligible measures
- Implementation Strategy
- Marketing Strategy
- Milestones
- EM&V Strategy
- APCo Virginia Administrative Requirements
- Budget
- Savings Targets
- Benefit-cost Test Results

5 DSM PORTFOLIO SUMMARY RESULTS

5.1 Portfolio Framework & Summary

Under the portfolio developed, a total \$134 million (2009\$) would be invested on energy efficiency programs during calendar years 2009 to 2013, assuming all programs within the suggested portfolio could be implemented expeditiously. The division of targeted efficiency program investment between residential and business customers is commensurate with the relative contribution to the DSM portfolio.

The plan maximizes the amount of program funds that go directly to customers through rebates and incentives, training and technical assistance, and customer and trade ally education. This portfolio also takes into account the realities of program start-up costs and funds needed to adequately plan, develop, deliver, and evaluate quality programs. The balance of the expenditures would be applied to program administration⁸ including staffing.

Customer incentive levels and other program elements would be reviewed and modified on an annual basis to reflect changes in market conditions or implementation processes in order to maximize cost-effective savings.

⁸ Administrative costs in this study are all costs for a given program aside from customer incentives: planning, marketing and sales, business process administration such as rebate processing, and evaluation, measurement, and verification. General overhead costs such as general DSM department overheads, general education/training, and pilot program funding are estimated separately from specific programs, but are included in the overall portfolio benefit-cost analysis.

Table 5-1 shows the overall estimated electric savings goals as percent of sales.

Table 5-1. Savings Goals and Efficiency Portfolio Investment – 2009 to 2013

Consumer Sector (incremental annual net savings at generator)	2009	2010	2011	2012	2013	2009-2013 Total
Energy Savings (GWh) (1)	22.3	35.7	46.7	48.9	57.9	211.5
% of Total Sector Loss-Adjusted Sales	0.30%	0.48%	0.62%	0.65%	0.76%	-
Winter Demand Savings (MW) (1)	14.9	17.4	19.7	24.2	33.0	109.2
% of Total Sector Loss-Adjusted Sales	0.70%	0.82%	0.93%	1.13%	1.53%	-
Total Cost (2009\$ million) (2)	\$5.4	\$7.0	\$8.7	\$11.3	\$14.6	\$47.1
Business Sector (incremental annual net savings at generator)	2009	2010	2011	2012	2013	2009-2013 Total
Energy Savings (GWh) (1)	28.3	41.3	61.3	67.9	82.2	281.0
% Savings of Sector Sales	0.29%	0.41%	0.61%	0.67%	0.81%	-
Winter Demand Savings (MW) (1)	14.0	15.9	18.4	19.2	22.5	89.9
% Savings of Sector Sales	0.80%	0.90%	1.04%	1.08%	1.26%	-
Total Cost (2009\$ million)	\$7.2	\$9.7	\$13.4	\$17.4	\$23.3	\$70.6
Total (incremental annual net savings at generator)	2009	2010	2011	2012	2013	2009-2013 Total
Energy Savings (GWh) (1)	50.5	77.0	108.0	116.8	140.1	492.5
% Savings of Sector Sales	0.29%	0.44%	0.62%	0.66%	0.79%	-
Winter Demand Savings (MW) (1)	28.8	33.3	38.1	43.4	55.5	199.1
% Savings of Total Sales	0.75%	0.86%	0.98%	1.11%	1.41%	-
Total Cost (2009\$ million)	\$12.7	\$16.7	\$21.8	\$28.7	\$37.9	\$117.7
Other Costs (2009\$ million) (2)	\$3.0	\$3.2	\$3.0	\$3.2	\$3.8	\$16.3
Portfolio Total Investment (2009\$)	\$15.7	\$19.9	\$24.8	\$31.9	\$41.7	\$134.0

(1) Savings are not projected for Low Income Energy Conservation Kits. APCo Virginia would also conduct program evaluation and other essential program support functions, such as compliance and reporting, database management, contracting and payables and portfolio cost-benefit analysis.

(2) Other Costs include support and other services, including: APCo Virginia DSM Department, General Education/Training/Media, Low Income Energy Conservation Kits, and Pilot Program Fund.

5.2 Benefit-Cost Analysis Background

On behalf of APCo Virginia, Summit Blue has estimated the energy savings, costs and net benefits associated with each of the programs included in the proposed portfolio of programs. The following section presents the benefit-cost results.

Types of Benefit-Cost Tests

As shown in Table 5-2, there are five major benefit-cost tests commonly utilized in the energy efficiency industry, each of which addresses different perspectives. Regardless of which perspective is used, benefit-cost ratios greater than or equal to 1.0 are considered beneficial. While various perspectives are often referred to as tests, the following list of criteria demonstrates that decisions on program development go beyond a pass/fail test.

Table 5-2. Comparative Benefit-Cost Tests

	Participant Test	Rate Impact Measure Test	Total Resource Cost Test	Program Administrator Cost Test (Utility Test)	Societal Test
BENEFITS:					
Reduction in Customer's Utility Bill	X				
Incentive Paid by Utility/Program Administrator	X				
Any Tax Credit Received	X		X		
Avoided Supply Costs		X	X	X	X
Avoided Participant Costs	X		X		X
Participant Payment to Utility (if any)		X		X	
External Benefits					X
COSTS:					
Utility Admin Costs		X	X	X	X
Participant Costs	X		X		X
Incentive Costs				X	
External Costs					X
Lost Revenues		X			

Summit Blue evaluated the cost-effectiveness of the measures, programs and overall portfolio based on the following standard tests:

The Utility System Resource Cost Test ("UCT", also referred to as the Program Administrator Test) measures the net benefits of a demand-side management ("DSM") program as a resource option based on the costs and benefits incurred by the utility (including incentive costs) and excluding any net costs incurred by

the customer participating in the efficiency program. The benefits are the avoided supply costs of energy and demand, the reduction in transmission, distribution, generation and capacity valued at marginal costs for the periods when there is a load reduction. The costs are the program costs incurred by the utility, the incentives paid to the customers, and the increased supply costs for the periods in which load is increased.

The Total Resource Cost Test (“TRC”) is a test that measures the total net resource expenditures of a DSM program from the point of view of the utility and its ratepayers. Resource costs include changes in supply and participant costs. A DSM program, which passes the TRC test (i.e., a ratio greater than 1.0) is viewed as beneficial to the utility and its customers because the savings in electric costs outweigh the DSM costs incurred by the utility and its customers.

The Participant Cost Test (“PCT”) illustrates the relative magnitude of net benefits that go to participants compared to net benefits achieved from other perspectives. While called a “participant” perspective, it is not necessarily a perspective indicating whether customers participate. The implied discount rate can vary substantially between customers. More importantly, many customers do not even know what a present-value benefit-cost analysis is let alone feel confident in making decisions based on it. Consequently, a simple payback (years) net of incentive has been shown to provide further guidance on customer participation. The benefits derived from this test reflect reductions in a customer’s bill and energy costs plus any incentives received from the utility or third parties, and any tax credit. Savings are based on gross revenues. Costs are based on out-of-pocket expenses from participating in a program, plus any increases in the customer’s utility bill(s).

The Rate Impact Measure (“RIM”) Test measures the change in utility energy rates resulting from changes in revenues and operating costs. The higher the RIM test, the less impact there is on increasing energy rates. While the RIM results provide a guide as to which technology has more impact on rates, generally it is not considered a pass/fail test. Instead, the amount of rate impact is usually considered at a policy level. The policy level decision is whether the entire portfolio’s impact on rates is so detrimental that some net benefits have to be forgone.

5.3 Benefit-Cost Test Results

As detailed in Table 5-3, the 2009-2013 DSM portfolio of programs passes the total resource cost test with a ratio of 2.2.

Table 5-3. Summary of Program Benefit-Cost Test Results – 2009 to 2013

Consumer Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Products	2.4	3.6	6.6	0.5
Recycling	1.1	0.9	N/A	0.0
Retrofit	2.5	3.8	3.8	0.8
Low Income	2.6	3.9	4.1	0.8
New Construction	2.5	3.8	6.9	0.5
Demand Response	1.5	4.1	1.5	1.1
Consumer Sector Total	2.4	3.8	4.3	0.7
Business Sector	Total Resource Cost Test (TRC)	Utility Cost Test (UCT)	Participant Cost Test (PCT)	Rate Impact Measure Test (RIM)
Prescriptive	2.1	3.4	4.6	0.5
Custom	1.4	2.1	4.5	0.4
New Construction	1.4	2.3	3.8	0.5
Demand Response	1.6	2.3	0.6	2.1
Business Sector Total	1.8	2.8	3.6	0.6
PORTFOLIO TOTAL	2.2	3.4	4.7	0.6

5.4 Benefit-Cost Methodology

The Summit Blue Resource Assessment Model SB-RAM is a model based on the integration of DSM measure impacts and costs, utility customer characteristics, utility load forecasts, and utility avoided costs and rate schedules. The model utilizes a “bottom-up” approach in that the starting points are the study area building stocks and equipment saturation estimates, forecasts of building stock decay and new construction, DSM technology data, past DSM program accomplishments, and decision maker variables that help drive the market potential scenarios.

The baseline estimates of building stocks and equipment saturations came from the results of the on-site audits conducted by Summit Blue. SB-RAM also used the electricity forecast, avoided cost forecast, and electricity prices as described in Chapter 5, above.

SB-RAM estimates technical, economic, and achievable DSM resource potential as defined below:

- **Technical DSM potential** describes the amount of DSM savings that could be achieved, not considering economic and market barriers, by customers installing DSM measures. Technical

potential is calculated as the product of the DSM measures' savings per unit, the quantity of applicable equipment in each facility, the number of facilities in a utility's service area, and 100% – the measure's current market saturation. Technical potential estimates include DSM measures that may not be cost effective, and technical potential does not consider market barriers, such as customer's lack of awareness of DSM measures. Therefore, technical DSM potential estimates do not provide a realistic basis for setting DSM program goals.

- **Economic DSM potential** describes the amount of technical DSM potential that is “cost-effective,” as defined by the results of the TRC test (or other preferred cost effectiveness test). The program benefits for the TRC test include the avoided costs of generation, transmission, and distribution investments and avoided fuel costs due to the energy conserved by the DSM programs. The costs for the TRC test are the DSM measure costs, plus the DSM program administration costs. The TRC test does not consider economic or market barriers to customers installing DSM measures.
- **Achievable DSM market potential** estimates the amount of DSM potential that could be captured by realistic DSM programs that include cost effective DSM measures over the forecast period covered by this DSM potential analysis. Achievable DSM potential can vary with DSM program parameters, such as the magnitude of rebates or incentives offered to customers for installing DSM measures; therefore many different scenarios can be modeled.

Within the achievable DSM potential assessment, the individual measures are modeled by expected type of DSM program design. Three different program design options are included in SB-RAM.

- **Replace on Burnout (“ROB”)** means that a DSM measure is not implemented until the existing technology it is replacing fails. An example would be an energy efficient clothes washer being purchased after the failure of the existing clothes washer.
- **Retrofit (“RET”)** means that the DSM measure could be implemented immediately. For instance, installing a low flow showerhead is usually implemented before an existing shower head fails. Replacing incandescent lamps may be a ROB, but can be treated as a RET, because of the relatively short lifetime for incandescent bulbs.
- **New Construction (“New”)** means measures that are installed at the time of new construction. Baseline technologies may be different in the new construction market, and implementation costs are often different due to the different technologies, either the energy efficient or base technology.

Cost Effectiveness Tests

SB-RAM employs several financial tests, including the cost effectiveness tests described in Chapter 5: the TRC, PAC, participant, and RIM tests.

Simple Customer Payback

The decision model of SB-RAM includes simple customer payback as part of its analysis. The calculation takes measure cost less the incentive received and divides it by first year energy bill savings.

DSM Measure Levelized Cost/kWh

DSM supply curves are based on the DSM measure cost per kWh, levelized over the lifetime of the measure. It is calculated by multiplying DSM measure costs by the Capital Recovery Factor (“CRF”), then dividing by the first year kWh savings.

Discount Rate

There is a time value of money because money spent in the future does not have the same value as money spent today. This time value is represented by a discount rate (analogous to an interest rate). Economic equations use the discount rate to convert all costs and benefits to a “present value” for comparing alternative costs and benefits. Summit Blue used a uniform discount rate of 8.1% for both energy efficiency programs and supply side resources.

Avoided and Energy Costs

DSM avoided cost benefits fall into two categories, avoided capacity benefits, and avoided energy costs. Avoided capacity benefits are the benefits derived from deferring the need to build new generating plants in the future. Avoided capacity values were based on APCo Virginia projections of future power plant costs considering expected level of capacity available over future years, and the costs of that capacity.

Administration,⁹ Implementation, and Direct Costs

Each program’s administration, implementation, and direct costs were allocated to the technologies delivered by the program in the ratio of the incentive investment to the total incentive investment for the program. The result is that individual technology benefit/cost ratios can appear low simply because administration or implementation costs have been allocated to the technology beyond the specific technology costs. On the one hand, this allocation helps ensure the overall cost-effectiveness of a program by guiding selection of technologies with sufficient benefits to support program delivery costs. This still allows technologies with a benefit-cost ratio less than 1.0 to be included as needed to meet other goals in addition to portfolio cost-effectiveness requirements. APCo Virginia support services that are not specific to individual programs are added as costs at the portfolio level for all programs.

Program Development

Program development involves the selection of technologies to include in a program, estimates of participation levels and estimates of program costs. It is obviously necessary for a portfolio of programs to be cost-effective. However, there are multiple and often contradictory perspectives on cost effectiveness. Alternative perspectives are described below. The primary cost-effectiveness perspective in the portfolio is the total resource cost test perspective. Fortunately, it is possible to achieve required cost-effectiveness at a portfolio level while also considering other important criteria. The following criteria also were considered in developing programs:

- Achieving more benefits net of cost is a higher priority than a high benefit-cost ratio.
- The portfolio must provide opportunities for specific customer sectors to participate.
- Long term contribution of a technology is important to program success and to future cost reductions.
- Consideration of different benefit-cost perspectives is necessary.

⁹ Administrative costs in this study are all costs for a given program aside from customer incentives: planning, marketing and sales, business process administration such as rebate processing, and evaluation, measurement, and verification. General overhead costs such as general DSM department overheads, general education/training, and pilot program funding are estimated separately from specific programs, but are included in the overall portfolio benefit-cost analysis.

6 DSM PROGRAM PLANS

Preliminary program plans represent an interim step between the measure-specific number produced by the DSM potential analysis and the detailed plans needed to implement the programs. The plans developed for this study are based on best-practice programs, with the concepts outlined in a strategic manner. The plans are proposed as guidelines for more detailed program planning; they are not intended to be operational *per se*. The intent of the portfolio presented here is to provide a sense of scope and scale and to convey the general schedule and resources needed to quickly gain a foothold in the various markets in which the programs will operate.

The performance targets of the program plans are based on normal economic conditions and the ability to overcome a variety of market barriers and perceived risks customers have regarding energy efficiency improvements and load management. Problems commonly encountered that affect delivery may occur and dampen program performance and include a variety of real and perceived risks in undertaking efficiency improvements or participating in load management programs:

- Reliability of the efficiency improvement, whether real or perceived
- Fit with existing facilities and processes
- Return on investment and cash flow effects compared to other financial and operating priorities
- Unfamiliarity with the technology leading to non-participation
- Availability of funds or credit to purchase the improvement
- Concern about occupant comfort and other aesthetics

Overall, a portfolio that covers a broad range of demographic, business, facility, and end-use markets is presented:

- Commercial & Industrial
 - Prescriptive Incentive Program: Covers a variety of standardized equipment types not requiring substantial engineering.
 - Custom Program: Covers specialized efficiency improvement projects not covered by the Prescriptive Program.
 - New Construction Program: Provides facility design assistance to capture long-term architectural and facility systems efficiency opportunities.
 - Direct Load Control Program: Offers financial incentives to customers with qualifying packaged air conditioning (for summer load cycling via smart thermostats) and winter electric space and water heating load cycling.
- Residential
 - Home Retrofit Program: Home energy audit and follow-up insulation, lighting and heating system retrofits.
 - New Construction Program: Incentives and guidance for design and construction of high-efficiency homes.

- Refrigerator/Freezer Recycling Program: Incentives to remove working units from service and fully recycle their materials.
- Residential Efficient Products Program: Incentives to purchase a variety of standardized equipment types not requiring substantial engineering.
- Residential Low Income Program: Free-of-charge services and products to improve the electric efficiency of qualifying low-income customers.
- Residential Direct Load Control Program: Offers financial incentives to customers with central air conditioners (for summer load cycling via smart thermostats) and winter electric space and water heating load cycling.

The preliminary plans below provide:

- Objectives
- Target markets
- Goals and objectives
- Duration
- Description
- Incentive strategy
- Eligible measures
- Implementation strategy
- Marketing strategy
- Milestones
- Administrative requirements
- Budget
- Savings targets
- Benefit-cost test results

6.1 Consumer Programs

6.1.1 Residential Efficient Products Program

Objective

Produce long-term electric energy savings in the residential sector by increasing the market share of high-efficiency lighting products, home appliances sold through retail sales channels, and promoting the purchase and installation of HVAC and domestic hot water heating equipment.

Target Market

Lighting: Residential customers purchasing light bulbs and fixtures through retail sales channels. Residential rental property owners and customers living in rental properties also would be eligible to purchase efficient lighting products, as well as small commercial customers.

Appliances: Customers in the market for new refrigerators and freezers, and considering fuel switching from electric to gas clothes dryers. Residential rental property owners would be eligible as well.

As new technology and/or proven program design options (e.g., lift-based incentive) become available, the program may target the purchase of other high-efficiency appliances and/or consumer electronics. At this time however, options are limited to the aforementioned products due to economic considerations (i.e., baseline market share is already high or the difference in consumption between the baseline and "high efficiency" does not warrant attention by the program).

HVAC and Domestic Hot Water: Customers installing new evaporative coolers and geothermal heat pumps in single-family homes and multifamily dwellings of three units or less would be eligible for incentives. Residential customers installing new water heating equipment would be eligible, both in the replacement market (through plumbing contractors as well as the Do-it-Yourself retail channel) and the new construction market (through contractors).

Program Duration

The Efficient Products Program would be an ongoing element of the program portfolio.

Program Description

Lighting: The Efficient Products Program would provide incentives and marketing support through retailers to build market share and usage of ENERGY STAR® lighting products. The program targets the purchase of lighting products through in-store promotion as well as special sales events. Customer incentives facilitate the increased purchase of high-efficiency products while in-store signage, sales associate training and support makes provider participation easier. The program would also provide convenient recycling for CFLs at local retailers.

Appliances: The program would use a retail channel-based strategy to influence the purchase of high efficiency appliances and electronics. Since appliance standards and the market share of high-efficiency appliances are gradually increasing, qualifying models would be specified and marketing will be targeted. The program initially provides incentives to customers encouraging purchasing high-efficiency

refrigerators and freezer. In future years, the program may target other cost-effective options for high-efficiency appliances and electronics.

HVAC and Domestic Hot Water: The program would affect the purchase and installation of evaporative coolers and geothermal heat pumps through a combination of market push and pull strategies that stimulate demand while simultaneously increasing market provider investment in stocking and promoting high efficiency products. The program would work through two distinct market channels – plumbing contractors and the retail Do-it-Yourself stores.

Incentive Strategy

Several incentive strategies could be employed to address current market conditions:

LIGHTING

CFL Markdowns: The markdown approach would be the primary driver of volume within the lighting program. With a markdown approach, APCo Virginia would reimburse select retailers for discounting the cost of CFLs or other products by a specified dollar amount per unit during special limited term promotions. The qualifying product would be listed at a lower retail price on store shelves or marked down automatically at the register. At the end of every month, the retailer provides a point of sale report and would be reimbursed for the discount provided on each unit that they sold. This strategy eliminates costs associated with mail-in rebate fulfillment, printing claim forms and setting up store locations, and is very cost-effective if APCo Virginia can capitalize on economies of scale by coordinating promotions with neighboring utilities. Volume would be controlled by allocating a specific number of CFLs that each retailer may discount, in advance of the promotion, and by offering discounts on a “while supplies last” basis.

Markdown promotions ideally should be arranged with retailers six months in advance to accommodate their marketing plans and allow sufficient time to procure product. APCo Virginia dollars may be leveraged through a request for proposal (RFP) process to gain retailer and manufacturer contributions of financial and logistical support for promotions. For example, retailers may be asked to bid on access to APCo markdown dollars based on how much they are willing to further reduce prices below normal retail rates or manufacturer offers to dispatch field representative to stores to stock shelves and train sales associates. Retailers must provide shipping documentation showing that the store received a specified number of units and monthly point of sale report showing the number of units sold.

Lighting Fixture and Ceiling Fan Markdowns: Similar to the CFL markdown model, the program would work with retailers to provide a discount on select ENERGY STAR products at the point of sale.

LED Holiday Lights Markdown: Similar to the CFL, fixture, and fan markdown promotion, the program would work with retailers to provide a discount on select products at the point of sale.

CFL Coupons: This incentive strategy would provide instant-rebate coupons on ENERGY STAR qualified CFLs at participating retailers who are unable to provide point of sale data in conjunction with markdown style promotions. A quantity restriction of twelve (12) CFLs per residential customer per year will be imposed to help maximize installation rates and a limit of 24 CFLs per commercial customer per year. Customers desiring more than the specified limit will be encouraged to call the program, explain their circumstance, and seek permission. Special bonus incentives may be offered for the purchase of CFL multipacks (e.g., 4-pack, 6-pack).

Lighting Fixture and Ceiling Fan Coupons: Customers could utilize instant rebate coupons available from retailers who are unable to provide point of sale data in conjunction with markdown promotions.

LED Holiday Lights Coupons: Instant rebate coupons would be available in stores that may be used to claim cash-back incentives from retailers who are unable to accommodate the requirements of markdown style promotions. This incentive strategy would only be available during the holiday season each year and should be considered a public relations activity as this product will not generate significant energy savings.

Pilot Program with Lighting Showrooms: Program field representatives would work with several lighting showrooms by providing training support and a salesperson incentive to promote the sale and installation of ENERGY STAR fixtures.

Lift-based Incentive: Although the incentive strategies outlined here assume a transfer payment to the retailer or customer based on a dollar amount per every unit purchased, APCo Virginia may consider moving to a lift-based incentive strategy in future years. With a lift based incentive strategy APCo would work with retailers to establish baseline market share for eligible products and negotiate an incentive for every unit sold above the baseline. The objective is to maximize the net to gross (savings) ratio by providing a greater incentive for the retailer to increase the share of targeted products they sell each year as those below the baseline may be considered largely free-riders. This approach is being tested by other utilities and implementation contractors in the country. APCo Virginia may want to follow the results of these pilots and revisit this incentive strategy within one to two years, depending on the results of pilot efforts.

HVAC AND DOMESTIC HOT WATER

HVAC contractors would be able to apply the appropriate incentive to the customer invoice and submit to APCo Virginia for reimbursement or the customer may submit a mail-in rebate application. In addition, the incentive design may employ a smaller additional incentive (e.g., \$25 to \$50/unit) directly to the HVAC contractor to further elicit program participation if necessary.

Mail-in incentive applications would be available at point-of-sale in retail stores that sell qualifying water heaters for the Do-it-Yourself market. Plumbing contractors would be able to apply the appropriate incentive to the customer invoice and submit to APCo Virginia for reimbursement or the customer may submit a mail-in rebate application.

A \$50 incentive would be paid to retailers or contractors who apply the incentive to the customer's invoice. This incentive would serve as additional motivation for market providers to stock eligible products and to further reduce the first cost burden on the customer. The incentive would be paid to the vendor (i.e., contractor or retailer) not the salesperson, which is necessary to avoid time-consuming efforts to secure market provider agreement to offer incentives to salespeople. The vendor may choose to pass the incentive on to their salespeople.

Eligible Measures

The measures listed below have been specified for planning purposes. APCo Virginia would revise eligible measures as needed in accordance with current market conditions, technology development, EM&V results, and program implementation experience. Within the program period of this plan, it is likely that LED bulbs technology will continue to improve and become more cost-effective, as

replacement for incandescent or CFL, and promoted in the future. Currently, it is premature to forecast a start date.

Note that the CFL incentive amount listed below is an average. Incentive amounts offered in conjunction with markdown promotions may vary based on agreements negotiated with retailers.

Measures addressed could include:

- CFL Lamp (average values)
- CFL Fixture
- Ceiling Fan w/ CFL Lamp Kit
- LED Holiday Lights
- Refrigerator
- Freezer
- Electric Hot Water Heater
- Gas Clothes Dryer (Fuel Switch from Electric)
- Whole House Evaporative Cooler
- Geothermal Heat Pump

Implementation Strategy

Lighting - Key Elements

Retailer/manufacturer recruitment for markdown component: APCo Virginia's implementation contractor would issue an RFP to solicit retailer/manufacturer participation for the markdown component of the program. The RFP would specify program requirements such as product specifications, performance criteria, product stocking objectives, data sharing requirements, and the option of participating in the bulb-recycling component of the program. In addition, it would provide the points on which retailers and their manufacturer partners may compete for access to the programs including financial and logistical support.

It is important to note that markdown promotions may be arranged with "big box" retailers through central corporate offices while retailers with franchise based business models (e.g., Ace Hardware and True Value) may require the additional step of contacting individual store locations to secure their participation. In the case of franchise retailers, APCo Virginia may work through corporate offices to make a product available and to communicate the availability of the program to individual stores, but independently-owned and operated stores often need additional contact to ensure follow through.

Retailer recruitment, education and outreach: APCo Virginia implementation contractor would utilize field representatives to recruit retailers for participation in both the instant rebate and markdown components of the program as well as special turn-in events and pilot projects. Field representatives would maintain regular contact with participating retailers to ensure the following:

- (1) Retail sales staff are informed about the program offering, rebate process, and benefits of qualifying products.
- (2) Retailers have an adequate supply of program marketing materials and coupons.
- (3) Point-of-purchase displays are visible and qualifying products are stocked in accordance with retailer commitments.

- (4) Retailers concerns and issues are addressed promptly.
- (5) Retailers are informed well in advance of planned promotional activities and cooperative advertising opportunities.

Incentive processing: APCo Virginia's implementation contractor would manage prompt processing of retailer/customer incentive payments. As prompt incentive payment is essential to retailer/customer satisfaction, the implementation contractor would establish protocols that expedite payment.

CFL Bulb recycling: APCo Virginia's implementation contractor would deploy recycling bins for CFL bulb collection at all participating retailers. These bins may be purchased in conjunction with a turnkey service that allows the retailer to mail a full bin to the recycling company and receive an empty bin in return. Retailers would be given training on proper sealing, labeling, and transportation for the bins.

Implementation-related administrative requirements would be handled by a third party implementation contractor, selected through a competitive bid process. The implementation contractor would be responsible for:

- Retailer/manufacturer recruitment, negotiation, and support
- Field services
- Marketing strategy
- Recommending content for marketing materials and advertising
- Management of bulb recycling
- Rebate processing
- Data tracking and reporting
- Budget tracking and reporting
- Contact (call) center services
- Customer satisfaction/Problem resolution
- Measurement and verification

Appliances - Key Elements

Retailer recruitment, education and outreach. APCo Virginia's implementation contractor would utilize field representatives to facilitate the recruitment of participating retailers. The field representatives would maintain regular contact with participating retailers to ensure the following:

- (1) Retail sales staff are informed about the program offerings, rebate application process, and benefits of ENERGY STAR qualifying products.
- (2) Sufficient host retailer(s) are recruited for the special turn-in events to meet the program's unit goal. Depending on the level of interest among retailers, it is expected that events would be scheduled with 5-10 retailers in various locations throughout the service territory.
- (3) Retailers have an adequate supply of program marketing materials and application forms.
- (4) Recycling services are provided to retailers and meet their needs.
- (5) Point-of-purchase displays are visible and qualifying products are stocked in accordance with retailer commitments.
- (6) Retailers concerns and issues are addressed promptly.
- (7) Retailers are informed well in advance of planned promotional activities and cooperative advertising opportunities.

Incentive coordination and processing: APCo Virginia's implementation contractor would coordinate the delivery of rebate coupons and materials to participating retailers and will manage prompt processing of incentive payments. As prompt incentive payment is essential to retailer/customer satisfaction, the implementation contractor would establish processes and procedures that expedite payment.

Appliance turn-in and recycling: APCo Virginia's implementation contractor would work with all host retailer(s) to coordinate the logistics of the turn-in component of the promotion. The contractor would also coordinate the collection, transportation and recycling of turned-in units through a private recycling firm.

Coordination with the Refrigerator/Freezer Recycling Program. APCo Virginia's implementation contractor would coordinate all activity with this program's recycling contractor so that customers are aware that they can also have their older dehumidifiers/room air conditioners picked up at their home if they have already scheduled an appointment for removal of a refrigerator/freezer.

Strategies to limit free ridership and promote spillover include:

- Educational messages in retail stores raise awareness of energy consumption on older appliances and encourage consideration of early replacement

APCo Virginia would manage the development and placement of marketing materials for distribution by the implementation contractor.

HVAC and Domestic Hot Water - Key Elements

Contractor recruitment, education and outreach. APCo Virginia's implementation contractor would utilize field representatives to facilitate the recruitment of HVAC and plumbing contractors and retail Do-it-Yourself stores to participate in the program. The field representative would maintain regular contact with participating contractors to ensure the following:

- (1) All contractors/stores are informed about the program offering and incentive application process.
- (2) Contractors/stores have an adequate supply of program marketing materials and application forms.
- (3) Qualifying equipment is readily stocked.
- (4) Contractors'/stores' concerns and issues are addressed promptly.
- (5) Contractors/stores are informed of cooperative advertising opportunities.

Application processing: APCo Virginia's implementation contractor would coordinate processing of all rebate applications, verification of eligibility and prompt delivery of rebate checks to contractors/customers.

Strategies to limit free ridership and promote spillover include:

- Incentives only for high-efficiency equipment
- Incentives set high enough to encourage purchases that wouldn't have happened without the rebate
- Incentive claims must be submitted within 60 days of purchase

Marketing Strategy

Marketing activities related to the development and placement of collateral materials, advertising, media outreach, and public relations would be managed by APCo staff.

Lighting - Key Elements

- Point-of-purchase displays
- Cooperative advertising with retailers
- Direct consumer marketing through APCo's website and newsletter
- Mass-market advertising through bill inserts, radio, newspaper, and/or television

The program would be marketed in-store through displays, signage, and other materials that would be developed in cooperation with participating retailers. Materials would employ a strong consumer education component emphasizing the benefits of high-efficiency lighting products (e.g., lifetime dollar savings, energy savings, longer life, safety, appropriate light quality, etc.). Marketing materials would leverage the ENERGY STAR Brand, which enjoys a high level of consumer recognition and favorable associations.

Cooperative advertising support (e.g., APCo Virginia pays 50% of the cost of advertising space dedicated to the program) would be offered to retailers as an incentive for them to promote the program. This is an important strategy as retailers best know their customers and cost-effective means of communicating with them. Terms for participation would require that advertisements include key product features and benefits and clearly communicate APCo Virginia's sponsorship of cash-back incentives through specified language and/or the use of the APCo's logo. Cooperative advertising terms and conditions would also require pre-approval by the implementation contractor or APCo to ensure advertisements are consistent with the intent of the program and to ensure APCo's Brand integrity.

APCo would post information about the ongoing mail-in rebate offers and markdown promotions on the company's website and in its newsletter. Advertising and other promotional activities would refer customers to the webpage or toll free number for more information on incentive offers, participating retailers, and product information.

Bill inserts and mass media advertising developed and placed by APCo Virginia would support spring and fall markdown campaigns, with the bulk of volume and therefore advertising targeted to the fall timeframe. Bill inserts and mass media advertising (e.g. radio, print, and/or television) would be employed to promote the availability of APCo -sponsored discounts at participating retail locations. Because it would be necessary to target stores within APCo Virginia's service territory to minimize the participation of ineligible customers, messaging would indicate discounts are available from participating retailers (e.g. participating Ace Hardware, Wal-Mart, and Target locations) and refer customers to a toll free number or the program webpage for a list of participating store locations. In addition to promoting the availability of financial incentives, advertising would promote the key features and benefits of targeted products, focusing primarily on CFLs.

Appliances - Key Elements

- Annual mailing of packets including incentive claim forms and other collateral materials to retailers
- Direct consumer marketing through APCo's website and newsletter bill insert
- Press releases
- In-store point-of-purchase displays
- Cooperative advertising with retailers
- Outside banners for turn-in events

All marketing materials would carry a strong consumer education message emphasizing the benefits of high efficiency appliances and early replacement with ENERGY STAR qualified models (lifetime dollar savings, energy savings, water savings, lower noise, etc.). Marketing materials would leverage the ENERGY STAR brand, which enjoys a high level of consumer recognition and favorable associations.

HVAC - Key Elements

- Annual mailing of packets including incentive claim forms and other collateral materials to HVAC contractors
- Rebate applications and program information available on-line
- Distribution of collateral materials to HVAC contractors through field representatives
- Direct consumer marketing through APCo's website and newsletter bill insert.
- Press releases
- Mass media advertising

HVAC equipment would be primarily marketed through local contractors, the most direct influencers of customer purchase decisions. Contractors would receive educational materials to share with their customers through an initial mailing campaign, kick-off meetings, and in-person visits by trade allies. Further, the program would employ a top down communication strategy involving the recruitment of HVAC equipment manufacturer and distributor representatives to support the program by passing information on to the contractors they serve.

The website would contain all necessary information about the program and incentive offers. Mass media advertising (e.g., print, radio, and television) would promote the availability of incentive offers along with the benefits associated with targeted products.

Domestic Hot Water - Key Elements

- Annual mailing of packets including incentive claim forms and other collateral materials to retailers and plumbing contractors
- Distribution of collateral materials to retailers and contractors through field representatives
- Direct consumer marketing through APCo's website and newsletter bill insert
- Press releases
- Mass media advertising

High efficiency water heating equipment would be marketed through two market channels: plumbing contractors and retail Do-it-Yourself stores. Contractors and retailers would receive educational materials to share with their customers.

The website would contain all necessary information about the program as well as a list of participating contractors. Press releases and mass media advertising would promote the availability of consumers incentives along with key benefits associated with targeted products.

Milestones

Table 6-1. Project Milestones

Lighting Tasks	Timeframe
DSM Plan Approval	TBD
Issue RFP to select retailer partners for fall campaign.	1 month
Selection of Program Implementation Contractor.	3 months
Complete negotiations with retailer partners for fall markdown campaign.	3 ½ months
Develop and distribute instant rebate coupon materials for ongoing use.	5 months
Recruit and secure product orders from independent retailers for fall campaign.	5 months
Issue RFP to select retailer partners for winter LED holiday light campaign	5 months
Complete negotiations with retailer partners for holiday light campaign.	6 months
Complete development of marketing materials and advertising for fall campaign.	6 months
Distribution of marketing materials to retailers for fall campaign.	7 months
Kick-off fall campaign; run on while-supplies- last basis.	7 months
Issue RFP to select retailer partners for spring markdown campaign	7 months
LED holiday lighting campaign kick-off	9 months
Complete negotiations with retailers for spring campaign.	10 months
Recruit and secure product orders from independent retailers for fall campaign.	11 months
Distribution of marketing materials to retailers for spring campaign.	1 year
Kick-off spring campaign.	13 months
Appliance Tasks	Timeframe
DSM Plan Approval	TBD
Selection of Program Implementation Contractor	3 months
Program planning and materials	6 months
Program launch – distribute materials to retailers	7 months
HVAC Tasks	Timeframe
DSM Plan Approval	TBD
Selection of Program Implementation Contractor	3 months
Program planning and materials	6 months
Initial mailing of program materials to contractors.	7 months
Telephone calls to targeted contractors to ensure they receive materials and to answer questions.	7 ½ months
In person outreach to contractors begins.	7 ½ months
Domestic Hot Water Tasks	Timeframe
DSM Plan Approval	TBD
Selection of Program Implementation Contractor	3 months
Program planning and materials	6 months
Initial mailing of materials to retailers and contractors	7 months
Follow-up telephone calls to contractors and retailers	7 ½ months
In person visits to retailers and contractors begins	7 ½ months

EM&V Strategy

All evaluation activities would be conducted by a third party contractor selected through a competitive bidding process. An integrated evaluation approach would be taken which includes: addressing evaluation at the onset of program design, collecting evaluation data as part of program administration, assessing and documenting baseline conditions, establishing tracking metrics, developing and refining deemed savings measure databases, as well as, conducting primary and secondary research as part of impact and process evaluations.

The process evaluation would be conducted during the first program year and then coordinated with follow-on impact evaluation work to be performed once program-approved measures have been installed and operating for a sufficient time to enable a robust impact evaluation. Wherever it is possible, practical, and appropriate, evaluation activities would be conducted in conjunction with other utilities and agencies in the Commonwealth to share funding of studies and help ensure consistency.

Self-report surveys with both participants and nonparticipants would be used to assess free riders/spillover as well as program delivery issues such ease of purchase and satisfaction of the products under normal use conditions. These surveys would be enhanced by collecting market data and assessing trends. Interviews with program managers, the implementation contractor and trade allies such as retailers would be conducted to assess the operational conditions of the program and to identify ways to improve the program. These surveys would be enhanced by collecting market data and assessing trends.

Lighting: The overall goal of the impact evaluation would be to validate/calibrate the deemed savings values, verify installation and determine program cost-effectiveness. Primary impact metrics are savings per unit, program participants, net-to-gross ratio and program cost-effectiveness. Deemed savings would be determined by a literature and data review, analysis of program records and conducting a light logger study with a selected sample of participants. Primary research to assess the impact of variables such as baseline bulb conditions, CFL use and storage conditions, and location would also be conducted.

Appliances: The overall goal of the impact evaluation would be to validate/calibrate the deemed savings values, verify installation and determine program cost-effectiveness. Primary impact metrics are savings per unit, program participants, net-to-gross ratio and program cost-effectiveness. Deemed savings would be determined by a literature and data review, analysis of program records and conducting research and analysis of a sample of appliances turned in for recycling.

HVAC: The overall goal of the impact evaluation would be to assess the degree of change in sales of more efficient HVAC equipment above what would have occurred in the market without the program, validate/calibrate the deemed savings values, and determine program cost-effectiveness. Primary impact metrics are increase in sales/penetration of more efficient HVAC equipment, savings per unit, program participants, net-to-gross ratio and program cost-effectiveness.

A market practice baseline study of sales of higher efficiency HVAC equipment would be conducted and changes in sales of equipment will be tracked by regular interviews with contractors. Estimates of deemed savings would be assessed through a literature and data review and field research of a sample of participants.

Water Heating: The overall goal of the impact evaluation would be to assess the energy savings for each type of water heating system and determine program cost-effectiveness. Primary impact metrics are savings per efficient system, program participants, net-to-gross ratio and program cost-effectiveness. Field research of a sample of participants and non-participants would be conducted to determine the

Winter Savings Targets**Table 6-3. Incremental Net Annual Energy and Peak Demand Savings at Generator**

Incremental Annual Energy Savings Net MWh (at Generator)					
2009	2010	2011	2012	2013	Cumulative Total 2009-2013
9,366	18,205	25,789	21,140	21,854	96,355

Incremental Annual Peak Demand Savings Net kW (at Generator)					
2009	2010	2011	2012	2013	Cumulative Total 2009-2013
1,114	2,012	2,700	2,558	2,836	11,221

Benefit-Cost Test Results**Table 6-4. Benefit-Cost Test Results**

Benefit-Cost Test	2009-2013 Benefit-Cost Test Ratio
Total Resource Cost Test (TRC)	2.4
Utility System Resource Cost	3.6
Participant	6.6
Rate Impact Measure (RIM)	0.5

impact of variables such as age and size of equipment replaced, income levels, and number of members of the household. This information would be input to an econometric/billing analysis of a sample of participants and non-participants to determine energy savings for the different types of water heating systems.

Administrative Requirements

APCo Virginia would be responsible for general administrative oversight of the program portfolio. It is estimated that a 0.75 full-time equivalent (FTE) would be required for program oversight. Key oversight functions include:

- Recruitment, selection, and management of the implementation contractor(s)
- Coordination of marketing strategy/public relations among programs and market sectors
- Development and placement of marketing materials with input from the implementation contractor.
- Coordination of all educational services
- Data warehousing
- Recruitment, selection, and management of the evaluation contractor
- Goal achievement within budget

Budget

Table 6-2. Incremental Annual Budgets

Incremental Annual Budget – Total					
2009	2010	2011	2012	2013	Total 2009-2013
\$806,998	\$1,385,579	\$2,046,757	\$2,336,383	\$2,428,506	\$9,004,224
Incremental Annual Budget – Customer Incentive					
2009	2010	2011	2012	2013	Total 2009-2013
\$394,888	\$657,375	\$1,015,181	\$1,201,457	\$1,263,317	\$4,532,218
Incremental Annual Budget – Administrative					
2009	2010	2011	2012	2013	Total 2009-2013
\$412,110	\$728,204	\$1,031,576	\$1,134,927	\$1,165,189	\$4,472,006

6.1.2 Residential Refrigerator/Freezer Turn-In Recycling Program

Objective

Produce long-term electric energy savings in the residential sector by permanently removing operable second refrigerators and freezers from the power grid and recycling them in an environmentally safe manner.

Target Market

Residential or small commercial customers who are currently operating second refrigerators and/or freezers.

Program Duration

The Refrigerator/Freezer Turn-In Program would be an ongoing element of the program portfolio.

Program Description

The average household replaces a refrigerator every ten years. However, many of the refrigerators being replaced are still functioning, so they often become backup appliances – energy guzzlers in basements and garages – or sold in a used-market. The Turn-In Program would be established to target those “second” refrigerators and freezers, providing the dual benefit of cutting energy consumption and keeping the appliances out of the used-market. Research results from impact evaluations on five refrigerator recycling programs indicate significant savings potential for this program. An appliance-recycling contractor provides turn-key implementation services that include verification of customer eligibility, scheduling of pick-up appointments, appliance pick-up, and recycling services.

Incentive Strategy

The customer would be offered free pick up and recycling of their old operable second refrigerators and freezers. Typically the customer would pay a municipal fee for appropriate disposal of the unit so the free service provides an additional value to the customer of approximately \$35. In addition, the customer would be offered a cash rebate to further motivate the turn-in of operable units.

Eligible Measures

The measures listed below have been specified for planning purposes. The utility would revise eligible measures as needed in accordance with current market conditions, technology development, EM&V results, and program implementation experience.

Implementation Strategy

Key elements of the implementation strategy include:

- **Turn-key appliance pick-up/recycling:** The utility would select an implementation contractor to provide comprehensive, turn-key implementation services from eligibility verification and scheduling of pick-ups to proper disposal and recycling of turned-in appliances.

- ***Incentive coordination and processing:*** The utility's implementation contractor would coordinate prompt processing of incentive payments. As prompt incentive payment is essential to retailer/customer satisfaction, the implementation contractor will establish protocols and service level requirements that expedite payment.

To minimize free-ridership, the program would use marketing messages targeted at consumers with "second" refrigerators and freezers. Mass marketing emphasizing the cost of operating second refrigerators/freezers also has the potential to increase spillover impacts. The program would not be marketed at retail point-of-sale, thus avoiding the situation where retailers are only promoting the service as convenient disposal for an appliance they are replacing regardless of the program.

Implementation-related administrative requirements would be handled by a third party implementation contractor, selected through a competitive bid process. The implementation contractor would be responsible for:

- Management of the scheduling, pick-up, and appliance recycling processes
- Marketing strategy and messaging
- Incentive processing
- Data tracking and reporting
- Budget tracking and reporting
- Contact (call) center services
- Managing public relations
- Customer satisfaction/Problem resolution

APCo Virginia would manage the development and placement of promotional materials, advertising, and public relations activities.

Marketing Strategy

All marketing materials would carry a strong consumer education message emphasizing the cost of operating "second" refrigerators and freezers and older, inefficient appliances, the benefits of early replacement with ENERGY STAR qualified models, and the importance of proper disposal and recycling of older units. Marketing materials would leverage the ENERGY STAR brand, which enjoys a high level of consumer recognition and favorable associations. Key elements of the marketing strategy include:

- Direct consumer marketing through the utility's website and bill insert newsletter
- Website links to EPA's new "ENERGY STAR Recycle My Old Fridge Campaign" at www.recyclemyoldfridge.com. Includes calculators to estimate savings
- Press releases
- Mass media advertising including print, radio, and/or television.

Milestones

Table 6-5. Project Milestones

Task	Timeframe
DSM Plan Approval	TBD
Selection of program implementation contractor	1 year
Program materials and advertising developed and placed	1 ½ years
Program Launch – Marketing	2 years
First Appliance Pick-Up	2 years

EM&V Strategy

All evaluation activities would be conducted by a third party contractor selected through a competitive bidding process. An integrated evaluation approach would be taken which includes: addressing evaluation at the onset of program design, collecting evaluation data as part of program administration, assessing and documenting baseline conditions, establishing tracking metrics, developing and refining deemed savings measure databases, as well as, conducting primary and secondary research as part of impact and process evaluations.

The overall goal of the impact evaluation would be to validate/calibrate the deemed savings values and determine program cost-effectiveness. Primary impact metrics are savings per unit, program participants, net-to-gross ratio and program cost-effectiveness. Deemed savings for refrigerators and freezers would be determined by a literature and data review, analysis of program records and testing a sample of equipment picked up for recycling. Primary research may be conducted to determine the impact of variables such as size of refrigerator, effective life of the equipment, and owner utilization. Self-report surveys with both participants and nonparticipants would be used to assess free riders/spillover, program awareness, barriers to participation, participant satisfaction, and other process efficiency issues. Interviews would also be conducted with program managers and implementation contractors. These surveys would be enhanced by collecting market data and assessing trends.

The process evaluation would be conducted during the first program year and then coordinated with follow-on impact evaluation work to be performed once program-approved measures have been installed and operating for a sufficient time to enable a robust impact evaluation. Wherever it is possible, practical, and appropriate, evaluation activities would be conducted in conjunction with other utilities and agencies in the Commonwealth to share funding of studies and help ensure consistency.

Administrative Requirements

The utility would be responsible for general administrative oversight of the program portfolio, which would require approximately 0.25 FTE, to address the following:

- Recruitment, selection, and management of the implementation contractor(s)
- Coordination of marketing strategy/public relations among programs and market sectors
- Development and placement of marketing materials and advertising
- Data warehousing
- Recruitment, selection, and management of the evaluation contractor
- Goal achievement within budget

Budget**Table 6-6. Incremental Annual Budgets**

Incremental Annual Budget – Total					
2009	2010	2011	2012	2013	Total 2009-2013
\$79,066	\$265,002	\$260,779	\$256,815	\$252,906	\$1,114,569

Incremental Annual Budget – Customer Incentive					
2009	2010	2011	2012	2013	Total 2009-2013
\$12,164	\$44,167	\$43,463	\$42,803	\$42,151	\$184,748

Incremental Annual Budget – Administrative					
2009	2010	2011	2012	2013	Total 2009-2013
\$66,902	\$220,835	\$217,316	\$214,013	\$210,755	\$929,821

Winter Savings Targets**Table 6-7. Incremental Net Annual Energy and Peak Demand Savings at Generator**

Incremental Annual Energy Savings Net MWh (at Generator)					
2009	2010	2011	2012	2013	Cumulative Total 2009-2013
319	1,157	1,138	1,121	1,104	4,839

Incremental Annual Peak Demand Savings Net kW (at Generator)					
2009	2010	2011	2012	2013	Cumulative Total 2009-2013
33	120	118	116	114	501

Benefit-Cost Test Results**Table 6-8. Benefit-Cost Test Results**

Benefit-Cost Test	2009-2013
	Benefit-Cost Test Ratio
Total Resource Cost Test (TRC)	1.1
Utility System Resource Cost	0.9
Participant	N/A
Rate Impact Measure (RIM)	0.0

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Summary: Testimony Exhibit KMM-2, pages 1-63 to Direct Testimony of Kevin M. Murray filed by Lisa G. McAlister (Part 3a of 4) electronically filed by Ms. Vicki L. Leach-Payne on behalf of Industrial Energy Users-Ohio